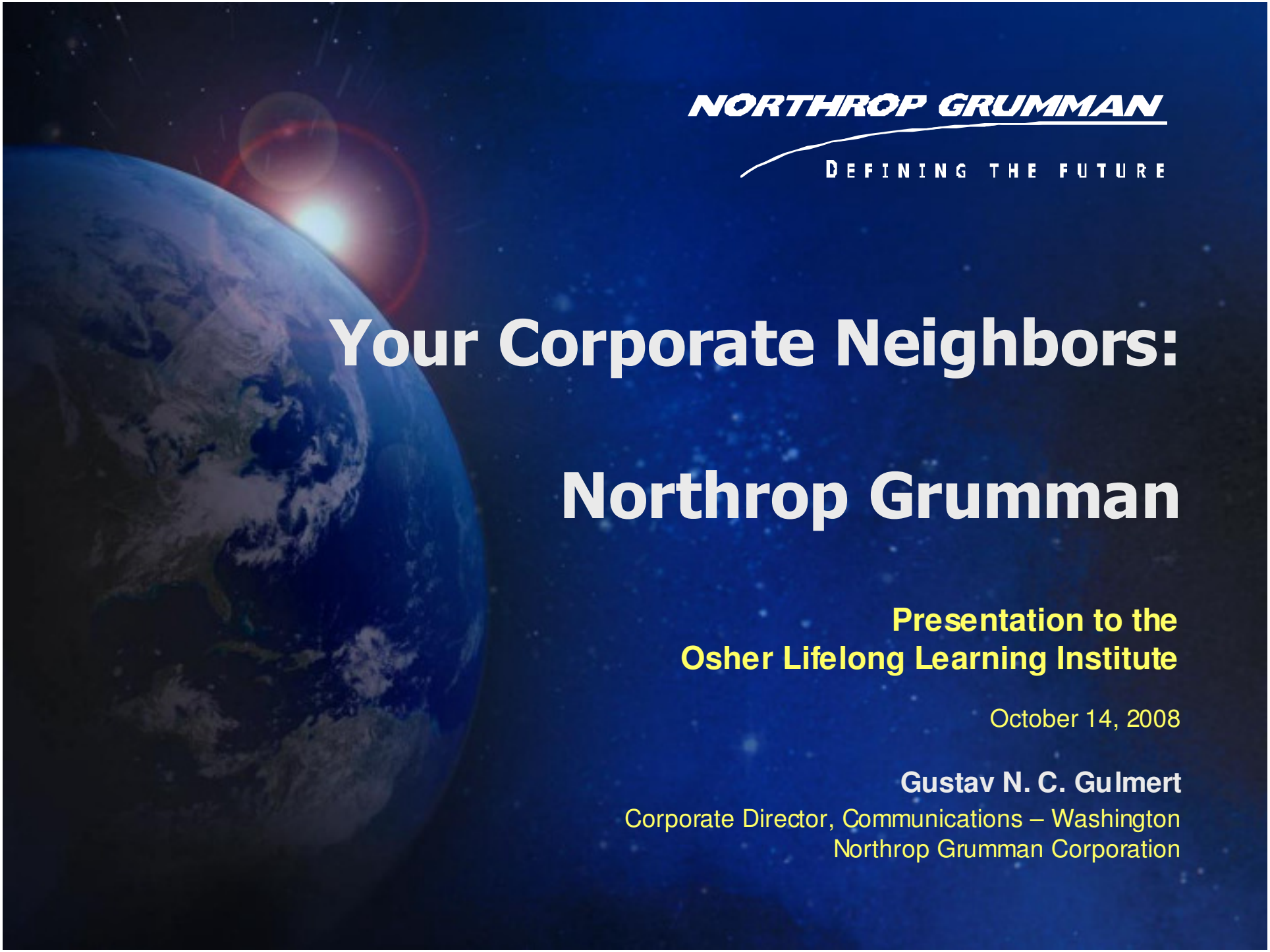

Your Corporate Neighbors:

Northrop Grumman

Presentation to the
Osher Lifelong Learning Institute

October 14, 2008

Gustav N. C. Gulmert
Corporate Director, Communications – Washington
Northrop Grumman Corporation

An Up-Close Look at Northrop Grumman

- Northrop Grumman history
- Today's Northrop Grumman
- Virginia, our second home
- Defense Technology: A Catalyst for Major Economic Change
- Questions and answers

The Northrop Legacy

NORTHROP GRUMMAN

The Northrop Legacy

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Crisis—End of the Cold War

NORTHROP GRUMMAN

By the early 1990's, Northrop faced outright extinction

- Market for combat aircraft (our core strength) vanishing
- B-2 production line closing down after the completion of only 21 bombers
- Entire defense industry downsizing in the aftermath of the Cold War

The Grumman Legacy

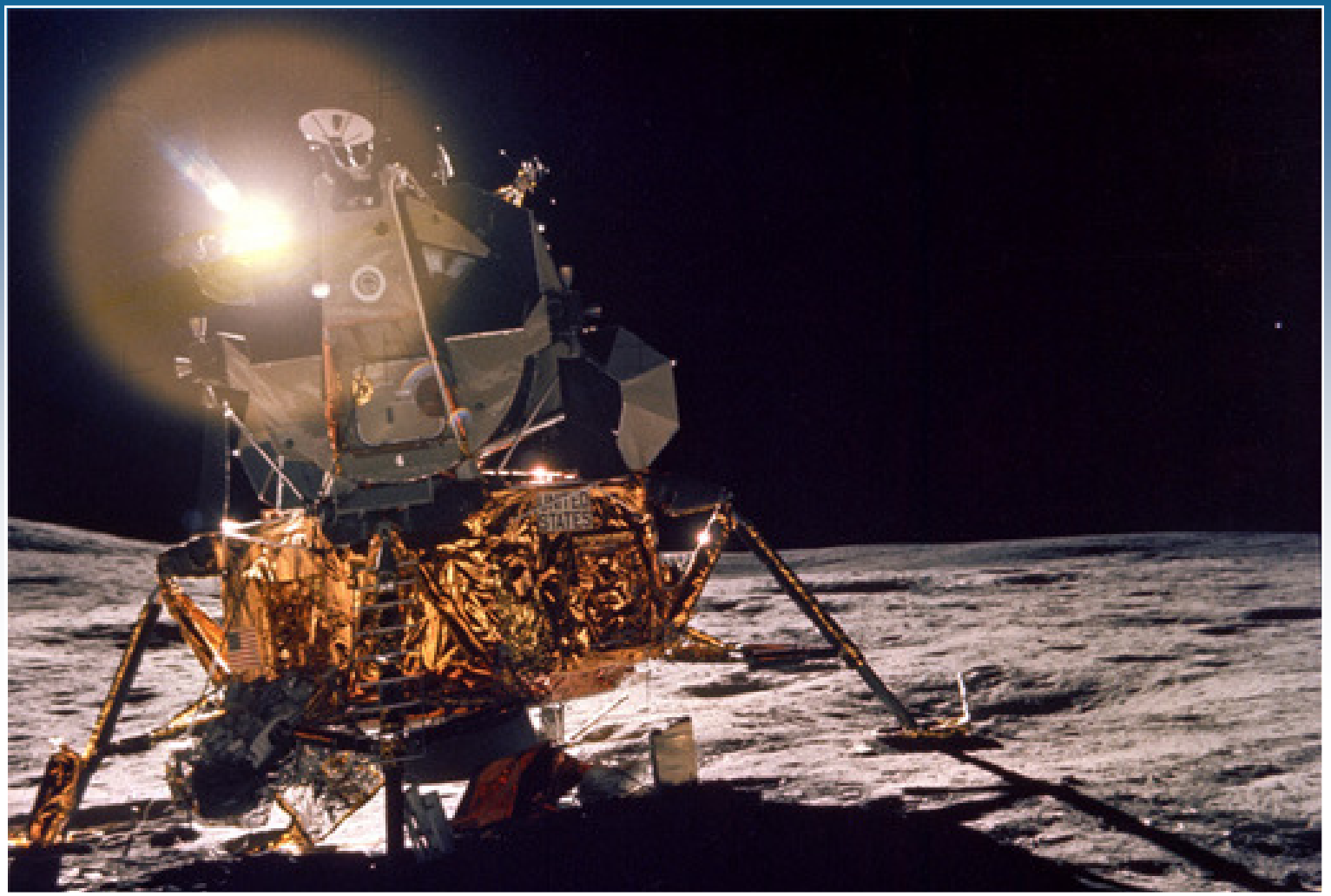
NORTHROP GRUMMAN

The Grumman Legacy

NORTHROP GRUMMAN

The Grumman Legacy

NORTHROP GRUMMAN



The Grumman Legacy

NORTHROP GRUMMAN

Building Blocks of the Company

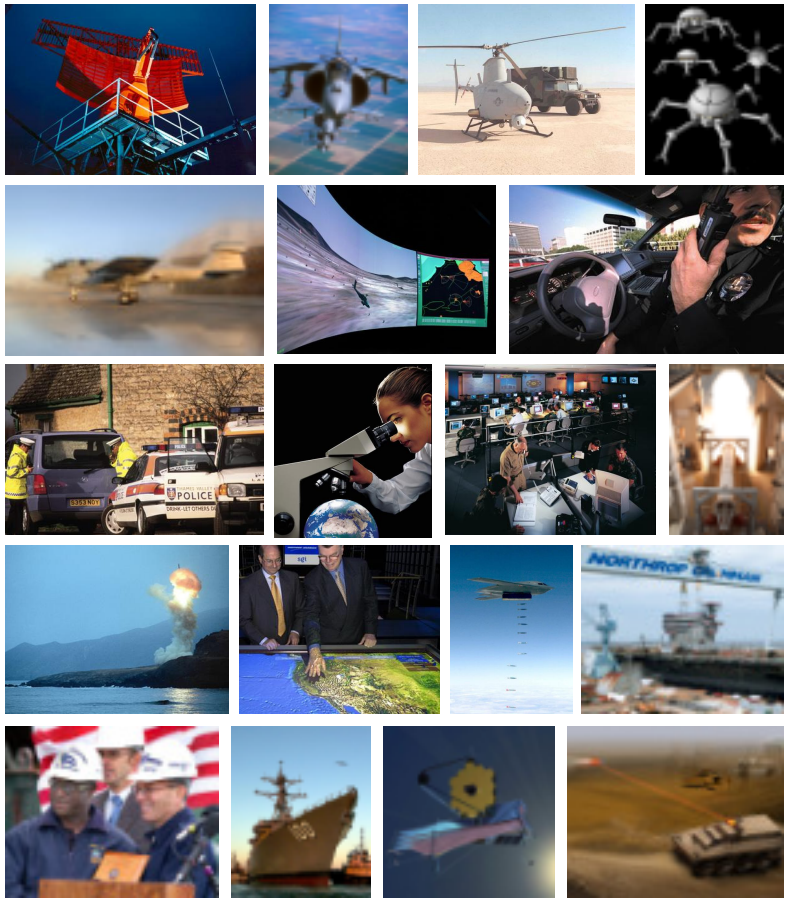
Unparalleled Capabilities

Northrop Grumman Today

- 3rd largest U.S. defense contractor
- $31.8 billion sales in 2007
- $68 billion total backlog
- 50 states, 25 countries
- 200+ principal locations
- 120,000 employees
- 45,000 scientists and engineers
- NYSE: NOC

Northrop Grumman Vision

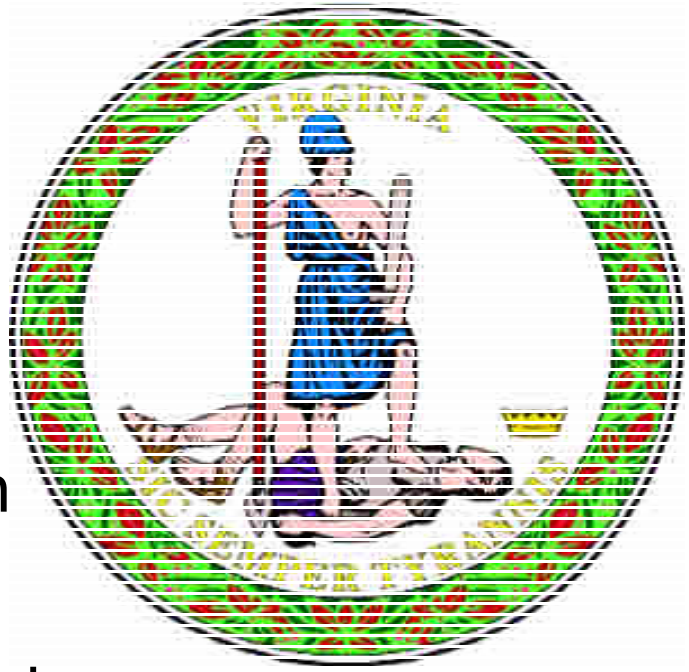
- Be the most trusted provider of systems and technologies for national security
  - Customers' provider of choice
  - Industry's employer of choice
  - Shareholders' investment of choice



Creating Value Through People and Technology

Northrop Grumman in Virginia

- 34,200 employees statewide
- 8,900 employees in Fairfax County
- Largest technology and manufacturing employer
- Headquarters for four of seven operating sectors
- East coast extension of corporate headquarters
- Presence in the state since 1891



Shipbuilding

NORTHROP GRUMMAN

- The nation's sole designer, builder and refueler of nuclear-powered aircraft carriers
- One of only two companies capable of designing and building nuclear-powered submarines
- Newport News is now the headquarters for Northrop Grumman's Shipbuilding sector

USS *Ronald Reagan*

NORTHROP GRUMMAN

USS *Virginia* (SSN 774)

NORTHROP GRUMMAN

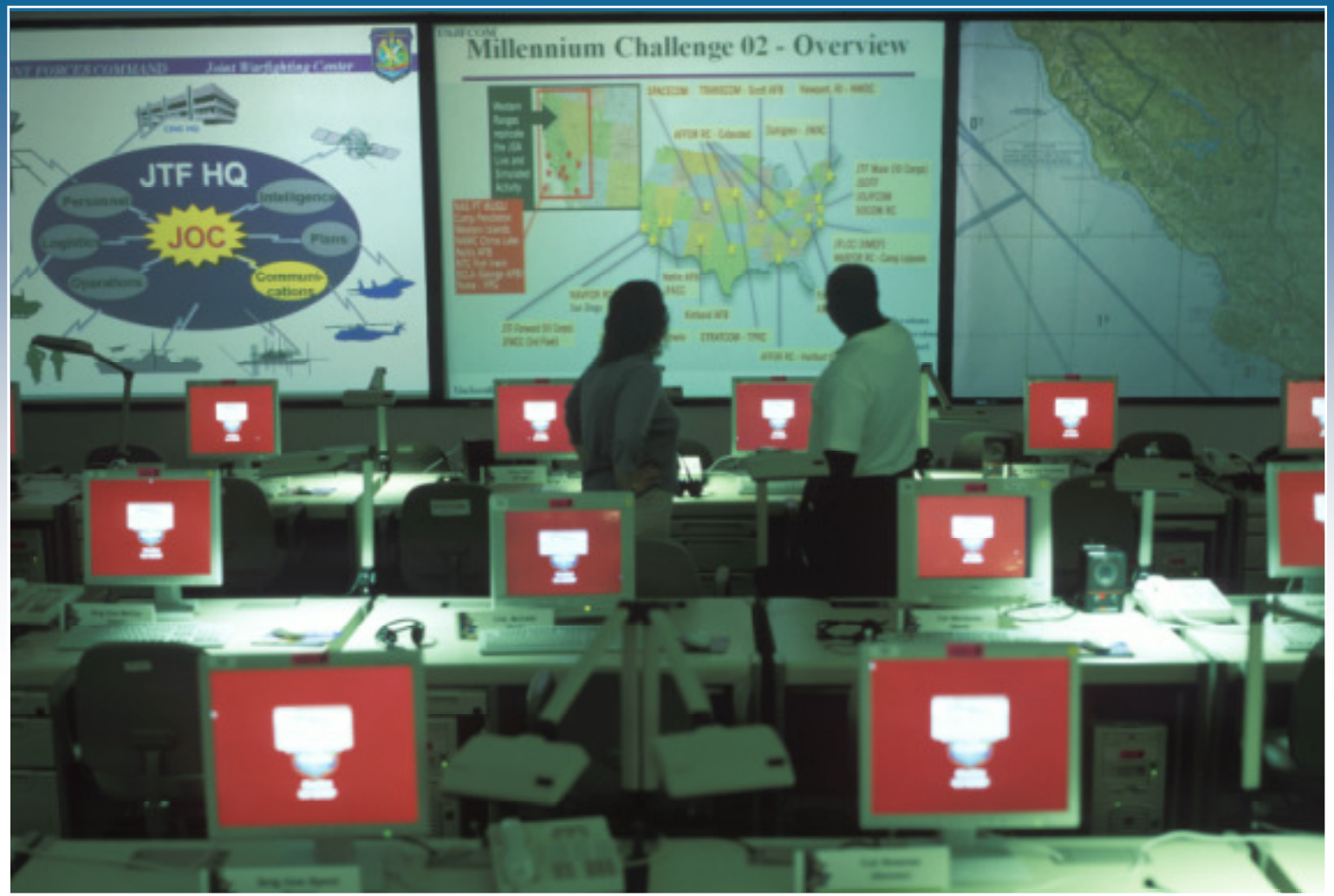
Mission Systems

NORTHROP GRUMMAN

- Two Primary Business Areas
  - Command, Control and Communications
  - Intelligence, Surveillance and Reconnaissance
- Leading integrator of complex, mission-enabling systems
- Solve our customer's most difficult problems

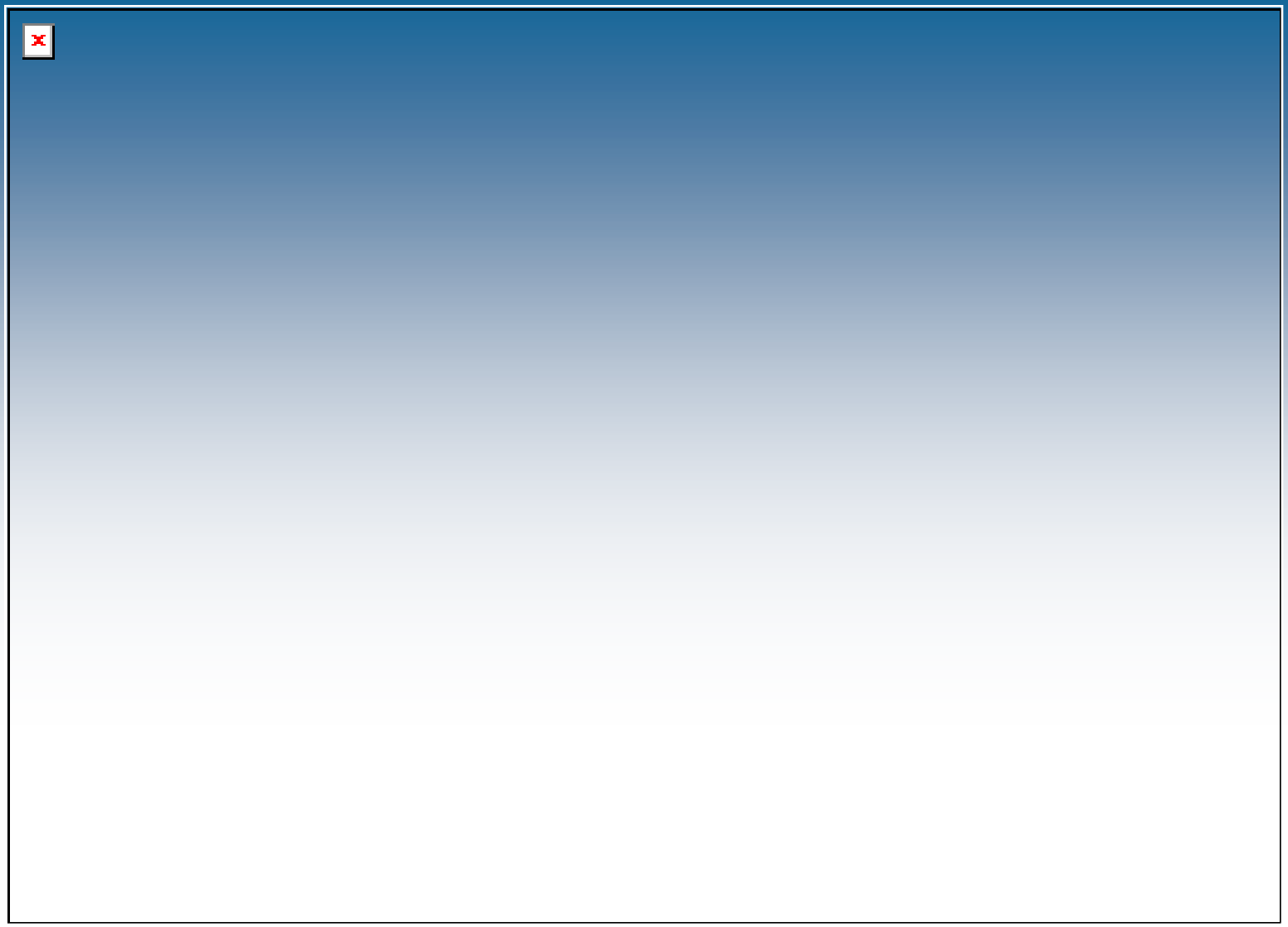
Joint Warfighting Center

NORTHROP GRUMMAN



Blue Force Tracker

NORTHROP GRUMMAN



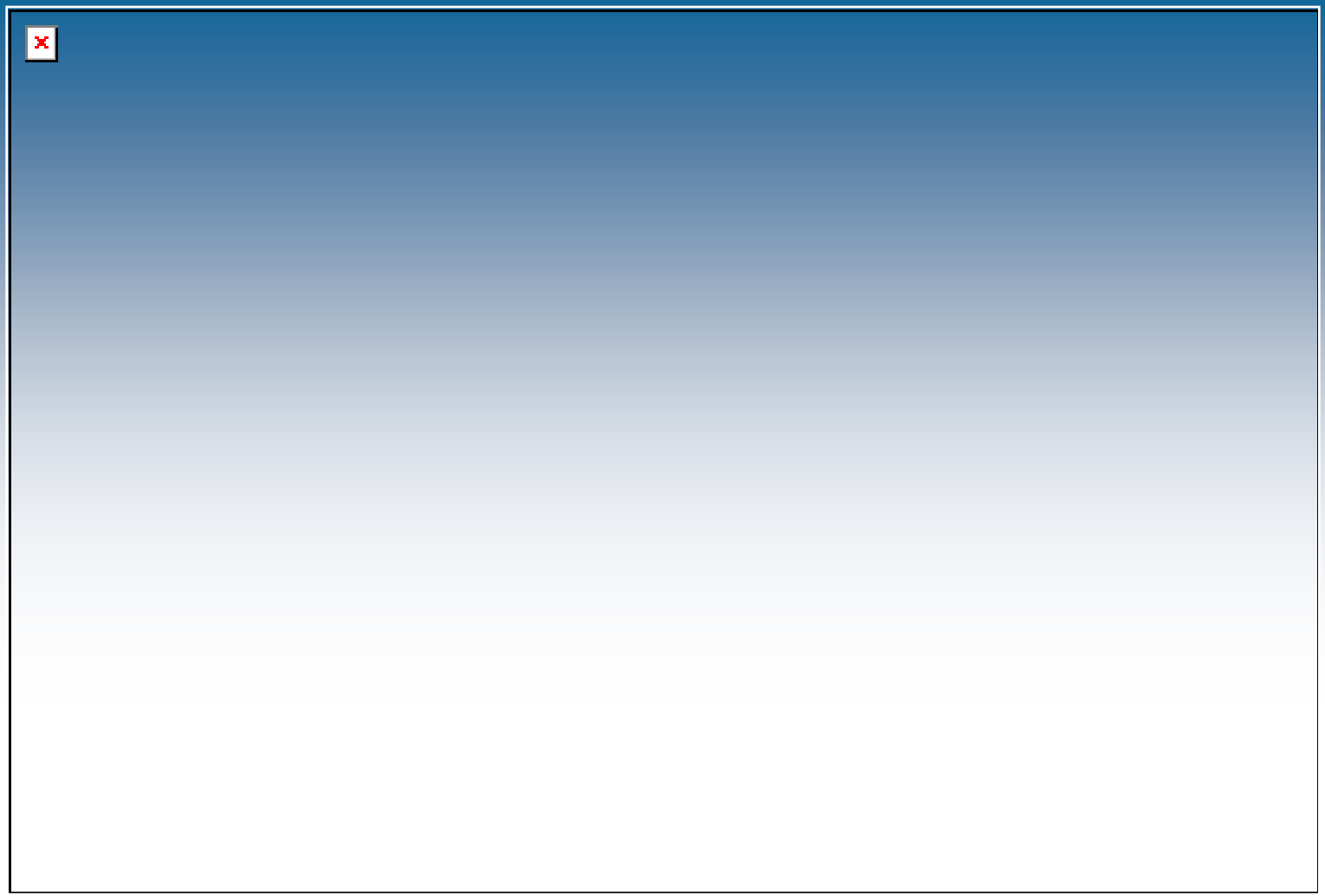
Information Technology

NORTHROP GRUMMAN

- Third largest provider of IT systems and services to the U.S. federal government
- Full spectrum of public service missions
  - NASA, Justice, Homeland Security, Health
- Growing presence in state and local markets
  - Virginia Information Technologies Agency
  - City of New York Wireless Communications
  - 911 Computer-Aided Dispatch
- Commercial IT programs

Virginia Information Technologies Agency

NORTHROP GRUMMAN



Public Safety Programs

NORTHROP GRUMMAN

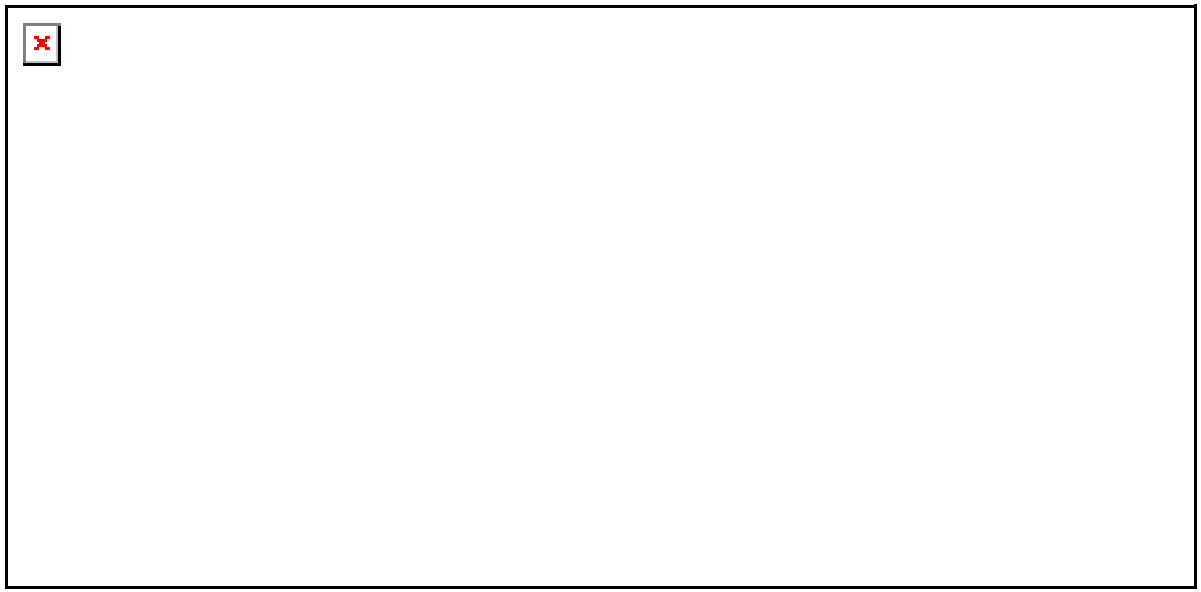
Technical Services

NORTHROP GRUMMAN

- Newest Northrop Grumman Sector
- Base operations and maintenance
- Training and simulation
- Infrastructure support

Corporate Office and Other Functions

- Northrop Grumman Washington Office
- Northrop Grumman Analysis Center
- Sperry Marine Worldwide Headquarters



Northrop Grumman KC-45 Tanker

- KC-45 critically needed to replace existing Eisenhower-era fleet
- Northrop Grumman bid judged superior on four of five major evaluation criteria
- Best value for U.S. Air Force and American taxpayer; $3 billion less than competitor for development phase
- DoD has pushed the decision forward to the new administration
- Northrop Grumman remains fully committed to providing tankers and expects to win the competition again
- Northrop Grumman is ready now to begin this project

Commitment to the Community

NORTHROP GRUMMAN

- Strive to be responsible corporate citizen
- Obligations go beyond generating a payroll and paying taxes
- Charitable giving focuses on education, human services and cultural activities
  - USO Service Center at Dulles Airport
  - Operation IMPACT
  - WalkAmerica March of Dimes
  - International Children's Festival at Wolf Trap
  - Weightless Flights of Discovery

NORTHROP GRUMMAN

DEFINING THE FUTURE

Defense Technology: A Catalyst for Major Economic Change

Presentation to the Osher Lifelong Learning Institute

October 14, 2008

Dana J. Johnson, Ph.D.
Senior Analyst, Northrop Grumman Analysis Center
Washington Office

Defense Spending and the Civilian Economy

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- Military spending produces important technology spillovers in the civilian economy
- The urgency of national defense and the government's ability to mobilize resources often accelerates technology development
- Technologies currently being developed by U.S. military forces could drive the economy of the future

National Security Sparks Innovation

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Past Examples

- The Computer
- The Internet
- Global Positioning System

On the Horizon

- Autonomous Navigation

Transforming the Way We Live

ENIAC – The First Large-Scale Electronic Computer

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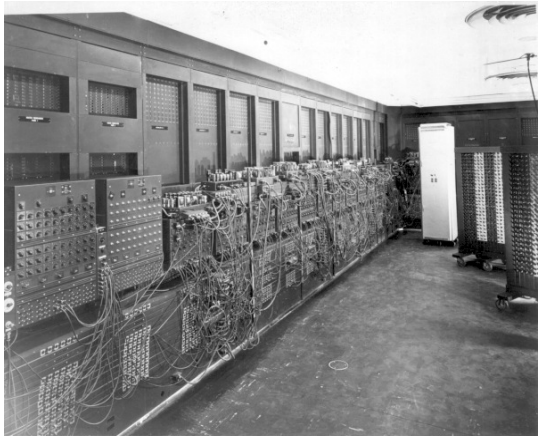
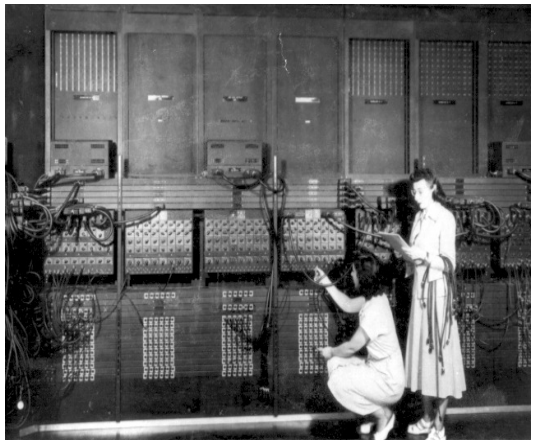
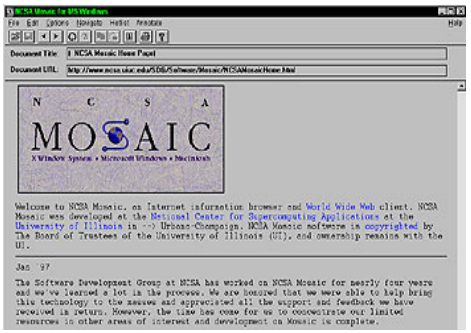
- ENIAC (electronic numerical integrator and computer) was built for the U.S. Army to calculate ballistic firing tables
- Activated in 1946, the machine was programmed and operated using punch cards
- Took up 1,800 square feet, weighed 30 tons, and used 150 kilowatts of power
- Had less memory and processing power than a typical cell phone today
- Increased the Army's trajectory calculations by a factor of 1,440
- Used to perform initial calculations for the H-bomb
- Retired in 1955, but its success spurred the rapid progress of computer technology





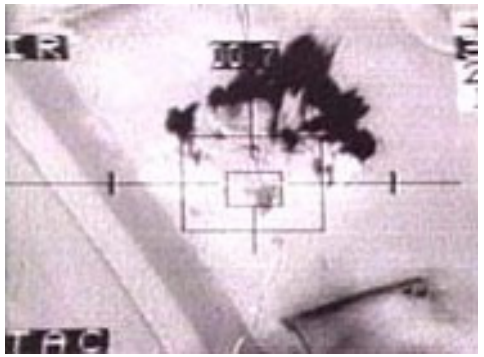
Internet

- In 1966, the Advanced Research Projects Agency (ARPA) begins to develop the computer network concept
- In 1969, the Pentagon implements ARPANET, linking four university computers
- By the early 1970s, the network expands to dozens of locations nationwide. The first international connection follows a few years later
- Transmission of electronic mail begins in 1972
- The military splits its network from ARPANET in 1983
- In 1991, legislation sponsored by then-Senator Al Gore increases funding and accelerates development of high-performance computing
- The first Web browser, Mosaic, is introduced in 1993, leading to dramatically increased Internet usage
- Today, more than 1 billion people routinely access the Internet



Global Positioning System

- In the 1960's, the Navy launches seven navigational satellites in low polar orbit to get a better fix on ballistic missile subs
- In 1973, the Pentagon consolidates Navy and Air Force research projects on satellite-based navigation, leading to NAVSTAR
- A decision to allow civilian access to GPS is made by President Regan in the aftermath of the Soviet downing of KAL 007 in 1983
- In 1984, the first commercial product is released at a cost of $150,000
- GPS revolutionizes combat operations in 1991 Gulf War
- By the mid-1990's, the cost of hand-held GPS units has dropped to $150
- Worldwide GPS market is estimated to reach a value of more than $30 billion by 2008



Autonomous Navigation

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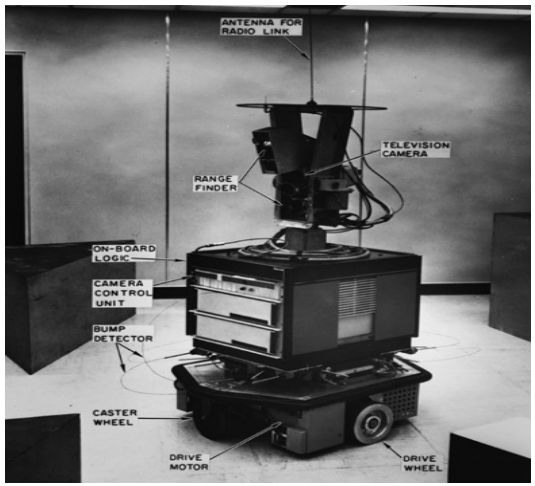
How will it shape our future?

Autonomous Navigation - History

- In World War II, B-17s are converted to radio control to fly into German V-2 installations
- Firebee drones, developed during Korean War, are remotely piloted or programmed to a preset course
- In the late 1960's, DARPA funds the development of the first autonomous mobile robots
- In 1983, DARPA initiates the Autonomous Land Vehicle (ALV) program. The Unmanned Ground Vehicle (UGV) follows in 1992
- Global Hawk makes its first flight in 1998 and later becomes the first unmanned powered aircraft to cross the Pacific Ocean
- The FY2001 National Defense Authorization Acts recommends that:
  - By 2010, one-third of the aircraft in the operational deep strike force aircraft fleet be unmanned;
  - By 2015, one-third of operational combat vehicles be unmanned



Autonomous Navigation – DARPA Grand Challenge

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The goal: leverage American ingenuity to develop autonomous technology that will keep warfighters off the battlefield and out of harm's way

- **2004 Grand Challenge:**
  - **142-mile desert course in less than 10 hours**
  - **Cash prize of $1 million**
  - **Fifteen autonomous ground vehicles enter**
  - **The most successful vehicle completes approximately 7 miles**
- **2005 Grand Challenge:**
  - **132-mile desert route in less than 10 hours**
  - **$2 million prize**
  - **Four autonomous vehicles succeed**
  - **"Stanley" from Stanford University completes course in 6 hours, 53 minutes, 8 seconds – approximately 11 minutes faster than the next vehicle**

- **Urban Challenge (November 3, 2007)**
  - **Autonomous ground vehicles maneuvering in a mock city environment**
  - **11 teams plus 30 manned vehicles to increase traffic density**
  - **Six autonomous vehicles succeed – Carnegie Mellon University winner, Stanford second, in under 1 hour 45 minutes**

Autonomous Navigation – Civilian Applications

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- **Impetus for change:**
  - **Over 42,000 traffic fatalities each year.**
  - **3 percent increase in highway traffic each year.**
  - **Aging infrastructure with constrained expansion opportunities.**
  - **Congestion results in >3.7 billion hours of delay and >2.3 billion gallons of excess fuel consumption annually.**
- **Advantages:**
  - **Improved safety – most crashes are caused by human error.**
  - **Improved urban traffic flow – some computer driven vehicles have an accuracy of driving 10 centimeters apart at 70 mph.**
  - **Decreased fuel consumption - traveling at steady speeds uses less fuel.**
  - **Increased productivity – commuting time could be spent performing work or other activities.**
  - **Lifestyle changes – more freedom for the disabled and elderly.**
- **Impediments to change:**
  - **Transition and privacy issues**
  - **Trust and CONFIDENCE!**

FROM: SIEMENS


FROM: GM

Future Federal Support for Research and Development

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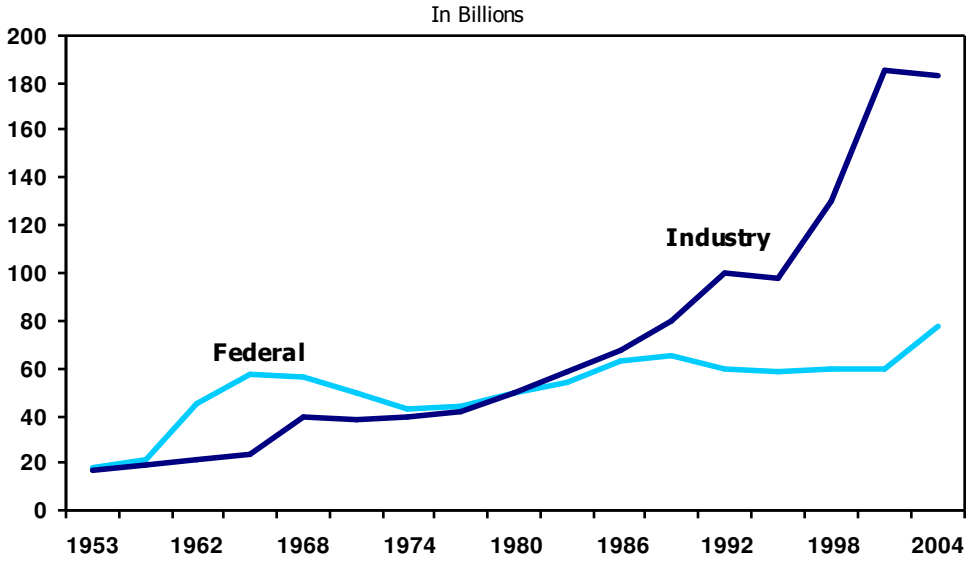
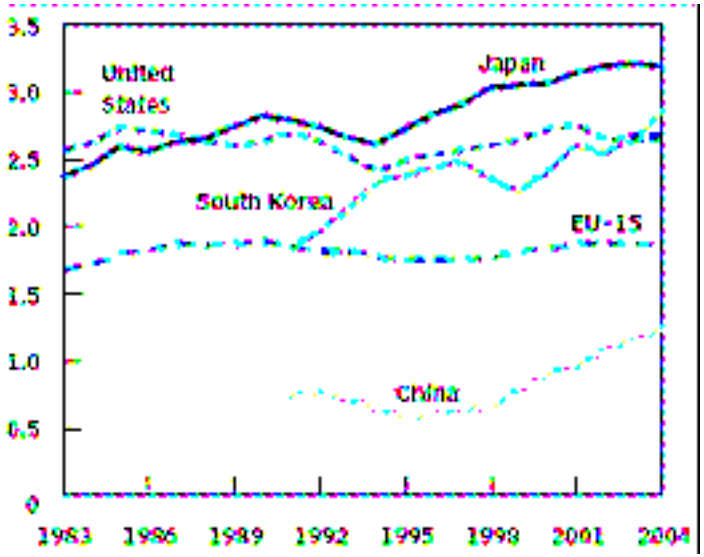
U.S. Funding of R&D by Source



R&D as a Percentage of GDP



- **Federal spending on R&D has grown at an average annual rate of 3.5 percent versus 5.4 percent for industry.**
- **R&D spending by U.S industry has exceeded federal funding since 1980.**
- **R&D activity is expanding in Asia.**
- **Some analysts question whether the U.S. can maintain the size and quality of its scientific and engineering workforce.**


NORTHROP GRUMMAN
DEFINING THE FUTURE
Questions and Comments?

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DEFINING THE FUTURE