So What?? The PD Perspective

1. Know your audience and what they care about.

2. When do you start to assess?

3. What to measure? Who should measure?

4. Specifics in the RFP: Where should we be in five years?

   - Research
   - Workforce and Diversity
   - External Engagement
   - Cyberinfrastructure
   - Sustainability
Purposes of Assessment and Evaluation:

Assess to make our case to our Audiences

Assess for program improvement
Audience

Those who provide financial support:
1. NSF EPSCoR, OIA, the Director and Congress.
2. State EPSCoR Committee
3. State legislators and officials
4. Higher Education administrators

Other Stakeholders:
5. Private Sector partners
6. K-12 partners teachers and students
7. University and College faculty and students
8. Research and outreach collaborators
9. Lay public
What do audiences care about?

1. Research innovations, new knowledge, new research groups and strengths, movement toward the next level of funding (e.g. centers), critical mass, improvements in competitiveness for funding, leveraging

2. Benefits to the state in the context of the state S&T Plan that might be physical infrastructure or human infrastructure but usually includes jobs and impact on the private sector as well as K-12

3. Jobs, K-12 improvements in students’ and teachers’ skills, numbers of opportunities for teacher training, training of the workforce

4. Research notoriety, research dollars flowing into the institutions, collaborations that cross units; success in recruiting the best talent and retaining this talent
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4. Research notoriety; research dollars flowing into the institutions; collaborations that cross units; success in recruiting the best talent and retaining this talent; Technology Transfer
5. Competitiveness for federal SBIR and STTR dollars; growth of high technology in the state; workforce training and increased numbers of skilled workers

6. Programs for teachers and students in STEM areas; summer education opportunities; more students going on to high education

7. Increased funding for STEM areas; increased success rate for federal funding; more graduate students and postdocs; more facilities and other infrastructure that helps them to be competitive

8. Increased numbers of collaborations and outcomes of the collaborations among the states

9. Increased recognition of the EPSCoR brand; awareness of STEM research and outreach in the State
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When do you start the process and who assesses you?

Start before you begin.
Start with an analysis of strengths/weaknesses and S&T Plan before creating a proposal.

White paper process for discovery and inclusion.

LM/OTL against which progress can be measured.

Who will assess you?

Arrange for an independent consultant and an external board.

Define the roles of each and the cycle of reports for formative and summative evaluation.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Outputs</th>
<th>Outcomes</th>
<th>Impacts</th>
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<tbody>
<tr>
<td>Analyze sustainable small scale biodiesel systems, linking optimal oilseed production systems to combustion characteristics and environmental outcomes</td>
<td>Quantify: (1) the <strong>processes</strong> associated with biodiesel fuel production at both the field and laboratory scales; (2) <strong>detailed characterization</strong> of oilseed and biodiesel fuel chemical composition and the energy and environmental impacts of two distinct land production systems; (3) emissions, performance and environmental and energy <strong>outcome metrics</strong> associated with biodiesel production and use; and (4) development of a transferable multi-criteria <strong>assessment framework</strong> to evaluate trade-offs between different fuel systems across the full production, delivery, and consumption life-cycle.</td>
<td>Identify the most appropriate biodiesel for Vermont to produce based on identification of criteria, characterization methods and assessment frameworks that include economic assessment. <strong>Multicriteria decision aide (MCDA)</strong> to evaluate fuel crops, production technologies and end-uses <strong>Methodological foundations and tools extendable to other climates and farming systems</strong></td>
<td>Move Vermont toward energy sustainability Create STEM/Green Technology jobs in Vermont Integrated, interdisciplinary systems approach to energy research Scientific understanding of production of biodiesel on a small scale Scientific/technical infrastructure for crop-based fuels research and application in Vermont Move other states that apply the methodology toward energy sustainability</td>
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<tr>
<td>LandSys Subgroup --- experimental field plots to examine rotational combinations of oilseed crops and traditional forage crops (Energy Crop Appropriate Land Use Project – ECALP)</td>
<td>Complete set of field-measured reference values for production and environmental costs/benefits of biofuels production in northeastern agricultural landscapes</td>
<td>Information for agricultural development and environmental management</td>
<td>Long-term sustainable oilseed production system for the northeast</td>
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<td>ChemSys -- Subgroup correlate chemical composition of the biofuel precursor components to biofuel infrastructure</td>
<td>Infrastructure to measure chemical properties constituting “chemical fingerprint” at all stages of biofuel production Measures for physical characteristics of biofuel</td>
<td>Systematic, comparative chemical and physical analysis establishing performance and sustainability baselines</td>
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<tr>
<td>Outputs</td>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
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<td>LandSys Subgroup --- experimental field plots to examine rotational</td>
<td>Complete set of field-measured reference values for production and</td>
<td>Continue with rotation of field treatments; water analysis; oil seed</td>
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<td>combinations of oilseed crops and traditional forage crops (Energy</td>
<td>environmenta l costs/benefits of biofuels production in northeastern</td>
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<td>Crop Appropriate Land Use Project – ECALP)</td>
<td>agricultural landscapes</td>
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<td>ChemSys -- Subgroup correlate chemical composition of the biofuel</td>
<td>Infrastructure to measure chemical properties constituting “chemical</td>
<td>Measures for physical characteristics important to biofuel performance</td>
<td>Chemical database including all inputs and final biofuel to determine</td>
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<td>precursor components to biofuel in-use performance.</td>
<td>fingerprint” at all stages of biofuel production</td>
<td>correlated with chemical content</td>
<td>the impact of the proposed crop rotation system on the chemical</td>
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<td>properties and reproducibility of the biofuel production sequence.</td>
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What to Measure?

The audiences tell us what to measure:

**Quantitative data for the APR and LM/OTL:** Every participant reports annually on:
- publications, grant proposals submitted and funded;
- faculty successful in promotion with tenure;
- new facilities;
- recruiting faculty and students in STEM area;
- number of teachers trained;
- number of teachers in summer or other programs;
- etc. etc.

**Qualitative measures:**

**surveys** of every participant. Do investments affect:
- faculty career development,
- graduate students' choice of careers,
- undergraduates' interest in STEM majors and careers,
- teachers' new skills,
- public awareness of the mission of EPSCoR and impact on the state?

Surprising outcomes that were not originally envisioned……
Web based reporting and surveys
Research: self-sustaining transdisciplinary group

What are the measures of such a group that can be parsed out over 5 years?

New faculty for critical mass; more graduate students; research outcomes in the form of collaborative publications and grant applications that increase over time; capital improvements; a new trans-disciplinary group that is no longer dependent on EPSCoR funds.
Diversity Plan:

There are many approaches to improving diversity in the STEM world.

A measure of increased participation in STEM education and/or research by under-represented groups.
A first step is a baseline.

Qualitative measures of attitude.

What groups can you partner with to cast a wide net?
Workforce Development:

This means different things to different constituencies: jobs, interest in STEM majors, keeping young people in state for S&T jobs, improved STEM education K-16.

The measures and yearly incremental improvements will depend on your particular program, but for the State and Private Sector generally include the list above.
External Engagement Plan:

Outreach, Communication, Dissemination: How to measure?

From the RFP: “Development of a diverse, well-prepared, internationally competent and globally engaged STEM workforce and for a more scientifically literate public”

What are measures of an informed public?

VPT partner!!
Vierwership - YouTube hits - Chat rooms - high school materials
Sustainability Plan:

**Innovation:**

Pilots, SBIR Phase (O), IF Awards

What are the measures and metrics? This is interesting because you will have to decide on your definition of innovation and transformation. Patents, disclosures, publications?

**Education and Human Resources Development:**

What are the measures? Recruit and retain faculty? Graduate students who complete their studies? Teacher preparation?
Thanks for “herding a bunch of idealistic scientists and engineers into a coherent, practically minded, and productive group. “

G. Petrucci, October 19, 2009

Our job is to develop transdisciplinary groups that will benefit the state and country with innovative research and bring all groups into the process.
Thank you!!
### Problem Statement:
A description of the problem that a program seeks to solve

### Goal
The intended aim or impact over the life of a program

### Rationales:
Why will program activities produce results?

### Assumptions:
What factors necessary for program success are already in place?

### Resources:
People, time, materials, funds dedicated to or consumed by a program

### Activities:
The actions a program takes to achieve desired results

### Outputs:
The tangible, direct products of program activities

### Outcomes:
The changes expected to result from a program – changes among clients, communities, systems, or organizations

### External Factors:
Other influences on program results; circumstances beyond program control