Vision for the Research Enterprise of the Odegard School

David Delene

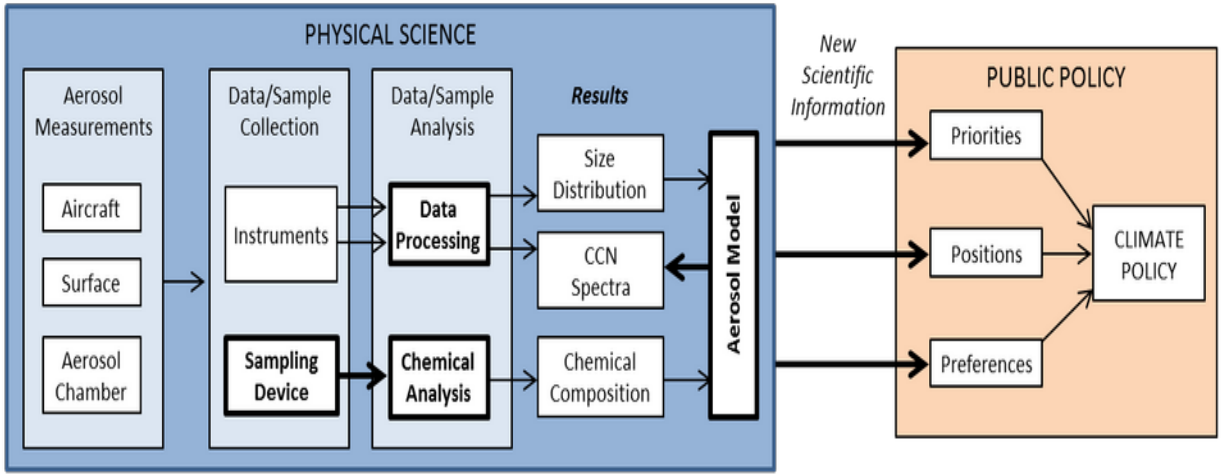
Presentation Overview: Examples and Plans to

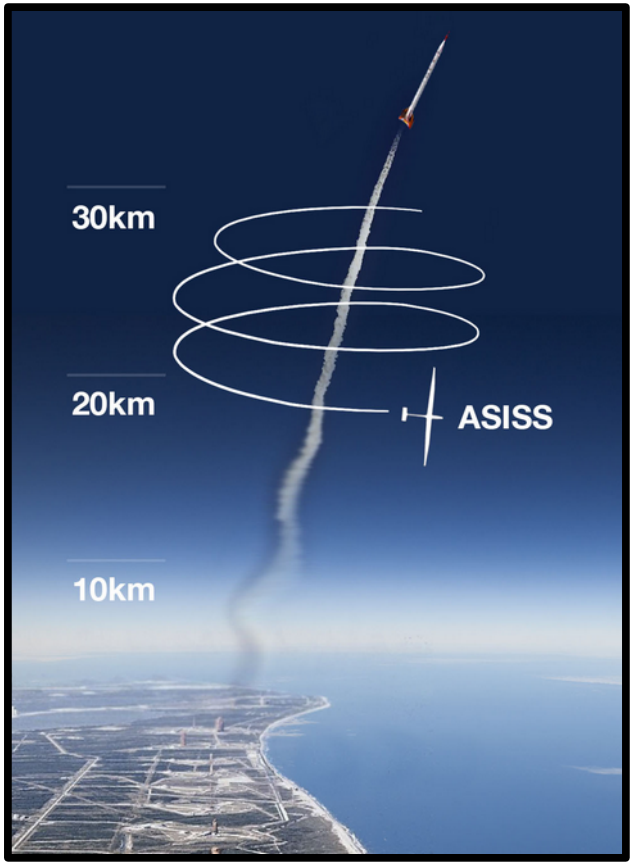
- represent the research enterprise of all department.
- promote a supportive research environment.
- advocate for research, creative activity and scholarship.
- identify opportunities for organizational improvements.
- promote research collaboration for funding opportunities.
- facilitate opportunities for interdisciplinary research.
- develop opportunities for new faculty.

CapeEx19
Field Project

Represent the Research Enterprise of Departments

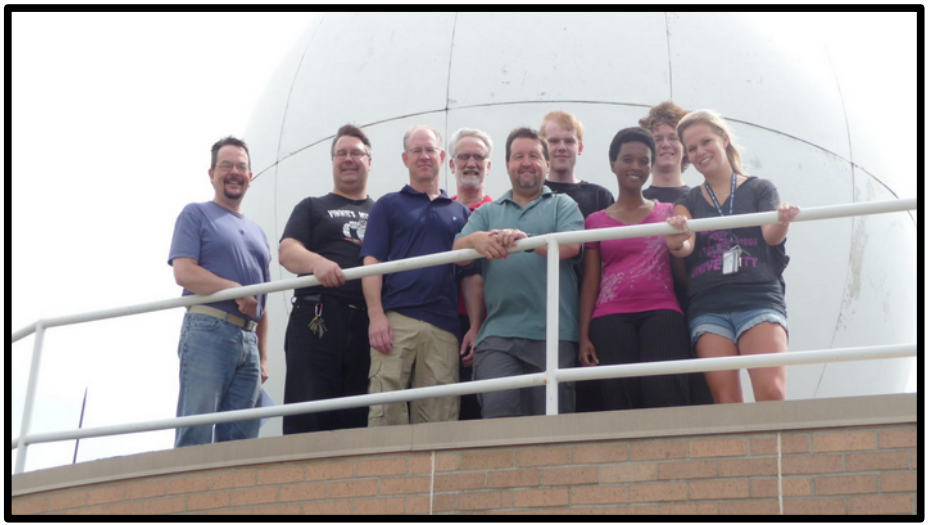
- Broad Background
  - Applied Physics, Geophysics, Atmospheric Sciences
- Understand the History
  - Part of Odegard School since 2001
- Diversity Experience
  - Projects related to all Departments





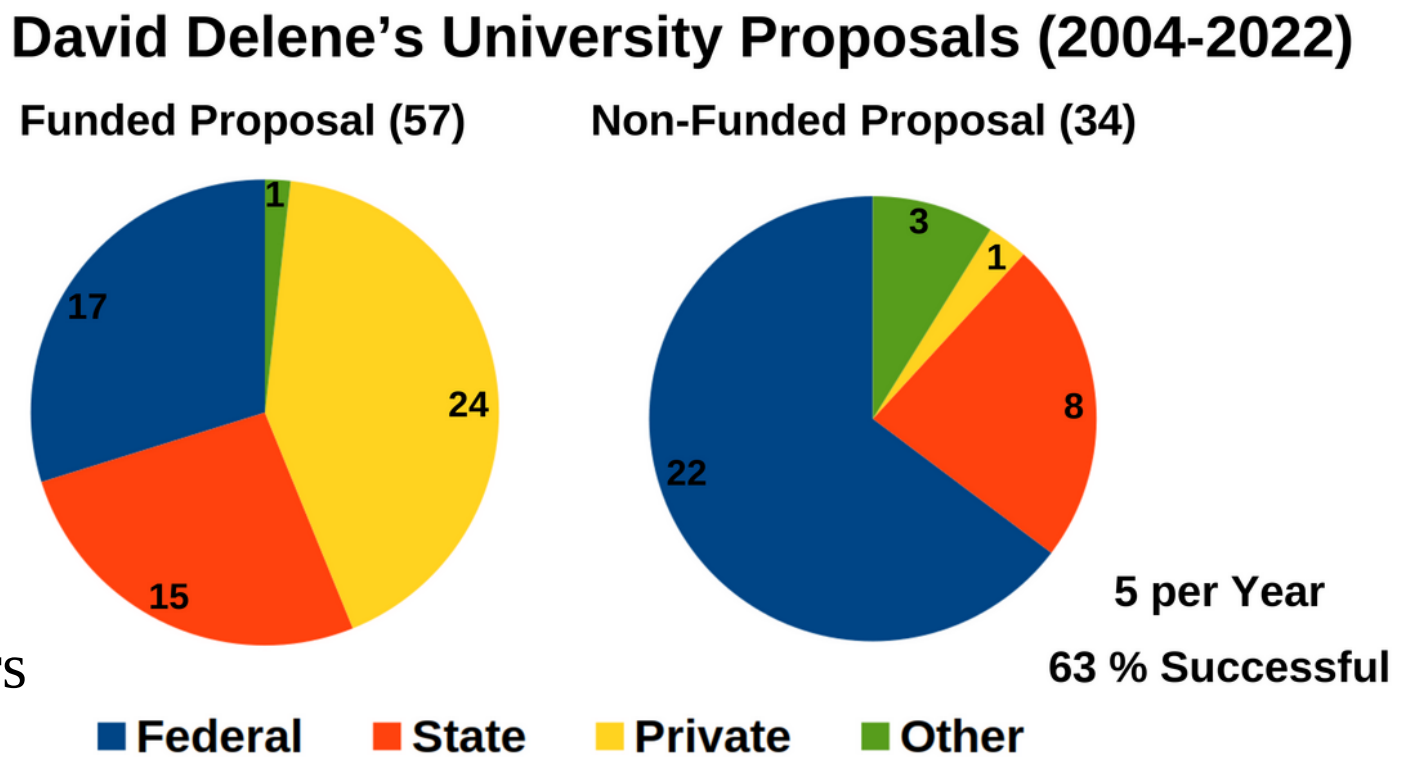
Promote a Supportive Research Environment

- Listen
  - Learn about problems and issues.
- Support
  - Work to provide needed support.
- Encourage
  - Provide recondition and rewards.



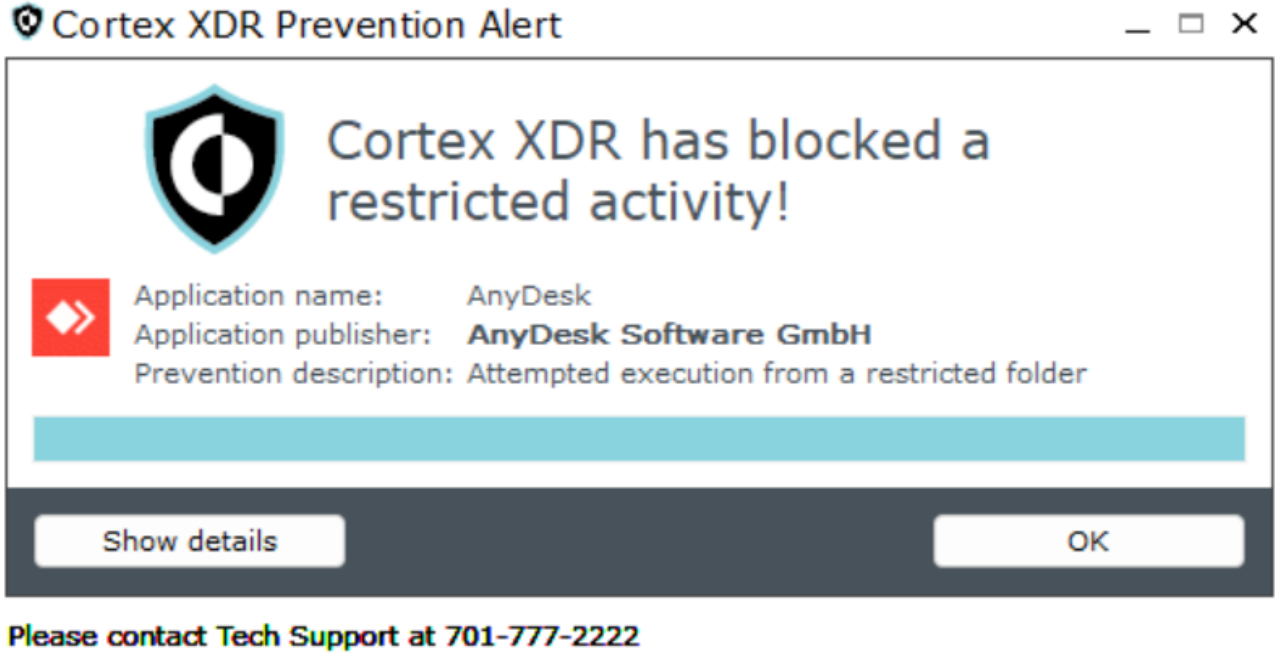
Advocate for Research, Creative Activity and Scholarship

- Discussions of Research Project Ideas (Internally / Externally)
- Funding Opportunities
  - Communicate potential sources of funding.
  - Determine if funding is not likely.
- Promote Growth
  - Postdoctoral Scholars
  - Research Professors



Identify Opportunities for Organizational Improvements

- Identify Common Issues
  - What issues are common to many researchers?
- Information Technology Issues
  - What are common road blocks?
    - Network Access
    - Email, Zoom, etc.
    - Workstations
    - Desktops
    - Software



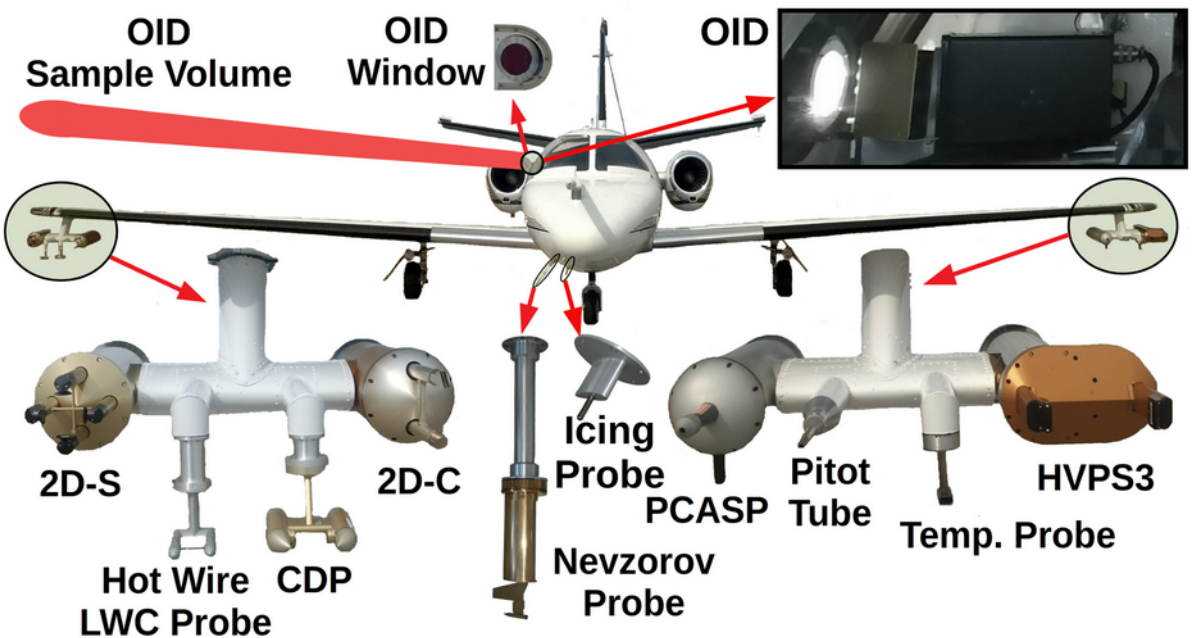
Promote Collaboration for Funding Opportunities

- Match Researchers with others on campus.
  - Finding people to complete proposed project.
- Discuss with broad set of University researchers about contribution.
  - Makes people aware of the project.
- Matching researchers with equipment/labs.
  - Working with private companies.
  - Develop College facilities.
    - Ballooning Area
    - UAS Testing Lab

Bryan Johnson - NOAA

Facilitate Opportunities for Interdisciplinary Research

- Working across the college and campus.
  - Finding people to complete proposed project.
- Working with local/regional companies.
  - Sikorsky Aircraft
  - WMI/Fargo Jet Center
  - Panasonic Weather
  - **Collins Aerospace**
  - Ophir Corporation
  - CAV Systems
  - Bird-C
  - Truweather Solutions
  - Stratodynamics
  - Skyfona



Wagner and Delene, 2022

Develop Opportunities for New Faculty

- Have initial meeting with all new faculty.
  - Listen to what they want to do.
  - What issues do they foresee.
  - Work to get initial proposals submitted and projects stated.
- Match new faculty with current research activities and strategic plan.

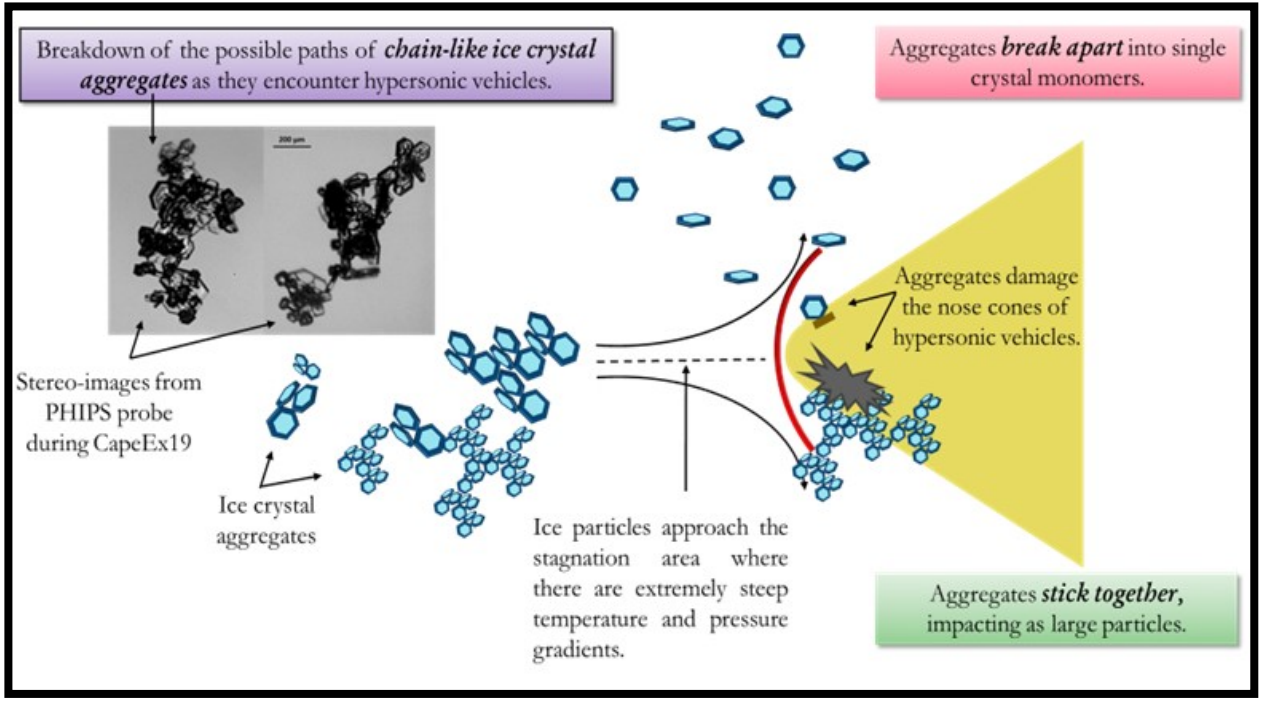


Image courtesy of Hallie Chelmo, Mechanical Engineering Department

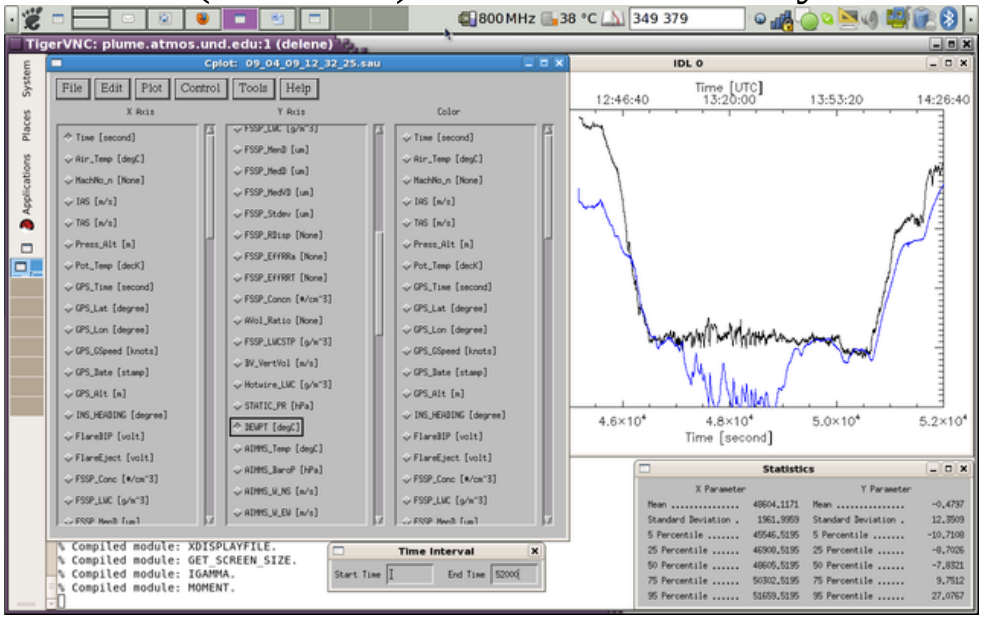
Strategies for Future Growth

Growth requires continue excellence and new focus.

- Uncrewed Aircraft Systems (UAS)
- Big Data / Machine Learning
- Rocket Flights:
  - **Stratosphere Research**
  - **Satellite Communications**
  - **Open Science**

    2023 - Year of Open Science

Airborne Data Processing and Analysis (ADPAA) Software Gateway



Wagner, Shawn and David J. Delene, Technique for comparison of backscatter coefficients derived from in-situ cloud probe measurements with concurrent airborne Lidar, Atmospheric Measurement Techniques, https://doi.org/10.5194/amt-2022-87, in press, 2022. (SummarySummary, Data Collection - DOI 10.31356/data015, Software Repository, Software Archive - doi:10.5281/zenodo.3740798)

Conclusion

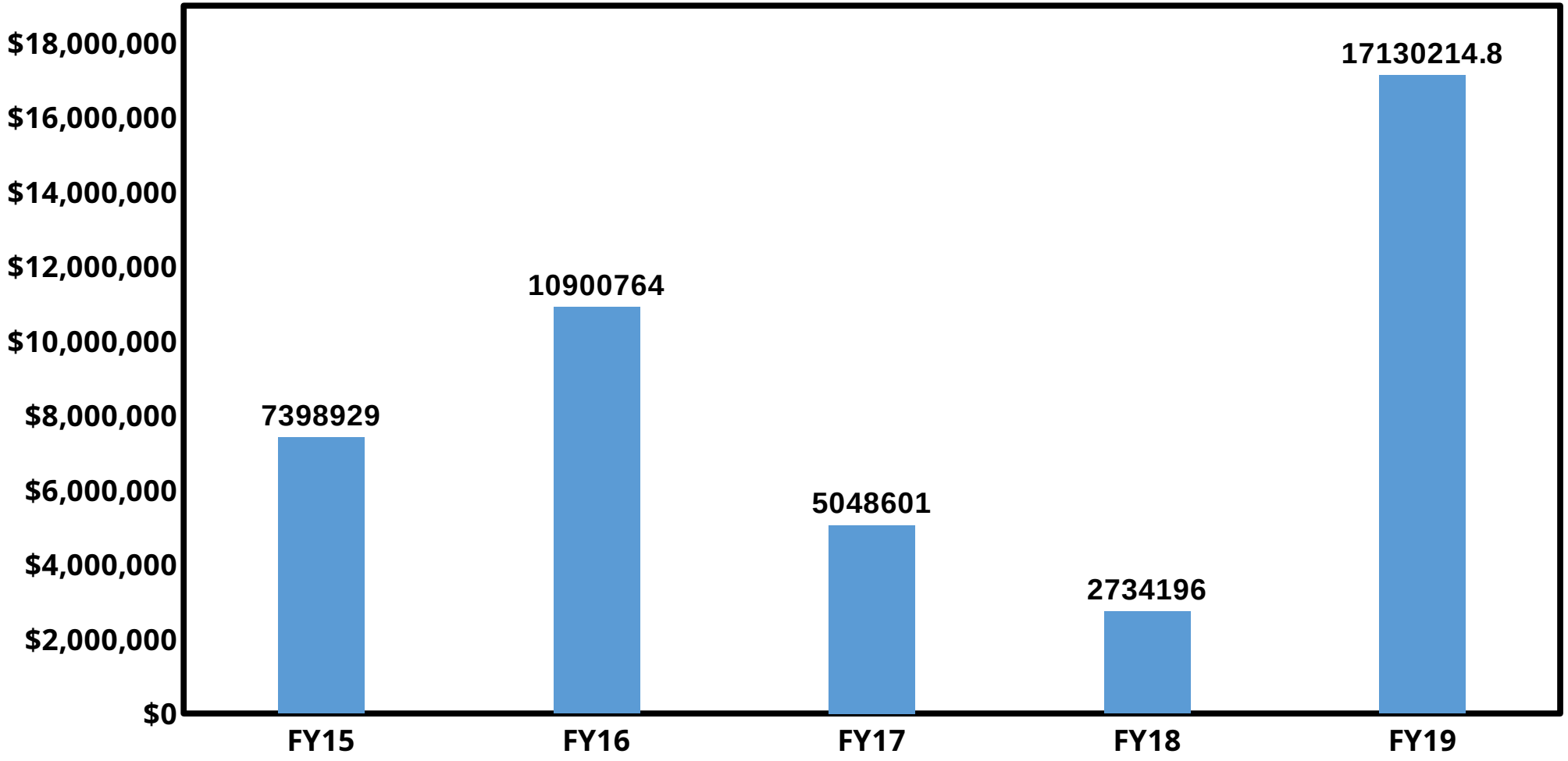
- The Odegard School has many strengths.
  - A focus on innovation and commercialization.
  - Well known and respected.
  - Dedicated people.
  - Great place to work.
  - Potential for growth in the research enterprise.

Research enterprise is to delivering opportunities for students, our state and worldwide community.

Strategies for Success: Execution

- Resources (Time) are finite; hence, need to work wisely.
  - Focus on Strengths
    - Strategic Planning
  - Be Efficient
    - Unnecessary Effort
  - Work Together
    - Across Campus and Around the World

Odegard School Proposals (FY2015-FY2019)



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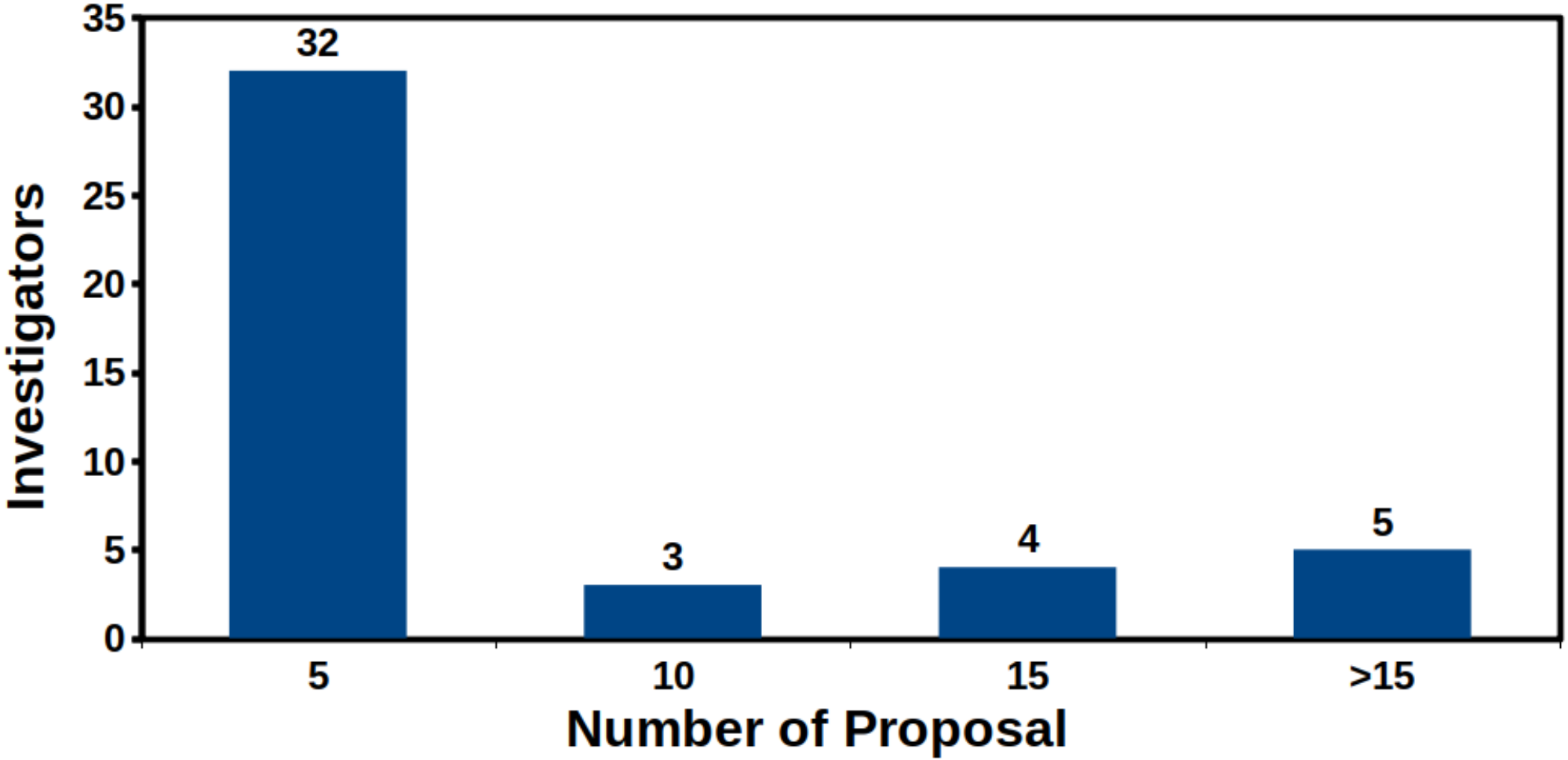


Societal Significance Drives Research

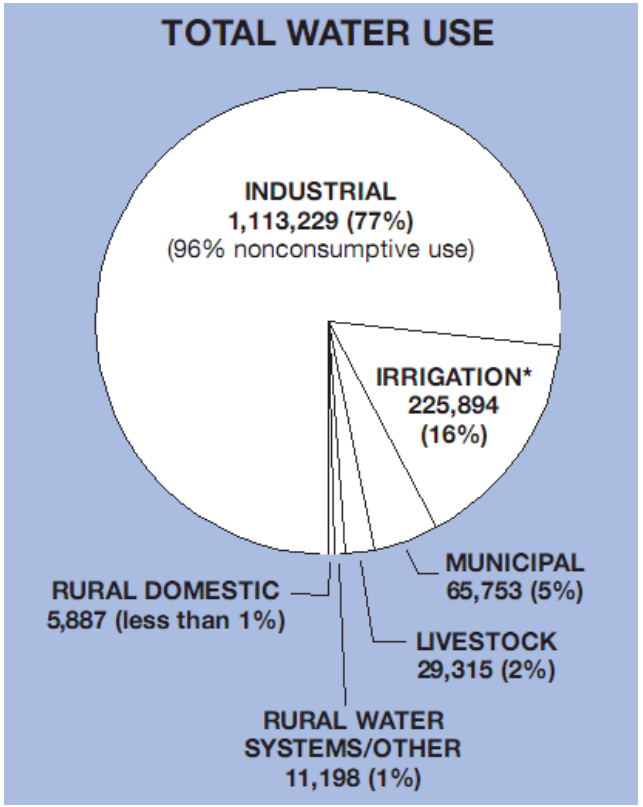
Largest Issues 1.) Energy 2.) Water

Richard Smalle: Our Energy Challenge

#	Company	Source
1	Great River Energy	Coal Creek Station
2	Basin Electric Power Cooperative	Leland Olds Station
3	American Crystal Sugar Company	Hillsboro Plant
4	American Crystal Sugar Company	Drayton Plant
5	Montana Dakota Utilities Company	RM Heskett Station
6	Great River Energy	Stanton Station
7	Basin Electric Power Cooperative	Antelope Valley Station
8	Minnkota Power Cooperative, Inc.	Milton R. Yong Station
9	Otter Tail Power Company	Coyote Station
10	Dakota Gasification Company	Great Plains Synfuels Facility
11	Red Trail Energy, L.L.C.	Richardton Ethanol Plant
12	Tesoro Refining and Marketing Company	Mandan Refinery

North Dakota Ambient Monitoring Network Plan 2012, Table 9, page 25.

Approximately 77 percent of North Dakota water use is for power generation. (ND Water - A Reference Guide)



North Dakota State 2003 Water Use (acre-feet)

Impact of Measurements on Research Progress

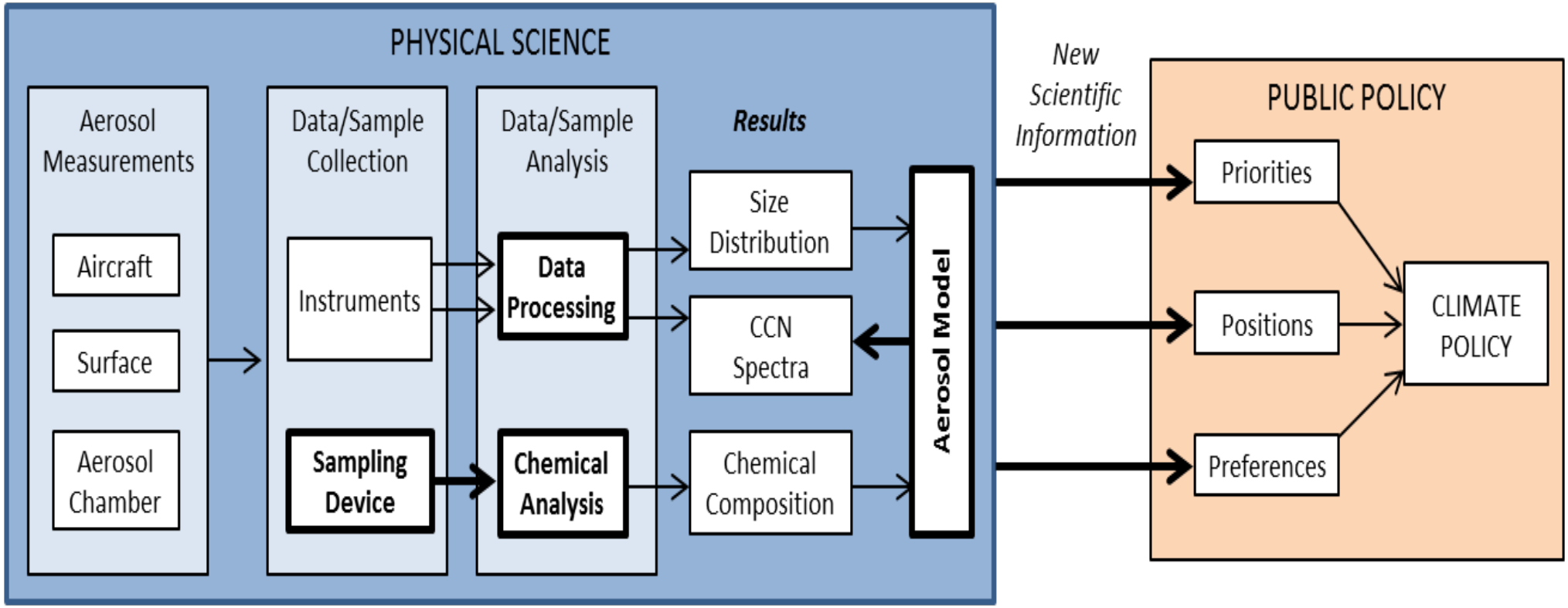
The scientific method consists of **the collection of data through observation** and experimentation, and the formulation and testing of hypotheses - *Merriam-Webster Dictionary*.

"The returns [of science] are so large that it is hardly necessary to justify or evaluate the investment" National Science Foundation. 1957, Basic Research: A National Resource, page 61

"A $3.8 billion investment drove $796 billion in economic impact, create 310,000 jobs and launched the genomic revolution." Economic Impact of the Human Genome Project.

National Academies (US) Committee on Measuring Economic and Other Returns on Federal Research Investments. Measuring the Impacts of Federal Investments in Research: A Workshop Summary. Washington (DC): National Academies Press (US); 2011. 8, Emerging Metrics and Models.

Linking Research to Public Policy



Research framework and tools for the project linking physical science research to public policy research. New capabilities that will be developed are shown in bold.

Even Small Field Projects Many of Researchers

United States Navy project to study Florida Cirrus Clouds.

CapeEx19 Field Project Group Photo on August 4, 2019