



CSC-9: RN91-311-002

Partnering for Scientific Innovation

The Los Alamos National Laboratory Experience

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LANL Today

LANL is a large multi-disciplinary research facility.

- 10,500 hectares
- \approx 14,500 people
- \approx 4,000 Ph.D's, \approx 1,400 students/year
- $>$ 350 post-doctoral fellows each year
- \approx 400 foreign national staff members
- Annual budget \$2.2 billion
- Government-owned; contractor-operated
- Managed by University of California for 60 years
- Managed by Los Alamos National Security LLC for 3 months

LANL Mission

- “Solve national problems in defense, energy, environment, and infrastructure”
- Energy is an important national problem
- Japan and the U.S. face energy supply issues

What We Are

- Have focused mission
- Provide science based solutions to complex problems
- Basic and applied research and development
- We collaborate with universities, other national laboratories, and industry

What We Are Not

- Low-cost
- Focused on short-term solutions
- “Wal-Mart” of science
- Contract engineering house

Examples of Los Alamos Collaborations

- Cooperative projects
- Centers of Excellence
- User facilities
- Gateways

A Cooperative Project - Chevron

- A collaborative research partnership based on complementary but not overlapping capabilities
- Areas of work
 - Communications
 - Modeling
 - Material Science
 - Chemistry
 - Earth Science
- A clear mutual understanding of problems and benefits

Posing the right question - Chevron

- Chevron was concerned about pipe failure as warm oil moved upward into very cold sub-ocean pipe
- They sought stronger steels to prevent fracture
- LANL scientists suggested an alternative solution – reduce the pressure on the pipe by inserting a chemical that reduces volume as temperatures rise

Chemical Hydrogen Storage Center of Excellence

- Hydrogen storage on-board a vehicle is a barrier to widespread implementation of hydrogen-powered vehicles
- A critical fundamental science problem because current technologies are not sufficient
- Center developed a set of collaborative projects
- We were able to facilitate creative research in a go/no go decision/milestone environment

Defining the problem and forming the right team

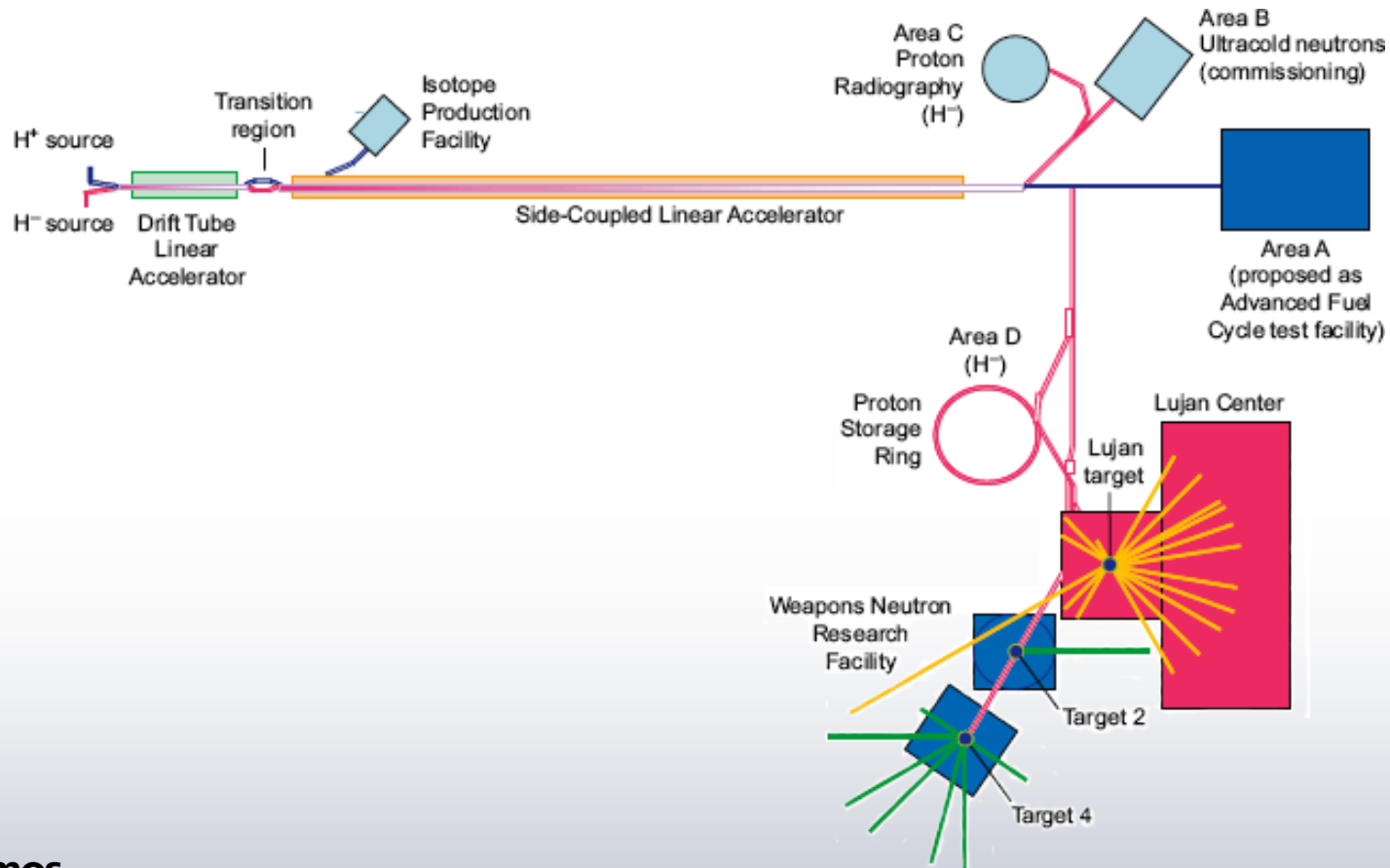
- The storage center defined the problem in science terms
- Identified the right set of highly qualified collaborators from National Laboratories, universities & companies
- Negotiated agreements in advance
- Developed a range of communication and reporting mechanisms, including personnel exchange

User Facilities - LANSCE

- Los Alamos Neutron Science Center
- Over 1,100 users annually
- Over 350 different experiments
- Beam time is allocated on a competitive basis

Neutrons, Protons & Instrumentation

With completion of the Asterix spectrometer, LANSCE will have the world's most intense source of polarized cold neutrons, which, along with neutron reflectometry and other neutron spectroscopies, will be essential for the study of complexity in nanomaterials.



A Gateway – Center for Integrated Nanotechnologies

- A joint effort between Los Alamos and Sandia National Laboratories
- Designed to take nanoscience from laboratory to commercial application
- Cutting-edge science including work on nano-bio-micro interfaces, nano-photonics, nano-electronics, and nano-mechanics
- Theory and modeling are integrated with experimentation

Prerequisites for Successful Collaboration

- A clear science need
- Connection to LANL mission
- Mutual scientific respect
- Agreement on timeframe required for success
- Synergy between research collaborators and capabilities
- A willingness to invest
- A balanced partnership

Why Relationships Fail

- One side seeks an unfair advantage
- One side thinks they can do everything alone
- One side thinks their solutions are best
 - Reduces creative and open thinking
- Differing long-term goals

Energy Security & Renewable Energy

- Japan and the US face the same energy supply issues
- By 2050 the world will need at least twice the total energy we use today
- Most of the new energy will have to be carbon-neutral
- No one solution will be sufficient

An Example of a Possible Collaboration

- Get our energy where we have always gotten it – from the sun
- Our current fossil energy is based on stored solar energy and we are rapidly depleting it
- Incremental improvements to existing knowledge and technology will not be sufficient
- This will require new science and research into the science of solar energy

Solar Energy

- This is a global problem; we need to globally develop a solution
- Bring together research institutes, universities, companies, in a collaborative research effort to reduce the cost/kW-hr by factors of 10 to 100
- Focus on fundamental, pre-competitive, science

Options

- Determine how to create a bold new cooperative research agenda with a strong connection among, national laboratories, universities, and industry
- Joint workshop(s)
- Joint institute