# Sandia science and technology: a vital resource for NM and the country

SAND2011-6233C


**Presented to**

## New Mexico State Legislators

**September 1, 2011**

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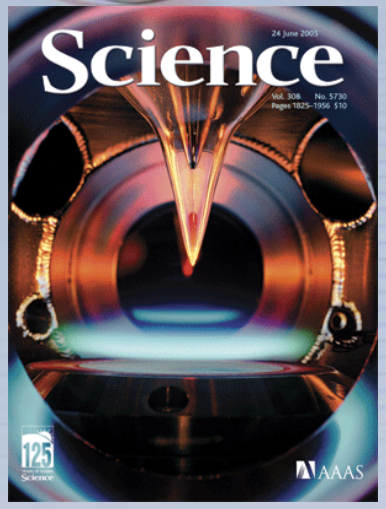
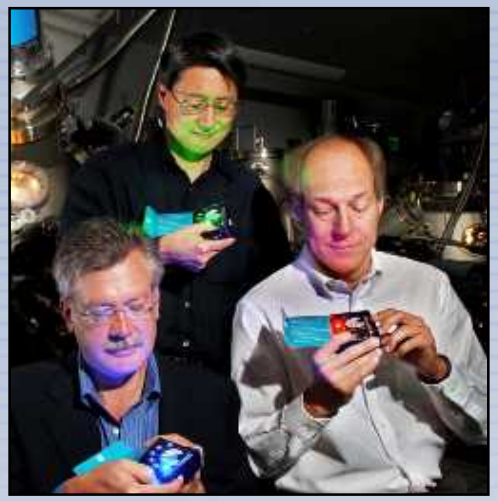
# Todays' topics

- **Energy**
- **Collaborations with UNM and Intel**
- **Supporting urgent national needs**
- **Cyber security**
- **Economic development programs**

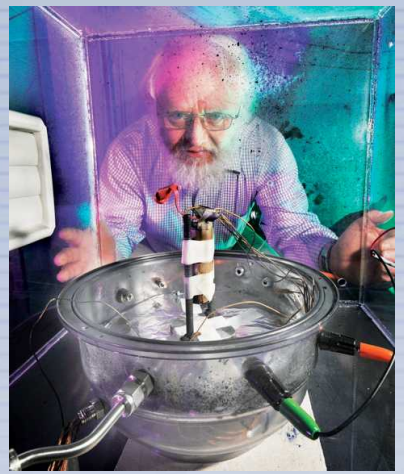
# What are the potential impacts in energy?




***Combustion***

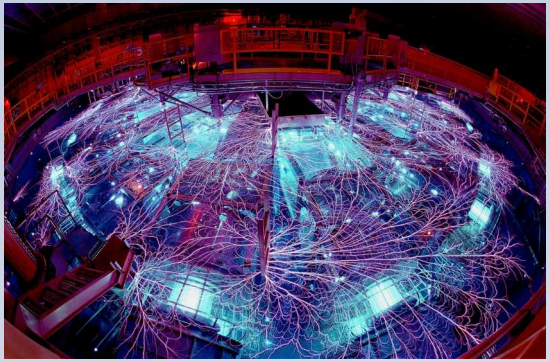


***Solid-State Lighting***



***Electrical Energy Storage***

***Fuels from Sunlight***



***Materials for Extreme Environments***

***Solar Energy Utilization***

***Smart Green Electrical Grid***

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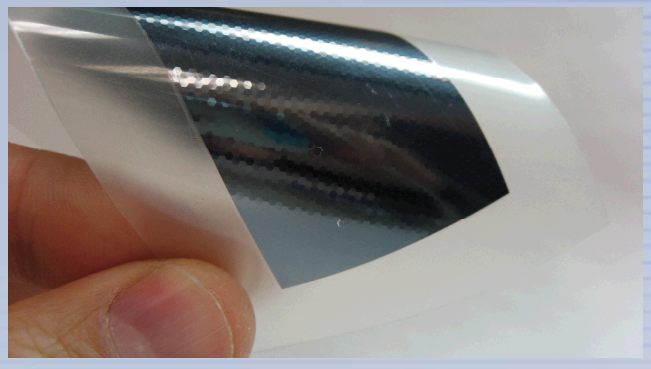
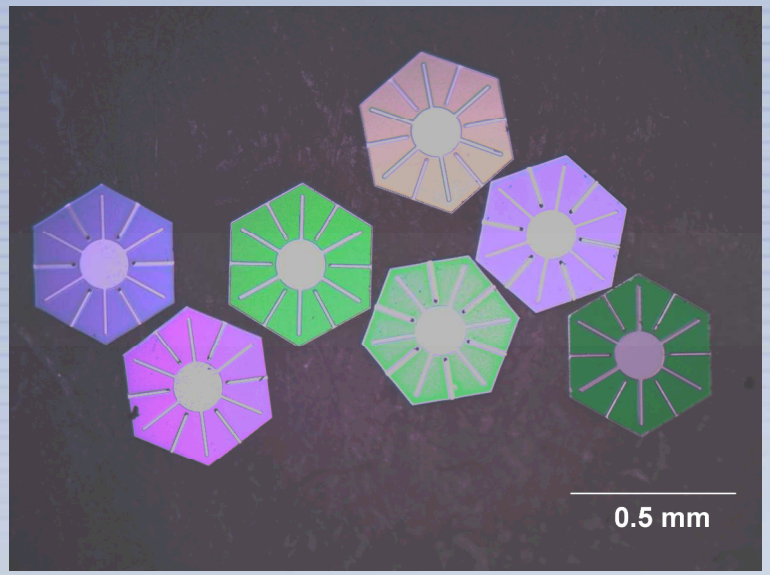
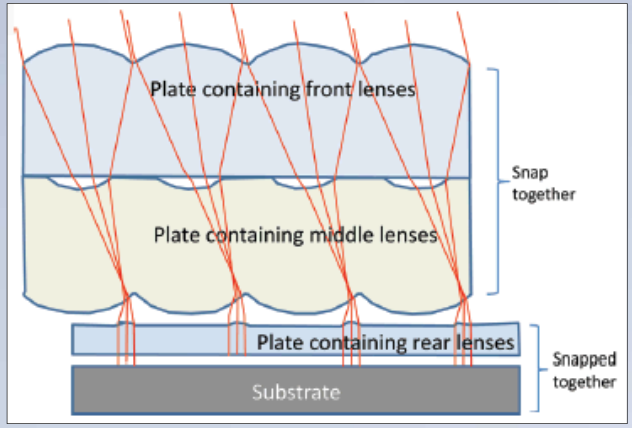
# Solar Glitter: a new approach to high-efficiency photovoltaics (30-40% conversion goal)



Flexible arrays



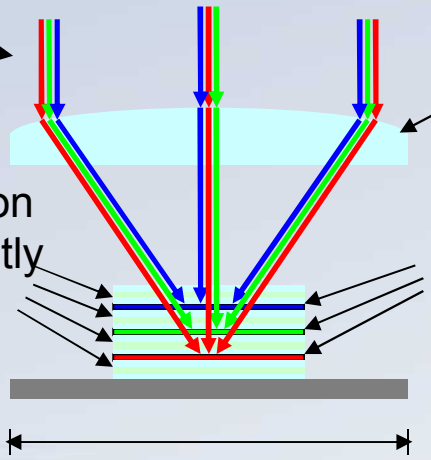

Core: Tiny efficient solar cells




A microlens concentrator array that enables coarse sun tracking

Incoming solar spectrum

Small dimensions allow high-quality, molded refractive optics



Each junction independently electrically connected

Cells grown independently, out of ideal materials, and optimum thickness

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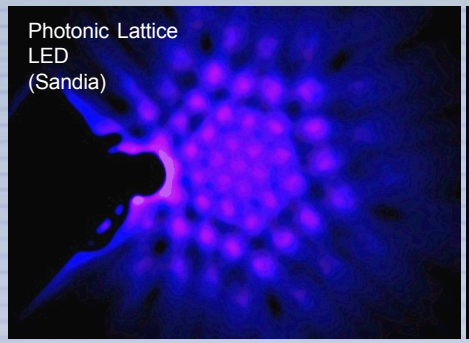
# Solid state lighting (SSL): a new DOE Energy Frontier Research Center (EFRC)

SSLS EFRC
SOLID-STATE LIGHTING SCIENCE
ENERGY FRONTIER RESEARCH CENTER

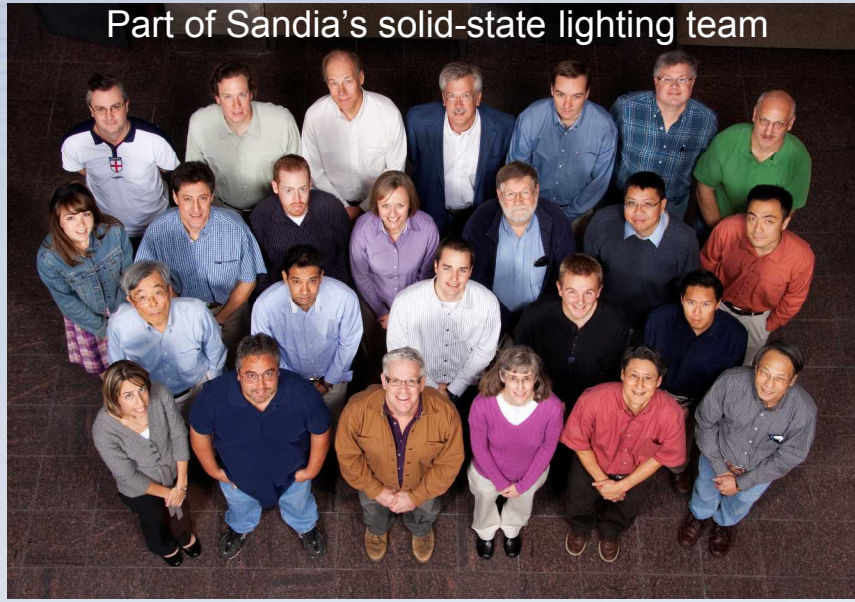




- **$3.6M / year budget for 5 years**
- **9 institutions**

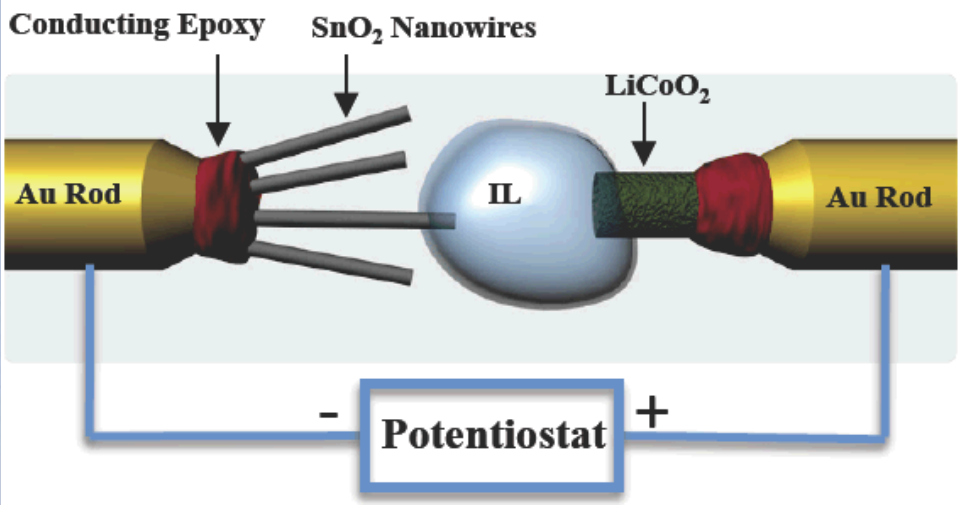
Research plan: Investigate conversion of electricity to light using radically new designs in sub-wavelength structures; understand and eliminate defects in SSL semiconductor materials that presently limit the energy efficiency.

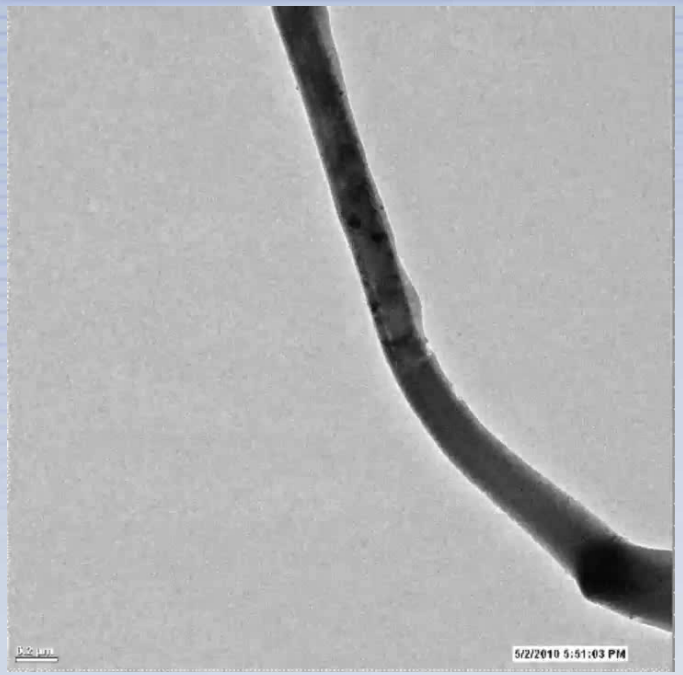
Part of Sandia's solid-state lighting team



Rensselaer Polytechnic Institute · The University of New Mexico · Northwestern University · UMASS · Los Alamos National Laboratory · Philips · Yale University · California Institute of Technology · Sandia National Laboratories

# Li-ion battery research at the nanoscale provides atomistic view of electrochemistry

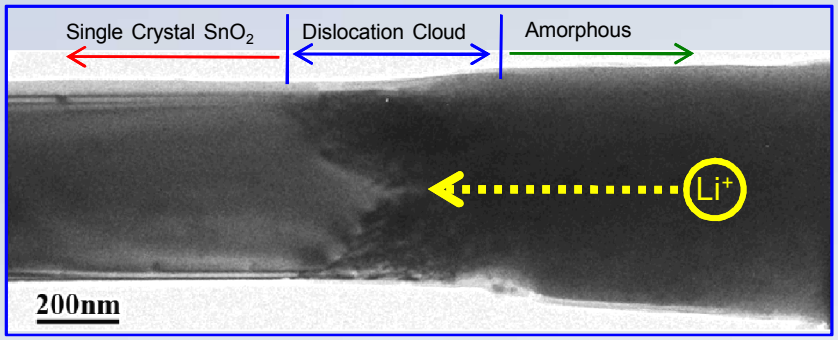



<u>World's smallest battery</u> inside a transmission electron microscope, enabling real time observations of electrochemistry at atomistic length scales

<u>New EFRC</u> led by University of Maryland

Sandia comprises ~ 20%




U.S. DEPARTMENT OF ENERGY | Office of Science

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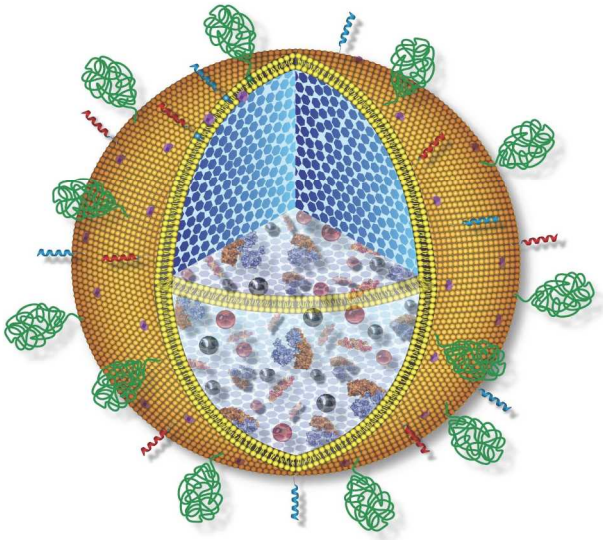
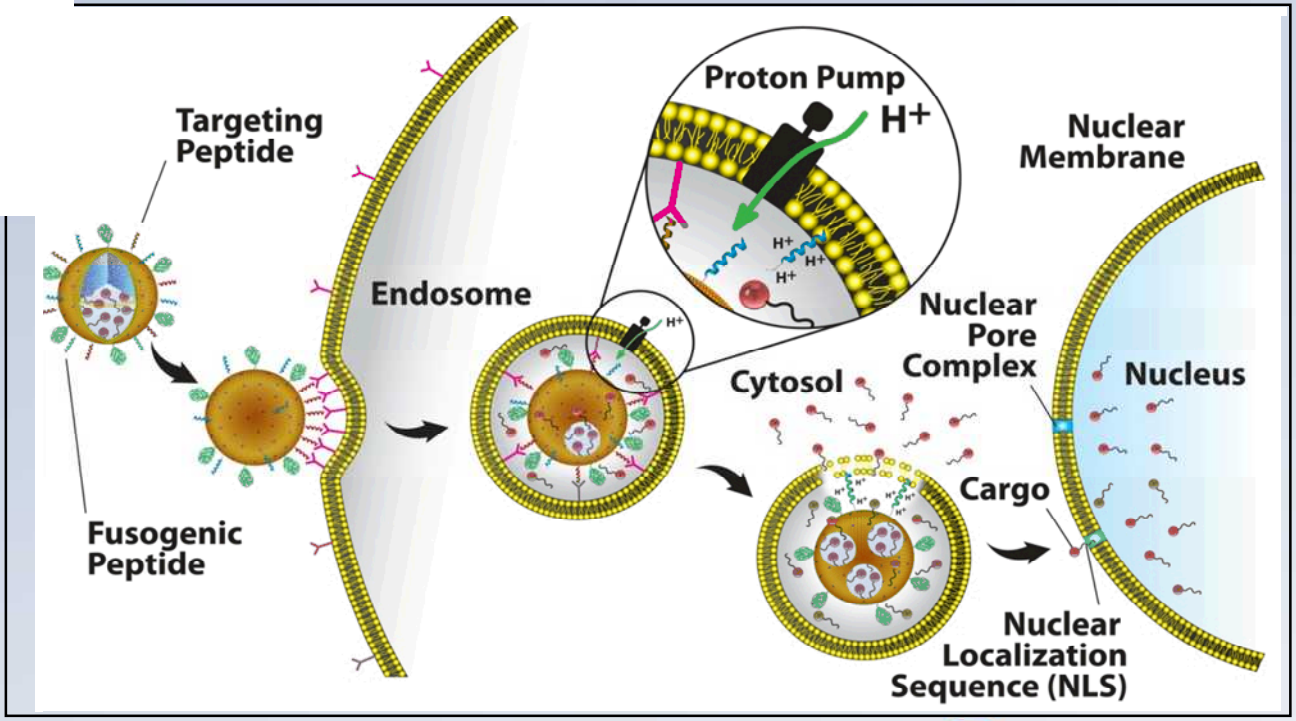
# “Protocells”: Joint project of Sandia and UNM Cancer Center



- Principal investigator Jeff Brinker has joint appointment
- Based on porous nanoparticle work supported by DOE Office of Science
- Applications to targeted cancer therapy

- 100 nm “Protocell” has silica core containing cargo of chemo drugs.
- Outer surface has specific molecules that select cancer cells for
- invasion
- Cargo is delivered inside cancer cell



# Intel and Sandia have collaborated in high performance computing since the mid 90s

- Jointly developed the first Teraflops supercomputer, ASCI Red
- Intel is an active contributor to Sandia's Portals project
  - Portals is a message passing interface that has been used by Cray, Intel and the Lustre file system
- Intel is collaborating on the development of Sandia's Structural Simulation Toolkit which enables hardware/software co-simulation
- We are currently working to extend the Intel Umbrella CRADA through 2016 and to expand the scope to include High Performance Computing as well as Advanced Electronics

ASCI Red, developed by Intel and Sandia, was the fastest computer in the world from June 1997 to June 2000

# Sandia leads DOE response to BP Deepwater Horizon oil spill

Former President Tom Hunter briefs press along with DOE Sec. Chu and Interior Sec. Salazar

April 20, 2010

# Sandia supports DOE response to Japanese earthquake and tsunami

DOE and NNSA employees and 8.5 tons of equipment were flown to Japan to assist in the monitoring of the Fukushima nuclear power plant. Sandia provided technical expertise and data analyses.
(photo from NNSA)

# What are the potential impacts in national security?

Nuclear Weapons

Counterterrorism

Intelligence

Chem-Bio Defense

Cyber Security

Infrastructure Surety

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# Technology-based economic development programs

SANDIA SCIENCE & TECHNOLOGY PARK

NMSBA
Los Alamos National Laboratory
Sandia National Laboratories

ESTT
Entrepreneurial Separation to Transfer Technology

# New Mexico Small Business Assistance (NMSBA)

- Governed by the Laboratory Partnership with Small Business Tax Credit Act (a New Mexico State Law)
- Public/Private Partnership with Sandia National Laboratories, Los Alamos National Laboratory, State of New Mexico, and New Mexico Small Businesses
- Allows up to $2.4M per lab per year in assistances and tax credits
- Must be a New Mexico for-profit small business to qualify
- Companies in rural counties are eligible for $20K per business each year/urban counties are eligible for $10K per business each year

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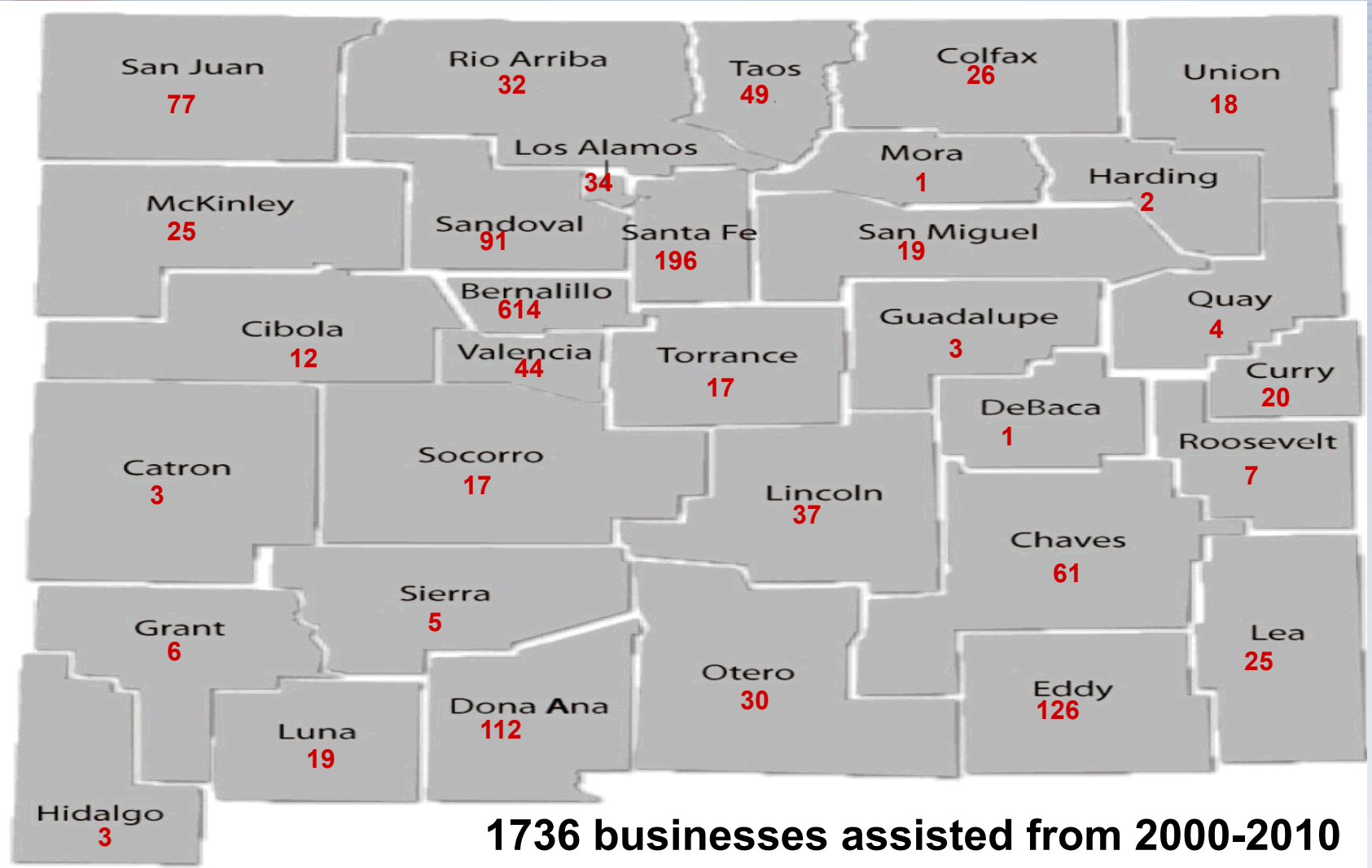
# NMSBA joint program results (SNL and LANL)

| | 2000-2010 | 2010 |
|---|---|---|
| | | |
| Number of Unique Businesses Assisted | 1736 | 339 |
| Number of Counties Supported (out of 33) | 33 | 27 |
| Dollar Value of Assistances to Companies | $25.2M | $4.6M |

# NMSBA has served every county in New Mexico




**1736 businesses assisted from 2000-2010**

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# Sandia Science & Technology Park: "A Master-Planned Technology Community"






- 340+ Acres
- Founded in 1998 to serve as a partnership and technology transfer tool for Sandia
- Key Sandia facilities located here: CINT, CSRI, IPB, and CERI (planned)
- Recent News: Raytheon acquired Ktech Corp., a company in the Park

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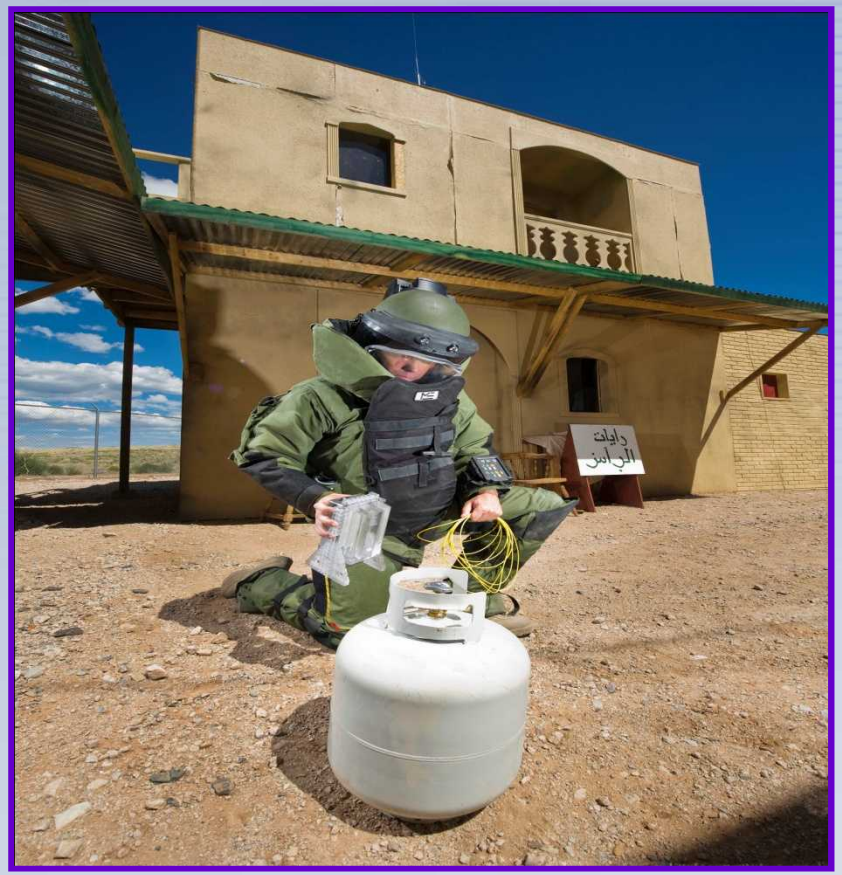
# Sandia Science & Technology Park: metrics for success

| | |
|---|---|
| Number of Companies | 31 |
| Number of Employees | 2,085 |
| Number of Buildings | 20 |
| Square Feet of Occupied Space | 989,425 |
| Acreage Developed (out of 340) | 102 |
| Funds-In and In-Kind Services from Park Companies to Sandia (i.e. CRADAs, Licensing Agreements, WFOs) | $18,418,476 |
| DOE/Sandia In-Kind Services to Park Companies (CRADAs) | $2,667,916 |
| Contracts from Sandia Procurement to Park Companies | $370,611,616 |
| Contracts between Park Companies | $9,412,297 |
| Public and Private Investment in the Park<br>Public<br>Private<br>Total | <br>$68,648,901<br>$281,857,983<br>$350,506,884 |
| Average Salary for Each Full-Time Job in the Park | $71,612 |
| Average Salary for Each Full-Time Job in Albuquerque | $39,342 |

# Entrepreneurial Separation to Transfer Technology (ESTT)


- Entrepreneurs terminate Sandia employment
- Term of separation is two years with the option to request a third year
- Entrepreneurs are guaranteed reinstatement by Sandia if they return before ESTT expiration
- Participants may start up or help expand technology businesses
- 139 people have left to start up or expand 91 companies, mostly in New Mexico

# Success story: TEAM Technologies



STINGRAY DISRUPTER

- Moved into Sandia Science & Technology Park in 2001; expanded in 2006
- Invested over $6M in the Park
- Contracts with Sandia since moving to Park > $60M
- Licensed technology from Sandia for “Stingray”; manufactured and shipped over 8000 of the $58 devices to Afghanistan for bomb disposal
- “Stingray” named one of the Best Inventions of 2010 by leading magazine