Savannah River National Laboratory™

OPERATED BY SAVANNAH RIVER NUCLEAR SOLUTIONS

We put science to work.™

Savannah River National Laboratory (SRNL) – Overview of SRNL

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Chief Information Officer

Presented at University of South Carolina
September 27th, 2016

SRNL-STI-2016-00552

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SRS Snapshot

- 198,334 acres,
  or about 310 square miles
  - Fourth largest DOE site in the United States (behind Nevada Test Site, Idaho National Laboratory and Hanford Site)
- SRS workforce: Approximately 8,000
  - Prime contractor SRNS includes SRNL (about 58 percent)
  - DOE-SR and DOE-NNSA
  - Other contractors
    - *SRR*
    - *Centerra*
    - *MOX*

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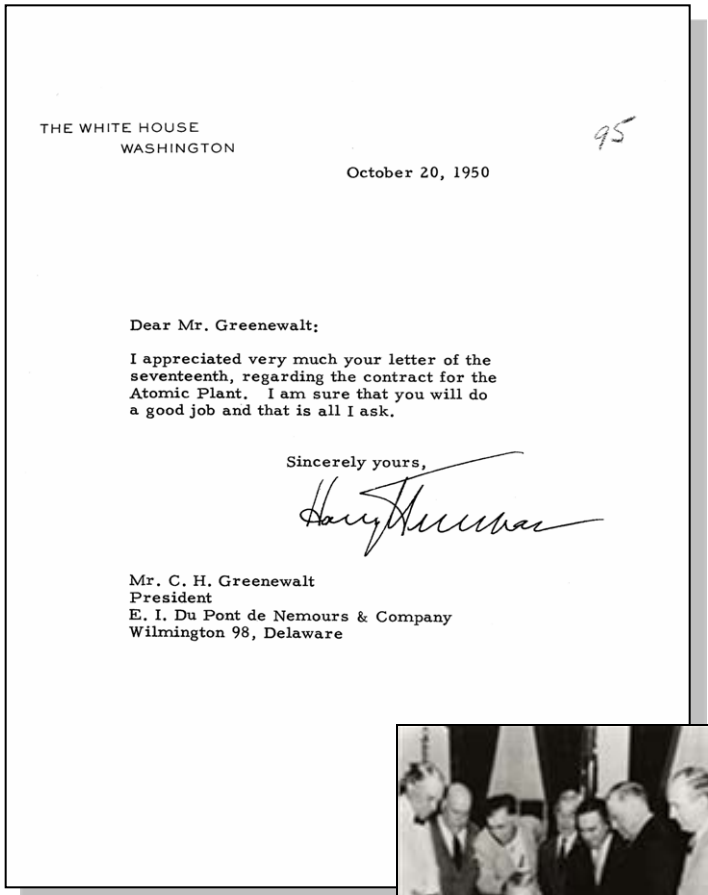
Chronology of the Savannah River Site

- Sept. 23, 1949
  - President Truman announced Russia tested its first atomic weapon
- June 12, 1950
  - Atomic Energy Commission asked E.I. Du Pont de Nemours & Company to undertake a new atomic project
  - Du Pont built SRS and operated it for nearly 40 years
- April 1, 1989
  - Washington Savannah River Company took the reins as SRS's prime contractor
- August 1, 2008
  - Savannah River Nuclear Solutions assumed responsibility for SRS management and operations
- July 1, 2009
  - Savannah River Remediation now in charge of liquid waste disposition



THE WHITE HOUSE
WASHINGTON

95

October 20, 1950

Dear Mr. Greenewalt:

I appreciated very much your letter of the seventeenth, regarding the contract for the Atomic Plant. I am sure that you will do a good job and that is all I ask.

Sincerely yours,

Harry Truman

Mr. C. H. Greenewalt
President
E. I. Du Pont de Nemours & Company
Wilmington 98, Delaware

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Initial Construction Facts

Earth moved	39 million cubic yards (a wall 10 feet high and 6 feet wide from Atlanta, GA to Portland, OR)
Concrete	1.5 million cubic yards (a highway six inches thick and 20 feet wide from Atlanta, GA to Philadelphia, PA)
Reinforcing steel	118,000 tons (a train 30 miles long)
Structural steel	27,000 tons (a train eight miles long)
Lumber	85 million board feet (enough for 15,000 homes)
Roads	230 miles of new roads (including South Carolina's first clover leaf intersection)
Railroads	63 miles of permanent new track
Blueprints	2 million
Process Steel	All of the 304L and 316L stainless steel available in the United States from 1951 through 1953

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Site History

- The Atomic Energy Commission builds a nuclear weapons complex

Six South Carolina towns moved; 6,000 people relocated

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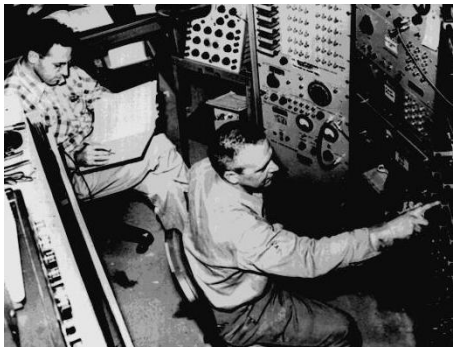
Historical Facts of Note

1956: Neutrino was discovered by Fred Reines & Clyde Cowan

P Reactor.

1995 Physics Nobel Prize



- 1961: University of Georgia founded the Savannah River Ecology Laboratory (SREL) to study effects of radiation on the environment

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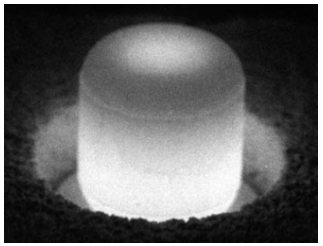
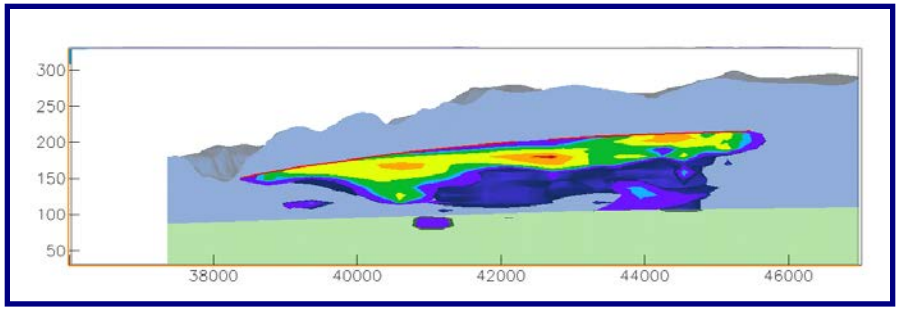
Historical Facts of Note

- 1972: SRS designated as a National Environmental Research Park

- 1980's: Produced Pu-238 for NASA's deep space exploration program



Environmental Cleanup began under the RCRA program



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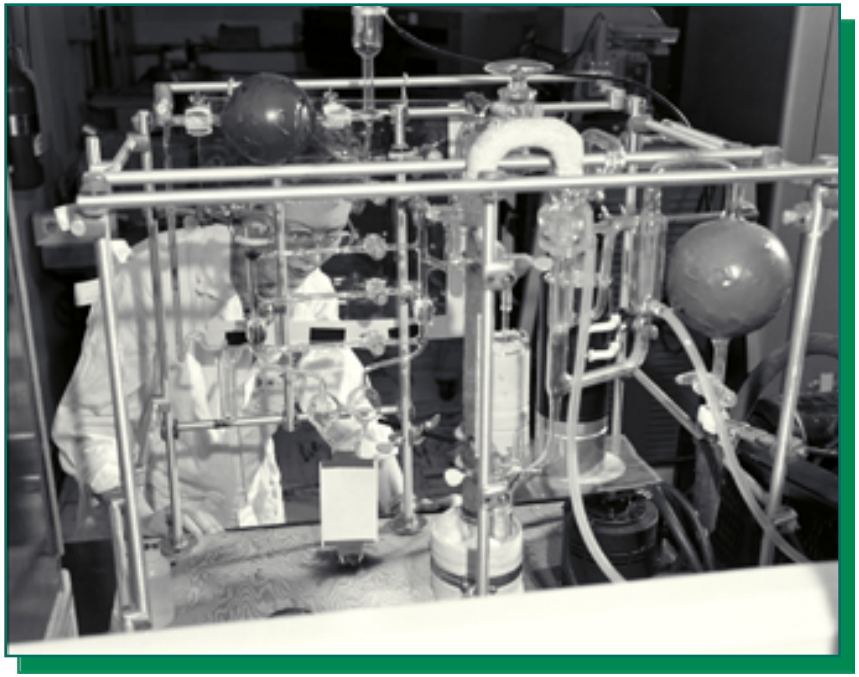
Early Days of the Laboratory

- Began operation in 1953
- Original mission:
  - Reactor research
  - Chemical separations
  - Tritium/Hydrogen support
  - Environmental science and monitoring
- Changing missions:
  - End of Cold War in 80's focus on safe containment disposition/environmental clean up/D&D
  - Response to 9/11 homeland security initiatives
  - Need for energy independence has led to dual use of hydrogen technology followed by other clean energy initiatives



SRNL brought technological support to nation's cold war efforts

SRNL at a Glance

~ 810 Staff

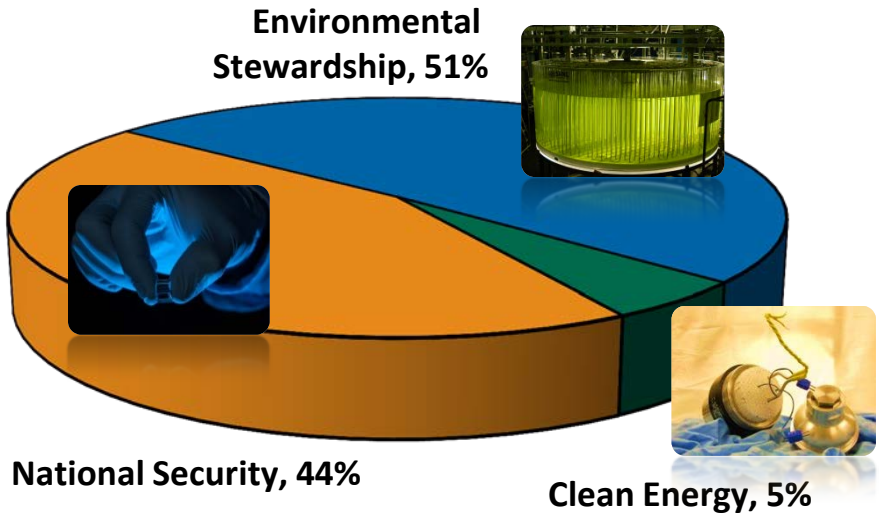
~ $212M (FY15 responsible scope executed)

~ 200M (FY15 work performed)

~ 350 Discrete Work Activities

Multi-Program Laboratory

> 60% of funding from non-SRS customers



SRNL FY15 Execution

Core Nuclear Capabilities

- Chemical Processing, Separation
- Materials Science
- Tritium / Hydrogen
- Environmental Science

Safest National Laboratory

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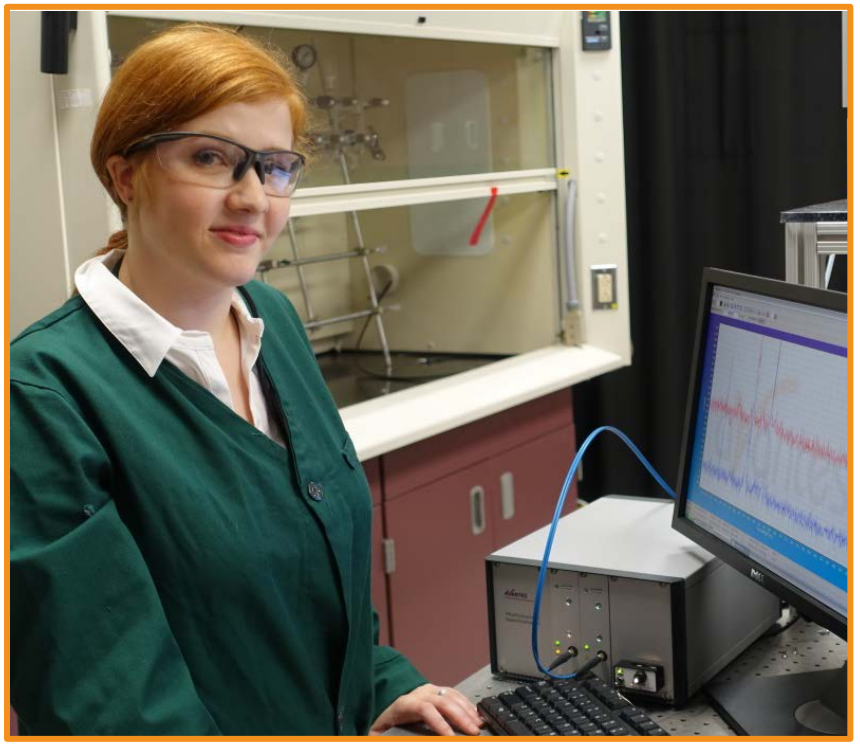
Partner with Regional Universities

- Over 400 sponsored projects involving regional university staff
- Over 300 internships
- Over 350 degrees from regional universities
- Over 107,000 students reached through “teach-ins”
- University Scholars pilot with USCA - $400K investment



University of South Carolina Aiken

Clemson University

Georgia Regents University Augusta

University of South Carolina

Georgia Institute of Technology

SC State University

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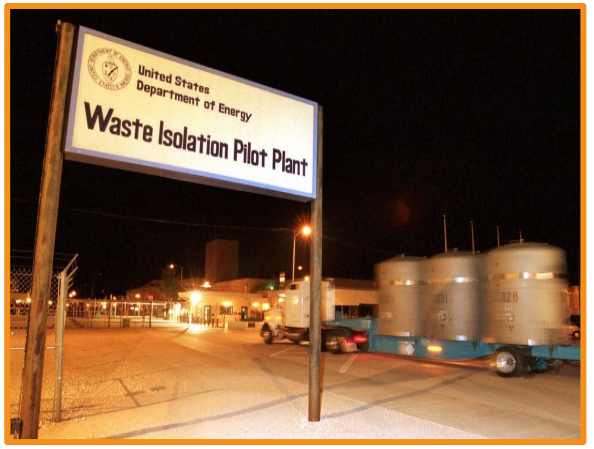
SRNL is Critical to DOE-EM Success

- Over $5 billion in projected savings in past five years
- Advanced Technologies



- Support to Fukushima
- Leadership of Initiatives at Hanford, WIPP

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In National Security, Our Reach Extends Far Beyond SRS

Tritium Expertise

Event Signatures

Mobile Plutonium Facility

Nuclear Packaging

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Essential to U.S. Non-Proliferation Objectives

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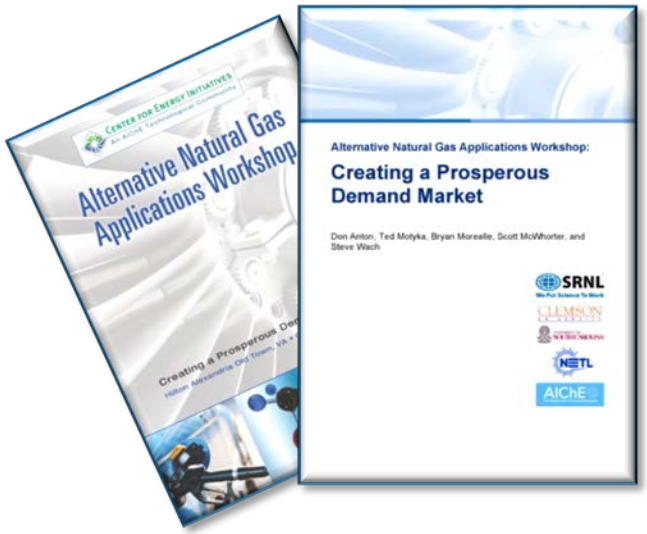
SRNL Contributes to Clean Energy Initiatives

Hydrogen Research

Safe Nuclear Fuel

Smart Grid / Cyber Security



Natural Gas Leadership

Solar Research Recognition

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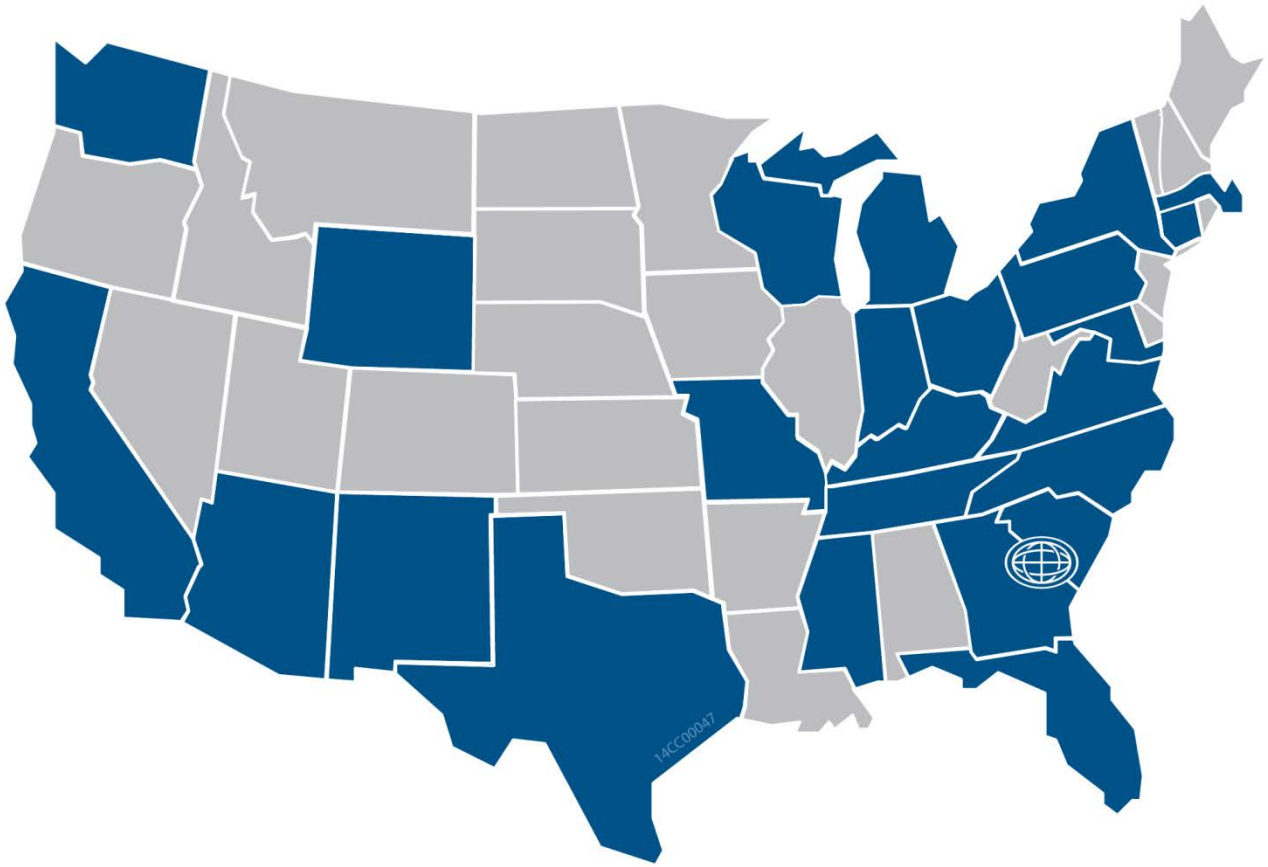
Impacting National Economic Competitiveness

Working with Companies in 24 States Through CRADAs and Other Agreements

(10 agreements in South Carolina; 8 in Georgia)

Work for Non-Federal Entities (~$24M 2008–2014)



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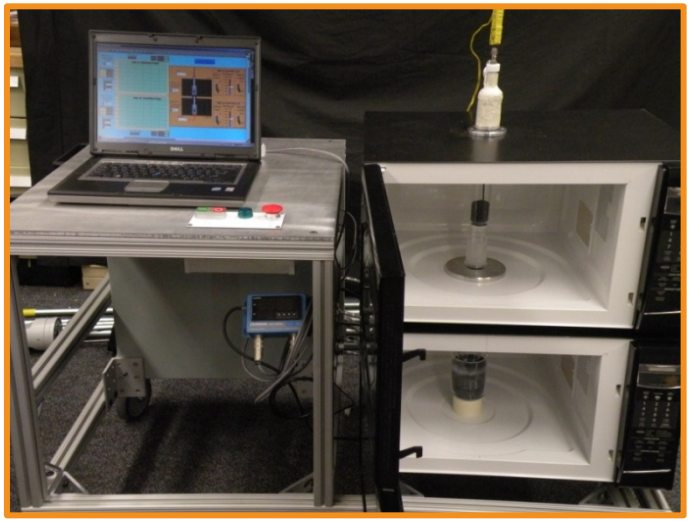
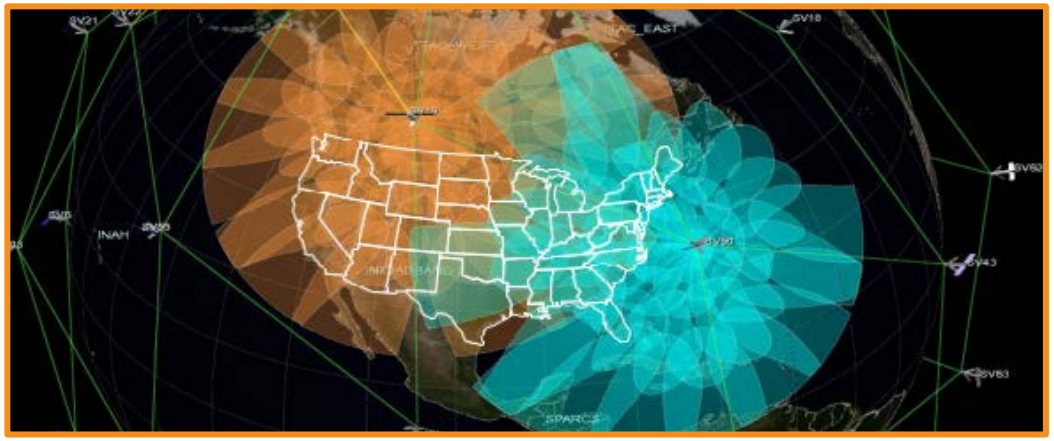
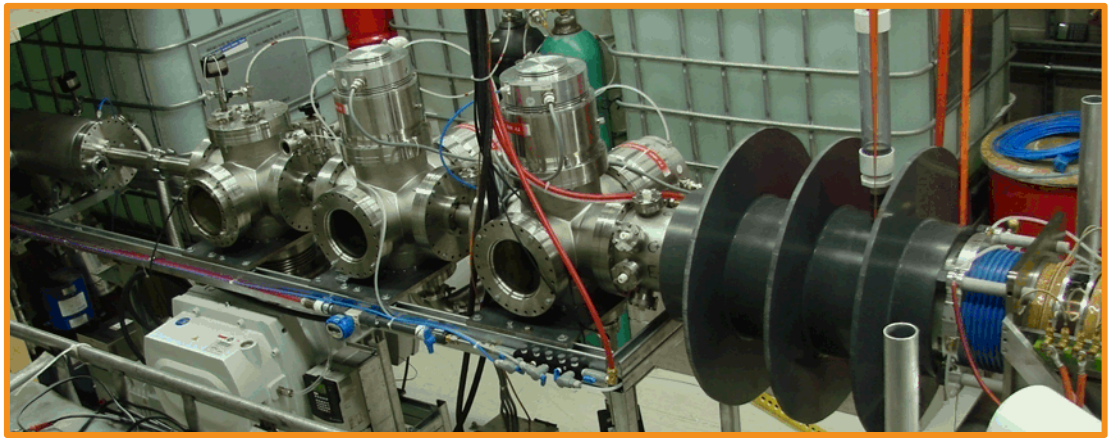
Partners to Commercialize Technology



Tandem Forensic Microwave



Iridium Satellite Communications System



Courtesy of SHINE Medical Technologies

Medical Isotope Production

Sound Anchor™

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SRNL Facilities

Aiken County's Savannah River Research Campus

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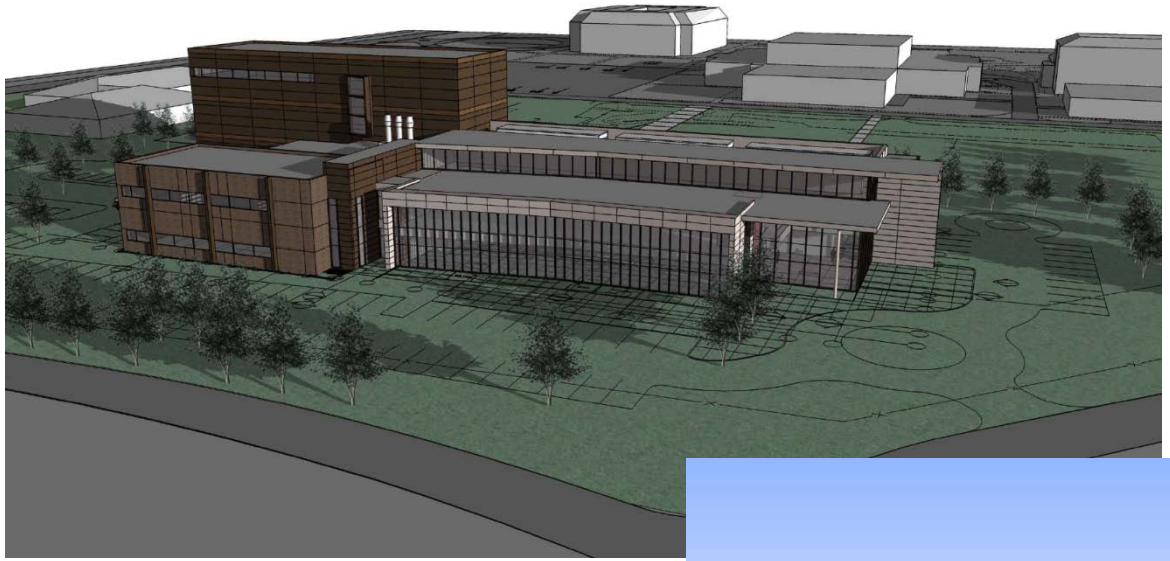
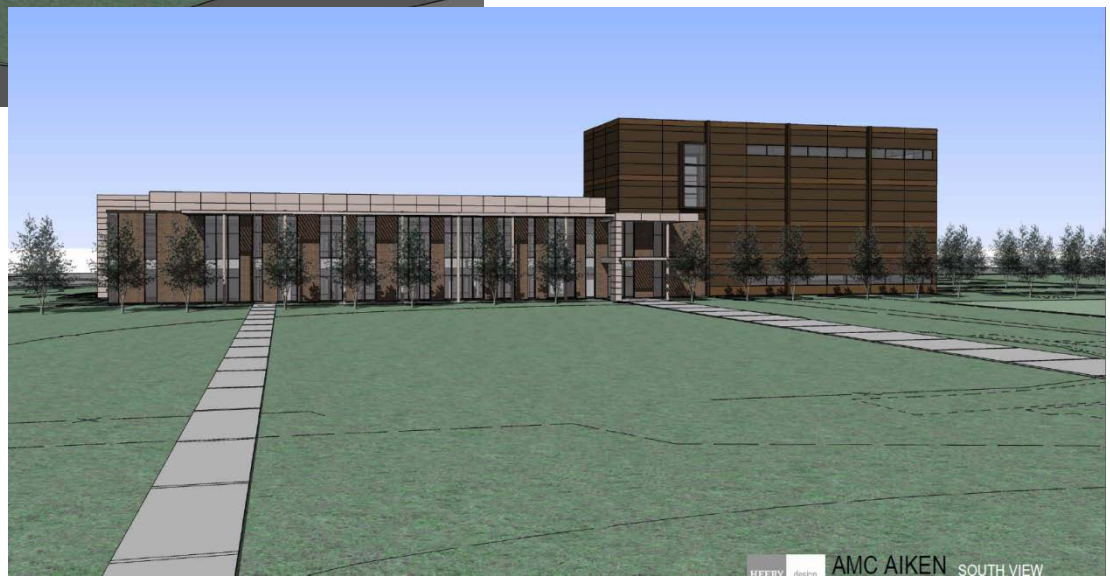
Conceptual Design for the Advanced Manufacturing Collaborative





A place for SRNL to collaborate with academia and industry side-by-side

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Advanced Manufacturing Collaborative

Bridging the Gap between Technology and Implementation

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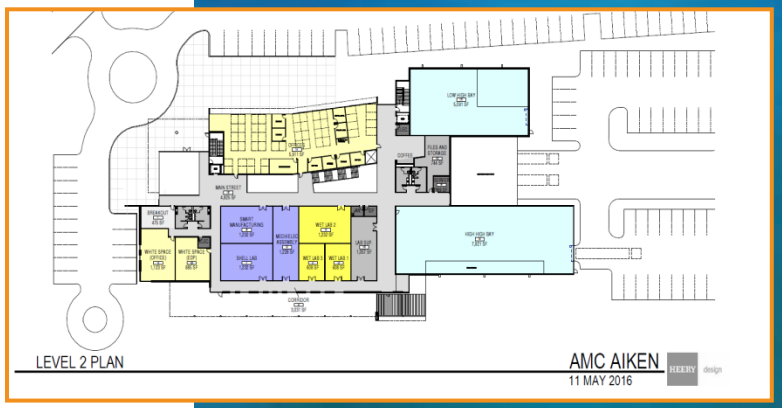
Design Philosophy

Promote Technology and Innovation Excellence

- "Lab as Social Center"
- Accessible by Lab, University, and Industry Collaborators
- Ideas and Talent Incubator
  - Open Innovation
  - Interactive Spaces
  - Inviting
  - Energetic
- Sustainable Energy Efficiency
- Flexible Space
- Ability to Expand



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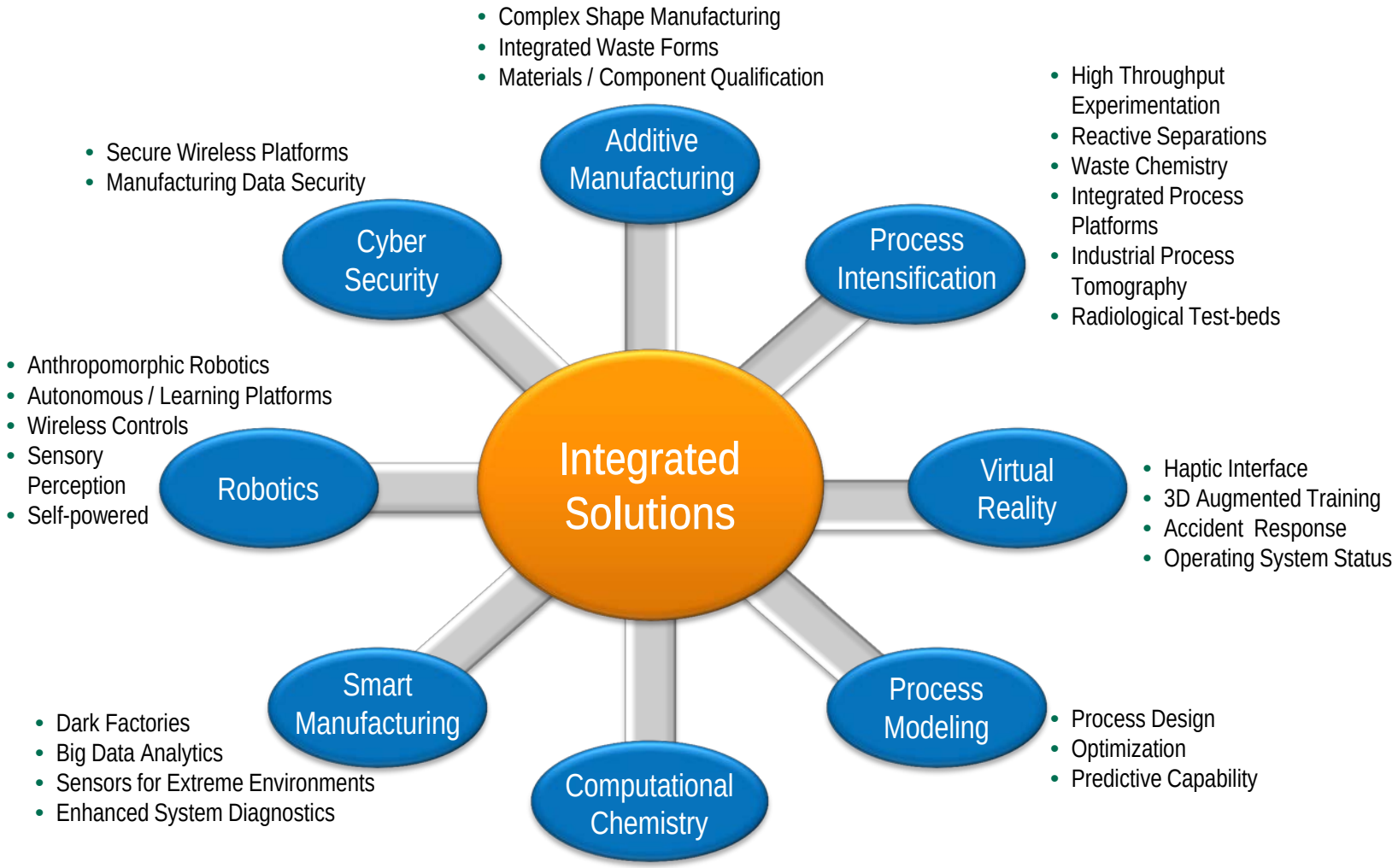
Apply New Technologies



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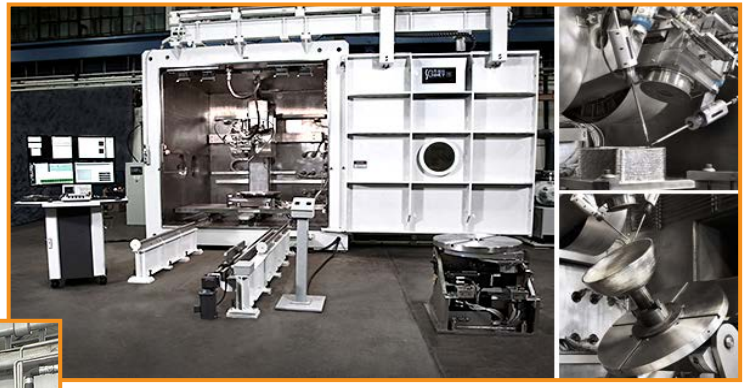
Defining Unique Capabilities and Equipment

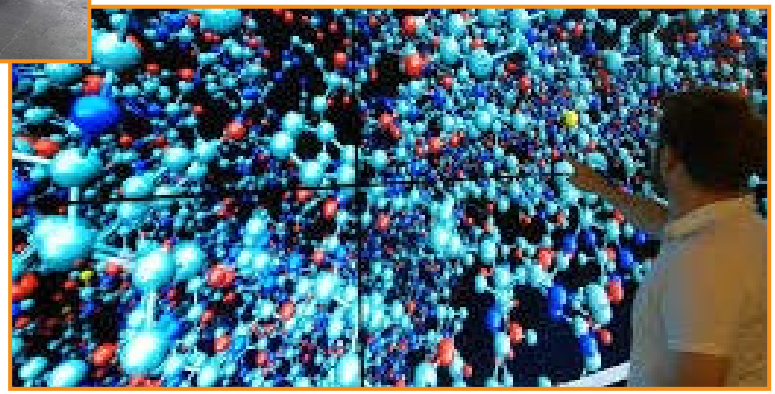
Process Tomography Systems and Platforms



E-beam Additive Manufacturing System

Pilot Scale Process Test Beds

Virtual Reality Cave



Process Modeling/Chemistry Visualization Wall

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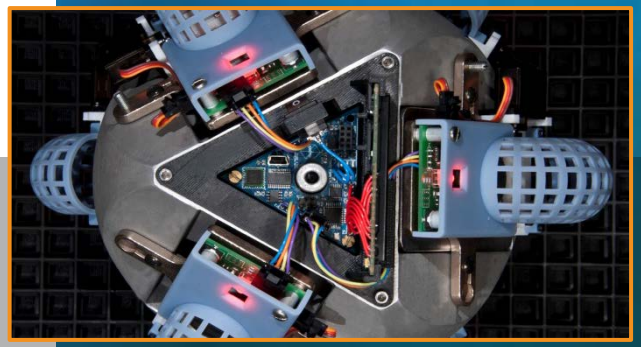
Leveraging Federal Investment

National Leader in Advanced Manufacturing Technology & Innovation

Educate the Next Generation Technology & Innovation Workforce

Economic Development through New Technology & Innovation



An Opportunity for the Region

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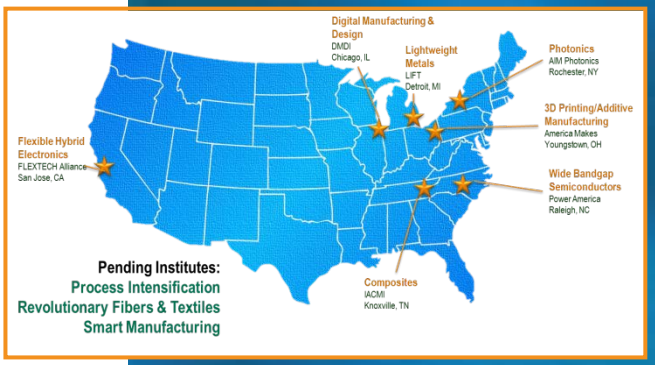
Industrial Partners and AMC

- Recruit workforce through engagement with Universities
- Engage experts to solve problems
- Develop new staff through hands on experience

Access to Federal Funding Programs

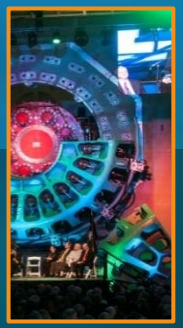
- access to research collaborations
- enhanced products

An Impact on the World



Environmental Recovery

Nonproliferation



Clean Energy

An Opportunity for Industry

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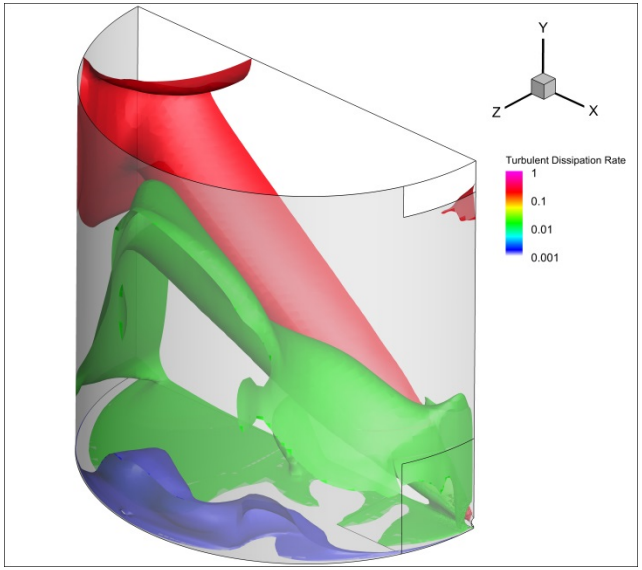
What's on the horizon?

- The future requires:
  - New advances in computing technology: hardware, software, algorithms, applications
  - New advances in data management, data analytics, visualization
  - MAJOR CYBER SECURITY ENHANCEMENTS
- Data Explosion
  - Will drive these advances
  - e.g.; genomics, climate
  - 50% of traffic is from "Big Data" on Esnet
- Current computing environment is not optimal for:
  - Collaboration of geographically distributed data, user, and facilities,
  - Interactive workflow, real time analysis

Other things to consider

- The world has changed – technology changing rapidly
- IT continues to change rapidly
  - PC sales flat
  - Growth is with tablets, smartphones, wearables, and other portable devices
  - IoT
- Innovations need to be driven
  - Cyber Security analytics
  - Processors & Memory
  - System Designs
  - System Software
  - Algorithms
  - Data management
  - Data analytics – Visualization – Machine learning



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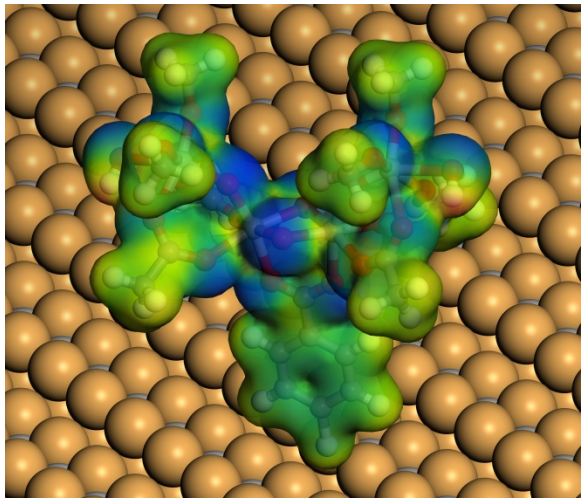
Other things to consider

- Cyber Security
  - Recent headlines of data breaches are becoming all too common
  - Personal information, credit cards, health data
  - Seeing more and more “hacktivist” groups claiming server breaches
  - Huge opportunities for the future in Cyber R&D
  - Needed to protect our nation – infrastructure (e.g.; power grid, nuclear reactors, dams, petroleum pipelines), industry (e.g.: banking, pharmaceutical, health, other energy driven business), intellectual property (e.g.; patents, proprietary data)
  - Need to secure “cloud solutions” – how do we protect data both nationally and internationally. How do we collaborate?

Final thoughts

- We will model things you never imagined over the next 5 – 10 years
- Computer technology has become part of our daily lives, economic base, science and engineering advances including security
- Computer scientists and engineers along with cyber security expertise is crucial for today's world
- The need for collaboration and connectivity will increase
- You are part of this future!



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QUESTIONS?