



Sandia
National
Laboratories

SAND2019-7100PE

Minority Serving Institute Program

Advanced Manufacturing Network Consortium

Sandia National Laboratories



PRESENTED BY

Stan Atcity, Ph.D.



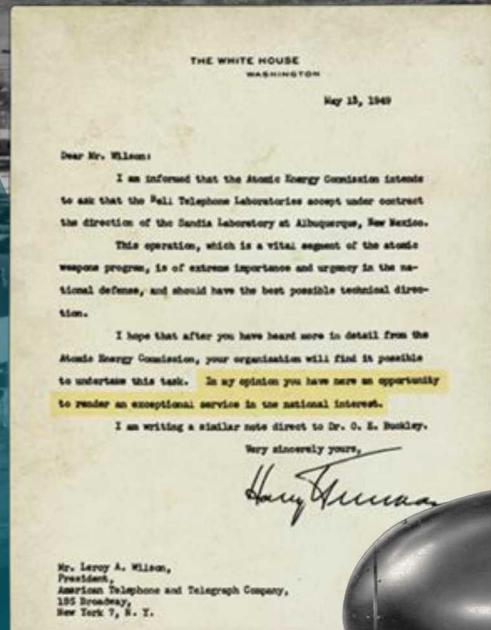
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SANDIA'S HISTORY IS TRACED TO THE MANHATTAN PROJECT



...In my opinion you have here an opportunity to render an exceptional service in the national interest.

- July 1945
Los Alamos creates Z Division
- Nonnuclear component engineering
- November 1, 1949
Sandia Laboratory established
- AT&T: 1949–1993
- Martin Marietta: 1993–1995
- Lockheed Martin: 1995–2017
- Honeywell: 2017–present





National Technology & Engineering
Solutions of Sandia, LLC, a wholly
owned subsidiary of Honeywell
International Inc.: 2017 – present

Government owned, contractor
operated



SANDIA HAS FACILITIES ACROSS THE NATION



Main sites

- Albuquerque, New Mexico
- Livermore, California

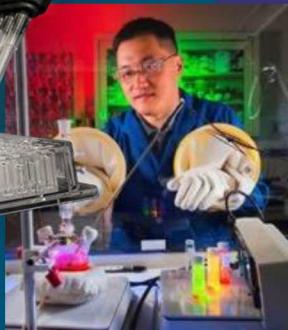


Activity locations

- Kauai, Hawaii
- Waste Isolation Pilot Plant, Carlsbad, New Mexico
- Pantex Plant, Amarillo, Texas
- Tonopah, Nevada

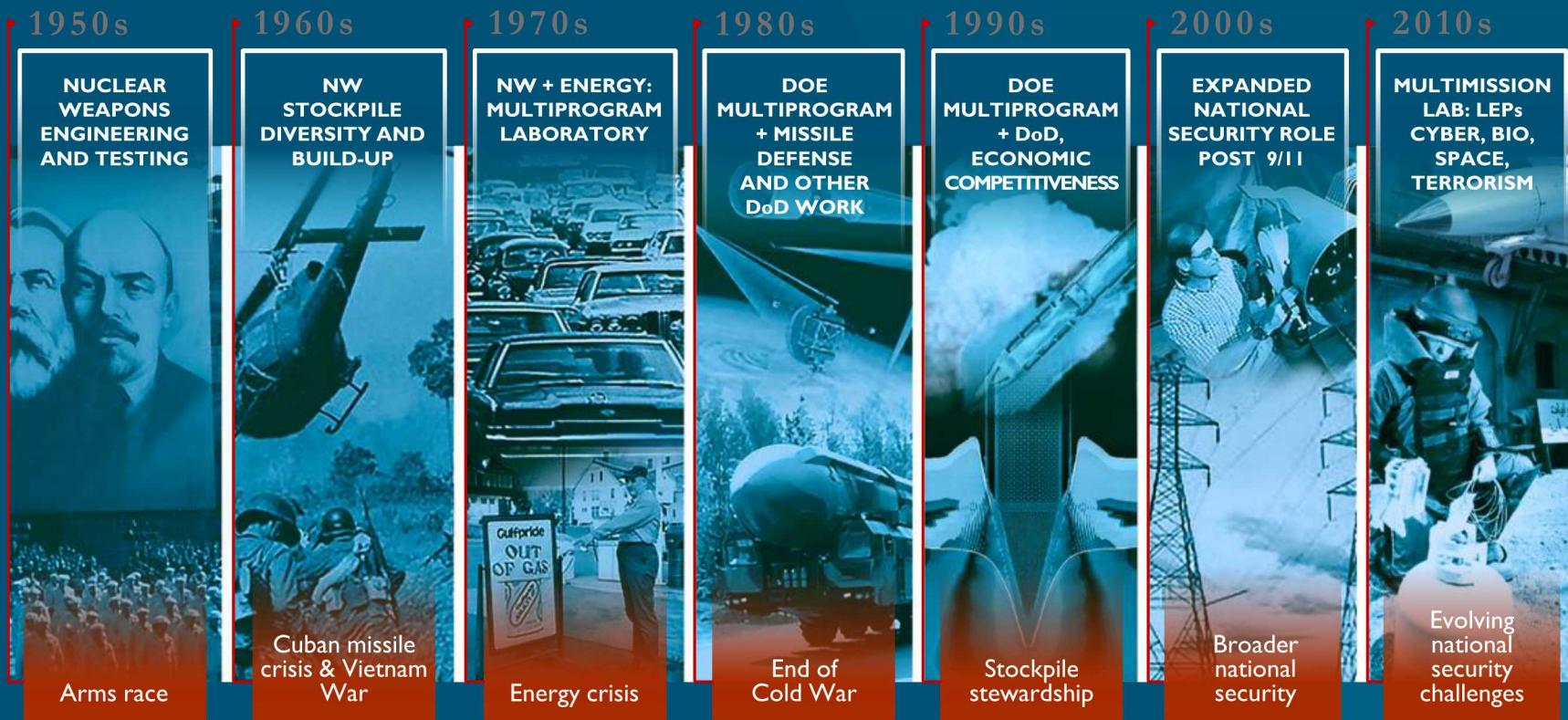


OUR PRIORITIES CREATE A VISION FOR THE FUTURE

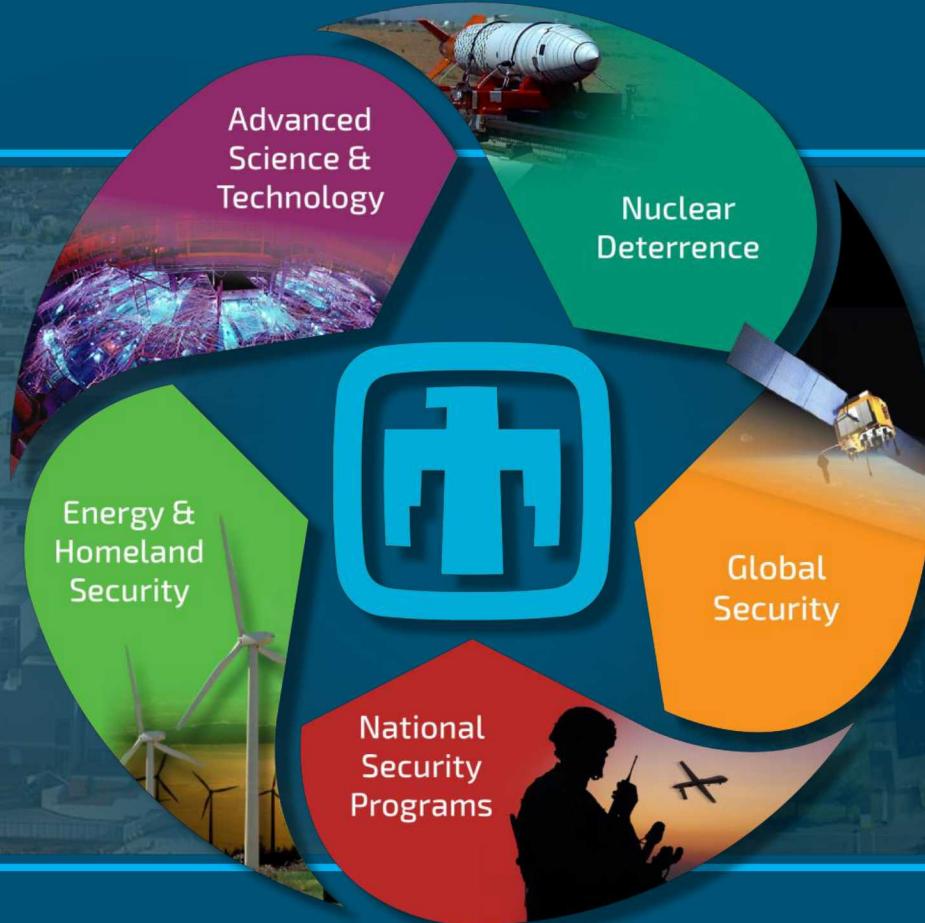


- **Deliver quality engineering, science, and technology** in the most efficient way possible
- **Safety and security** are top of mind
- **Collaboration** is vital – inside and outside the Labs
- Sustain a **diverse and inclusive** Laboratories culture
- **Think strategically:** What might the world look like in 20 to 30 years?

SANDIA ADDRESSES NATIONAL SECURITY CHALLENGES



SANDIA HAS FIVE MAJOR PROGRAM PORTFOLIOS





Renewable Systems & Energy Infrastructure

Renewable Energy, Energy Efficiency, Grid and Storage Systems

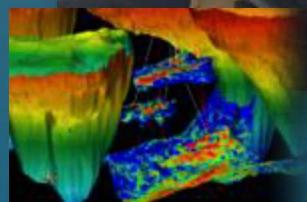
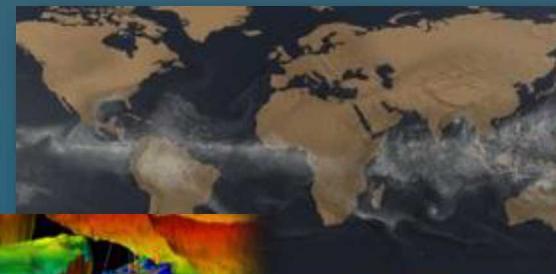
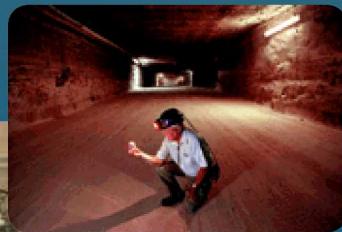


Energy Research

ARPAe, BES Chem Sciences, ASCR, CINT, Geo Bio Science, BES Material Science

Nuclear Energy & Fuel Cycle

Commercial Nuclear Power & Fuel, Nuclear Energy Safety & Security, DOE Managed Nuclear Waste Disposal



Transportation Energy & Systems

Vehicle Technologies, Biomass, Fuel Cells & Hydrogen Technology

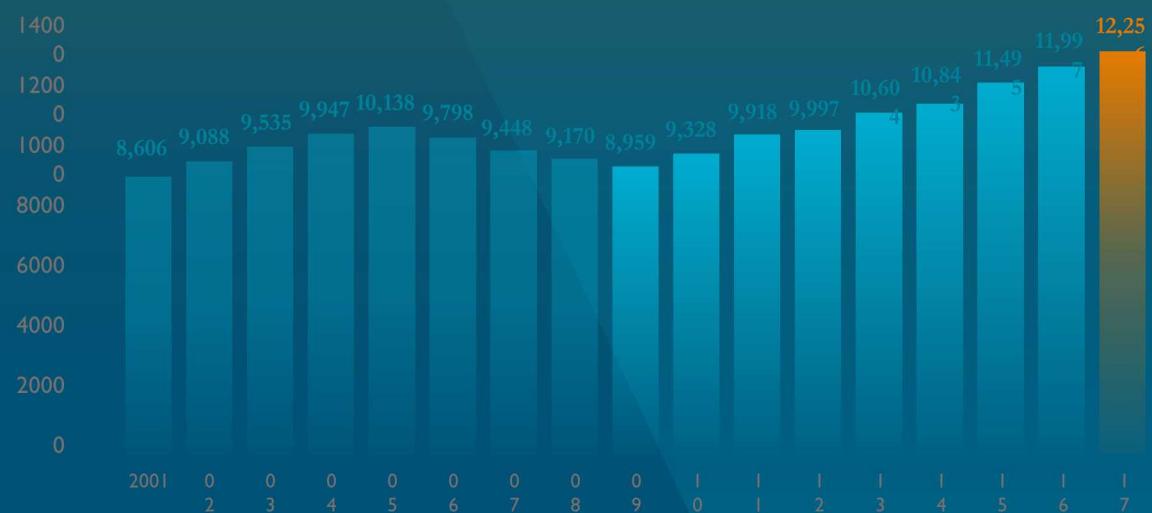


SANDIA'S WORKFORCE IS GROWING



9

Staff has grown by over 3,000 since 2009 to meet all mission needs



DIVERSITY AND INCLUSION ARE STRATEGIC ADVANTAGES TO SANDIA

Sandia's leadership is dedicated to attracting, hiring, and retaining a diverse workforce, and building an inclusive environment

Sandia strives to increase the pool of diverse candidates

- Close collaboration with hiring managers
- Partnership with Sandia's Affirmative Action Employee Resource Groups to recruit, mentor, and support career development
- Expanded diversity outreach activities at targeted schools
- Recruiting at National Diversity Conferences

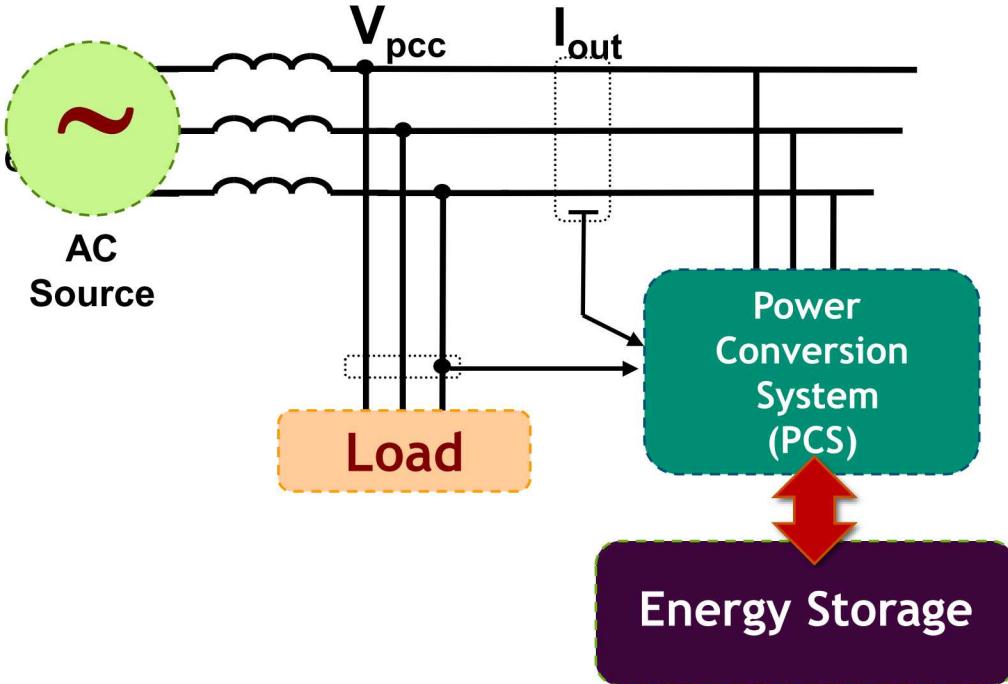


Why is US DOE Office of Electricity and Sandia interested in power electronics R&D?



Needs:

- Reduce install cost/kW
- Decrease size and weight especially for transportable systems
- Improve integration control
- Increase reliability
- Increase efficiency



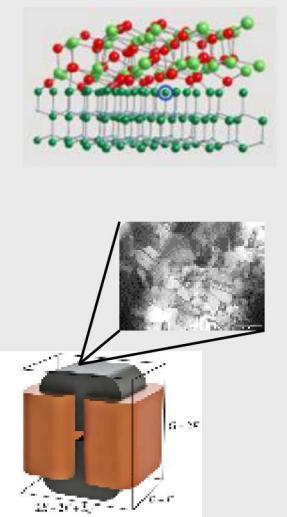
Focus:

- Interface optimization between power electronics and electrochemistry
- Development of advanced power converters using SiC and GaN
- Reliability of WBG Power Converters
- Improved energy storage safety through power electronics

The PCS is a key component of the energy storage system. It can represent 20 to 60% of the total system cost.



Materials R&D



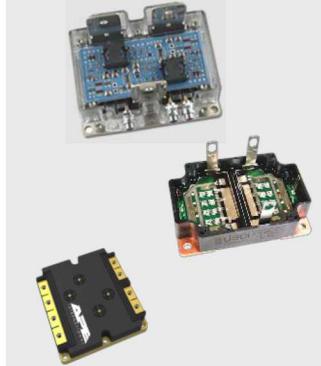
- Gate Oxide R&D
- Advanced Magnetics

Devices



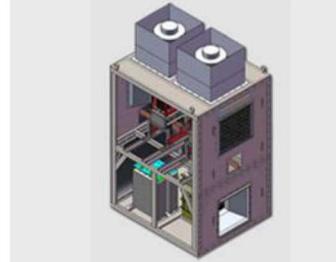
- ETO
- SiC Thyristors
- Monolithically integrated SiC transistors
- WBG Characterization & Reliability
- High energy dielectric capacitors

Power Modules



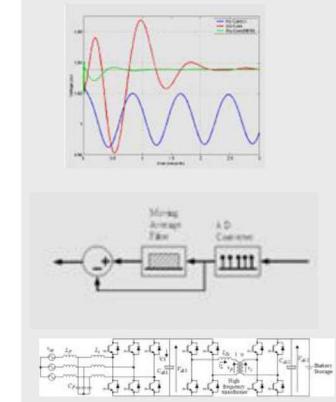
- SiC High Temp/density Power Module
- HV SiC JFET Module
- HV, HT Reworkable SiC half-bridge modules

Power Conversion System



- Dstatcom plus energy storage for wind energy
- Optically isolated MW Inverter
- High density inverter with integrated thermal management
- High temp power inverter

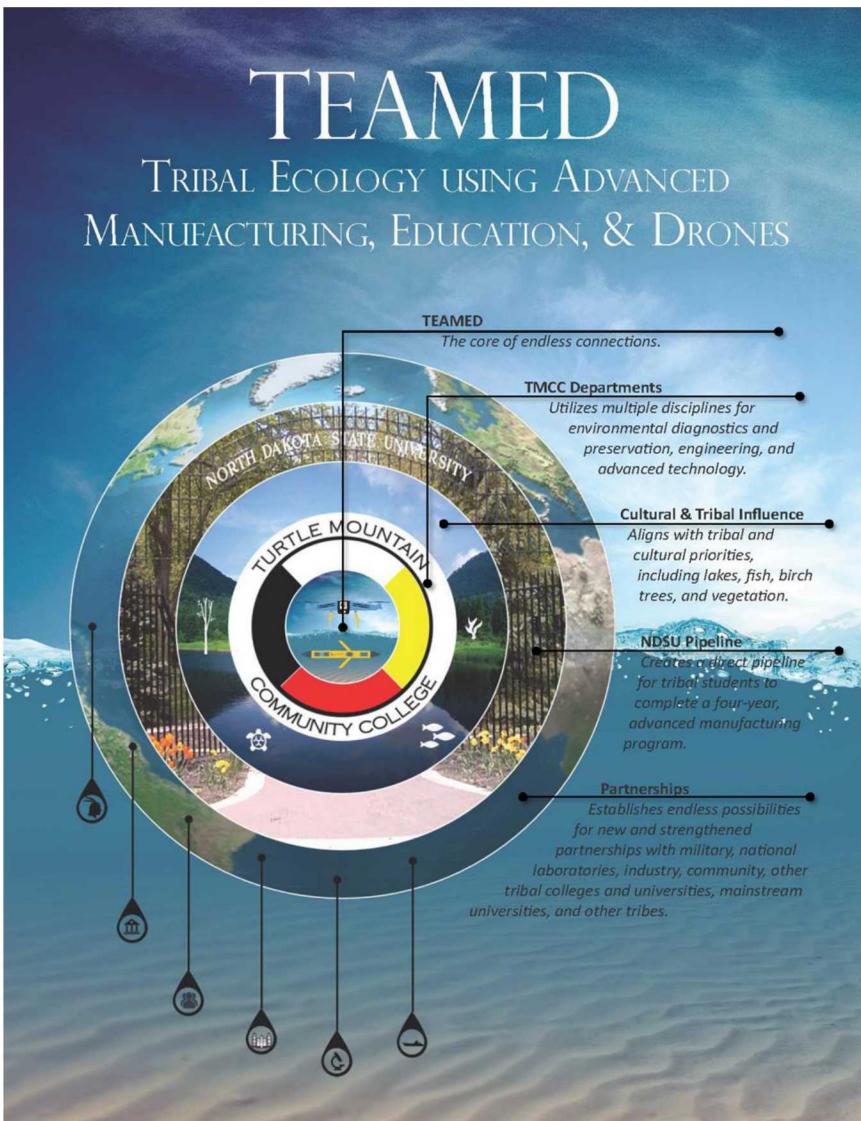
Applications



- FACTS and Energy Storage
- Power smoothing and control for renewables
- Dual active bridge for advanced energy storage system designs

Remote Power Systems – Tribal Lands

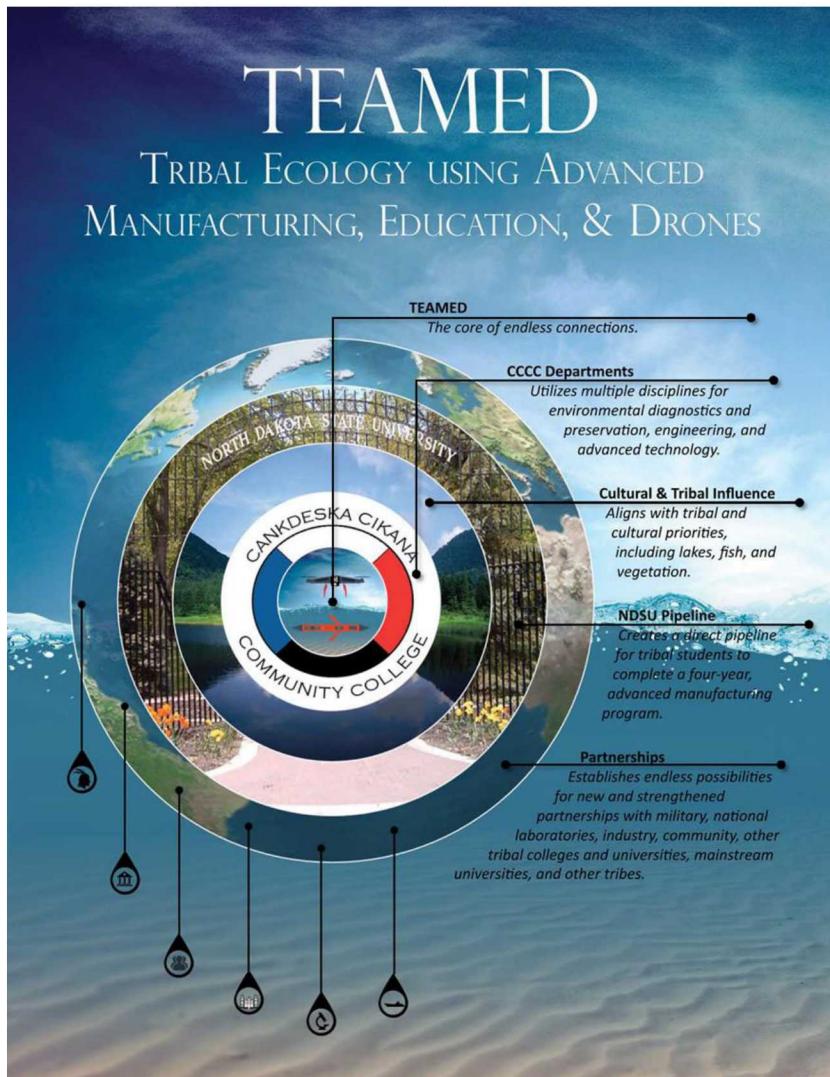




TEAMED concept grew out of TMCC
Sandia SMEs: Stan Atcitty, Jeri Timlin, Tom
Reichardt

- NDSU faculty introductions: Sreekala Bajwa, John Nowatski, Alimohammad Shirzadifar, Xin (Rex) Sun – Department of Agricultural and Biosystems Engineering
- TM Community High School and TMCC's environmental engineering outreach presentations

Note: The letter "E" in TEAMED is flexible. "E" can easily be migrated to "Engineering" to be general.



**CANKDESCA CIKANA
COMMUNITY COLLEGE**
Spirit Lake Dakota Nation
Start Here • Go Anywhere

Sandia SMEs: Stan Atcitty, Jerilyn Timlin and Tom Reichardt

Remote Sensing of Algae Growth in Waterways

Optical sensors technology

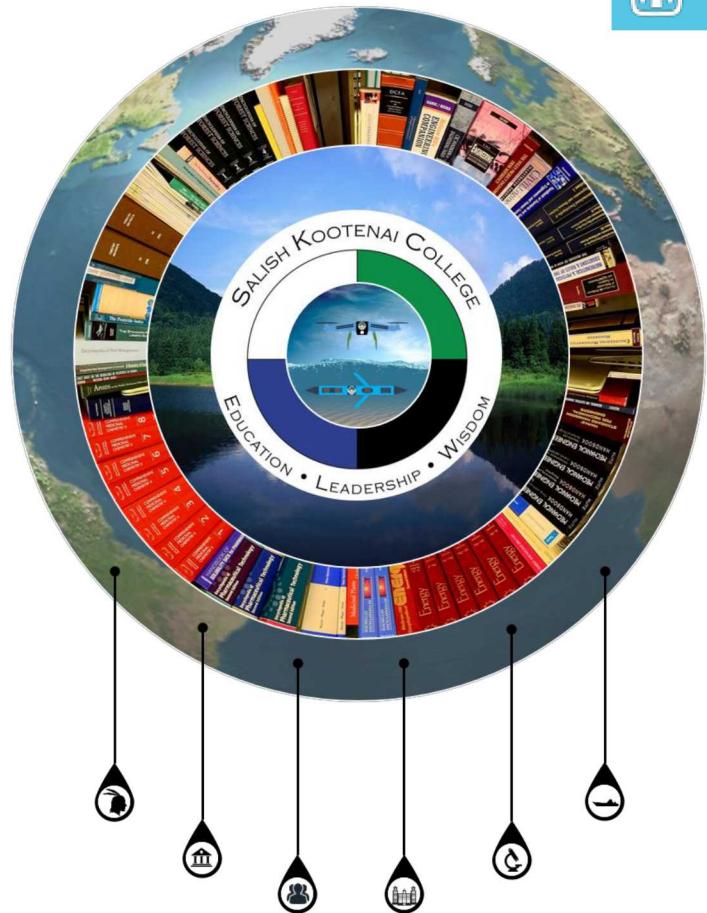
- Bio sensing
- Sensor design criteria
- Data analysis
- Drone-based design of algal blooms as a case-study (ecology and farming)
- Teleconference with NSDU next week

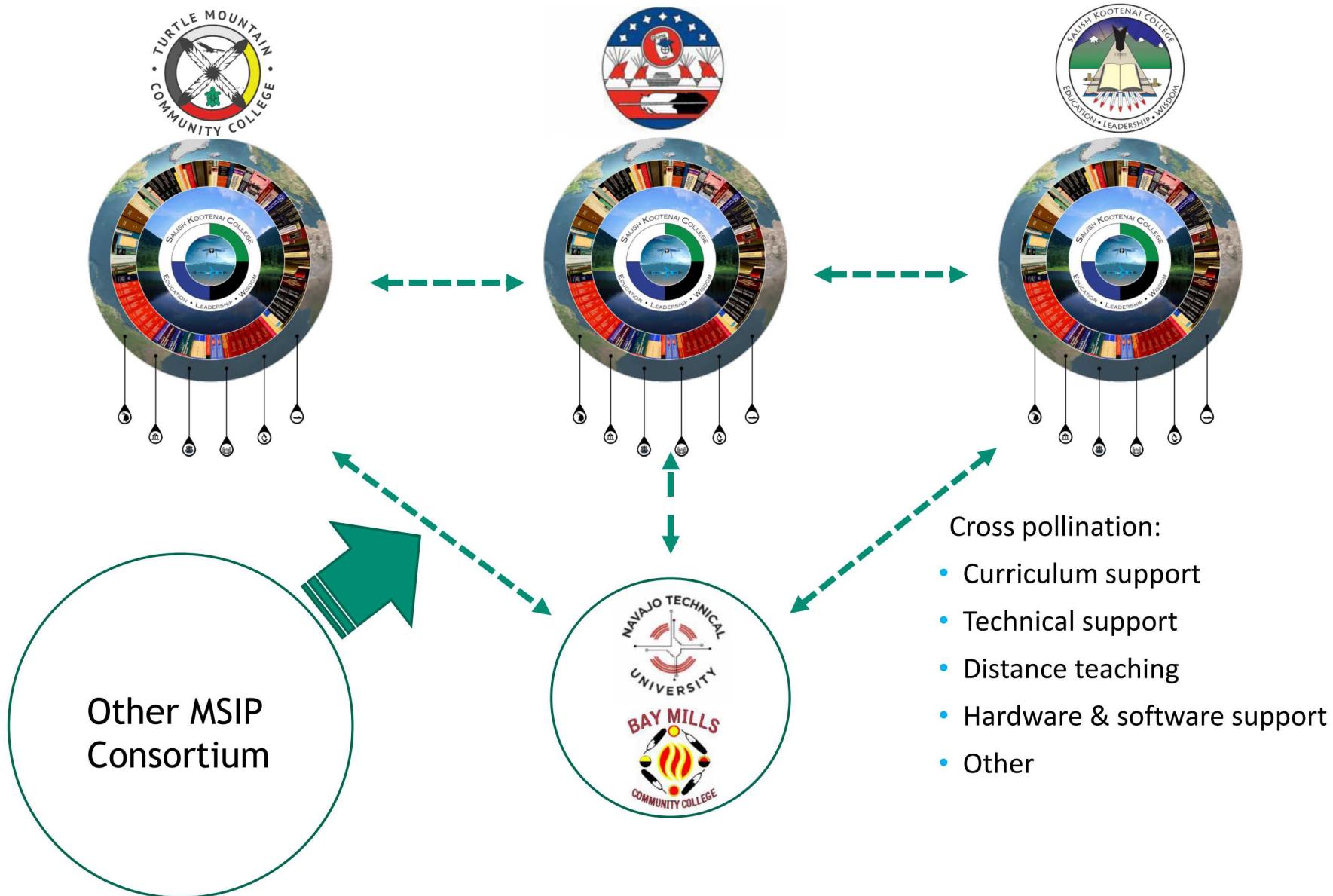
SKC TEAMED



Sandia SMEs: Stan Atcity, Jeri Timlin, Tom Reichardt, and Charles Carter

- SKC embraced the TEAMED concept
- Underwater Drone focus
- Charles Carter SME, Complex Reliability Analysis on BisonSat II
- Polson High School and Two Eagle River School Outreach







NNSA Minority Serving Institute Program



Advanced Manufacturing Network Initiative



Office of Indian Energy Policy
and Programs

Sandia Summer Internship
Program



Sandia MSIP American Indian Students



Summer 2018

- Gordon North Piegan, Blackfeet Tribe, EE, Montana State University, SKC transfer student – **First-ever NNSA MSIP American Indian summer student!**



Summer 2019

- Isnala N. Roan Eagle, Oglala Sioux Tribe, ME, Cankdeska Cikana Community College
- Roy Rafael, Navajo Tribe, EE, Navajo Tech University
- Brett Alberts, Spirit Lake Dakota Tribe, Computer Information Technology and Pre Engineering, United Tribe Technical College



Gordon North Piegan - *“My overall experience at Sandia National Laboratories was once in a lifetime. I would describe it as one of the most challenging yet rewarding endeavors I have been a part of. The idea that from the very start that I contributed to projects that have the potential to change the world was truly inspiring. However, it was not only the work that was rewarding, but the people I could meet. Sandia had one of the most diverse workforces I have ever been a part of. The Native American community made me feel right at home and other minorities here allowed me to truly see the world from a new perspective.”*



Stanley Atcitty (Stan), Ph.D.

Distinguish Member of Technical Staff

Energy Storage Technology and Systems Dept. 08811
Sandia National Laboratories

Phone: 505-284-2701

Email: satcitt@sandia.gov