

# EPSCoR External Evaluation Panel

Thursday, 24 January 2013  
EPSCoR PD/PA/EOD Meeting  
Newark, Delaware

# Agenda: Assessment and Evaluation

- 9:30 – 9:50 am : The Evaluator's Perspective
  - Lisa Kohne (SmartStart Educational Consulting Services)
  - Kirk Minnick (Minnick & Associates, Inc.)
- 9:50 – 10:10 am : The Project Director's Perspective
  - Gayle Dana (Nevada EPSCoR)
  - Gail McClure (Arkansas EPSCoR)
- 10:10 – 10:30 am : The Funder's Perspective
  - Jeanne Small (NSF EPSCoR)
  - Uma Venkateswaran (NSF EPSCoR)
- 10:30 – 11:00 am : Moderated Discussion and Q&A

# The Project Director's Perspective

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Gayle Dana, Project Director  
Nevada EPSCoR

# Outline

- Front-end evaluation
- Formative evaluation
- Summative evaluation
- Communicating evaluation results
- Implementing evaluation results

# Front-end Evaluation

- Refine project logic model
- Refine benchmarks, milestones, timelines
- Develop timelines, data collection procedures



# Formative Evaluation - Uses

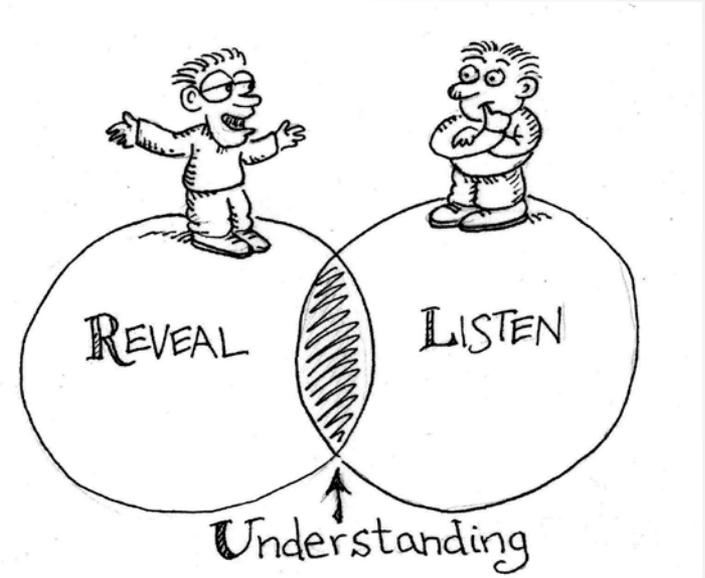


- Provides planning for, and feedback on **project activities**
  - Activity assessment and evaluation plans
  - Activity usefulness
  - Activity effectiveness

# Formative Evaluation

## What is helpful

- Direct communication between evaluator and project activity leads
  - Updating activities
  - Designing instruments
  - Educating on how/why of evaluation
- Concise evaluation reports
  - Summarizing data/results
  - Positives
  - Recommendations



# Summative Evaluation

- How well are we achieving our goals
- How to maximize positive impacts



# Communicating Evaluation Results



## The NSF Track 1 Quarter 1 Evaluation Report, September 1 to November 30, 2012 is now available online.

The following EPSCoR activities were conducted between September to November 2012. Evaluation results of these project components are included in this Quarter 1 report:

- Climate Change Seminar Series
- Community College Faculty Summer Fellowships
- UNR Losing the Lake and NCCP Works
- Interdisciplinary Modeling Course
- Technical Writing Assistance Service

To access the report go to:

<http://epscorspo.nevada.edu/nsf/climate1/evaluation.php>

Login: epscor  
Password: climate

**Thank you!**

For information about EPSCoR opportunities visit:



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## Nevada System of Higher Education

(NSHE) System Sponsored Programs Office provides infrastructure support to federal and state programs advancing the development of Science, Technology, Engineering & Mathematics (STEM) in Nevada.

For Nevada NSF EPSCoR information contact:

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(702) 522-7079

[marcie\\_jackson@nshe.nevada.edu](mailto:marcie_jackson@nshe.nevada.edu)

# Implementing Evaluation Recommendations



# The Project Director's Perspective

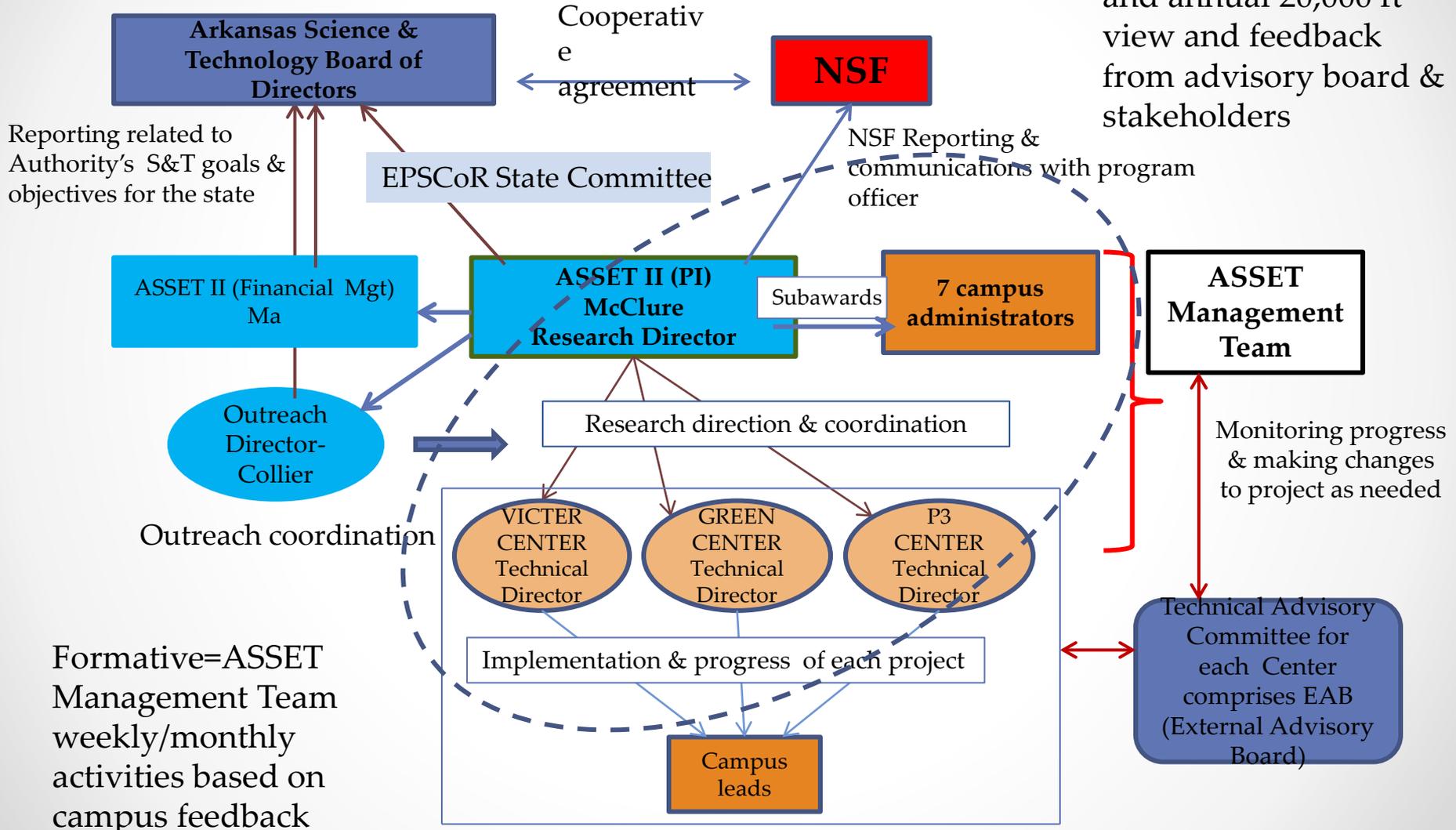
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Gail McClure, Project Director  
Arkansas EPSCoR

# ASSET Organization Chart

Team management structure

Summative=Quarterly and annual 20,000 ft view and feedback from advisory board & stakeholders



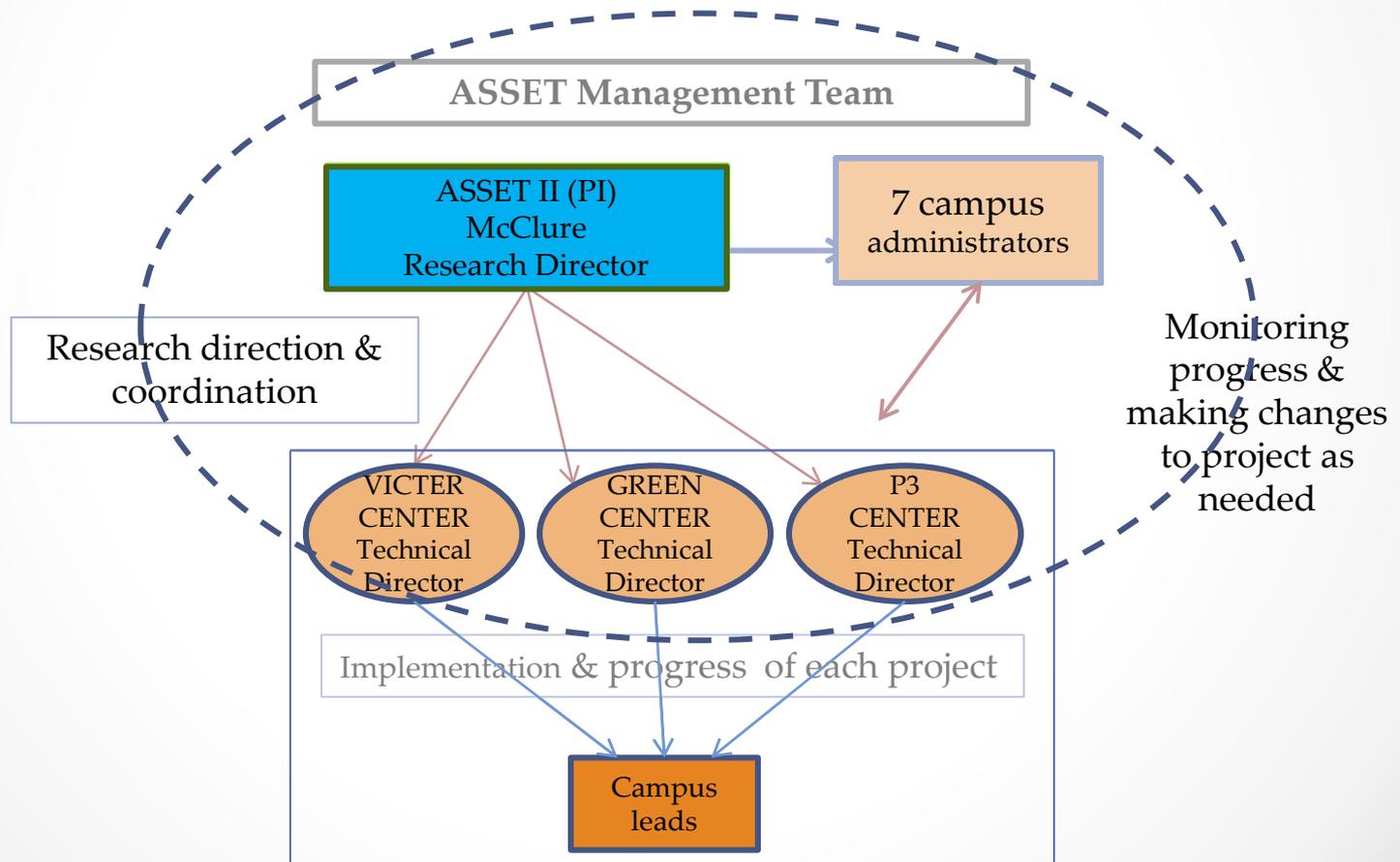
Formative=ASSET Management Team weekly/monthly activities based on campus feedback

# How do you use formative evaluations?

ASSET Management Team meets monthly for progress reports & discussion.

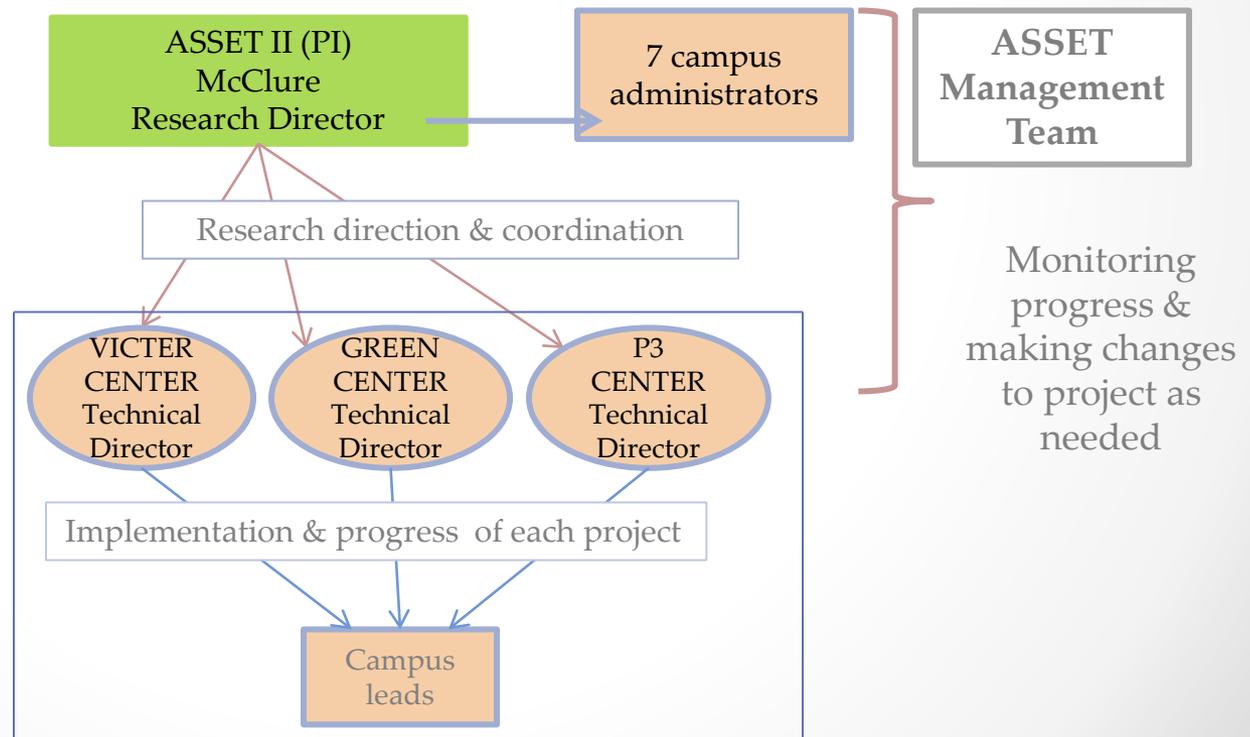
Issues with research, tech transfer, infrastructure sustainability, or outreach can be addressed and decisions made.

Technical directors then work with campus leads to implement.



# What are the key characteristics of a useful formative evaluation?

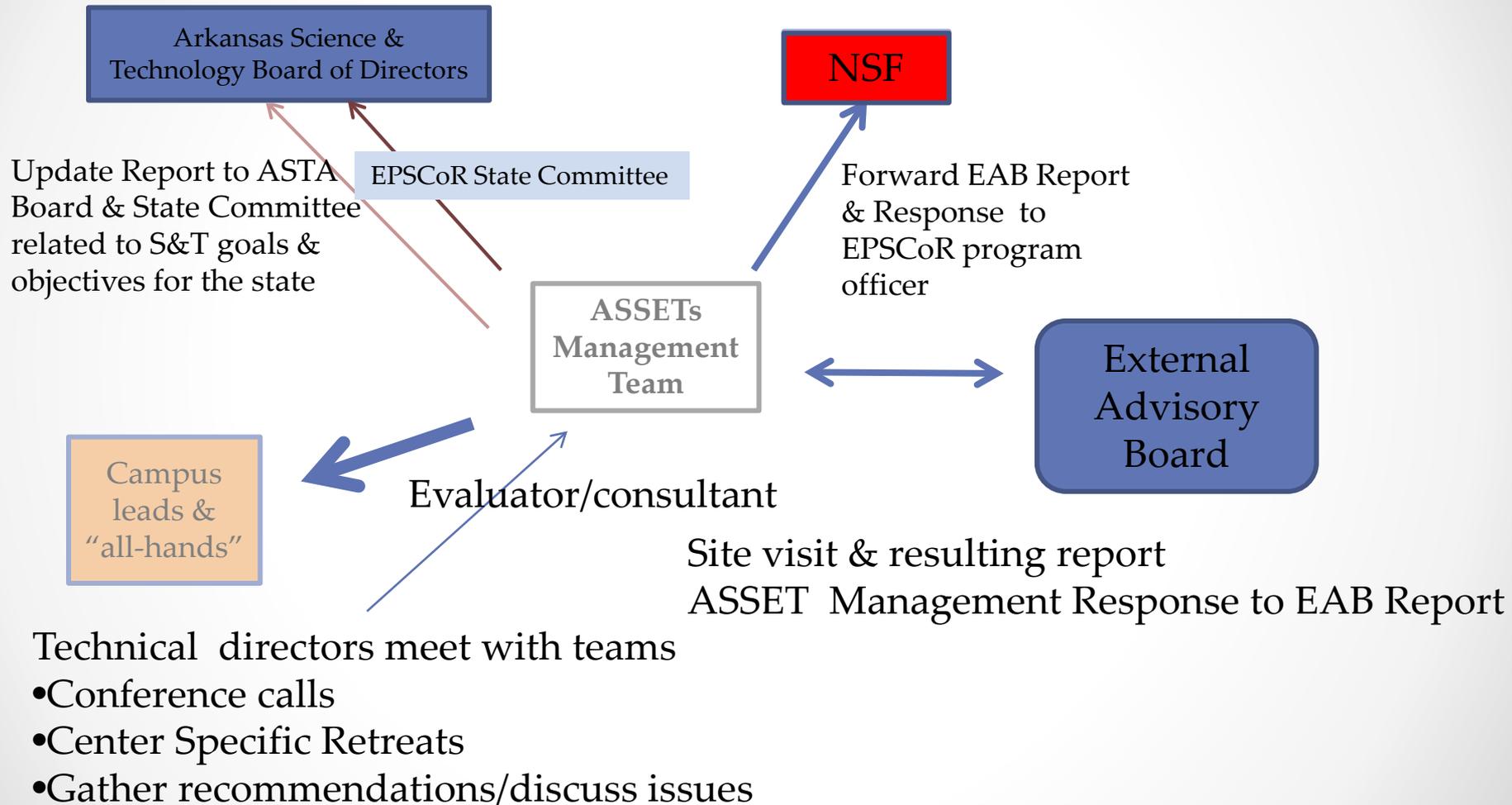
Timely acquisition of information & multiple sources: data, issues & successes  
Frequent reminder of milestones & metrics for internal assessment  
Rapid dissemination to expanded teams (all-hands)  
Feedback on regular basis



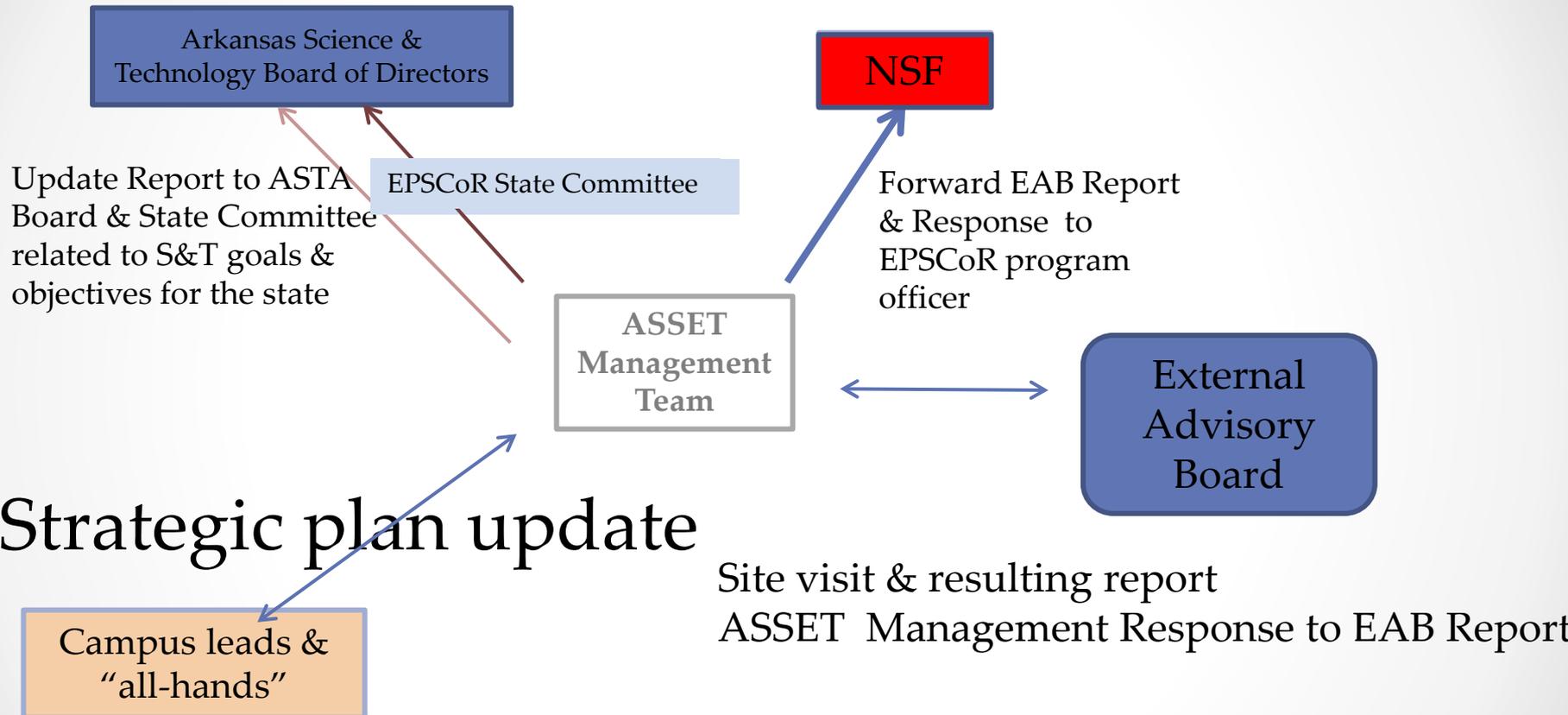
# What are the key characteristics of a useful summative evaluation?



# How do you communicate evaluation results to your project members and stakeholders?



# How do you implement evaluation recommendations?



# The Evaluator's Perspective



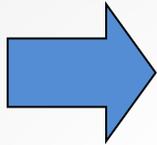
Lisa Kohne, SmartStart Educational Consulting Services

Kirk Minnick, Minnick and Associates, Inc.

# Role of the Evaluator

- External evaluator is a **member of the project team**, as well as part of overall evaluation strategy
- **Evaluation is responsibility of many**; including AAAS, advisory boards, internal data collector, external evaluator, and PIs.
- External evaluator is similar to your medical **general practitioner**; others provide critical program support
- We provide a **reality check** of project resources, activities, strategies, outputs, outcomes and impacts
- Evaluator is a **critical friend** who monitors health of project and makes recommendations for change
- Evaluation based on the project's **strategic plan**.

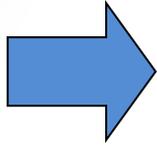
Project  
Blueprint



Strategic Plan

guides the

Evaluation  
Tools



Research  
Plans

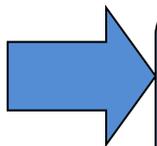
Logic  
Model

Milestones  
& Metrics

Assessment &  
Evaluation  
Plan

created for

Different  
Needs of  
Evaluation



Formative &  
Summative  
Evaluation

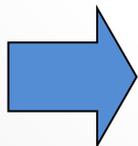
Scientific  
Merit

Strategic  
Planning

External  
Engagement

assessed by

Appropriate  
People & Skills



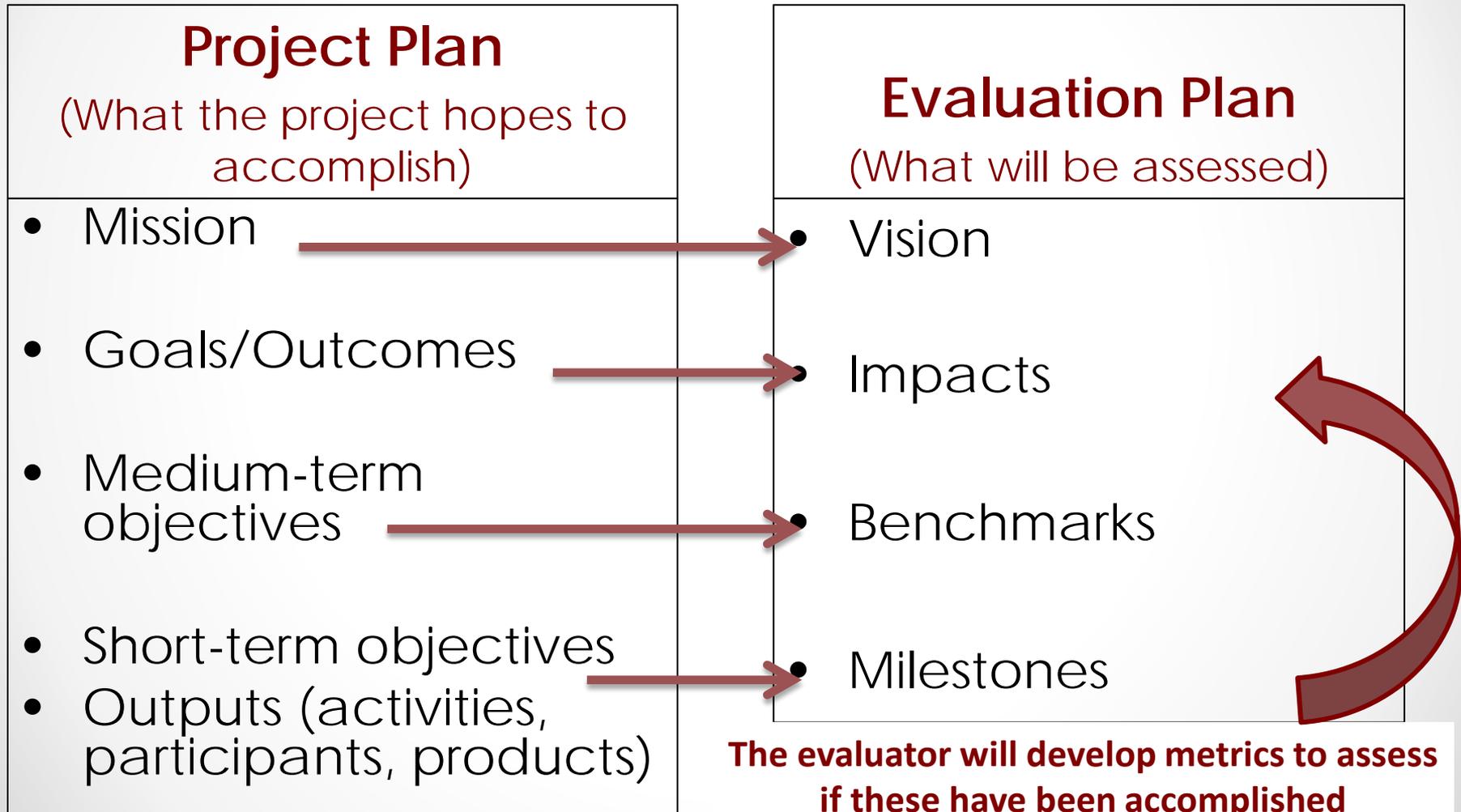
External Project  
Evaluator

Informal  
Science  
Evaluator

External  
Advisory  
Board

AAAS  
Review

# Development of the Evaluation Plan for the Project Proposal



## Step-by-step process:

- Logic Model
- Benchmark / milestone tables
- Evaluation plan



## Logic Model

(10) Mission:								
(1) Problems		(2) Need to do to address problems	(5) Inputs	Outputs		Short-term Objectives	Outcomes	(3) Goals
			(6) Activities	(7) Participants	(8) Short-term Objectives	(9) Medium-term Objectives		
						(4) Project Component 1		
						Project Component 2		
						Project Component 3		

## Sample Logic Model

**Mission:** U.S. Researchers and students will join with foreign colleagues to direct gravitational wave detection, build a diverse community of researchers with international expertise, and lay the groundwork for gravitational wave studies in the next decade and beyond.

Inputs	Outputs		Outcomes		
	Activities	Participants	Short-term Objectives	Medium-term Objectives	Goals
<b>NSF Funding</b>  <b>US Institutions</b> <b>Universities</b> <ul style="list-style-type: none"> <li>• Cornell University, Ithaca, NY</li> <li>• Franklin &amp; Marshall College, Lancaster, PA</li> <li>• Lafayette College, Easton, PA</li> <li>• Oberlin College, Oberlin, OH</li> <li>• University of Texas, Brownsville, TX</li> <li>• University of Vermont, Burlington, VT</li> <li>• University of Wisconsin, Milwaukee, WI</li> <li>• West Virginia University, Morgantown, WV</li> </ul> <b>Research labs</b> <ul style="list-style-type: none"> <li>• Goddard Space Flight Center, Greenbelt, MD</li> <li>• NRAO, Charlottesville, VA</li> <li>• Naval Research Laboratory, Wash, DC</li> </ul> <b>International Institutions</b> <b>Universities</b> <ul style="list-style-type: none"> <li>• McGill University, Montreal, Canada</li> <li>• Monash University, Melbourne, Australia</li> <li>• Swineburne University, Melbourne, Australia</li> <li>• University of British Columbia, Vancouver, Canada</li> <li>• University of Manchester, England, UK</li> </ul> <b>Research labs</b> <ul style="list-style-type: none"> <li>• Astron, Dwingeloo, Netherlands</li> <li>• ATNF, Sydney, Australia</li> <li>• Jodrell Bank Centre, Manchester England</li> <li>• Max Planck Institute, Bonn, Germany</li> <li>• Nancay Radiotelescope, Orleans, France</li> <li>• National Centre for Radio Astrophysics, Pune, India</li> <li>• Osservatorio Astronomico di Cagliari, Italy</li> </ul>	<ul style="list-style-type: none"> <li>• Annual International science meeting</li> <li>• Biannual domestic NANOGrav-PIRE workshops</li> <li>• Student international research abroad experience</li> <li>• Faculty and post-doc international and national research visits</li> <li>• Mentoring and advising for undergraduate and graduate students</li> <li>• International and national videocons</li> <li>• NANOGrav-PIRE website</li> <li>• Recruit high school and undergraduate students</li> <li>• Connect with and support institutions as they send students/faculty abroad</li> </ul>	<b>US Participants</b> <ul style="list-style-type: none"> <li>• Senior researchers</li> <li>• Faculty</li> <li>• Post-docs</li> <li>• Graduate students</li> <li>• Undergraduate students</li> <li>• High school students</li> </ul> <b>International Participants</b> <ul style="list-style-type: none"> <li>• Senior researchers</li> <li>• Faculty</li> <li>• Post-docs</li> <li>• Graduate students</li> <li>• Undergraduate students</li> <li>• High school students</li> </ul>	<b>Component 1: Scientific Research and Knowledge</b>		
			<ul style="list-style-type: none"> <li>• Develop software repository</li> <li>• Review sources of noise</li> <li>• Complete pass of GBNCC</li> <li>• Process GBT drift survey.</li> <li>• Investigate bb timing code</li> <li>• Develop TOAs system</li> <li>• Ramp-up operation of GUPPI/PUPPI</li> <li>• Analyze WAPP, Mark IV data</li> <li>• Complete TOA analysis</li> <li>• Complete analysis of CS</li> </ul>	<ul style="list-style-type: none"> <li>• Develop analysis pipelines</li> <li>• Develop and stimulate work on nHz GW sources</li> <li>• Identify new search projects</li> <li>• Design, implement, and analyze pulsar observations for timing array</li> <li>• Ensure timing data are accessible via a database.</li> <li>• Strategic Planning</li> <li>• Improve understanding of ISM</li> </ul>	<ul style="list-style-type: none"> <li>• Advance new knowledge and discoveries at the frontiers of science.</li> <li>• Achieve 3 sigma sensitivity to gravitational waves</li> </ul>
			<b>Component 2: Education and Workforce Development</b>		
			Participants will study: <ul style="list-style-type: none"> <li>• Timing</li> <li>• Interstellar medium</li> <li>• Gravitational wave detection</li> <li>• Gravitational wave sources</li> <li>• Cultural understanding</li> <li>• Outreach/advertise/recruit</li> </ul>	Participants will conduct: <ul style="list-style-type: none"> <li>• Timing</li> <li>• Interstellar medium analyses</li> <li>• Gravitational wave detection</li> <li>• Gravitational wave sources</li> <li>• Research abroad</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate greater faculty preparation for and participation in international research collaboration</li> <li>• Facilitate greater student preparation for and participation in international research collaboration</li> </ul>
<b>Component 3: Partnerships</b>					
<ul style="list-style-type: none"> <li>• Coordinate with institutions and participants</li> <li>• Recruit undergraduate and graduate students</li> <li>• Facilitate development of partnerships</li> </ul>	<ul style="list-style-type: none"> <li>• Foster international collaborations</li> <li>• Participate in research visits and exchanges</li> <li>• Publish joint papers</li> <li>• Conduct joint presentations</li> <li>• Increase URM/female participation</li> </ul>	Enable U.S. scientists to: <ul style="list-style-type: none"> <li>• Establish collaborative relationships</li> <li>• Operate effectively in teams comprised of partners from different nations and cultural backgrounds.</li> </ul>			
<b>Component 4: Institutional Capacity</b>					
<ul style="list-style-type: none"> <li>• Plan and organize Benchmarks/milestones</li> <li>• Hire support personnel</li> <li>• Develop documents/logo</li> <li>• Develop website</li> <li>• Establish modes of communication</li> </ul>	<ul style="list-style-type: none"> <li>• Support institutions to develop capacity to collaborate internationally</li> <li>• Collaborate and standardize procedures and policies</li> <li>• Improve institutional attitudes towards research, educational, and cultural exchanges</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthen the capacity of institutions to engage in international research</li> <li>• Strengthen the capacity of institutions to engage in and benefit from education collaborations</li> </ul>			

**(10) Mission:**

<b>(5) Inputs</b>	<b>Outputs</b>		<b>Outcomes</b>		
	<b>Activities</b>	<b>(7) Participants</b>	<b>Short-term Objectives</b>	<b>Medium-term Objectives</b>	<b>Goal</b>
			<b>Project Component 1</b>		
			<b>Project Component 2</b>		
			<b>Project Component 3</b>		

## Benchmarks and Milestone Table

:

**(Impacts):**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Expected final accomplishments</b>
<b>(Benchmarks)</b>	<b>(Milestones)</b>			

# Evaluation Plan

## Front-end

Organize the project  
Assess needs  
Finalize

- Logic model
- Benchmarks/  
milestones
- Timelines
- Strategic plan

Develop

- Data collection  
procedures
- Evaluation  
instruments

## Formative

- Evaluation of activities
- Monitor the effectiveness of project implementation
- Provide ongoing feedback
- Used to improve

## Summative

Assess annual and summative achievement of project goals and broader impacts on participants, institutions, scientific fields and community

**Guiding evaluation questions based on project goals**

# Project Component:

## Goal (Impacts):

	Year 1	Year 2	Year 3	Expected final accomplishments
Medium-term Objectives (Benchmarks)	Activities / Short-term Objectives (Milestones)			

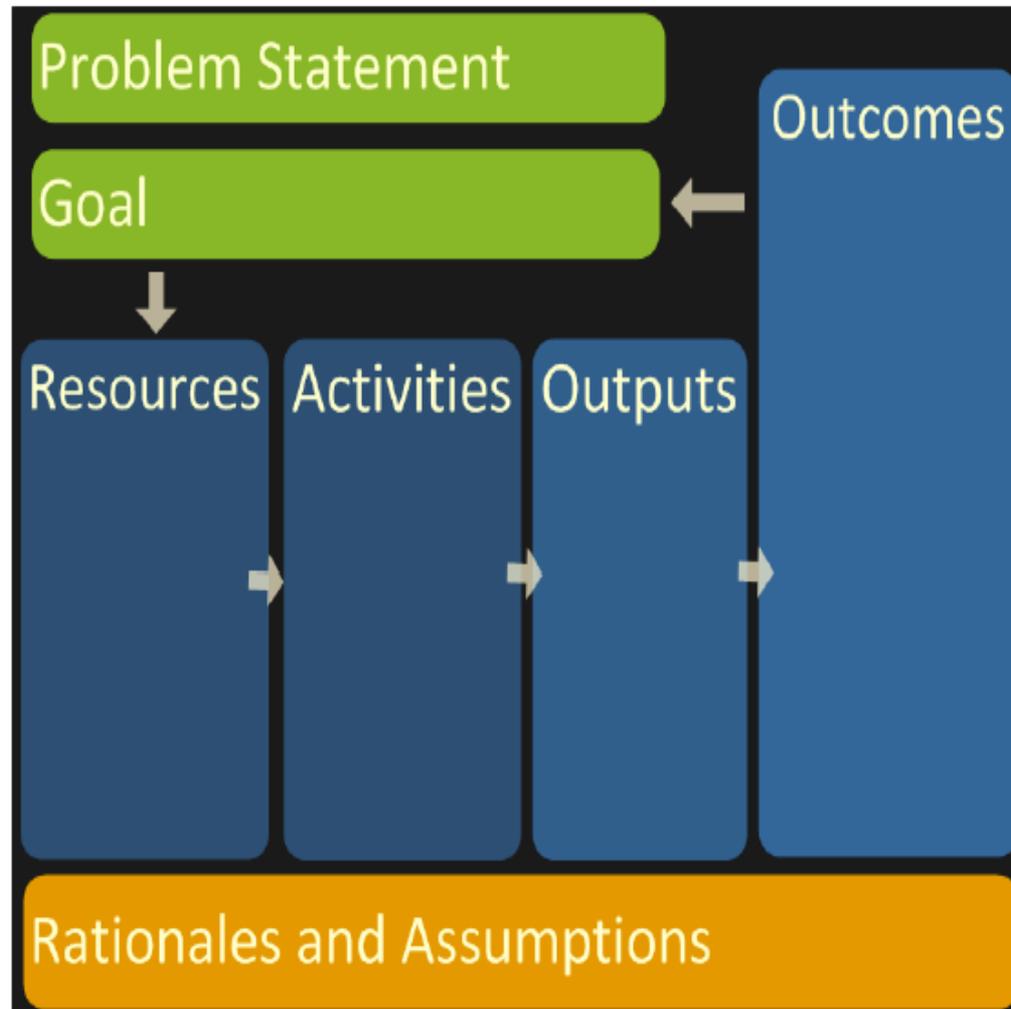
## Evaluation Plan

Benchmarks by Component	Benchmark Metrics	Timeline												Impact Metrics
		Year 1				Year 2				Year 3				
<b>Watershed Science</b>		1	2	3	4	1	2	3	4	1	2	3	4	Progress made on annual milestones [80% met], Baseline/annual post survey to assess perceived gains in knowledge and research progress [.25 increase per year]
Parameterize and validate watershed models	# models													
Develop CSDMS adapters for models	# adapters													
Coordinate model runs with students	# models and students													
Disseminate findings and products	# theses, publications, data													
Snow Camp for students and faculty	# participants													Progress made on annual milestones [80% met], Baseline/annual post survey to assess perceived gains in knowledge and research progress [.25 increase per year], Participants report use and value-added impact of CI visualization and data [impact interviews and surveys]
<b>CI Visualization and Data</b>		1	2	3	4	1	2	3	4	1	2	3	4	
Tri-state coordination	# monthly/quarterly mtgs.													
VW user requirements gathering and prototyping	# users engaged													
Develop and deploy VW visualization adapters	# adapters													
Design VW immersive env. and desktop frontends	% design completed													
VW interface frontend rapid prototyping	prototype completed													
VW interface frontend deployment	deployment													
Data and model requirements gathering (faculty/students)	# faculty/students engaged													
Develop and deploy VW data and service platform	platform deployed													
Develop and deploy VW platform adapters	# adapters													
Develop and deploy VW model adapters	# adapters													
Integration with CUAHSI and WaterOneFlow services	integration completed													
Integration of state data centers as DataONE Nodes	# nodes deployed													
Data management workshops for faculty and students	# participants													
<b>Workforce Development</b>		1	2	3	4	1	2	3	4	1	2	3	4	Progress made on annual milestones [80% met], Baseline/annual post survey to assess perceived gains in workforce development [.25 increase per year], More qualified graduate, undergraduate students and undergraduate faculty (e.g., retention in STEM, jobs)
Graduate Interdisciplinary Training	# participants													
Summer institutes for graduate students	# participants													
UVMN cohort 1 (10 undergrads/10 faculty)	# participants													

**HARD WORK  
PAYS OFF**



The components of the logic model used by Innovation Network are:



# Formative Evaluation

- Formative evaluation continues through out the life of the project, not just the first year
- Output metrics and satisfaction are equally important, as is content knowledge learned
- Formative evaluation tools include: observation, surveys, interviews and focus groups
- Provides external/independent perspective to the project team about its strategies/activities
- Assists project in refining or changing its strategies to achieve the goals desired

# Summative Evaluation Questions

- Are the jurisdiction's researchers becoming more competitive for R&D funding?
- Is the research generating knowledge that is being disseminated and applied for the good of the jurisdiction/nation?
- Are jurisdiction and regional collaborations being fostered that advance research, innovation and benefit society?
- Is the program broadening participation of people (especially those historically underrepresented); institutions and organizations in STEM?
- Does the jurisdiction R&D community capitalize on the EPSCoR investment to further develop experimental programs?
- Are the programs expanding the scientific literacy of all citizens of the jurisdiction and informing them of the importance of STEM research and education?

# Milestones

- Setting milestones is the process of establishing a quantity and time for a metric
- A milestone can be stated as an absolute #, such as saving \$1M by age 60 (absolute quantity by a specified time); or relative, such as saving enough money to cover living expenses in retirement (relative quantity by variable time)
- Milestones in academia are complex and are not always clearly understood by funders or the public
- Research and discovery do not follow a linear path; and there is no standard 'currency' for intellectual knowledge
- But, as Yogi Berra said "You've got to be careful if you don't know where you're going, because you might not get there."

# SMART Targets or Key Performance Indicators

S - Specific (What? Why? Who? Where? Which?)

M - Measurable (How much? How many? How will I know?)

A - Actionable (How can it be accomplished?)

R - Realistic (Right time? People Resources?)

T - Time-bound (When? 6 weeks? This year? Five years?)

# Outputs, Metrics and Outcomes

- **Outputs/milestones** are the direct result of program activities and may include types, levels and targets of activities that are conducted by the project
- **Metrics** are the measures we use to track changes or improvement in outcomes. They are often not exact measures of what we want to change, but indicators of the true outcomes we want to accomplish.
- **Outcomes** are the specific changes in behavior, knowledge, skills, status that are a result of the project activities

# Examples of Outputs, Outcomes and Metrics

Goal/Objective	Output Metric	Outcome	Outcome Metric
Intellectual Knowledge	# of publications	Quality of publications	Relative citation rate
Research Competitiveness	# of proposals	Quality of proposals	Dollars awarded
Benefit Society	# of patent applications	Quality of patents	Patents approved
Broadening Participation	# of under-represented undergrads involved	Quality of research experience	# of these students who graduate, apply to grad school and graduate in STEM

# Evaluation Process

- Evaluator consults with client to clarify project goals and objectives ; and Identify outputs, metrics and outcomes
- Conduct formative evaluation to improve project activities to maximize likelihood of success on achieving objectives
- Collect data through a variety of methods; including both qualitative (observations, interviews, focus groups, surveys) and quantitative ( publications, citations, presentations, proposals, awards, products/technologies/patents, honors/awards)
- Analyze and report data annually, including recommendations based on longitudinal assessment of data
- An evaluator, like your medical doctor, cannot make project leadership take our advice. We present our findings and rely on the strength of our data to support our recommendations
- Evaluation is a partnership between the evaluator, project leadership and the funding agency

# The Funder's Perspective

An external evaluation report is required each year, covering all program elements, and addressing:

- Is the project going as planned?
- What are the impacts/major accomplishments of the project (during that year)?
- Observations and recommendations?

In the annual report, the PD must address the findings of the external evaluation report, including approaches to incorporate evaluation feedback

# Helpful NSF Guides

- The 2002 User-Friendly Handbook for Project Evaluation
- [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf02057](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf02057)
  - Evaluation and types of evaluation
  - The steps in doing an evaluation
  - An overview of quantitative and qualitative data collection methods
  - Strategies that address culturally responsive evaluation
- Evaluation for Advanced Technological Education
  - [http://evalu-ate.org/app/webroot/files/uploads/ATE\\_evaluation\\_primer.pdf](http://evalu-ate.org/app/webroot/files/uploads/ATE_evaluation_primer.pdf)
  - <http://evalu-ate.org/>