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

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
  o Updating activities
  o Designing instruments
  o Educating on how/why of evaluation

• Concise evaluation reports
  o Summarizing data/results
  o Positives
  o 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!
Implementing Evaluation Recommendations
The Project Director’s Perspective

Gail McClure, Project Director
Arkansas EPSCoR
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?

Evaluator assist with:
- Designing metrics that are “assessable”
- Identifying weak areas or omitted areas of assessment/milestones
- Analyzing data and providing easily understandable interpretation for team review
- Compliance with NSF goals and strategic plan
- Compliance with state’s S&T plan

EAB addresses following:
- Metrics consistent with current state of research
- Current industry needs and issues
- Solutions from other innovative centers
- Identifying unanticipated issues to be addressed
How do you communicate evaluation results to your project members and stakeholders?

Arkansas Science & Technology Board of Directors

Campus leads & “all-hands”

EPSCoR State Committee

ASSETs Management Team

Evaluator/consultant

NSF

Forward EAB Report & Response to EPSCoR program officer

External Advisory Board

Update Report to ASTA Board & State Committee related to S&T goals & objectives for the state

Site visit & resulting report
ASSET Management Response to EAB Report

Technical directors meet with teams
• Conference calls
• Center Specific Retreats
• Gather recommendations/discuss issues
How do you implement evaluation recommendations?

Arkansas Science & Technology Board of Directors

Update Report to ASTA Board & State Committee related to S&T goals & objectives for the state

EPSCoR State Committee

ASSET Management Team

NSF

Forward EAB Report & Response to EPSCoR program officer

External Advisory Board

Campus leads & “all-hands”

Strategic plan update

Site visit & resulting report

ASSET Management Response to EAB Report
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**.
Strategic Plan

- Project Blueprint
- Evaluation Tools
- Different Needs of Evaluation
- Appropriated People & Skills

Research Plans
- Logic Model
- Milestones & Metrics
- Assessment & Evaluation Plan

Formative & Summative Evaluation
- Scientific Merit
- Strategic Planning
- External Engagement

- External Project Evaluator
- Informal Science Evaluator
- External Advisory Board
- AAAS Review
# Development of the Evaluation Plan for the Project Proposal

## Project Plan
*(What the project hopes to accomplish)*
- Mission
- Goals/Outcomes
- Medium-term objectives
- Short-term objectives
- Outputs (activities, participants, products)

## Evaluation Plan
*(What will be assessed)*
- Vision
- Impacts
- Benchmarks
- Milestones

The evaluator will develop metrics to assess if these have been accomplished.
Step-by-step process:

- Logic Model
- Benchmark / milestone tables
- Evaluation plan
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.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Activities</th>
<th>Participants</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Funding</td>
<td>Annual International science meeting</td>
<td>US Participants</td>
<td>Component 1: Scientific Research and Knowledge</td>
</tr>
<tr>
<td>US Institutions</td>
<td>Biannual domestic NANOGrav-PIRE workshops</td>
<td>Senior researchers</td>
<td>- Develop software repository Review sources of noise</td>
</tr>
<tr>
<td>Universities</td>
<td>Student international research abroad experience</td>
<td>Faculty</td>
<td>- Develop analysis pipelines Develop mock data challenges</td>
</tr>
<tr>
<td>• Cornell University, Ithaca, NY</td>
<td>- Faculty</td>
<td>- Study and stimulate work on nHz GW sources</td>
<td></td>
</tr>
<tr>
<td>• Franklin &amp; Marshall College, Lancaster, PA</td>
<td>- Post-docs</td>
<td>- Identify new search projects</td>
<td></td>
</tr>
<tr>
<td>• Lafayette College, Easton, PA</td>
<td>- Graduate students</td>
<td>- Design, implement, and analyze pulsar observations for timing array</td>
<td></td>
</tr>
<tr>
<td>• Oberlin College, Oberlin, OH</td>
<td>- Undergraduate students</td>
<td>- Ensure timing data are accessible via a database.</td>
<td></td>
</tr>
<tr>
<td>• University of Texas, Brownsville, TX</td>
<td>- High school students</td>
<td>- Strategic Planning</td>
<td></td>
</tr>
<tr>
<td>• University of Vermont, Burlington, VT</td>
<td>International Participants</td>
<td>- Improve understanding of ISM</td>
<td></td>
</tr>
<tr>
<td>• University of Wisconsin, Milwaukee, WI</td>
<td>• Senior researchers</td>
<td>Component 2: Education and Workforce Development</td>
<td></td>
</tr>
</tbody>
</table>
| • West Virginia University, Morgantown, WV | • Faculty | Participants will study:
| • Goddard Space Flight Center, Greenbelt, MD | • Post-docs | • Timing |
| • NRAO, Charlottesville, VA | • Graduate students | • Interstellar medium |
| • Naval Research Laboratory, Wash, DC | • Undergraduate students | • Gravitational wave detection |
| • International Institutions | • High school students | • Gravitational wave sources |
| Universities | International and national videocons | • Cultural understanding |
| • McGill University, Montreal, Canada | - NANOGrav-PIRE website | • Outreach/advertise/recruit |
| • Monash University, Melbourne, Australia | - Recruit high school and undergraduate students | Component 3: Partnerships |
| • Swinburne University, Melbourne, Australia | - Connect with and support institutions as they send students/faculty abroad | • Coordinate with institutions and participants |
| • University of British Columbia, Vancouver, Canada | - | • Participate in research visits and exchanges |
| • University of Manchester, England, UK | Research Labs | • Publish joint papers |
| • Astron, Dwingelo, Netherlands | - | • Conduct joint presentations |
| • ATNF, Sydney, Australia | • Recruitment of students | • Increase URM/female participation |
| • Jodrell Bank Centre, Manchester England | • NANOGrav-PIRE website | Component 4: Institutional Capacity |
| • Max Planck Institute, Bonn, Germany | • Recruit high school and undergraduate students | - Plan and organize Benchmarks/milestones |
| • Nançay Radiotelescope, Orleans, France | • Connect with and support institutions as they send students/faculty abroad | - Support institutions to develop capacity to collaborate internationally |
| • National Centre for Radio Astrophysics, Pune, India | • International Partnerships | • Collaborate and standardize procedures and policies |
| • Osservatorio Astronomico di Cagliari, Italy | • NANOGrav-PIRE website | • Improve institutional attitudes towards research, educational, and cultural exchanges |

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### Benchmarks and Milestone Table

#### (Impacts):

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Expected final accomplishments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(Benchmarks)</td>
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<td>(Milestones)</td>
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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):

<table>
<thead>
<tr>
<th>Benchmark Metrics</th>
<th>Timeline</th>
<th>Impact Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
</tr>
<tr>
<td>Progress made on annual milestones [80% met], Baseline/annual post survey to assess perceived gains in knowledge and research progress [0.25 increase per year]. Participants report use and value-added impact of CI visualization and data [impact interviews and surveys].</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Evaluation Plan

<table>
<thead>
<tr>
<th>Benchmarks by Component</th>
<th>Benchmark Metrics</th>
<th>Timeline</th>
<th>Impact Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
<td></td>
</tr>
<tr>
<td>Watershed Science</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parametrize and validate watershed models</td>
<td># models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop CSDMS adapters for models</td>
<td># adapters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinate model runs with students</td>
<td># models and students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disseminate findings and products</td>
<td># theses, publications, data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snow Camp for students and faculty</td>
<td># participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI Visualization and Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tri-state coordination</td>
<td># monthly/quarterly mtgs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VW user requirements gathering and prototyping</td>
<td># users engaged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and deploy VW visualization adapters</td>
<td># adapters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design VW immersive env. and desktop frontends</td>
<td>% design completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VW interface frontend rapid prototyping</td>
<td>prototype completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VW interface frontend deployment</td>
<td>deployment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data and model requirements gathering (faculty/students)</td>
<td># faculty/students engaged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and deploy VW data and service platform</td>
<td>platform deployed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and deploy VW platform adapters</td>
<td># adapters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and deploy VW model adapters</td>
<td># adapters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integration with CUAHSI and WaterOneFlow services</td>
<td>integration completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integration of state data centers as DataONE Nodes</td>
<td># nodes deployed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data management workshops for faculty and students</td>
<td># participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workforce Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Interdisciplinary Training</td>
<td># participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer institutes for graduate students</td>
<td># participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UVMN cohort 1 (10 undergrads/10 faculty)</td>
<td># participants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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HARD WORK PAYS OFF
The components of the logic model used by Innovation Network are:
Formative Evaluation

• Formative evaluation continues throughout 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


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

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

- **Goal/Objective**: The objectives for which outputs, outcomes, and metrics are measured.
- **Output Metric**: A measurable quantifiable indicator of progress.
- **Outcome**: The result or effect achieved that is intended to be measured.
- **Outcome Metric**: A measurable quantifiable indicator of the outcome effect.
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
    o Evaluation and types of evaluation
    o The steps in doing an evaluation
    o An overview of quantitative and qualitative data collection methods
    o Strategies that address culturally responsive evaluation

• Evaluation for Advanced Technological Education
  • [http://evalu-ate.org/](http://evalu-ate.org/)