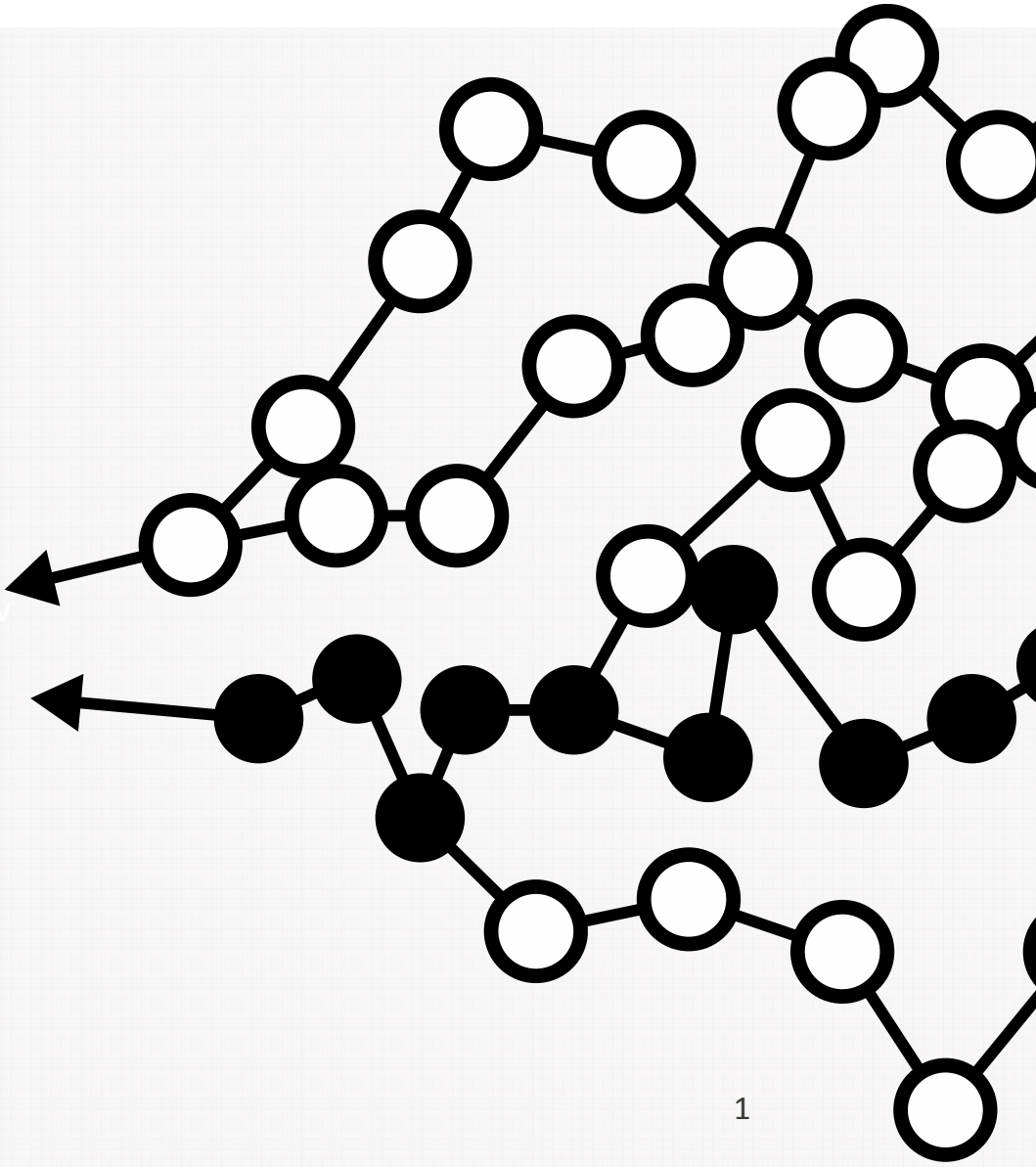
SW CSC Repeat Workshop Report

Mapping the Future of the SW CSC

Sept 15-16, 2015



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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY (1 of 6)

- The purpose of the two workshops (April & September) was to gather stakeholder input on the most valuable roles the SW CSC could play in enabling science-based climate change adaptation in the Southwest.
- The outcomes of the April and September workshops were largely similar. (The endstates and events for September were updated based on feedback from the April workshop and from additional interviews with attendees at the second workshop.)
- It became apparent that there is not a shared definition of knowledge co-production. The attendees agreed that the purposes of co-production are to (1) produce actionable science and (2) assist RMs (Resource Managers) in navigating and synthesizing existing science.
- The classic co-production approach demands a lot of time from both the PI and the RM and it is not always necessary. There are less time consuming approaches that can serve the same purposes.
- Convening has multiple dimensions of value. It can draw out information from RMs. RMs can learn from one another's experiences. Science translators (aka climate science navigators) and scientists can build personal relationships with RMs. Convening is part of this relationship building.
- The CSC is responsible for the convening and visioning work necessary to establish a science agenda, and also determining the most effective way to address science needs. Knowledge transfer is key– how to get scientific knowledge to be understood and actionable by science translator/navigator who will be likely point of contact for the RM.

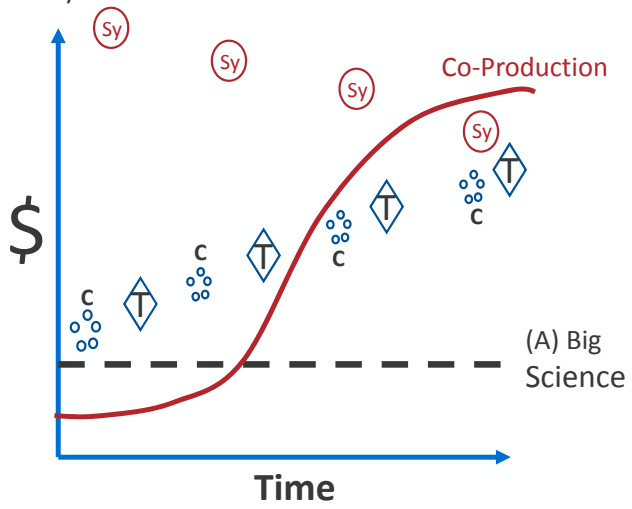
EXECUTIVE SUMMARY (2 of 6)

- The CSC needs a better way to incorporate experience of various advisory groups. Scenarios are one method for this as the discussions move to the "what" in addition to the "how" of CSC operations. While labor intensive, 1:1 interview time prior to any meetings is the route to higher value, facilitated, face-to-face meetings of any format.
- The endstate synthesis diagrams from the September workshop were not radically different from April group. Nobody is suggesting there is no big science, it's a question of mix. Almost everyone sees value in science translators / navigators and some level of convening.
- Most participants see the crisis du jour situation as inevitable. An on-staff climate navigator could aid by rapidly synthesizing existing science; another alternative is to turn to private sector firms attuned to quick response (perhaps pre-qualified to speed their dispatch).
- This group strongly endorsed the need for and role of LCCs. If the LCCs were de-funded, it would be a big problem for the CSC.
- There's a feedback loop between scientists and subset of RMs that's important. Personal relationships between PIs, RMs, tribes, have a lot of value for all parties, but they're rare and need nurturing. These relations cannot be invoked by command; they take time to develop. Convening events need to allow time to get together and know each other.

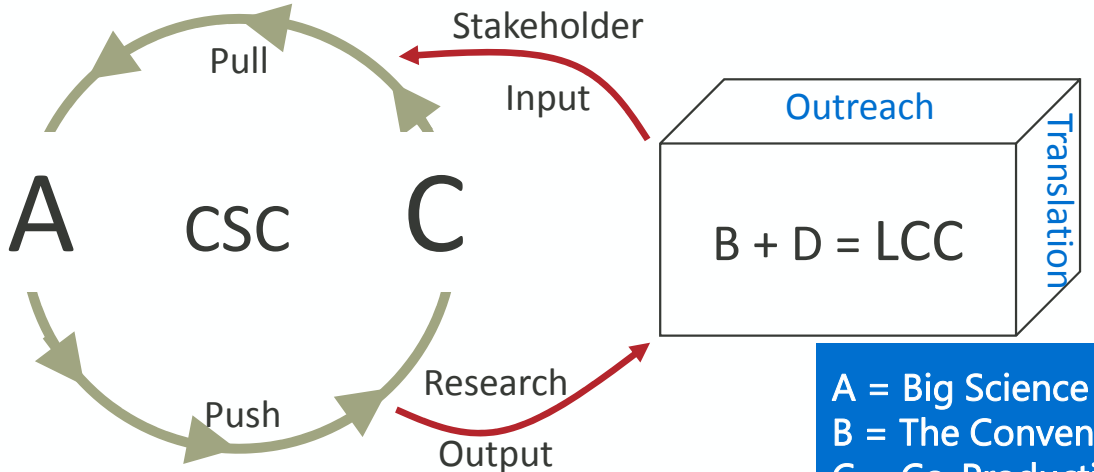
EXECUTIVE SUMMARY (3 of 6)

The endstate synthesis diagrams from the September workshop were not radically different from the April group. Nobody is suggesting that there is no big science, but rather it's a question of mix. Almost everyone sees value in science translators / navigators and some level of convening.

One team's endstate synthesis shows high initial efforts to synthesize (Sy) science, and increasingly convene (c) and translate (T) to make science outputs relevant over time. "Big Science" is a steady baseline.



Another endstate synthesis shows the relationship between the CSC, which is more responsible for science (A and C) and whereas the LCC takes the role of the convener / translator (B and D). The roles are complementary. Both are needed.



A = Big Science
B = The Convener
C = Co-Production
D = Climate Navigator
E = Crisis Response

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More detail on endstate syntheses on pages 36-43

EXECUTIVE SUMMARY (4 of 6)

During the synthesis task, teams were asked to select (or create) events critical to the success of the SW CSC. These emphasize themes heard throughout the workshop: the importance of the LCCs, the need to build broad partnerships, the importance of actionable science, and the need to share successes and case studies.

CRITICAL EVENTS SELECTED:

- **23:** CSCs pull together all LCCs in region (selected by 4 teams)
- **38:** Universities increasingly incentivize applied research, field impact, and stakeholder engagement
- **49:** CSCs develop cadre of science translators to facilitate discussion between scientists and practitioners (selected by 5 teams)
- **50:** CSC drought project hugely successful in eyes of resource managers
- **58:** Congress eliminates LCCs (must not happen)
- **69:** BLM, Forest Service, BoR, Tribes become active partners with SW CSC
- **74:** SW CSC holds annual climate workshops for stakeholders (selected by 2 teams)
- **93:** CSC network sponsors regional workshops on co-production techniques
- **(New):** SW CSC produces case studies and good stories to share with others

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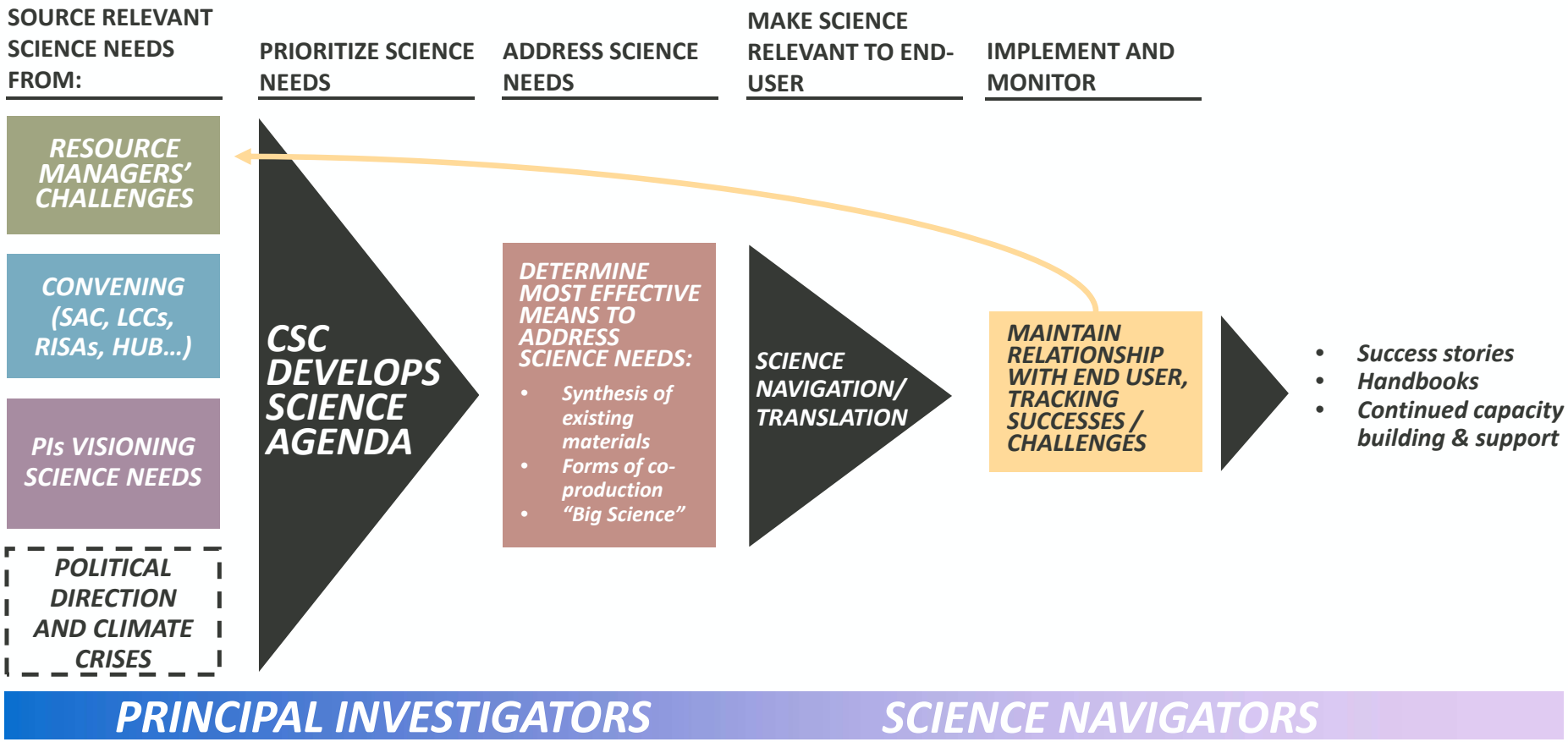
PROPOSED CSC "ACTIONABLE SCIENCE" PROCESS (5 of 6)



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DIFFERENT TYPES OF CO-PRODUCTION? (6 of 6)

HEAVY

The RM and the scientist together define the problem and the plan for the science work. They execute the plan together (e.g. instrumentation and data collection). They review the results and discuss implications together. The work together to develop products (decision tools, models, visualizations, reports) that can and will be used by RMs. They may even publish a co-authored paper together. This takes a lot of time and resources from both parties.

MID-RANGE

The RM and the scientist together define the problem and the approach. The scientist does the work, bringing occasional clarifying questions to the RM. The RM reviews the results before publication, and does not wait for publication to take action.

LIGHT WEIGHT

The RM brings a problem to the scientist, asking for guidance to find and properly use existing science to address the problem. Similar to the climate science navigator idea.

OUR TAKE

- To our ears, each of these seem reasonable and appropriate. They may apply to different situations.
- Sorting out which level is best for different problems is a key CSC role. Picking correctly avoids inappropriate expectations for either party.
- There is no single widely held definition of co-production. Use of the term can cause people to mis-communicate.
- It is not important to adopt a single definition. It is important for the parties to be clear at the outset which of these defines the optimal co-production approach for the task at hand.

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PROJECT OVERVIEW

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PROJECT OVERVIEW, September Workshop

Topic: What is the strategy of the SW Climate Science Center over the next 5 years?

*BY THE NUMBERS**

- ***31 + 34*** participants
- ***76*** expert interviews
- ***5*** endstates
- ***111*** events
- ***2*** two-day workshops

OVERVIEW

Sponsored by the USGS Southwest Climate Science Center (SW CSC), Anthros Consulting ran two Future Mapping workshops (April 2015, Tuscon & September 2015, Sacramento) using essentially the same material. This document summarizes the result of the 2nd workshop.

A diverse group of representatives from USGS, other Department of the Interior and federal agencies, NGOs, and universities discussed and debated the future of the SW CSC over the next five years. It was a workshop to explore strategic issues and choices, not a decision making meeting. Although the topic was explicitly about the SW CSC, the discussions ranged wider and addressed the issues faced by all the participants in developing science-informed resource decisions in the Southwest region.

*Includes April and September workshops

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FUTURE MAPPING PROCESS OVERVIEW

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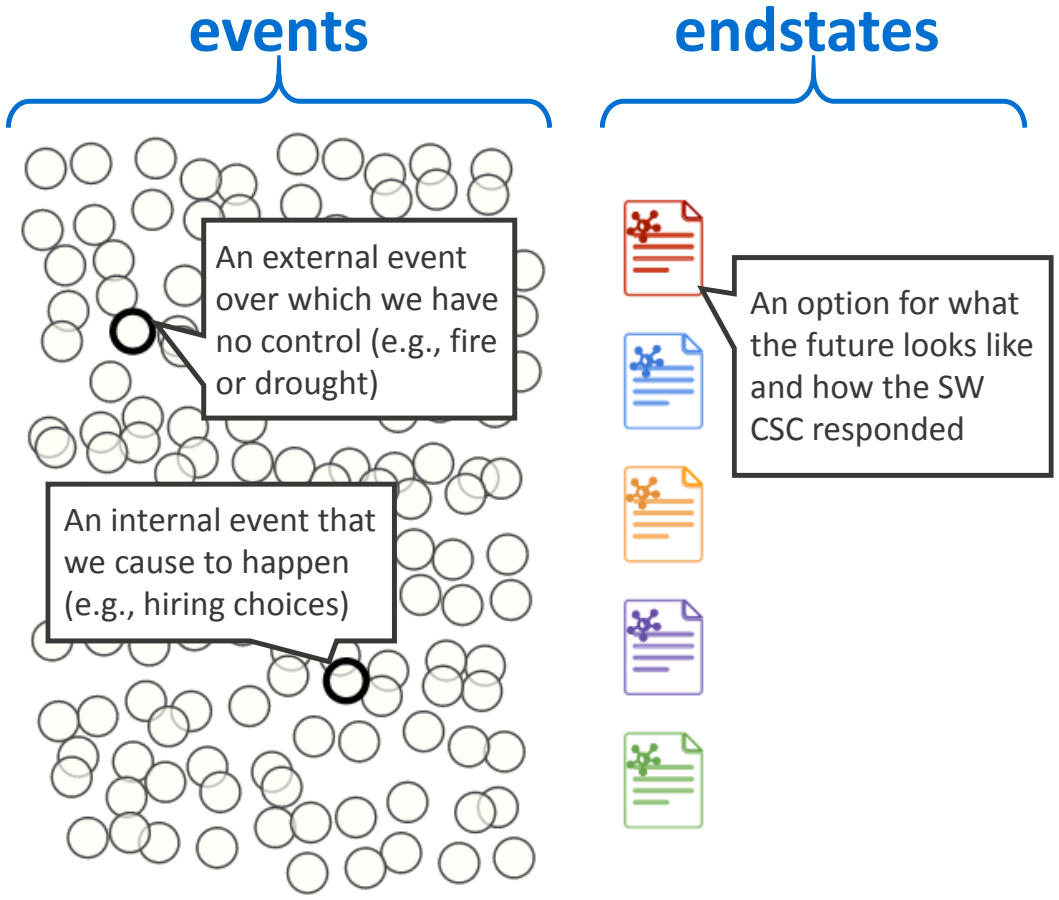
HOW DOES FUTURE MAPPING WORK?

Scenarios for Future Mapping are made of endstates and events



About Future Mapping
Future Mapping is a special type of scenario planning that enables participants to interact with the future in a highly prepared meeting format. These materials were created through in-depth research and **seventy-six interviews across SW CSC stakeholders**.

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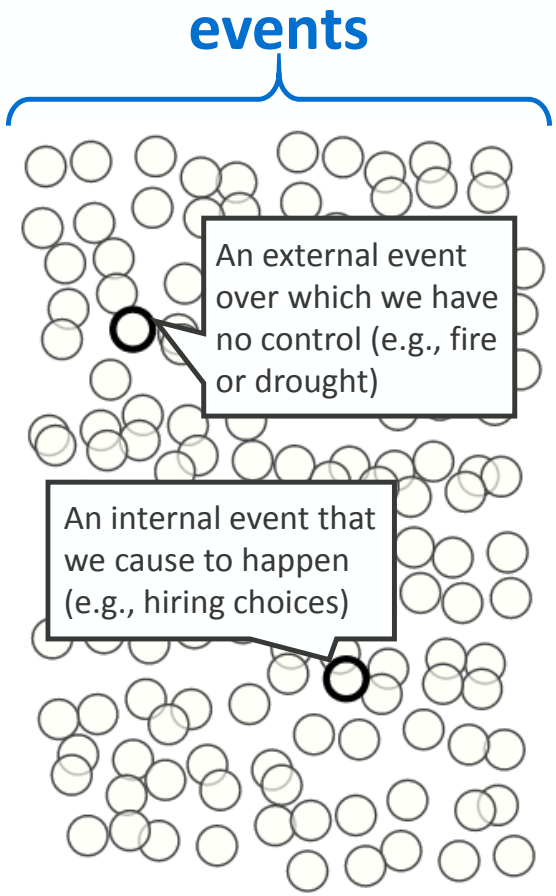
HOW DOES FUTURE MAPPING WORK?

Scenarios for Future Mapping are made of endstates and events



FUTURE MAPPING 'EVENT' ACTIVITIES:

Voting on likelihood: For "external events", every participant voted on whether the event is highly likely, highly unlikely, or truly uncertain.

- High level results are on p. 44-47 and in-depth results are in the appendix

Assessing criticality: Each team reviewed events that 'help' or 'hurt' their endstate's likelihood of coming to be.

- High level results are on p. 48-51 and in-depth results are in the appendix

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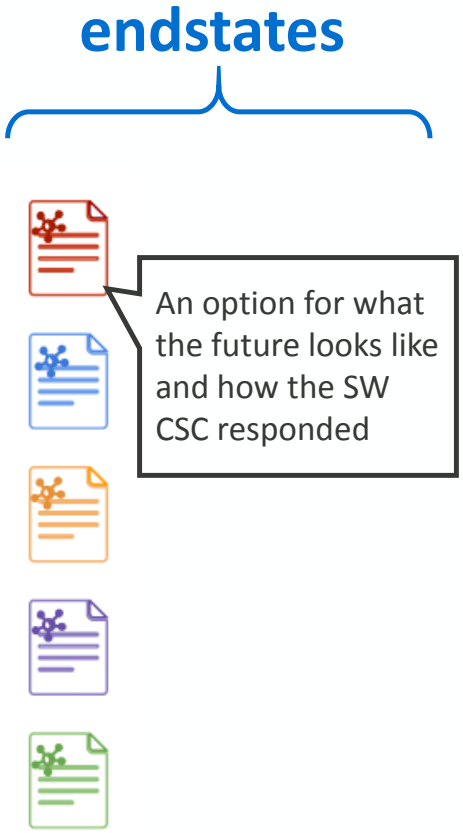
HOW DOES FUTURE MAPPING WORK?

Scenarios for Future Mapping are made of endstates and events



FUTURE MAPPING 'ENDSTATE' ACTIVITIES:

Voting on desirability/attainability: Before the workshop and after the endstate defenses, each participant voted on the relative likelihood and desirability of the five endstates

- High level results are on p. 19-20 and in-depth results are in the appendix

Defending endstate: Each team was tasked with an endstate and crafting a 15-minute presentation defending why their endstate is attainable and desirable

- High level results are on p. 21-35 and in-depth results are in the appendix

Combining endstates: Teams were split and tasked to combine endstates to create synthetic views of the ideal future of the CSC

- High level results are on p. 36-43 and in-depth results are in the appendix

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HOW WERE THESE MATERIALS CREATED?

INTERVIEWS

Anthros Consulting interviewed 60 different stakeholders)

Feb 2014 - Mar 2015

ENDSTATE CREATION

Anthros Consulting & SW CSC leadership assembled 5 endstates based on ~100 "endstate elements" (big, standalone ideas from interviews)

April 2015

EVENT SELECTION

Anthros Consulting & SW CSC leadership selected ~110 relevant events out of ~200+ generated from interviews and research

April 2015

1st SW CSC WORKSHOP

Held in Tuscon, Arizona

April 14-15

INTERVIEWS

Anthros Consulting interviewed 12 additional stakeholders

June-Aug 2015

ENDSTATE REVISION

Anthros Consulting & Steve Jackson made edits to endstates based on first workshop feedback and new interviews

Aug 2015

EVENT SELECTION

Anthros Consulting & Steve Jackson made edits to events and adding/ deleting based on interviews and feedback, resulting in ~110 events

Aug 2015

2nd SW CSC WORKSHOP

Held in Tuscon, Arizona

April 14-15

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SW CSC WORKSHOP REPORT

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STRUCTURE OF THIS REPORT

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THE FIVE ENDSTATES FOR THE SW CSC

Endstates formed the basis of debate about goals and aspirations of the SW CSC. Each was assigned to a team of 6-7 people who defended it and 'mapped' how it came to be from 2015-2020 using a set of events.

A: Big Science

The SW CSC puts most of its energy into funding, managing and coordinating major research projects guided by the needs of resource managers but not overly constrained by them.

B: The Convener

The SW CSC has become known as the convener of physical scientists, ecologists, LCCs, RISAs, Climate Hubs, NGOs, local, state and Federal governments, tribes and Mexico, and everyone else needed to attack wicked climate adaptation problems that inherently cross organizational boundaries.

C: Co-Production

The SW CSC stakes out knowledge co-production as its focus area. It develops best practices for connecting practitioners and researchers, for integrating climate science into resource decision making, and for evaluating the effectiveness of both research and resource management decisions.

D: Climate Navigator

The SW CSC structures itself as an information service, the "go to" organization for climate science information. Resource managers can make requests for climate science relevant to a problem or decision they are working on, with responses delivered in a few days for many regular requests.

E: Crisis Response

The SW CSC has evolved into an agile, adaptive, learning organization. It is able to quickly and robustly respond to a growing number of climate-driven crises and accelerating ecosystem changes in the region—another snowpack failure in the Sierras, a powerful El Niño event, failing monsoons, a massive trout die-off in Colorado trout, etc. There are new needs all the time.

These are summaries of endstates; full endstate text can be found in the appendix.

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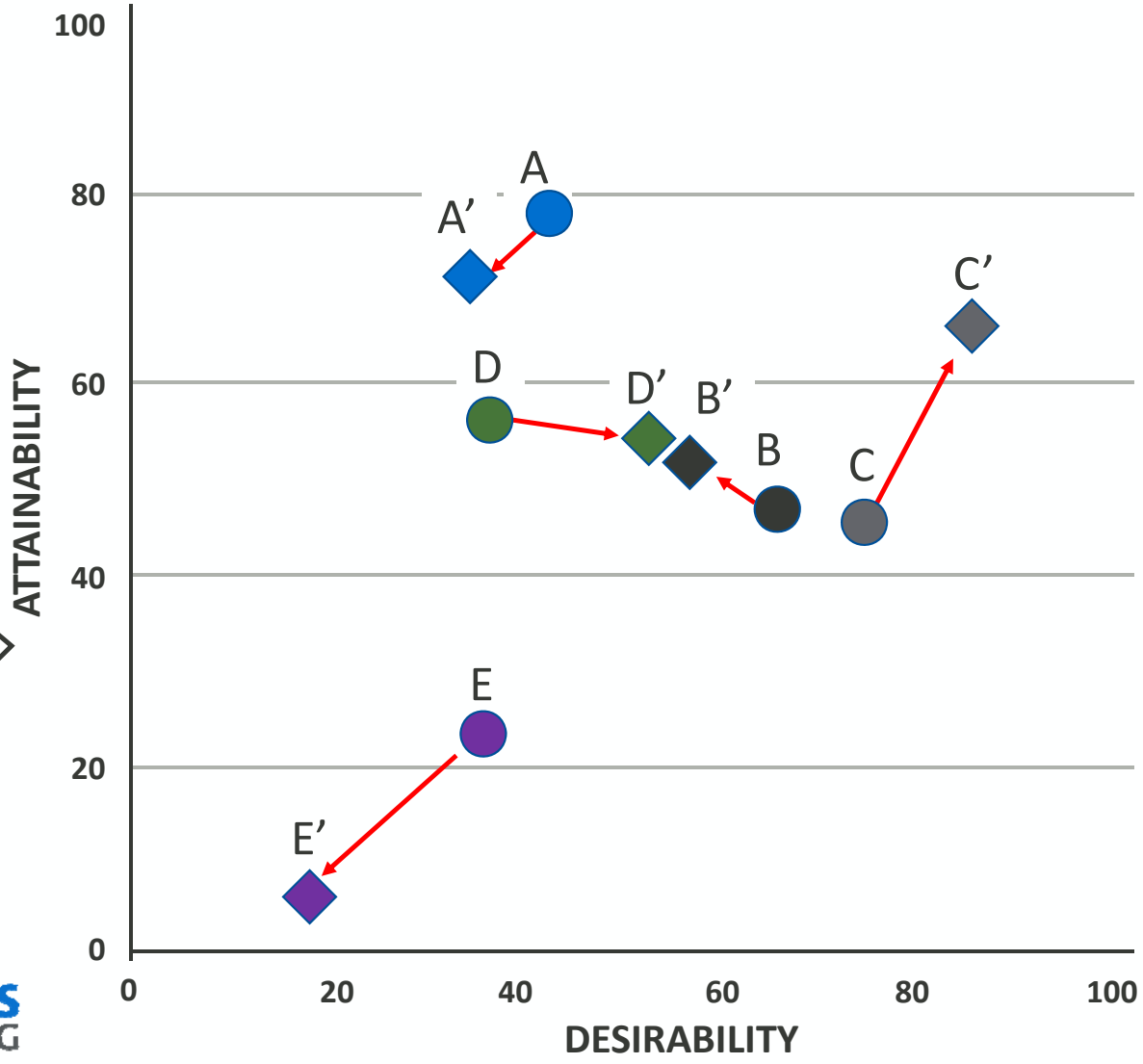
ENDSTATE RANKINGS- BEFORE & AFTER



ABCDE = before ○

A'B'C'D'E' = after ◇

A = Big Science
B = The Convener
C = Co-Production
D = Climate Navigator
E = Crisis Response

Before and after the September workshop, participants ranked endstates for desirability and attainability. These are their results. (100 = everybody agrees that an endstate is the most desirable/attainable. 0 = everybody agrees that an endstate is the least desirable/attainable.)

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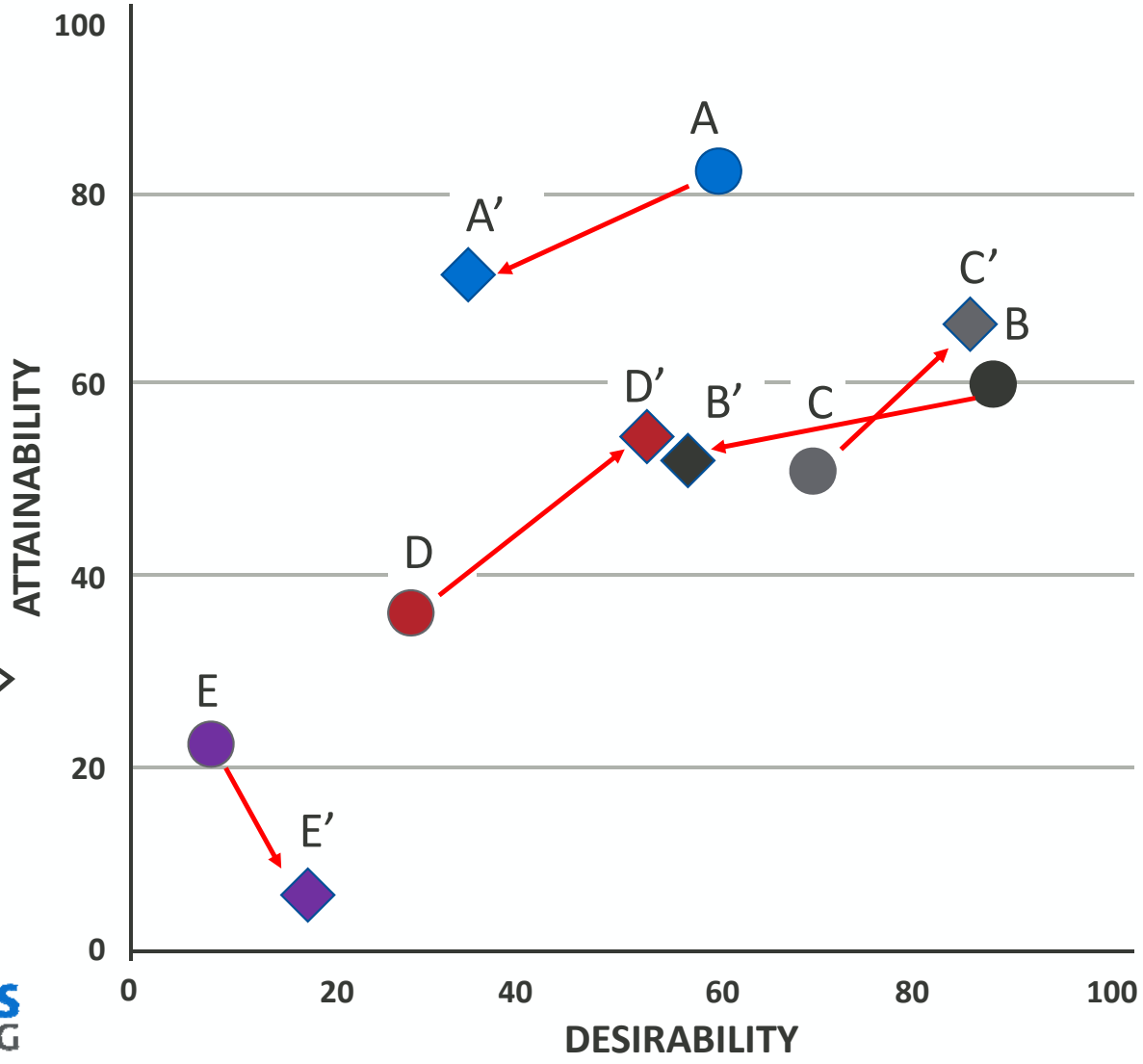
FINAL ENDSTATE RANKINGS- APRIL VERSUS SEPTEMBER



ABCDE = April ◯

A'B'C'D'E' = Sept ◇

A = Big Science
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Participants ranked endstates for desirability and attainability. These are their results. (100 = everybody agrees that an endstate is the most desirable/attainable. 0 = everybody agrees that an endstate is the least desirable/attainable.)

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Endstate A: "Big Science" Overview

ENDSTATE SUMMARY

The SW CSC puts most of its energy into funding, managing, and coordinating major research projects guided by the needs of resource managers but not overly constrained by them.

TEAM MEMBERS: Debra Schlafmann, Janet Cushing, Tom Kimball, Aparna Bamzai, Christine Schirmer, Alexander Gershunov, Mark Sogge

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Endstate A: "Big Science"

PRESENTATION DETAIL

Scene: News radio show set in 2020, celebrating the successes of SW CSC.

Causes: Many crises, scientists distracted doing small projects – couldn't tackle the complex climate issues of the region

Actions:

- **Strategic, collaborative science:** Pulled together PIs to outline vision and strategic goals, which were then communicated to LCCs and partners. Collaborated across disciplines (e.g., hydrologists, geologists, meteorologists) to tackle long-term, multidisciplinary regional problems. Published in top journals.
- **LCC partnership:** Clarified roles, where CSC focuses on science, LCCs translate to resource managers. LCCs convey science needs from relationships with Resource Managers (and from vulnerability assessments)

Q&A SUMMARY

Q: How did you keep science actionable and relevant to stakeholders?

A: "North Korean" model of strong, visionary leader who splits up larger problems to groups of visionary co-PIs. Held joint strategy sessions with CSCs and LCCs, as well as a venue for cross-disciplinary collaboration for involved scientists.

Q: How did you get message through from LCCs to Resource Managers?

A: LCCs put money into convening people instead of into projects, and intensified translation before and after science. People didn't like working directly with CSCs. CSCs did 'train the trainer' sessions with LCCs.

Q: How did LCC funding cuts impact CSCs?

A: Discovered codependence. Climate crises increased science funding, so CSCs could help fund LCCs. Having clear, distinct roles from CSCs helped LCCs justify funding needs.

Q: Are CSCs restricting LCCs from having top choices for scientists?

A: CSCs have proven to be only consortium that can address big regional problems. Could cut CSC funding if wanted to only address small local problems. LCCs cannot address big issues due to political pressure to address the local issues.

Q: How were you able to make science that was both 'big journal-ready' and locally-relevant?

A: Joint strategy sessions with LCCs assisted, and LCCs translated the outputs to make them usable.

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Endstate A: "Big Science"

How did you really feel about this endstate?
Anonymized feedback from Team A

> **Most of us struggled to defend this model** when we got down into the details.

> **There needs to be a stronger coupling with the stakeholder community.** It's tough to throw away things about co-production.
>
> As a scientist, I enjoy doing the actionable science and dealing with stakeholders, learning what their important issues are.

> **I like the clarified roles between CSCs and LCCs that this model presents.** More narrow, distinct roles will help us defend ourselves in the face of OMB and Congress.
>
> But, this also makes us **rely on every piece of the puzzle fitting together.**

> The model seems to be unstable, **depending on appropriate funding and the different pieces working together.**
>
> You need a **strategic and visionary CSC leader**. Otherwise, scientists could get away with doing locally irrelevant science.

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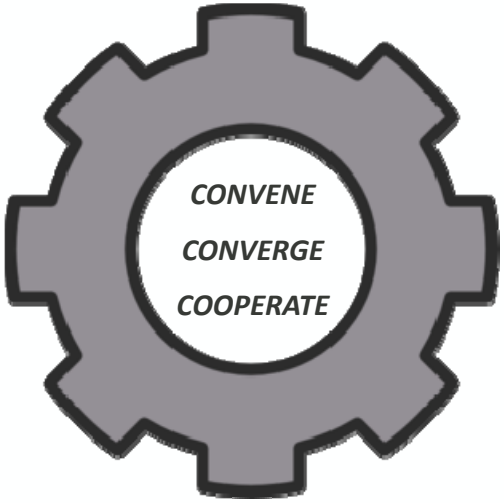
Endstate B: "The Convener" Overview

ENDSTATE SUMMARY

The SW CSC has become known as the convener of physical scientists, ecologists, LCCs, RISAs, Climate Hubs, NGOs, local, state and federal governments, tribes and Mexico, and everyone else needed to attack wicked climate adaptation problems that inherently cross organizational boundaries.



TEAM MEMBERS: Tonnie Cummings, Mike Chotkowski, Theresa Krause, Kenneth Nowak, Ryan Boyles, Koren Nydick

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Endstate B: "The Convener"

PRESENTATION DETAIL

Scene: Steve Jackson and young relative, flashbacks.

Causes: Partners were doing great science but wasn't enough. One climate event after another, and nobody was listening to university research.

Actions:

- **Gaps assessment:** Determined what was missing in SW science world, including rethinking conservation strategy and social science (economics) to quantify science priorities.
- **Partnering across agencies:** Loosening of funding restrictions, etc. enabled CSC to bring together different partners in person and online to identify priorities.
- **Training:** Held sessions to bring together researchers, decision-makers in government, practitioners to understand climate science and the available / needed tools to address their problems.

Q&A SUMMARY

Q: How much funding was left for science, with how much time is spent on convening / training?

A: On the order of 33%+ for convening/training. The regional 'big science' needs in the SW are already being funded by other mechanisms. What's unique about the CSC is focusing on the issues that tie in to local issues.

Q: How do the LCCs fit into this model?

A: The convening moved upstream (from LCCs to CSCs). CSCs convened across LCCs and agencies, across geographies, specifically on climate issues. LCCs convene locally and on issues beyond just climate.

Q: With both LCCs and CSCs convening, when do people have time for other stuff? Meeting fatigue?

A: We tended to convene different groups, where LCCs convened on local issues and CSCs convene on thematic issues across larger landscapes. We lowered the burden of participation, going to people instead of having them come to us. Also, agencies decided that collaboration was a fundamental need, not an afterthought. Communication became part of the culture.

Q: If you work above the level of the LCCs, how does this translate to people on the ground?

A: We can't convene working level partnerships everywhere, and instead bring support to those that ask for assistance. We've developed best practices at both levels, for detailed partnerships and for more general convenings.

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Endstate B: "The Convener"

How did you really feel about this endstate?
Anonymized feedback from Team B

> **This has a lot of potential**, particularly being powerful in bringing together diverse groups of stakeholders / researchers with common interests and common goals.

> **We are threading the needle between doing relevant science and not pushing towards a specific management decision.** The biggest pitfall is the risk in the grey area this endstate occupies, between doing science and developing policy. We need to preserve that line to preserve the credibility of science.

> Two important issues are ensuring **limited overlap between LCC and CSC roles** and dealing with current **bureaucracy in terms of travel restrictions**.

> This model **requires a paradigm shift that is unlikely to happen, which is having all agencies join and sign on**. Building trust, which is needed for this endstate, does not happen overnight. If you go too fast, you won't bring people along.

> **The desirability of this model is high, but it's difficult to attain.** The goal is coproduction across each land management unit. It's tough, the idea of doing science across so many units and agencies and effectively applying it.

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Endstate C: "Co-Production" Overview

ENDSTATE SUMMARY

The SW CSC stakes out knowledge co-production as its focus area. It develops best practices for connecting practitioners and researchers, for integrating climate science into resource decision making, and for evaluating the effectiveness of both research and resource management decisions.

SW CSC
Collaborate
Co-produce
Catalyze
Solutions for our future

TEAM MEMBERS: Ellie Cohen, Glen MacDonald, Deanna Dulen, Sarah Sawyer, Linda Mazzu, David Behar, Matt Williamson

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Endstate C: "Co-Production"

PRESENTATION DETAIL

Scene: 2020 Congressional hearing, thanking for 22% funding increase.

Causes: Needed to reach broader stakeholder base and make science relevant to practitioners.

Actions:

- **Network building:** Incentivized scientists to work with resource managers, developing coproduction networks. It's no longer a "publish or perish" world, more a "show you're making a difference" world.
- **New way of working:** Help resource managers with their problems, whether synthesized from available research or by generating new research. We've hired science translators and social scientists, held workshops/trainings for scientists to communicate better.
- **Capitalizing on success:** We advertised success stories, so managers flocked to sessions and additional partners wanted to join. Feedback loops of increased support. #coproductionrules

Q&A SUMMARY

Q: What are you now doing for people on the ground?

A: People on the ground provide the best testimony for what we've done. The relationship we've cultivated has been through the provision of science that is relevant to their needs.

Q: How do the LCCs fit into this model?

A: CSCs are focused on science production, while LCCs are focused on stakeholder communication.

Q: Why should we keep your funding so high with other agencies clamoring for more money?

A: We are well funded because of the strong network we've built (local government and recruiting funding beyond what Congress provides). We're the best fit to get science applied on the ground, which is especially important in places like California through this long drought.

Q: Why have you produced fewer publications than other organizations with similar funding?

A: We used to produce peer-reviewed literature. The CSC now works as a service, and sometimes we don't create new science. We take science that exists and make it applicable and valuable for people on the ground.

Q: How do you work for the 'small guy'?

A: Through LCC partnerships, we hear the 'small guy'. We can't partner with everyone, but we are able to work directly with some farmers and in other cases use LCCs to apply messages to smaller, more diverse groups.

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Endstate C: "Co-Production"

How did you really feel about this endstate?
Anonymized feedback from Team C

> With all the other funders providing hundreds of millions in grants for big science, what we need is to **use our tiny fraction of federal spend on services at the ground level**.

> As a scientist, I'm hoping for a **mechanism for how my research can work on the ground** and how to be informed by people on the ground for what I should research.

> As a resource manager, I'm reliant on big science, but the **best available science doesn't address problems on the ground**.

> It's currently a **'Wild West' environment for finding information to use**. Having an go-to entity is essential for ecosystem managers who don't work on this full-time.

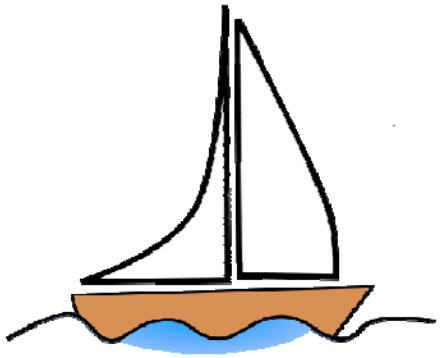
> **Coproduction priorities cannot solely be driven by resource managers' stated needs.** Rather, we need to look over the horizon and tackle issues that impact resource managers that they may not be aware they're facing.

> **Coproduction is not a one-size-fits all solution.** We need a better definition because we may be getting a buzzword allergy when dealing with this topic.

Endstate D: "Climate Navigator" Overview

ENDSTATE SUMMARY

The SW CSC structures itself as an information service, the 'go to' organization for climate science information. Resource managers can make requests for climate science relevant to a problem or decision they are working on, with responses delivered in a few days for many regular requests.



TEAM MEMBERS: Miriam Morrill, Kelly Redmond, John Andrew, Laurna Kaatz, Mary Mahaffy, Jim Thorne, Bruce Stein

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Endstate D: "Climate Navigator"

PRESENTATION DETAIL

Scene: 2020 Presidential briefing topic: Crown jewels of making America great.

Causes: Inspired by ACA "Obamacare" need to navigate options, eliminate redundancy, and save money.

Actions:

- **Redundancy elimination:** Reviewed, synthesized, and translated existing relevant science. Developed accessible narratives for communication to managers.
- **Communication:** Hired science translators, built out regional social (media) networks. Built stakeholder trust through transparent, neutral review of science and turning it into actionable output. Hired experts who are trusted, good communicators.
- **Clarified relationships:** Limited duplication between universities, CSCs, LCCs, and limited duplication of science produced. Conduct joint strategies with LCCs.

Q&A SUMMARY

Q: Why is this not a role for the private sector, like with AccuWeather?

A: The private sector is better for proprietary interests, whereas we are working across all interests (including those that can't pay for our efforts).

Q: You assume new funding. How would you execute this on a flat budget?

A: It's actually more cost effective to look through what exists than fund duplicative research efforts. Once you've done the literature review, you get over the funding 'bump' because the capacity is set. Some of the science that the CSC was doing has moved out of its portfolio.

Q: Are you still funding original research?

A: Yes. While our profile shifts to focus on synthesis, it's not an "either-or". Up front, there's a lot of translation and weeding through the chaos of science. Then, communication will be a big part. But science never goes away.

Q: There are already some organizations that do this – why CSCs?

A: This is a big playing field, and there is room for plenty in tackling this. A lot of what we know is already good enough to get us a long way to answer a lot of the questions on the ground now.

Q: Do you still need top young researchers, or do you need nameless bureaucrats?

A: We thought of synthesis as spatial – looking at GCMs and model outputs and evaluating those and providing neutral reviews. For this, you'll still need scientists who want to be at the forefront of science.

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Endstate D: "Climate Navigator"

How did you really feel about this endstate?
Anonymized feedback from Team D

> **This is an important function, but the question is the ratio.** We certainly need to do a better job of guiding to what's available and worth using, but that needs to be coupled with real additional research needs.

> LCCs will appreciate the neutral review and synthesis. And **everyone will appreciate the removal of duplication** across the chain. Through analysis you'll identify emerging gaps.

> **We get this out of a local RISA**. They synthesize info and put it into an accessible packet, which works in court documents and for climate skeptics.

> This is a key role for CSCs. **People are so busy, they don't have time to go out and look, and if they did, they wouldn't know where to start.**

> **This is less practically attainable.** We have to recognize our own context in a broader set of activities, and while we may be able to be the 'go-to' for DOI, it's unrealistic that we'd be everyone's 'go-to'.

> I can't see much in terms of a sustainable model here. **You can't get involved in a lot of things, like co-production.**

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Endstate E: "Crisis Response" Overview

ENDSTATE SUMMARY

The SW CSC has evolved into an agile, adaptive, learning organization. It is able to quickly and robustly respond to a growing number of climate driven crises and accelerating ecosystem changes in the region – another snowpack failure in the Sierras, a powerful El Nino event, failing monsoons, a massive die-off in Colorado trout, etc. There are new needs all the time.

When stuff hits the fan, call Fast Eco-Climate Action (FECA)!

TEAM MEMBERS: Brian Miller, Cliff Duke, Christine Albano, Sarah Allen, Robin O'Malley, Peter Stine, Steve Jackson

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Endstate E: "Crisis Response"

PRESENTATION DETAIL

Scene: Infomercial for FECA and congressional hearing.

Causes: One climate event after another. Need for a scientific first-responder group.

Actions:

- **Back-end planning:** Built trusted partnerships based on information provision in normal operating modes (sans crisis). Developed issue-level libraries for quick deployment in crisis times.
- **Rapid deployment:** Generated ability to convene 'smartest people in the region and best available science in a timely manner' for new emerging issues.
- **Org redesign:** No longer research organization; we have generalists, futurists and horizon scanners. We've worked out a disaster prioritization matrix and have evolved coproduction to an institutional level. Primary clients are still resource managers, and we draw from USGS and academic science community. Plan w/ LCCs.

Q&A SUMMARY

Q: It's feast or famine in the consulting world. How do you balance out which tasks you can tackle?

A: We brought in experienced project managers, who enable us to manage peak demand times and help us draw all hands on deck for crisis situation. It's built into our organizational structure, with generalists who can rapidly assess issues and draw from universities. We prepared by developing in serial fashion our crisis library.

Q: Who sets which crisis receives priority?

A: We develop a prioritization scheme with our regional partners. For example, where are we most likely to be successful? We also develop information that can be generalized, and partners come up with their own resources to leverage the generalized information we provide.

Q: Is this a permanent or an ad-hoc group?

A: It's permanent. There are a lot of crises, but in the moments when there are none we develop our library and scan the future to help managers see what could be coming their way.

Q: What happens when you respond to a crisis but there isn't the right information available?

A: We are well connected in the research community, and provide feedback to universities and research partners when the right research doesn't exist.

Q: Why not move to a fee-for-service model?

A: In a sense we already are, as many of our partners come to the table with their own funds. But this should be looked at not as an expense, but as a money-saving organization. By moving towards a proactive (or quickly responsive) model, we're helping mitigate / prevent financial wreckage for our partners for which the government would have to pay.

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Endstate E: "Crisis Response"

How did you really feel about this endstate?
Anonymized feedback from Team E

> **We could make this plausible, having some sort of scenario planning or horizon scanning early on.** Having core folks who know the institutional landscape is core, so when you bring in an internal expert there isn't much ramp-up time.

> In terms of org structure this is not attainable. Just think of budgeting.

> In order for this to have a chance of working, we'd need to build trust; **having people parachute in after crises is not the way to do it.**

> This faces the issue of getting on the crisis hamster wheel and not having the time to be strategic. **The notion that we'll have downtimes when there aren't crises is unrealistic.**

> **I do like the idea of taking what's emerging from basic science and putting ourselves in better position to anticipate the next series of crises and disasters.** Maybe it would be a FEMA-like mode where we help planners get ahead of what's to come.

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New Teams Were Asked to Produce Synthesis Diagrams

- New teams were formed that included someone from each endstate defense team
- The were asked to produce diagrams that integrated the 5 endstates.
- The diagrams follow

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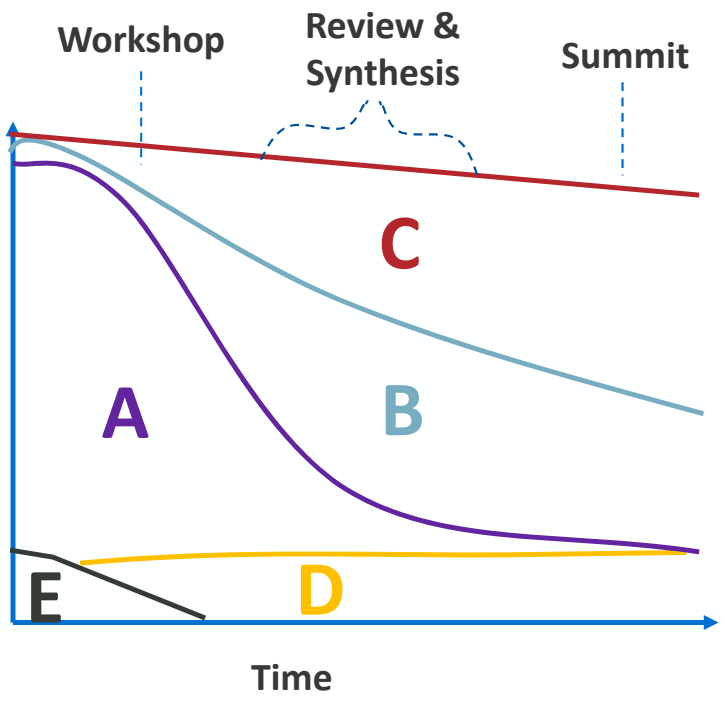
TEAM 1 SYNTHESIS



We are currently focusing on A (Big Science) and E (Crisis Response). We initially grow D (Climate Navigators), and through those we begin to play some sort of a convening role (B). Because of reviews and synthesis and convening, we can move towards a more co-production focused model.

The timescale was left intentionally vague – it depends on how quickly the CSC can ramp down from its current science projects, meaning this could be a 5-10 year timescale.

The "Big Science" questions will eventually be answered by others, as they're not the role of the CSC. Rather, we'll be moving towards stakeholder-driven knowledge.

Crisis Response (E) has gone away because we can't respond to short-term needs; we think on a longer-term timescale.

KEY EVENTS:

Workshops: As climate navigators, you begin by having workshops to play a convening role. (Similar to event # 23, CSCs pull together all LCCs in their region)

Review & Synthesis: Enables understanding of existing research, moving towards co-production role. (Similar to event #49, CSCs develop cadre of science translators)

Summit: Coordinated with LCC, getting stakeholders involved. (Similar to event #74, SW CSC hosts annual climate workshop for stakeholders)

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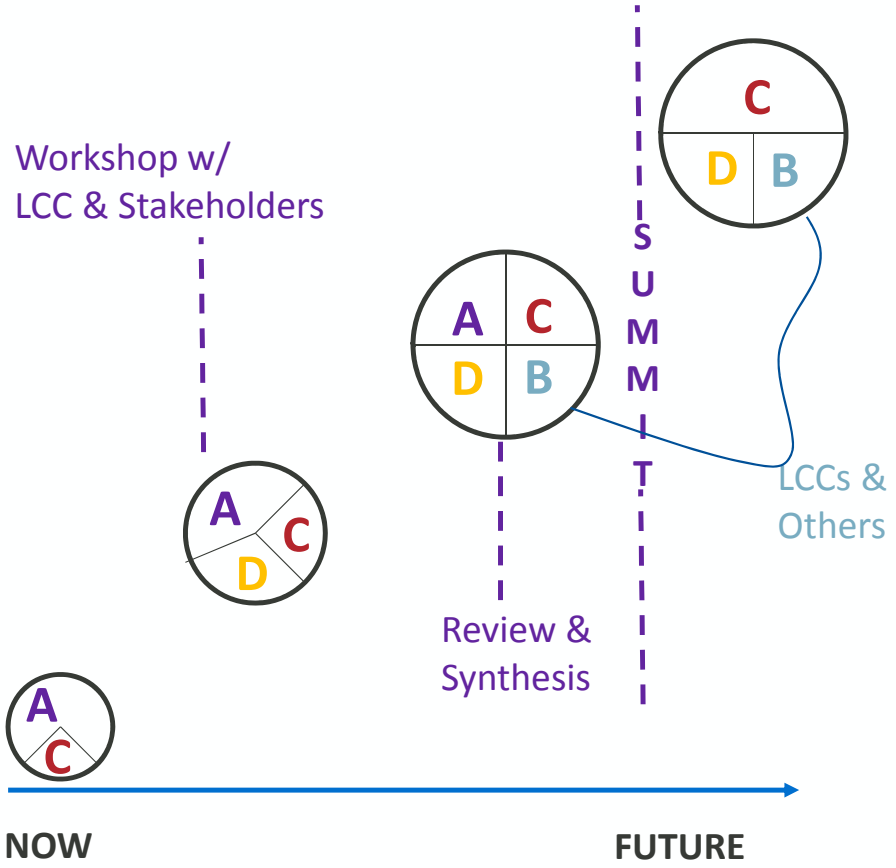
TEAM 1 SYNTHESIS (DIAGRAM 2)



This diagram conveys the same message as does Diagram 1 for Team 1.

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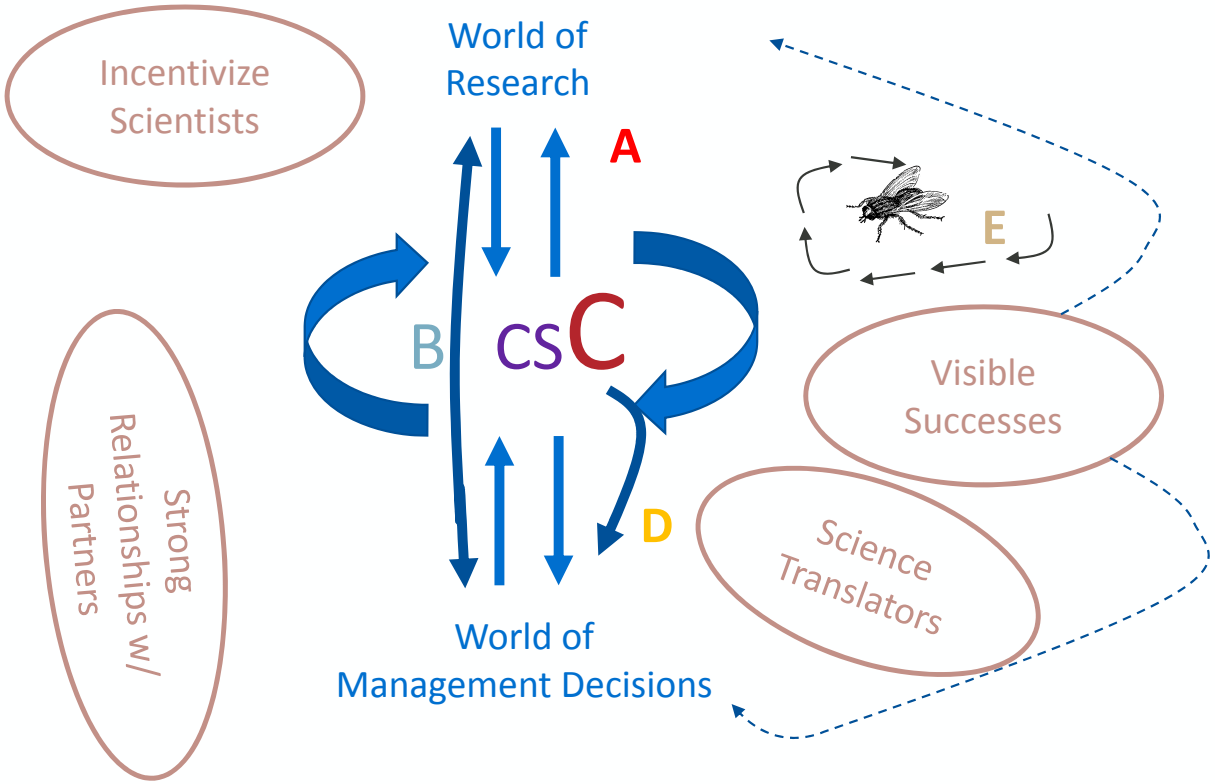
TEAM 2 SYNTHESIS



This is a relational, not temporal, diagram. There is a world of research and a world of management decisions, and the CSC is the boundary organization trying to reach/connect both.

Co-production (C) is the lion share of what we're doing currently (due to the need for stakeholder engagement) which will only increase in the future. There will still be "A" (Big Science) as our university partners will always have one foot in the world of research.

We `don't have the capacity or responsibility to be the sole convener (B) for the region. We'll be one among many LCCs and RISAs. However, we'll convene across the world of research and world of management decisions bringing research teams together with managers.

Crisis response (E) will be the horsefly that keeps us on our toes, and we can't kill it. If more resources come about, "D" could grow.

CRITICAL EVENTS:

Incentivizing scientists to engage in knowledge coproduction (Event #38)

Development of greater science translation capacity (Event #49)

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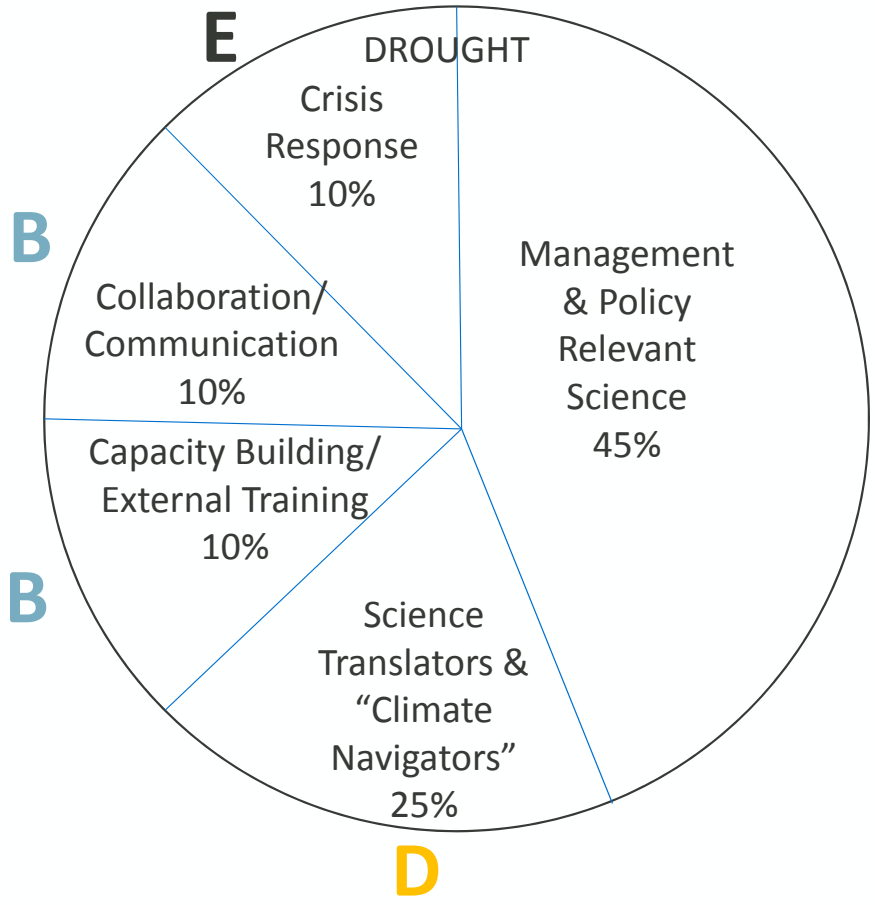
TEAM 3 SYNTHESIS



A&C

This diagram focuses on resource allocation by output and effort. In 2020, what does the allocation of effort within the CSC look like?

The largest functional area is management and policy-relevant science, which is a combination of endstates A and C. This is not called coproduction, because coproduction is a process, not an output.

About 25% of effort should go into the Navigator function (D). Something not explicitly discussed in this workshop is external capacity building and training (which we lump in with "B" and allocate 10%). An additional 10% goes in collaborating / convening. The reason this is so small is that the CSC won't be THE convener, but will convene stakeholders for some particular issues in the ecological/climate nexus.

Some emerging issues will require attention, so we allocate 10% of time (likely concentrated at certain crisis points) to crisis response.

CRITICAL EVENTS

Development of greater science translation capacity (Event #49)

CSC drought project hugely successful (Event #50)

METRICS FOR SUCCESS

- Research credibility
- Having a positive impact (influence decisions)
- Good case studies – results on the ground
- Positive political/public exposure – good stories!!!
- Evolutionary potential – adaptability
- Leverage Resources
- New knowledge generation

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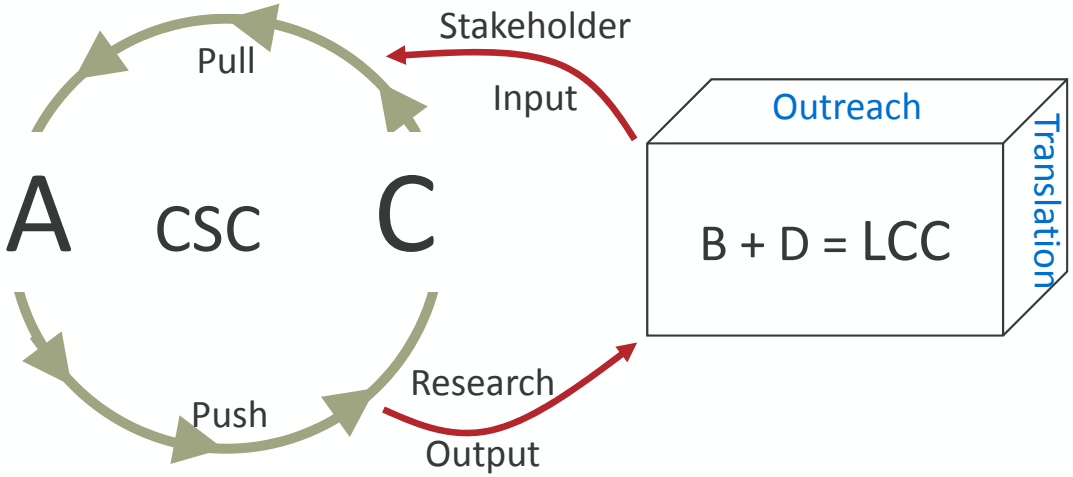
TEAM 4 SYNTHESIS



This is a relational diagram between different stakeholders.

Science is 'pushing' information out to stakeholders, who are 'pulling' via feedback and co-production requests.

Important (but not shown) is "E"; crises can guide the direction of research provision.

Translation and outreach ("B" & "D") will largely be done by LCCs, but CSCs will collaborate. We don't always have to have defined roles between LCCs and the CSC, we just have to coordinate on each problem to define problem-specific roles.

CRITICAL EVENTS:

Development of greater science translation capacity (Event #49)

Congress MUST NOT eliminate LCCs (Event #58)

CSCs pull together all LCCs in their region (Event #23)

CSC network sponsors regional workshops on co-production techniques (Event #93)

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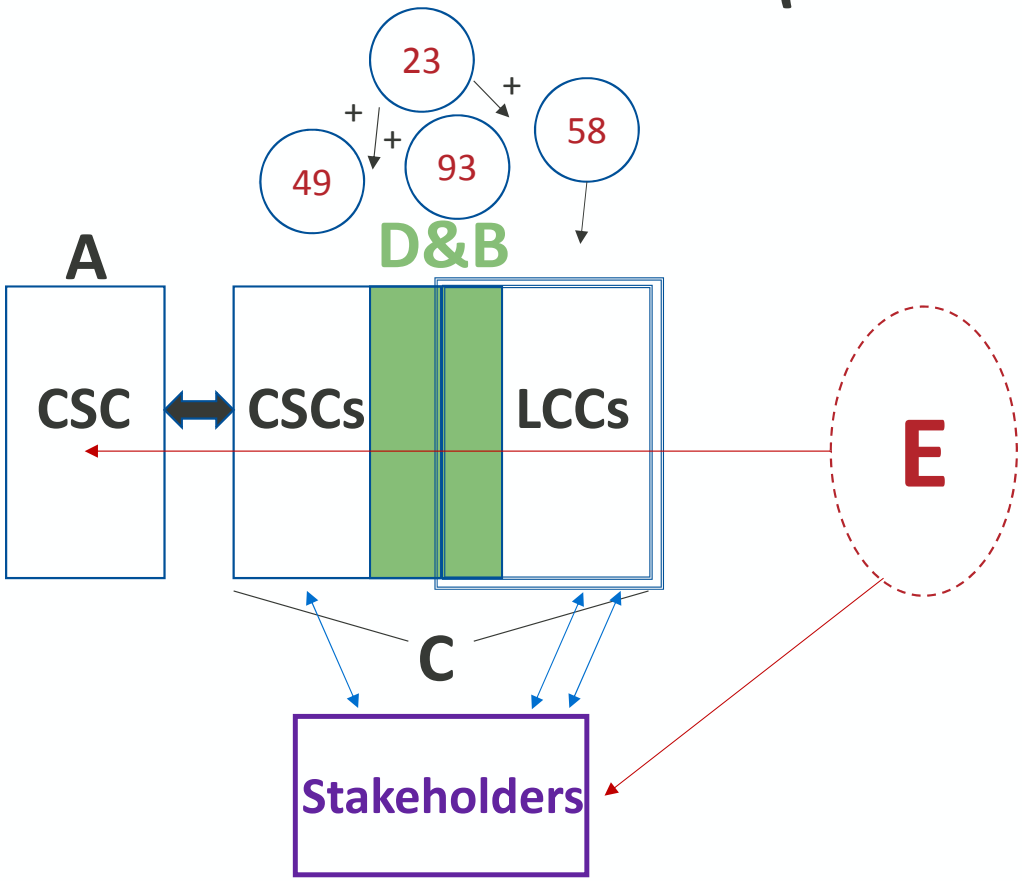
TEAM 4 SYNTHESIS (DIAGRAM 2)



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This is a diagram that shows a plausible relationship between the CSC and LCCs.

The key component is "C" (Co-production), the actionable, management-relevant science. "A" is still very important because managers don't always know what they need until they're shown it. However, we need a litmus test to make sure we're funding relevant work.

"D" and "B" are the areas where the CSC works with LCCs; both convene and provide information, and they need to coordinate for which stakeholders they provide services to not be duplicative. This is the key aspect here- defining roles to limit redundancy.

"E" is also present – the firefly that is beyond our control. We can have a contingency plan for when it happens, but the impact on the CSC is really crisis-dependent.

CRITICAL EVENTS:

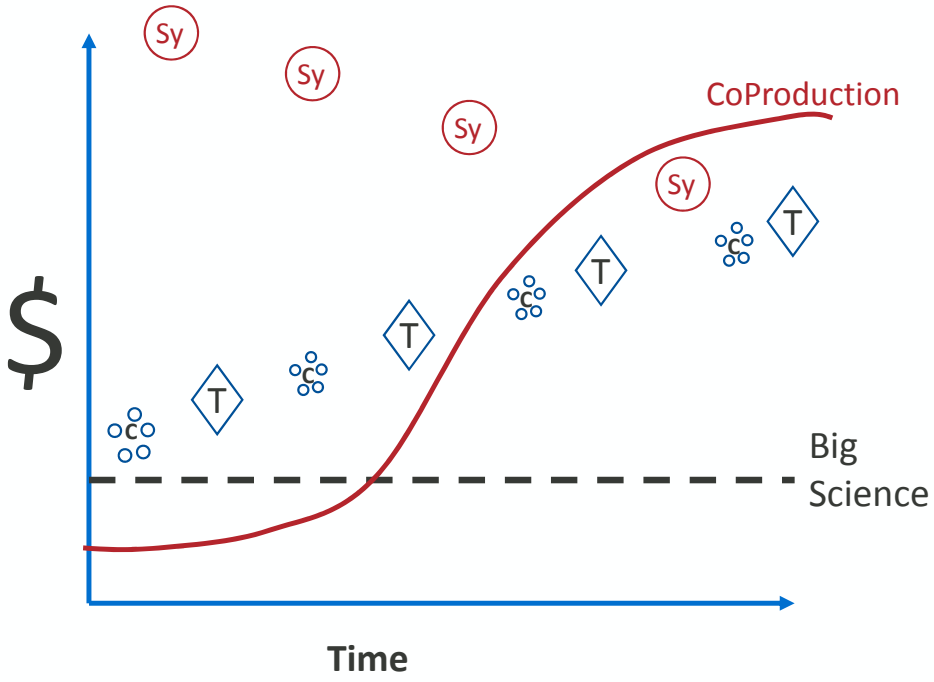
Development of greater science translation capacity (Event #49)

Congress MUST NOT eliminate LCCs (Event #58)

CSCs pull together all LCCs in their region (Event #23)

CSC network sponsors regional workshops on co-production techniques (Event #93)

TEAM 5 SYNTHESIS



This chart shows the relative investment by the CSC over time.

The black dotted line is “Big Science”, which will continue steadily along.

The “c” surrounded by circles is a convening meeting. The red “Sy” stands for synthesis. And the blue diamond with “T” inside represents science translation.

This model projects batches of convene (to determine problems facing managers), synthesize (available / new research), and translate (to develop narrative storylines, provide interpretation and data).

Co-production will increase over time as the cost of synthesis decreases (the time investment decreases over time, as the CSC only focuses on newer research once old research has been synthesized).

These syntheses could become the biological/ecological component of the National Climate Assessment; making the science truly actionable on the ground (which may enable to the NCA to become more actionable as well.).

CRITICAL EVENTS:

CSCs pull together all LCCs in their region (Event #23)

SW CSC hosts annual climate workshops for stakeholders (Event #74)

Development of greater science translation capacity (Event #49)

BLM, Forest Service, BoR become active partners with SW CSC (Event #69)

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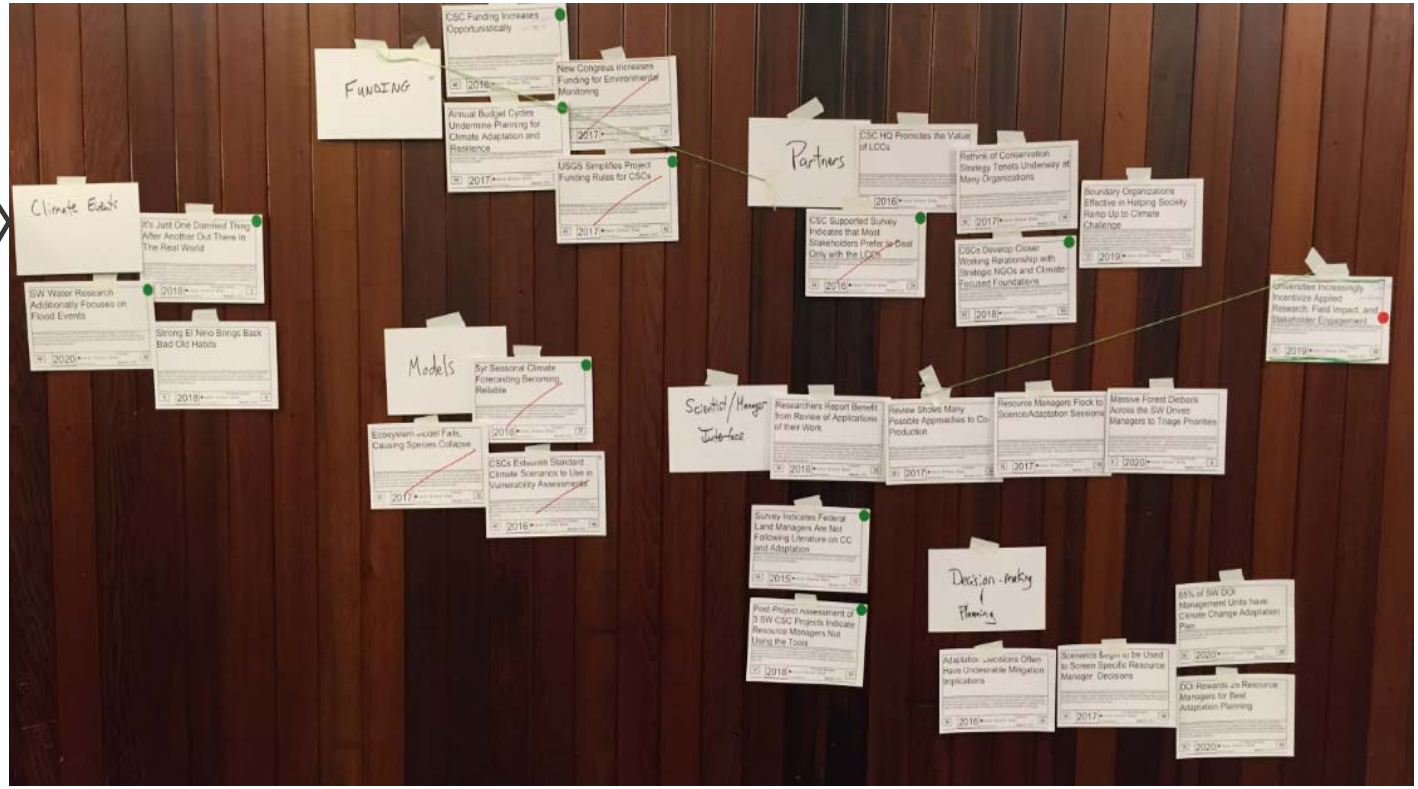
CURRENT EXPECTATIONS

Each participant voted on the likelihood of 61 external events. This section reviews their aggregate participant voting and serves as the group's endstate-agnostic projection of the future.

Participants were tasked to vote if an event was:
Highly likely: >75% likelihood of event happening within given timeframe
Highly unlikely: <25% likelihood of event happening within given timeframe
Uncertain: Not highly likely or highly unlikely within given timeframe



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CURRENT EXPECTATIONS RESULTS

FORMULAS

HU = Highly Unlikely, HL = Highly Likely

CONSENSUS LIKELY: %HL - %HU > 50%

CONSENSUS UNLIKELY: %HU - %HL > 50%

Process: >75% or <25% probability votes (highly likely, highly unlikely, uncertain) are summed for all attending and turned into percentages. The net of (HL, HU) must exceed 50% to appear in this 'current expectations' summary. A simple majority (49:51) nets to 2, so appears as conflicted.

- **Climate:** By 2018 one damn thing after another – the disaster of the month. SW CSC research priorities follow (drought to flood). Strong El Nino brings back bad old habits. Massive forest dieback pushes managers into triage mode. There is an expectation that crisis response drives funding.
- **Modeling:** All the modeling events were unlikely. 5yr seasonal climate forecasting. Success in ecosystem modeling. The CSC establish standard climate scenarios for use by planners. None of these ideas are in play by 2020.
- **Funding:** There are expectations that CSC funding will bump up opportunistically, following disasters. Washington budget politics and cycles will undermine climate change science and planning. No increase in monitoring budgets is expected. Simplified USGS project funding is what everyone attending would like but no one thinks is realistic.
- **Partners:** HQ is expected to promote the LCCs importance. Still, stakeholder interaction with LCCs is not a substitute for CSC connections. A rethink of conservation goals and strategy will be broadly underway. CSC working relations with NGOs and other climate focused partners strengthen. Boundary organizations handle broader societal shifts on climate issues.
- **Scientist / Manager interface:** Researchers will report benefit from reviewing applications of their work. Many co-production approaches emerge. Convening stakeholders to hear the science work draws people in, but they do not follow the publications or use published tools.
- **Decision-making and Planning:** Adaptation plans are being created. Scenarios are proving to be a useful approach. "Best Plan" awards are being handed out by DOI. Unforeseen complexity means adaptation decisions have poor mitigation implications.

SUMMARY: There is a much stronger culture of planning for climate change by 2020. The work is getting done, but not by reading papers and using off the shelf tools. Managers need more human interaction to get the information they need – they don't learn by reading academic journals or struggling with models and tools they are not familiar with. Funding is uneven and priorities shift with the crises of the times buffeted by politics in DC.

Compared to the April workshop, there only event with dramatically different votes was the idea that universities would support a shift to more applied science. The April group thought this was not the case, but this group did think universities would change.

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CONFLICTED EVENTS

- In cases where the probability voting splits, e.g. 51%:49%, the net is only +2%. Where there are votes, opinions are strongly held, but in conflict.
- Following are September workshop events with net voting of <10%
- Subject matter events
  - Diverse CSCs offer a set of uniform services
  - Co-production solves the problem of long waits for research results
  - CSC drought project hugely successful in the eyes of RMs
  - Support for gov't action on climate change reaches 75% in the general population in the Southwest
  - **SUMMARY**: By the following reasons, the conflicted opinions about these events makes sense.
    - Aiming for a small set of uniform services is a stretch from current CSC operations. Co-production is not uniformly defined, hence the confusion. The drought project has the hint of crisis response which seems to make the CSCs uncomfortable. General support for climate change action has become a political issue, largely out of reach of science's influence.
- Funding events
  - CSCs allowed to use 25% of funds 'out of network'
  - Congress supports a step up in funding climate change organizations
  - DOI funding is skewed toward regions with the most Federal land
  - **SUMMARY**: Congressional funding actions are clearly uncertain these days

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GROUP COMMENTS ABOUT CURRENT EXPECTATIONS

- Surprised to see researchers are reporting benefits, at same time managers aren't using their tools. Points to human interaction but not the instruction manual / tool / paper method. Hints at a different kind of relationship that is successful with resource managers.
- Suggestion that it is not case in CA that El Nino will bring back bad human behaviors. Human behavior has changed basic use – different water fixtures, no more lawns. CA agriculture has needed to adopt innovations to survive. While confident with CA, rest of the SW is different.
- Resource managers have no time to independently ramp up on a tool or read journals to puzzle out implications. Following literature implies loading dock model – it is not working and will not work.
- Recommendations based on models require trust in models. It helps if it uses information the RM knows about.
- RMs need lot of trust in the people who bring the tools, and proof.
- All this points to more human interaction and less of a loading dock approach.

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COMMON EVENTS ANALYSIS

DEFINITION: A "common event" is one that at least four (out of five) teams believe helps or hurts their endstate

DETAIL:

- A common event can be a mix of both "helps" and "hurts" events. This divergence may highlight key differences between scenarios. It can also indicate a split in the road or a choice that has to be made.
- Events whose current expectations are the same as their helpful/hurts voting are said to be **CONSISTENT**. Those that vary are **INCONSISTENT**. (For example, if an event is likely and largely 'helps', it is **CONSISTENT**.)
- There were seven events that were selected as important by all five teams, and 13 events selected by both April and September workshop (46% overlap).

EXAMPLE:

Was the event voted highly likely or highly unlikely? If neither, there will not be a "Y" in either column.

A	B	C	D	E	HU	HL	CardNum	Year	Title
+	+	+	+	+	Y		42	2017	USGS Simplifies Project Funding Rules for CSCs

Does the event help (+) or hurt (-) each endstate?
In this case, every team said the event helped (which is why it's highlighted yellow).

If the Card Number column is green, then it was also a common event in the April workshop.

Key: Common to all 5 teams; Also voted common in April Workshop

HL: voted highly likely
HU: voted highly unlikely

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Partnerships are key, especially with the LCCs

A	B	C	D	E	HU	HL	CardNum	Year	Title
+	+	+	+				23	2016	CSCs Pull Together All LCCs in their Region
+	-	-	-	-	Y		24	2016	CSC Supported Survey Indicates that Most Stakeholders Prefer to Deal Only with the LCCs
	+	+	+	+			69	2016	BLM, Forest Service, BoR Become Active Partners with SW CSC
-	+	+	+	+			74	2016	SW CSC Hosts Annual Climate Workshops for Stakeholders
+		+	+	-			78	2017	SW CSC and WUCA Partner on Water Research
-	+		+	-			96	2016	SW CSC Builds Regional Social Network and Online Community for SW Climate Adaptation

CONSISTENT

Coproduction provides multiple benefits, and CSCs start to focus on it

A	B	C	D	E	HU	HL	CardNum	Year	Title
	-	-	-	-		Y	17	2018	Post-Project Assessment of 3 SW CSC Projects Indicate Resource Managers Not Using the Tools
+		+	+	+		Y	29	2016	Researchers Report Benefit from Review of Applications of their Work
	+	+	+	+			38	2019	Universities Increasingly Incentivize Applied Research, Field Impact, and Stakeholder Engagement
-	+	+	+				47	2016	CSC Project Funding Now Includes Time and Resources for Periodic Meetings with Stakeholders
-	+	+	+	+			49	2017	CSCs Develop Cadre of Science Translators to Facilitate Discussion between Scientists and Practitioners
-		+	-	-			91	2015	SW CSC Selected for Pilot Project on Co-Production
	+	+	-	-			93	2016	CSC Network Sponsors Regional Workshops on Co-Production Techniques
-		+	+	+			103	2016	SW CSC Hires Science Translators

INCONSISTENT
CONSISTENT

Notes:
A (big science) usually votes contrary to the others, since it requires few stakeholder touchpoints
E (crisis consulting) tends to vote against events requiring upfront planning

Key: Common to all 5 teams; Also voted common in April Workshop

HL: voted highly likely
HU: voted highly unlikely

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Disasters provide an impetus to actions

A	B	C	D	E	HU	HL	CardNum	Year	Title
+	+		+	+			2	2018	A Review Paper in Science Indicates a Big Increase in Number of Ecosystems Experiencing Step Changes
+	+		+	+		Y	3	2018	It's Just One Damned Thing After Another Out There In The Real World
+	-		+	+			7	2019	Lake Mead Hits 1024', Colorado River Compact Open to Discussion

CONSISTENT

Science focuses on topics of current importance

A	B	C	D	E	HU	HL	CardNum	Year	Title
+	+	+	+				50	2017	CSC Drought Project Hugely Successful in Eyes of Resource Managers
+	+	+	+				83	2016	SW CSC Focuses on Approaches to Dealing with Uncertainty
+	+	+		+			85	2016	SW CSC Focuses on How to Assist the Development of New Ecosystems In the Wake of Large Disturbances

Key

Common to all 5 teams

Also voted common in April Workshop

HL: voted highly likely
HU: voted highly unlikely

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Red tape and funding restrictions are a big impediment

A	B	C	D	E	HU	HL	CardNum	Year	Title	
-	-	-	-	-			18	2019	DoI Land Managers Unable to Implement SW CSC Findings	
-	-	-	-	-			28	2019	CSC/LCC Attrition Disrupts Many Projects	
-	-	-	-	-			40	2016	Coordinated National CSC Plans by HQ Divert Regional CSC Goals	
+	+	+	+	+	Y		42	2017	USGS Simplifies Project Funding Rules for CSCs	INCONSISTENT
+		+	+	+			43	2017	CSCs Allowed to Use 25% of Funding "Out of Network"	
+		+	+	+	Y		57	2017	New Congress Increases Funding for Environmental Monitoring	INCONSISTENT
-		-	-	-			58	2017	Congress Eliminates the LCCs	
+		+	+	+			59	2018	Congress Supports Strategic Step-up in Funding for Climate Change Organizations	

Anthros Commentary:
Half of these events in this section were unanimous, and half were common to the April workshop. This is a strongly felt, impactful set of issues. All of them are external events – meaning that they are outside the control of the SW CSC. Two of them (42, 57) – are both important and unlikely - making them significant obstacles to ultimate SW CSC success.

Key: Common to all 5 teams; Also voted common in April Workshop

HL: voted highly likely
HU: voted highly unlikely

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List of Attendees

Name	Title	Organization	Email
Christine Albano	Research Associate	SW CSC (UC Davis)	calbano@ucdavis.edu
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Cliff Duke[2]	Director of Science Programs	Ecological Society of America	CSDuke@esa.org
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Steve Jackson	Director	DOI Southwest Climate Science Center (USGS)	stjackson@usgs.gov
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Tim Kimball	Research Manager	Western Ecological Research Center, USGS	Tkimball@usgs.gov
Teresa Krause	Post-doctoral Fellow	DOI SW CSC (USGS)	tkrause@usgs.gov
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List of Attendees (cont)

Name	Title	Organization	Email
Name	Title	Organization	Email
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Brian Miller	Research Scientist	Colorado State University, NC CSC PI	brian.miller@colostate.edu
Miriam Morrill	Climate Adaptation Planner	Bureau of Land Management, California Office	mmorrill@blm.gov
Kenneth Nowak[1]	Hydrologic Engineer	Bureau of Reclamation, Lower Colorado Region	knowak@usbr.gov
Koren Nydick	Ecologist & Science Coordinator	Sequoia and Kings Canyon National Parks	koren_nydick@nps.gov
Robin O'Malley	Policy and Partnership Coordinator	National Climate Change & Wildlife Science Center, USGS	romalley@usgs.gov
Kelly Redmond[3]	Climatologist & Deputy Director	Western Regional Climate Center, Desert Research Institute	Kelly.Redmond@dri.edu
Sarah Sawyer	Assistant Regional Ecologist	U.S. Forest Service, Region 5	scsawyer@fs.fed.us
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