Enhancing interdisciplinary climate change work through comprehensive evaluation

Jenna Klink [a], Vikram Koundinya [a,*], Kim Kies [b,1], Courtney Robinson [c], Amulya Rao [c], Claire Berezowitz [c], Melissa Widhalm [d], Linda Prokopy [e]

[a] Environmental Resources Center Evaluation Unit, University of Wisconsin-Extension, 445 Henry Mall, Room 202, Madison, WI 53706, United States
[b] Environmental Resources Center Evaluation Unit, University of Wisconsin-Extension, 445 Henry Mall, Room 203, Madison, WI 53706, United States
[c] Environmental Resources Center Evaluation Unit, University of Wisconsin-Extension, 445 Henry Mall, Room 214, Madison, WI 53706, United States
[d] Forestry and Natural Resources, Purdue University, FORS Room 201A, 195 Marsteller St, West Lafayette, IN 47907, United States
[e] Forestry and Natural Resources, Purdue University, FORS Room 201B, 195 Marsteller St, West Lafayette, IN 47907, United States

ABSTRACT

This paper shares the details of an evaluation plan from an interdisciplinary climate change project that developed decision support tools (DSTs)[2] for agricultural advisors and farmers. It showcases how evaluation enhanced the project work by providing opportunities for the team to reflect on and use data to improve performance. The plan included both formative and summative approaches, team member interviews to assess team functioning, usability testing of DSTs, outreach and marketing campaign evaluation. Outreach evaluation included surveying those reached, monitoring project website traffic, and tracking and mapping outreach details. Marketing evaluation included pre-testing campaign materials, assessing open and click rates of email campaign, and monitoring associated traffic to website. The Useful to Usable (U2U) team was generally high functioning, but team interviews allowed the evaluators and leaders to discern factors that were influencing intended outcomes, respond to needs, assign resources, and catalyze activities that were crucial in shaping the outcomes. Usability testing surfaced issues related to default values and search and help features that were addressed by the team and resulted in improved usability. Outreach evaluation found geographic and methodological gaps that were filled, resulting in more target audiences reached and more effective methods used (e.g., hands-on events). Marketing evaluation allowed for improving contact lists over time and improving campaign messaging before deployment. Evaluators and project leaders working on similar projects may adapt or utilize methods detailed in this paper, along with the recommendations, while designing and implementing improvement-oriented evaluation plans.

* Corresponding author.
E-mail addresses: jlklink@wisc.edu (J. Klink), vkoundinya@wisc.edu (V. Koundinya), kim.kies@wisc.edu (K. Kies), crobinson8@wisc.edu (C. Robinson), amulya.vishweshwer@wisc.edu (A. Rao), cberezowitz@wisc.edu (C. Berezowitz), mwidhalm@purdue.edu (M. Widhalm), lprokopy@purdue.edu (L. Prokopy).
[1] University of Wisconsin Institute for Clinical and Translational Research, 4240 Health Sciences Learning Center, 750 Highland Avenue, Madison, WI 53705, United States.
[2] DST = Decision Support Tool.

1. Introduction

Changing climate conditions pose a significant threat to future agricultural productivity in the Midwestern United States (Melillo et al., 2014; Pryor et al., 2014; Walthall et al., 2012). According to the 2014 National Climate Assessment, Midwestern farmers should expect impacts from increased weather variability and extremes. These impacts include: wetter spring conditions that reduce field access; heatwaves during key pollination periods, which could reduce yields; and early and late season anomalous freeze events that damage crops (Melillo et al., 2014; Pryor et al., 2014). Farmers will need to adapt their practices and management strategies to sustain future productivity, and many researchers have suggested that integrating climate information into agricultural decision-making will be an essential component for risk reduction (Haigh et al., 2015; Hatfield et al., 2014; Mase and Prokopy, 2014; Meinke and Stone, 2005; Selvaraju, 2012; Takle et al., 2014). One way to help farmers integrate climate information into agricultural decision-making is to develop decision support tools (DSTs) that aid them in this process (Mase and Prokopy, 2014). This is especially important for the Midwestern United States, where there are few tools already available (Prokopy et al., 2015).

Useful to Usable (U2U) is a multi-year research and extension project funded by the U.S. Department of Agriculture (USDA) to increase the resilience of Midwestern farmers to climate change and variability by improving the usability and uptake of climate information. The team consisted of over 40 members from nine universities, two regional climate centers and the National Drought Mitigation Center. Team expertise was diverse, including social science, climatology, agricultural economics, outreach/extension education, computer programming, project management, evaluation and marketing. U2U created climate-related DSTs and implemented an outreach strategy and marketing campaign with usability in mind. While many researchers focus on integrating climate and economic data or improving forecast skill of their DSTs (Hoskins, 2013; Magnusson and Kallen, 2013; Mirschel et al., 2014), other researchers include stakeholder feedback as a main component of DST design and dissemination (Khan et al., 2010; Kostner et al., 2014). Additionally, social scientists frequently argue that DSTs should be developed in consultation with farmers and other users to ensure they meet users' needs (Breuer et al., 2008; Crane et al., 2011). Significantly, U2U sought to understand how farmers and agricultural advisors interact with the DSTs, and how they respond to outreach and dissemination efforts.

Chen (2015) states that stakeholders need evaluations that are improvement and accountability oriented. The fundamental premise of participatory evaluation is engaging stakeholders in the evaluation process, which enhances the relevance, ownership and utilization of an evaluation (Cousins and Whitmore, 1998). Utility and actual use of evaluation form the basis for Michael Patton's utilization-focused evaluation approach. Patton asserts that "evaluators should facilitate the evaluation process and design any evaluation with careful consideration of how everything that is done, *from beginning to end*, will affect use" (Patton, 1997, p. 20).

Interdisciplinary and participatory evaluations in particular are faced with specific challenges that have been extensively characterized (Campbell, 2005; Daily and Ehrlich, 1999; Jacob, 2008; Massey, 2006; Quinlan et al., 2008). Key components of a successful interdisciplinary evaluation that addresses these challenges are: mixed methods, participatory methods, superior communication, clear conceptual framework, clear logic model, discipline compatibility, competent leadership, material conditions, systems thinking, and trust between members of the research team (Alberti et al., 2011; Jacob, 2008; Norman et al., 2011; Runyan et al., 2014; Trochim et al., 2008).

Large interdisciplinary initiatives within the environmental, agricultural, and extension education fields may need to look to other fields, such as public health, for examples of thorough evaluation plans. For instance, a multi-year pilot evaluation of the Transdisciplinary Tobacco Use Research Centers initiative of the National Cancer Institute showcases a mixed methods evaluation design. The evaluation methods included concept mapping, outcome logic modeling, researcher surveys, content analysis of progress report summaries, peer evaluation of progress reports, bibliometric analysis, peer evaluation of publications and citations, and financial expenditures analysis (Trochim et al., 2008). Similar large efforts in the fields of agriculture and natural resources have traditionally focused on quantitative evaluation designs. CenUSA Bioenergy project, a multi-state research and outreach endeavor, primarily used end-of-session surveys to assess the learning and behavior change in their extension and outreach participants (CenUSA, 2016). Similarly, the large Sustainable Corn project focused its evaluation on team member surveys (E. Norland, personal communication, June 26, 2014).

This paper demonstrates how a comprehensive evaluation plan can be used to monitor progress and enhance a multi-million dollar research and extension project.

2. Materials and methods

A mixed methods approach was taken for this evaluation, incorporating both qualitative and quantitative measures and employing formative and summative processes focused on four specific components of the project:

2.1. Team functioning

Team members were interviewed throughout the project to assess how the activities were progressing, how the team was functioning, and to provide actionable insights for project leadership.