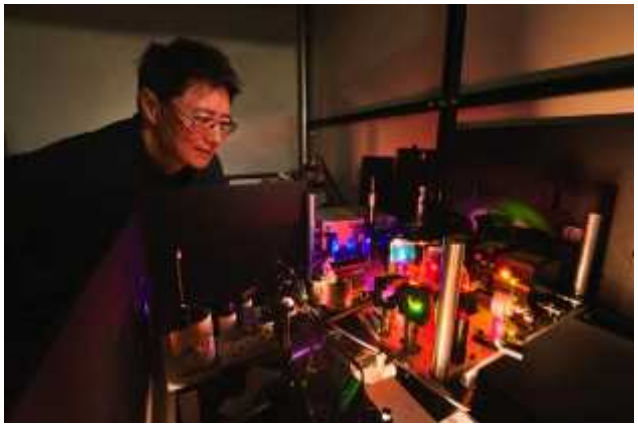
SAND2015-10011C

Exceptional service in the national interest

Sandia National Laboratories



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Sandia National Laboratories

DMSMS 2015

December 2, 2015

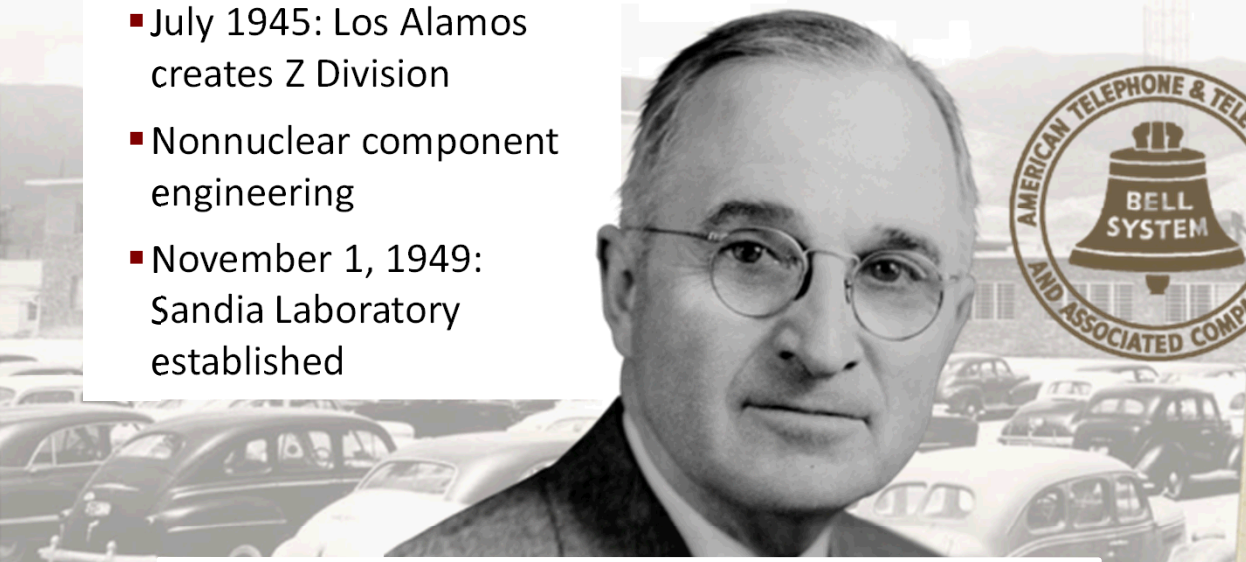
U.S. DEPARTMENT OF ENERGY | NNSA

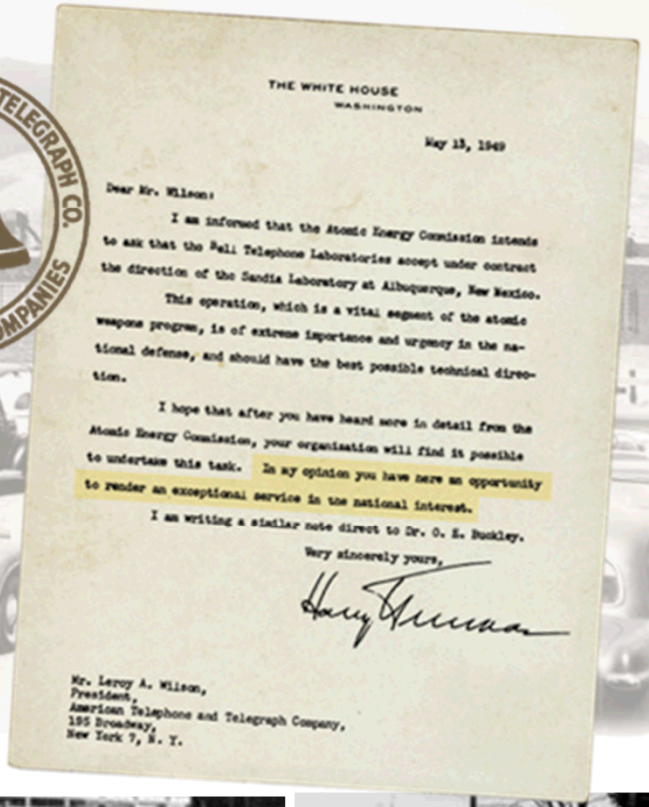
Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.SAND2015-354569

Sandia's History

Exceptional service in the national interest

- July 1945: Los Alamos creates Z Division
- Nonnuclear component engineering
- November 1, 1949: Sandia Laboratory established





THE WHITE HOUSE
WASHINGTON

May 13, 1949

Dear Mr. Wilson:

I am informed that the Atomic Energy Commission intends to ask that the Bell Telephone Laboratories accept under contract the direction of the Sandia Laboratory at Albuquerque, New Mexico.

This operation, which is a vital segment of the atomic weapons program, is of extreme importance and urgency in the national defense, and should have the best possible technical direction.

I hope that after you have heard more in detail from the Atomic Energy Commission, your organization will find it possible to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.

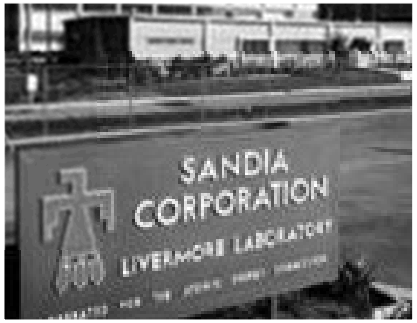
I am writing a similar note direct to Dr. O. E. Buckley.

Very sincerely yours,

Harry Truman

Mr. Leroy A. Wilson,
President,
American Telephone and Telegraph Company,
195 Broadway,
New York 7, N. Y.

to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.



Sandia Addresses National Security Challenges

Sandia National Laboratories

1950s	1960s	1970s	1980s	1990s	2000s	2010s
Nuclear weapons	Development engineering	Multiprogram laboratory	Missile defense work	Post–Cold War transition	START Post 9/11	LEPs Cyber, biosecurity proliferation
Production and manufacturing engineering	Vietnam conflict	Energy crisis	Cold War	Stockpile stewardship	National security	Evolving national security challenges

Governance of Sandia Laboratories

Sandia Corporation

- AT&T: 1949–1993
- Martin Marietta: 1993–1995
- Lockheed Martin: 1995–present
- Existing contract expires: April 30, 2016, with a one-year contract extension option
- Government owned, contractor operated

Federally funded research and development center

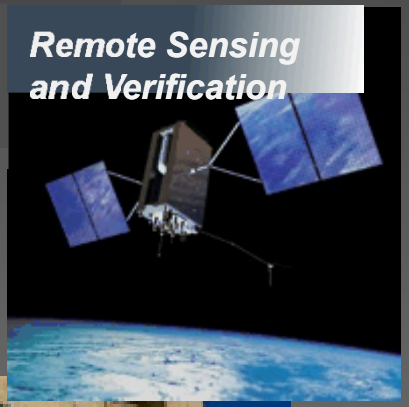
Defense Systems & Assessments Programs

Sandia National Laboratories

Information Operations

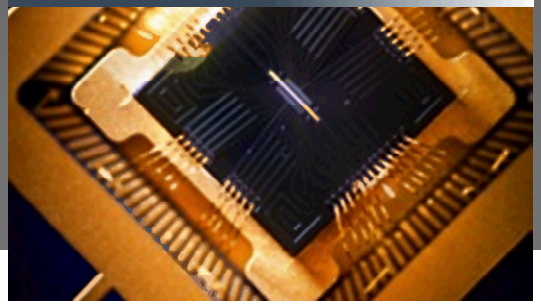
Surveillance & Reconnaissance

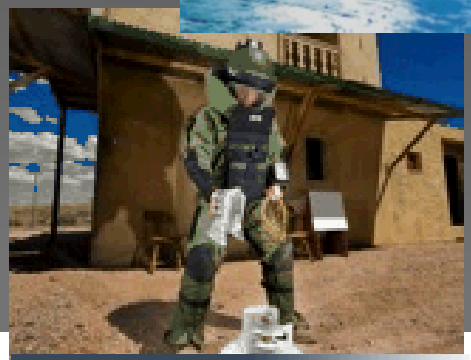
Remote Sensing and Verification



Space Mission

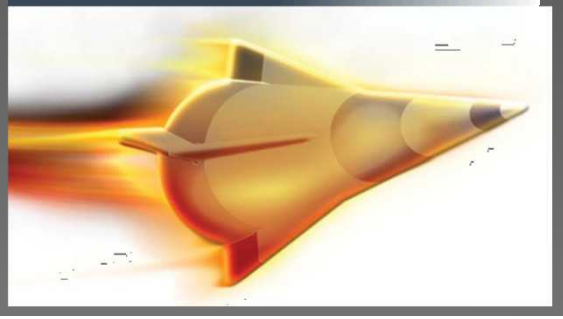
Science & Technology Products





Proliferation Assessment

Integrated Military Systems



International, Homeland, & Nuclear Security

Sandia National Laboratories

Global Security

WMD Counterterrorism and Response

Homeland Security Programs

Cyber and Infrastructure Security

Homeland Defense and Force Protection

Microsystems and Engineering Sciences Applications (MESA): 400,000 Sq-ft Complex with >650 Employees

Sandia National Laboratories

- Trusted Digital, Analog, Mixed Signal & RF Integrated Circuits Design & Fabrication
- Custom IC Design
  - Secure microcontrollers
  - Sensor Readout ICs
  - Analog/Digital/RF
  - IBM Trusted Foundry
  - Tamper Resistant
- Micromachining
- RAD Effects and Assurance
- Failure Analysis, Reliability Physics
- Test & Validation
- 3-D Integration Features

- Advanced Computation
- Modeling & Simulation
- COTS Qualification
- Advanced Packaging
- Custom Electronic Components
- System Design & Test

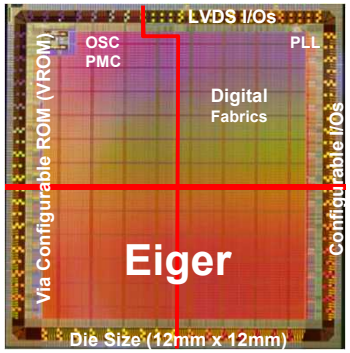
- Compound Semiconductor Epitaxial Growth (UV-THz)
- Photonics
- MEMS, VCSELs, Plasmonics
- Specialized Sensors, FPAs
- Materials Science, Graphene
- Nanotechnology, Chem/Bio
- Heterogeneous-Technology Integration & Processing
- Semiconductor Devices
  - Neutron-Immune HBT
  - Rad-hard Optical Links
  - Solid-State RF Devices
  - GaN Power Electronics

MESA is an FFRDC-based development and production facility for any microsystem component or technology that cannot or should not be obtained commercially.

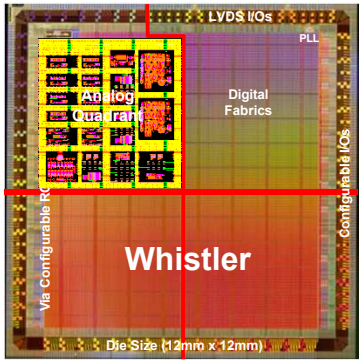
Trusted Foundry: Meeting the needs of the Rad Hard IC & Research Community

Sandia National Laboratories

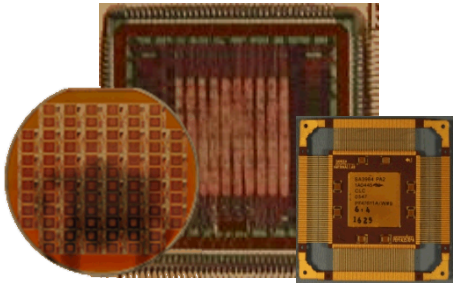
- Sandia a certified DoD Category 1A Trusted Supplier for both Foundry and Design
- Silicon Process Technology
  - 350nm, 3.3V, Radiation Hardened, Silicon on Insulator Mixed Signal Technology
  - Also Supports MEMS technology
- Low Volume Mixed Signal Radiation Hardened ASICs
  - Low Cost Multi-Project Wafer Program (MPW)
  - Quick Turn Structured ASIC ViArray Platforms
  - Low Volume Production ASICs
- NNSA's Primary supplier of custom rad-hard ICs for weapon life extension programs and satellite systems
  - Currently delivering thousands of ASICs



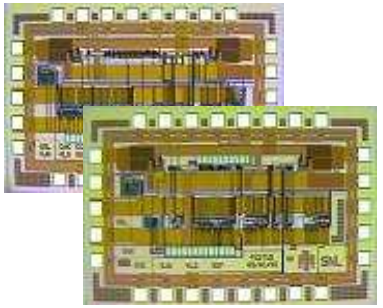
Digital Rad-Hard ViArray



Mixed Signal Rad-Hard ViArray



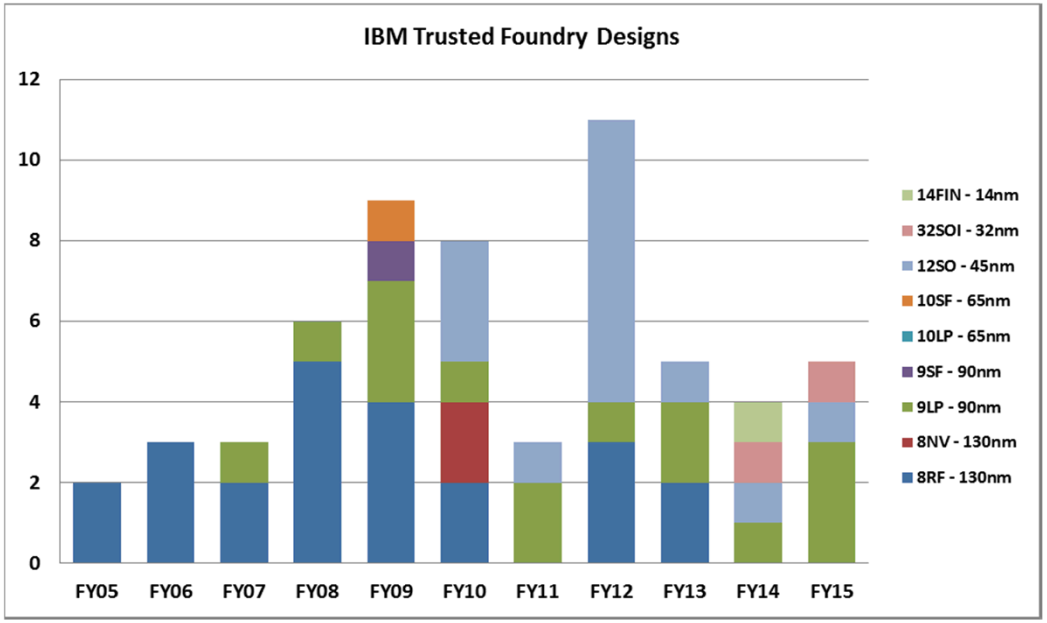
Custom Rad-Hard Digital ASICs



Custom Rad-Hard Mixed Signal ASICs

Trusted Integrated Circuit Design in Multiple Trusted Foundries

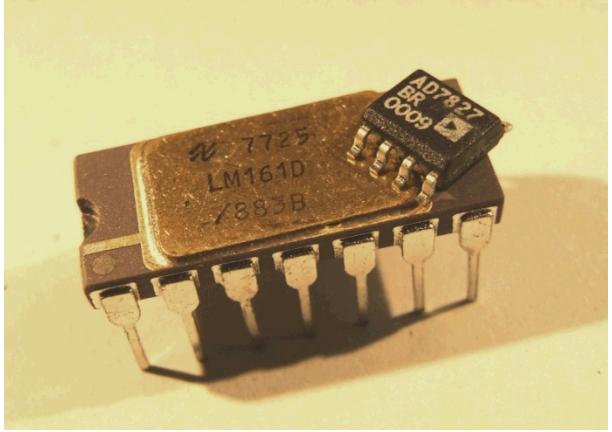
- Delivering ASICs from Sandia Radiation Hardened Trusted Foundry
  - Meets the needs for strategic radiation hardened programs
  - Flexible to accommodate research activities
- IBM Trusted Foundry: 56 Designs

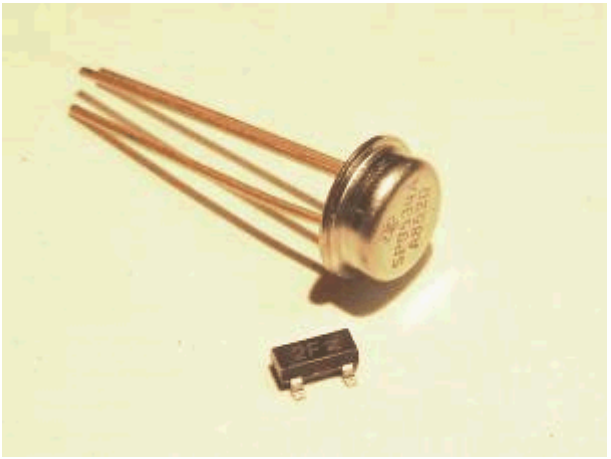


- History and Experience with Other Trusted Suppliers
  - National Semiconductor Corporation Foundry
  - Honeywell Aerospace Foundry
  - Partnerships with Northrop Grumman
  - Jazz Semiconductor

Qualified COTS For Hi-Rel Systems

- Weapon applications require the use of COTS
  - Availability, cost, and/or functionality
- Developed processes for unique issues in using COTS for weapon systems
  - Hostile environments (radiation, temperature, humidity, etc.)
  - Long dormant storage (>20 yrs.)
  - Procurement practices (traceability, qualification)
- Science based processes/methodologies and models/simulations (verified by sample test data) provide confidence that the component will meet all requirements
  - Vendor and part assessments are made to verify specified and unspecified requirements
  - A LoPB (Life of Program Buy) is made from the "best" suppliers





Custom Cables, Connectors and LACS

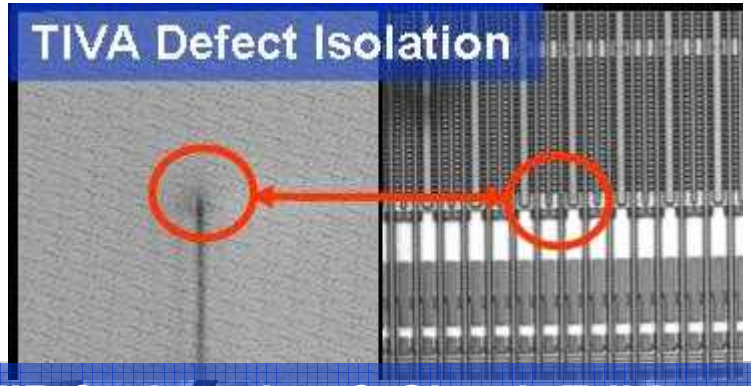
Sandia National Laboratories

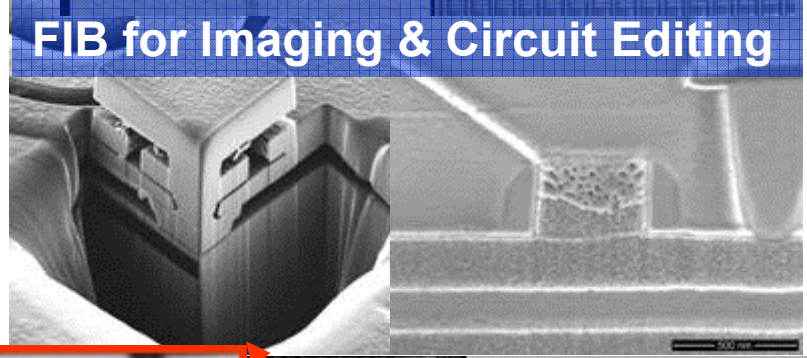
- Custom Cables
  - Flat flex & Flat ribbon
  - Round Wire – bundle
  - Flexible Coax & Semi-rigid coax
  - Fiber optic
  - Controlled encapsulation shapes
- Connectors
  - Multi-contact
    - Circular, rectangular
    - Hermetic, non-hermetic
  - Micro miniature & Nano
  - RF
- Custom Junction Boxes
- Specialty Connectors
  - High voltage
  - Filter connectors
  - Fiber optic
  - Low inductance HV
  - Lightning arrestor

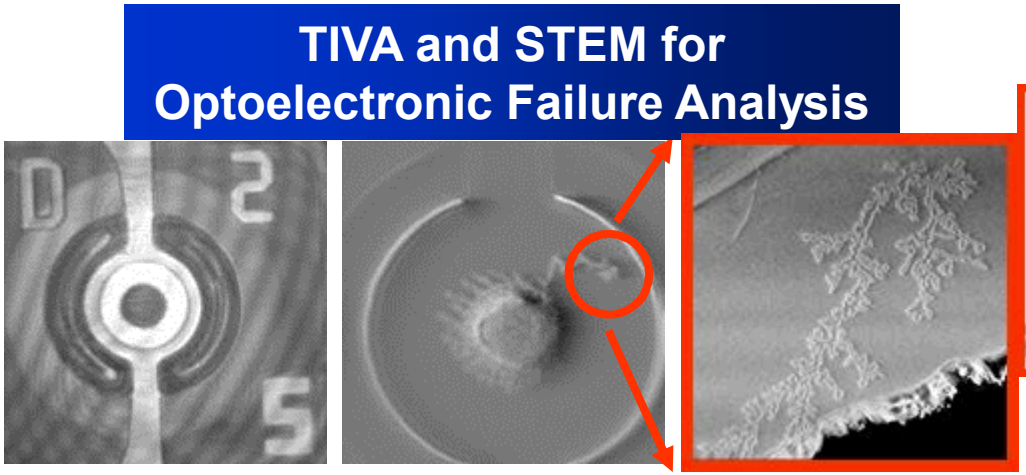
Our Customers include nuclear weapons, satellite systems, test vehicles and work for others

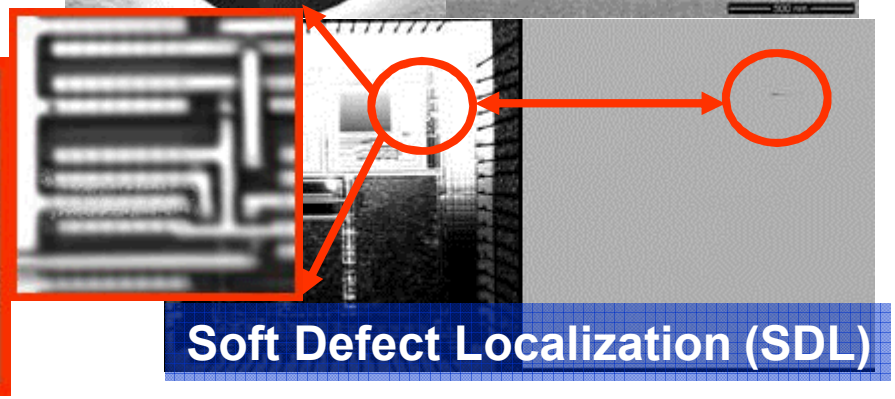
Microsystems Reliability & Failure Analysis Department

- Expertise in Si CMOS, III-V, MEMS, and Optoelectronics
  - Component and now board-level
- Sandia developed techniques now industry standards (LIVA, TIVA, SDL, etc.)
- Component analysis, deprocessing, and build analysis capabilities
- Support through entire product life cycle
- Extensive reliability & FA capabilities, equipment, tools, & techniques









Engaging with Sandia

Sandia National Laboratories

- Strategic Partnership Projects (SPP)
  - Non-Federal Entity Agreement (NFE)
    - Private Industry and Individuals
    - Local and State Governments
    - Colleges and Universities
    - Non-Profit Organizations
    - Foreign Governments and Foreign Companies
  - Official Federal Agency Agreement (OFA)
    - Other Federal Agencies
      - Work is consistent with /complimentary to DOE/NNSA and SNL Missions.
      - Work will not adversely impact execution of assigned programs and will not create a detrimental future burden on DOE/NNSA resources.
      - Work will not place SNL/the government in direct competition with the domestic private sector.
  - Cooperative Research and Development Agreement (CRADA)
    - Work hand in hand on research in each others facilities.