Evaluating the Process and Impacts of "Actionable" Science:

How Do We Know When It's Working?
How Do We Know What "Working" Means?

Alison M. Meadow – University of Arizona
Tamara Wall – Desert Research Institute

Center for **Climate Adaptation Science** and **Solutions**

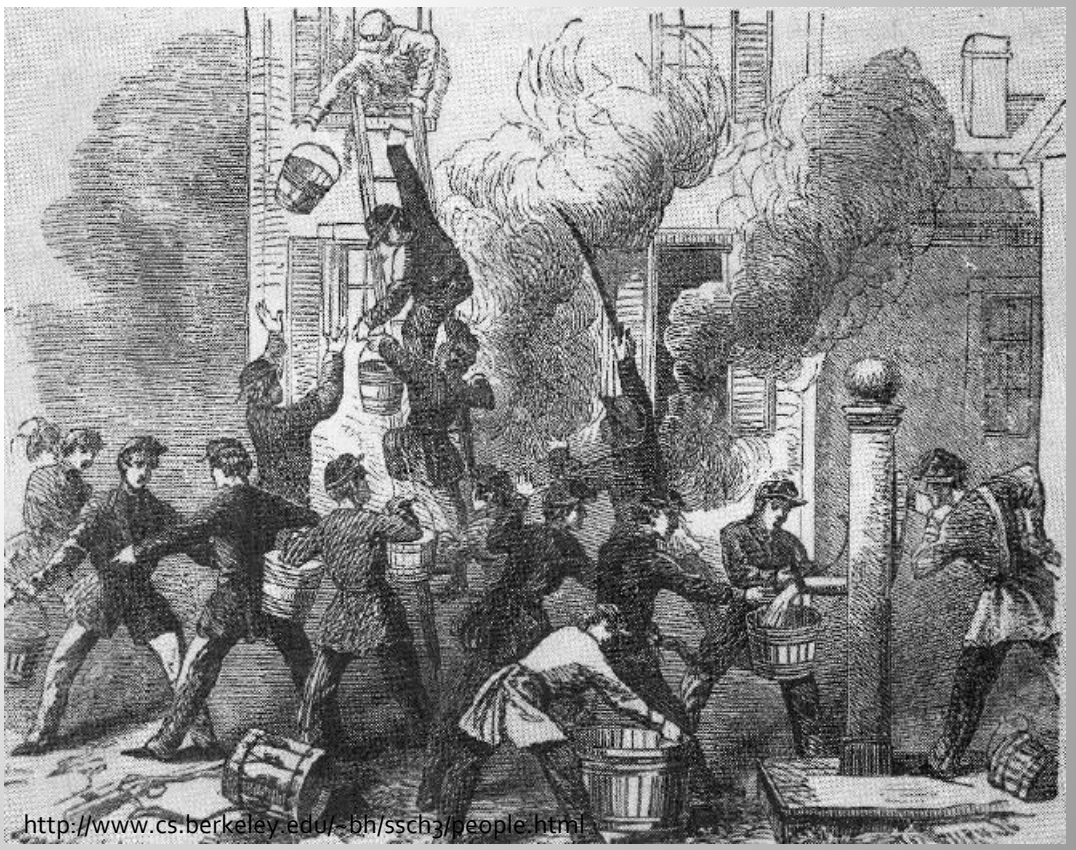
THE UNIVERSITY OF ARIZONA

DRI

Collaboration to produce knowledge with greater impact

Engaged, collaborative approaches to knowledge production seem to have better outcomes than "loading dock" – the knowledge is more likely to be used by decision makers

- Decision makers understand the information better and feel a greater sense of ownership
- Information is more likely to meet their specific needs
- Information is more likely to fit organizations' decision making processes



http://www.cs.berkeley.edu/~bh/ssch3/people.html

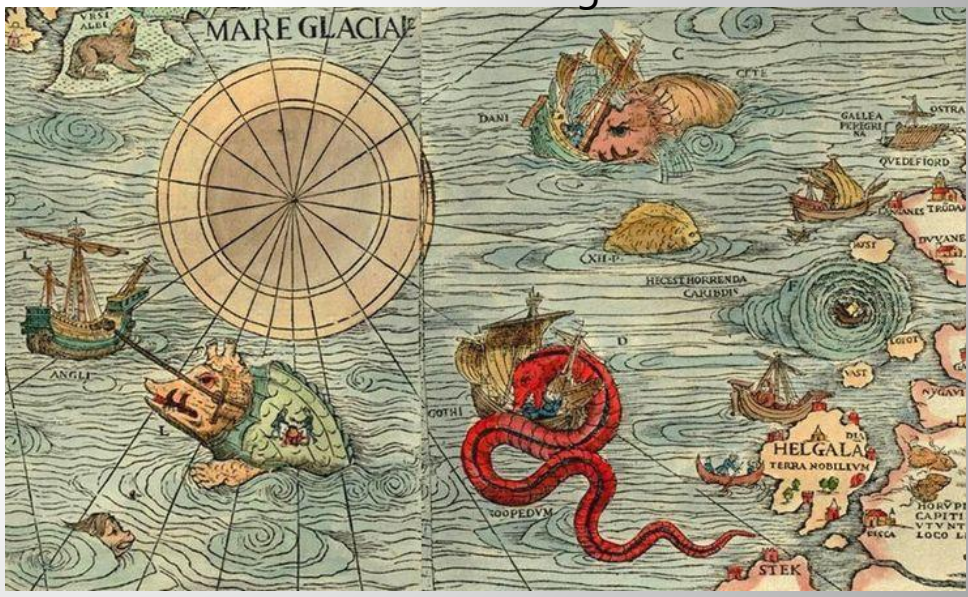
Supporting Effective Production of Actionable Science – the many questions

- How do we do this *efficiently and effectively*?
- What *actions and practices* are most helpful in establishing collaborative partnerships?
- What is the best way to incorporate both scientists' and stakeholders' *interests, needs, and perspectives* into a project?
- Which *actions and practices* most influence the development of usable (and used) science?
- How do we know whether the project *worked* and the science was *used*?

Guideposts

- Action Research (1940s)
- Collaborative Research
- Community Based Research
- Diffusion of Innovations Theory (1962)
- Program Evaluation (1960s)
- Information Science
- Coproduction of Knowledge (1998)

There Be Dragons!

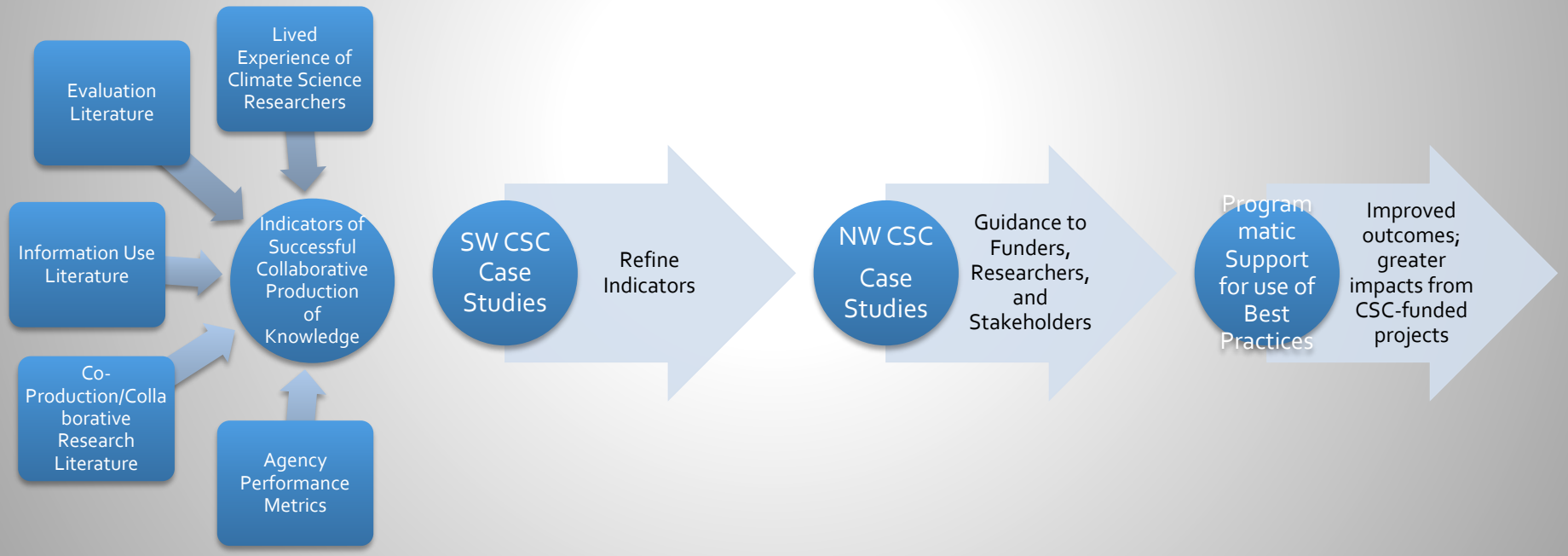


Evaluating Collaboratively Produced Actionable Science

An evaluation framework for "actionable" climate science research projects.

- What process factors most influence the outcome of usable science?
- What outputs, outcomes, and impacts do we observe in these projects and how were they achieved?
- How does context – and factors outside the control of the researchers and end-users – affect project processes, outcomes, and impacts?

Building the Framework



Sample Indicators

CATEGORY	INDICATOR
INPUTS	Necessary disciplines to answer the research question are included on research team. (I.1.)
	Proposal includes a clear plan for collaboration between agency representatives and research team. (I.7.)
PROCESS	Timing – when did agency representative enter the research process? (P.1.)
	Participants perceive that they had equitable opportunities to participate in the project. (P.3.)
	Both groups are satisfied with their level of engagement in the project. (P.5.)
OUTPUTS	Number of peer-reviewed articles. (OP.1.)
OUTCOMES	End-users perceive the science as credible (OC.2.)
	End-users perceive the science as salient to their problem (OC.4.)
IMPACTS	Findings from study are explicitly used in agency planning, resource allocation, or policy decision. (IM.9)

A few lessons (so far) about co-production (from SW CSC cases)

"We needed to be brought in sooner . . . If we'd been included as more of a real collaborator . . ."

"I appreciate that ____ is unique in a researcher in that he is looking at how this will effect decision making and a lot of researchers don't take that step . . . it's just a lot more beneficial if that's part of their thought process; as they're putting a plan together of what they want to do they're kind of looking ahead to how could this be applicable."

Co-designing projects is challenging because of the way most projects are funded.

It is also a *paradigm shift* for many people.

Lessons (so far)

Collaborative research is a *skill*.

Natural and physical scientists aren't necessarily trained to do the things they are being asked to do.

Lessons (so far)

- Time frame to see *impacts* may be longer than we think

Conceptual Use	Justification Use	Instrumental Use
Decision maker perceives herself to be better informed about the issue or has change his opinion about the issue; may share information with others.	Information is used to justify a decision that may have already been made.	Decision maker perceives a use for the information and it has contributed to a decision.

Based on Oh (1996) *Linking Social Science Information to Policy-Making*

Lessons (so far)

Impacts might be different from what we expect

- Within one project, we saw two different types of "use"
- One group of resource managers was ready to directly apply the information. They were prepared and had an opportunity.
- Another group of stakeholders used their findings to spur proposal development. That's not a direct application of the science to decision making, but it is an important use of the information.

Project Outputs

- Meadow, Alison M., Daniel B. Ferguson, Zack Guido, Alexandra Horangic, Gigi Owen, and Tamara Wall. 2015. Moving toward the Deliberate Coproduction of Climate Science Knowledge. *Weather, Climate, and Society* 7 (2):179-191.

- Brugger, Julie, Alison Meadow, and Alexandra Horangic. 2015. Lessons from First Generation Climate Science Integrators. *Bulletin of the American Meteorological Society*.

- Wall, Tamara, Alison Meadow, and Alexandra Horangic. in press. Developing Evaluation Indicators to Improve the Process of Co-producing Usable Climate Science. *Weather, Climate, and Society*.

- Horangic, Alexandra, Alison M. Meadow, and Tamara Wall (in prep). *Defining Credibility, Saliency, and Legitimacy in Resource Management-Focused Collaborative Research.*

Questions?

THANK YOU!

Alison Meadow
Center for Climate Adaptation Science and Solutions
University of Arizona
meadow@email.arizona.edu

Tamara Wall
Desert Research Institute
Tamara.Wall@dri.edu