# Preparing an Effective SAES-422 Report


## By
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## INTRODUCTION

The 1993 Federal Government Performance and Results Act[2] (GPRA) significantly changed the expectations for Executive Branch agencies. Hence fourth all agencies, including those funding scientific research activities, were required to develop performance-based plans that were to be reported against annually. The anticipation is that budget decisions in the future will be related to demonstrated performance by agencies, based on their reported results.

Missing was any organized plan for gathering information generated external to the agency regarding performance and results. This was notably true for scientific research activities which are notoriously difficult to predict as outputs and outcomes of research trials yet-to-be conducted.

The GPRA requirements were imposed across all agencies from all the Social Security System, the Internal Revenue Service, and the Department of Defense, to the science-based agencies such as the National Science Foundation and the Department of Agriculture. However, results for the U.S. Army or Social Security have little resemblance to the results of research. The ramp up period to full GPRA reporting is now over, and the pressure is on to provide what is now seen as competitive information on why programs should be funded.

The 1998 Farm Bill that required all federal formula funded activities at public institutions to be organized in state-based Plans of Work. The understood expectation from Congress was to provide the funding agency (i.e., the Cooperative State Research, Education, and Extension Service of the USDA) with reliable information that could be assembled into performance reports for GPRA compliance.

Federal formula funding is viewed as an essential component of the Federal-State Partnership in agricultural research and extension. However, formula funding is under attack as not being accountable enough, or has been assumed to be an entitlement. Some critics of formula funding have proposed that the funds be converted to competitive grants. SAES directors are very interested in assuring proper accounting for the use of formula funds, and they are in fact looking for ways to increase federal formula allocations.

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[1] Executive Directors, Regional Associations of State Agricultural Experiment Station Directors. For more information contact any of the authors at the Regional Associations. David MacKenzie passed away October, 2002. Tom Helms is now retired.

[2] http://www.whitehouse.gov/omb/mgmt-gpra/gplaw2m.html

Formula funds are used for maintaining facilities, paying faculty salaries, hiring technicians, feeding research animals, buying fertilizers for crop trials, and other essential resources. Matching non-federal funding is required in equal amounts, and they are often overmatched in ratios of five- or even ten to one. Loss of formula funding would be devastating to agricultural research as we know it.

An additional requirement for formula funding is 'not less than 25 %" must be used for multistate research projects, and twice the amount of the 1997 base (or not less than 25% of the formula funds, which ever is less) must be used for integrated activities with extension. The justification for these requirements rests with the perspective that federal tax dollars should not be used for studying local or state-specific problems or issues. The use of federal funds should be invested more towards regional and national needs and opportunities.

To address this requirement to account for federal funding investments in agricultural research new reporting methods were developed for Multistate Research Projects. One of these changes was the design of an SAES-422 format (see Appendix 1) that asks for annual reports of outcomes and impacts for MRF projects.

Based on the review of the '01 SAES-422 submissions there is a pressing need to improve the content and quality of the submissions. This publication was developed to provide guidance for committees. We have included an example of what we think is an exemplary SAES-422 (see Appendix 2).

# BACKGROUND

Traditionally, scientific research has been pretty much left alone to pursue discoveries in search of knowledge that may or may not benefit the nation's economy, society, health, or the environment. Consider the 1945 publication entitled "Science, The Endless Frontier" by Vannevar Bush[3]. This policy document was in force for nearly 50 years, and in essence asked for major federal investments in post-WWII science with the general pledge that such investments would yield huge payoffs. Indeed such payoffs did occur, but the documentation on the extent of the payoffs is scanty. For most of the second half of the 20th Century the federal government invested heavily in scientific research. In return health improvements are legend. Food supplies have been vastly increased and food costs have dropped to less than 9% of the average American's disposable income. The environment has been greatly improved. All of these results and much more, have been a direct result of public and private investments in scientific research.

Agricultural research programs funded by the federal government must be responsive with information that justifies their continuation. This means that each project or committee should do its best to report results in a way that information can be compiled into more comprehensive reports for decision makers. To facilitate this responsibility, and hopefully better support the preservation of this important source of research funds, the regional associations of State Agricultural Experiment Station directors adopted a set of guidelines that were designed to implement the intent of the changes in the 1998 Farm Bill and turn the reporting instruments into an outcomes oriented system. Among those changes was the requirement to submit an annual SAES-422 accomplishment report.

[3] http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm

The first round of reports focused mostly on activities rather than accomplishments or outcomes. That is, a meeting attended, a common set of plants grown, or an animal fed for so many days. Unfortunately, none of these measures tells anyone about the outputs of the research or the benefits of the application of research knowledge as outcomes.

To address the need for clear communication we have adapted the terminology of the Consultative Group on International Agricultural Research (CGIAR) that has adopted with some changes to align the terms with current American English and to accommodate terminology in use at USDA.

# TERMINOLOGY

## Performance Targets:

**Goals:** Overall benefits intended for the targeted beneficiaries.[4]

**Intermediate Goals:** Benefits directly resulting from the uptake of an innovation that includes research outputs from the Federal-State Partnership (see Appendix 3 for the current intermediate national research goals).

> **Themes:** Topics of information organized to describe progress in addressing one or more goals (or intermediate goals). The utility of themes (versus a programmatic organization) is said to be in the versatility of themes, which can be flexed to respond shifting priorities as administrations change in Washington, D.C. The application of thematic organization is commonly done through text searches for key words (e.g., food safety).

## Accomplishments:

**Outcomes**: Quantitative, measurable benefits of the research outputs as experienced by those who receive them. Examples include the adoption of technology, creation of jobs, reduced cost to the consumer, less pesticide exposure to farmers, access to more nutritious food, and cleaner environment and healthier communities.

> **Indicators**: Qualitative surrogate observations or indirect measures of quantitative performance measures which permit monitoring the achievement of outcomes when direct measurement of performance is difficult, too costly, or not possible. An indicator of cultivar adoption might be seed certification records, rather than actual land area planted to that cultivar.

**Outputs**: Defined products (tangible or intangible) that are delivered by a research project. Examples of outputs are reports, data, information, observations, publications, and patents.

> **Milestones**: Key intermediate targets necessary for achieving and/or delivering the outputs of a project, within an agreed timeframe. Milestones are useful for managing complex projects. For example, a milestone for a biotechnology project might be “To reduce our genetic transformation procedures to practice by December 2004”.

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[4] The USDA’s five goals are: an agricultural system that is highly competitive in the global economy; a safe and secure food and fiber system; a healthy, well nourished population; an agricultural system which enhances natural resources and the environment; and enhanced economic opportunity and quality of life for Americans. The Federal-State Partnership in agricultural research has adopted the 5 goals of the USDA

**Activities:** Organized and specific functions or duties carried out by individuals or teams using scientific methods to reveal new knowledge and develop new understanding.

> **Objectives:** A specific target (or set of targets) against which a set of research activities are planned.

**Inputs:** Human, financial and intellectual capital made available for an activity. Allocations of inputs may be made as a competitive grant, institutional project support, access to technicians, etc. with each a monetary value, at least indirectly.

# REALITY CHECK

If only the world were as neat as this typology. But it is not. Many research results find utility in some far off applications. Some research discoveries must be combined with other findings to make a difference. Many times a research discovery must await other "market" factors before being applicable. Frequently, the associated measures of research impact are not gathered or are not available. So who gets credit? Who does the study?

What is needed is a system of providing to the Federal Partners information suitable for summary statements for reports to policy and budget decision makers. The following section sets out how that task can be made easy for both the researcher and the agency analyst.

# INFORMATION ORGANIZATION

Research project proposals should be organized to facilitate evaluation including reporting of outputs and outcomes. If a project has as an objective a reduction in pesticide use, how might that be measured? If another project is intending to improve child nutrition, what statistics are available as benchmarks, and how might the intended change be documented?

Selection of research objectives will need to become more closely tied to meaningful measures in the future. Some measures are relatively simple, such as calculating internal rates of return on a research investment. If a project cost $500,000 to accomplish and provided the target audience with $10 million in benefits the following year the annual *rate of return on the investment* is easily calculated.

In another example, the cost of a project versus the benefits in terms of gains for the intended users can be expressed as a ratio (the *cost: benefit ratio*). Another measure might be the *proportion of an area affected*, or the *percentage of individuals adopting* a specific technology.

In many cases direct measurement of an outcome is not possible, or it would be dubious. In these instances *indicators* might be used to express the outcomes derived from research investments. In other cases testimonials from beneficiaries may be an adequate substitute (e.g., a quote from a please farmer). In fact, many newspaper reporters use antidotal information to prove a point. Politicians particularly use case examples to make their points. Long eschewed by science, *case studies* may in fact be necessary method for defending some types of research accomplishments. This may be especially true for those project outcomes that cannot be easily measured, such as environmental quality improvements.

*Plausible associations* are also useful in establishing research accomplishments. For example, it is plausible to claim that reduced food costs are the result of higher yields and other factors. In particular, cheap potatoes are the result of high yielding cultivars and better cultivation technologies. Proving that claim might be difficult, but claiming it to be true seems plausible.

Sharing credit for research outcomes is problematic in many cases. This is especially true when the work of many contribute to a success story. A common example of this happens when several institutions work with the private sector to complete an activity. Who gets the credit? In all fairness, everyone should be able to claim the success.

*Ex ante* and *ex post* impact studies can be helpful in documenting research outcomes. But in many cases the expense of doing such an analysis may not be worthwhile. In these instances substitutes should be sought.

Milestones are particularly helpful in reporting outputs and outcomes. If a research project is cleverly designed with well thought out milestones, reporting progress and achievements can be greatly facilitated. Thus, time invested in project design pays off in the reporting requirements. This thought motivated the recent changes to the suggested multistate project outline, which is now outcomes-oriented with a milestones structure.

# CONCLUSION

Much will soon be developed as improvements to the way we report our achievements in agricultural research. And these changes are necessary if we are to sustain (indeed increase) our funding for agricultural research. Our staunch advocates want to double the funding for agricultural research, as has been done for the National Institutes of Health and the National Science Foundation in recent years. We need to give our advocates within and outside the Federal government the ammunition they need to make a case for increased funding. To do this, research scientists need to provide clear, concise and up to date information on research outputs and outcomes. Equally important are clear statements about what it all means for the intended beneficiaries. The SAES-422 is the recommended way to fill that need.

# APPENDIX 1

## SAES-422 Format for Multistate Research Activity Annual Accomplishments or Termination Report

**Note:** The Annual Accomplishments report is submitted each year of an activity's duration and is due 60 calendar days following the annual meeting. The Termination report is due by March 1 following the termination date of the project and replaces the Annual Accomplishments report for the final year.

Fields with asterisks (*) are required. If you are adding attachments (for participant lists, meeting minutes, or publications) you will need to add them right before you submit as a working copy or final.

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Project/Activity Number*:

Project/Activity Title:

Period Covered*: _____ to _____ (mm-yyyy) to (mm-yyyy) For **Termination** report, use project initiation and termination dates.

Date of this Report*: _____ (mm-dd-yyyy)

Annual Meeting Date(s)*: _____ to (mm-dd-yyyy) to (mm-dd-yyyy)

Administrative Advisor's Authorization Code*: _____ If you are not the administrative advisor of the project.

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**Participants***: Provide a list of those who attended each meeting, and their employing institution. As an alternative, provide an attachment of the meeting minutes, if that report contains the list of those who were present. And, if available, add the address for the list server as well.

Max characters = 4000. Suggested Format: "Last name, First name (email) - Institution;" The semicolon is used to separate participant information.

Participant attachment file: (Allowed file extensions = htm, html, doc, pdf, gif, jpg, txt)

List server address:

**Brief Summary of Minutes of Annual Meeting***: Provide information with a focus on the decisions made. As an alternative, provide the attachment of your meeting minutes. For **Termination** reports, provide this information for the last annual meeting only.

Max characters = 12000. Single line breaks are not preserved, please use a double line break to separate paragraphs.

Meeting minutes attachment file: (Allowed file extensions = htm, html, doc, pdf, gif, jpg, txt)

**Accomplishments and Impacts***: In this section focus on intended outcomes and potential impacts. This information should be built around the activity's milestones, as they were identified in the original proposal. The report should also reflect on the items that stakeholders want to know, or want to see. Also, describe plans for the coming year in no more than one or two short paragraphs. For **Termination** reports, provide a summary of all accomplishments and impacts of this project, particularly related to each original objective as described in the project outline. Also, indicate if there are plans to develop a new or revised MRF project in this area of research.

**Accomplishments**: Max characters = 12000. Single line breaks are not preserved, please use a double line break to separate paragraphs.

**Impact Statements:** Click on the "add impact" button to add another text box to input an impact statement. It will automatically eliminate empty boxes. Each box has a limit of 500 characters and spaces. Please write clear, concise, one-sentence statements for each impact. **Termination** reports should include an impact statement(s) that reflects the overall impact of the project.

add impact

**Publications**: For Annual Accomplishments reports, list the publications for **current** year only (with the authors, title, journal series, etc.). For **Termination** reports, list all publications resulting from the project. If this list exceeds the maximum character limit below, an attachment file may be used.

Max characters = 50000. Single line breaks are not preserved, please use a double line break to separate paragraphs.

Termination report publications attachment file: (Allowed file extensions = htm, html, doc, pdf, gif, jpg, txt)

Save as Working Copy Submit as Final

"Save as Working Copy" will allow you to come back and edit it. "Submit as Final" will send the emails to notify people that the report has been submitted. Once it has been submitted as final you will not be able to edit it.

If you "Submit as Final" an email message will be sent to notify CSREES, CRIS, the US-AES directors, the regional system administrator, the participants, CSREES Reps and administrative advisor(s) of the project that an Annual Accomplishments or Termination report has been submitted.

# APPENDIX 2

## Example of a Completed SAES-422

# Northeastern Regional Association of Agricultural Experiment Station Directors

**Multi-State Research Project**

**Project No:** NE-184
**Project Title:** Development of New Potato Clones for Environmental and Economical Sustainability in the Northeast
**Period Covered:** January 2001 to January 2002
**Date of This Report:** May 2002
**Annual Meeting Date:** January 18 – 19, 2002
**Participants:** Bill Brodie (NY), Barb Christ (PA), Walter De Jong (NY), Don Halseth (NY), Mel Henninger (NJ), Chad Hutchinson (FL), Matt Kleinhenz (OH), Dave Lambert (ME), Bill Lamont (PA), David MacKenzie (MD, NERA), Keith Perry (NY), Robert Plaisted (NY), Greg Porter (ME), Joe Sieczka (NY), Rikki Sterrett (VA), George Tai (NB, AAFC), Lesley Wanner (BARC, USDA), Marion White (FL), Craig Yencho (NC).

**BRIEF SUMMARY OF MINUTES OF ANNUAL MEETING:**
*NE184 rewrite.* Greg Porter presented version 2.0 of the proposal. It has been examined twice by the rewrite committee. The length of the document needs to be reduced to fit within national guidelines. Detailed discussion of the document was tabled until the next morning, when all present will have had a chance to read it. The revised proposal will be reviewed by five scientists outside the NE region. After their comments are incorporated, the proposal will go to the NERA Multistate Advisory Committee for a recommendation and then to the NERA Directors for a final vote.

*State, Federal and Provincial Site Reports for 2001.* A discussion arose concerning continued Canadian participation. It was noted that NE184 seed meets Canadian Federal standards but provincial rules in NB or PEI prevent us from sending seed from a farm with the ring rot pathogen present. State reports updated the meeting participants on clone performance and weather conditions during trials.

*Comments from Industry Representatives.* No industry representatives were present. C. Yencho suggested that we should invite industry representatives to one of our meetings every few years, and that we have a session where we listen to them (rather than have them listen to us). D. Halseth suggested that we could also invite them to observe some of our trials.

*Pathology Test Reports.*

- Nematology (B. Brodie). This activity continues to offer all breeding programs screening for resistance to the golden nematode. Currently he is evaluating NY, ME, USDA (Beltsville), NB and Frito Lay material. He can screen for resistance to both races Ro1 and Ro2. Ro2 has been found on grower's land where 5-6 years of successive plantings of Ro1-resistant lines has apparently selected for Ro2.

- Early Blight and Powdery Scab (B. Christ). Reports on clone performance were distributed.

- Late Blight, Corky Ringspot and TSWV (P. Weingartner) All three diseases were observed in Florida this year. Late blight reactions looked like race US-11. Corky ringspot data were distributed as well.

- Ring Rot (D. Lambert). Ring rot test results were distributed.

- Viruses (G. Sewell, Maine). One ARS line from WI and one AF line look to be resistant to PLRV. A brief report on these results is available from G. Sewell.

- New pathologist. L. Wanner (BARC/USDA) will work with scab and has an interest in durable disease resistance.

Breeding Reports.

- New York (W. De Jong and R. Plaisted). R. Plaisted mentioned that NY112 is being considered for release. It does well in PA, NY, ME. Farther west or south yields and specific gravity are observed to be reduced.
- USDA, Beltsville (K. Haynes). Not present, but a written report was distributed.
- North Carolina (C. Yencho). He is making a limited number of crosses, trying to fish out genes involved in leptine synthesis, and he is performing some early generation selection.
- Maine (G. Porter). Planting plans were already in place when Al Reeves passed away last May. There is no written report this year, but one can find a progress report in the NE Potato Special Grant proposal. Interviews for a new potato breeder will start next week.
- New Brunswick (G. Tai). Their breeding report was distributed. Their new policy on releases was described. Frying potato clones are evaluated for six years. Then interested parties can perform non-exclusive testing for a further two years. After this period parties may bid for three years of exclusive testing. Six year renewable license agreements are available after this time. Chipping potato are evaluated for eight years or more, and then bidding takes place after three years of exclusive evaluation. Ultimately six year renewable licenses are negotiated.

**Results using cluster and AMMI analysis** (G. Tai). AMMI and cluster analyses results were distributed. AMMI provides a simple, easy way to interpret and summarize multistate trial data. D. Halseth and a graduate student assembled the 1998-2001 data for analysis, which was distributed as a summary report.

**Seed Orders.** G. Porter distributed a 'shopping list" of advanced clones. He noted that there were some seed quality problems this past year, and expressed hope to do better this coming year. They are now performing extra testing to ensure freedom from viruses and ring rot. Breeders' seed constitutes an increasing percentage of the original propagules multiplied by NE-184 each year.

**Old Business.** B0564-8 and AF1753-16 were nominated to represent NE184 in the 2002 national trial. G. Porter reminded the group that last year we had decided to place all our reports up on a web site. A committee of C. Hutchinson, D. Halseth, B. Christ, D. Lambert formed to investigate development of a

NE184 database and web site, and will report back to the technical committee next year. They will evaluate if we want/need a common data format for future field testing performance reporting.

**Site committee selection report.** Next years meeting is to be held in North Carolina, possibly Charlotte, Raleigh or Myrtle Beach. Date - January 23 and 24, 2003.

**Nominations committee report**. Next year's Executive Committee are -- Matt Kleinhenz, Chair; Walter De Jong, Vice-chair; and Craig Yencho, Secretary.

**Resolutions committee: (**Adopted)
"Whereas Dr Alvin F. Reeves, potato breeder and long-time NE-184 participant, passed away in May of 2001, let us observe a moment of silence in his memory and gratefully recognize his many NE-184 accomplishments and the years of friendship that we shared with him."

Meeting adjourned at 1:20 pm, January 19, 2002

**ACCOMPLISHMENTS AND IMPACTS:**
The NE-184 project was formed in the mid-1970s to respond to the trend to ever increasing proportions of potatoes being industrially processed for consumption. One goal was to replace pesticide dependency with naturally resistant selections carrying improved industrial-processing characteristics. Another goal was to increase the quality attributes of potatoes grown in the region to enhance their suitability for processing markets and fresh consumption. A third goal was to develop replacement potato cultivars that were less costly to grow and better suited to processing and regional fresh market niches.

**2001 Outputs:** *Advanced clone testing:* Nineteen advanced breeding lines were evaluated against 10 NE-184 "standards" in replicated field trials in 2001. As expected, performance varied by location. But several selections outperformed standard lines at several locations. Measures of performance included yield, yield of US#1 tubers, chipping color after storage, cooking characteristics, and specific gravity (an indicator of dry matter content).

*Germplasm trials:* Several sites tested breeding materials of varying stages of development against named cultivars. Performance measures included total yield and size distributions, specific gravity and cooking characteristics. Additionally disease resistance and physiological defects were recorded.

**Project Impacts:** As a result of this project's efforts many replacement potato cultivars have been adopted region-wide by growers. As a consequence of these cultivar replacements pesticide dependency has been reduced significantly in the region. Although reliable numbers on pesticide sales are not available from pesticide companies, testimonials by East coast potato growers attest to the reduced need to spray crops for diseases and insect pests on the replacement cultivars. Moreover, the substitution of golden nematode resistant potato cultivars in New York is said to have saved the state's industry from what would have been otherwise its complete foreclosure.

One of the greatest successes of the project is the ability to predict on-farm cultivar performance, based on field test results obtained by the project from plots planted from maritime Canada to Florida. These tests have allowed for the selection of cultivars that are either broadly adapted, or adapted to specific environment. As a result, the NE-184 developed cultivars are known to perform well in varied soil and

climatic conditions. Moreover, potato grower participation in the on-farm demonstration of these selections has let to their rapid adoption, and the consequent impacts. Further, the project is currently testing and validating new statistical models that enable scientists to predict a potato selection's performance, allowing for more efficient breeding and variety development schemes in the future.

A study by the International Potato Center (Lima, Peru) on the economic returns for NE-184 investments has shown an annual rate of return from the NE-184 activities to exceed 40%, for a total net farm value that exceeds $14 million. This rate of return and the resulting pay-off competes favorably with some of the best internal rates of return obtained from agricultural research and extension investments.

**PUBLICATIONS:** G. Porter is preparing a summary document to be put online. D. Halseth is organizing a project to put all other project reports online.

**AUTHORIZATIONS:** David R. MacKenzie, Administrative Advisor

# APPENDIX 3

## Experiment Station Section

### NATIONAL RESEARCH PRIORITIES
### 2005 - 2010

The following five research areas (in bold) were selected as the highest priority areas for future research activities by the SAES/ARD Directors at their Workshop in New Orleans, September 26-28, 2000. The statement below each area (in italics) represents the primary outcome-oriented goal desired from research in that area. The bullet list[5] under each area indicates areas for more specific research activities of critical national need within each high priority area.

1. Environment, Natural Resources, and Landscape Stewardship

Natural resources will be managed to improve the environment and the economy.

- Water: ecosystems/watershed management, quality and quantity
- Land: use, management, and preservation
- Biodiversity
- Risk assessment

2. Relationship of Food to Human Health

Food will always contribute to human health.

- Human health impacts of food, diet, and environment
- Assuring safe food throughout the food value chain
- Nutraceuticals and functional foods

3. Rural Community Vitality

Agricultural science will help rural communities thrive.

- Human capital development
- Access to and application of new technologies
- Risks facing rural people
- Competitiveness of commodity-based and product-based enterprises

4. Biobased Products

Biobased products will be central to sustaining the economy and the environment.

- Biofuels and biobased materials
- Genetic enhancement and preservation
- Nutraceuticals and functional foods
- Social, economic, and environmental dimensions of technological change

5. Functional Genomics and Bioinformatics

[5] Bullet lists are not in priority order.

Genomic science will help assure global health and well being.

- Genetically enhanced plants, animals, and microorganisms
- Improved techniques to advance genomic science
- Safety, risk assessment, and consumer use