

# Advancing Innovation Through Partnerships

2011-2012 Technology Transfer Progress Report



**Innovate Locally. Impact Globally.**







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*“Our strategy as a multi-program national security capability laboratory is to develop and apply the best science, technology and engineering solutions to the toughest national security missions.”*

*-Charlie McMillan  
Laboratory Director, LANL*



*“Our partners tell the most powerful stories about success in innovation, driving public awareness of the Laboratory, our people and our programs.”*

*-Duncan McBranch  
Chief Technology Officer, LANL*

**In reflecting on the last two fiscal years,** we see ample cause to celebrate innovation at Los Alamos National Laboratory. Innovation, characterized as the combination of invention, translation, and commercialization, is a process central to the health and success of any institution. Taking this one step further, innovation and the transfer of technology across Laboratory boundaries plays an essential role in improving the quality and security of the outside world. For this reason, it is exciting to assess the breadth and quality of our technical work through the lens of innovation, where commercial outcomes, valuable partnerships and real world impact bring into focus our achievements here at Los Alamos.

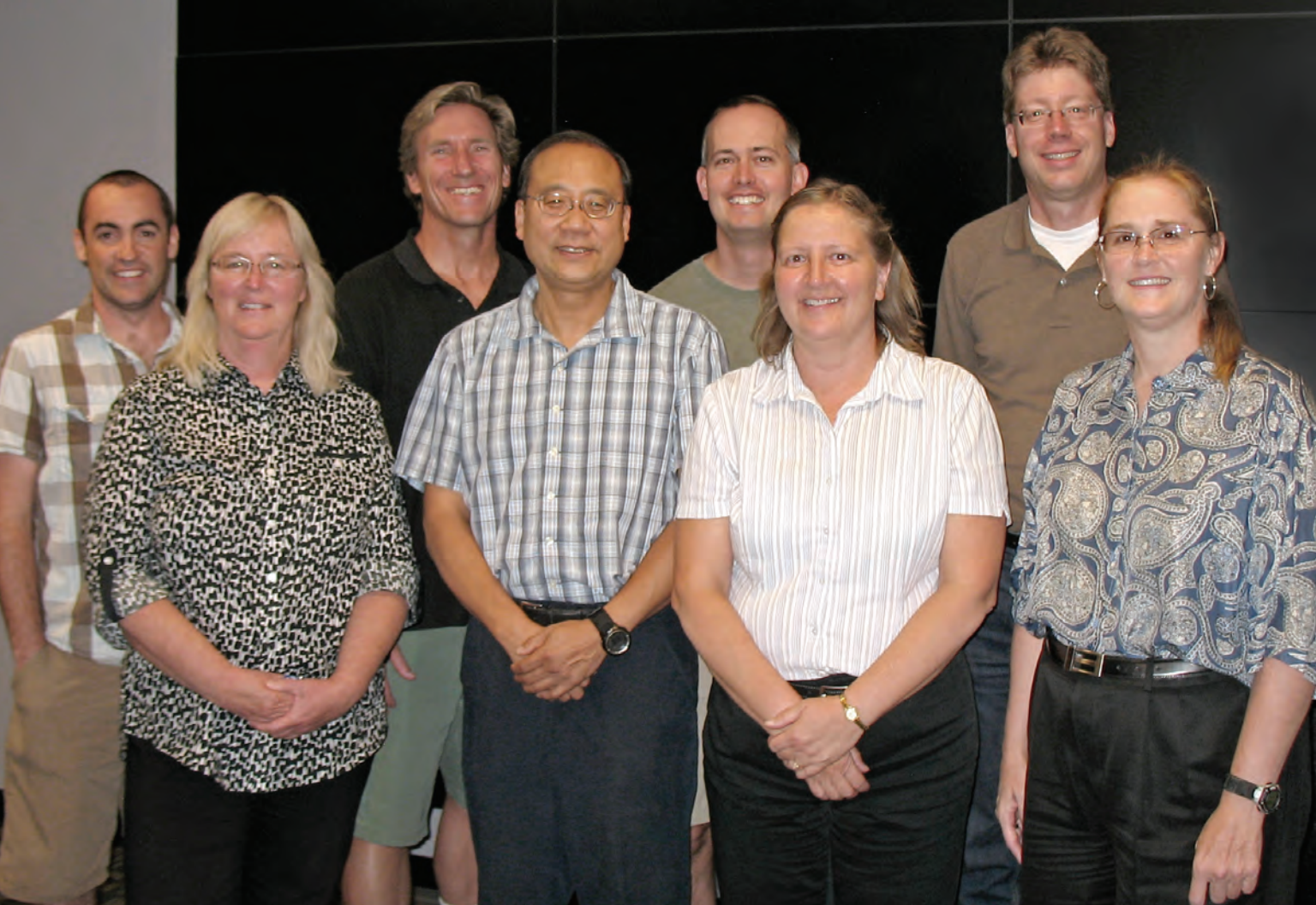


As we celebrate the Laboratory’s 70th anniversary, we have the opportunity to reflect on the rich history of this institution even as we actively prepare for the future. Take the case of Richard Feynman, one of the iconic physicists at Los Alamos during the Manhattan project. Feynman not only revolutionized the approach to computation in weapons design during his tenure here, he was also one of the first patent holders at Los Alamos. When Feynman moved on to academia to make breakthrough contributions in physics, including his most celebrated work in quantum electrodynamics, he left Los Alamos with much to consider, particularly about the interplay between world class science and its tie-backs to mission. His legacy challenges us to explore the equilibrium between a culture of regulated compliance and a culture of ideas, which bears strongly on the Laboratory’s ability to attract, develop and deploy its best technical minds.

With the outstanding assembly of technical resources that Los Alamos enjoys, it is important to think about how the Laboratory contributes to one of the key U.S. national security advantages: the ability to transition ideas into technical products that increase competitiveness. Our Division is working hard to support the Laboratory in a renewed spirit of innovation that blends discovery science with national security outcomes. The following report captures the stories, the individuals and the outcomes that Los Alamos takes great pride in celebrating. We look forward to working with you as we transition many more Laboratory ideas beyond our borders to help make the world a safer and better place.

David Pesiri  
Technology Transfer Division Leader





Above: Dr. Michael Hamada and team  
Right: Dr. Harold Martz

## The Richard Feynman Prize for Innovation Achievement

*“It is in the admission of ignorance and the admission of uncertainty that there is a hope for the continuous motion of human beings in some direction that doesn’t get confined, permanently blocked, as it has so many times before in various periods in the history of man.”*

*Dr. Richard Feynman*

Beginning this year, individual contributions to innovation at Los Alamos National Laboratory (LANL) are being recognized with the Richard Feynman Prize for Innovation Achievement Award. In awarding this prize, the Laboratory is celebrating accomplishments in innovation by recognizing past achievements and inviting future innovators to play this vital role in service to the nation.

This first annual Richard Feynman Prize for Innovation Achievement Award recognizes Harry Martz, Mike Hamada, and the LANL team of researchers who collaborated with Procter & Gamble beginning in 1995 and produced a fundamental change in how the company views and manages its manufacturing productivity. Their breakthrough resulted in a cost savings of over a billion dollars a year, and led the company to re-imagine manufacturing as a competitive advantage, not just as the cost of doing business.

Their breakthrough was a software simulation that today is part of a larger CEO-to-factory floor operations method called Reliability Technology (RT), and is proliferating into other high-speed, high-volume industrial sectors. P&G and its scale-up partner, the Ernst & Young Company, are also employed in an experiment to selectively apply the method to LANL’s sensitive materials handling program. The original innovation has had the power to transform many areas of U.S. manufacturing, and now its legacy is returning to the Laboratory to reduce costs in the interest of U.S. national security. This is the long shadow cast by the original innovation of Dr. Hamada and Dr. Martz.

Please join the Laboratory in this salute to innovation, and in recognizing Dr. Harold Martz and Dr. Michael Hamada for their lifetime achievement.





G DATA COMPUTING


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IT SOLUTIONS


## EMC Corporation

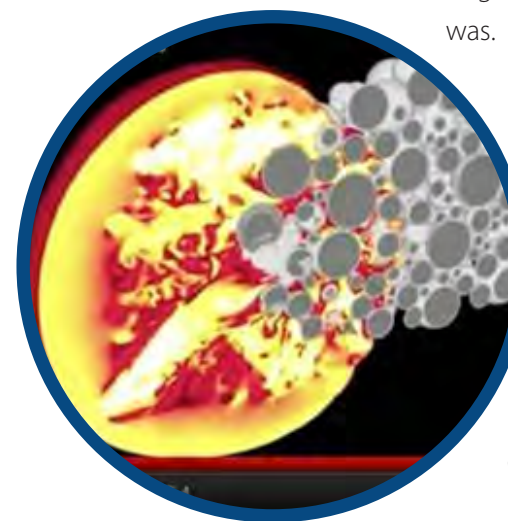
***“Our partnership with LANL has brought us all into an exciting new era where we get a once in a career opportunity to redesign the entire storage architecture using cutting edge innovations in both hardware and software.”***

*Percy Tzelnic, Senior Vice President and Fellow, EMC*

EMC is a global leader in enabling businesses and service providers to transform their operations and deliver information through cloud computing. By creating innovative products and services, EMC is accelerating the journey to cloud computing by helping their customers store, manage, protect and analyze their information, in a more agile, trusted and cost-efficient way.

Together, Los Alamos National Laboratory (LANL) and EMC, are enhancing, designing, building, testing and deploying new cutting-edge technologies in an effort to meet some of the nation’s most difficult information technology challenges. Thus far, the LANL and EMC collaboration has been engaged in high-performance computing and data storage research, as well as large-scale analytics.

One of EMC’s innovative products is a flash appliance, called the Active Burst Buffer Appliance, or aBBa, which helps extreme scale high-performance computing set-ups run faster and smoother. It acts like a very fast book mark: when one of the millions of parts that make up a supercomputer fails; the tightly coupled application can quickly get back to where it was.



A key software development in the operation of aBBa and other computing platforms is Parallel Log-structured File System (PLFS). PLFS, designed and developed at LANL, is an open-source, extremely scalable data-management middleware library that can be used with everything from small clusters of computers to the largest supercomputers in the world. This technology is file-system agnostic and could improve computing efficiency significantly.



## Chevron Partnership

***“We are pleased to support the work of outstanding research facilities like Los Alamos National Laboratory. Energy is a collaborative venture, and some of the best solutions are built through partnerships.”***

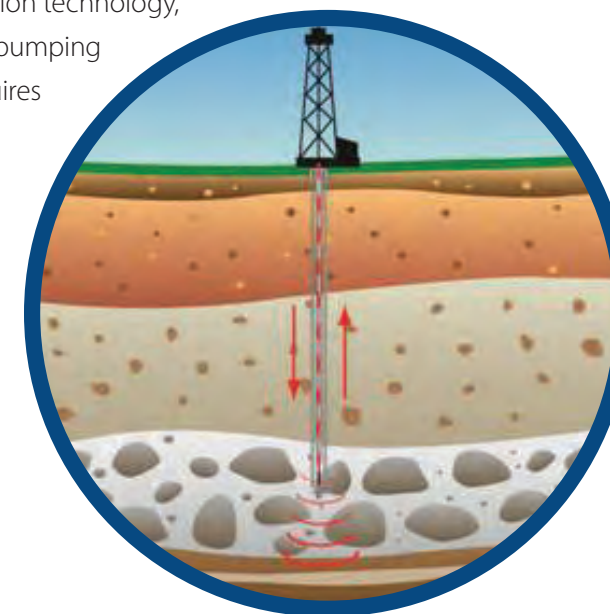
*Manny Gonzales, Alliance Manager at Chevron Energy Technology Co.*

A commitment to partnership is a central value and major source of strength for Chevron. Their collaboration with Los Alamos National Laboratory (LANL) enables technologies first developed for national security to be advanced and applied in unique ways to the oil field.

The newly commercialized Inficomm™ communication system shows how this collaboration process can work. Inficomm technology began as a LANL project for use in military communications. To develop it for downhole use, Chevron turned to its Area 52 research facility. Area 52 is comprised primarily of recent retirees from LANL and provides Chevron with a prototyping facility that can rapidly transfer LANL technologies into the market.

Inficomm technology reliably transmits real-time pressure and temperature data from depths as great as 25,000 ft (7,620m). It is paired with a companion technology, TruDepth™, that identifies oil and water levels in the pumping well. Unlike current systems, neither technology requires batteries or wires running from the surface to the bottom of the wellbore. This results in decreased costs and increased reliability relative to the sensors currently used.

The Inficomm system promises to be an important technology for production and reservoir management and is currently in the commercialization and manufacturing phase.







## Decision Sciences International Corporation

*"The Multi-Mode Passive Detection System is safe, effective, reliable and accurate, and represents the best of American scientific innovation."*

*Decision Sciences President and CEO Dr. Stanton D. Sloane*

Decision Sciences International Corporation provides advanced technology for security and detection systems. In August of 2012, the company deployed its first fully operational Multi-Mode Passive Detection System (MMPDS) at Freeport Container Port in the Bahamas. This advanced scanning device locates unshielded to heavily-shielded nuclear and radiological threats inside cargo containers and all types of vehicles and rail cars. Additional modality enables explosive and contraband detection.



Cargo containers offer an attractive mechanism for terrorists to deliver a potential nuclear disaster. While a nuclear explosion at a port would be catastrophic, there does not have to be an explosion to cause devastation. The discovery of a device in a container would be enough to shut down the global supply chain, causing the closure of hundreds of ports and resulting in hundreds of billions of dollars in damage to the national and global economies. Recovery could take years.

Decision Sciences' MMPDS, which is based on technology originally developed at Los Alamos National Laboratory, is a technological breakthrough that harnesses nature by detecting and tracking muons. Produced from cosmic rays entering the earth's upper atmosphere, muons naturally and harmlessly rain down on the planet's surface.

Since MMPDS is completely passive, there are no radiation or safety issues relative to its use. It can safely scan all types of cargo, and is harmless to animals, people, food and other materials sensitive to high energy radiation. Because of its ability to see through heavy shielding, MMPDS can provide an effective defense against nuclear smuggling.





## RockSmith Precision Machining, Inc.

*“The new customer relationships we have developed as a result of the tech transfer license procedure have really put the name RockSmith out into the world of Explosive Ordnance Disposal.”*

*Laney Smith, Co-owner RockSmith Precision Machining, Inc.*



Laney Smith and Tom Rock were ready to diversify their RockSmith Precision Machining custom machine shop business. They jumped at the chance to collaborate at Los Alamos National Laboratory (LANL) Intelligence Analysis & Technology group in developing an extended reach utility tool to safely disable explosive devices.

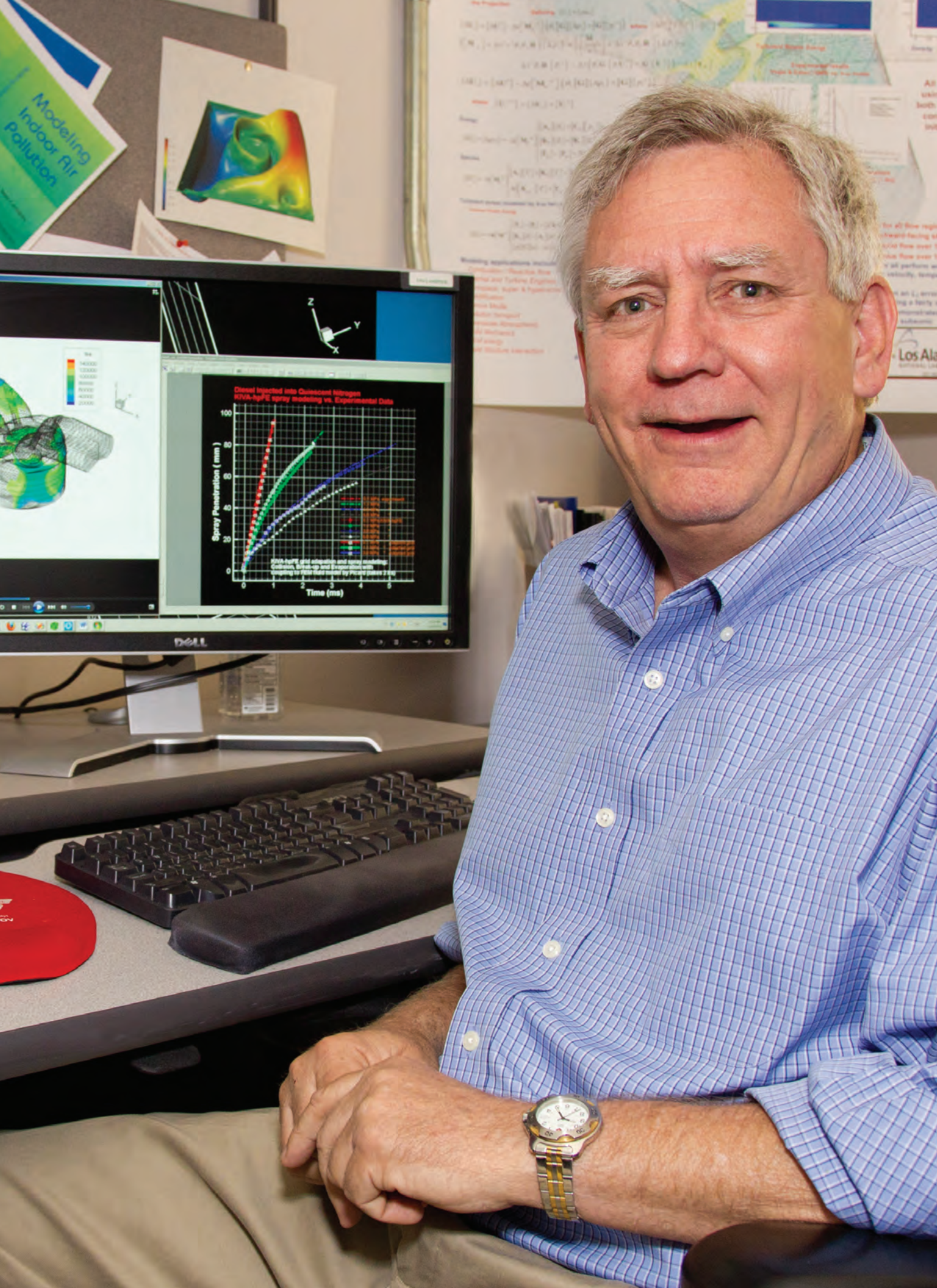
The project with LANL was successful, and in 2010 RockSmith bid for the production of 80 utility tool kits that were completed in September 2011.

The need for bomb disposal tools continues to grow as many state and local authorities become more active with bomb disposal. RockSmith’s goal is to be an early supplier of these tools. There are currently no such products on the market; therefore, the potential to establish expertise in this field is high and the time to enter the market is good.

To enter into this market, the company had to machine and mass-produce the intricate tools for their customers. But they didn’t realize they were missing two of the key elements for success: increased production and better inventory control. Through the New Mexico Small Business Assistance Program at LANL, New Mexico Manufacturing Extension Partnership (NM MEP) helped RockSmith organize their manufacturing process to increase capacity and provide precise delivery estimates for the tools.

RockSmith expects more positive results from working with the LANL team and NM MEP. By acquiring new products, learning better business practices and making more industry contacts, they aim to put themselves and northern New Mexico on the industrial map.





## KIVA Software

***“We are finding it [KIVA] quite accurate for simulating air jets and air-mist water sprays. The modeling results on free air-mist agree very well with experimental ones and the predictions concerning impinging mists look very encouraging.”***

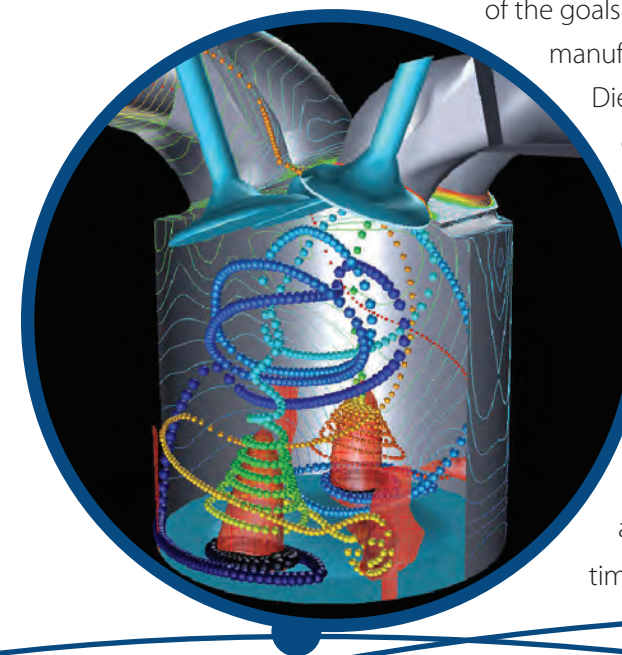
*A. Humberto Castillejos E, Ph.D., Prof. of Metallurgical Engineering at Centro de Investigación y de Estudios Avanzados del IPN*

LANL’s Computational Fluid Dynamics expertise hails from the very beginning of the Manhattan Project in the 1940s. Over the decades, this core Laboratory capability transformed into KIVA, an internal combustion engine modeling tool designed to help make automotive engines more fuel-efficient and cleaner-burning.

KIVA is a family of Fortran-based Computational Fluid Dynamics (CFD) software that predicts complex fuel and air flows as well as ignition, combustion, and pollutant-formation processes in engines. Employing KIVA software helps to optimize internal combustion engine processes, including diesel engines, for higher efficiency and lower emissions.

This software is ever evolving and continues building from its origins. The software team is constantly employing the newest algorithms, numerical methods, and models in response to industry needs. Each version has added significant elements to the previous licensed version. One

of the goals of U.S. and foreign automakers and engine manufactures (e.g. Cummins, Caterpillar, Detroit Diesel, John Deere) is to optimize combustion engines with the objective of reducing fuel usage, retaining or increasing power and reducing undesirable emissions.



The demand for the KIVA code was so great that a limited-functionality version was made available at no cost. This free version of KIVA can be accessed online in a matter of minutes by users anywhere in the world and has been downloaded more than 400 times since January 2012.



## The National Institutes of Health's Models of Infectious Disease Agent Study (MIDAS)

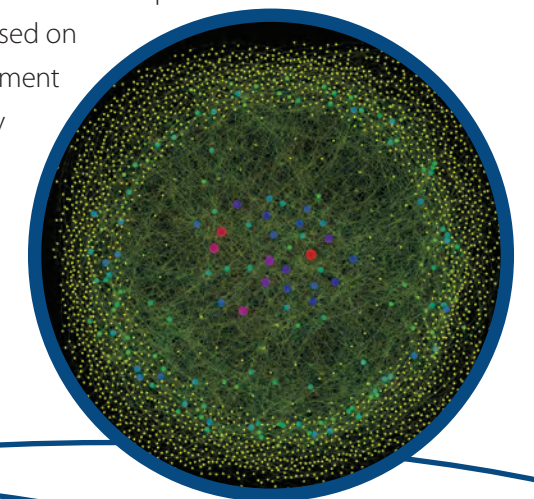
*"Until we understand and incorporate these complex social dynamics in our models, we won't be able to accurately predict the spread of epidemics."*

*Sara Del Valle, Energy & Infrastructure Analysis*

In 2011, The National Institutes of Health awarded a five-year Models of Infectious Disease Agent Study (MIDAS) grant to a team of researchers from Los Alamos National Laboratory (LANL) and Tulane University. This team, lead by principal investigator Sara Del Valle, connects social media and epidemiological research in an attempt to predict people's social behavior and quantify uncertainty during an epidemic. If successful, the study could lead to improvements in the computer models used to simulate disease outbreaks, thus saving lives as well as millions of dollars in epidemic response planning.

As an example, in 2009, many people were afraid of getting infected with pandemic H1N1 influenza and changed their behavior. Through social media, LANL scientists were able to quantify the degree to which some people started wearing surgical masks and the resulting impact on disease spread. If there's a new pandemic, scientists can start tracking what people are tweeting and use this information to make better predictions of how likely they are to change their behavior, such as getting vaccinated, washing their hands, or wearing a mask. In addition, they are estimating the geographic and demographic contact patterns for the U.S. in order to develop social contact networks and predict the spread of behaviors. Based on the results of the model, public health practitioners and government agencies can change their communication strategies and policy decisions.

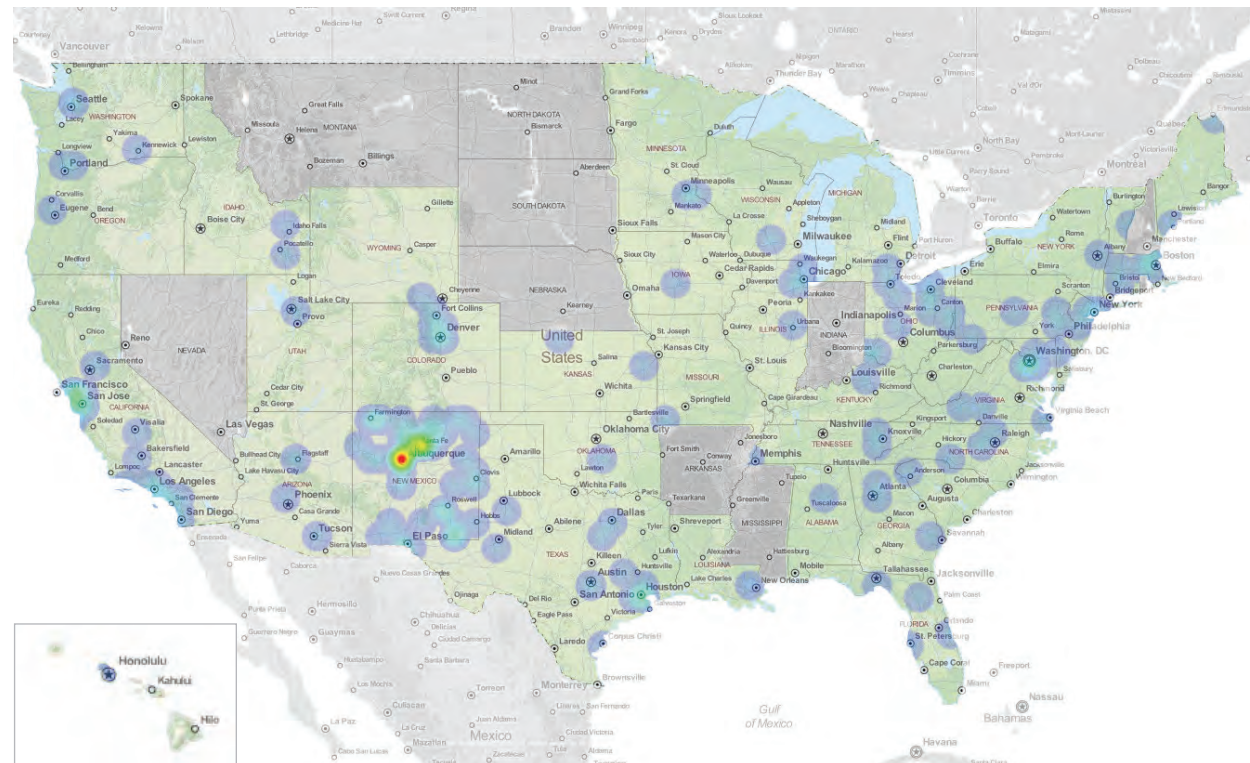
Studies such as this one can help improve all existing epidemiological models, furthering the ability of public health practitioners and policymakers to effectively manage a burgeoning epidemic.





# Performance Metrics Cont.

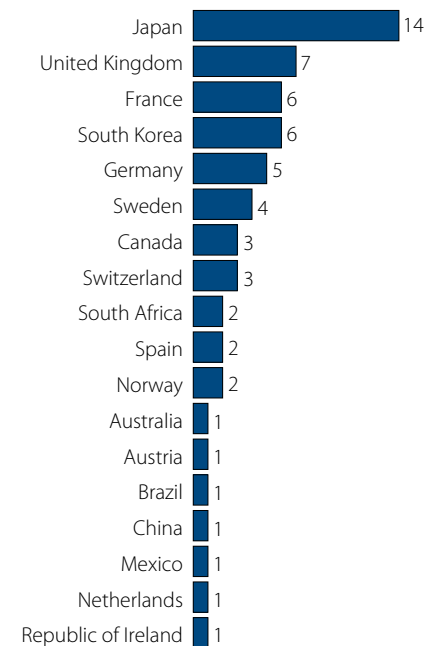
## Number of Projects and Agreements from 2009 to 2012



Between 2009 and 2012 LANL collaborated with non-DOE government agencies, private companies and research institutions in 40 out of the 50 United States and 18 countries worldwide. These collaborations have generated 831 new or amended projects through the following types of agreements:

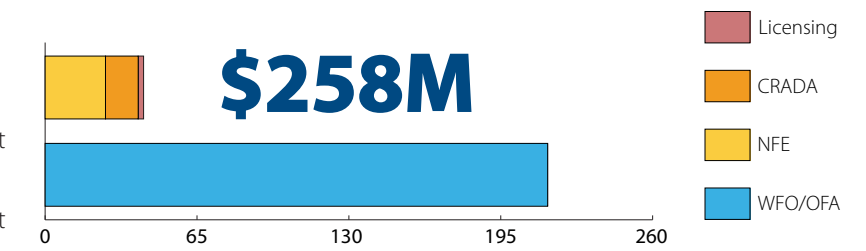
- Collaborate Research & Development Agreements (CRADAs)
- Licenses of LANL technology
- Work-For-Others with Non-Federal Entities (WFO-NFE)
- User Facility Agreements (UFAs)
- Venture Acceleration Fund (VAF) Awards
- New Mexico Small Business Assistance (NMSBA) projects
- LabStart companies

## Global Impact Count

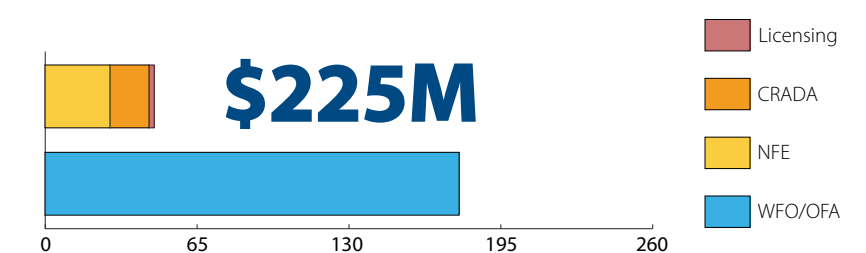


# Performance Metrics

## 2011 Revenue by Category

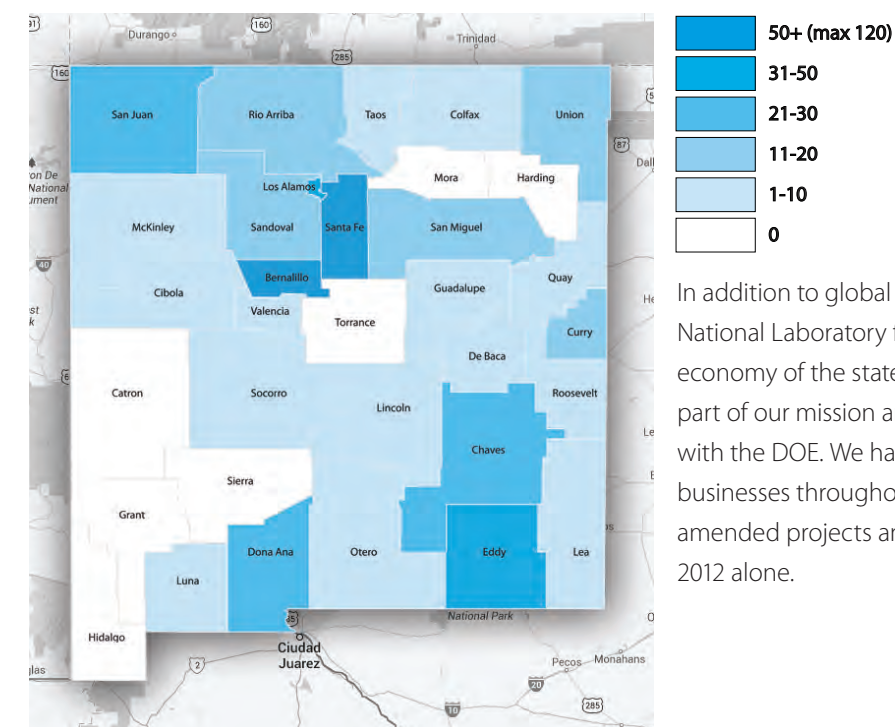


## 2012 Revenue by Category



The role of technology transfer at Los Alamos National Laboratory (LANL) is to deliver Laboratory technology to our customers to meet national security needs, increase US competitiveness and bring significant benefit to the health, security and sustainability of our society. LANL experienced exceptional revenues in FY 2011 and 2012. Licensing income reached an all-time high of \$2.32M in FY 2011, which was followed closely by \$2.14M in 2012. We also experienced increases in income from Cooperative Research and Development Agreements (\$14M and \$16.7M in 2011 and 2012 respectively) and Work for Others: Non-Federal Entities (\$25.9M and \$27.9M in 2011 and 2012). We do business with federal agencies outside the Department of Energy to leverage science within the federal government; revenue from these agencies accounted for \$216M in 2011 and \$178M in 2012.

## Number of Projects and Agreements in 2011 and 2012

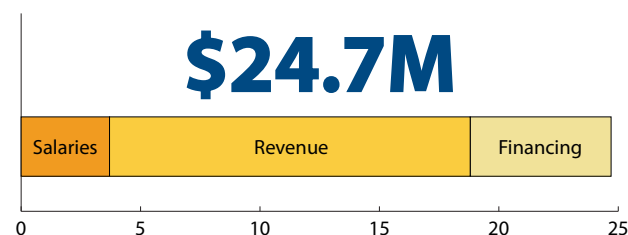


In addition to global collaborations, Los Alamos National Laboratory focuses on developing the economy of the state of New Mexico. In fact, it is part of our mission and a requirement of our contract with the DOE. We have served both small and large businesses throughout the state, with 530 new or amended projects and agreements created in 2011 and 2012 alone.



# Economic Impacts

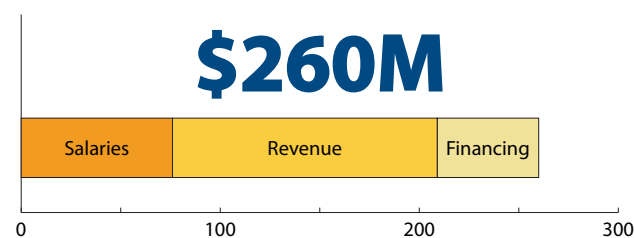
## Los Alamos National Security Venture Acceleration Fund (VAF)



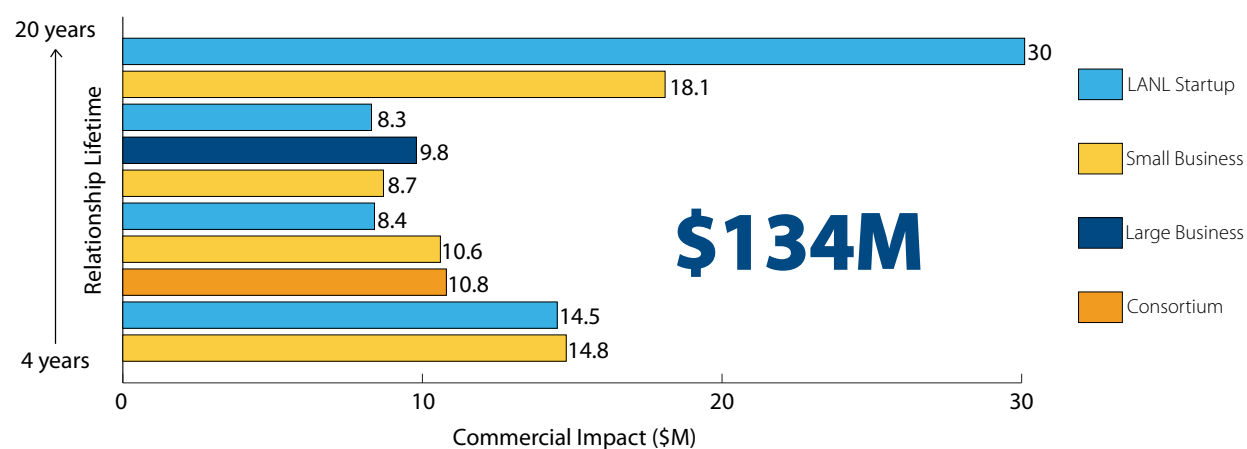
VAF helps Northern New Mexico companies commercialize technology and take it to market faster. To date, 30 innovative technology companies have increased revenues by \$15.1M and attracted \$5.9M of new funding and financing as a direct result of VAF. These clients also added nearly 50 jobs with salaries totaling \$3.4M. So far the total return on investment is \$24.7M.

## The New Mexico Small Business Assistance (NMSBA) Program

The NMSBA Program helps New Mexico small businesses solve technical challenges using laboratory expertise from Los Alamos and Sandia National Laboratories. Since 2007, nearly 1820 companies have participated. These clients have created and retained 2379 jobs with salaries totaling \$75.8M, experienced revenue growth of \$133.3M, and received outside financing of \$51.7M. The total return on the State of New Mexico investment is over \$260M dollars.



## Top 10 Industry Relationships with Commercial Impact (Licensing)



The road to commercialization requires a strong and often long relationship with a company. Of LANL's most successful relationships, many have been around for as long as 20 years. Our top 10 commercial relationships, depicted above, range from those fueled as start-ups to working with an industry consortium, all resulting in more than \$134M of commercial impact.

## Patents Issued in 2011

- |  |   |   |
|--|---|---|
| Acoustic Concentration of Particles in Fluid Flow<br>U.S. Patent # 7,837,040   | Explosive Complexes<br>U.S. Patent # 7,999,116  | Microwave Determination of Location and Speed of an Object inside a Pipe<br>U.S. Patent # 7,852,091   |
| Active Terahertz Metamaterial Devices<br>U.S. Patent # 7,826,504   | Fiber Optical Assembly for Fluorescence Spectrometry<br>U.S. Patent # 7,847,941   | Mixed Semiconductor Nanocrystal Compositions<br>U.S. Patent # 7,888,855   |
| Adaptive Real-Time Methodology for Optimizing Energy-Efficient Computing<br>U.S. Patent # 7,971,073  | Flat-Panel X-Ray with Reduced Internal Scattering for Improved Attenuation Accuracy and Dynamic Range<br>U.S. Patent # 7,812,314              | Mosaic Clade M Human Immunodeficiency Virus Type 1 (HIV-1) Envelope Immunogens<br>U.S. Patent # 7,951,377   |
| Anion-Conducting Polymer, Composition, and Membrane<br>U.S. Patent # 7,846,980   | Flow Method and Apparatus for Screening Chemicals Using Micro X-Ray Fluorescence<br>U.S. Patent # 7,929,662                                   | Multimodal Radiation Imager<br>U.S. Patent # 7,863,567  |
| Anomalous Change Detection in Imagery<br>U.S. Patent # 7,953,280   | Highly Thermostable Fluorescent Proteins<br>U.S. Patent # 7,910,700   | Multiplexed Lateral Flow Microarray Assay for Detection of Citrus Pathogens Xylella Fastidiosa and Xanthomonas Axonopodis Pv Citri<br>U.S. Patent # 7,910,309                     |
| Apparatus for Producing Voltage and Current Pulses<br>U.S. Patent # 7,855,904  | Hydrogen Sensor<br>U.S. Patent # 7,839,499  | Nanophosphor Composite Scintillators Comprising a Polymer Matrix<br>U.S. Patent # 7,834,319   |
| Buffer Layers for Coated Conductors<br>U.S. Patent # 8,003,571   | In-Line Stirling Energy System<br>U.S. Patent # 7,908,856   | Non-Aqueous Liquid Compositions Comprising Ion Exchange Polymers<br>U.S. Patent # 7,981,319   |
| Carbon Microtubes<br>U.S. Patent # 7,959,889   | Integrated Calibration Sphere and Calibration Step Fixture for Improved Coordinate Measurement Machine Calibration<br>U.S. Patent # 7,908,756 | Non-Contact Feature Detection Using Ultrasonic Lamb Waves<br>U.S. Patent # 7,963,165  |
| Circular Permutant GFP Insertion Folding Reporters<br>U.S. Patent # 7,960,144  | Isotopically Labeled Compositions and Method<br>U.S. Patent # 7,977,102   | Nucleic Acid Encoding a Self-Assembling Split-Fluorescent Protein System<br>U.S. Patent # 7,955,821   |
| Coating for Leak Detection and Method<br>U.S. Patent # 7,915,047   | Measuring Momentum for Charged Particle Tomography<br>U.S. Patent # 7,838,841   | Optoelectronic Devices Utilizing Materials Having Enhanced Electronic Transitions<br>U.S. Patent # 7,893,512  |
| Controlling the Pressure within an Annular Volume of a Wellbore<br>U.S. Patent # 7,870,905<br>U.S. Patent # 7,950,460<br>U.S. Patent # 7,963,333 | Metal-Polymer Composites Comprising Nanostructures and Applications Thereof<br>U.S. Patent # 7,988,887  | Polymorphous Computing Fabric<br>U.S. Patent # 7,873,811  |
| Desensitization of Metastable Intermolecular Composites<br>U.S. Patent # 7,931,764   | Method and Apparatus for Detecting Explosives<br>U.S. Patent # 7,939,803  | Polynucleotides Encoding Anti-Sulfotyrosine Antibodies<br>U.S. Patent # 7,868,152   |
| Determination of Time Zero from a Charged Particle Detector<br>U.S. Patent # 7,908,121   | Method and Apparatus for Measuring Enrichment of UF6<br>U.S. Patent # 7,957,504   | Portable Sample Preparation and Analysis System for Micron and Sub-Micron Particle Characterization Using Light Scattering and Absorption Spectroscopy<br>U.S. Patent # 7,986,399 |
| Determining Effects of Turbine Blades on Fluid Motion<br>U.S. Patent # 7,953,563   | Method for Detecting Binding Events Using Micro-X-Ray Fluorescence Spectrometry<br>U.S. Patent # 7,858,385                                    | Preparation of A Dense, Polycrystalline Ceramic Structure<br>U.S. Patent # 7,846,378  |
| Device and Method for Generating a Beam of Acoustic Energy from a Borehole, and Applications Thereof<br>U.S. Patent # 7,839,718                  | Method of Making Chalcogen Catalysts for Polymer Electrolyte Fuel Cells<br>U.S. Patent # 7,851,399  |   |
| Diamond-Silicon Carbide Composite and Method<br>U.S. Patent # 7,959,841  |   |   |
| Energy Efficient Synthesis of Boranes<br>U.S. Patent # 7,837,852   |   |   |



**2011 Patents Cont.**

Preparation of Bulk Superhard B-C-N Nanocomposite Compact  
U.S. Patent # 7,938,997

Primary Explosives  
U.S. Patent # 7,875,725

Proboscis Extension Reflex Platform for Volatiles and Semi-volatiles Detection  
U.S. Patent # 7,841,226

Regeneration of Polyborazylene  
U.S. Patent # 7,846,410

Semiconductor Neutron Detector  
U.S. Patent # 7,902,517

Synthesis of Fluorescent Metal Nanoclusters  
U.S. Patent # 7,914,588

System and Method for Measuring Particles in a Sample Stream of a Flow Cytometer or the Like  
U.S. Patent # 7,835,000

System and Method for Knowledge Based Matching of Users in a Network  
U.S. Patent # 7,933,856

Thick-Shell Nanocrystal Quantum Dots  
U.S. Patent # 7,935,419

Wide Band Gap Semiconductor Templates  
U.S. Patent # 7,851,412

X-Ray Radiography for Container Inspection  
U.S. Patent # 7,957,505

**Patents Issued in 2012**

A Photo Stimulated Low Electron Temperature High Current Diamond Film Field Emission Cathode  
U.S. Patent # 8,227,985

Actinide/Beryllium Neutron Sources with Reduced Dispersion Characteristics  
Patent # 8,241,532

Activation of Molecular Catalysts Using Semiconductor Quantum Dots  
U.S. Patent # 8,029,652

Advanced Membrane Electrode Assemblies for Fuel Cells  
U.S. Patent # 8,227,147

Analytical Effective Tensor for Flow-Through Composites  
U.S. Patent # 8,204,690

Anion-Conducting Polymer, Composition and Membrane  
U.S. Patent # 8,063,111

Anti-Influenza M2e Antibody  
U.S. Patent # 8,080,244

Apparatus and Method for Measuring Critical Current Properties of a Coated Conductor  
U.S. Patent # 8,228,055

Apparatus and Method for Phase Fronts Based on Superluminal Polarization Current  
U.S. Patent # 8,125,385

Apparatus for Separating Particles Utilizing Engineering Acoustic Contrast Capture Particles  
U.S. Patent # 8,083,068

Chemical Solution Deposition Method of Fabricating Highly Aligned MgO Templates  
U.S. Patent # 8,088,503

Code Division Multiple Access Signaling for Modulated Reflector Technology  
U.S. Patent # 8,170,079

Combining Multi-Layered Bitmap Files Using Network-Specific Hardware  
U.S. Patent # 8,125,486

Determining Effects of Turbine Blades on Fluid Motion  
U.S. Patent # 8,170,813

Dynamic Radioactive Particle Source  
U.S. Patent # 8,207,490

Energy Efficient Synthesis of Boranes  
U.S. Patent # 8,101,786

Enrichment of Light Hydrocarbon Mixture  
U.S. Patent # 8,066,852

Fibrous Composites Comprising Carbon Nanotubes and Silica  
U.S. Patent # 8,034,448

Flexible, Scalable, Service-Oriented Surveillance System Architecture  
U.S. Patent # 8,183,994

Gas Separation Using Ultrasound and Light Absorption  
U.S. Patent # 8,231,707

Immunogenic Compositions Comprising Human Immunodeficiency Virus (HIV) Mosaic NEF Proteins  
U.S. Patent # 8,119,140

Isotopically Labeled Compositions and Method  
U.S. Patent # 8,247,234

Kerogen Extraction from Subterranean Oil Shale Resources  
U.S. Patent # 8,104,536

Metal-Polymer Composites Comprising Nanostructures and Applications Thereof  
U.S. Patent # 8,148,294

Method and System for Generating a Beam of Acoustic Energy from a Borehole, and Applications Thereof  
U.S. Patent # 8,116,167

Method for Non-Contact Particle Manipulation and Control of Particle Spacing Along an Axis  
U.S. Patent # 8,263,407

Method of Fabricating Metal-Matrix Composites and Functionalized Textiles  
U.S. Patent # 8,157,948

Nanocrystal Structures  
U.S. Patent # 8,121,162

Nanocrystal/Sol-Gel Nanocomposites  
U.S. Patent # 8,198,336

Non-Aqueous Liquid Compositions Comprising Ion Exchange Polymers Reference to Related Application  
U.S. Patent # 8,236,207

Non-Contact Fluid Characterization in Containers Using Ultrasonic Waves  
U.S. Patent # 8,176,783

Non-invasive Fluid Density and Viscosity Measurement  
U.S. Patent # 8,166,801

**2012 Patents Cont.**

Novel Thermostable Fluorescent Proteins  
U.S. Patent # 8,067,541  
U.S. Patent # 8,168,411

Nucleic Acids Encoding Modified Human Immunodeficiency Virus Type 1 (HIV-1) Group M Consensus Envelope Glycoproteins  
U.S. Patent # 8,071,107

Particle Analysis in an Acoustic Cytometer  
U.S. Patent # 8,266,950 (Apparatus)  
U.S. Patent # 8,266,951 (Method)

Particle Detection and Applications in Security and Portal Monitoring  
U.S. Patent # 8,247,767

Plasmids and Packaging Cell Lines for Use in Phage Display  
U.S. Patent # 8,227,242

Polymer-Assisted Deposition of Films  
U.S. Patent # 8,124,176

Porous Light-Emitting Compositions  
U.S. Patent # 8,158,247

Projectile Containing Metastable Intermolecular Composites and Spot Fire Method of Use  
U.S. Patent # 8,230,937

Purification of Water from Cooling Towers and Other Heat Exchange Systems  
U.S. Patent # 8,236,181

Real Time Measurement of Shock Pressure  
U.S. Patent # 8,135,244

Remote Detection of Electronic Devices  
U.S. Patent # 8,275,334

Scintillator Having A MgAl<sub>2</sub>O<sub>4</sub> Host Lattice  
U.S. Patent # 8,080,175

Separation of Single-Walled Carbon Nanotubes into Chirally Enriched Fractions  
U.S. Patent # 8,153,014

Single-Exciton Nanocrystal Laser  
U.S. Patent # 8,098,700

Spent Nuclear Fuel Recycling with Plasma Reduction and Etching  
U.S. Patent # 8,192,704

Synthesis of [1-<sup>13</sup>C]Pyruvic Acid], [2-<sup>13</sup>C]Pyruvic Acid], [3-<sup>13</sup>C]Pyruvic Acid] and Combinations Thereof  
U.S. Patent # 8,198,484

Synthetic Analogs of Bacterial Quorum Sensors  
U.S. Patent # 8,071,790

System for Generating a Beam of Acoustic Energy from a Borehole, and Applications Thereof  
U.S. Patent # 8,259,530  
U.S. Patent # 8,233,349

Usage Based Indicators to Assess the Impact of Scholarly Works: Architecture and Method  
U.S. Patent # 8,135,662

**Copyrights Issued in 2011**

Amanzi, Version 0.x

BABBO, Version 1.0

Climate-Energy Assessment for Resiliency (CLEAR), Version 1.0

Continuum Dynamics Evaluation and Test Suite (CODY), Version 1.0

Genome Majority Vote (GMV), Version 0.x

iDREAM Space Weather App, Version 1.1

Infrastructure on Demand, Version 2.0

LANL DSDdriver and LANL DSD Library, Version 1.0

LANL Go Suite

Los Alamos Transferable Tight-binding for Energetics (LATTE), Version 1.0

McPhD, Version 1.0

MESA++, Version 0.1

Multi-Dimensional Hashed Indexed Metadata (MDHIM) System

Neutron Transport Evaluation and Test Suite (HILO), Version 1.0

Nuclear Power Human Resource Modeling Tool, Version 1

Prototype All Sky Imager FX correlator

(PASIFX), Version 1.0

py\_siminput, Version 1.0

REDfISH, Version 1.x

Scout, Version 0.x

SpacePy, Version 0.1.0

STEM Education CRADA, Phase 4

Three Layer Diffusion, Version 1

Total-Variation Regularized Numerical Differentiation, Version 1.0

YAP, Version 4.6.8

**Copyrights Issued in 2012**

3D Gaming GUI Manager, Version 1.x

Altera NIOS2 BSP for RTEMS, beta release

Altera Triple Speed Ethernet Driver for RTEMS, beta release

ARMD Data Analysis Software, Version 1.x

ARMD Embedded, Version 1.x

ARMD Tester, Version 1.x

Bottle Liquid Scanner Analysis and Control Code, Version 1.x

Byfl, Version 1.0

CartaBlanca, Version 3.0

CLAMR, Version 1.x

Cruft, Version 1.x

DKM Web Services (DKMService.war), Version 1.0

electronic Knowledge Management (eKM.jar), Version 1.0

eMF, Version 1.0

EPICS, Version R3.15



**2012 Copyrights Cont.**

FRAM, Version 5.1	Medium Cable Cutter (MCC) (aluminum)	OpenCL Mid-Level Abstractions, Version 1.0.0
FRAM, Version 5.1 Canberra		
FRAM, Version 5.1 Ortec	Mode-Transformer Element for Generation of Polarized Currents in a Circular Superluminal Antenna	Portable Data Parallel Visualization and Analysis (PISTON), Version 0.x
Heavy Cable Cutter (HCC) (handle, extensions, & cutter head)		
HIV Software Suite	Mode-Transformer for Generation of Polarized Currents in Linear Superluminal Antenna	Preplt.jar, Version 1.0
Hot Knife		
Hydra-TH, Version 2.0	NuT, Version 0.x	PROSIG, Version 1.x
Lavaredo	Oil Well Produced Water Treatment - P&ID and Model	SEQSTRAP, Version 1.x
Light Coax Cutter (LCC) Tool		Super-Resolution (SuperRes), vBeta
		Superluminal Labview Code
		Taxila, Version 1.0
		Transactional Web Archive, Version 1.0

**Cooperative Research and Development Agreements (CRADAs) Issued in 2011**

Achieving a 10,000 GPU Permeance for Post-Combustion Carbon Capture with Gelled Ionic Liquid-Based Membranes	Dynamic Response of Perforating Systems Upon Down-Hole Activation	Growth and Characterization of Nanostructured Glass-Ceramic Scintillators for Miniature High-Energy Radiation Sensors
Audit/Accelerator Demonstration	Energy-Efficient Purification of Bio-Fuels and Bio-Chemicals Using a Novel Advanced Polymeric Membrane System	Integrating the Past Web into the Current Web
Crop Transformations and Enzyme Development for Plant Growth and Yield Improvement	Exchange of Safety and Security Best Practices	Kinetic Energy
Detection and Analysis of Corrosion Under Insulation	Free Electron Laser Innovative Naval Prototype	Multi-layer B-10 Prototype for He3 Portal Monitor Replacement
Development of Superluminal Radio Frequency (RF) Sources		Scaleup of Nanostructured Fiber Coloring Process
		Small Reactor Development

**Cooperative Research and Development Agreements (CRADAs) Issued in 2012**

A Novel Approach to Recover Heavy Oil from Sand Formations: Phase I Effort	Development of a Miniature Screening Device for Multiplexed Detection of Pathogens	Irradiation Testing and Microstructural Analysis
Acoustic Sensor Development	Development of Superluminal Radio Frequency (RF) Sources	Magneto Inertial Fusion Plasma Target Collaboration
Advanced Study - Change, Anomaly and Feature Extraction with RADIUS for Image-based ISR	Electric Field Induced Separations	Methane Detection and Attributions
Applied Composite Cable Project	Electron Accelerator Production of Molybdenum Project	Mimetic Finite Differences and Algebraic Multilevel Methods for Reservoir Performance Predictions
Atomistic Investigation of the Surface Chemistry Leading to Alloy Corrosion During Petroleum Refining Operations	Feasibility Studies of Metastable Innershell Molecular State (MIMS) Applications	Multi-layer B-10 Prototype for He3 Portal Monitor Replacement
Beryllium Recycling and Sustainability	GaN and InGaN Films for Photovoltaic Applications	Multi-Scale Stability Forecasting
Change, Anomaly and Feature Extraction with RADIUS for Image-based ISR	Growth and Characterization of Nanostructured Glass-Ceramic Scintillators for Miniature High-Energy Radiation Sensors	Numerical Modeling Capability for Hydrocarbon Extraction from Oil Shale Deposits
Detection of Supercooled Large Droplets		Parallel Log-structured File System Project

**2012 CRADAs Cont.**

Power & Water Facility and Infrastructure Planning	Small Reactor Development	Testing of New Scintillating Materials
Program and Technical Assistance	Space Situational Awareness using Specialized Camera Technology	The Battle Field Magnetic Resonance Image
Quantum Communications Transmitter at 775 nm	Steam Quality Discriminator	University of Texas Synthetic Fuel and Organic Material Program
Quantum Dot Solar Cells	System for Treating Produced Water (ProAqua)	Wide-Area Motion Imagery and RF Compressive Sensing Applications
Risk-Informed Analysis of Pressurized Water Reactor Sump Blockage	Test and Comparison of Explosive Compounds for Extreme Down-hole Environment Performance	

**Non-Federal Agreements (NFEs) Issued in 2011**

Advanced Radiation Monitoring Devices (ARMD)	Modeling	Near Real-Time Nondestructive Active Inspection Technologies Utilizing Delayed Gamma-Rays for Advanced Safeguards
Allergy, Immunology and Transplantation Research	Development of Carbon Nanotube Composite Cables for Ultra Deepwater Oil and Gas Fields	Polycrystalline Ceramic as a Replacement for 3He Neutron Detector
Antigenic Protein and Lipopolysaccharide Signatures from Burkholderia Pseudomallei Towards Specific Biothreat Detection Strategies	Development of Chemical Model to Predict the Interactions between Supercritical Carbon Dioxide and Reservoir Rock in EGS Reservoirs	Population Genetics Phase 2
ARRA Geothermal Project	Differential Metabolic Network of Tumor Progression	Predictive Maturity of Multi-Scale Computer Models for Fuel Performance
Assisted Deployment of LANL Technology in ORTEC Hybrid K-Edge Densitometer Systems	Forensics Investigation	Structures of M. Tuberculosis Proteins Conferring Susceptibility to Known M. Tuberculosis
CGCS Mosaic	ITER Near Term Fuel Cycle Planning and Interface Activities	Study of interfacial interactions using thin film surface modification radiation and oxidation effects in materials
Clean and Secure Energy from Domestic Oil Shale and Oil Sands Resources	Mass spectrometry Analysis of lipid and protein antigenic determinants	US Advanced Coal Technology Consortium (US-ACTC)
Collaborative Integration of HCV Molecular Virology and Mathematical	MCNP/MCNPX Training Course in Paris, France	

**Non-Federal Agreements (NFEs) Issued in 2012**

A Software Toolbox for Systematic Evaluation of Seismometer-Digitizer System responses	Analysis of Hepatitis C Virus Infection and Treatment Data	Center for Remote Sensing of Ice Sheets (CREGIS)
Accurate evolutionary rates for precise pathogen sourcing	Anomaly Detection in Streaming Radio Interferometer Data	Center for Spatiotemporal Modeling of Cell Signaling (STMC)
Alisporivir Project	Assisted Deployment of LANL Technology in ORTEC Hybrid K-Edge Densitometer Systems	CGCS Mosaic
Allergy, Immunology and Transplantation Research	ATK HPM Support	Characterization and Development of Plasma Facing Materials
An Agent-Based Simulation Environment for Predictive Longitudinal Modeling of High School Math Performance	Boron Trifluoride Conversion	Characterization of Low-Level Drug Resistance Mutants in Breakthrough Infections from the CAPRISA004
	Building Blocks of Three-Dimensional Magnetic Reconnection	Tenofovir Prophylaxis Study Via Deep Sequencing
	Cell culture for single cell genomics of the human microbial flora	Clostridium Botulinum



**2012 NFEs Cont.**

Coating of Substrates with Gold	High-Throughput Identification of Influenza Virus Amino Acids Responsible for Human-to-Human Transmission	Probabilistic Algorithms for New Architectures
Comparative Genomic Analysis of Bacillus anthracis strains	HIV-1 Evolution and Functional Correlates of MTCT	Regional Infrastructure Protection Plan (RIPP)
Comprehensive Antibody Vaccine Immune Monitoring Consortium (CAVIMC)	Hydrogen Storage Materials	Regional storage or direct source-sink CCS infrastructure: the impact on business models for commercial-scale CO2 emissions
Critical Issues Report Team	Improved Plutonium Canister Assay System (iPCAS) Phase VIII	Removal Transport and Installation at IUCF of the 425 MHz LANL Klystron Test Station
Data Assimilation in the Near-Earth Radiation Environment	Influenza Sequence Database	Rochester Center for Bio Defense Modeling
Design of nanoceramics with high radiation tolerance	Innovative Exploration Techniques for Geothermal Assessment	Scientific Remote Sensing Sensor Design Study
Development of Rapid, Inexpensive, Multiplex Assays for Simultaneous Detection and Strain Characterization of Multiple Citrus Pathogens	Invisible U mining toward sustainability of C-free energy	Soil Metagenomics of the Cedar Creek Ecosystem Science Reserve
Development of Safeguards Systems for the Japanese MOX Fuel Fabrication Plant (JMOX)	ITER Near Term Fuel Cycle Planning and Interface Activities	Sparse modeling for high-dimensional data
Differential Metabolic Network of Tumor Progression	LIBS Mars Project	Stand Off Radiation Detection Systems (SORDS) Algorithm Spiral Development
Direct Numerical Simulation of Oil Water Interactions in Sand	Material Synthesis and Optics for Si and Ge Spintronics	Statistical and Data Management - Adult Analyses
DUSEL S4 project	MCNP/X Training Courses for 2011 in Las Vegas, Nevada and Paris, France	Statistical & Data Management - Pediatric Analyses
Dynamic Testing of Fluidic Micro-Truss Blast Protection Concepts	Neutron Scattering for Branched, Entangled Polymers in Flow	Strategies for Eliciting bnAbs against Conserved HIV-1 Quaternary Epitopes
Editorial Review of Non-Linear Science	Next Generation Dynamic Carbon-Nitrogen Model	Structures of M. tuberculosis proteins conferring susceptibility to known M. tuberculosis
Editorial Review of Computation Materials Science'	Non-Destructive Assay of Spent Fuel for Swedish Repository	Support for Swedish Nuclear Waste Repository
Energy-Angle Correlations in Spontaneous- and Induced-Fission Neutron Emissions	Nonlinear ultrasound to evaluate the integrity of concrete	Synthesis of Nanocomposites for Radiation Scintillation
Field Evaluation of the Restorative Capacity of the Aquifer Downgradient of a Uranium ISR Mining Site During Mining Operations	Novel Carbon Capture Technology Development for Power Generation Using Wyoming Coal	Systems Engineering
Fukushima Daiichi Muon Tomography Project	Novel therapeutics for pathogen neutralization	Technical Support for Utility and System Requirements Studies for Remote Sensing Technologies
Full waveform seismic tomography using stochastic methods	NSF Facilities Renewal Grant	UC Lab Fees Research Program
High Income Country Source Repatriation	PathScan Enumeration Cyber Security Project	UCR-LANL Energy Storage Research Initiative
High Sensitive Polymer Nanowire Sensor Device for Accurate and Real-time CO2 Monitoring	Pore-Scale Modeling of Reacting Flow Involved in the Leaching of Molten Salt into the Hydrocarbon-Bearing Reservoir	US-Advanced Coal Technologies Consortium (US-ACTC)

# Organization

Technology transfer at Los Alamos National Laboratory (LANL) helps move technologies from the LANL to the marketplace to benefit society and the U.S. economy. We do this by ensuring that Laboratory inventions receive intellectual property protection, which enables us to license LANL technologies to existing and start up companies. Our Business Development and Work for Others teams are available to assist government agencies, universities and businesses in finding the right collaboration at LANL to solve the toughest technical challenges and research problems.

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