Co-production as an approach to improve the impact of EESM research

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HYPERFACETS
A Framework for Improving Analysis and Modeling of Earth System and Intersectoral Dynamics at Regional Scales

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Overview

1. **Value of Co-production**
2. **Foundational Capabilities on Co-production within DOE**
    - HyperFACETS's ~8 years experience in co-production
3. **Three ways in which co-production can improve the impact of EESM research**
4. **Gaps and resource needs**

1. Value of co-production for DOE research

Increased calls for Earth & Environmental Sciences to be “engaged” and societally “relevant”

Public calls for science to inform policy and action

Scientific community calling for a new “social” contract for science

ASSOCIATION AFFAIRS

Entering the Century of the Environment: A New Social Contract for Science

Jane Lubchenco
• See all authors and affiliations

Science 23 Jan 1998:
Vol. 279, Issue 5350, pp. 491-497
DOI: 10.1126/science.279.5350.491

Impacts | Published: 02 December 1999

Science's new social contract with society

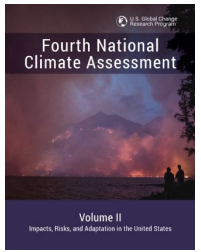
Michael Gibbons

Nature **402**, C81–C84(1999) | Cite this article

2359 Accesses | **340** Citations | **19** Altmetric | Metrics

Overall, more and more meetings, reviews, other discussions, both within and outside DOE, are focusing on how research needs to be more engaged and impactful

Impactful science-society collaborations



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2. Foundational Capabilities on Co-production within DOE

- **HyperFACETS as a case study for co-producing fundamental EESM research**

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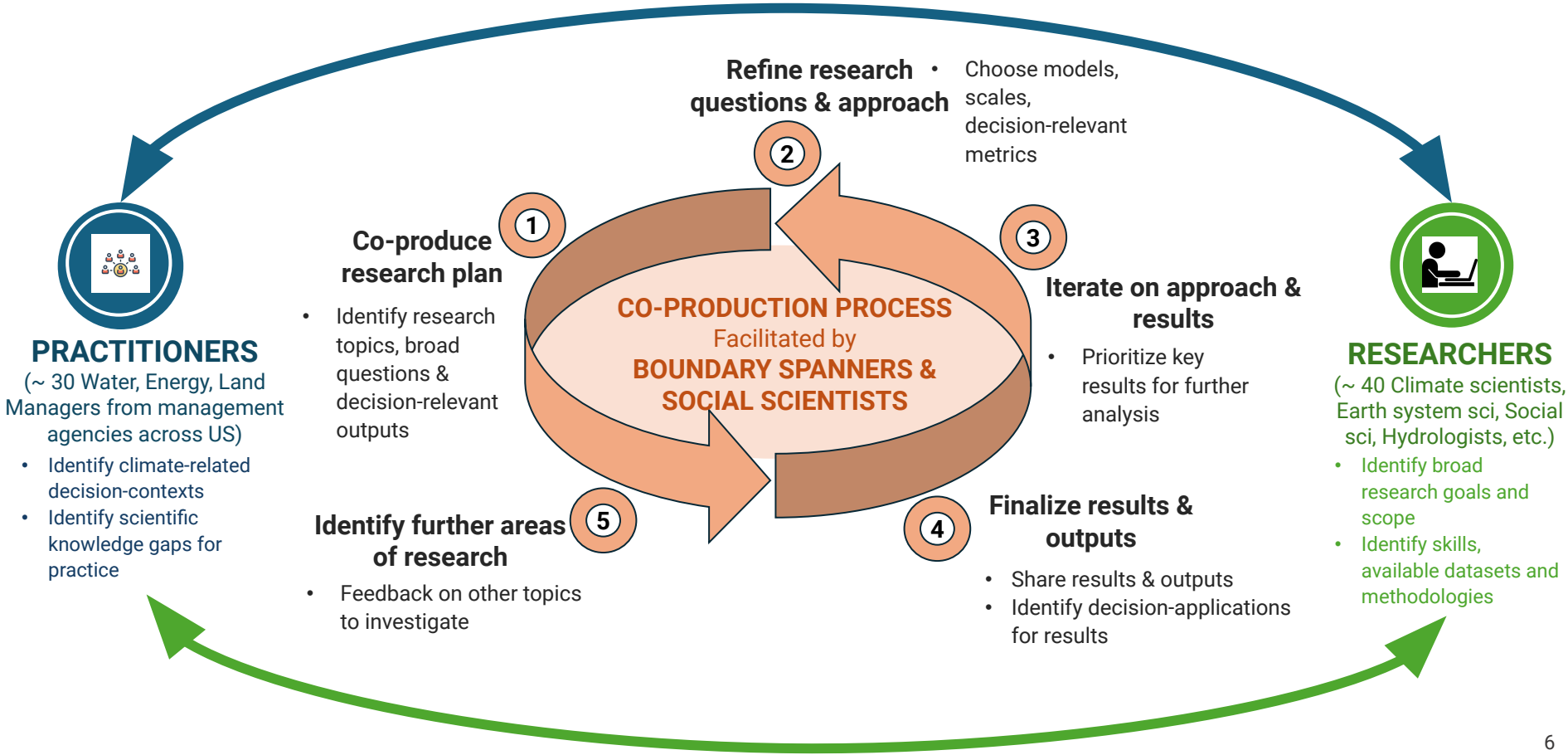
HyperFACETS Co-production Approach



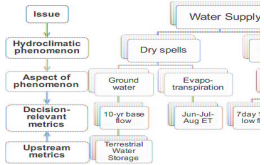
~8 years of iterative engagement activities

Phase 2 (2019-22)

2016 – 2017

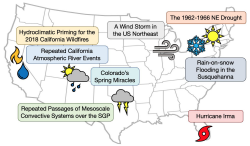
- Practitioner recruitment
- Discussed decision-context, management challenges & knowledge gaps
- Co-produced project goals *(Workshop -1)*

2017 – 2018



- Identified hydroclimatic phenomenon & decision-relevant climate metrics *through quarterly Focus Group Discussions* (FGDs)
- Iterated on preliminary credibility evaluations and refined approach *(Workshop-2)*

2018 - 2019



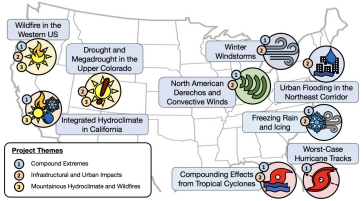
- Finalized results of Phase -1 credibility analyses and discussed decision-applications of results *(Workshop-3)*
- Based on practitioner input, Identified storylines as a key topic for the next phase proposal

2019 - 2021

- Additional practitioner recruitment for storyline topics
- Co-produced research plans for each storyline *(Workshop-4)*
- Iterated on storyline research through *quarterly FGDs and follow-up surveys*

2021 - 2023

- Finalized Phase-2 storyline results and discussed decision-applications *(Special spotlight Seminar)*
- Identified new storyline topics for next phase proposal



2023 - ongoing

- Co-produced research plans for new storylines *(Workshop-5)*
- Interactive exercise to identify 3 cross-cutting research topics
- Iterating on research *through ongoing FGDs & surveys*

Phase 1 (2016-19)

Phase 3 (2022-25)

5 *workshops, ~****50*** *focus group discussions, ~****32*** *monthly spotlight seminars,* ***~30*** *surveys, & other informal conversations and meetings*

3. Three ways in which co-production can improve the impact of EESM research

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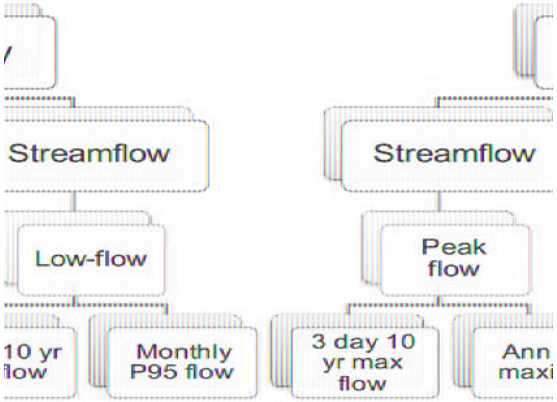
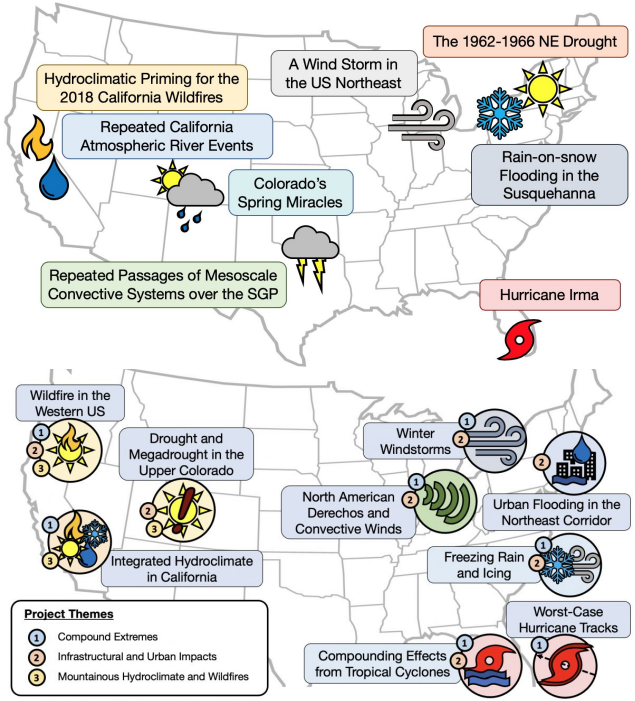
(1) By identifying fundamental research questions/directions that are both scientifically and societally impactful





Co-production enabled collective identification of research topics and questions. E.g. identification of metrics for credibility analyses (left), storyline events (middle), and cross-cutting topical areas (right)

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(2) By improving the rigor and credibility of key modelling choices

Final outputs

- Maps
- Data
- Tools

- Choose storm metrics
- Choose characteristics of compound storms

Final results

Prioritize specific results for additional analyses

- How intense are worst storms?
- How likely are compound storms?

Urban planners, emergency managers, reservoir operators, resilience managers, stormwater engineers, and other communities have grounded regional knowledge that helped scientists make these significant decisions

- Intensity of worst-case storm increases
- Back-to-back or compound storms more likely

Data analysis and preliminary results

- Recreate past worst-case event with climate change
- Choose which past event & which characteristic
- Examine the worst possible future storm

Refine research question

Select methods, approach & data

- Which models or simulations to choose
- Which spatial or time scales to focus on

- Whether to focus on storm tracks, storm frequency & intensity or flooding

- Whether to focus on frequency of all extreme storms? Worst-case storms? Or predictors of storms ?

Develop broad research question

Identify problem

Illustrative example of choices in the research process

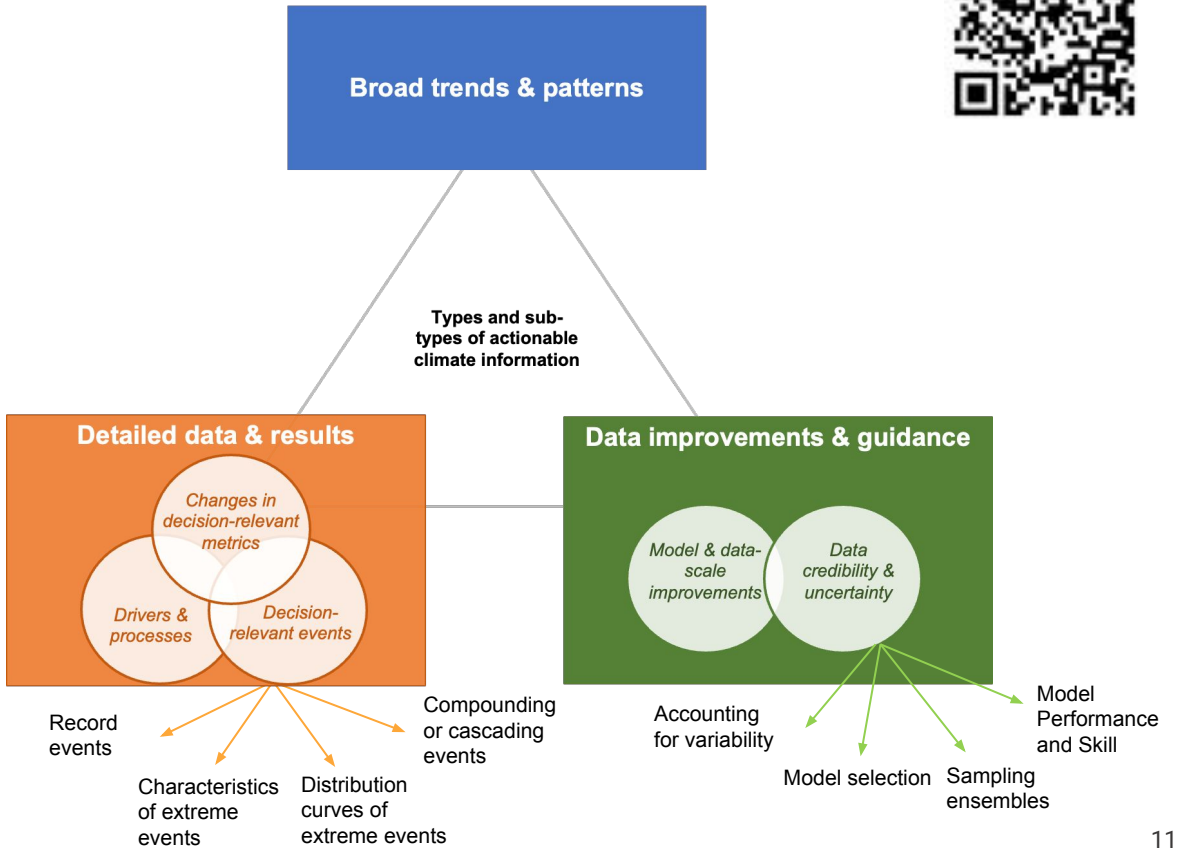
(3) By developing fundamental research on the *"Science of Actionable Knowledge"*

What is SOAK?

- SOAK involves systematic investigations of the drivers and mechanisms of actionable knowledge development and its use.
- Goes beyond case studies to provide generalizable frameworks for scaling-up collaborative science practices.

Through systematic inquiry and examination of the longitudinal co-production engagements of HyperFACETS, we were also able to make meaningful contributions to the SOAK literature

Typologies of actionable climate information



Typologies of “use of climate information”

Jagannathan, K., Buddhavarapu, S., Ullrich, P. A., Jones, A. D., & HyperFACETS Project Team. (2023). Typologies of actionable climate information and its use. *Global Environmental Change*, *82*, 102732.

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4. Resources needed for advancing co-production across BER

Resource Needs

- **New way of doing research, needs shift in mindset**
  - Needs a clear and strategic direction from BER and scientists
- **Needs dedicated resources, time and expertise for conducting engagements**
  - Engagements need not always be intensive, there are smaller meaningful opportunities but need to be done well and intentionally
- **Growing literature on co-production and similar practices need to be engaged with**
  - Often engagement is done without attention to existing work and science on the topic
- **Growing evidence that this is not just valuable for society, it is also more rigorous and innovative science**
  - Inclusion of diverse perspectives, Environmental Justice

Thank you !

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