APT
Applications Process Team

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Institute of the Environment

CLIMAS
Climate Assessment for the Southwest

Why Does U.S. CLIVAR Need an APT?

Climate research is becoming ever more interdisciplinary in nature. Whereas the physical climate system has been the primary focus of U.S. CLIVAR research activities, it is increasingly clear that interactions between physical, chemical and biological components are critical not only for understanding climate impacts but also for understanding feedbacks in the system that determine how the physical climate system itself changes.

Why Does U.S. CLIVAR Need an APT?

- Applications concerns may inspire new science:
  - Identification of the Pacific Decadal Oscillation (PDO) occurred as a result of collaborative research on salmon catches
- Regional expressions of climate variability
  - U.S. CLIVAR also poses the fundamental science question, "What determines regional expressions of climate variability and change?"
  - What regional expressions are important to society, ecosystems, & the "Grand Challenges"
  - Requires collaboration with applications communities

Why Does U.S. CLIVAR Need an APT?

Communication about Models

Climate models often fail to inform not because of bad algorithms or bad design, but because **of inadequate communication of how they work and what their relative strengths and weaknesses are**.

Communication about state of the science: Use of U.S. CLIVAR science can be improved through:

- **the thoughtful** articulation and communication of the limitations to the science, uncertainty, and confidence in predictions and projections
- Use of language that is mutually understood by producers and users of climate science information.

Why Does U.S. CLIVAR Need an APT?

Communication about Uncertainty and Risk

Communicating uncertainty may involve extra effort to understand the institutional, organizational and cultural contexts of end users, their risk tolerances, and competition with other factors shaping their decision context.

An APT can help **facilitate and organize the conversation** the information necessary for climate service agencies to develop these efforts.

Why Does U.S. CLIVAR Need an APT?

Communication about Uncertainty and Risk

- **In many cases,** additional information about forecast skill, or ability of models to capture historical climate variations, will be needed.
- Communicating probabilistic information depends on user metrics and familiarity with various ways of communicating forecast success, in addition to efforts to educate end users.

Why Does U.S. CLIVAR Need an APT?

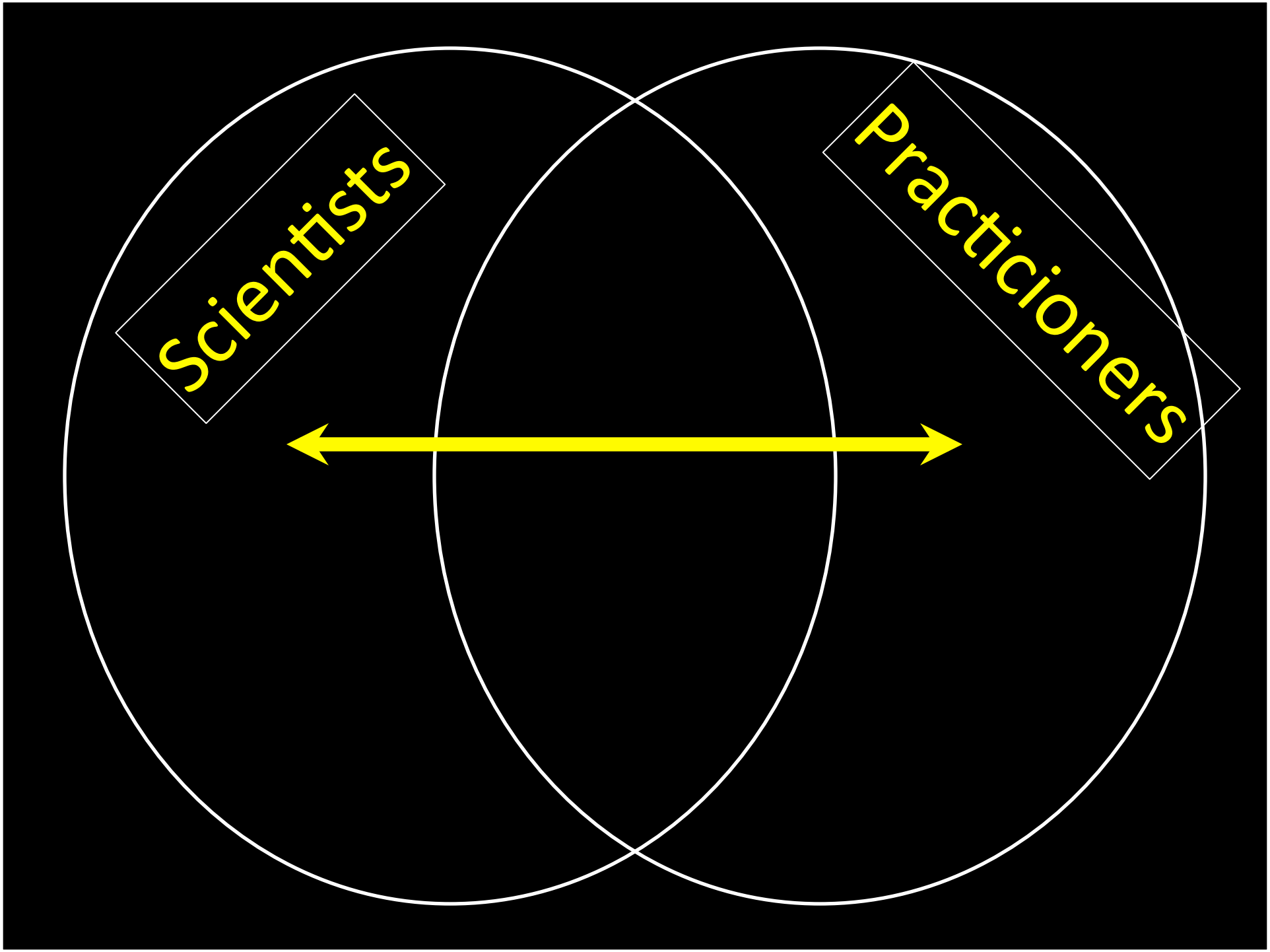
Societal Benefit

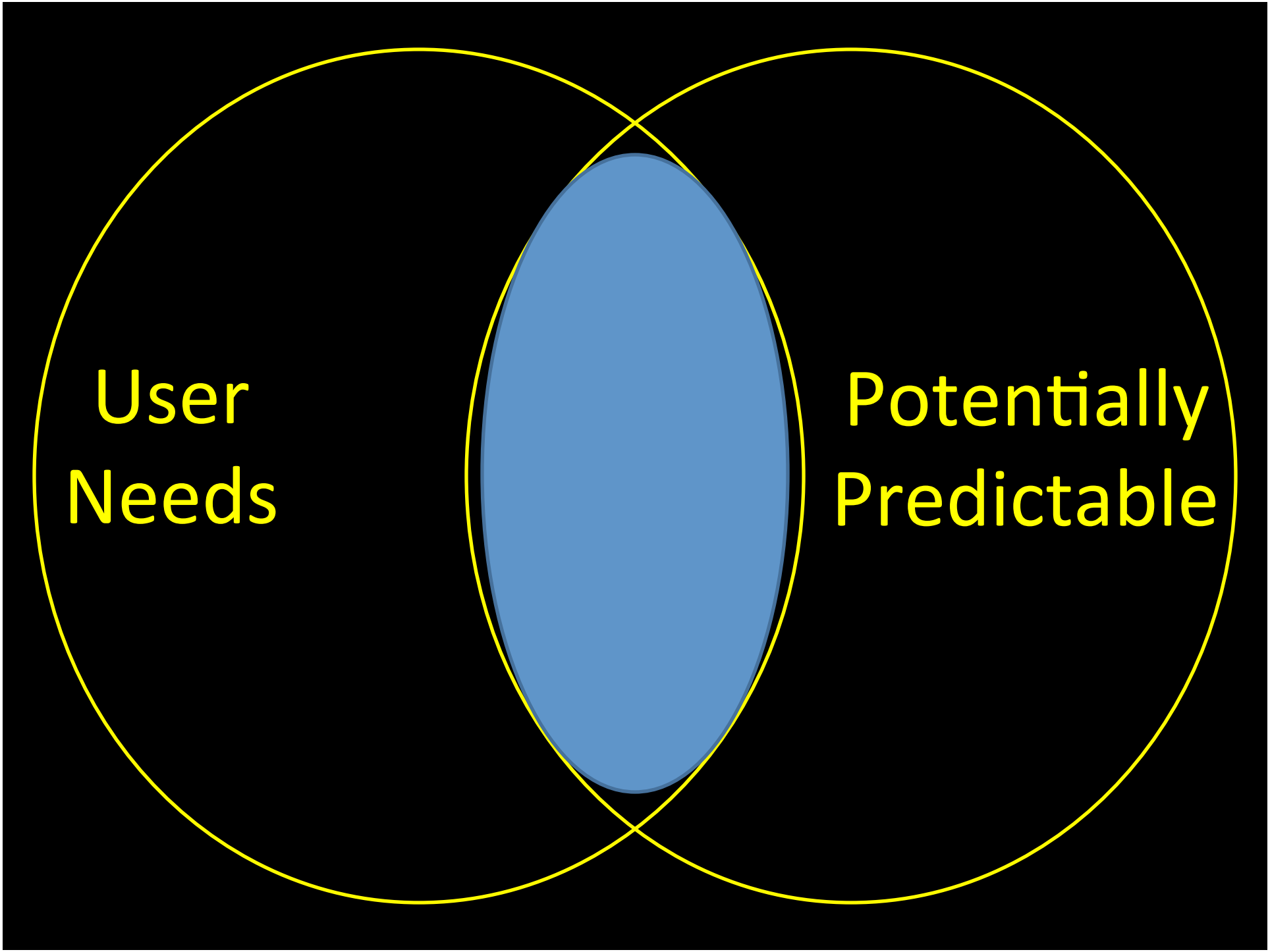
- Effective communication of climate research results, information and insights is essential for society to reduce vulnerabilities to the impacts of climate variability and change.
- **An APT could plan and organize a** focused effort to communicate climate science
- will also allow society to reap the benefits of substantial investments in the climate research enterprise.
- Anticipation and response to seasonal, interannual, and decadal and longer time-scale climate variability offers potentially significant societal benefits.


Society
Science

Linear

- Problem
  - Research
    - Knowledge
      - Transfer
        - Adoption
          - Diffusion


Scientists
Practicioners


User
Needs
Potentially
Predictable

APT: Goals

- Increase science understanding
- Improve communication
- Maximize science/knowledge use
- Improve science

APT: Topics

- State of knowledge
- Science readiness
- Applications community readiness – what groups are ready to collaborate
- Uncertainty
- Communicate distinctions

APT: Tasks

- Assess the state of knowledge
  - Known / Unknown / Pace of Progress (when might we make progress on questions)
- Characterize and communicate uncertainty

- Assess user needs, agency concerns
- Facilitate knowledge exchange
  - Within and across boundaries
    - Institutional connections, mechanisms
- Research and develop best practices
  - Assess knowledge, co-production, metrics
  - Community of practice

APT: Model 1

- U.S. CLIVAR's Boundary Organization
  - Science → Applications + User
    - NOAA RISA, NMFS (marine ecosystems), NOS (sea level, protected areas)
    - DOI Climate Science Centers
    - USDA Regional Hubs
      - Cooperative Extension
    - Professional Societies
      - Am Society of Civil Engineers, American Planning Society, Ecological Society of America, Am Water Resources Assoc, Soc for Range Mgmt, Soil Science Soc America

APT: Model 1

- U.S. CLIVAR's Scout Team/Communication Team
  - Assessing needs and knowledge
  - Establishing institutional linkages
  - Engaging the stakeholders
    - Intermediaries
    - New applications communities
    - End users
  - Crafting the message

APT: Model 2

- U.S. CLIVAR's Applications Research Team
- Assessing needs and knowledge
- Developing best practices
  - Protocols
  - Metrics of effectiveness
  - Pitfalls
- Understanding networks
- End-to-end-to-end…value added

Cross-Cutting Strategies⇨ Goals ⇩	*Sustained and new observations*	*Process studies*	*Model development strategies*	*Quantifying improvement in predictions and projections*	*Communication of climate information*
Understand the role of the oceans in climate variability on different timescales	Document variations	Data to evaluate and improve models	Improve modeling of climate across processes and timescales	Understand limits of climate predictability	Prioritize observing network and predictability studies and improve predictions of ocean and climate variability
Understand the processes that contribute to climate change and variability in the past, present and future	Document climate-critical processes	Investigate processes to help explain variations	Property conserving climate reanalyses	Quantifying importance of model uncertainty in projections	Set priorities for observations and predictability studies; communicate about confidence and predictability
Better quantify uncertainties in the simulations and projections of climate	Initialize and evaluate model simulations	Model assessment	Improve models	Quantify model, structural and scenario errors	Address needs for predictability and sensitivity studies
Improve the development and evaluation of climate simulations	Initialize and evaluate climate models	Provide data to develop and test model process representation	Reduce biases in climate models	Quantify importance of model physics errors	Determine key targets for model development across communities
Collaborate with research communities that develop and use climate information	Provide multi-disciplinary datasets	Provide process understanding and opportunity for collaboration across disciplines	Communication between observational and model communities	Improved communication across disciplinary boundaries	Provide information on dominant climate phenomena and predictability