

Sandia National Laboratories

...making a difference in our nation....
....and in our communities...

Presented by

Michael DeWitte, P.E.
Senior Manager

Director of Science & Engineering
Education Programs, K-12



Sandia
National
Laboratories



LOCKHEED MARTIN 



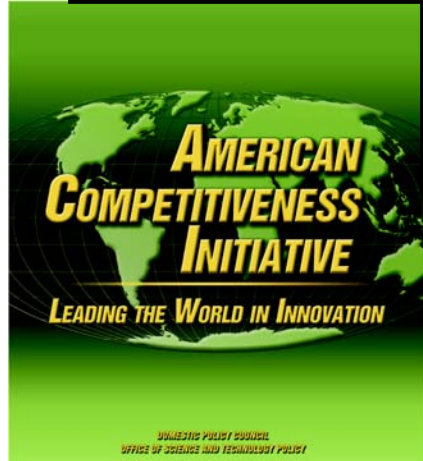
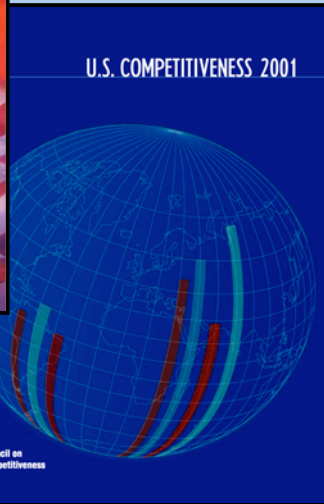
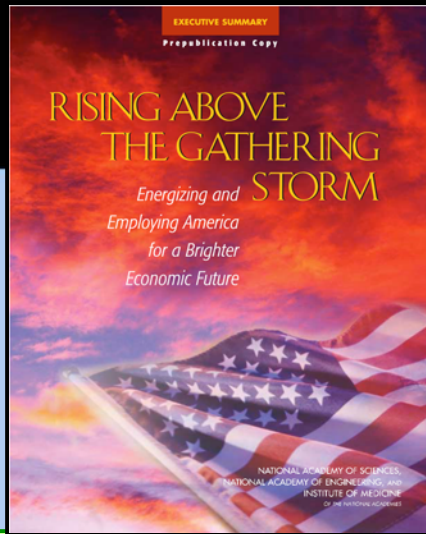
Sandia National Laboratories

Analyze, Decide and Correct the Course – K-12 Education

It is imperative that we include a detailed systems analysis in our policy making efforts. The complexities of the modern world will indeed have the capacity to confound the plans of our leaders – government, business and military – yet we cannot be content to drift along at the mercy of events because we fear that whatever we try will have unintended consequences. We must study and model the problem to gain the best understanding possible of implications and consequences to friends, foes and our own constituencies. Only then can we move forward and plot the best course possible; yet even then, we must humbly accept the probability that we will be required to correct the course during our journey. That is our challenge.

Michael DeWitte

Consistent Recommendations: K-12 Piece



Expand the pool of US Scientists and Engineers

Increase America's talent pool by vastly improving K-12 science and mathematics education.

Annually recruit 10,000 science and mathematics teachers by awarding 4-year scholarships and thereby educating 10 million minds.

Strengthen the skills of 250,000 teachers through training and education programs at summer institutes, in master's programs, and Advanced Placement and International Baccalaureate (AP and IB) training programs and thus inspire students every day.

Enlarge the pipeline by increasing the number of students who take AP and IB science and mathematics courses.

Protecting America's Competitive Edge through Energy

(PACE – Energy, S. 2197)

Senators Domenici (R-NM), Bingaman (D-NM), Alexander (R-TN), and Mikulski (D-MD)

Why a Science, Math and Technology Focus?

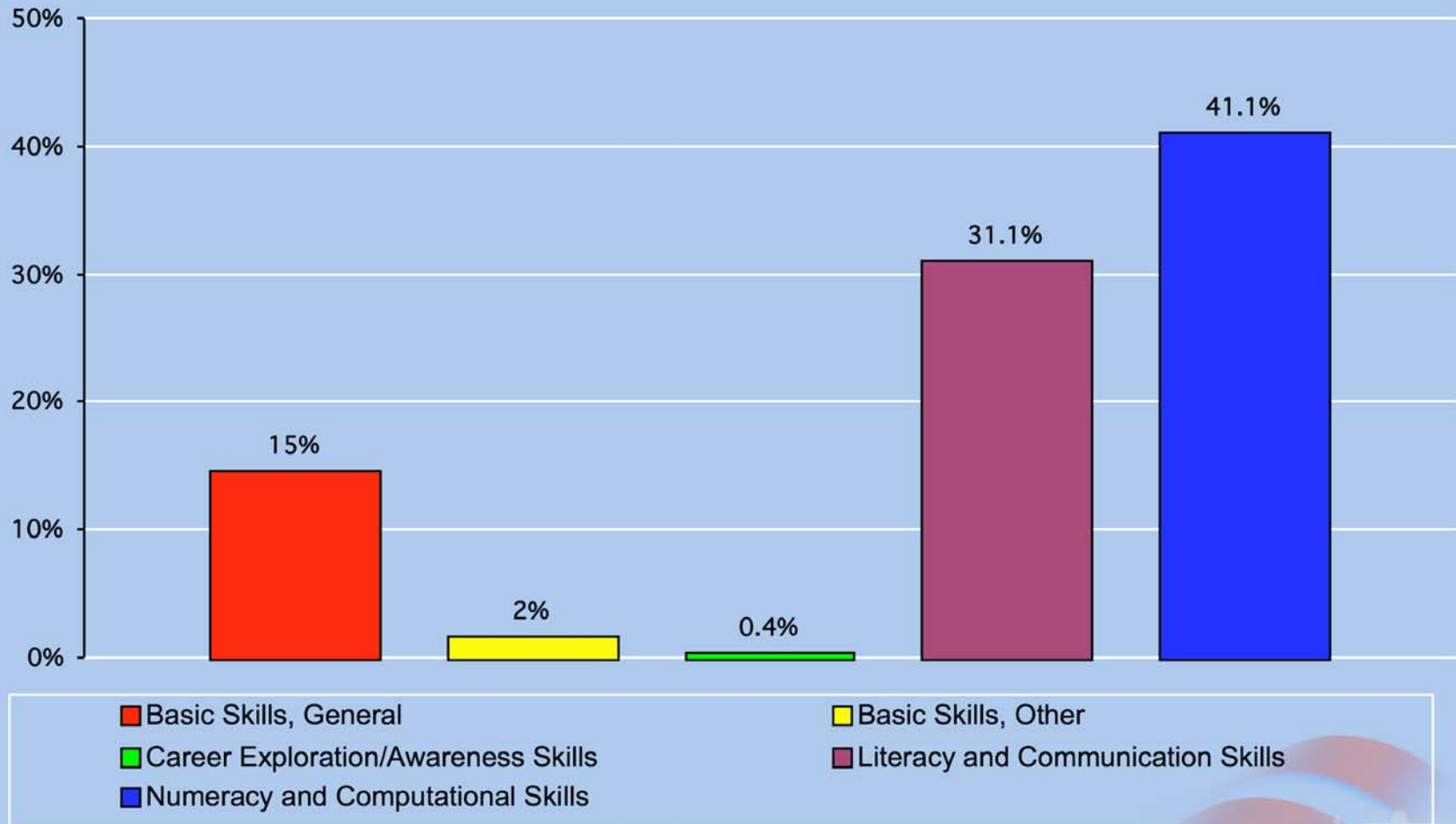
In an age now driven by the relentless necessity of scientific and technological advance, the current preparation that students in New Mexico (and the U.S.) receive in mathematics and science is, in a word, unacceptable.

- Four enduring reasons underscore the need to achieve competency in mathematics and science:
 - The rapid pace of change in both the increasingly interdependent global economy and in the American workplace demands widespread mathematics- and science-related knowledge and abilities;
 - Our citizens need both mathematics and science for their everyday decision-making;
 - Mathematics and science are inextricably linked to the nation's security interests; and
 - The deeper, intrinsic value of mathematical and scientific knowledge shape and define our common life, history, and culture. Mathematics and science are primary sources of lifelong learning and the progress of our civilization.

Re: Before It's Too Late: A report to the Nation from the National Commission on Mathematics and Science Teaching for the 21st Century

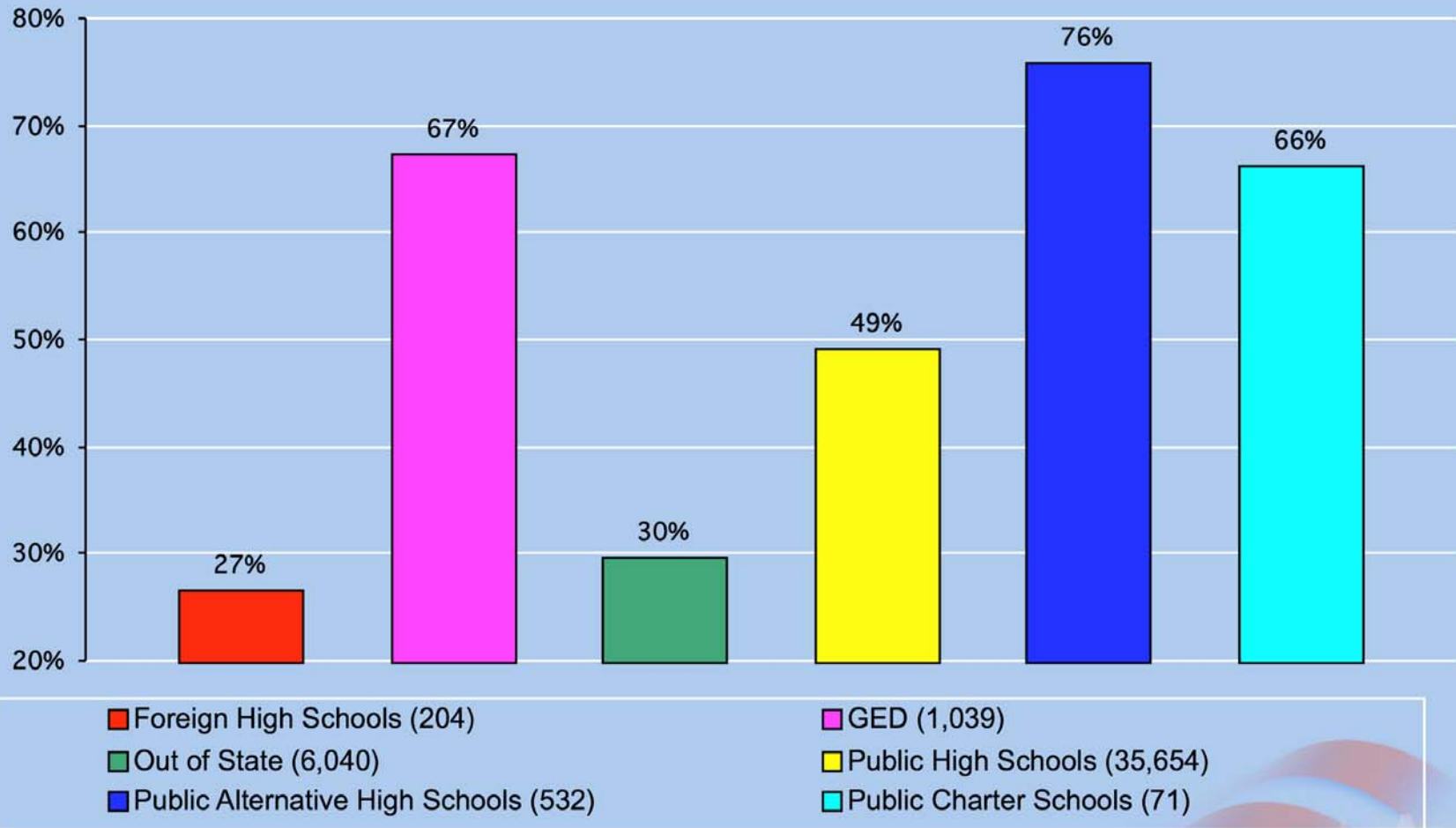
Percentage Of Public High School Graduates Taking Developmental Classes In College By Type of Course (N=35,654)

New Mexico



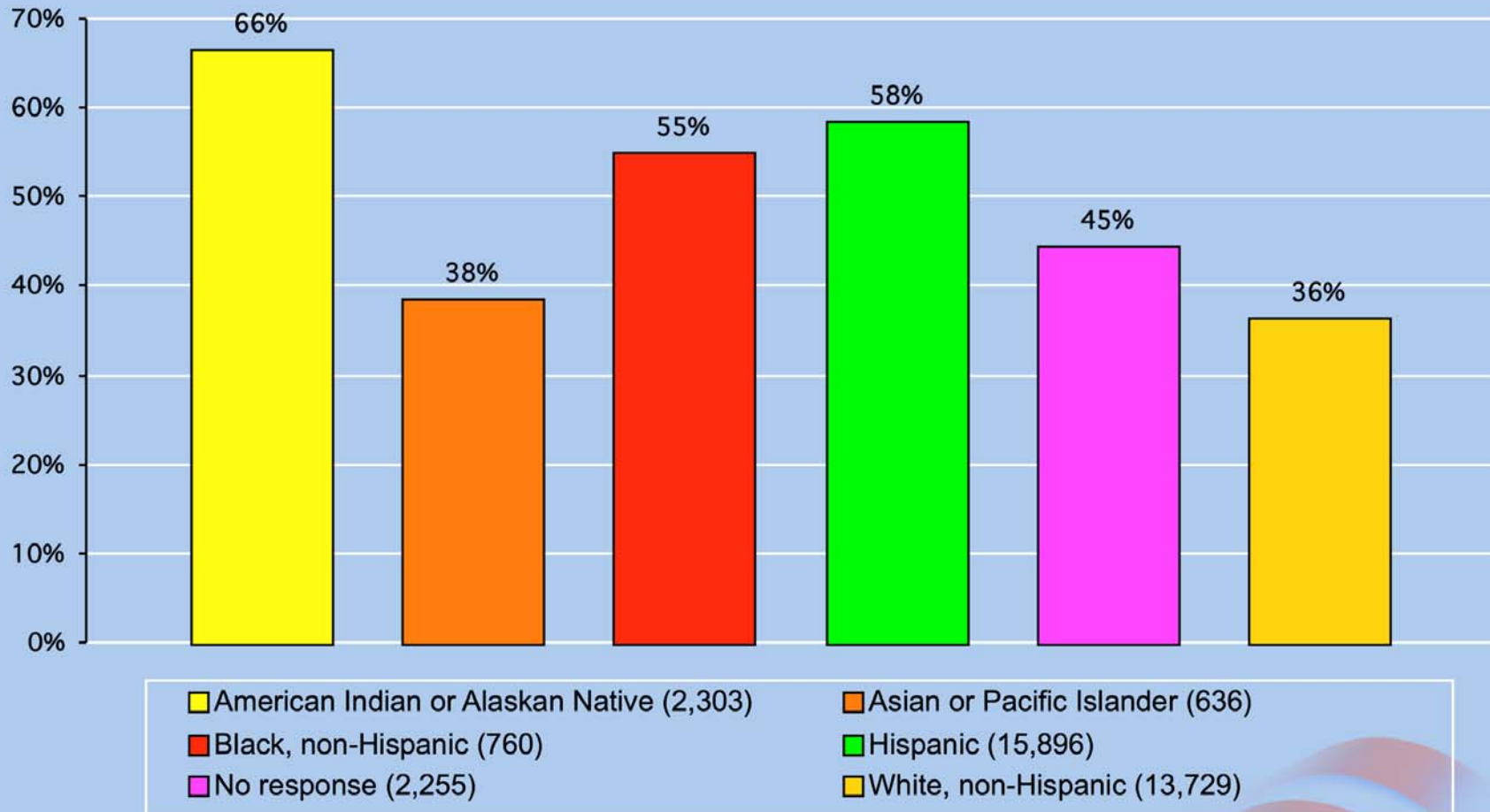
Percent of Students Taking Literacy and/or Numeracy Courses In College By School Type (N=43,540)

New Mexico



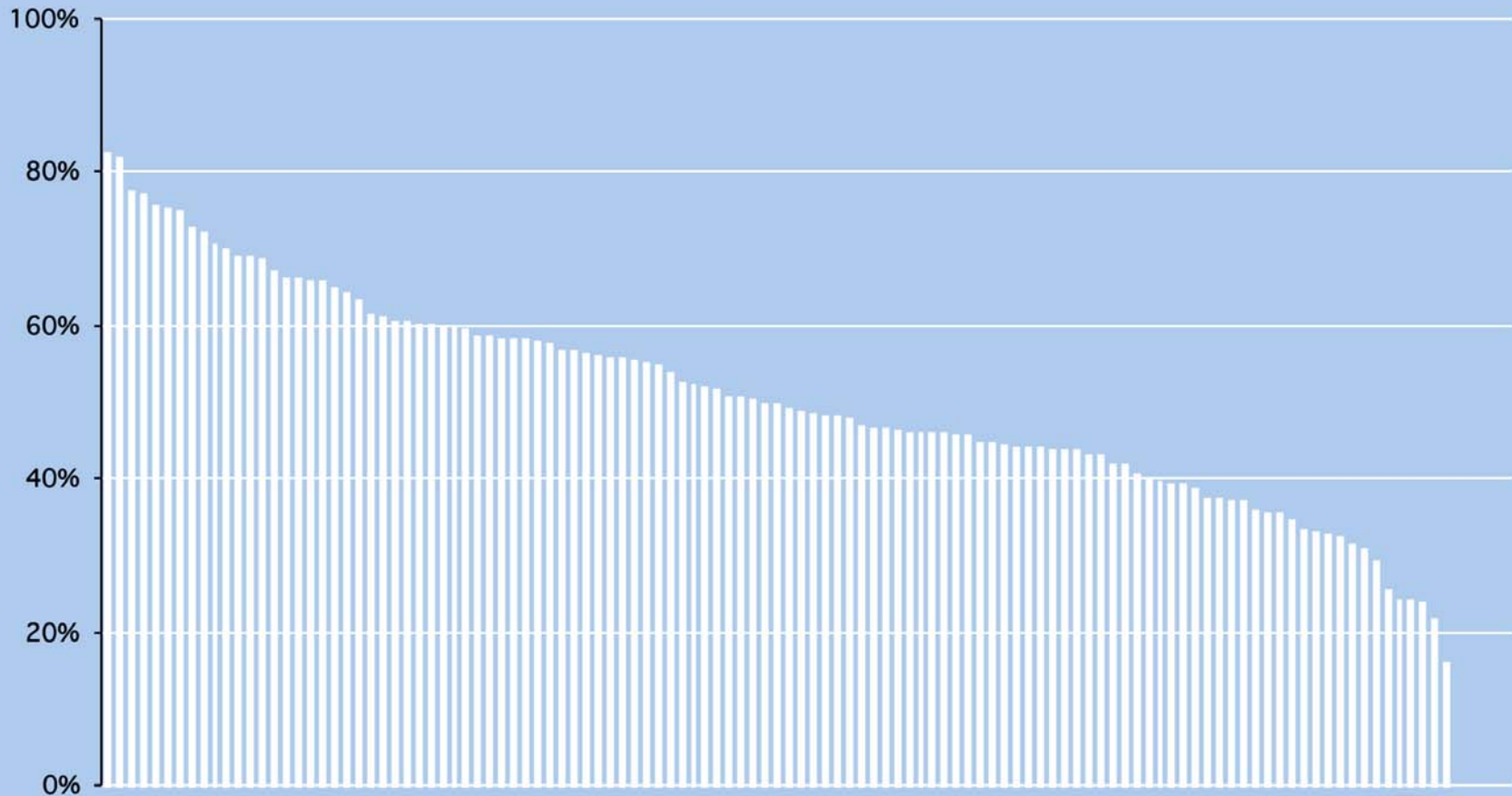
Percentage of Public High School Graduates Taking Literacy and/or Numeracy Courses In College By Ethnicity (N=35,579)

New Mexico



Percent of Public High School Graduates Taking Literacy And/Or Numeracy Courses In College By High School

New Mexico



New Mexico's Public High Schools Ranked From High To Low Percentages



Re: Office of Education Accountability
NM Dept of Finance and Administration



Percent of Public High School Graduates Taking Numeracy and Computation Courses In College By High School

New Mexico



New Mexico's Public High Schools Ranked From High To Low Percentages



Re: Office of Education Accountability
NM Dept of Finance and Administration



Percent of Public High School Graduates Taking Literacy And/Or Numeracy Courses In College By District

New Mexico



New Mexico's School Districts Ranked From High To Low Percentages



Re: Office of Education Accountability
NM Dept of Finance and Administration



What Children Need but May not Get

- Ongoing nurturing relationships
- Physical protection, safety and regulation
- Experiences tailored to individual differences
- Developmentally appropriate experiences
- Structure and Discipline
- Stable, supportive communities and cultural continuity
- A protected future.

New Mexico Career Clusters

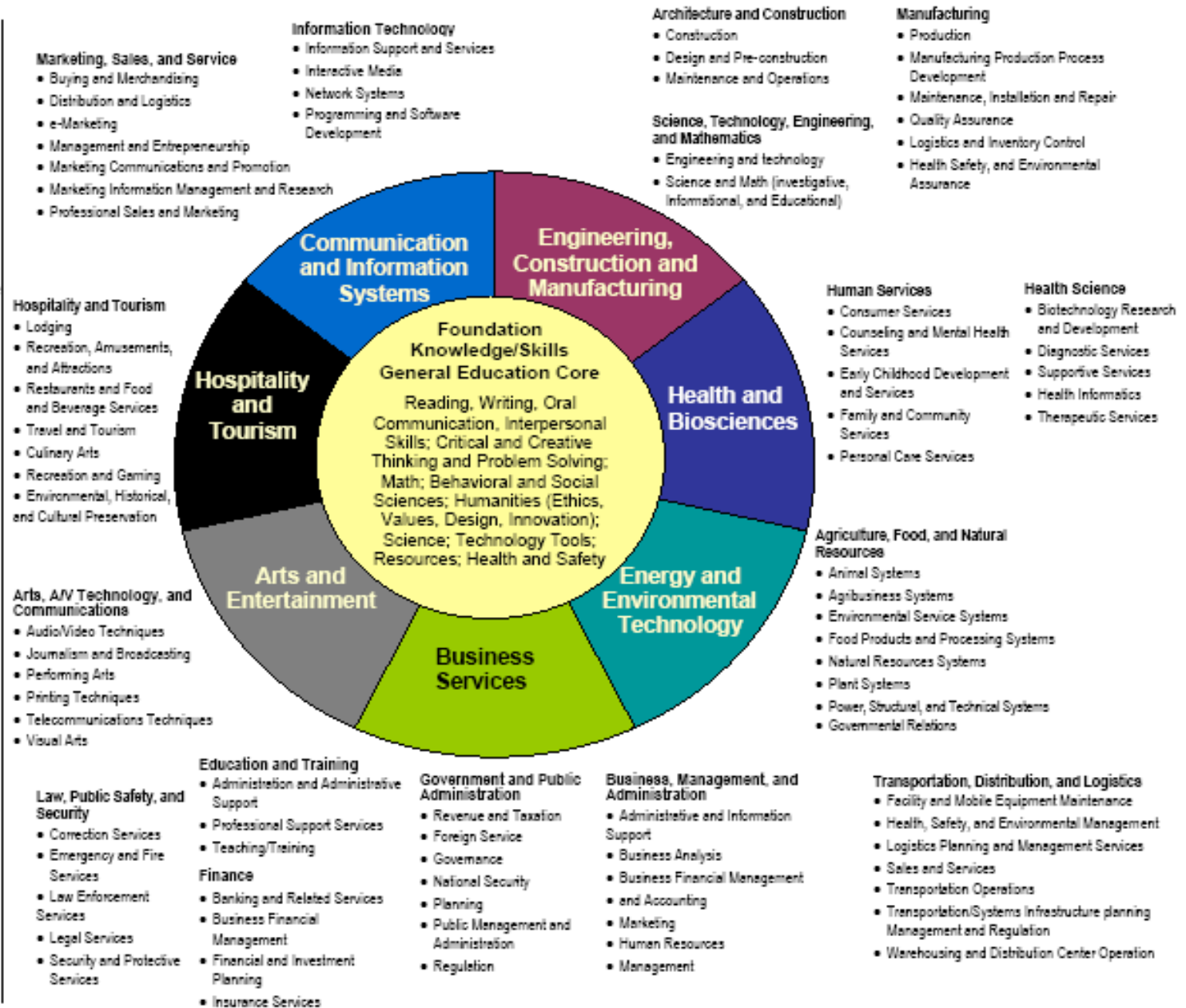
- Career Clusters are groupings of similar skills and common themes. Employment is available at various educational levels.

Career Clusters help students, parents, employers, and educators understand how curriculum relates to the career opportunities.

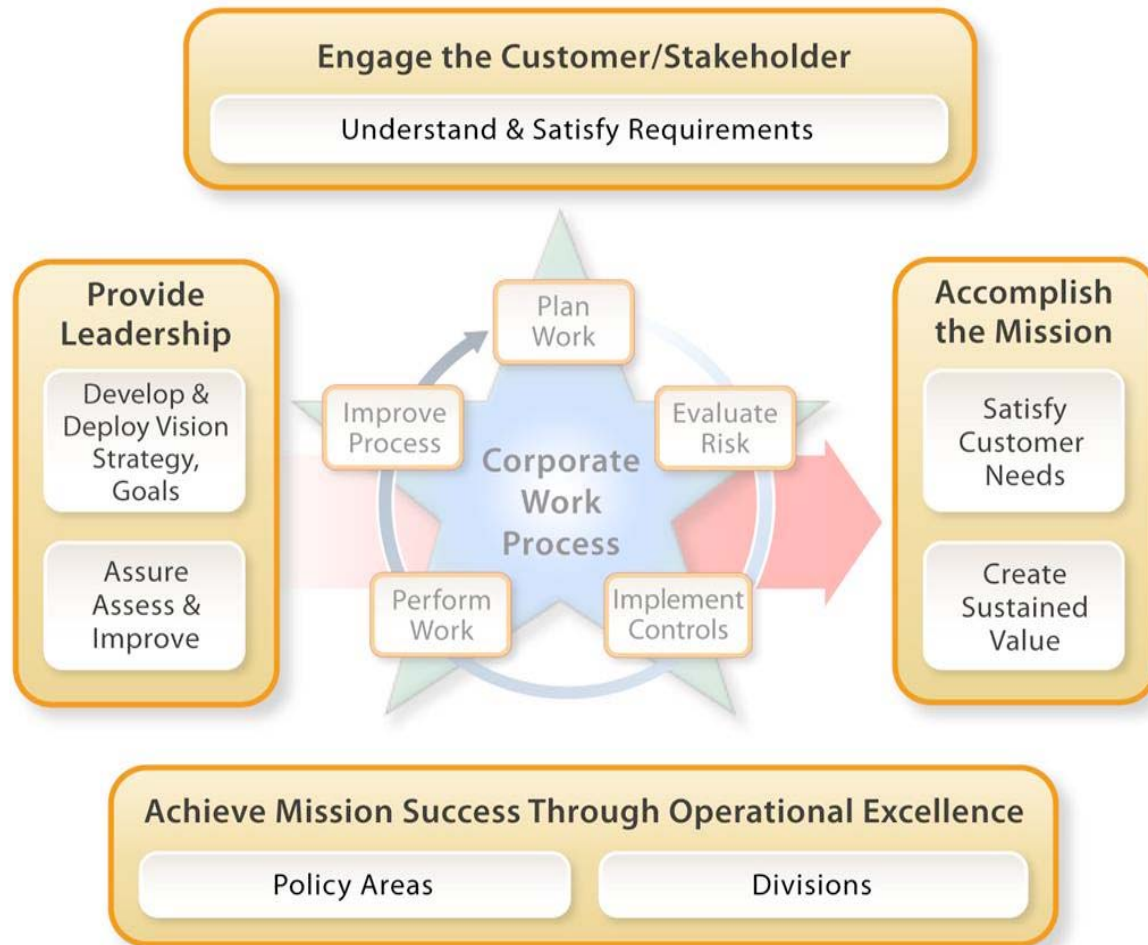
U.S. Department of Education has identified 16 Career Clusters. These and the Career Pathways, which define the specific types of career opportunities within each Cluster, are listed outside the circle.

- New Mexico has compressed the 16 into seven priorities based on economic development and job projections.
- Foundation Knowledge/Skills and the General Education Core are a set of common skill sets all students should know.
- Career Specialties are specific job titles within a pathway within a cluster.

Visit www.careerclusters.org for more information



Integrated Laboratory Management System





Exceptional People Achieving Exceptional Results

Vision:
Helping our nation secure a peaceful and free world through technology.

Highest Goal:
To become the Laboratory that the nation turns to first for technology solutions to the most challenging problems that threaten peace and freedom for our nation and the globe.

integrity

excellence

teamwork

Support and enable mission success through excellence in strategic partnerships, leveraging through outstanding teachers, professional development, a systems approach, alignment and integration of programs, a strategy of “engagement, involvement and enhancement” all to enable student success and “**exceptional people achieving exceptional results.**”

- Enterprise Model -- A robust and clear, simple and focused structure that demonstrates our strategies and tactics for our efforts.
- Ensure Customer Confidence -- **Mission execution is assured to be successfully achieved to satisfaction of the customer, on time and within budget.**
- Work safely, securely, & mindfully -- **Common, best practices are implemented across our programs and shared with the Lab to achieve excellence in safety, security, and overall management, enabled by a Lab-wide information system and outstanding talent.**
- Create breakthrough results through innovation, communications and teamwork.
- **Our education partnerships and programs become a model for Sandia, the community, the state, the DOE/NNSA Complex and our nation as we demonstrate our commitment, action and results.**
- Provide extraordinary programs and projects -- **A robust program development and implementation process to include teacher professional development, internships/externships, adjunct teacher corps members, courses/lectures via video streaming, content rich and user friendly web sites, special outreach programs reaching K-12 students throughout the nation and effective partnerships with schools, colleges, universities, government agencies and business organizations throughout our nation.**

Goal: Be a valued and responsible corporate citizen and partner in our community.

Value Algorithm: $V_R = f(\text{CL}, \text{CG}^2, \text{ER}, \text{EP}, \text{EI}) * (\text{CP}, \text{PME})$

where CL = Community Leadership

CG = Community Giving (monetary & volunteerism)

ER = Environmental Responsibility

EP = Education Partnerships

EI = Economic Impact

CP = Community Perceptions

PME = Positive Media Exposure

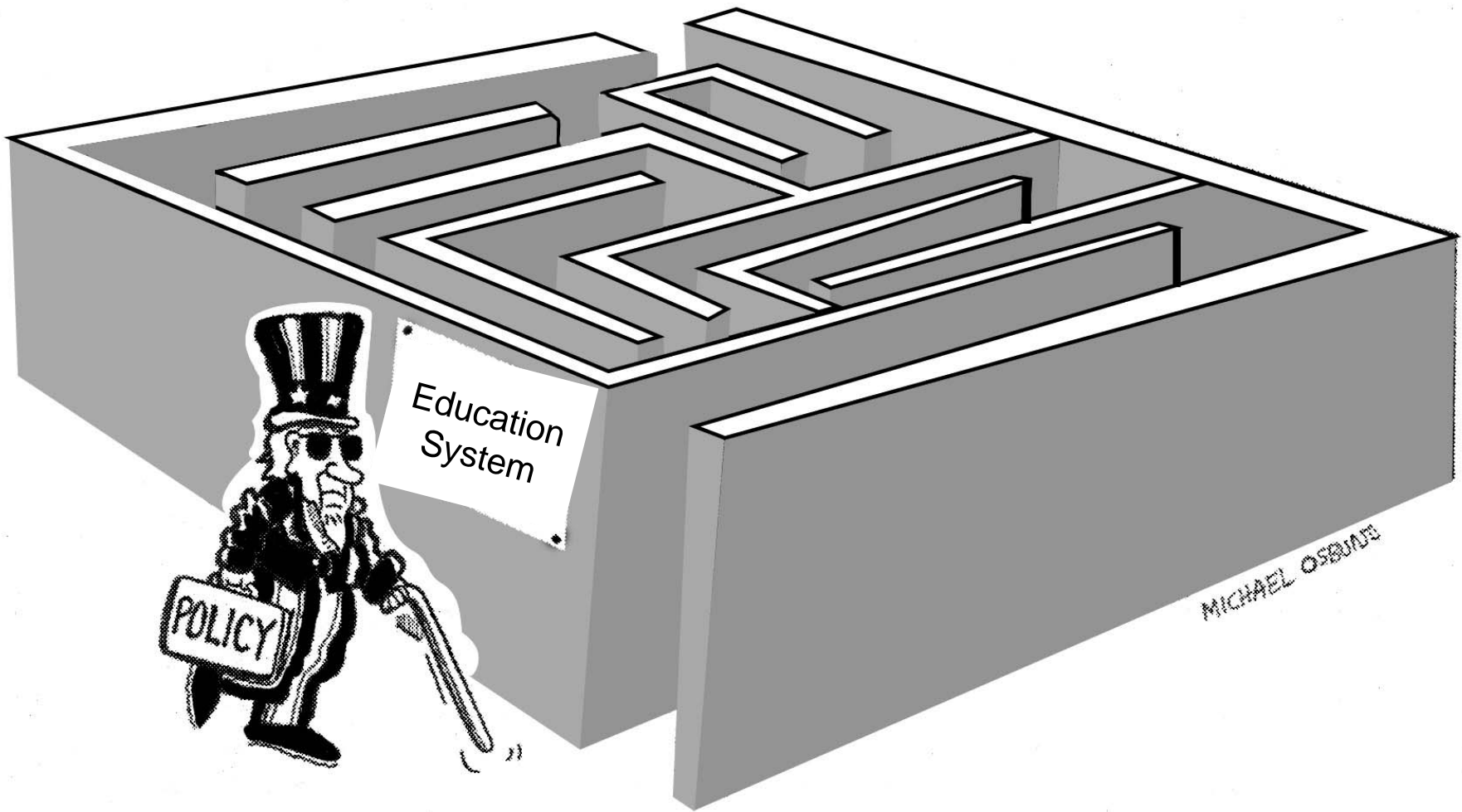
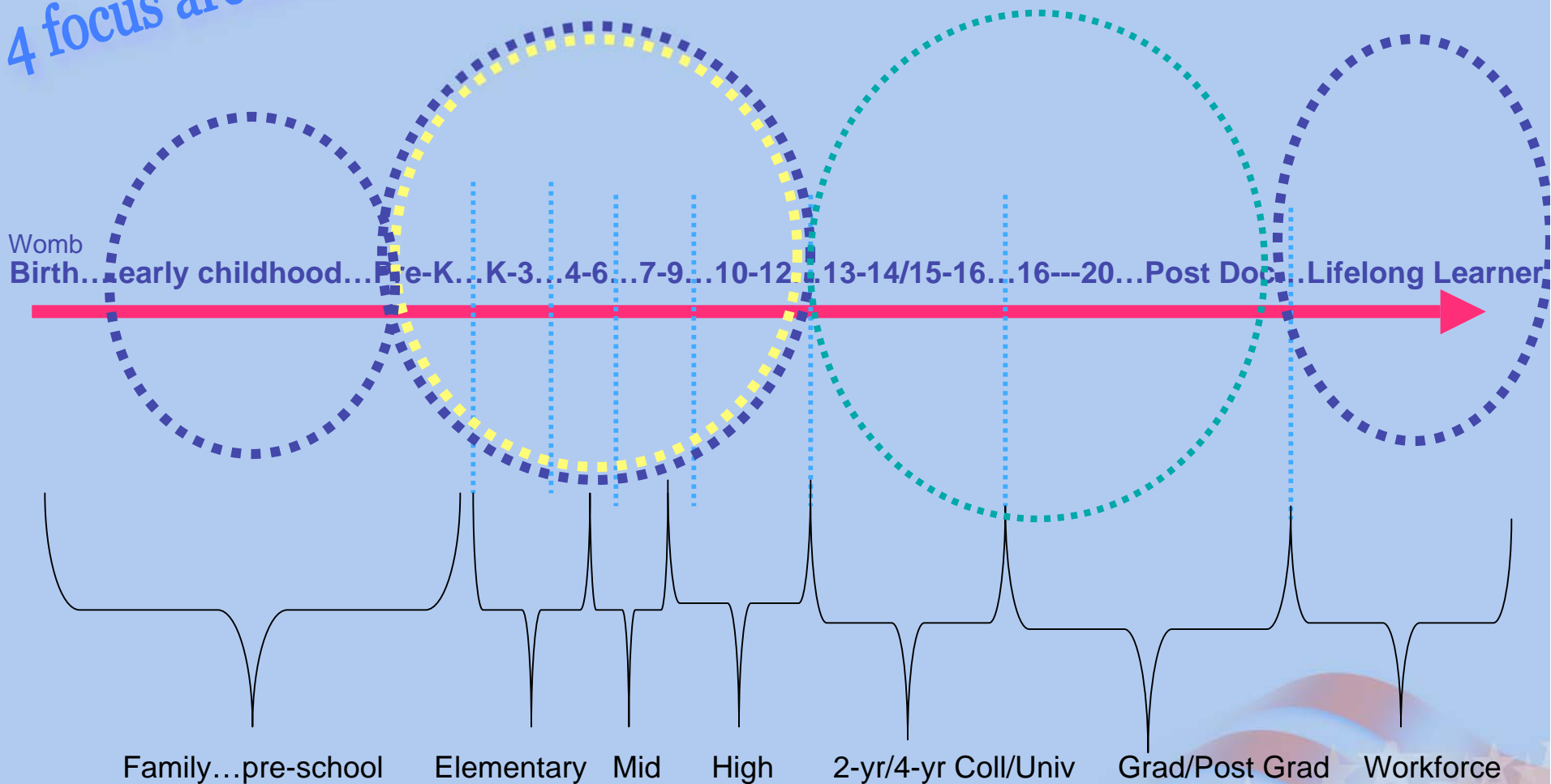


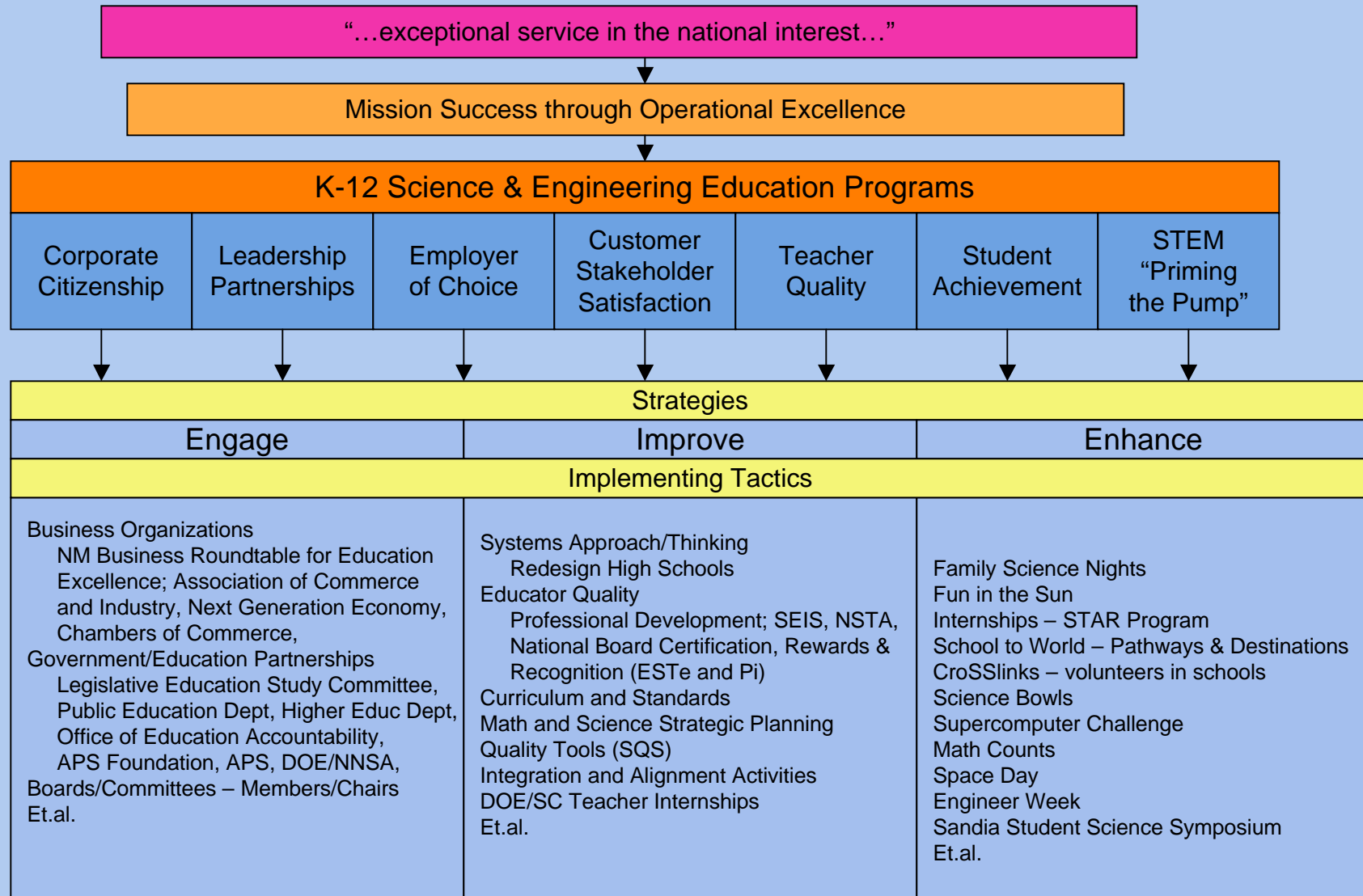
Illustration from the Albuquerque Journal

Continuum of Education and Learning

4 focus areas for consideration



K-12 Education Enterprise Model

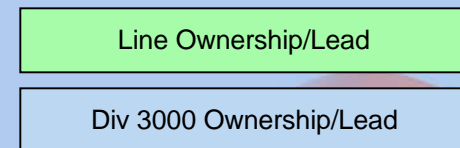


Education Continuum – Talent Development, Recruitment & Retention

Pre-K	K – 12	13 – 20+	Employee Prof Dev/Educ Aid
Guide for employees	Special Programs (Family Science Nights, Math/Engineering Nights; Literacy/Numeracy, Mission Engineering, CroSSLinks; etc)	Line Programs and Resource Needs University & Faculty Relations Faculty Internships/Externships Revolution/Transformation of Engr	Line Programs Strategic Planning/Needs UTS and other MOU's Prof Dev/Resp Discernment/Crit Think
	Prof Dev Workshops and Conferences (e.g. NSTA, SEIS, AP Trng, etc) Support for National Boards/NBCT Recognition (ESTe)	National Planning and Policy Facilities/Systems of Future R&D Leadership Areas Interdisciplinary Problem Solving	Strategic Lab Needs Cross-Training/Critical Skills ID Special Prof Dev (Problems/Seminars) Strategic Education Committee
	Special Out of School Enhancements (School to World, S4, Science Bowl, Programs to engage kids in science, technology, engineering and math)	Recruitment Planning and Tools Communications – Targeted to Gen Y University Champions Diversity Programs/Remediation Issues	Education Programs – Mission Needs Formal - Current/Future In Residence/On-Line UTS/Other/MOU's – Program Support
	Course/Curriculum Development; Alignment to Econ Dev/Needs and SNL (NNSA) future needs;	Student Internships Recruitment/Hiring Partnerships SNL Policy	Leadership Development Special Organizational Development Consultation - Work Environment Issues Diversity - Culture – Change
	Internships Special Programs (STAR) Employee Workshops		Policy, Process and Program Dev Employee Working Groups Communications Interdisciplinary Problem Solving
	Partners – Teaching Methods; Educating and Engaging Gen Y-Z; Classroom of Future; Technology & Society; Quality In Schools; Jr Achieve; Character Counts		
	Policy and Programs Business/Gov't/Educ Partnerships/Groups/Organizations (NMBREE, GBEE's, USBR, et.al.)		

Sandia National Laboratories

These color coded delineations of primary ownership are intended to provide simple clarity; however, teaming and communications are key to the success of this effort.



Education Continuum – Talent Development, Recruitment & Retention

Pre-K	K – 12	13 – 20+	Employee Prof	Aid
Guide for employees	Special Programs (Family Science Nights, Math/Engineering Nights; Literacy/Numeracy, Mission Engineering, CroSSLinks; etc)	Line Programs and Resource Needs University & Faculty Relations Faculty Internships Revolution		
	Prof Dev Workshops and Conferences (e.g. NSTA, SEIS, AP T... Support for Nat...			

All Supporting Increasing America's Talent Pool (and SNL's too!)

K-12 System: 10,000 Teachers/10 Million Minds

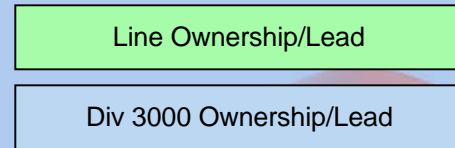
Vastly improving K-12 science and mathematics education

Strengthening Skills of 250,000 teachers

Enlarging the Pipeline by increasing AP courses (math/science)

Engaging more HS Graduates in Engineer/Science programs

...for coded delineations of primary ownership are intended to provide simple clarity; however, teaming and communications are key to the success of this effort.



Education Continuum.....

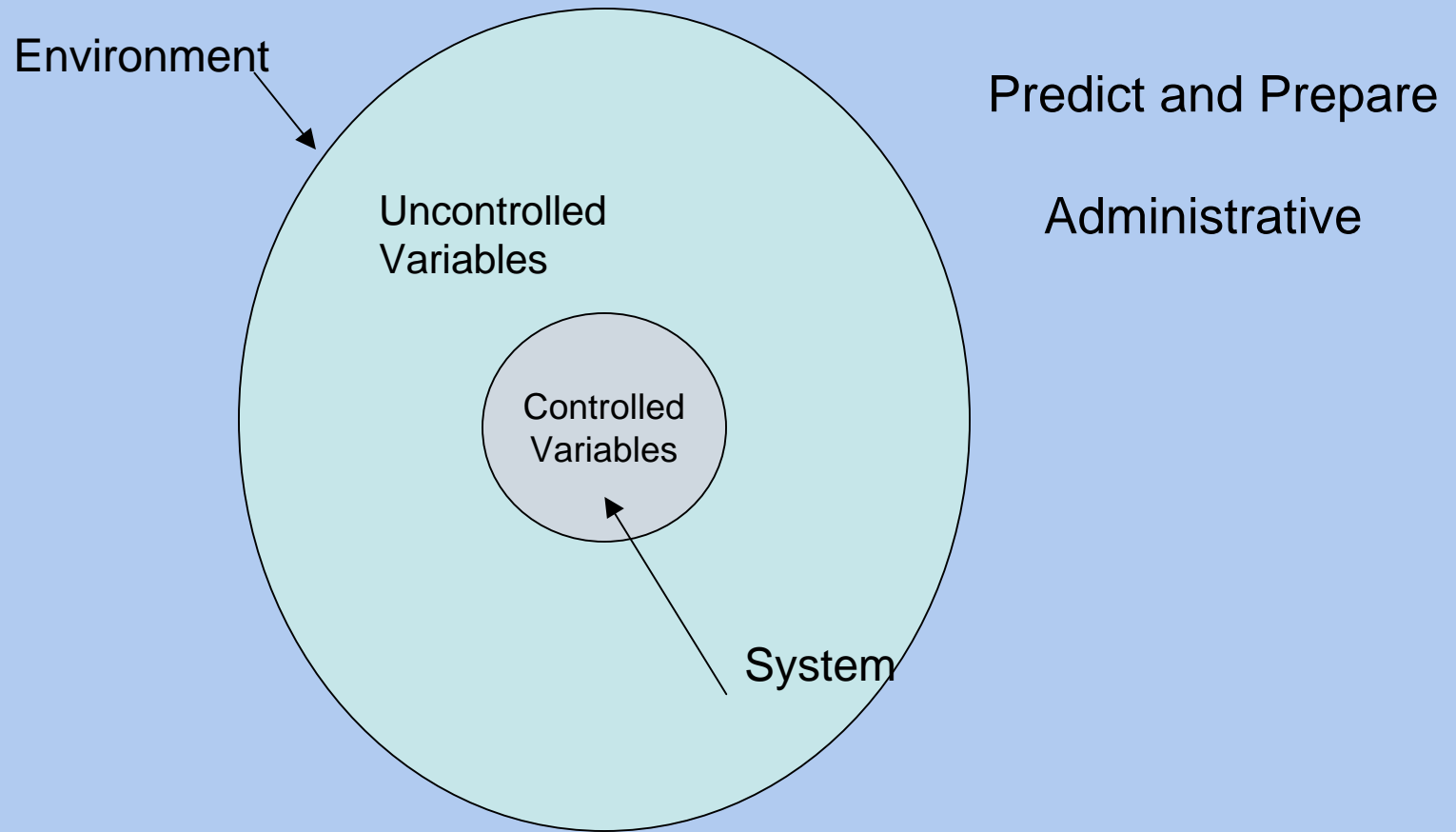
Educator Talent Development, Recruitment & Retention

- 12

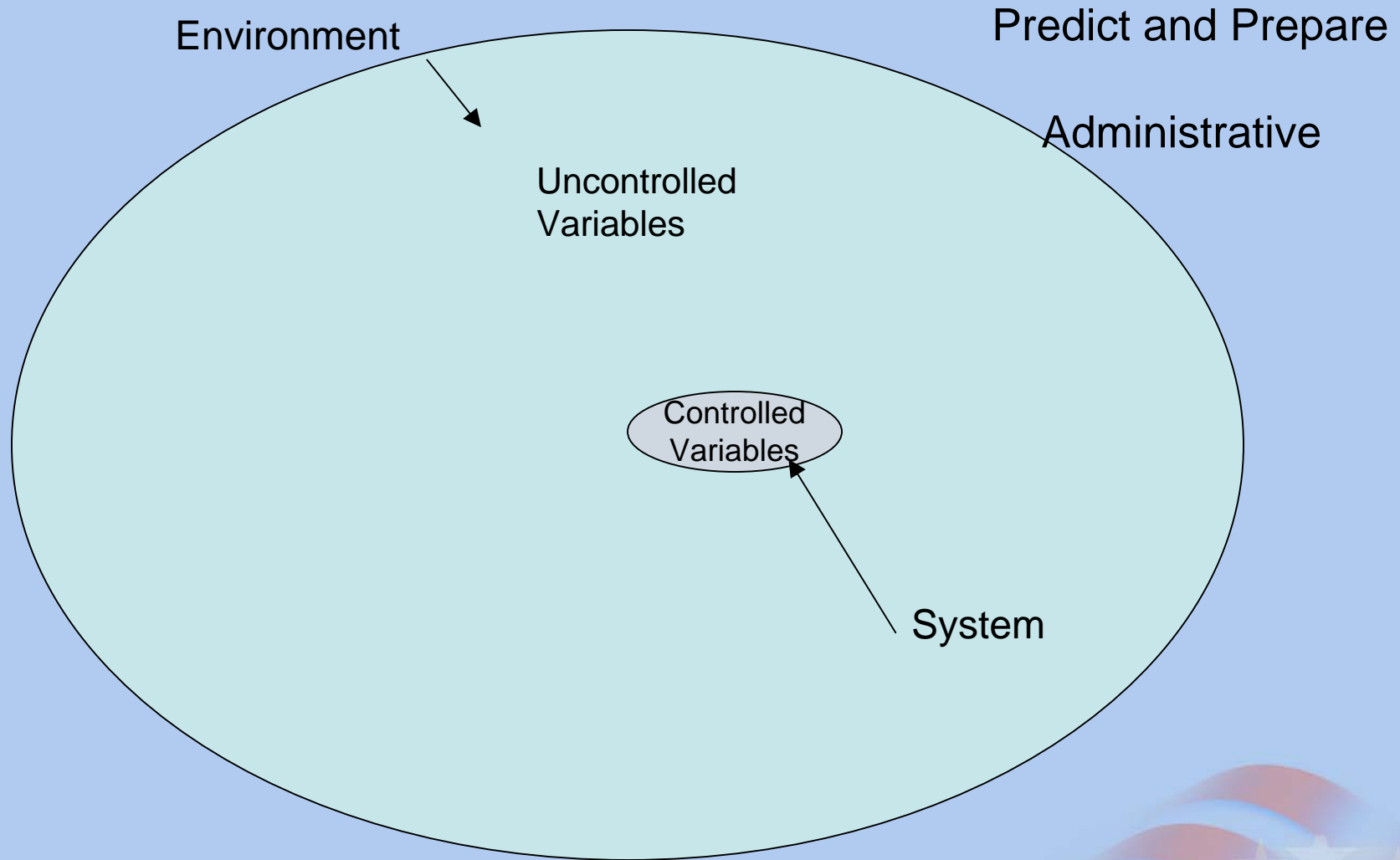
Teacher Workshops	Integrating Literacy and STEM Exposure to STEM	Out of School Enhancements Science Bowl School to World Adjunct Faculty Led Field Trips	Out of School Enhancements Science Bowl School to World Adjunct Faculty Led Field Trips
Classroom Visits	CroSSLinks Sandia volunteers – Visit and Help with STEM teaching/experiments	CroSSLinks Adjunct Faculty	CroSSLinks Adjunct Faculty
Hands-On Kits Partners	STEM Hands On Experiments/Kits Family Science Nights Family Math Nights Up'n Atom Van	Special Summer Programs	Internships STAR
	Professional Development	Professional Development NSTA NBCT	Professional Development NSTA NBCT
	Recognition ESTe Awards Pi Awards	Recognition ESTe Awards Pi Awards	Recognition ESTe Awards Pi Awards
	Next?	Next?	Next?

- Current Programs
- New Programs

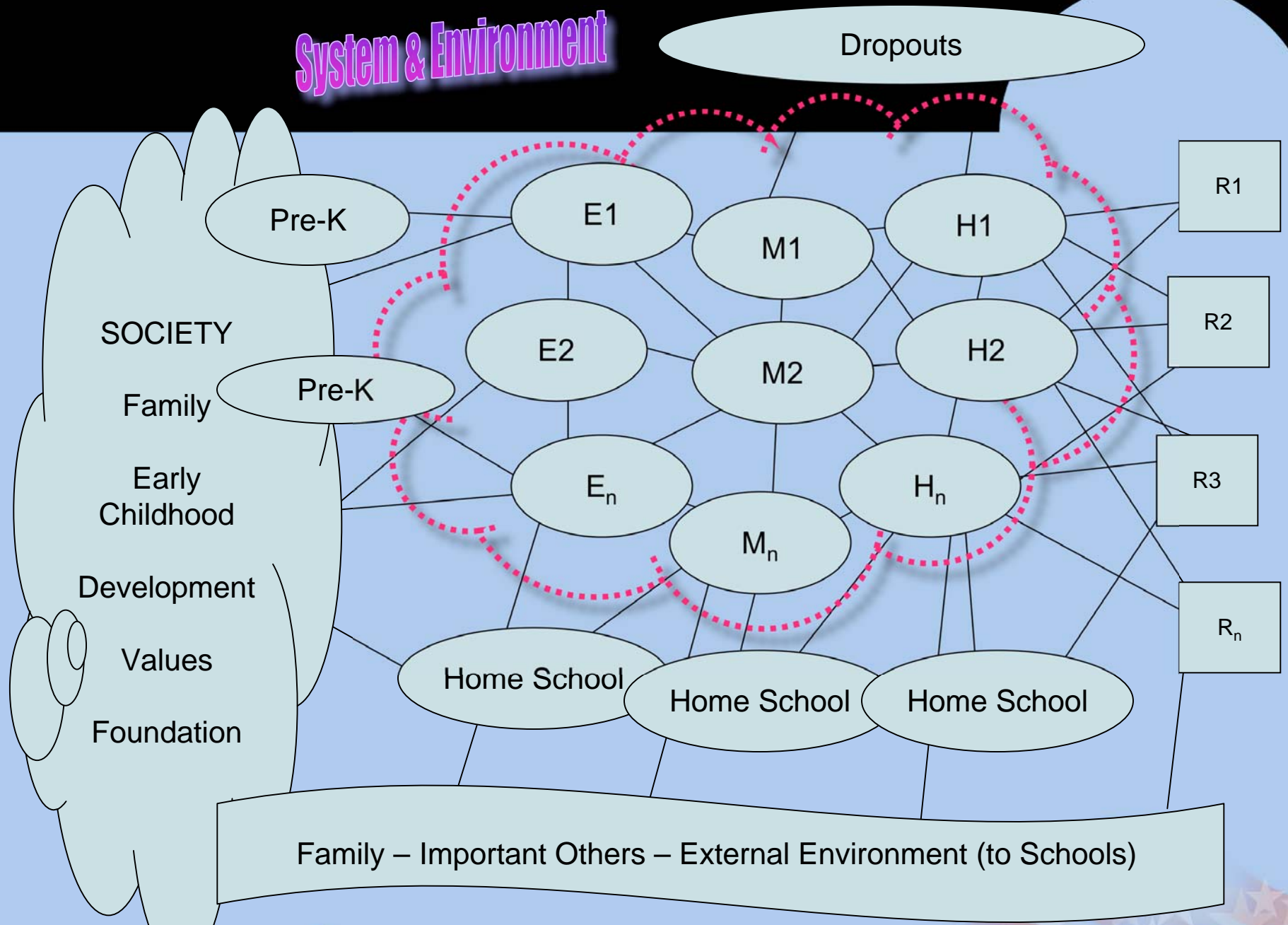
Systems can only be understood in the context of their environment



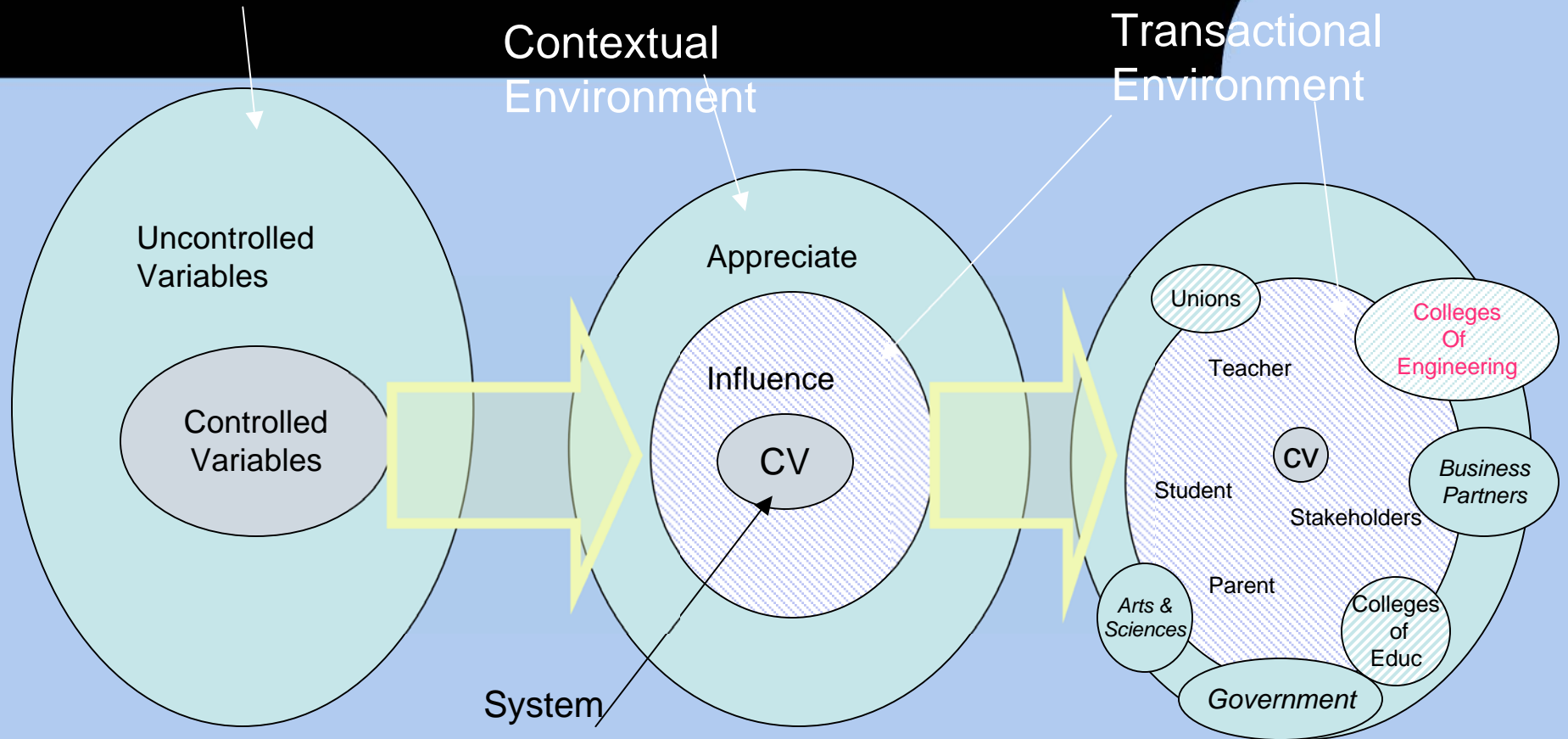
Yet the environment has changed.... and continues to change.



System & Environment



Environment



Predict, Prepare,
Lecture & Administrate

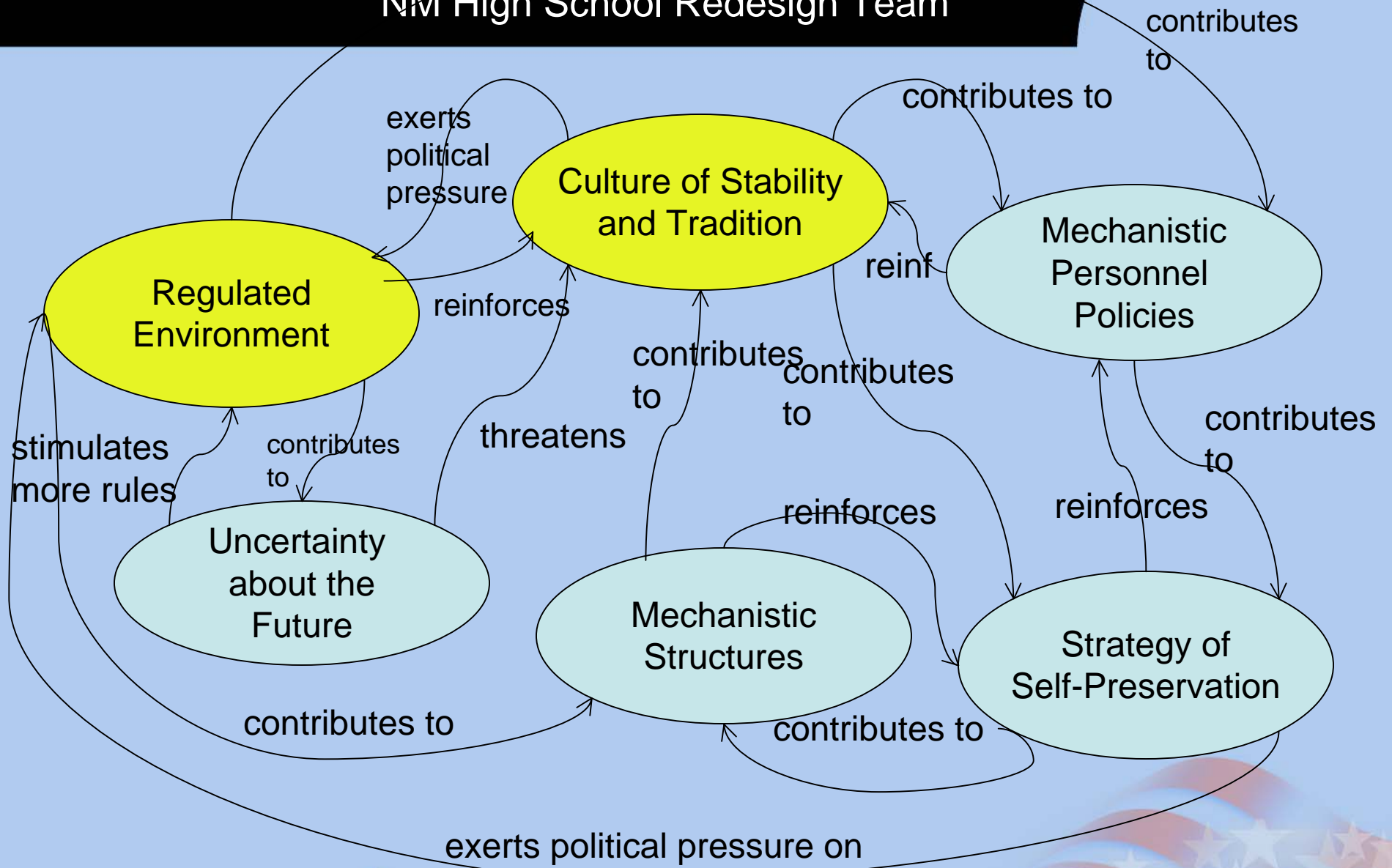
Analyze, Adapt &
Facilitate Learning

Transform Educational
System in Transactional
Environment (Leadership)
In support of SBET

Influencing and Impacting K-12 Education for Engineering Pipeline

Systems can only be understood in the context of their environment

Set of Interacting Problems Facing the NM High School Redesign Team



Input for some of the Benefits to “Sandia”

- Workforce
 - **Recruitment/Retention/Recognition/Rewards**
 - Improved schools for children/dependents
 - Opportunities to Volunteer and “give back” to community/etc.
 - Professional Development and Lifelong Learning
 - Formal Educational Programs & Assistance
 - Result: **Outstanding People** (a Sandia 10 year objective)
- Contract
 - Supports involvement/engagement.....”requirement...”\
 - Supports DOE/NNSA education programs/initiatives
- Corporate Citizenship
 - **a valued and responsible corporate citizen and community partner**
 - **Reputation and Branding**
 - Responsive to “needs” of our communities....

Benefits to “Our Communities”

K-12

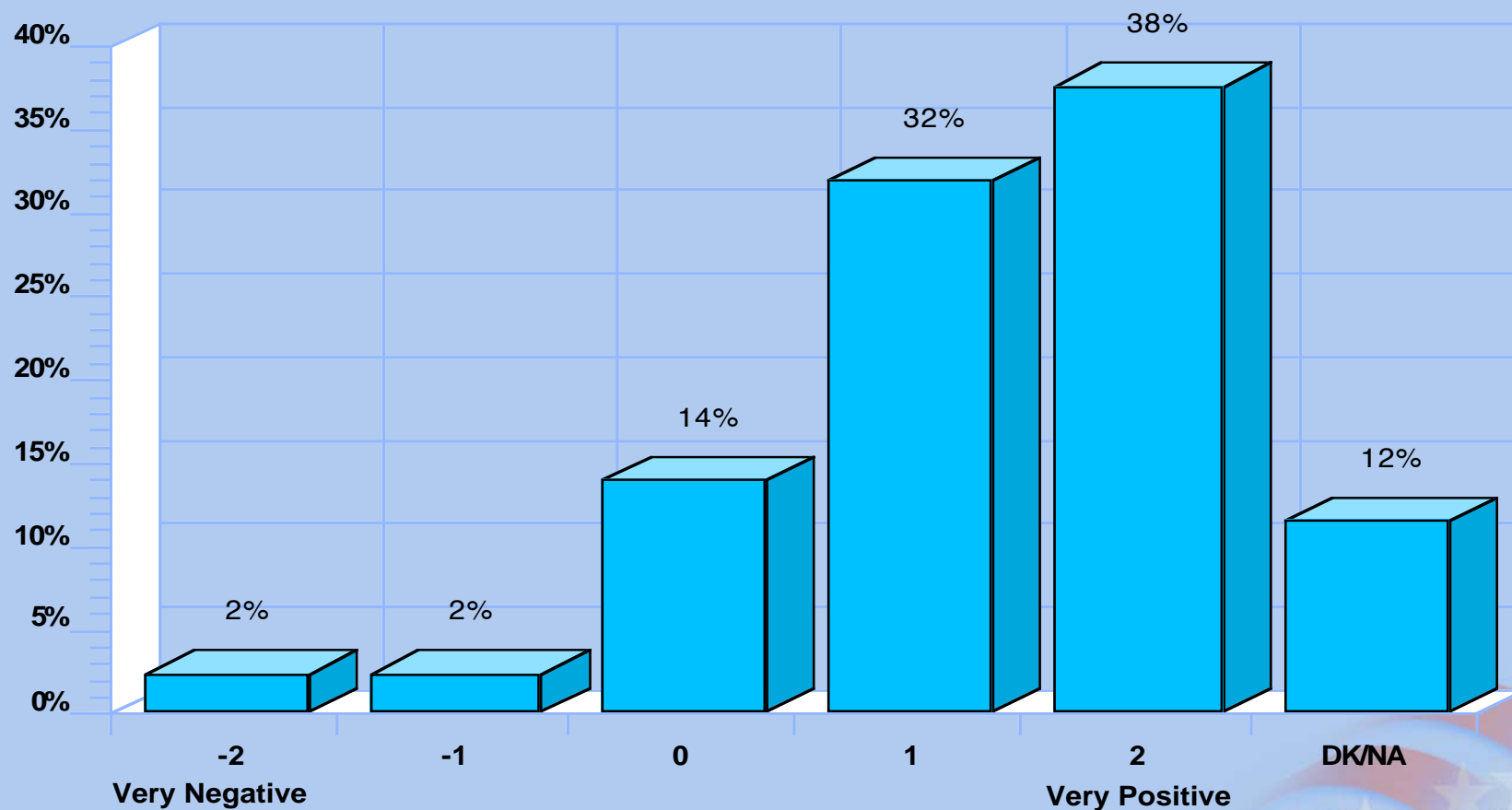
- Caring and Engaged Citizens/Volunteers
 - Volunteers in support of education
 - SNL programs, community programs, tutors, etc.
 - Measure: surveys/interviews
- Leadership
 - Local, regional and national business/education organizations
 - Measure: Leadership positions in critical organizations/committees
- Quality Educators and Schools
 - Focus: STEM and professional development
 - Assessment/Continuous Improvement and Content Knowledge
 - Special Teacher Programs (ACTS, CroSSLinks, etc.)
 - Measure:....test scores and Surveys where longitudinal data is available
- Engaging and Inspiring Students
 - Careers - STEM fields
 - Prime the pump...for the pipeline...pathways to STEM destinations
 - ImagiNANOvation, School to World, Science Bowl, etc.
 - Internships vs. Summer Jobs + Mentors + Relevance
 - Measure: Test Scores in Science/Math and Success in having students choose a STEM field/major
- Community and Economic Development
 - Improved Workforce/Recruitment of Business

Sandia Leadership for NM Education Issues examples

- Chair of NM Business Roundtable for Educational Excellence (NMBREE)
- Board of Directors for Governor's Business Executives for Education (GBEE's)
- Chair of Albuquerque Hispano Chamber of Commerce's Education Committee
- Co-Chair of Economic Forum
- Chair position of Association of Commerce and Industry's Education Committee (4 of past 6 years)
- Chair of Talent Development Committee for NextGen Economy
- Co-Chair for NM First Town Hall "Implementation Team" w/ former Gov. Carruthers for improving Higher Education and the 'pipeline.'

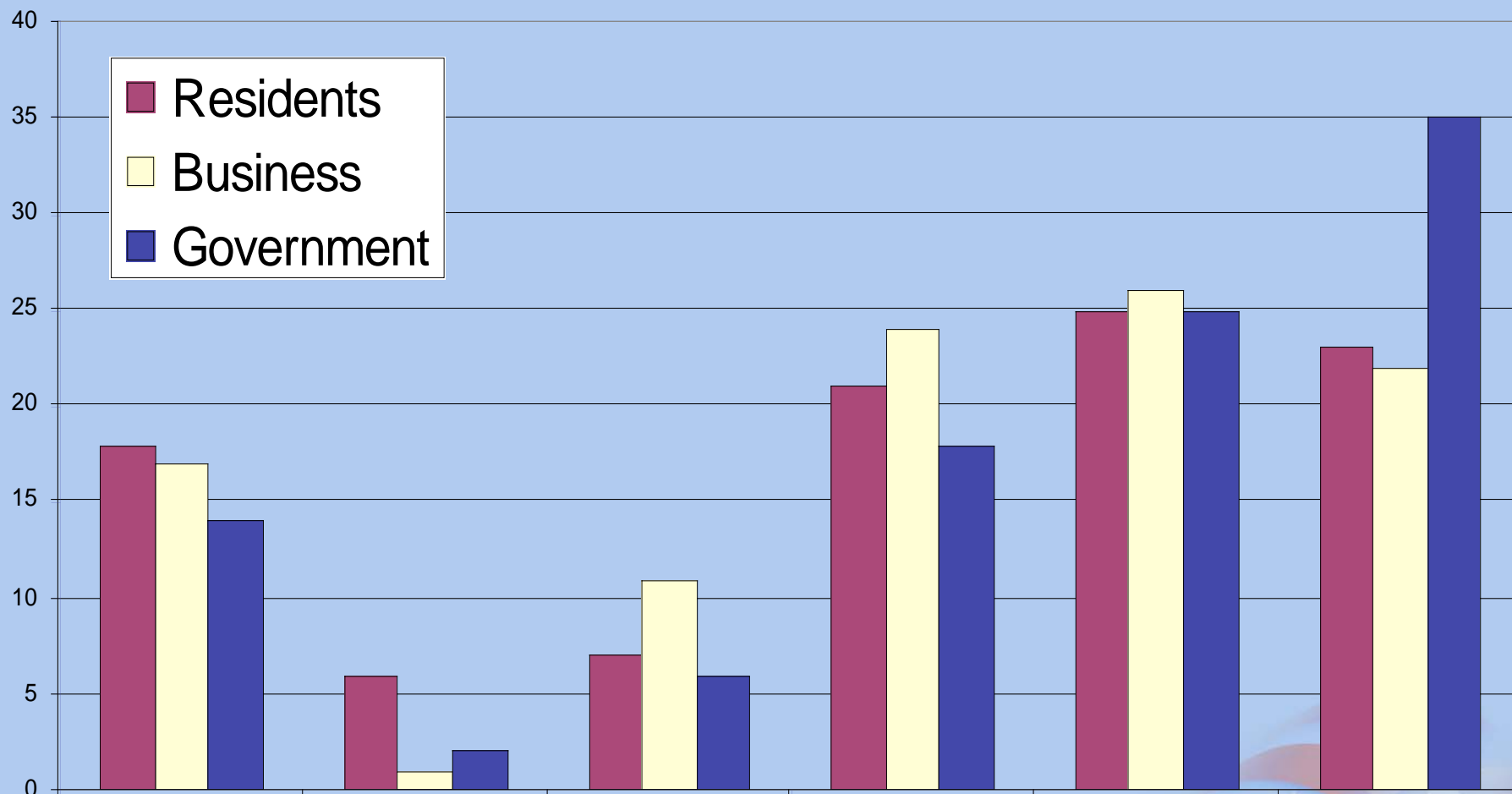
2005

What effects do Sandia Labs have on education in your community?



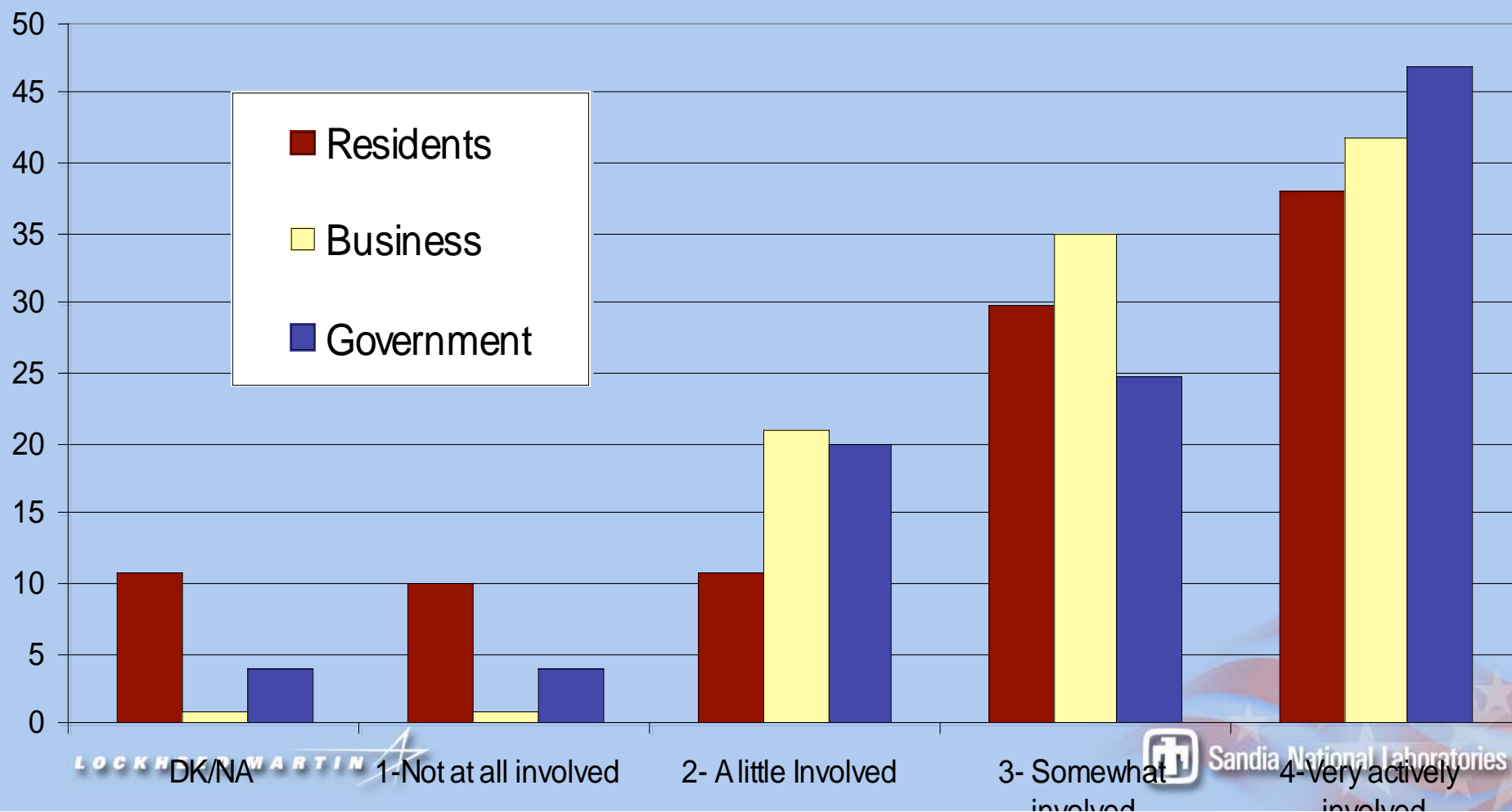
2005

Sandia National Laboratories is actively involved in improving science & math education in our schools



2005

Do you think Sandia National Laboratories is involved in the community with volunteer programs, education outreach & community programs.



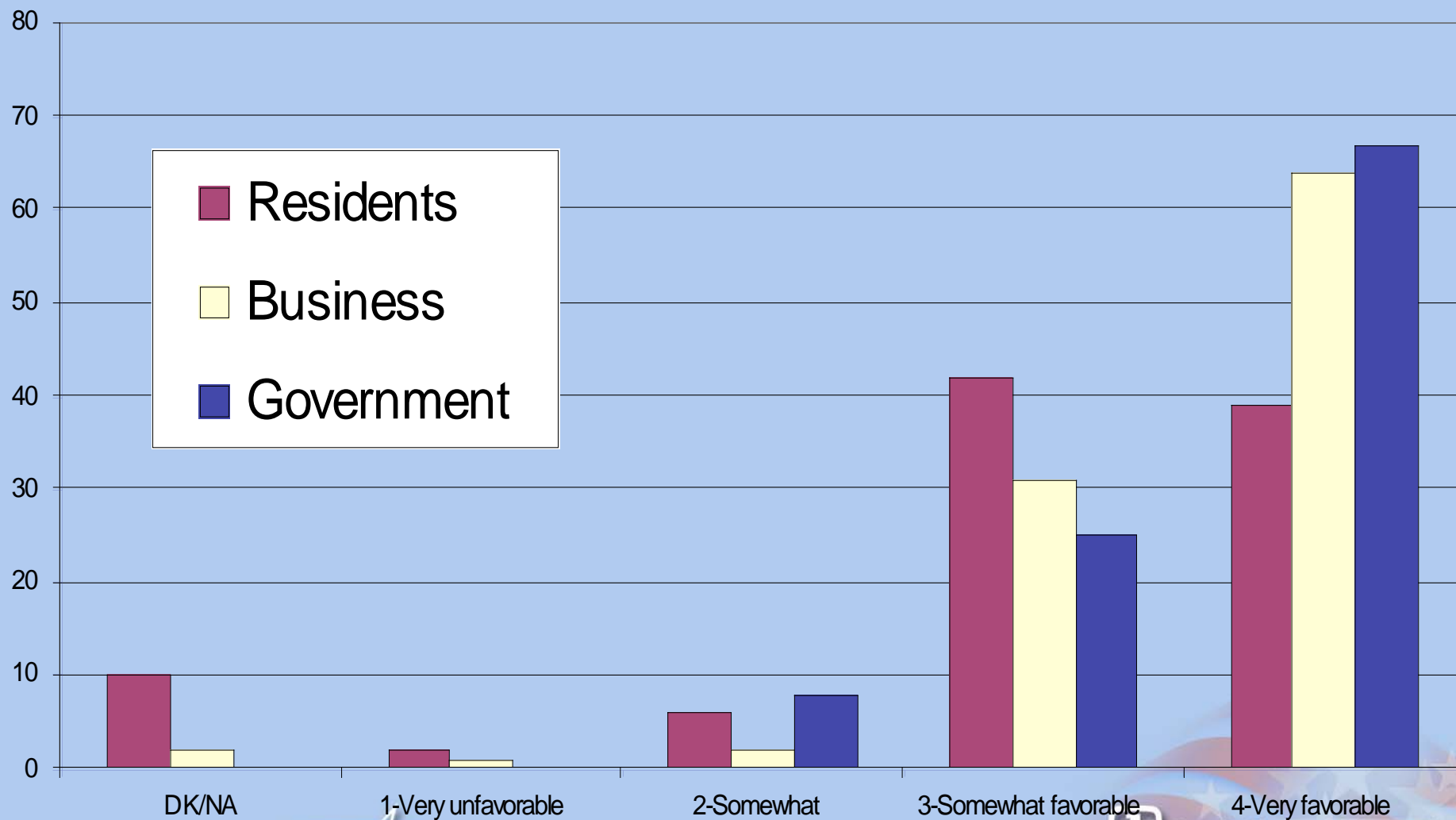
LOCKHEED MARTIN



Sandia National Laboratories

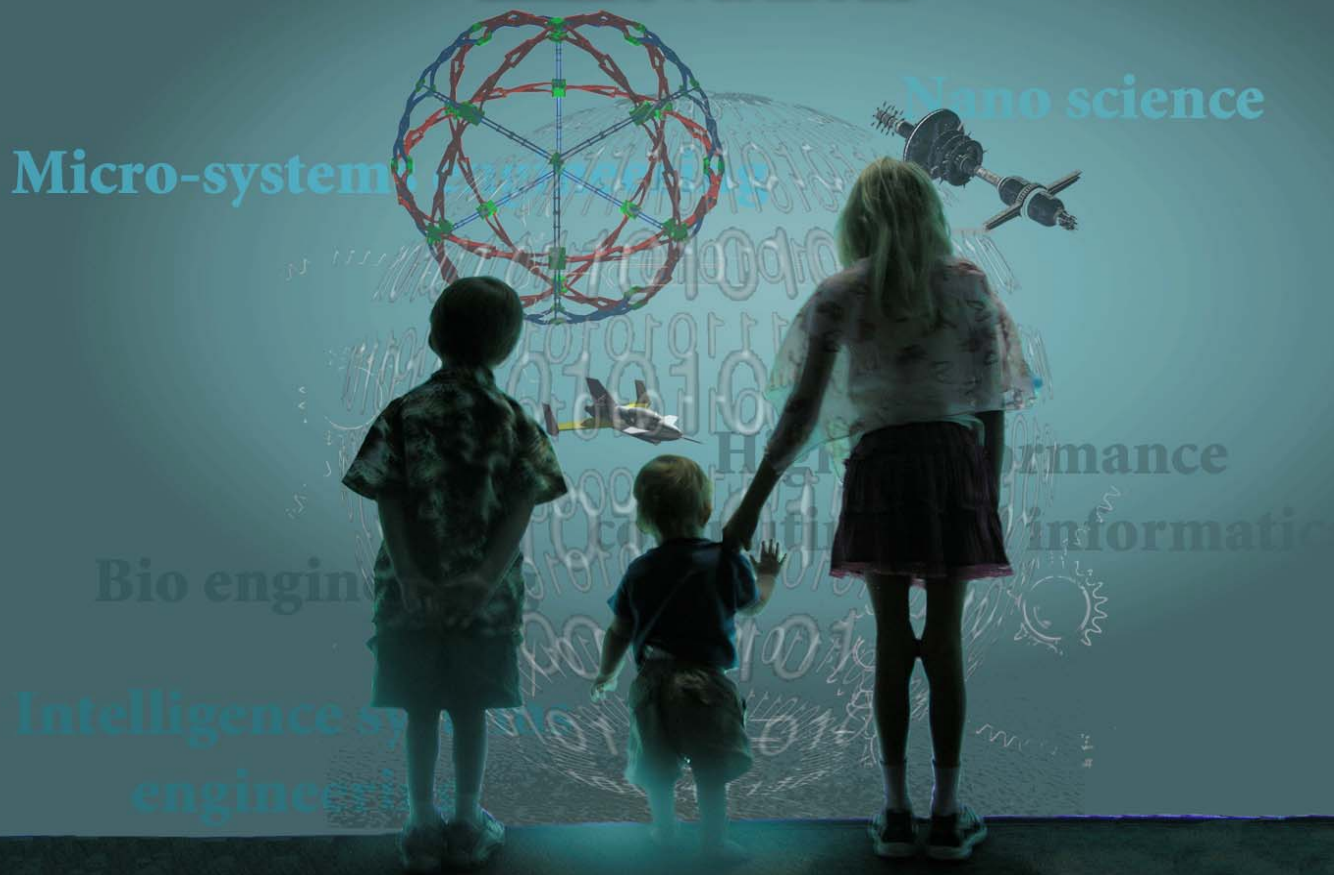
2005

How favorable are your views of Sandia National Laboratories?



We must look at the entire “pipeline”

Accelerating Engineering Innovation



It takes 14 years to prepare an engineer.

A sad...parody....

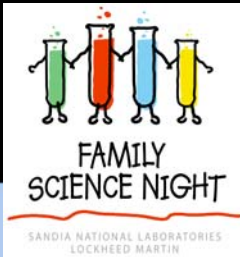




Science is Fun!



Family Science Night



- Evening program of hands-on activities that provides an opportunity for children and parents to enjoy science
- Started in Albuquerque in 2001 with 22 evenings
 - Added summer program - Fun in the Sun
 - Expanded to Livermore, CA in 2004
- Provided at no charge to local elementary schools
- Hosting over 70 evenings a school year (5000 students and their families)
- In Albuquerque, over 40% are bi-lingual evenings
- Family Science Night is an effective way to engage students and parents – rated 4.9 on scale of 1-5 with 5 being Strongly Agree
- Share model nationally (website and regional/national teacher conferences)

*“The science activities are wonderful. The parents really enjoyed working on the experiments with their children. I think Family Science Nights are a lot more effective than science fairs in terms of motivating interest in science.”
Linda Smith, Lew Wallace Elementary School teacher*

Fun in the Sun



School to World

“Curriculum is often irrelevant for those without a destination in mind.” Michael DeWitte

a community partnership



2500 students/year attend from all over the state



Space Day



STAR Intern Program

- Piloted summer of 2002
- 10-15 exceptional students/year who are interested in science, math or engineering careers
- Offered to local public high school students
- 8 week research program with dedicated mentor
- Technical presentation on research experience
- First group graduated from college in 2007
- % have continued as regular student interns at SNL
- Over 60 students have participated in the program

"I will never forget my summer working at Sandia Labs. It was a period of my life where I feel I learned a great deal about the hiring process, work ethic, teamwork, the importance of following processes and procedures, and above all about science."

STAR student



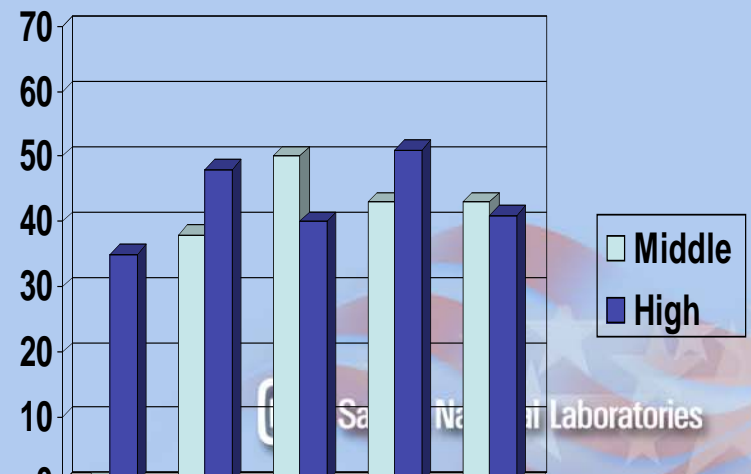


New Mexico Science Bowls

- Middle and High School students from across New Mexico rural & urban schools
- Added Middle School in 2003
- Students demonstrate knowledge of science in a fun and competitive format
- Winning teams travel to national competitions
- Participants include Santa Fe Indian School, NM Military Institute, San Jon and Hot Springs High Schools



of Teams



*"Since Science Bowl is a game, it made science fun for my son & his team mates. They all had a blast in Washington, DC. Thanks for providing this great learning opportunity."
Parent of Science Bowl winner*

Thunderbird Awards

Overcoming
Adversity...

...and Succeeding!



Excellence in Science Teaching Awards

ESTe Award

- Local schools nominate teachers
- Recognize teachers at an annual banquet
- Invite schools, business and government as well as families
- Provide money for classroom supplies and cash award to teacher
- 29 recipients to date



Excellence in Math Teaching



Professional Development for Teachers

- National Science Teacher Association Conference scholarships and Presentations
- Supported 20 teachers to become National Board Certified in Science and Math
- Partner with UNM to provide courses to enable middle school teachers to meet NCLB “highly qualified teacher” requirements
- Support Albuquerque Teacher’s Institute
- Support AP teacher training
- Provide funding for substitutes to enable teachers to participate in workshops

SNL's support and collaboration in various teacher preparation and professional development projects has been invaluable, enabling the College to begin working toward improving science education in our state. With their support, the importance of science education and what it means to the future of New Mexico is being fully recognized.

(Doug Earick, Education Outreach Coordinator, College of Arts & Sciences University of New Mexico)

“If it was not for Sandia’s professional development efforts for science teachers; our APS teachers would simply not have any !” (T. Wagner, APS Science Coordinator)

National Science Teachers Association

- **NSTA Adopts New Position Statement on Professional Development**
- *“NSTA believes a high-quality science teacher workforce requires meaningful, ongoing professional development. To achieve this goal, schools and school systems must devote time and resources to effective professional development for all K–16 teachers of science and science educators to support learning throughout their careers.”*
- This quote is taken from the new position statement on professional development recently adopted by the NSTA Board of Directors. The statement focuses on the key principles behind professional development; considerations for designing professional development; planning, implementing, and sustaining professional development; and specific needs of professional development providers.

SEIS INSTITUTE

SUMMER SCIENCE COURSES FOR TEACHERS

Science Education Institute of the Southwest

*A Center for
Innovative Learning,
Teaching and Research*



P.O. Box 40463
Albuquerque, NM 87196-
0463

Phone: 505-266-2070
Fax: 505-254-9407
www.seisinstitute.org

Gems and Minerals of New Mexico

Instructor: Paula Watt, Earth &
Planetary Sciences
Offered as E&PS 552 ,
June 5 - 22, mornings



Natural History of New Mexico

Plants Instructors: Tim Lowrey,
Biology and Amy Ellwein, Earth &
Planetary Sciences
Offered as Biol. 402/502,
June 5 - 9, full-day residential program at the UNM Sevilleta Field Station

Schoolyard Science For Elementary Teachers : Integrating Literacy and Inquiry

Instructors: Matt Nyman, Earth & Planetary Sciences and Mary Earick, College of Education
Offered as Nat Sci 400*, June 5 - 22, mornings

How to Bring Astronomy into the Classroom Instructor: Michael Crane, UNM Natural
Sciences Program

Offered as Nat Sci 400*, June 12 - 29, afternoons and evenings

Understanding Nuclear Science & Technology Instructors: Bob Busch, Chemical & Nuclear
Eng; Jay Shelton, Santa Fe Prep; and Debra Thrall, WERC
Offered as Chem Eng / Nucl Eng 499, June 26 - 29, full-day

UNM graduate tuition and books provided for free to all participants.

A \$100 course fee to cover other costs for participation will be charged.

**For more information or an application, please contact
Doug Earick at 266-2070 or dlearick@unm.edu.**

Partnership

UNM & SNL



Sandia National Laboratories

Take a closer look!



E P L O R E

ENGINEERING

Turn Your Ideas into

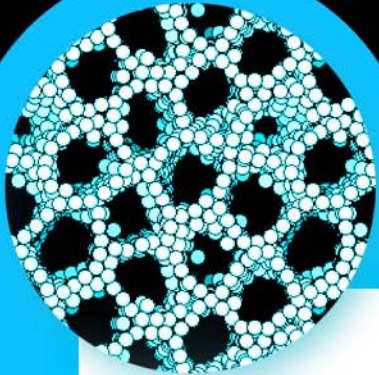
Reality



Sandia National Laboratories

LOCKHEED MARTIN





If you **like to...**

- Solve problems
- Design things
 - Build things
 - Work puzzles
- Figure out how things work
 - What makes people click?



Consider **engineering!**



What is it like to be an **engineer?**

Meaningful & Challenging Work



You'll never be bored!

Good Pay and Benefits



You'll often work in a team.

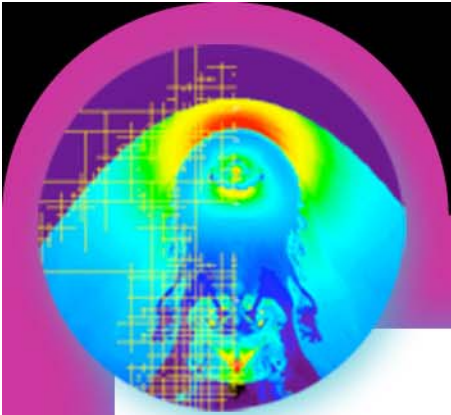
Fun and Exciting Work



Solve World Problems



Enjoy a flexible schedule with time for friends and family.



Engineering teams have

- Project manager
- Team leader
- Designer
- Cost manager
- Tester
- Quality control
- Sales engineer



- Applications engineer
- Computer modeler



*Let's keep our eye
on the prize....
"Student Success!"*