U.S. DEPARTMENT OF COMMERCE BOULDER LABORATORIES

History of the Boulder Labs

On September 14, 1954, President Dwight D. Eisenhower dedicated the newly completed National Bureau of Standards Radio Building to "the welfare of humanity—in America and throughout the world."

- 1946 – National Bureau of Standards (NBS) Central Radio Propagation Lab (CRPL) formed and needed a facility outside Washington D.C.
- 1950 – Boulder raised funds to buy 217 acres of land for CRPL
- 1988 – NBS renamed NIST

U.S. Department of Commerce 50 1954 - 2004 BOULDER LABS

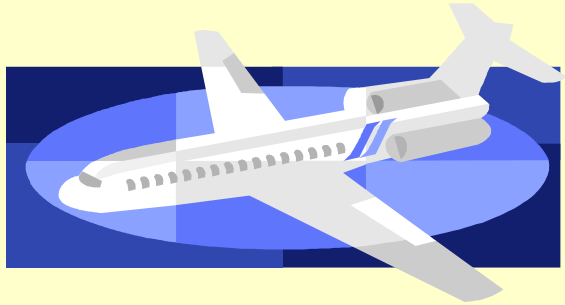
Agencies of the U.S. Department of Commerce Boulder Laboratories

- **National Institute of Standards and Technology (NIST)**
  - 720 employees (federal and affiliates)
- **National Oceanic and Atmospheric Administration (NOAA)**
  - 1,070 employees (federal and affiliates)
- **National Telecommunications & Information Administration (NTIA) Institute for Telecommunication Sciences (ITS)**
  - 87 employees (federal and affiliates)

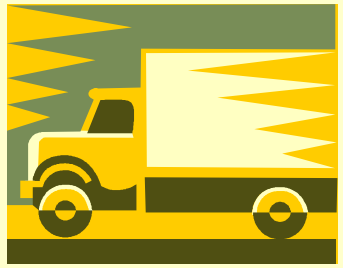
NIST Boulder Labs

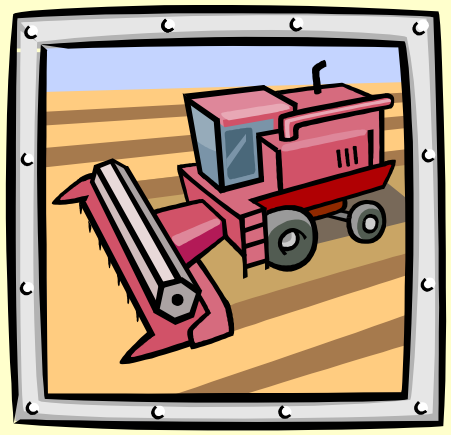
- **Electronics and Electrical Engineering Divisions**
  - Electromagnetics
  - Optoelectronics
  - Quantum Electrical Metrology
- **Physics Divisions**
  - Time and Frequency
  - Quantum Physics (JILA)
- **Materials Science and Engineering Division**
  - Materials Reliability
- **Chemical Science and Technology Division**
  - Physical and Chemical Properties
- **Information Technology Divisions**
  - Mathematical and Computational Sciences
  - Statistical Engineering

Definition



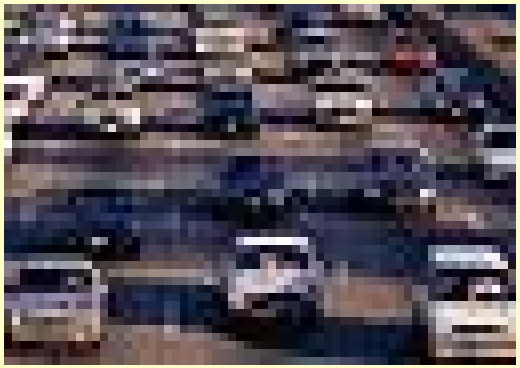
- Infrastructure **-- the facilities to move and to house people, goods, raw materials, energy, and information.**





Magnitude of U.S. Infrastructure

- Over 10% of GDP (over $ 1 T/yr) goes toward transportation
- U.S. Government alone spends > $ 50 B/yr on new buildings
- U.S. has over 2.5 M km of pipelines (oil, gas, ammonia, etc.). Many pass through very sensitive areas.
- Average age of offshore platforms is 20 years, with 400 over 40 years old
- Over 5 trillion T-km/yr of freight shipped by trucks, barges, and planes (Issues with bridges, locks and vehicles)



Needs in Infrastructure

- Many systems are deteriorating, and we invest less than our global competitors
- Many older systems are sensitive to sabotage
- Systems are taken for granted, and criticized when they fail
- Environmental impact becoming more visible
- NIMBY > NOPE
- Costs might be reduced and technology improved through innovation, but few funds for academia, industry in a rut

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History of our Infrastructure Projects

- 1976 - Welds in Alaska Pipeline
- 1978 – Walkway Collapse in St. Louis
- 1983 – Study of Cost of Fracture ($ 99 B/yr in 1978)
- 1985 – Union Oil Explosion
- 1995 – Aqua Fria Siphon
- 1995 – Chemical Blender Explosion
- 2000 – Hoover Dam Turbines
- 2002 – Folsom Dam Gates
- 2002 – Repair of U.S. Capitol Dome
- 2004 – Properties of Pipelines

NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Impacts

- Alaska Pipeline began operation much earlier, and has operated safely
- Source of Walkway Collapse led to closer inspection of details
- Union Oil Explosion led to changes in code (29 CFR 1910) and more frequent inspections
- Aqua Fria Siphon problems led BoR to change the specifications for piping
- Architect of the Capitol has selected our repair recommendation over all others
- WTC investigation is already beginning to indicate many changes in codes and procedures

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The Future

- **Pipeline**
  - Finish CTOA developments (effect of rate, study of welds, etc.)
  - Develop better understanding of fracture propagation
  - Transfer discoveries to industry and standards committees
  - Some ideas that come out of this meeting?
- **Hydrogen**
  - Materials properties development (larger scale specimens)
  - On-line database