

1 Introduction

The Incorporated Research Institutions for Seismology (IRIS) Education and Public Outreach (EPO) program has undertaken a new effort to increase the rigor with which it evaluates its programs and products. We sought to make evaluation an integral part of our EPO staff's work, enable staff to demonstrate why we do the activities we do, enhance the impact or our products and empower staff to be able to make evidence-based claims. The challenges we faced included a modest budget, finding an applicable approach to both new and legacy programs ranging from formal and informal education to public outreach, and implementing the process without overwhelming staff.

We have found that the Collaborative Impact Analysis Method (IAM; Davis and Scalice, 2015)

- Promotes the development of staff knowledge and skills regarding evaluation,
- Provides a common language among staff,
- Increases enthusiasm to collect and share data,
- Encourages discussions of evaluative approaches when planning new activities, and
- Improves each project's ability to capture the intended and unintended effects on the behaviors, attitudes, skills, interests, and/or knowledge of users/participants.

Here we share the initial IAM Scores for products in the EPO portfolio, along with examples of the action plans and the impact that implementing those actions plans has had on our evaluations.

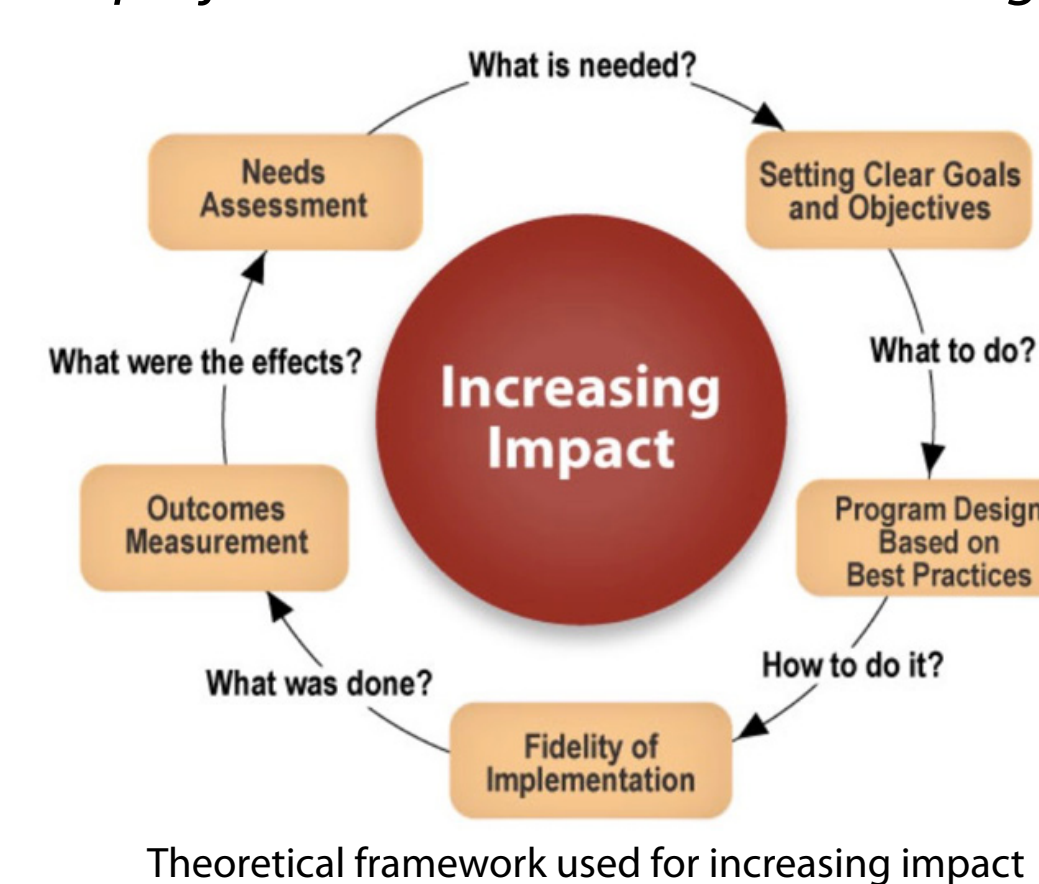
2 Collaborative Impact Analysis Method

In order to better assess both the quality and impact of the wide variety of our EPO programs we adopted the Collaborative Impact Analysis Method (IAM; Davis and Scalice, 2015). IAM was selected as it allowed us to combine the EPO staff's knowledge of programs, audiences and content with the expertise of an outside evaluation expert.

One unique aspect of this approach is a periodic consultation between staff and an external evaluator.

- Each project is reviewed jointly with the external evaluator, and together they score the project's evaluation using a qualitative rubric (below).
- Outcome is a benchmark score representing where that project's evaluation stands regarding best practices, and a pathway to improve each score.
- This process promotes improvement in evaluation no matter the initial state of a project evaluation, while delivering the formative and impact data to ensure program efficacy and efficiency.

Project Phase	Fair (1)	Good (2)	Very Good (3)	Excellent (4)
Needs Assessment What is the evidence of need?	Prior experience; "Seems like a good idea"	Research on what works; Literature review on similar programs/ products/ populations/ goals	Conversation with and/or direction from stakeholders (Focus Group); Experts review the ideas/plan	Survey of or pilot with potential audience/ users about the draft program
Goals and Objectives How measurable are the goals and objectives?	General direction; Understood by team; Agenda substituting for objectives	Explicit, written; For a target audience	Objectives are SMART: Specific, Measurable, Action-oriented, Realistic, Time-bound	Logic model of inputs, outputs, and outcomes in place
Design of Project How evidence- or research-based is the design?	Series of activities; Uses what has worked before	Based on objectives; Connects to standards; Includes contingency plans for emerging needs	Thematic; Has continuity; Participatory, personalized, responsive; Uses advanced organizers	Developmental; Embeds evaluation/ reflection
Implementation How true to the design is the implementation? (fidelity)	Facilitators prepare to implement the design	Collect and use feedback during implementation	High fidelity to design OR implements contingency plans to meet objectives if needed	Participants able to monitor their own progress against objectives
Outcomes Assessment/ Methods What is the evidence of impact on BASK?	Post only survey or reflection; Follow up survey or interview; Web stats; Anecdotes; Facilitator reports	External evaluator observes, or does case studies; Pre/post self-report survey; reflections; Post only measure (test, retrospective survey, task)	Pre/post measures (tests, performance tasks, observation); Pre/post follow-up	Comparison group studies (quasi-experimental); Experimental study (random assignment)



- Secondary benefits**
- Development of a common language to discuss internal evaluation
 - Development of staff's evaluation knowledge and skills
 - Increased enthusiasm to collect, share and use data for evaluation

3 Evaluation Process and Initial Status

Process

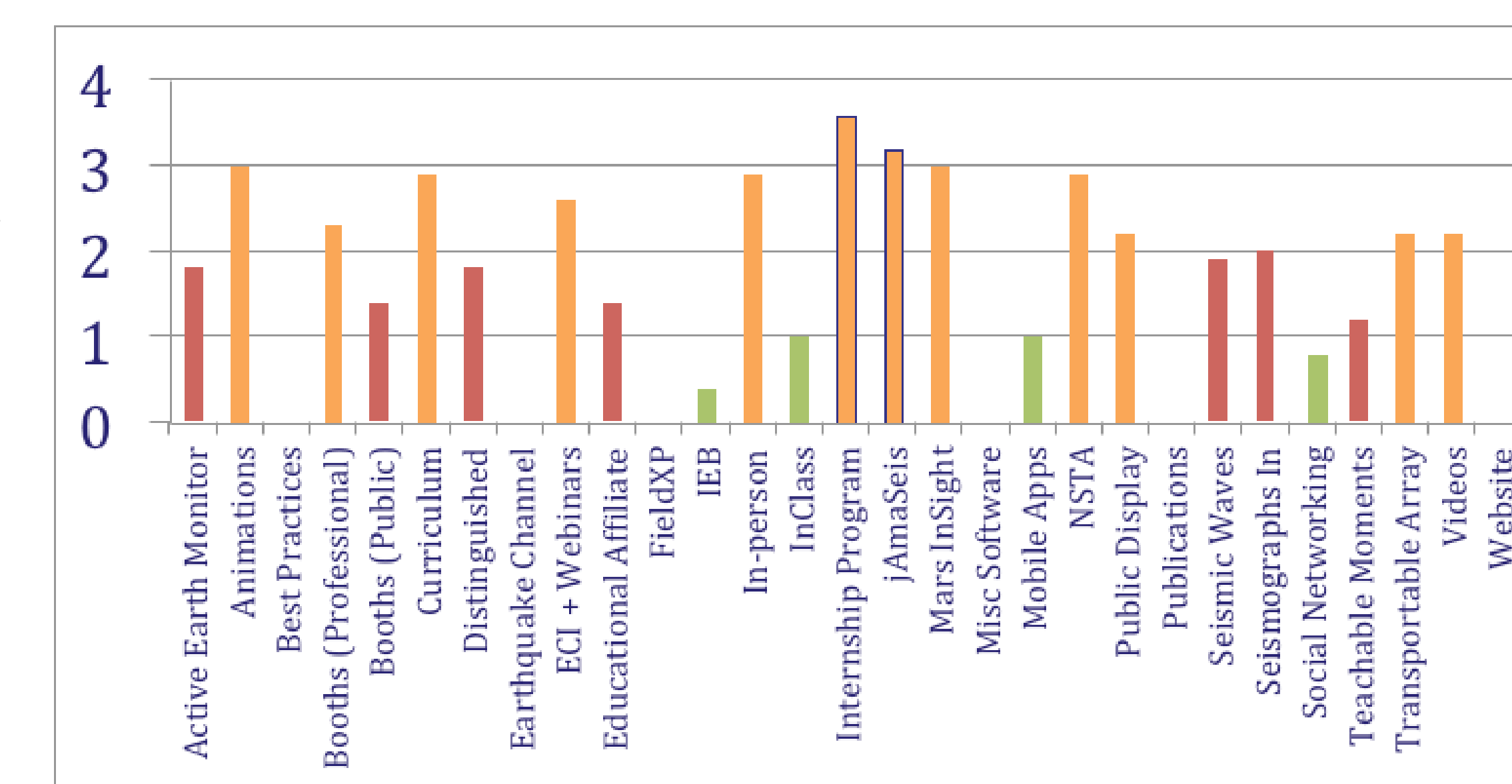
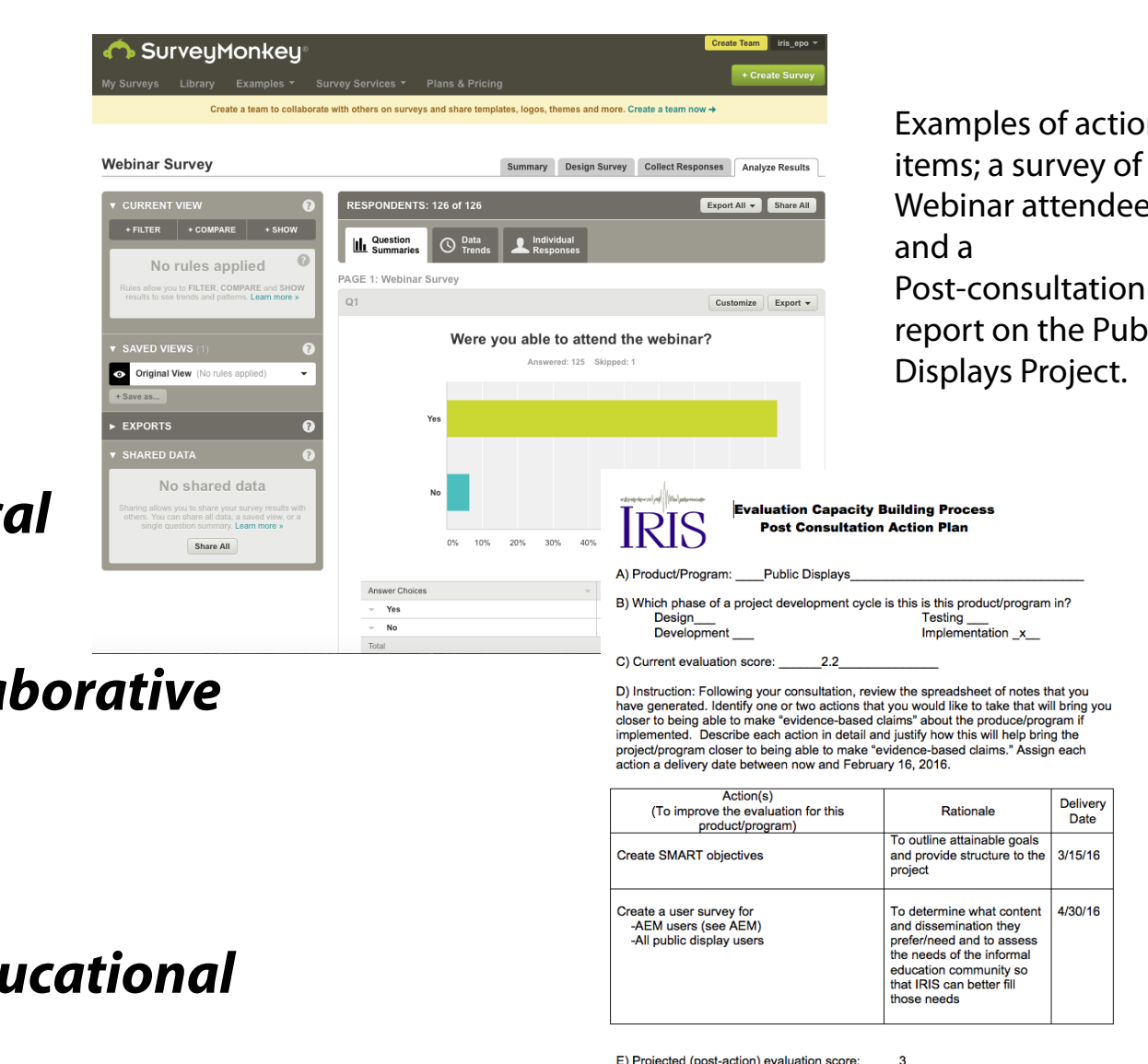
- Consultations with external evaluator - Assess current evaluation for each project
- Internal staff development - Consultations with external evaluator, presentation, reading
- Action plans - Develop internal structures and reporting mechanisms to support evaluation
- Implementation - Make incremental changes to our projects to improve rubric scores

This chart (right) shows all of the EPO programs and their initial evaluation scores. The programs have a wide range of scores because the projects are in different stages of development and implementation.

- A score of zero typically occurred for projects that were just beginning or were not as easily assessed using IAM, such as product development.
- Low numbers are more an indication that there is lack of formal evidence of impact rather than a lack of quality in the program. Some of our most successful programs earned a low score, due to a lack of systematic data collection.
- As actions plan items are implemented the project score (as determined from the rubric; left) improves.

Action plan example

- Write SMART Objectives
- Review and update design criteria/critical features
- Request pre/post survey data from collaborative workshops
- Create a logic model for project
- Conduct needs assessment survey of Educational Affiliate members of IRIS



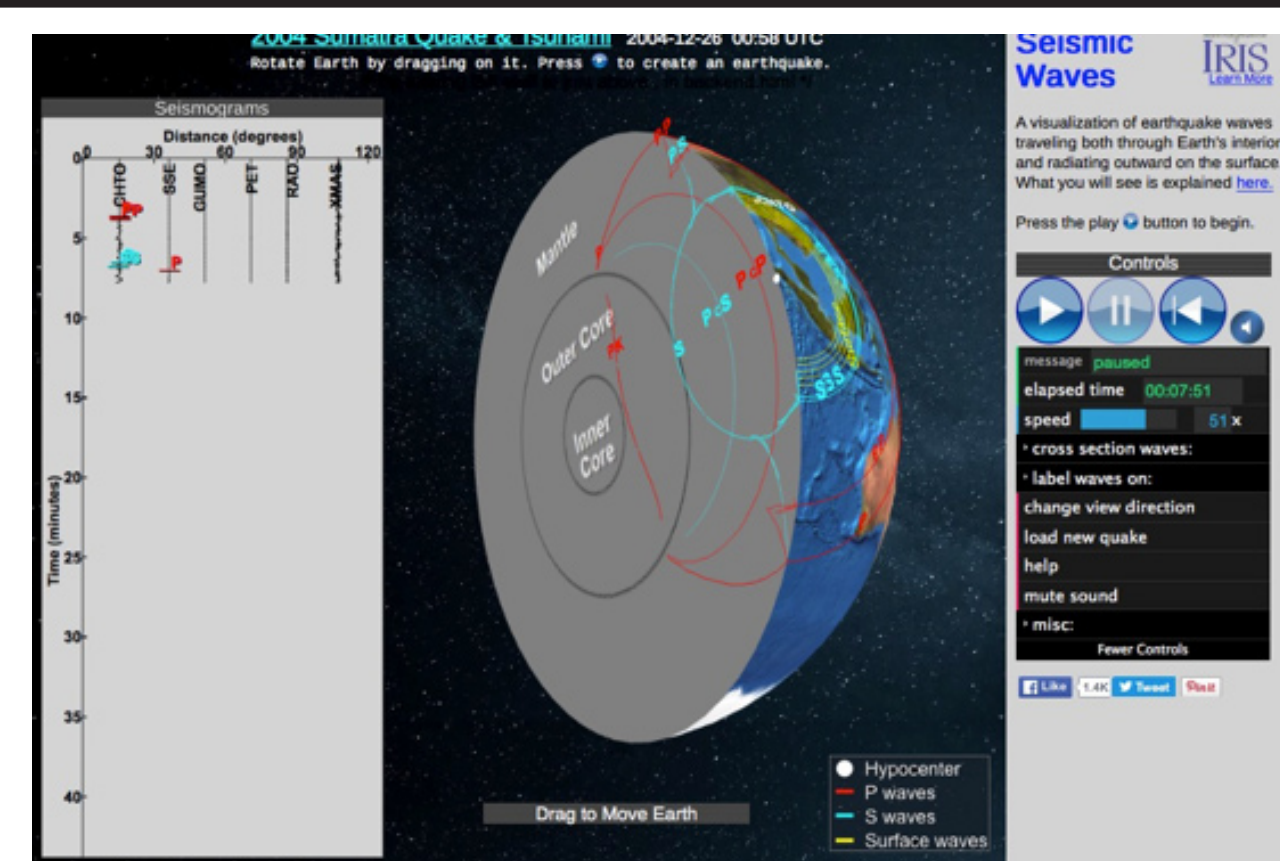
4 Programs

Below are some examples of IRIS EPO Programs in different stages of development / implementation. We show their beginning evaluation score, their action plan, implementation actions and the resulting rubric score. The objective is not to achieve a perfect score; the objective is to improve the impact and efficacy of the program through evidence based action.

New Program

Seismic Waves

Seismic Waves is a browser-based tool to visualize the propagation of seismic waves from historic earthquakes through Earth's interior and around its surface. <http://ds.iris.edu/seismon/swaves/>



Design and implementation of the new version of Seismic Waves followed the IAM rubric from the beginning:

- A survey of users of the previous program was conducted.
- A survey of potential users was conducted to identify other tools used to teach this concept.
- SMART objectives and design criteria were used to define success..
- Design options were explored with potential users through small surveys
- Beta website was tested with experienced classroom instructors.

- Current Score 2.8**
- Needs Assessment - 4
 - Goals and objectives - 3
 - Design - 4
 - Implementation - 3
 - Outcome Assessment - 1

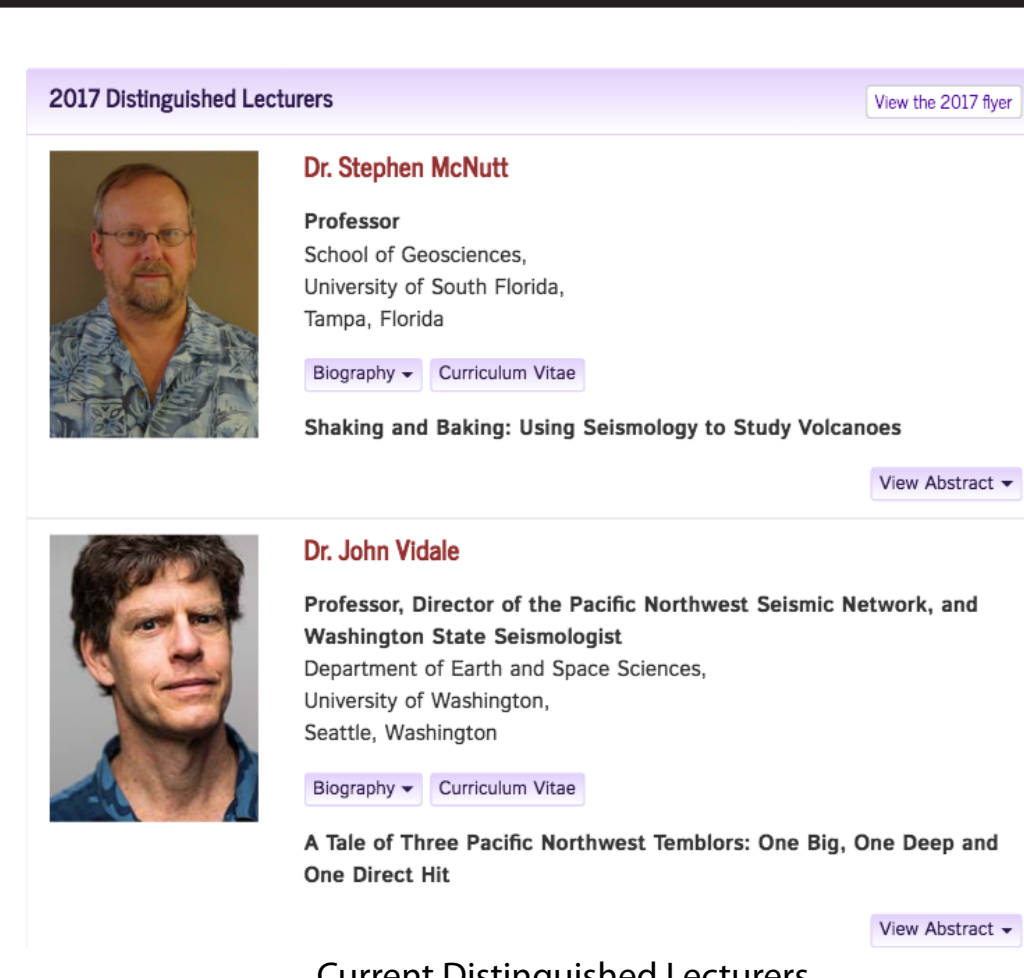
- Actions taken to achieve that score**
- Design - Critical feature list
 - Design - Revision based on testing
 - Implementation - Beta/usability testing
 - Outcome - Measuring effects of use Promotion

- Qualitative and quantitative data was collected through an online post-use survey, and an in-person usability test of the website.
- Advertising messages promoting the product were derived from responses to the needs assessment.
- Use of the tool is monitored through the collection of online analytics.

Existing Program

Distinguished Lecture Series

For more than 10 years, IRIS and SSA have offered non-technical presentations on seismology-related topics to general audiences across the US through its IRIS/SSA Distinguished Lectureship Program. Lectures are typically presented at science museums, universities or similar settings as part of the venues' established speaker series.



Rubric and Scoring Actions

This project had completed a survey prior to evaluation and thus scored Excellent (4) on the Needs Assessment portion of the rubric. However, the project Design and Implementation were rated Good (2) to Fair (1), because the activities were not

- Initial Score 1.8**
- Needs Assessment - 4
 - Goals and Objectives - 2
 - Design - 2
 - Implementation - 1
 - Outcome Assessment - 0

- Action Plan**
- Goals and Objectives - Rewrite goals as SMART Objectives
 - Needs Assessment - Post lecture surveys of speaker and venue
 - Implementation - Obtain feedback from SSA

Current Score 2.6

based on clear objectives and an implementation plan. The project scored a (0) on Outcome Assessment as that step had not yet been implemented.

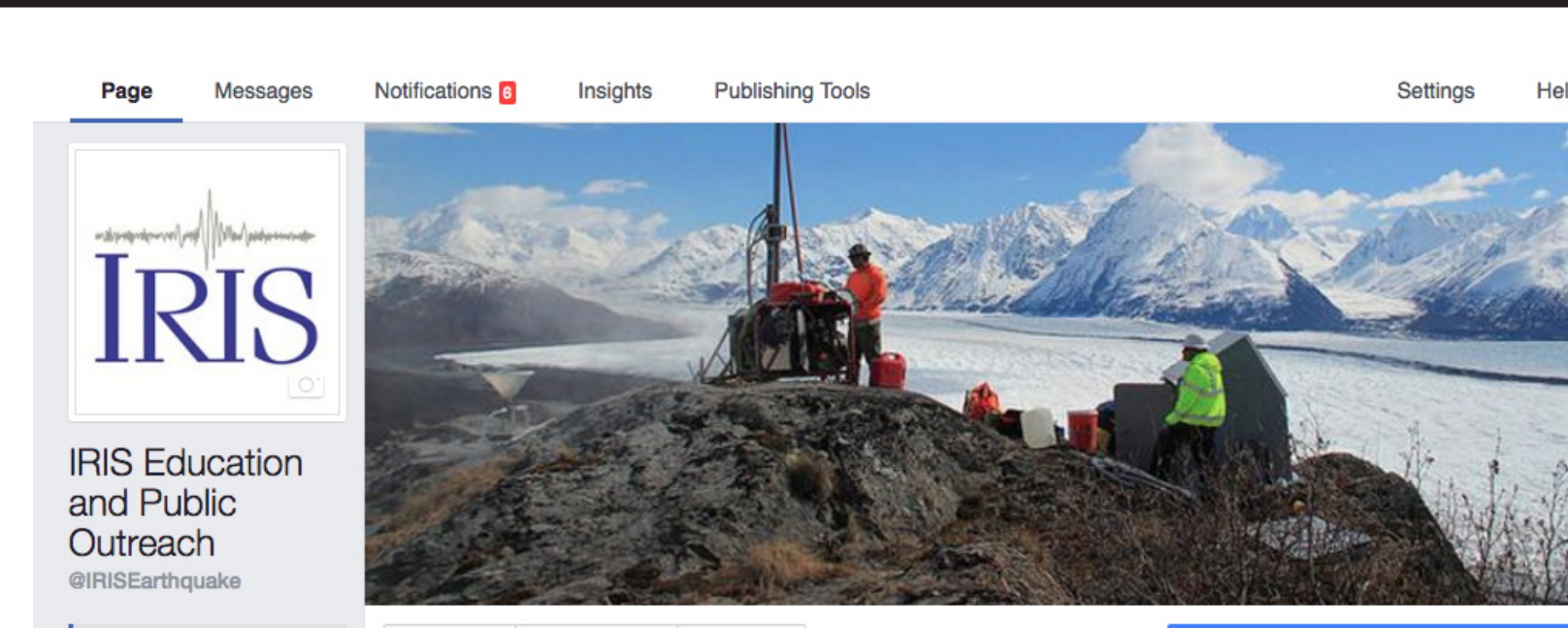
In order to improve the rigor of the program and thus increase the rubric score an action plan was created with the steps shown in the box (left)

By completing these steps the project has increased its rubric score from a 1.8 to a 2.6, with improvements in Goals and Objectives, Implementation, and Outcome Assessment, and can provide much better evidence of quality and impact.

Revised Program

Social Media

IRIS maintains multiple social networking channels spread over a variety of social media platforms including Facebook, Twitter, LinkedIn, YouTube, Pinterest and Reddit.



This project was able to make large strides in improving its IAM rubric score by rewriting goals as SMART Objectives and conducting a survey of users. This improved the evaluation quality in the Needs Assessment and Goals and Objectives phases. Additionally, a social media strategy was implemented based on prior staff experience that helped to raise the Design score. The responses to the survey and the feedback collected during the implementation of the strategy were used to improve and update the posting content and methods that improved the Outcomes and Assessment score.

- Initial Score 0.8**
- Needs Assessment - 1
 - Goals and Objectives - 0
 - Design - 2
 - Implementation - 1
 - Outcome Assessment - 0

- Action Plan**
- Goals and objectives - Rewrite goals as SMART Objectives
 - Needs Assessment - User survey
 - Design - Implement Strategy
 - Implementation - Revise based on strategy and survey feedback

Current Score 2.6

- In the past 12 months
- Facebook following has increased 154% from 4100 to 10,500
 - Twitter following has increased 196% from 700 to 2,100
 - Facebook weekly reach has gone from <5k to >20k
 - Number of monthly impression on Twitter has increased from 20k to 460k
 - ~9 million Facebook and Twitter impressions

To learn more about IRIS Social Media strategy and evaluation, please attend "Importance of strategy in social media: getting the most out of your post" on Wed from 9:15-9:30 in 309 Moscone South (ED31D-06)

6 Conclusions and Future Work

We have found that this collaborative evaluation method leads to more focused implementation of projects, improves the use of resources, results in richer reporting to NSF and overall produces greater project impact. The IAM plan is particularly useful because it can be implemented at any stage of the project and evaluation is integrated throughout the project life cycle. It is also well suited to facility EPO programs that are more engaged in evaluation than single PI outreach, but which don't have the detailed evaluation plans of a focused education project, as well as organizations working to add more robust evaluation to a well-developed, mature program.

Critical success factors

- 1) existing internal evaluation expertise
- 2) clear leadership commitment and involvement
- 3) intentional cultural change
- 4) ongoing support from an external evaluator
- 5) use of evaluation results for improvement and reporting

We have developed a comprehensive future evaluation plan that hinges on continuing implementation and feedback and includes yearly consultations and portfolio evaluations

Timeframe	Internal	External	Elements	I	E
Annual Cycle			Build internal evaluation capacity through annual project consultations	X	X
			Develop action plans to increase level of evaluation based on consultation	X	
			Conduct ongoing data collection and prepare technical report on the evaluation		X
			Review of the technical report		X
Optional Periodicity			Some projects targeted for publication	X	X
			External evaluator and senior staff engage in higher-level cross program analysis and strategic planning	X	X
Proposal, after year 2, and year 4 of 5 year award			Provide proposal support	X	X
			Review annual data rollups	X	X
			Conduct Year 2 total portfolio evaluation	X	X
			Conduct Year 4 total portfolio evaluation	X	X

7 References

Davis, H. & Scalice, D. (2015). Evaluate the Impact of your Education and Outreach Program Using the Quantitative Collaborative Impact Analysis Method (Invited). Abstract ED53D-0871 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 14 - 18 Dec.