

A CHANGING NATIONAL SECURITY LANDSCAPE

"A new generation of threats has emerged, and this complicates the landscape for national security. While the influence of new threats in economic, cyber and climate domains, for example, does increase the degree of complexity, it does not change the value proposition of our Laboratory. Our focus on developing the talent, ideas and potential solutions as a part of the broader science, technology and innovation enterprise remains unchanged. We must accelerate our capacity to deliver technology solutions to a nation that needs them now more than ever."

– Terry Wallace
Principal Associate Director of Global Security

"The world of technology is changing at a staggering rate. Scale and agility have become necessary for technology dominance. Those who cannot innovate on these terms are finding it increasingly difficult to compete. At Los Alamos, our response to innovation must embrace the realities of how the global technology marketplace is evolving. Our Laboratory remains strong and attractive as a player on the global stage as we strive to make our people, facilities, and business processes competitive in a rapidly changing world."

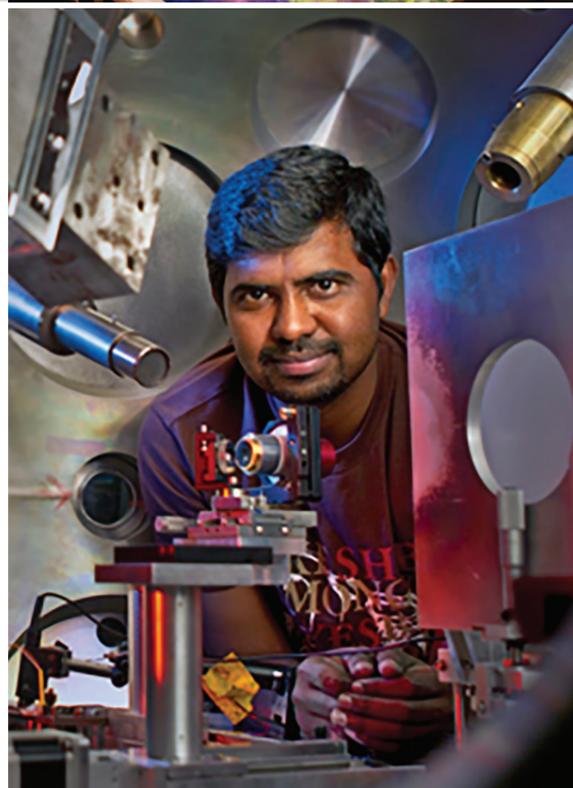
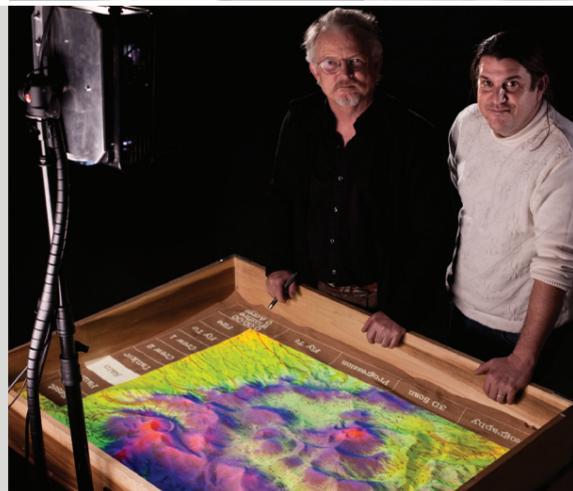
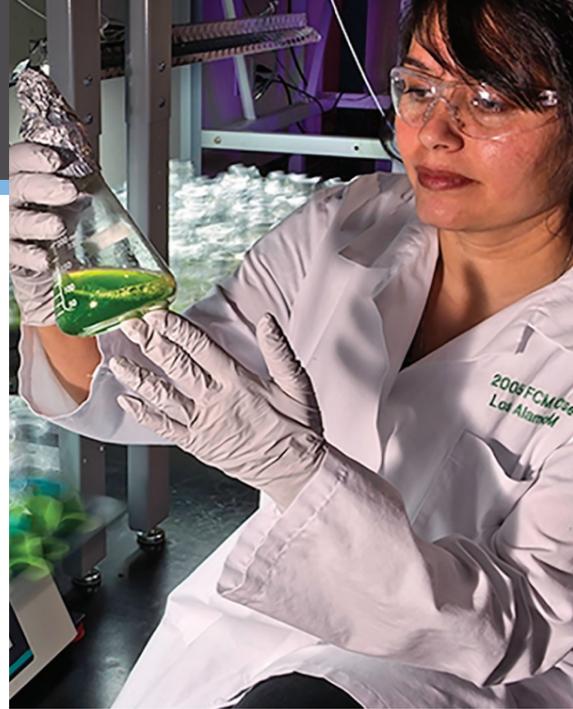
– Duncan McBranch
Chief Technology Officer

"Innovation at Los Alamos is characterized by a great many opportunities and some significant challenges. It is clear that our customers are placing an increased emphasis on our ability to deploy solutions to meet national needs. This focus on moving beyond the development of an idea toward a more complete solution is visible throughout the Laboratory. Moreover, we are moving toward a state where we are deliberately producing the ideas most in need of development by our customers. As a result, Los Alamos is reshaping our portfolio of partners and intellectual property to meet modern needs. Today we are working with more companies, in a more diverse set of technical areas than we ever have before."

– David Pesiri
Director of the Richard P. Feynman Center for Innovation



www.lanl.gov/feynmancenter



ACCOMPLISHMENTS & HIGHLIGHTS

Scaling out Cyber Security Strategic alliance toward a more secure cyber future

It's no secret that increasingly sophisticated cyberattacks are inflicting significant economic, social and even political damage to U.S. organizations.

To combat this, Ernst & Young LLP and Los Alamos National Laboratory teamed up to launch PathScan, one of the most advanced behavioral cybersecurity tools available to the commercial market.

PathScan uses behavioral analysis to detect threat actors once they have breached an organization's perimeter, but before they can inflict serious damage. This new technology promises to strengthen cybersecurity for businesses, organizations and the government, potentially saving millions of dollars.

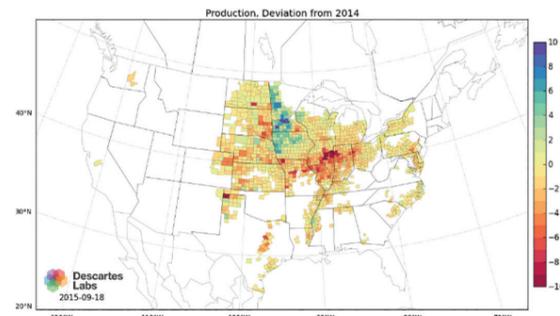


Building a Living Atlas of the World Attacking big data problems with machine learning

Descartes Labs spun out of Los Alamos in December 2014 with the technology and expertise to turn satellite imagery into high-level business intelligence.

After securing venture investments, they quickly spun up operations and began analyzing vast amounts of satellite imagery. Automated analysis of satellite imagery enables a revolution in our understanding of global agriculture and food security risks.

Descartes Labs' living atlas of the world supports food producers, farm equipment suppliers, commodities traders, insurance companies and the government policy community.



Harnessing Talent to Accelerate the High-Tech Landscape Launching a new venture to manufacture better, safer materials

As a postdoc at Los Alamos, Hunter McDaniel developed a new kind of quantum dot substantially free of toxic elements.

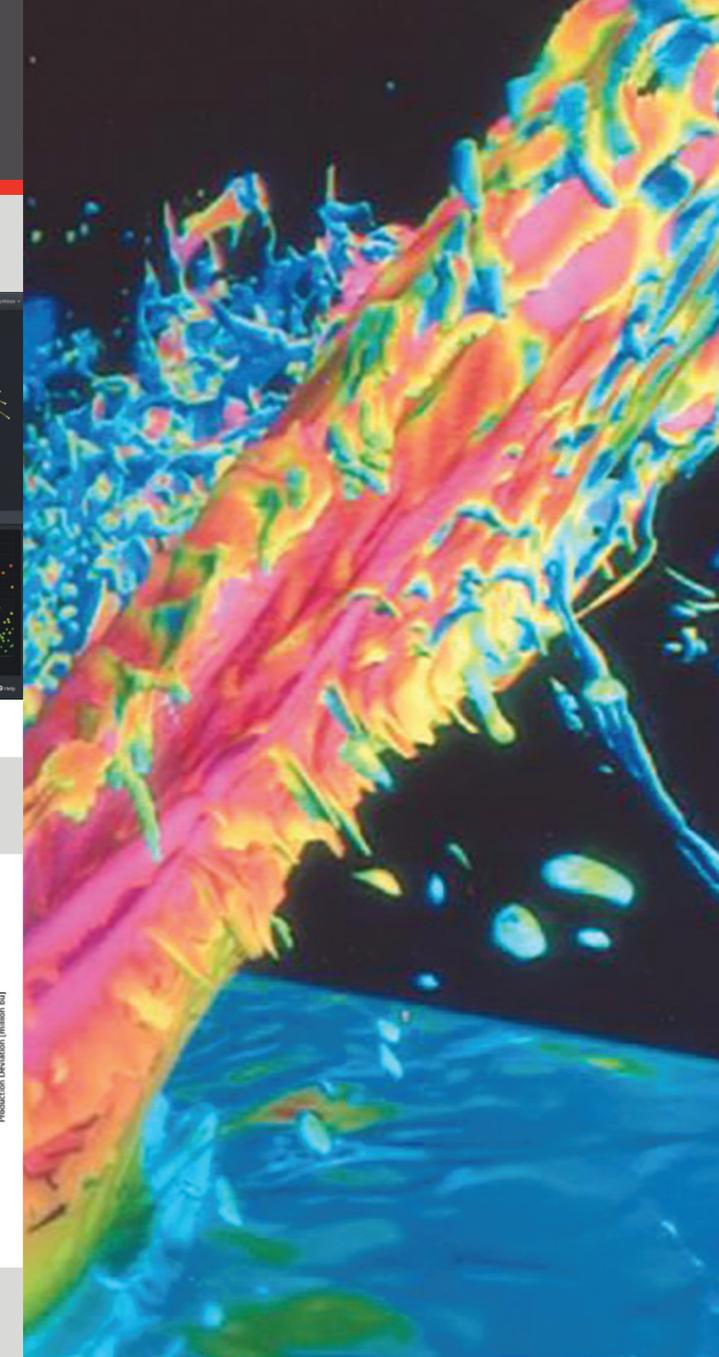
The rapidly growing quantum dot industry was demanding less-hazardous solutions and McDaniel saw an opportunity to manufacture these new materials at a lower cost than the toxic alternatives.

His new company, UbiQD, licensed the materials and manufacturing processes from MIT and Los Alamos, and his startup began operations at the New Mexico Consortium Los Alamos facility. UbiQD has taken advantage of the New Mexico Small Business Assistance Program and a 2015 Venture Acceleration Fund award.



Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by Los Alamos National Security, LLC, for the National Nuclear Security Administration of the U.S. Department of Energy under contract.

LA-UR-16-24596



IMPACT TO MISSION

Richard P. Feynman Center for Innovation
2015 Progress Report

OPENING THE APERTURE OF INNOVATION

Los Alamos National Laboratory continues to innovate. Our most inspired minds are making remarkable contributions in fields from satellites to curing cancer, and energy materials to energetics. What's more, new collaborations with industry are growing and increasing the impact of our contributions to the marketplace.

The United States Department of Energy (DOE) is supporting new initiatives such as the Small Business Voucher program, the Technology Commercialization Fund, the Clean Energy Manufacturing Initiative and the Technologist-In-Residence program, to invigorate innovation within its national laboratory system. Los Alamos is moving faster, with more impact, than ever before.

CHALLENGE

Globalization and the relative decline of the U.S. dominance in technology have far reaching implications. This challenges us to fast-track the creation and delivery of new technology to meet the needs of the nation. We must commit to improving how we **transition our technology to the customer and expand our ability to innovate.**

OBJECTIVES

To help frame our objectives at the Richard P. Feynman Center for Innovation to support the Laboratory and accelerate innovation, we're focusing on:

- executing current missions;
- helping to establish a strategic and balanced portfolio of program sponsors;
- contributing to stable and appropriately evolving capabilities;
- recognizing and enabling staff innovation;
- supporting deliberate partnering strategies;
- enhancing the Laboratory's reputation and impact; and
- promoting regional and national economic development.

INITIATIVES

Our initiatives improve how we patent, how our systems support our customers, and how to get to solutions more quickly.

Please visit our website to learn more about new forums, projects, and programs:

www.lanl.gov/feynmancenter



2015 RICHARD P. FEYNMAN INNOVATION PRIZE RECIPIENT: GARY GRIDER, HIGH PERFORMANCE COMPUTING

Celebrating the people that lead innovation at Los Alamos



This year's Richard P. Feynman Innovation Prize recognizes Gary Grider for his leadership in both high performance computing (HPC) mission work and his innovative use of partnerships at Los Alamos. Gary has earned his place as a thought leader in the HPC storage community.

Gary was a key contributor to two of the three dominant parallel clustered file systems in use today. His development of and continued work on the Parallel Log-structured File System (PLFS) directly impacts execution of the Laboratory's mission via the Trinity computing platform. PLFS is being deployed for the first time at extreme scale locally at Los Alamos. PLFS is also being used for new product development by many industry leaders including Intel, Data Direct Networks and Cooperative Research and Development Agreement (CRADA) partner EMC. PLFS is also a core technology in DOE's FastForward program targeted at eliminating barriers to exascale computing.

New efforts led by Gary in the HPC field include leading research under the Seagate CRADA to investigate power-managed disk and software solutions for deep data archiving, and designing the MarFS storage system—the first of its kind to utilize object storage at a massive scale with a first-class scalable POSIX name space. MarFS will improve Trinity's efficiency and has drawn interest from multiple corporate storage vendors.

INNOVATIONS:

- Lustre and Panasas, dominant parallel file systems
- Parallel Log-structured File System (PLFS)
- MarFS storage system
- Multi-Dimensional Hierarchical Indexing Middleware system

RECOGNITION:

- 2012 Distinguished Copyright Award for PLFS
- 2014 Named Top 16 People to Watch in High Performance Computing by HPCwire
- 2015 R&D 100 Finalist for Multi-Dimensional Hierarchical Indexing Middleware

Multiplicity Counter-15 Team

The MC-15 (Multiplicity Counter-15 tubes) is a neutron multiplicity instrument specifically designed for various tasks, specifically nuclear emergency response.

The impact of the MC-15 beyond Los Alamos is two-fold. First and foremost, it is a tool specifically to perform high performance passive diagnostics on threat objects for national security. The data gathered by this instrument is critical and used by emergency responders in developing recommendations for national-level decision makers. Second is its role in general neutron multiplicity work. Los Alamos is instrumental in developing a qualified manufacturing process that will deliver necessary quality instruments.

The MC-15 team has worked diligently over the years to make this instrument a reality. Their foresight in evolving mission requirements has already proven to be visionary for the new applications for this technology.

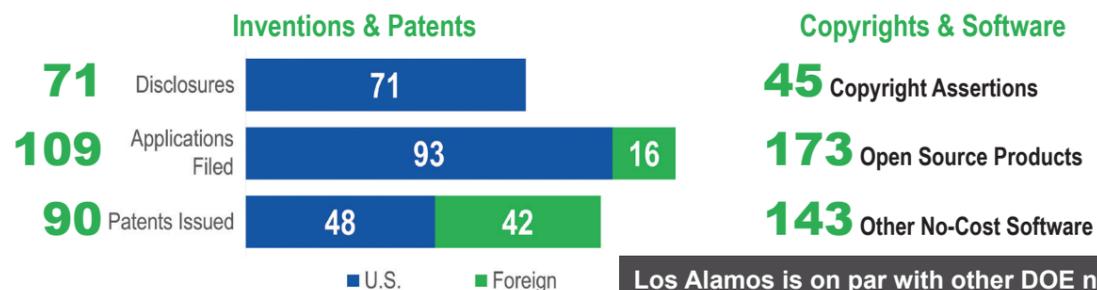


Back row: Gary Sundby, Chris Romero, Rick Rothrock, Kiril Ianakiev, Brian Rooney
First row: Sam Salazar, Metodi Iliev, Eric Sorensen, Mark Smith-Nelson

IMPACTING SCIENCE, TECHNOLOGY & DEPLOYMENT

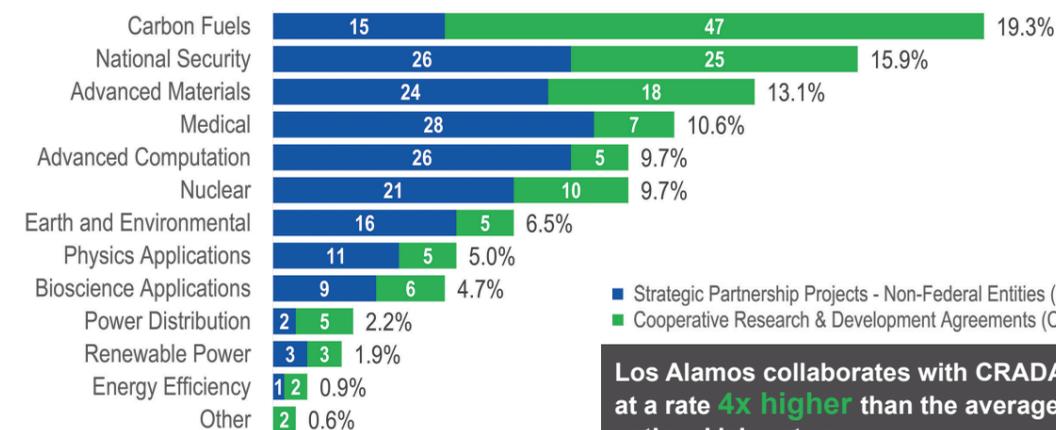
Proactive and collaborative investments in targeted research are necessary for critical national security science and technology needs.

INTELLECTUAL PROPERTY: Building Our Innovation Capacity for the Future



Los Alamos is on par with other DOE national laboratories in patenting and is in the **Top 5** for new copyright assertions.

PARTNERSHIPS: Collaborating to Accelerate U.S. Innovation



■ Strategic Partnership Projects - Non-Federal Entities (SPP-NFE)
■ Cooperative Research & Development Agreements (CRADA)

Los Alamos collaborates with CRADA partners at a rate **4x higher** than the average DOE national laboratory.

Economic Development: Transitioning Technology Solutions from Lab to Market



The Venture Acceleration Fund (VAF) provides seed funding to early stage companies with the goal to add jobs and revenue in northern New Mexico.

\$3.2M
Total Investment 2006-2015
\$138.1M*
Total \$ Results Realized by Companies 2006-2015

* Cumulative program totals. Surveys, conducted by a third-party contractor, were performed with clients in each program within one year of project completion.



The New Mexico Small Business Assistance (NMSBA) Program provides New Mexico small businesses with access to laboratory expertise and cutting-edge technologies at Los Alamos and Sandia national laboratories to solve technical challenges.

336
Total Companies Assisted 2015
19%*
Return on Investment

Licensing Program

Los Alamos' Licensing Program moves technologies to the market for the benefit of the U.S. economy.

114 14 (Patents) 91 (Copyrights) 9 (Other)

\$2.4M
Total License Income 2015
\$90.2M
Cumulative Economic Impact 2015†

† Estimated sales based on 2% earned royalties defined by the National Institute of Science and Technology

The economic impact of VAF companies is **43x** our investment, and for NMSBA clients, **11x** the State of New Mexico's investment.

CONTACTS

Richard P. Feynman Center for Innovation
505.665.9090
feynmancenter@lanl.gov

Jerome Garcia
Business Development
fci-bd@lanl.gov

Marcus Lucero
Licensing
licensing@lanl.gov

Kathleen McDonald
Intellectual Property
fci-ip@lanl.gov

Shandra Clow
Economic Development
fci-edev@lanl.gov

Nina Epperson
Agreements and Sponsored Projects
nina_e@lanl.gov