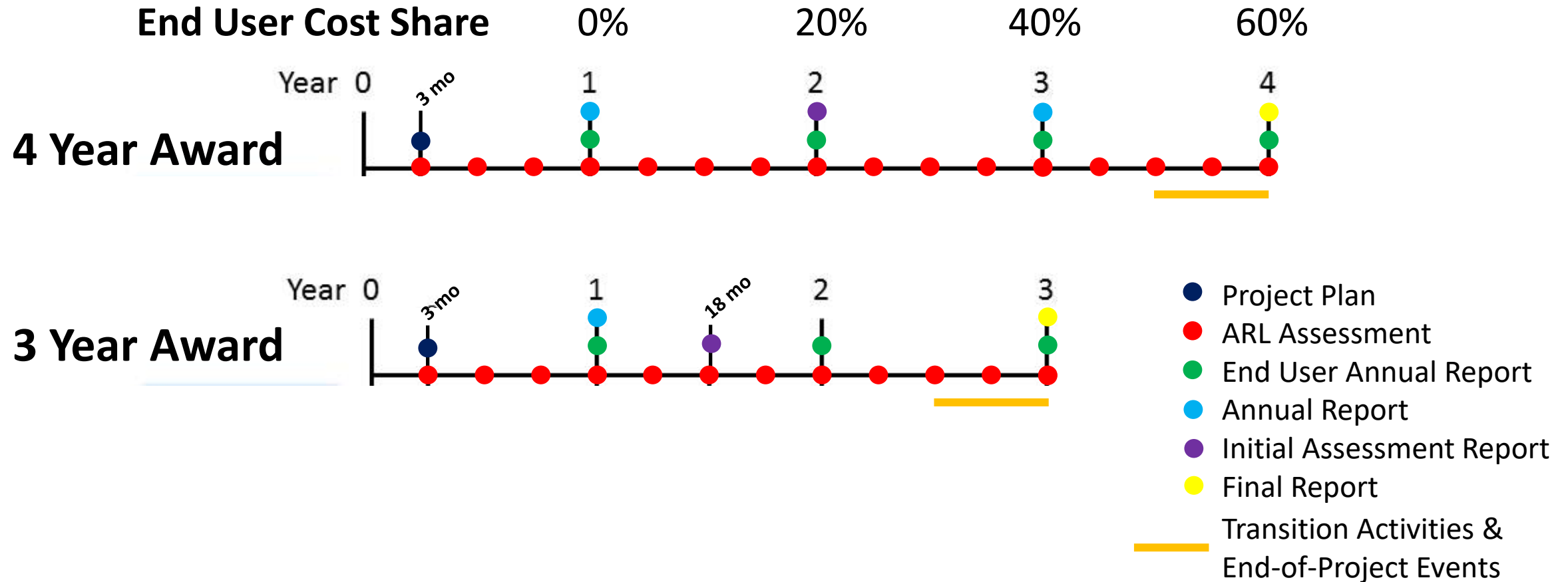




# Ecological Forecasting: Requirements & Vision

# Project Requirements Timeline



# Project Requirements Timeline

Table 1: Cost Sharing Requirements

Project	Activity	NASA Share	End-User Share
Year 1	Prove out application potential and begin development	100%	0%
Year 2	Develop application	80%	20%
Year 3	Continue development	60%	40%
Year 4	Complete application and transition	40%	60%

Failure to meet the required end-user cost share during any budget year of the project:

- will require the awardee to return funds based on the approved cost share rate in proportion with the total (cost share and Federal funds) of that year's funding,
- will be part of the yearly review to determine if NASA will continue funding for the following year, and
- may result in enforcement actions, including termination, for failure to comply with the terms and conditions of the award.

# Project Requirements Timeline

	Description	Length	Components
<b>Annual Report</b>	Summary of the progress made during the last year and assessment of whether the project is on track in terms of schedule, budget, end user relationships, product development, and overall goals.	5-8 Pages	<ul style="list-style-type: none"><li>• Introduction &amp; ARL level</li><li>• Project goals &amp; Schedule</li><li>• Activities and accomplishments</li><li>• Challenges</li><li>• Plans for next year</li><li>• Budgetary info &amp; Cost Share</li></ul>
<b>Initial Assessment Report</b>	Mid-Point assessment of how well the enhanced decision support tool/system meets end user needs. Thus, end users must be involved in report drafting.	10 Pages	<ul style="list-style-type: none"><li>• Summary &amp; Introduction</li><li>• ARL Discussion</li><li>• Assessment</li><li>• Sustainability</li><li>• Conclusions and Next Steps</li><li>• Budgetary info &amp; Cost Share</li></ul>
<b>Final Report</b>	Review of the impact of the project on the end user's decisions support tool/system and the end user's ability to meet their mission objectives	10-13 Pages	<ul style="list-style-type: none"><li>• Summary</li><li>• Introduction</li><li>• ARL Discussion</li><li>• Assessment</li><li>• Sustainability</li><li>• Conclusions and Recommendations</li><li>• Budgetary info &amp; Cost Share</li></ul>
<b>End User Annual Report</b>	Assessment of end user project engagement, needs, application use, benefits from the application, sustainable transfer potential, and recommendations.	2-3 Pages	<ul style="list-style-type: none"><li>• 10-part standardized Questionnaire</li></ul>

# Project Requirements Timeline

1. What is your role in your organization?
2. What is your role in the project?
3. Please describe how the project data and/or tools will be and/or have been used for decision-making in your organization.
4. Are you using metrics to track advancement and success of the project? If so, please explain.
5. How often do you communicate with the project team?
6. How important are the project data/tools to your organization (High, Moderate, Low) and why?
7. What are the barriers to sustained use of the project data/tools in your organization?
8. Where will be the “home” of the data/tool after the project’s conclusion?
9. Who will be responsible for maintaining/updating the data/tool after the project’s conclusion?
10. Do you have a means of tracking how often the tool/data are used and how effective it is at informing decision-making and action? If so, please explain.



# **Interlude: Comments, Questions & Reflections**

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# Earth Science Division

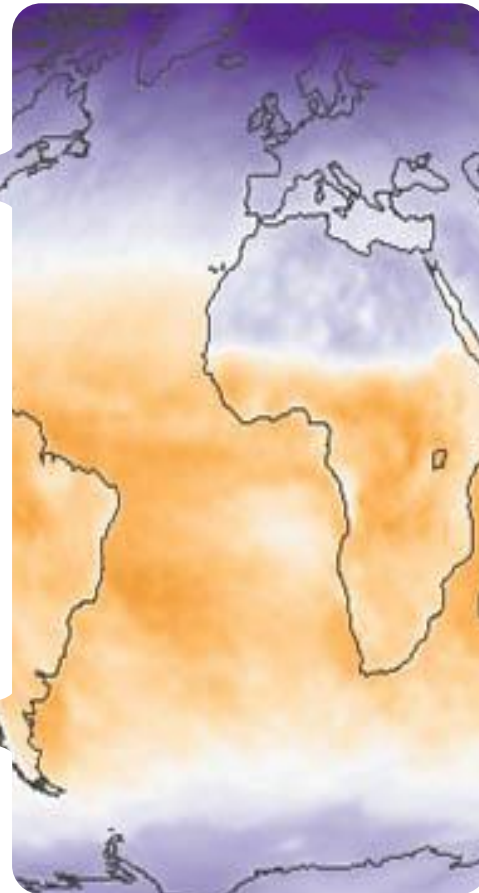
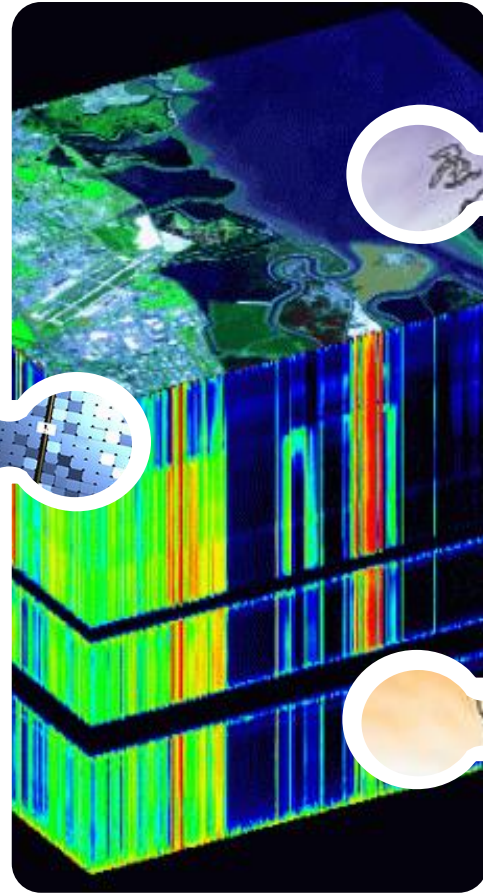
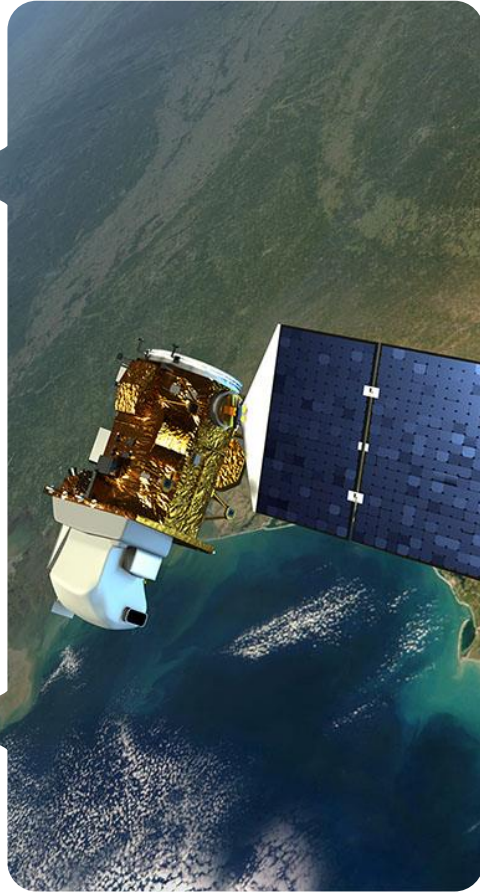
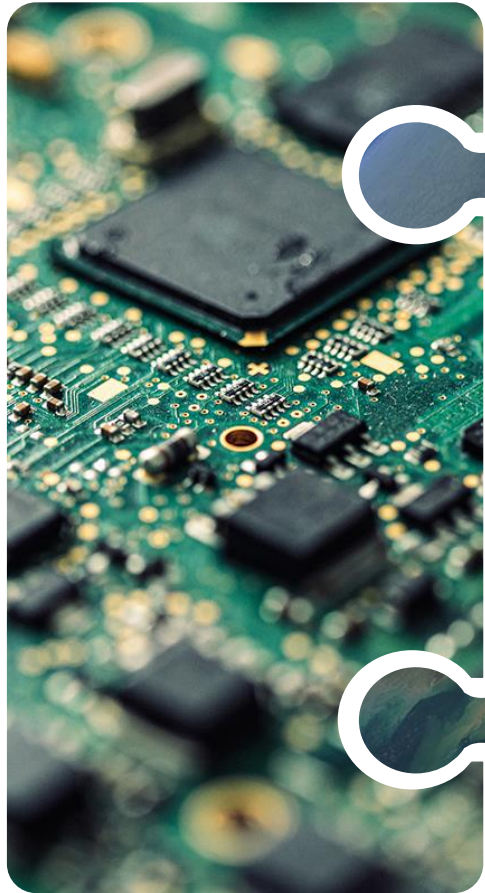
Technology

Flight

Data

Research

Applications





*The Applied Sciences Program (ASP) collaborates with end user or partner organizations to extend the application of NASA's research results to policy and management decision support tools. The purpose is to help these end user organizations expand their use of NASA Earth science products, increase the benefits to society derived from these products, and enhance the decision support capabilities of the end user organizations.*



Discovery & Feasibility

Development, Testing & Validation

Integration into Partner's System

## ARL 9 - Approved, Operational Deployment and Use in Decision Making

Actual operational, successful use of application by users in decision making activities.

## ARL 8 - Application Completed and Qualified

Actual system completed and 'qualified' through test and demonstration for partners' decision-making activity. Application has been proven to work in its final form and under expected conditions.

## ARL 7 - Application Completed and Qualified

Prototype near or at planned operational system. A major advance from ARL 6, requiring prototype system demonstration of an actual system prototype in an operational environment, such as partners' decision-making activity.

## ARL 6 - Demonstration in Relevant Environment

Major increase in the application's demonstrated readiness. Prototype system demonstration in a relevant environment or simulated operational decision making environment.

## ARL 5 - Validation in Relevant Environment

Basic components are integrated with reasonably realistic supporting elements so application can be tested in a simulated decision making environment.

## ARL 4 - Initial Integration and Verification

**(in experimental environment)** Basic components of Earth science products and decision making activity (decision support system, tool, etc.) are integrated together to establish that they will work together.

## ARL 3 - Proof of Application Concept

Feasibility studies to assess the potential viability of the application. More complete characterization of the decision making process, including baseline.

## ARL 2 - Application Concept

Application invention and formulation begins. Once basic principles are observed and products produced and validated, practical applications can be invented.

## ARL 1 - Basic Research

Basic principles and concepts observed and reported. Scientific research produces results that could begin to be translated into applied research and development.

PHASE III

PHASE II

PHASE I

# *What is* Impact?

1. **Knowledge Gain** - Improvement in understanding or ability



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1. **Knowledge Gain** - Improvement in understanding or ability
2. **Use** - Amount of product use by end user/public



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3. **Change in Behavior** - Decisions made by end user with product



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4. **Awareness & Perception** – Product awareness & perceived value



# *What is* Impact?

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3. **Change in Behavior** - Decisions made by end user with product
4. **Awareness & Perception** – Product awareness & perceived value
5. **Benefit** - Benefit to end user resulting from ASP product use
6. **Sustainability** – Long term continued use

Discovery & Feasibility

Development, Testing & Validation

Integration into Partner's System

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### ARL 4 - Initial Integration and Verification (in experimental environment)

Basic components of Earth science products and decision making activity (decision support system, tool, etc.) are integrated together to establish that they will work together.

### ARL 3 - Proof of Application Concept

Feasibility studies to assess the potential viability of the application. More complete characterization of the decision making process, including baseline.

### ARL 2 - Application Concept

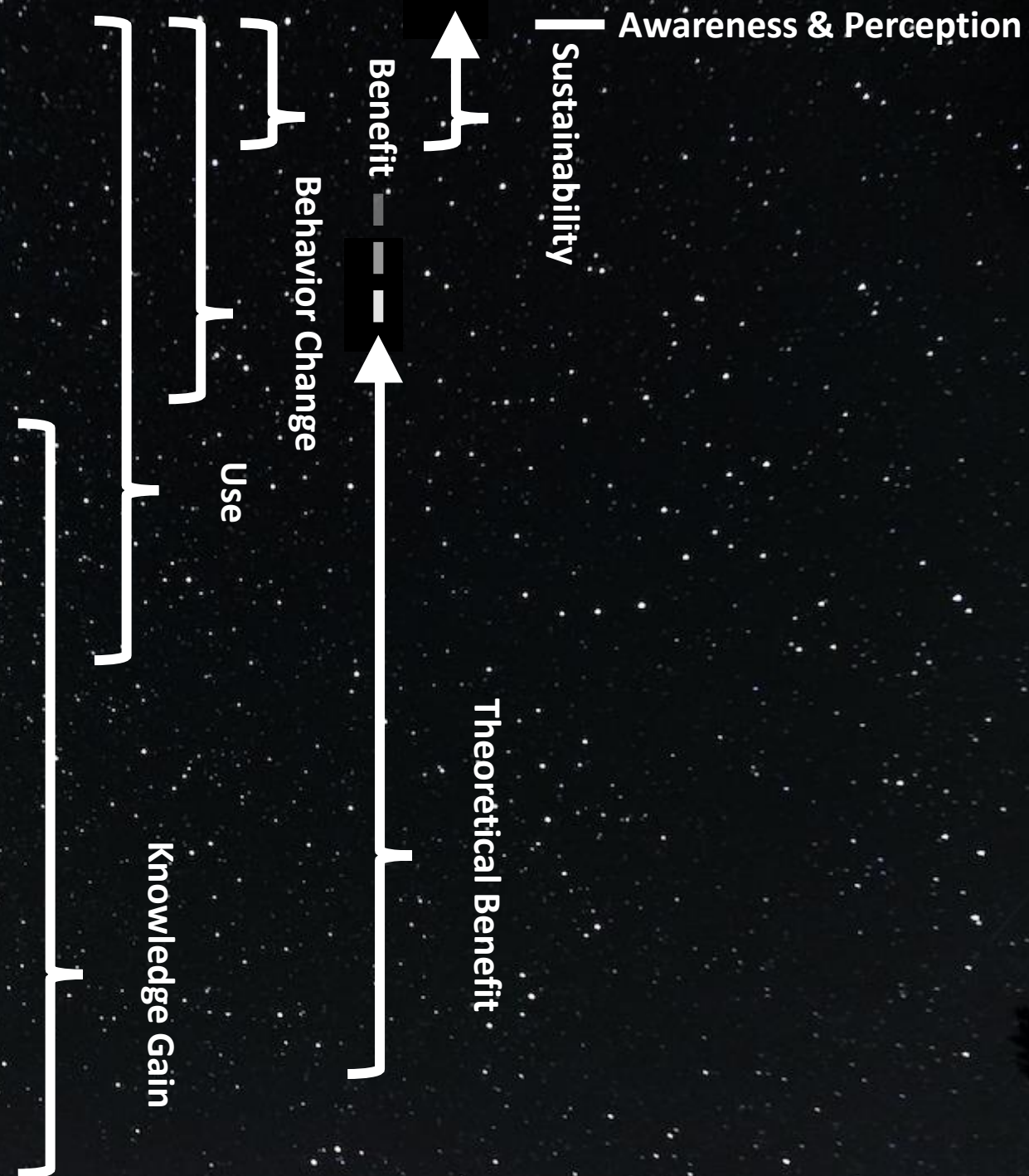
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**ARL 1 - Basic Research** Basic principles and concepts observed and reported. Scientific research produces results that could begin to be translated into applied research and development.

PHASE III

PHASE II

PHASE I



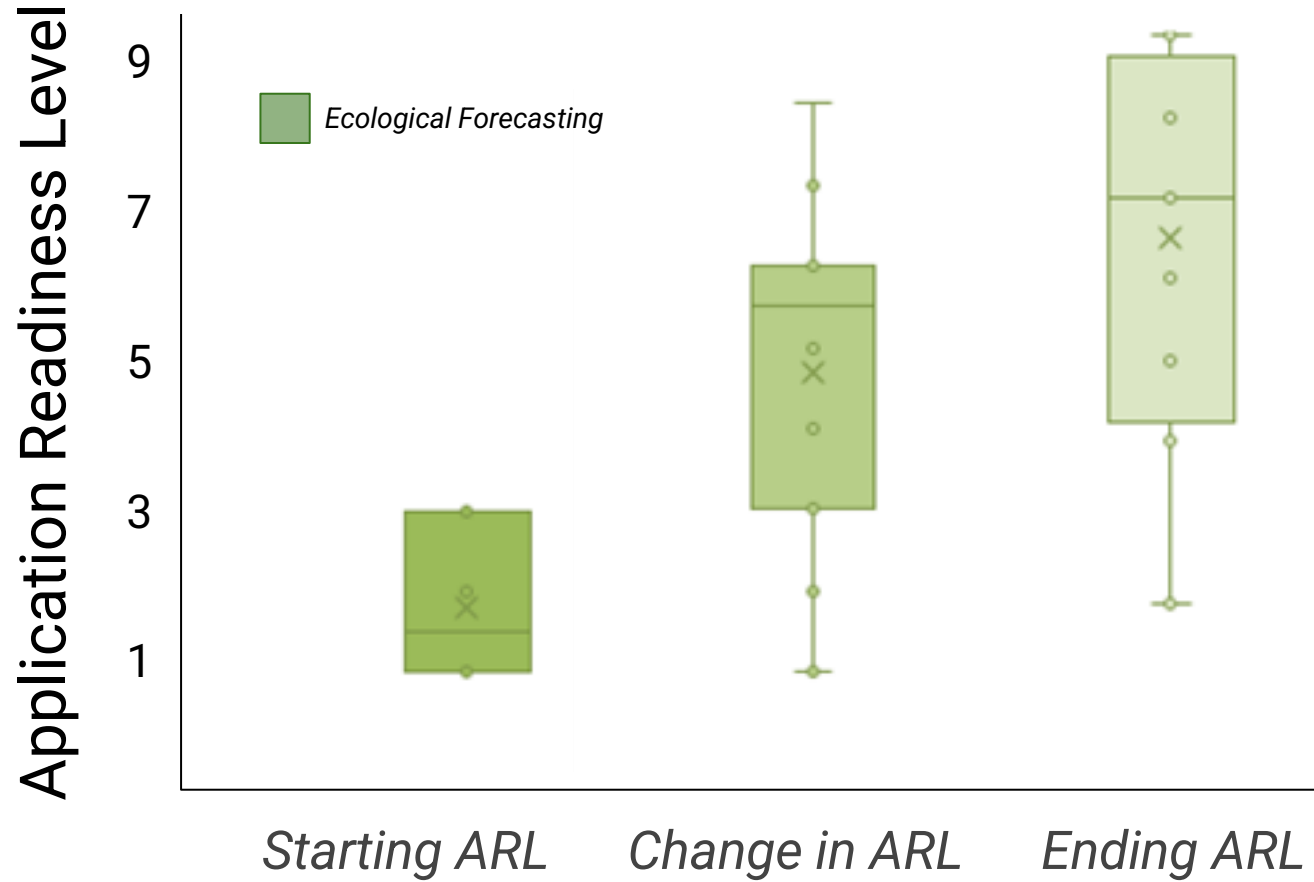




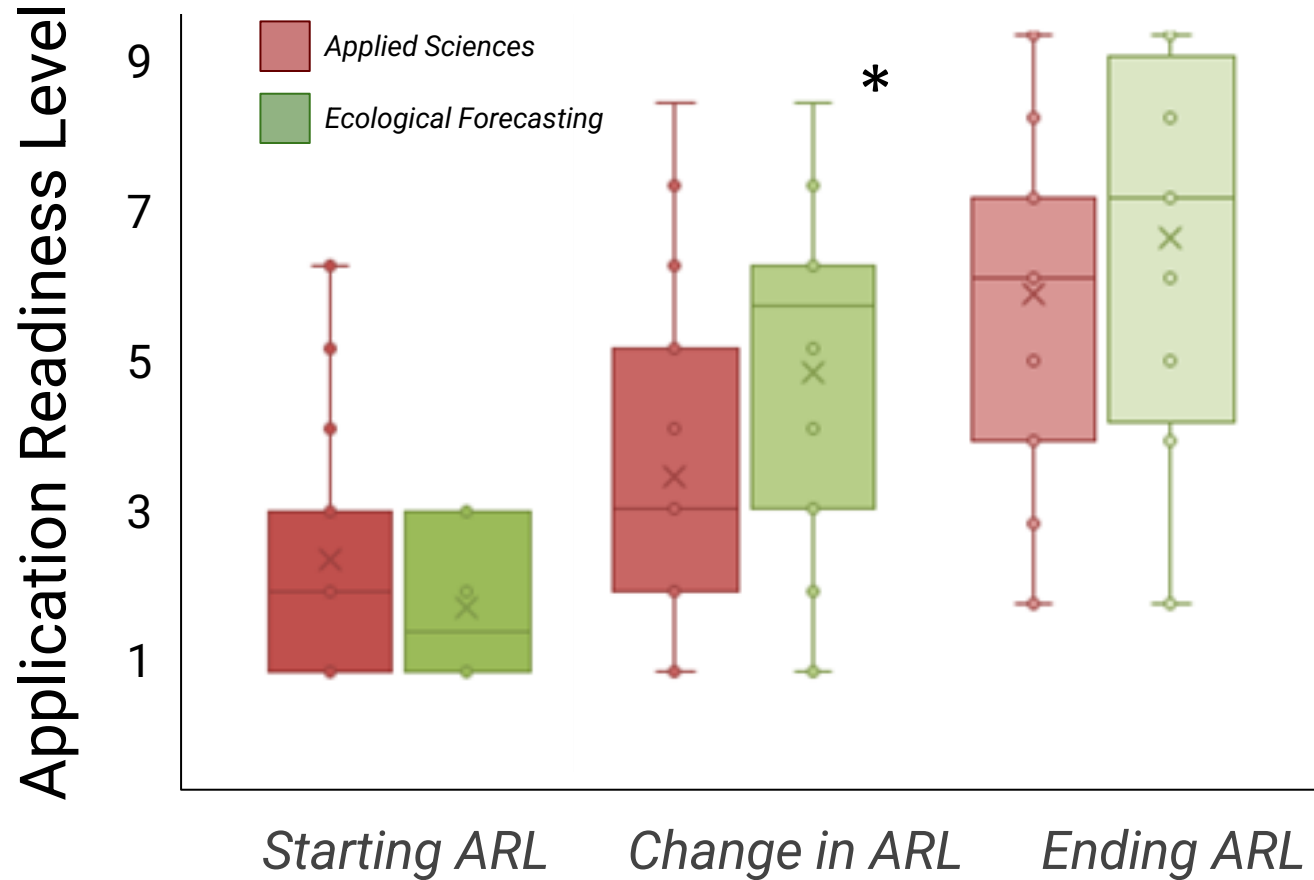
# **Interlude: Comments, Questions & Reflections**

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# Application Readiness Level

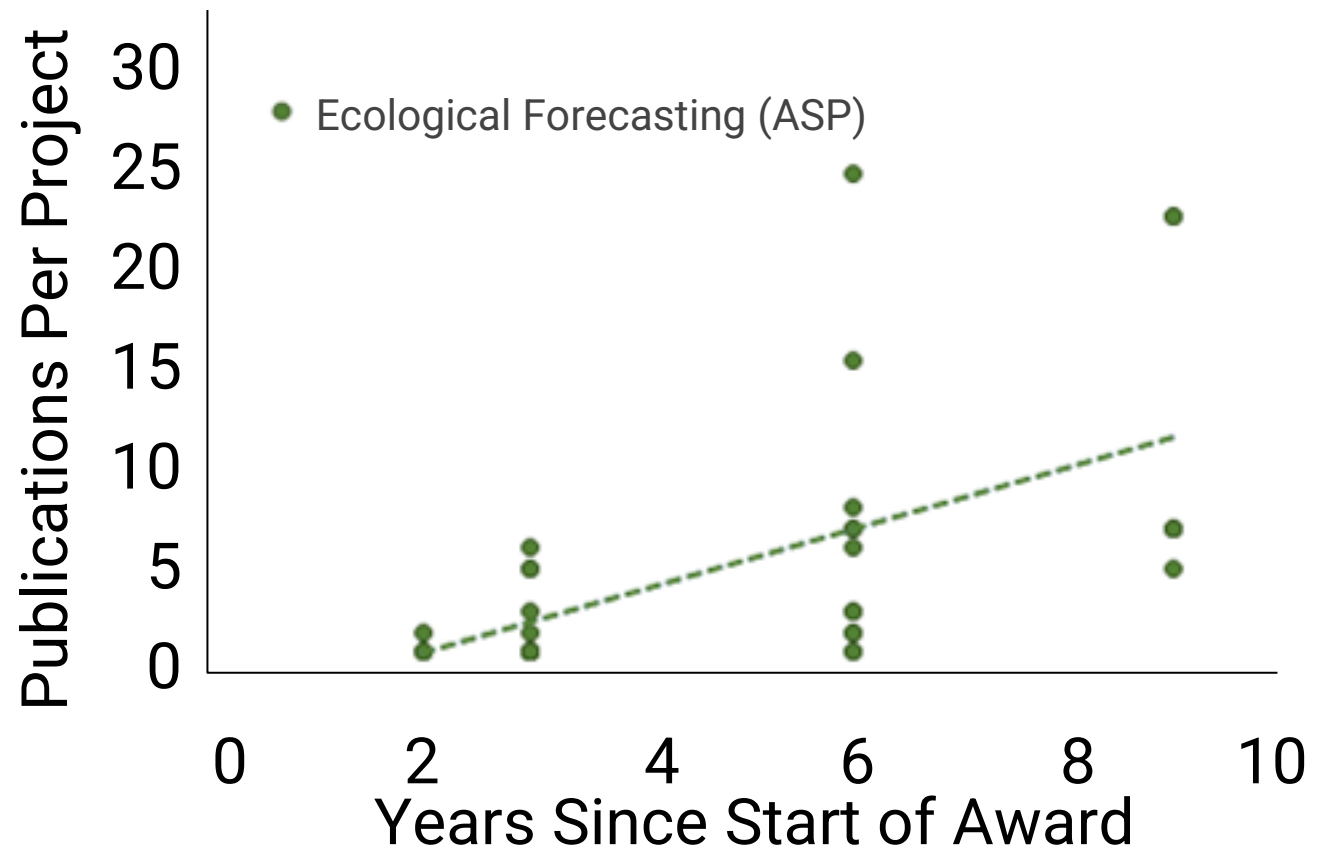


# Application Readiness Level

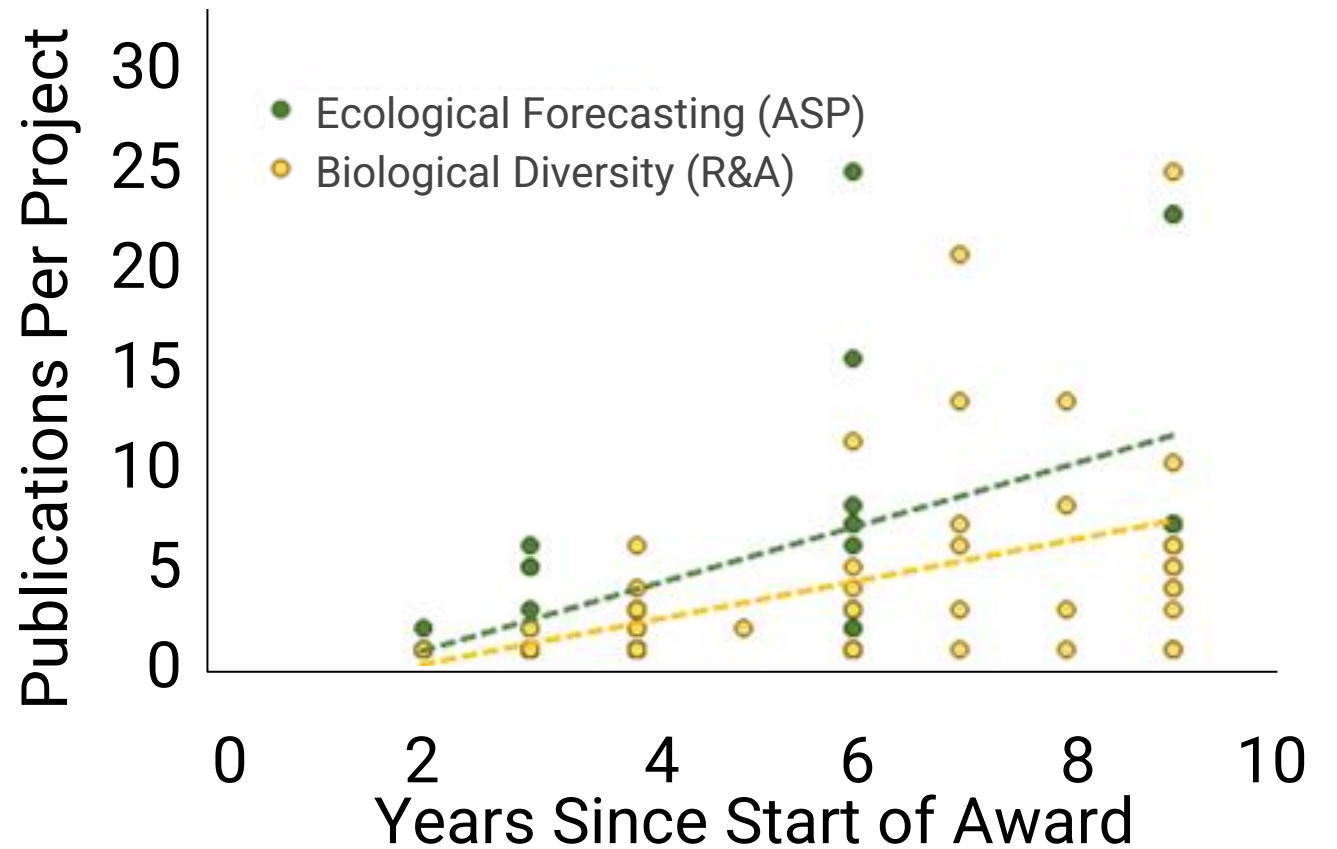




# Publications



# Publications



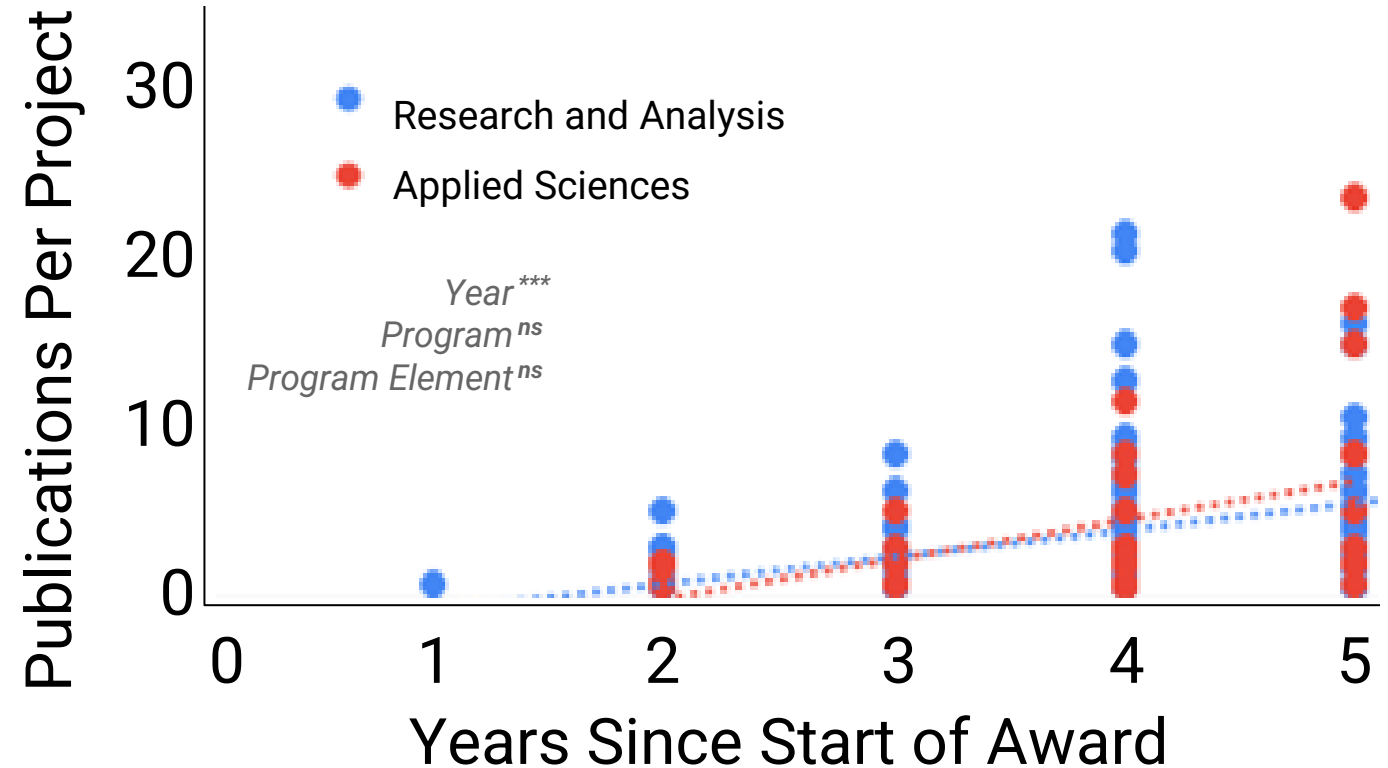


# Publications

## Reviewed

- 45 Solicitations
- 676 Projects
- 1428 Publications

16-OBB16	14-TE14	18-ACMAP18	17-THP17	19-PO17
15-OBB15	15-BIODIV15	15-ESI2015	19-MAP19	18-DISASTER18
14-LCLUC14	18-SLSCVC18	16-ESI16	16-MAP16	16-WATER16
15-LCLUC15	14-ACLS14	17-ESI17	15-MAP15	18-WATER18
16-LCLUC16	14-ACMAP14	18-ESI18	14-PO14	15-HAQST15
17-LCLUC17	14-ACSCS14	19-ESI19	15-PO15	17-HAQ17
18-LCLUC18	16-ACMAP16	14-WEATHER14	16-PO16	16-ECO4CAST
18-TE18	16-UACO16	16-WEATHER16	17-PO17	15-Cryo16
16-TE16	17-ACLS17	16-THP16	18-PO17	17-Cryo17

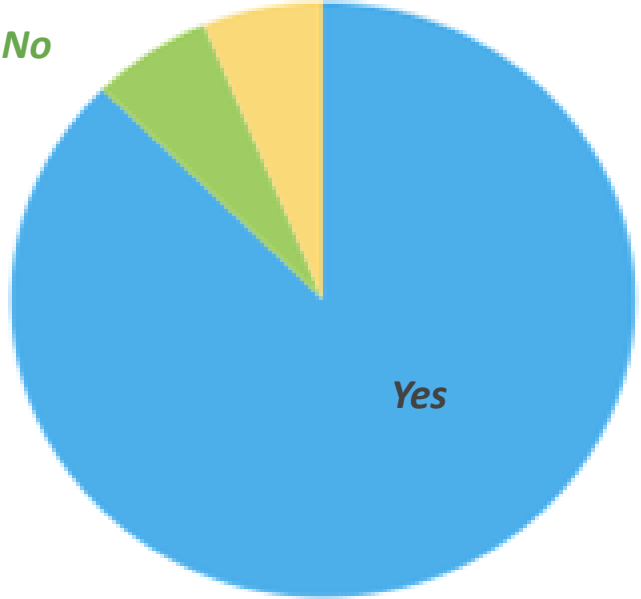


# Sustainability

## Sustainability

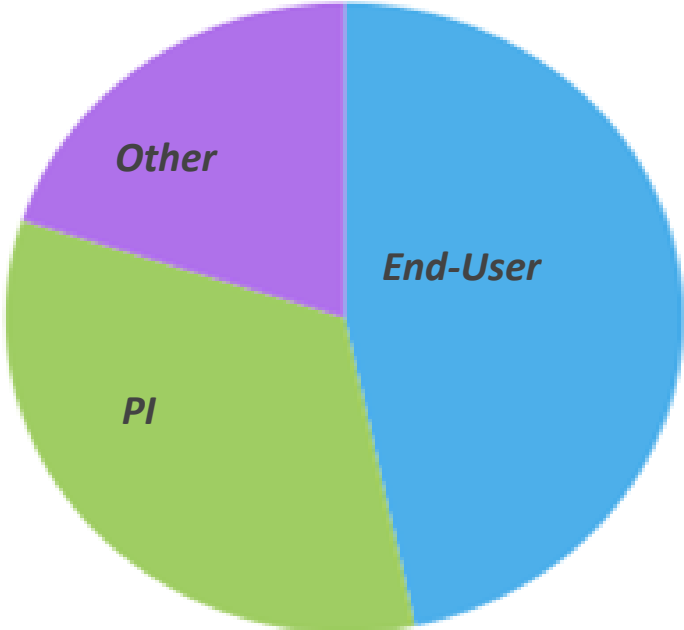
Are products still used by end user?

*I don't know*



## Transition

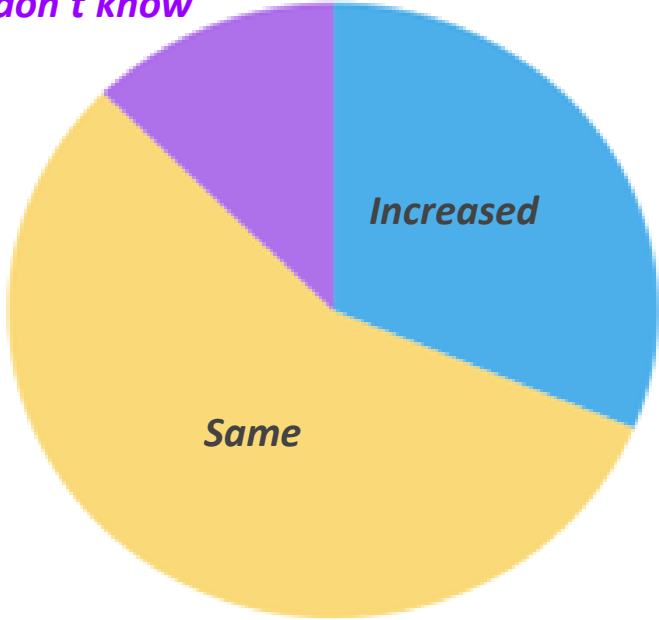
Who maintains the products?



## Advancement

Has ARL changed since the project ended?

*I don't know*





# **Interlude: Comments, Questions & Reflections**

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# Private-Sector Engagement Strategy

## VISION

To be the private sector's principal federal agency partner in enabling the use of Earth Science, expanding benefits to ever-growing audiences, and strengthening global sustainability.

## MISSION

To enable scalable application of Earth Science insights by the private sector through trusted and intentional relationships.

## PURPOSE

To build a larger end-user community, reach new audiences, and leverage resources. This activity will increase the use of NASA Earth Science information for decision-making processes by better understanding and addressing user needs and enabling scaling of applications and tools.

## GUIDING PRINCIPLES

Mutually Beneficial AS-PSE

Smart, Scalable, and Supported Methodologies

Enabling Pathways to Open Science

Coordinated Efforts and Consistent Messaging

### Partnership Targeting

### External Needs Assessment

### Engagement Mechanisms

### Data Access and Support Tools

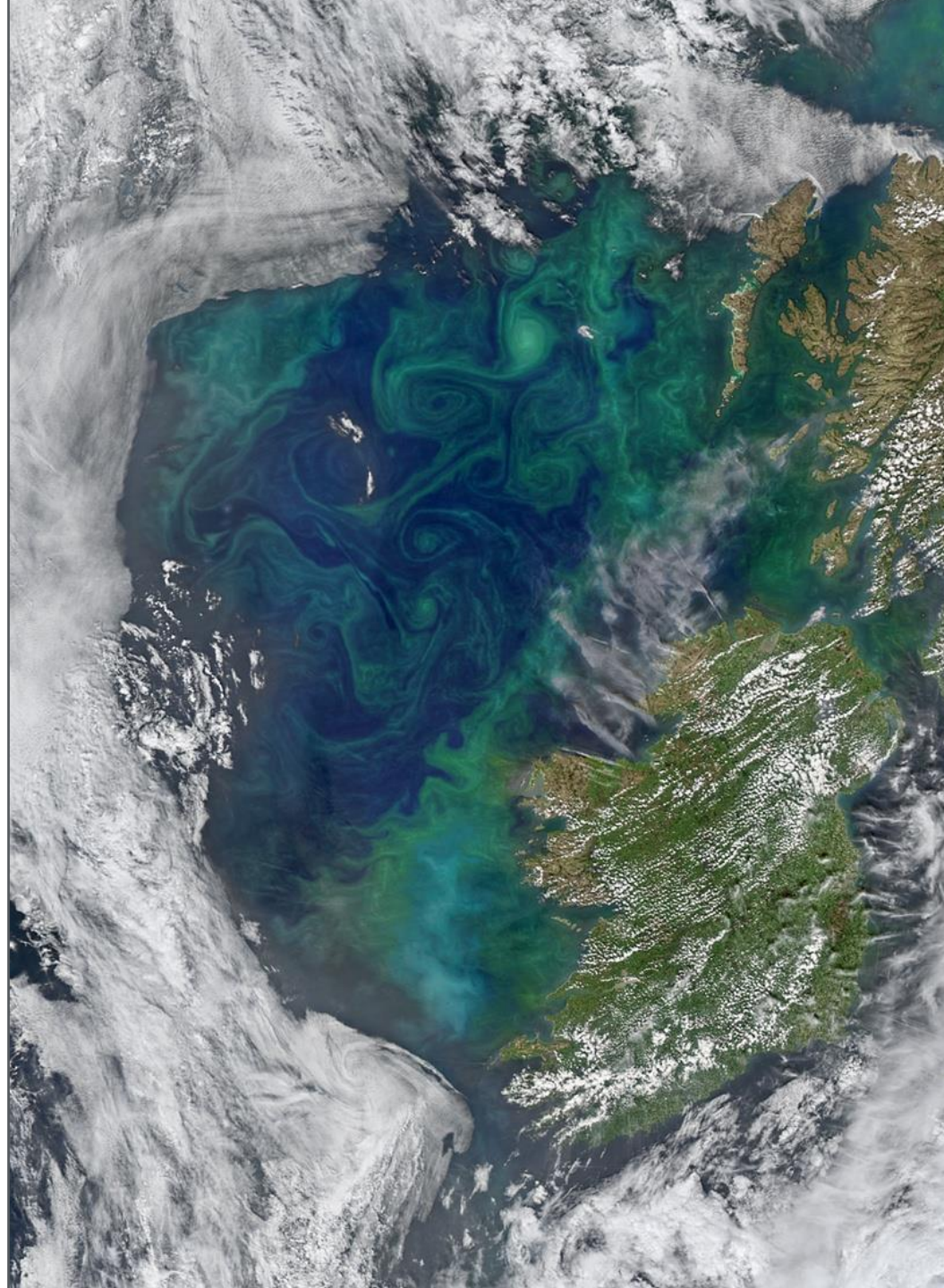
### Envisioned Success

Develop an adaptive targeting strategy that identifies, prioritizes, selects, and evaluates private-sector engagement in a mutually beneficial way.

Build an internal standard approach for all ASP members to conduct end-user needs assessment and market analysis that minimizes effort and maximizes the likelihood of success.

Create an enabling environment to collaborate and promote mutual learning and developing innovative financial mechanisms to enable engagement for the benefit of all involved organizations.

Enable private-sector entities to easily find, access, and utilize relevant data and tools and understand where to turn with questions on utilizing the information and products.



# Methods

## What is the past history of ASP PS engagement?

- Reviewed Projects funded by HAQ, EF, WR, and Disasters (2007-present)
  - 10 Solicitations
  - 80 Selected projects
  - 604 Team Members

## Where do we have clear indication for potential PSE?

- Reviewed past-history of ARSET training attendance (2009-2021)
  - 12647 private sector attendees (commercial and non-profit sector)
- Sessions spanned Climate, Disasters, Health/Air Quality, Water, and Land Management
  - Within just Land Management session (EF related):
    - 2514 Commercial attendees
    - 2788 Non-profit attendees

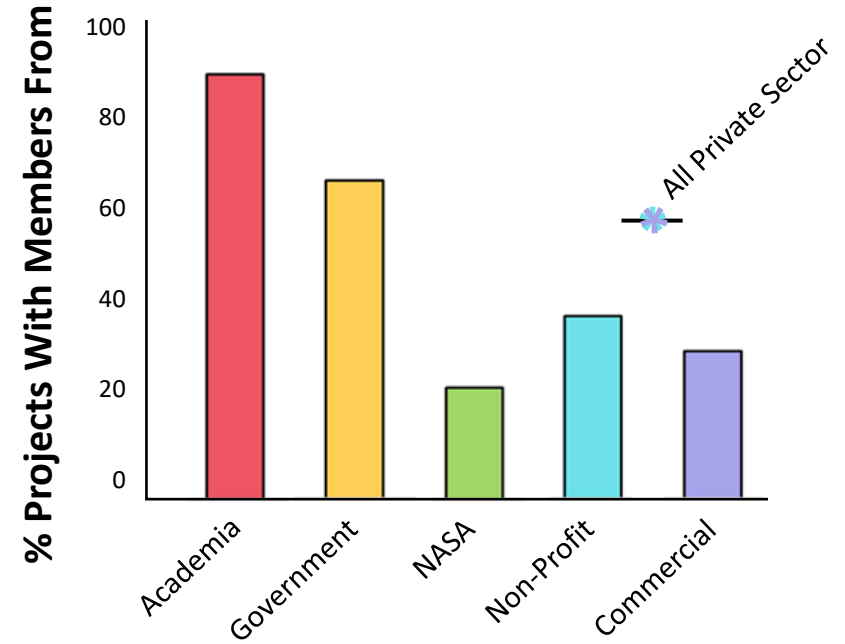
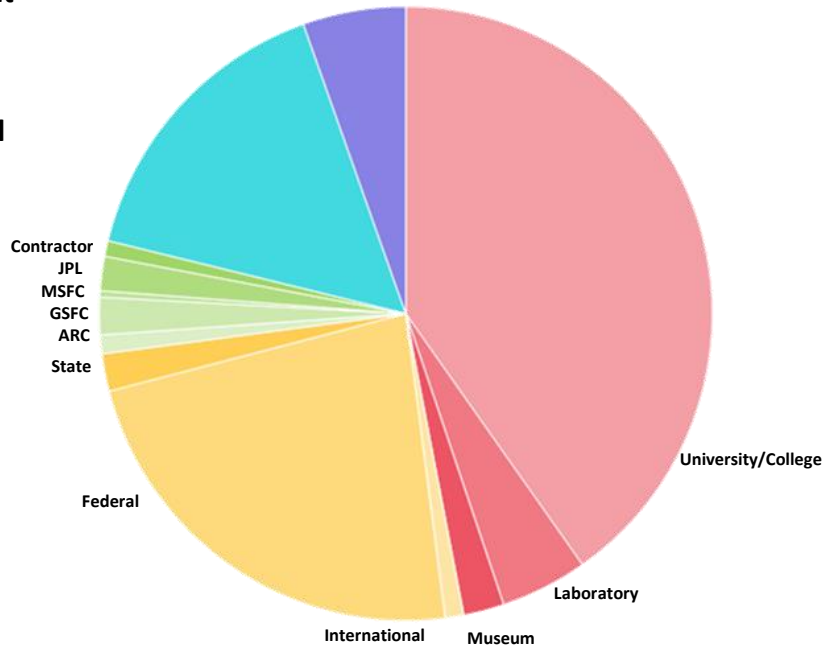
## EF Solicitations

- 07-DEC07
- 08-DEC08
- 08-FEAS08
- 10-BIOCLIM10
- 12-ECOF12
- 16-ECO4CAST
- 16-GEO16
- 18-ECOSTRES18
- 18-SLSCVC18
- 20-ECOF20

# What is the past history of EF PS engagement?

## Team Members

- Academia
- Government
- NASA
- Non-Profit
- Commercial



## Definitions

### Co-Investigators

Co-I, Co-I/Co-PI (non-US organization only), Co-I/Institutional PI, Co-I/Science PI

### Students

Graduate/Undergraduate Student, Postdoctoral Associate

### Support Roles

Support Staff, Consultant, Other Professional, Unlisted

	Academia	Government Agency	NASA	Non-profit	Commercial
PI	66%	6%	8%	15%	5%
Co-I	43%	32%	8%	12%	6%
Collaborator	39%	39%	3%	16%	5%
Support Roles	48%	5%	1%	40%	5%
Students	80%	15%	0%	0%	5%
<b>All</b>	<b>47%</b>	<b>26%</b>	<b>6%</b>	<b>16%</b>	<b>5%</b>

# What is the past history of EF PS engagement?

**Non-Profits 31** Total non-profit agencies previously involved in Ecological Forecasting Award



**Commercial 16** Total for-profit agencies previously involved in Ecological Forecasting Award





# Methods

## What is the past history of ASP PS engagement?

- Reviewed Projects funded by ASP (2007-present)
  - 21 Solicitations
  - Selected projects
    - 27 Disasters
    - 41 Health and Air Quality (HAQ)
    - 74 Water Resources (WR)
    - 80 Ecological Forecasting (EF)
  - 1,157 Team Members

## Does ASP PS engagement differ from R&A?

- Reviewed Projects funded by sister R&A programs (2007-present)
  - 28 Solicitations
  - Selected projects
    - 161 Earth Surface and Interior (ESI)
    - 170 Atmospheric Composition (AC)
    - 71 Terrestrial Hydrology Program (THP)
    - 59 Biological Diversity (BD)
  - 1,878 Team Members

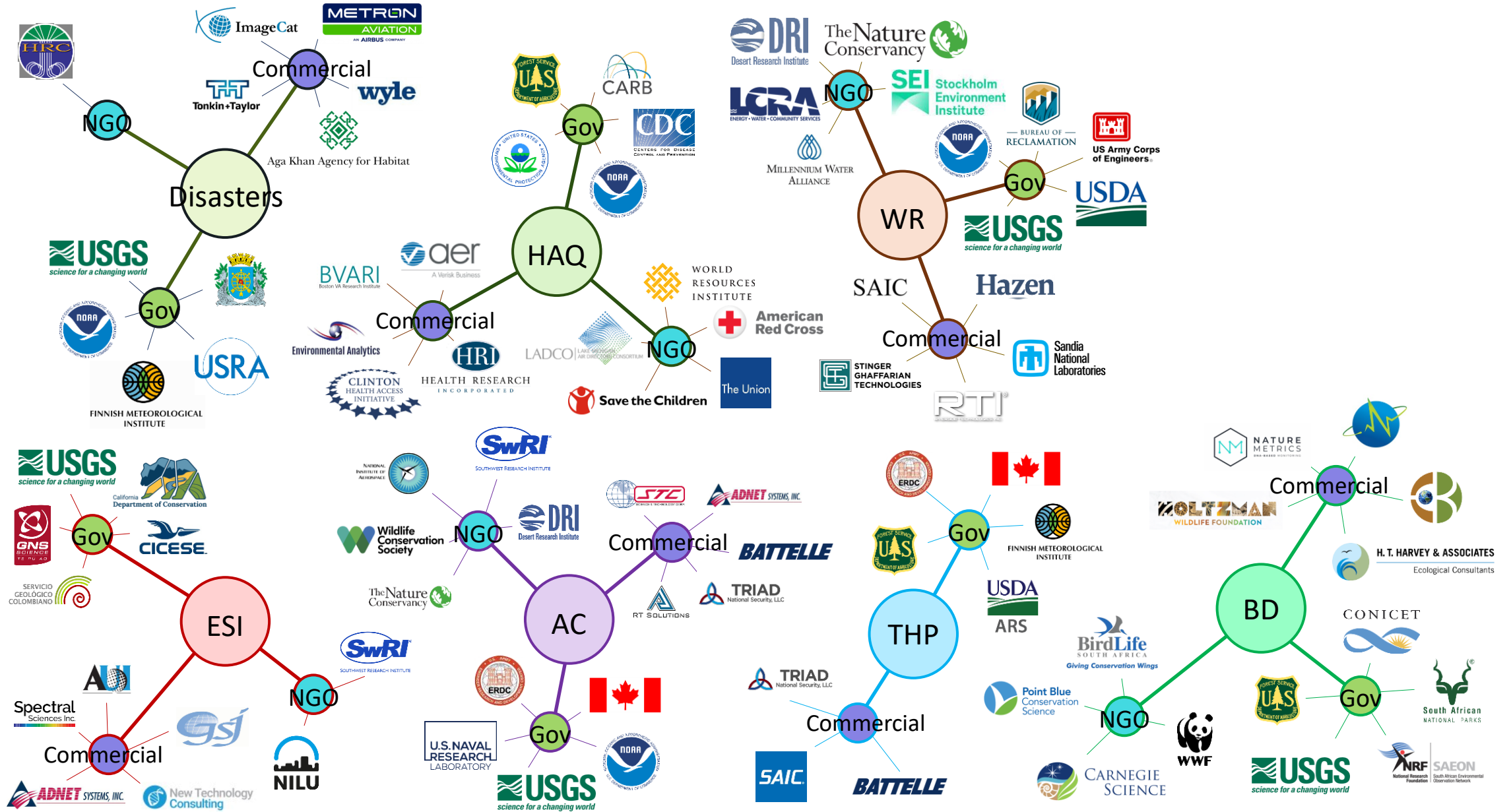
### ASP Solicitations

- 07-DEC07
- 08-DEC08
- 08-FEAS08
- 10-BIOCLIM10
- 12-ECOF12
- 16-ECO4CAST
- 16-GEO16
- 18-ECOSTRES18
- 18-SLSCVC18
- 20-ECOF20
- 11-DISASTER11
- 18-DISASTER18
- 13-HEALTH13
- 15-HAQST15
- 17-HAQ17
- 21-HAQ21
- 11-WATER11
- 13-WATER13
- 16-WATER16\_2
- 18-WATER18\_2
- 21-WATER21-2

### R&A Solicitations

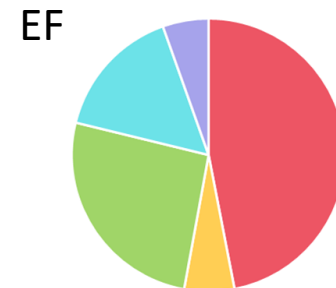
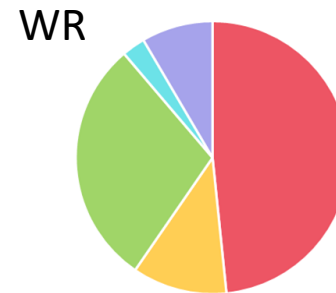
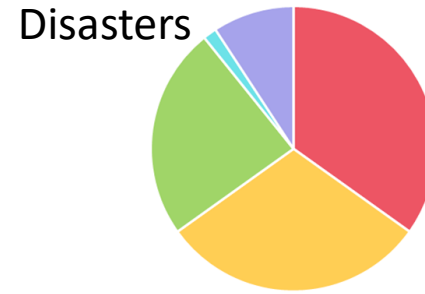
- 14-ACLS14
- 14-ACMAP14
- 14-ACSCS14
- 16-ACMAP16
- 16-UACO16
- 17-ACLS17
- 18-ACMAP18
- 20-ACCDAM20
- 20-ACLS20
- 08-BIODIV
- 15-BIODIV15
- 18-SLSCVC18
- 20-BIODIV20
- 21-BIODIV21
- 10-ESI10
- 13-ESI13
- 15-ESI2015
- 16-ESI16
- 17-ESI-17
- 18-ESI18
- 19-ESI19
- 20-ESI20
- 21-ESI21
- 13-THP13
- 16-THP16
- 17-THP17
- 19-THP19
- 20-THP20

# Most Common Project Participant Organizations



# 1. What is the past-history of ASP PS engagement?

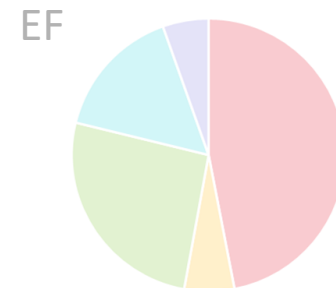
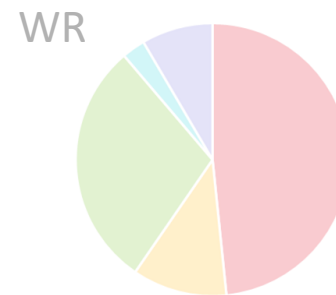
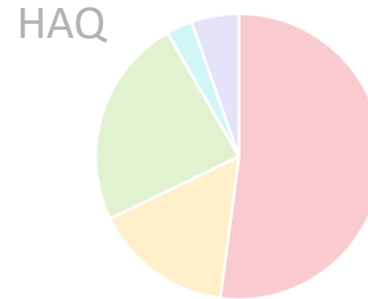
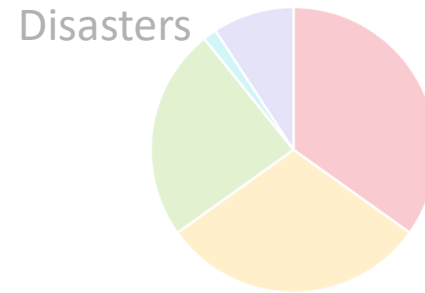
## Team Members



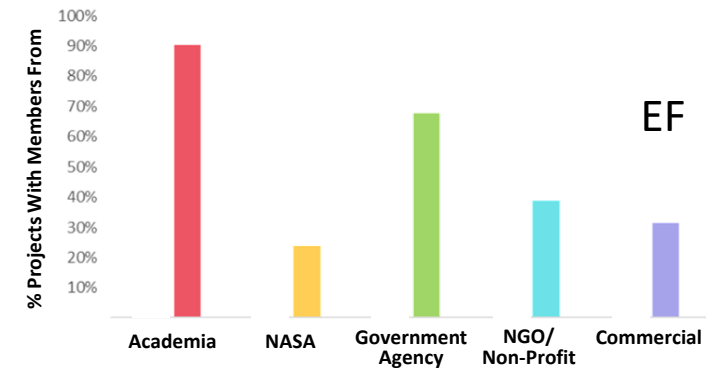
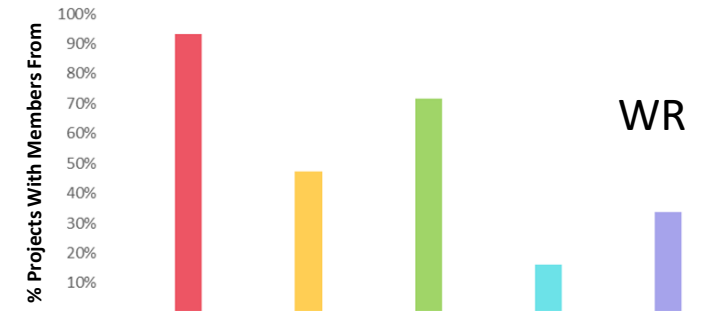
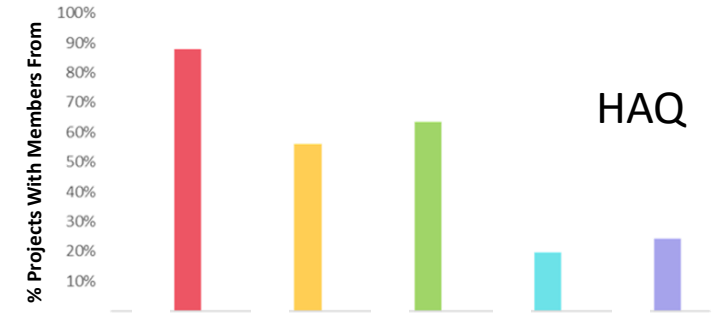
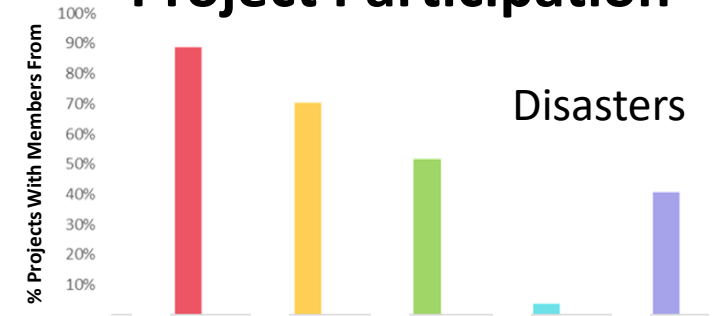
# 1. What is the past-history of ASP PS engagement?



## Team Members



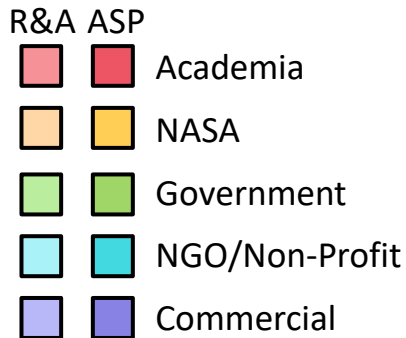
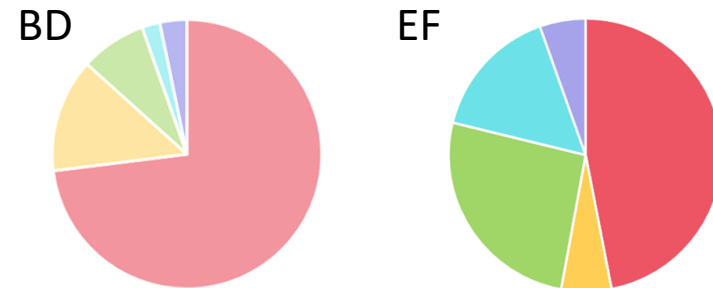
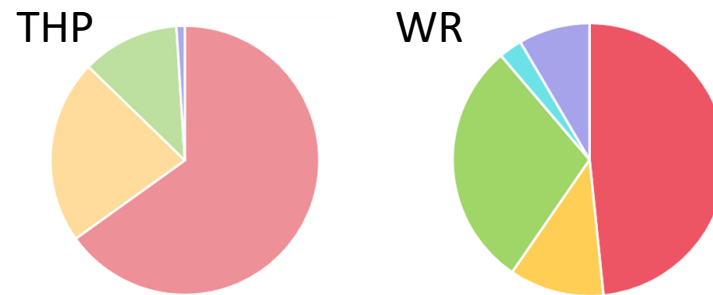
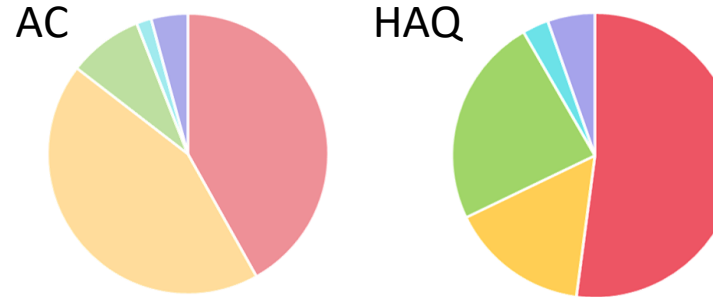
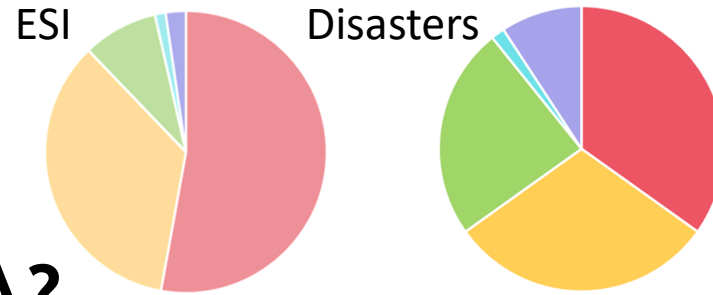
## Project Participation



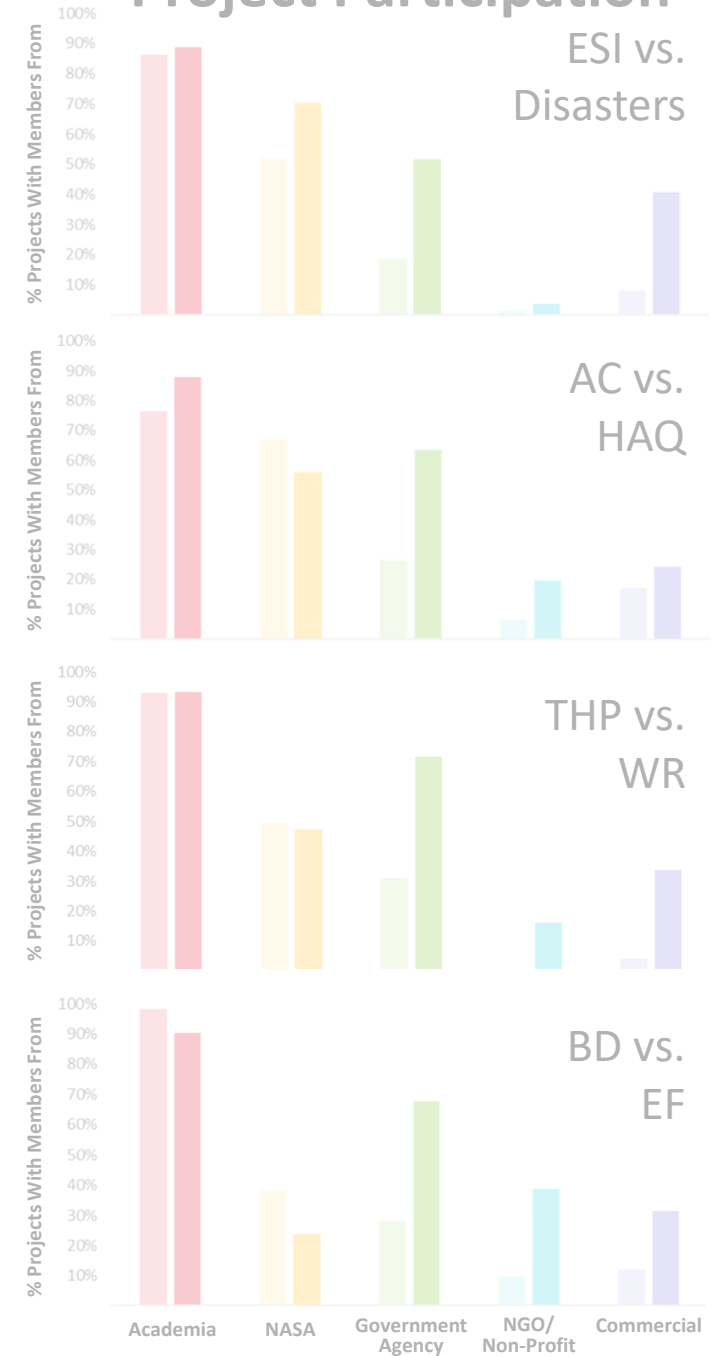


## 2. Does ASP PS engagement differ from R&A?

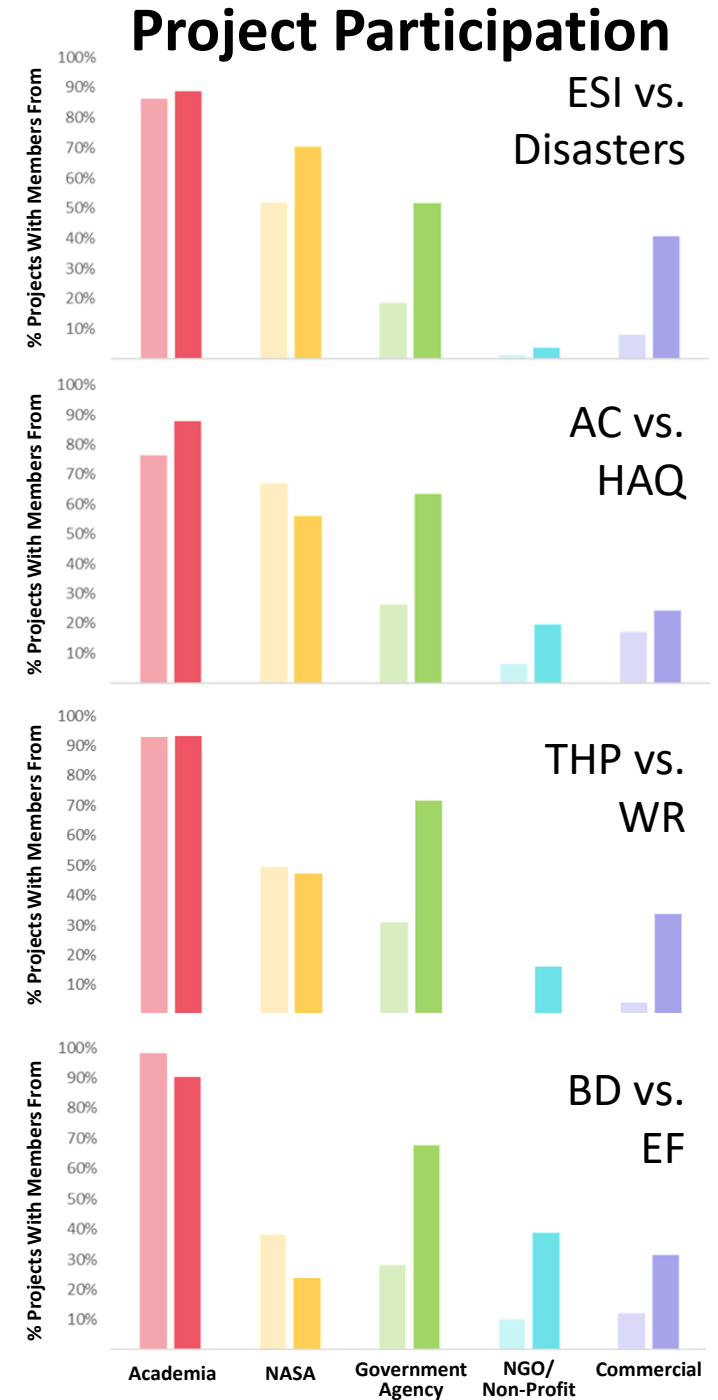
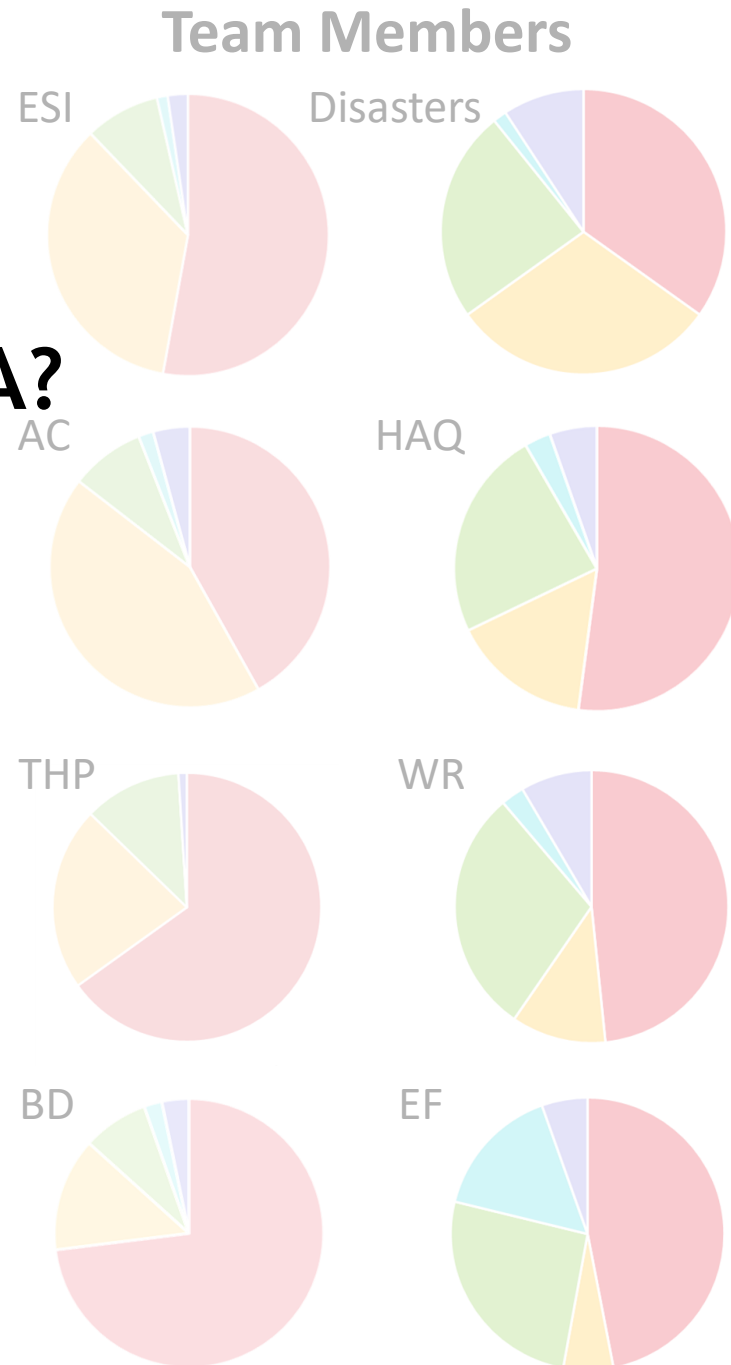
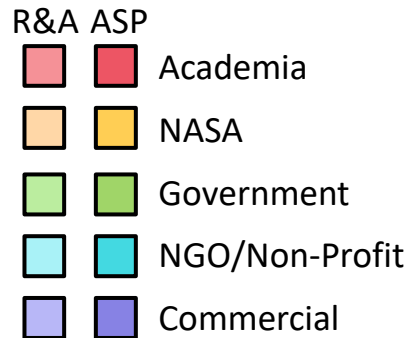
### Team Members



### Project Participation



## 2. Does ASP PS engagement differ from R&A?



Where do we have clear indication for potential PSE?

# Where do we have clear indication for potential PSE?

## Non-Profits



## Commercial





# **Interlude: Comments, Questions & Reflections**

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