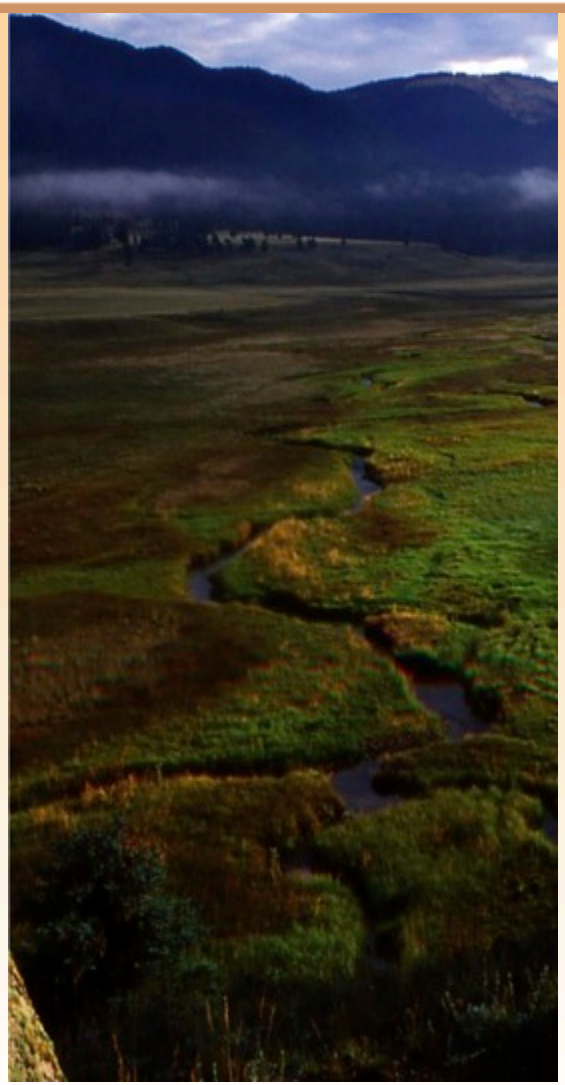
New Mexico EPSCoR



New Mexico EPSCoR

NSF RII4 Planning

19 September 2011

New Mexico Nexus of Energy, Water and Environment (NM-NEWE)

2013-2018

Agenda

- 10 am – Welcome and overview (Bill Michener, NM EPSCoR State Director)
  - NSF NM EPSCoR and the current project
  - The energy-water-environment nexus
  - RII 4 planning process and timeline
- 10:45 am – Introduction of participants
- 11:15 am – Identify possible research focal areas and questions
- 11:40 am – Lunch and informal discussions
- 12:15 – Revisit research focal areas (i.e. breakouts)
  - Any different groupings?
  - Breakout group process and expected outcomes
- 12:30 – Breakout groups
- 2:00 – Break
- 2:15 – Reconvene and reports from breakouts
  - Major ideas
  - Writing team lead and members
- 2:45 – Next steps
- 3:00 pm – adjourn

Objectives for Planning Meeting #1

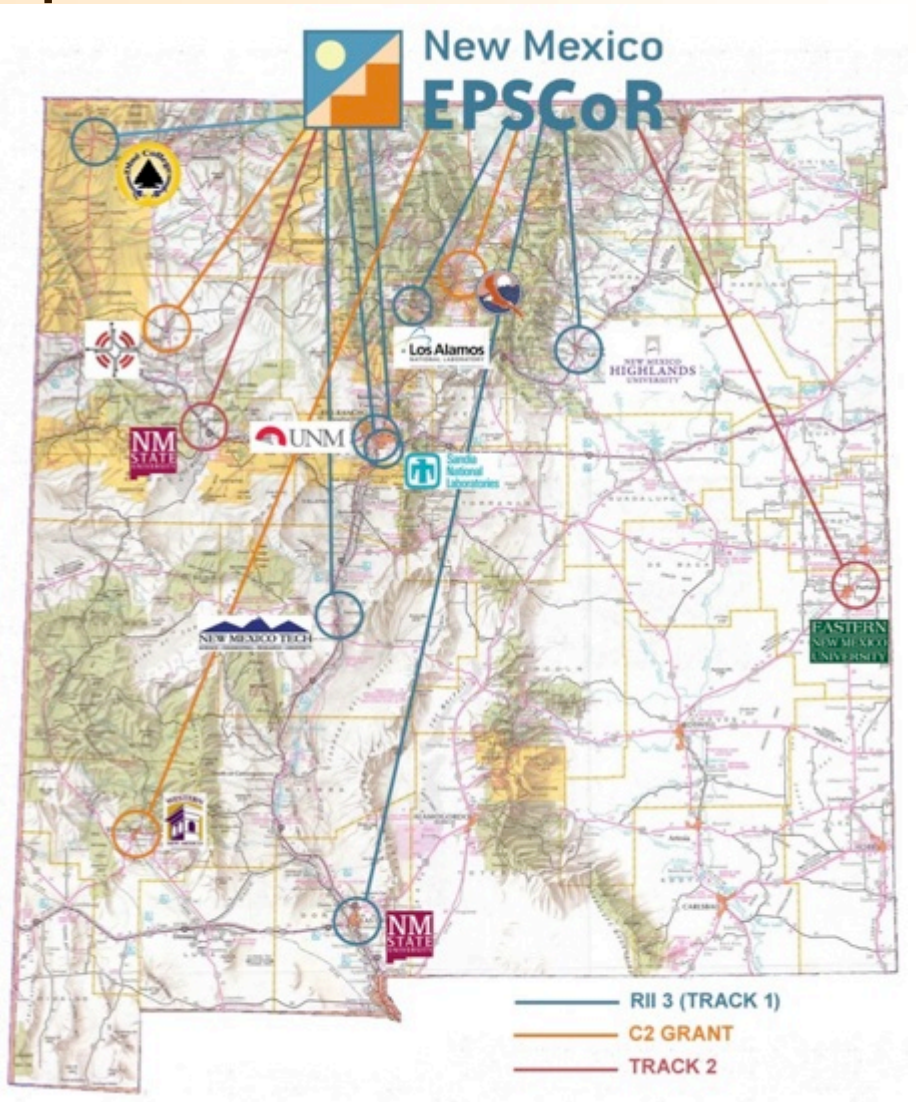
1. Introduce EPSCoR and the currently funded project
2. Introduce the energy-water-environment nexus
3. Review the process for proposal development
4. Answer any questions about the process
5. Identify and prioritize science questions (and ID possible research activities) based on scientific importance, potential to be transformative and to lead to successful NSF grants in future, and relevance to multiple institutions and investigators
6. Identify lead and 3-5 writers who will develop each topic into a 3-6 page position paper
7. Outline next steps

NSF EPSCoR Program Definition

- Experimental Program to Stimulate Competitive Research
  - Track 1 – $20M for 5 years ($4M/yr); capacity building
  - Other related EPSCoR support:
    - Track 2 – $2M for 3 years; cyberinfrastructure
    - C2 – $1M for 2 years; network connectivity
    - Workshops
    - Cost-share on NSF proposals that are competitive but not top-ranked

The New Mexico Landscape

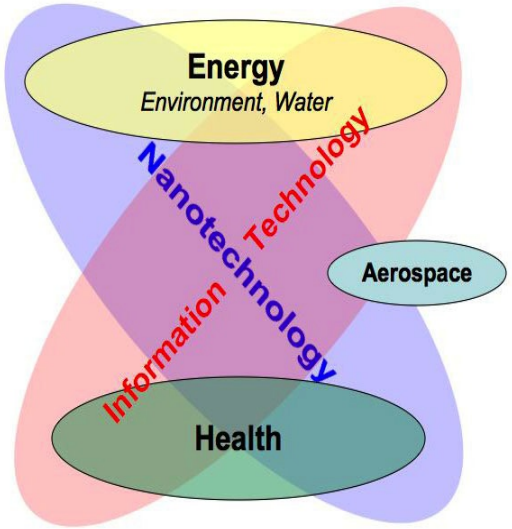
- New Mexico People
  - 46% Hispanic
  - 9.4% Native American
  - 2.1% Black
- 5th Largest State
  - 121,355 square miles
- 6th most sparsely inhabited state
  - ~2,000,000 people
  - 17 people/square mile



Source: U.S. Census Bureau

New Mexico State S&T Plan Core Areas

- Aerospace
- Bioscience
- Energy, Environment, and Water
- Information Technology
- Nanotechnology



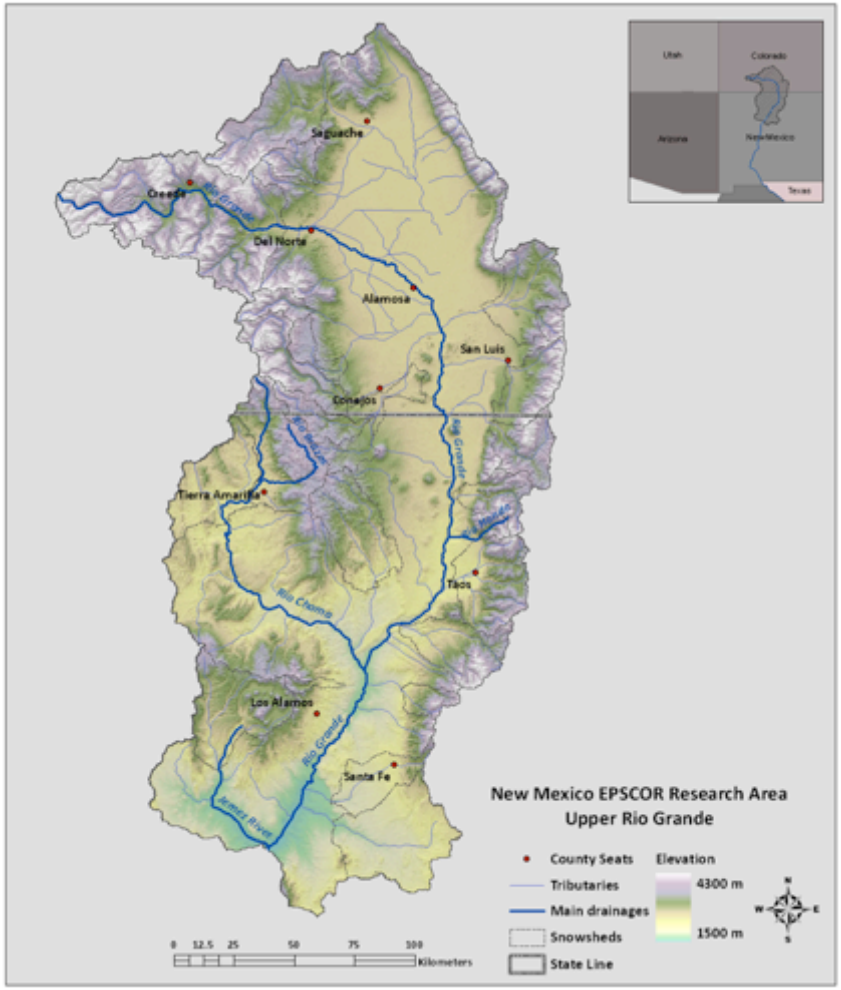
Additional Focal Areas: Economic Development, Education, and Workforce Development

Technology21

Source: http://www.edd.state.nm.us/scienceTechnology/intro/index.html

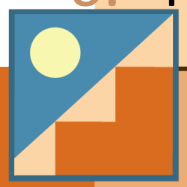
EPSCoR RII 3 Focus: Climate Impacts on New Mexico's Mountain Sources of Water

- Mission: "Provide the critical gap infrastructure, computational support, and education and outreach opportunities to foster excellence in climate change research and collaboration"
- 2008-2013



Strategic Plan-Research Infrastructure

1. Enhance climate and hydrology research infrastructure (from data acquisition through modeling)
2. Improve water quality monitoring in high altitude stream environments
3. Develop interdisciplinary socioeconomics and acequia research capacity
4. Provide critical gap infrastructure for New Mexico Highlands University
5. Use Innovation Working Groups (IWG) to address key scientific, education, diversity, and workforce development challenges
6. Provide Critical Infrastructure Gap Seed Awards



Strategic Plan-Cyberinfrastructure

7. Enhance scientific data and model output generation, management, discovery, and use through <u>cyberinfrastructure</u>

Strategic Plan-Human Infrastructure

8. Enhance diversity in all elements of the EPSCoR Program
9. Enhance professional teacher development for STEM areas in northern New Mexico
10. Develop an Undergraduate Research Opportunity Program that increases the exposure of students at non-PhD granting institutions to high quality, relevant, hypothesis-driven research
11. Design and develop graduate research training group opportunities
12. Inform faculty about funding opportunities via NSF Days
13. Enhance leadership skills for faculty via a Faculty Leadership Workshop Program
14. Create a citizenry that is informed about climate change and its impact on NM's natural resources via public outreach and communication

Source: NM EPSCoR Strategic Plan

NM EPSCoR Successes

- Research Infrastructure
  - Hydrologic and meteorologic observation network on a par with other Western states
  - Upgraded chemistry laboratories at NMHU and NMT providing enhanced research and education opportunities for students
  - Real-time, continuous water chemistry monitoring network

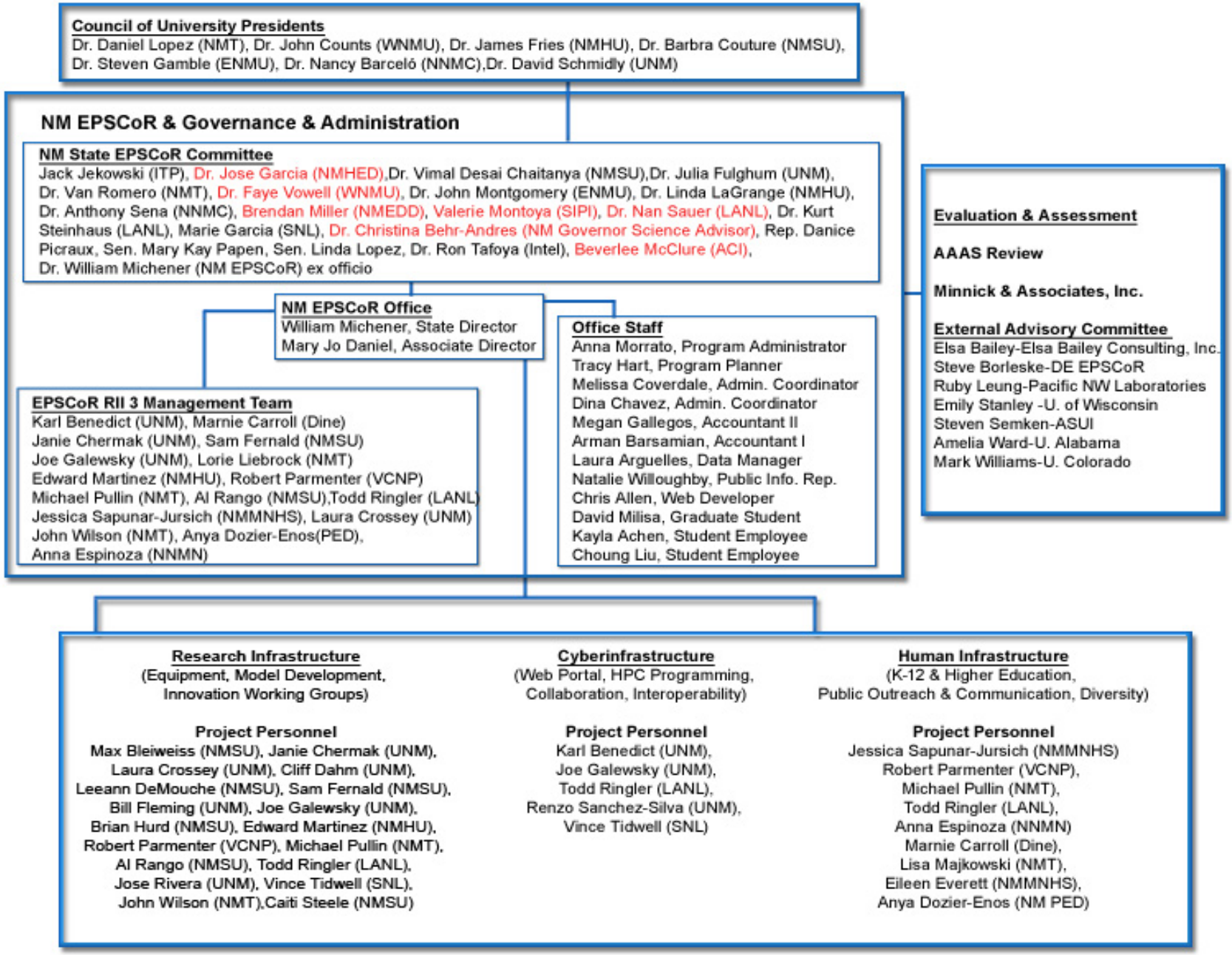
NM EPSCoR Successes

- Cyberinfrastructure
  - Scalable infrastructure for flexible data/information delivery
  - Leadership role in developing interoperability standards for Western Tri-State Consortium
  - Coordination between researchers for enhanced data management and sharing

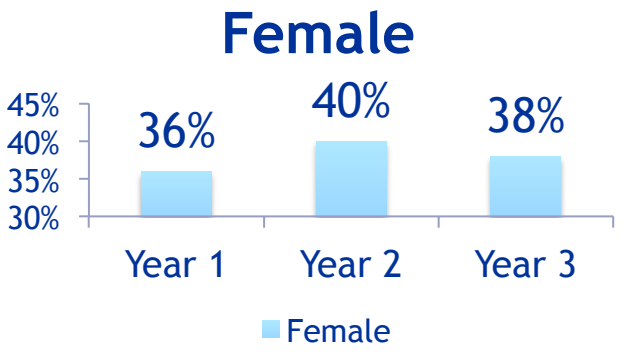
NM EPSCoR Successes

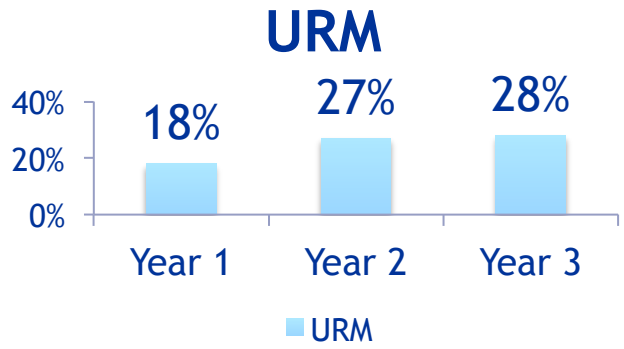
- Human Infrastructure
  - Teachers from 27 schools in Northern NM received professional development in experimental field methods and climate science
  - 30 undergraduate students in UROP with EPSCoR mentors
  - “Degrees of Change: New Mexico’s Climate Forecast” opened; 250,000 annual visitors
  - Best Practices Guide for Faculty Diversity created and approved by the Council of University Presidents

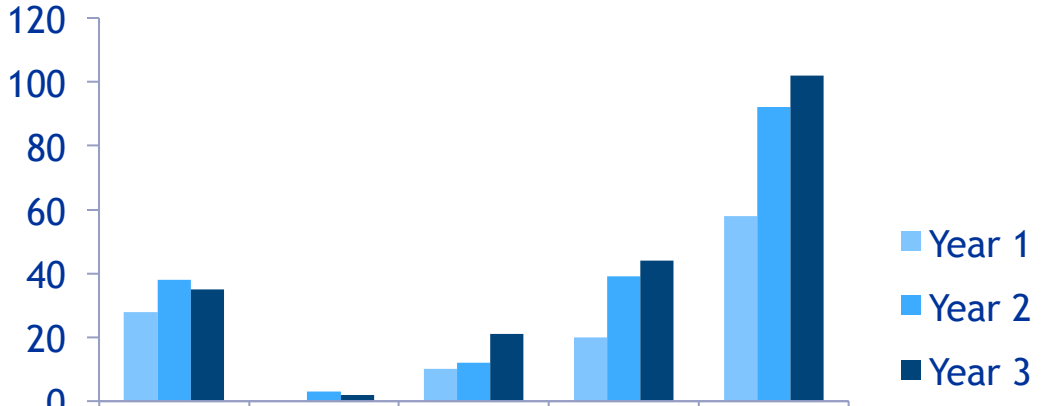
New Mexico EPSCoR Structure



Participants in NM EPSCoR RII3

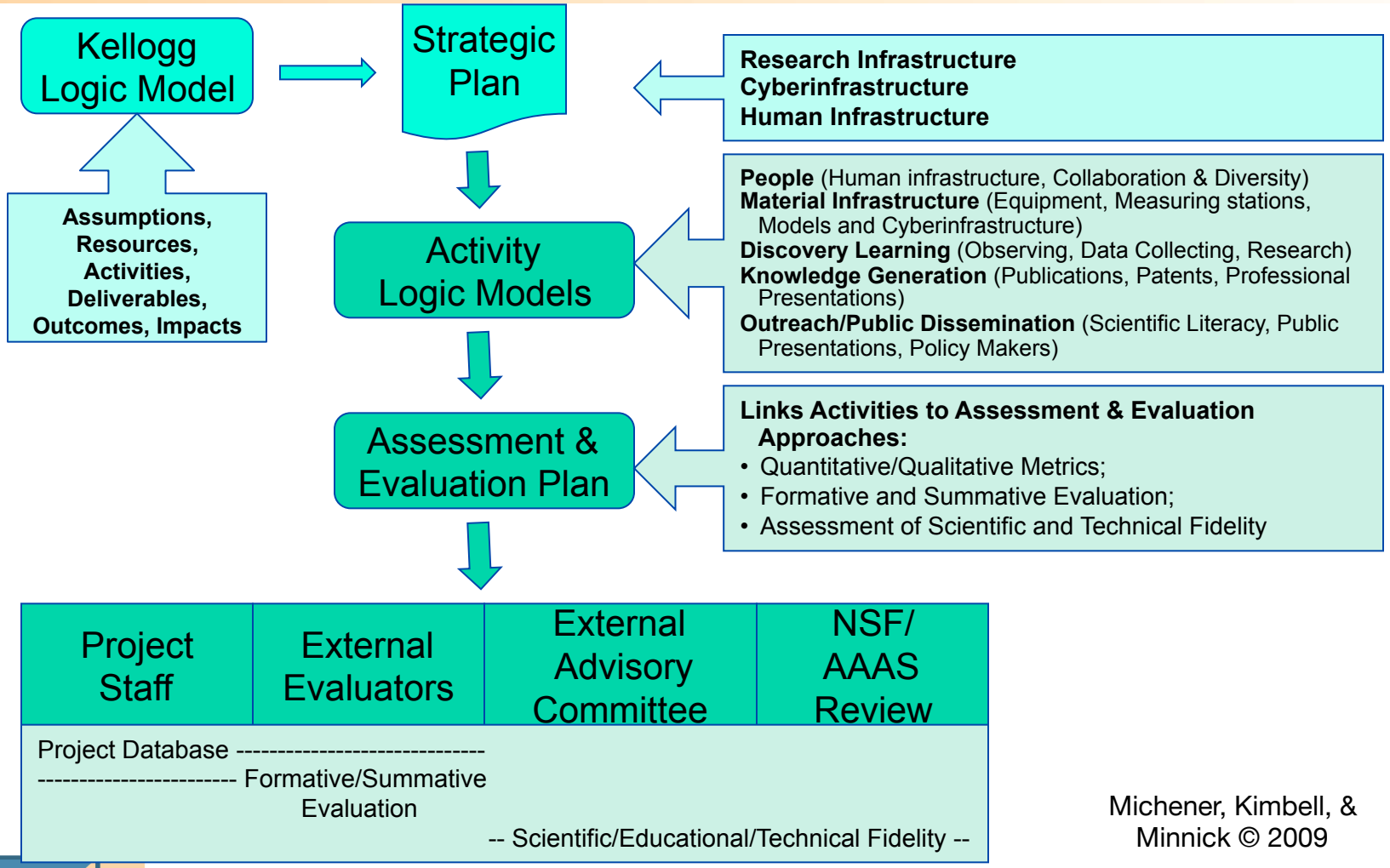






	Faculty	Post Docs	Grad Students	Undergrad	Total
Year 1	28	0	10	20	58
Year 2	38	3	12	39	92
Year 3	35	2	21	44	102

Evaluation and Assessment: Process



Michener, Kimbell, & Minnick © 2009

Project Timeline (original proposal)

Research
Install climate stations
Upgrade chemistry labs
Deploy hydrometeorological stations and water quality sensor systems
Infrastructure seed grant program
Multi-scale model development
Innovation working groups

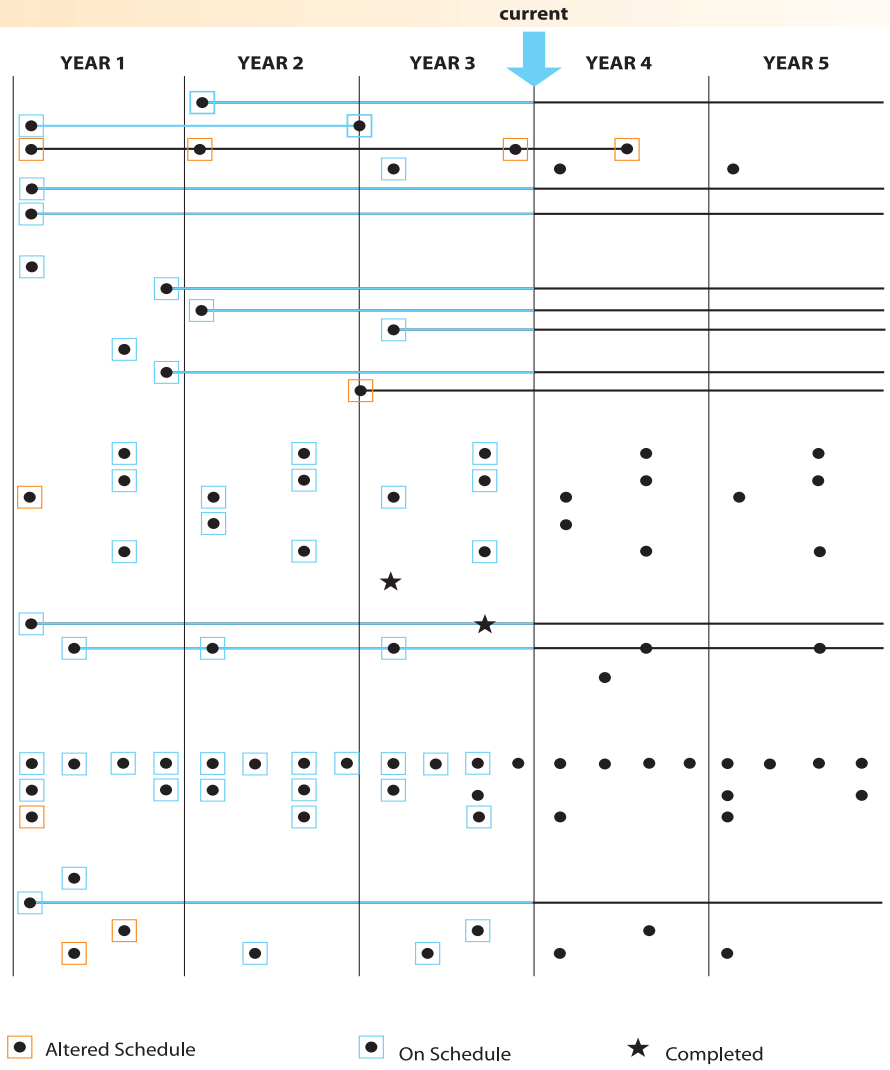
Cyberinfrastructure
Define internal data storage standards
Establish core data ingest services
Establish core data delivery services (OGC WxS)
Establish data delivery SOAP services
Establish portal framework
Publish content into portal
Develop analytic and visualization service for portal

Education
Summer Institute for Teacher Professional Development
Undergraduate Research Opportunities Program
Climate change course/workshops
Graduate Summer School in Regional Climate Modeling
Junior Faculty Leadership Training
Hold NSF Day

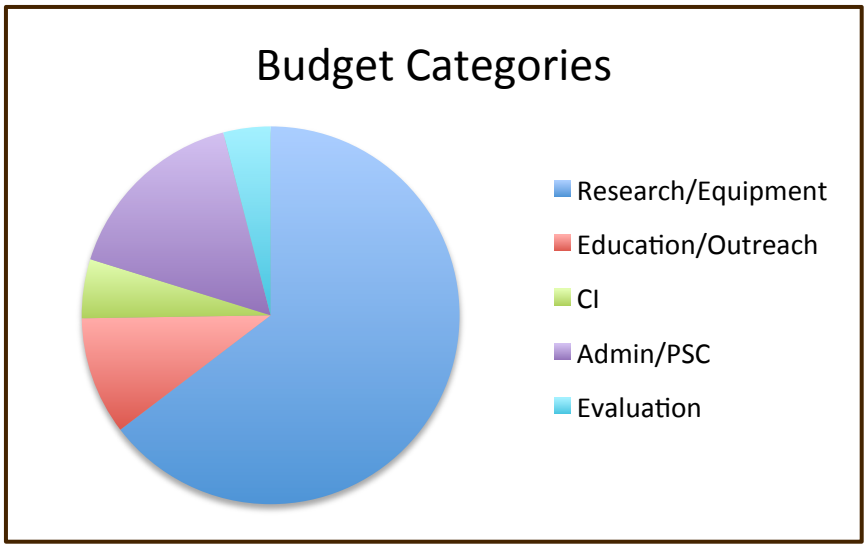
Public Outreach and Communication
Develop climate change exhibit
Public outreach activities
Town Hall Meeting

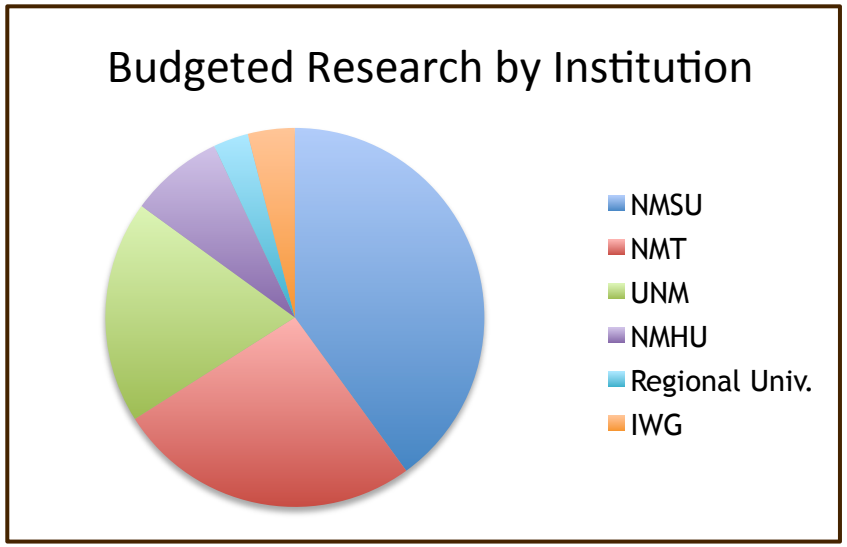
Management
Management Team meetings
State EPSCoR Committee
CUP meeting

Evaluation and Assessment
Baseline assessment of public perception (Korn&Assoc.)
Independent E&A (Minninck&Assoc.)
AAAS review
External Advisory Committee



Allocation of Financial Resources





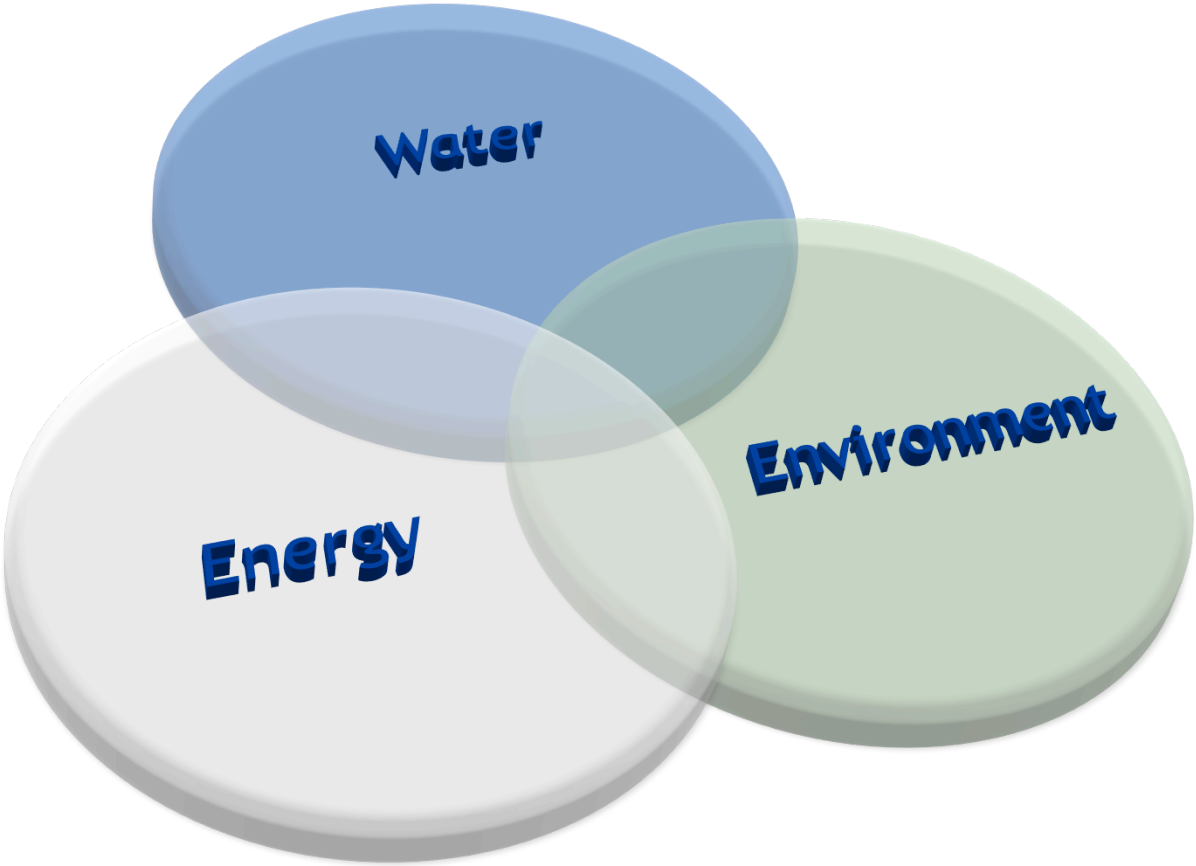
RII4 Planning

- Energy-water-environment nexus
- The planning process

EPSCoR RII4 Proposal

- Research: Energy, Water, Environment Nexus
  - SEC decision following AAAS recommendations:
    - Builds on current project (RII 3)
    - Increased focus on building capacity of regional and tribal colleges
    - Strongly integrative cyberinfrastructure component
    - Extend and expand current efforts on building STEM pipeline
    - New and related workforce development activities

S&T Plan: Energy-water-environment nexus



S&T Plan: Energy, Water, Environment

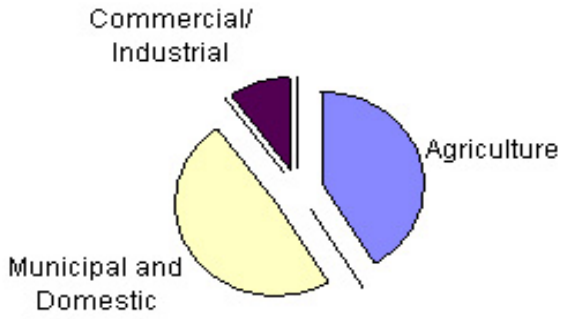
- Energy
  - Oil and gas; renewable energy sources such as biofuels, wind, solar; hydrogen; fuel cells; conservation; clean coal
- Water
  - Hydrology; sensors; modeling; watershed and aquifer sustainability; groundwater issues; conservation; water quality; desalination; use of brackish and produced water, etc.
- Environment
  - Climate change; remote sensing; ecosystem modeling; impact of forest thinning; atmospheric modeling; soil, air, air and water remediation; etc.
- Socioeconomic
  - Choice; cost trade-offs; individual based modeling; scenario-building and forecasting; etc.

Energy as a growth area in New Mexico

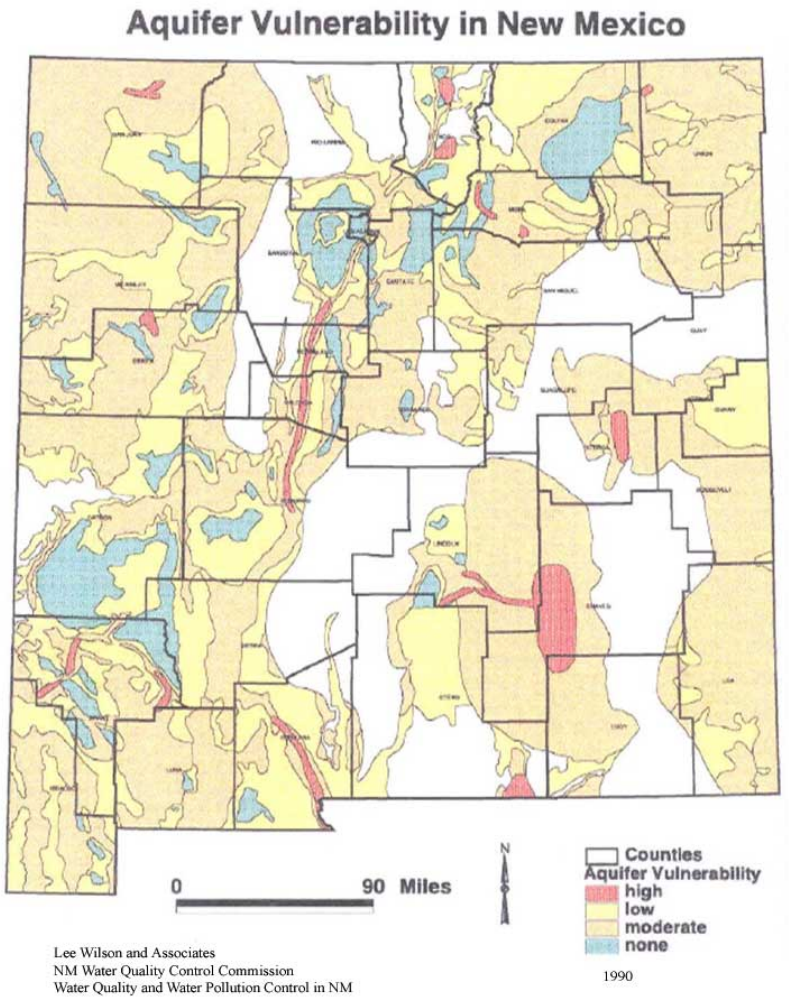
Projected Water Demand in New Mexico

AF Per Year	Agriculture	Municipal and Domestic	Commercial/ Industrial	Total
Year 2000	2,765,879	307,716	208,382	3,281,977
Year 2040*	3,054,937	644,846	278,260	3,978,043
Absolute Increase 2040 over 2000	289,057	337,130	69,878	696,066
Percentage Increase 2040 over 2000	10%	110%	34%	21%

Distribution of Consumption Increases



New Mexico Aquifer Vulnerability



Algal Biodiesel

- Development of biofuels is well underway in NM
- Has potential to be a major economic driver
- Requires large amounts of saline water from aquifers

Competition for water limits energy development, and affects and is affected by environmental issues

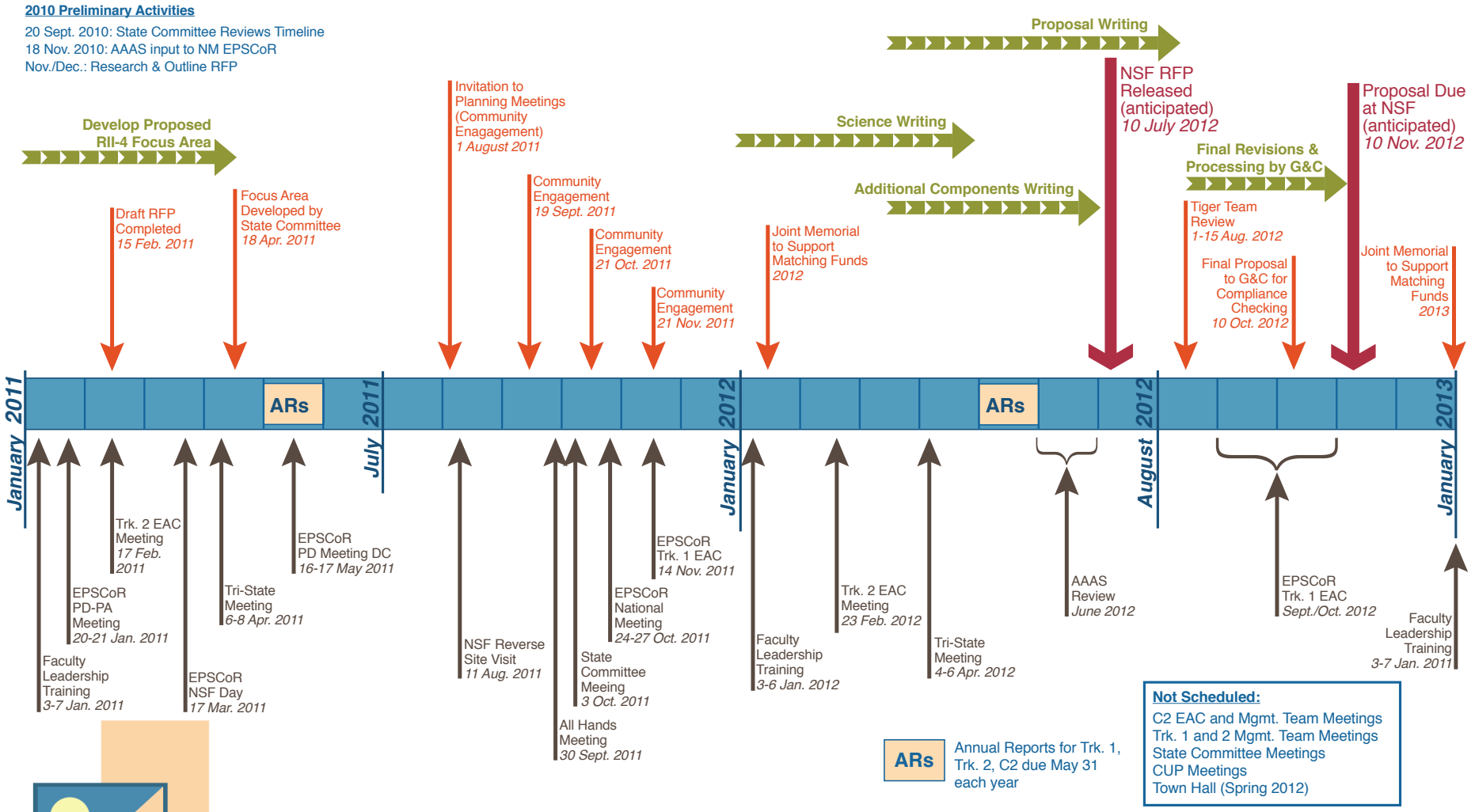
- The energy-water-environment nexus is a national concern and encompasses many interdisciplinary grand scientific and societal challenges
- We must develop an understanding of the complex interdependencies among energy, water, environmental, and socioeconomic systems, and apply science, socioeconomic approaches, and engineering to create sustainable systems.

New Mexico EPSCoR

EPSCoR RII Track 1 Critical Milestones

Climate Change Impacts on New Mexico's Mountain Sources of Water

DRAFT #4: JUNE 24, 2011



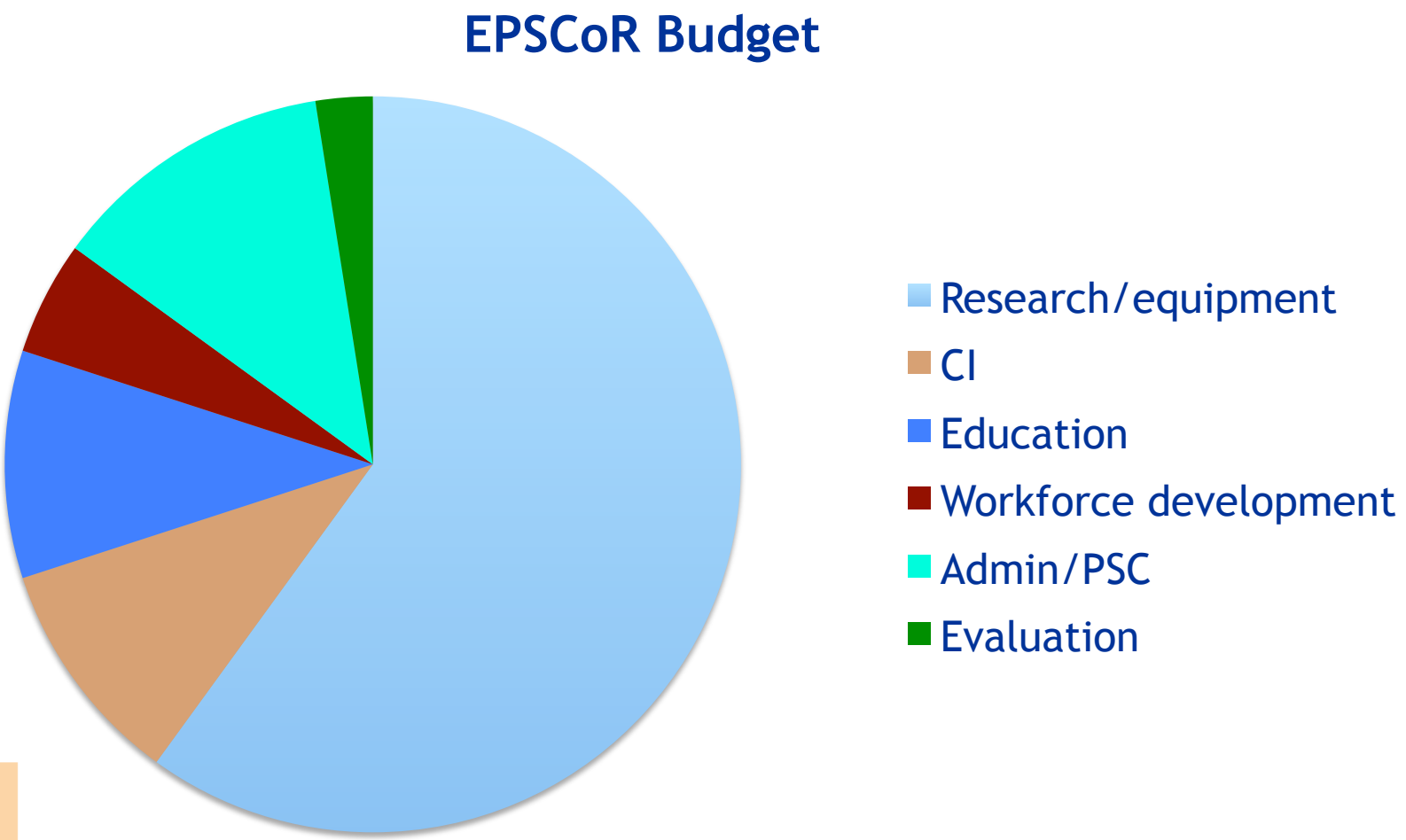
The Planning Process

- Fall 2011 – Stakeholder planning meetings
  - Sept 19 – science questions to be addressed
  - Oct 21 – research infrastructure and CI
  - Nov 21 – education, outreach, and workforce development
- Dec 2011 – Establish Proposal Steering Committee
- Jan – July 2012 – Proposal writing and additional workshops
- June 2012 – AAAS Review
- July 2012 – NSF RFP Released (tentative)
- July 2012 – Revisions to proposal based on AAAS Review and RFP
- Aug 2012 – External Review by Tiger Team
- Aug – Sept 2012 – Final revisions, budgeting, and processing
- Oct 2012 – Proposal to G&C for compliance checking
- November 2012 – submit proposal

The Proposal Steering Committee

- 12 members +/-
- Expertise
  - Subject area expertise
    - research, CI, education, outreach, workforce development
  - Writing talent and organizational abilities
- Diversity
  - Institutional
    - Major research universities
    - Regional universities and colleges
    - National labs
    - ….
  - Gender, racial, and ethnic diversity

Funding scenario ($20-24M)



Eligible research expenditures

- Research equipment
- Laboratory upgrades
- Field experimental facilities
- Faculty start-up packages
- Undergraduate, graduate and post-doc support
- Miscellaneous
  - Faculty salary for administrative activities
  - Training and professional development
  - Travel, supplies, etc.
  - …

20% match ($4M)

1. Many states receive a state appropriation for the entire cost-share requirement and it is written into legislation.
2. $ contributions from industry and business.
3. Salary and wages and FB for any EPSCoR staff that are supported.
4. Reduced IDC rates.
5. University and foundation contributions to picking up RAs, GRAs, Post-docs
6. University cost-share on faculty start-up packages.
7. Contributions of equipment.
8. Faculty release time.

Q&A

- Process
- EPSCoR in general
- etc.

10:45 am – Introductions

- Name
- Institution
- Research interest

11:15 am – Possible Breakouts (foci and questions)

- Bioalgae and biofuels and the EWE nexus
- Geothermal and the EWE nexus
- Socioeconomic research and the EWE nexus
- Oil and gas and the EWE nexus
- Wind and the EWE nexus
- Solar and the EWE nexus
- _____ and the EWE nexus
- _____ and the EWE nexus

12:15 am – Revisit Possible Breakouts & Process

- Bioalgae and biofuels and the EWE nexus
- Geothermal and the EWE nexus
- Socioeconomic research and the EWE nexus
- Oil and gas and the EWE nexus
- Wind and the EWE nexus
- Solar and the EWE nexus
- _____ and the EWE nexus
- _____ and the EWE nexus

Process to follow in breakouts

- Refine and prioritize questions
  - Identify related activities that might be supported
- Identification of lead writer and key contributors to develop a 3-6 page white paper on the topic
  - Title
  - Authors/contributors and affiliations
  - Background / introduction (1 page)
  - Focal questions (2-3 pages)
    - Relevance of questions to energy-water-environment nexus (0.5 page)
    - Capacity to enhance competitiveness for NSF funding (0.5 page)
  - Other people/institutions that can/should be brought in as partners (appendix)
- Identify others to invite to next meeting to identify research infrastructure and CI needs

12:30 – Breakouts

2:15 – Reports from Breakouts

2:45 – Next steps

- Science white papers
  - September 28: First draft of white paper sent to team reviewers
  - October 3: Revisions back to lead writer
  - October 10: Draft to full development team
  - October 12: Final comments to lead writer
  - October 16: Final draft to EPSCoR Office (mjdaniel@unm.edu)
- Fall 2011 – Stakeholder planning meetings
  - Oct 21 – research infrastructure and CI
  - Nov 21 – education, outreach, and workforce development
- Dec 2011 – Establish Proposal Steering Committee
- Jan – July 2012 – Proposal writing and additional workshops

Thank you!