

# PRAGMA 36: Overview and Updates

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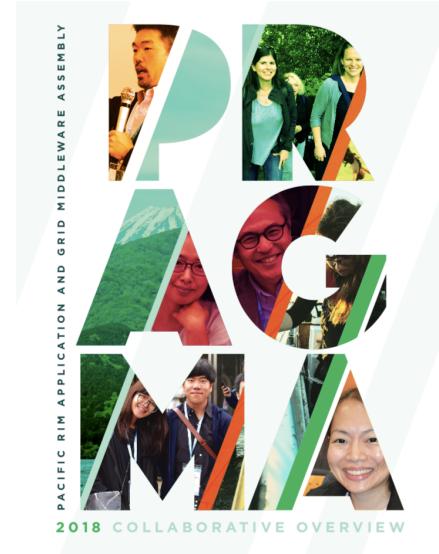


Current NSF award: OCI 1234983



**PRAGMA seeks to address these challenges to improve *CI and scientific impact via practical implementation*. We focus on international *collaborations that uniquely team technology specialists and domain scientists***

- Science is **inherently international** and requires collaboration.
- Cyberinfrastructure is only one dimension; **people and trust are also essential**
- Collaboration is **enabled by sharing and exchanging data, algorithms and tools**.
- There are fundamental challenges in matching existing CI to hundreds of communities. **Deep interactions with long-tail communities has the potential to transform both science domains and CI development**



Founded in 2002

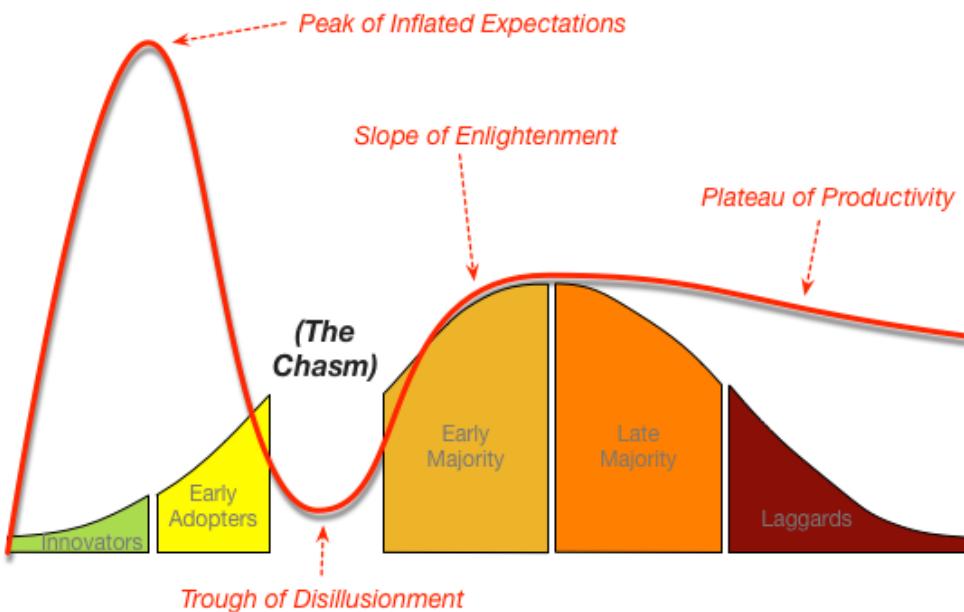
Focused on  
researchers and  
institutions on the  
Pacific Rim

Open Community of  
Practice

Engages “Long Tail”  
science communities

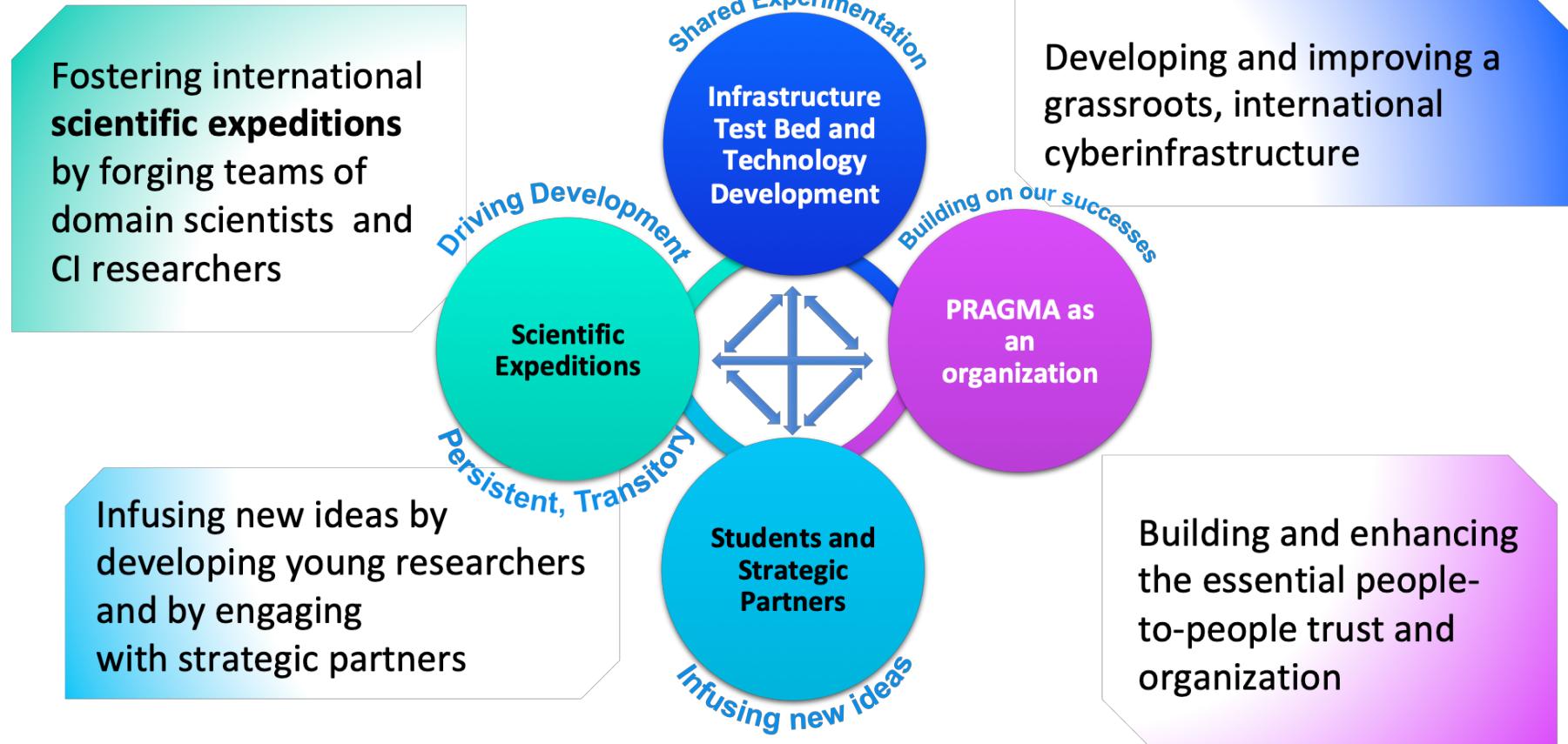


# Cyber technologists invent – but then how does one make long-term impact on domain science?



- Nearly all cyber (information) technologies follow the Gartner “hype” cycle
  - Grids, Clusters, Clouds, Big Data, Machine Learning, Software-Defined Networking, Workflows, IoT, AI, Cloud Orchestration...
- For domain scientists (non-CI)
  - What are the **potentially transformative** CI innovations
  - If I'm an early adopter or early majority, who can help me cross the chasm?

# Building Trusted Community of Practice through four strategies of collaborating



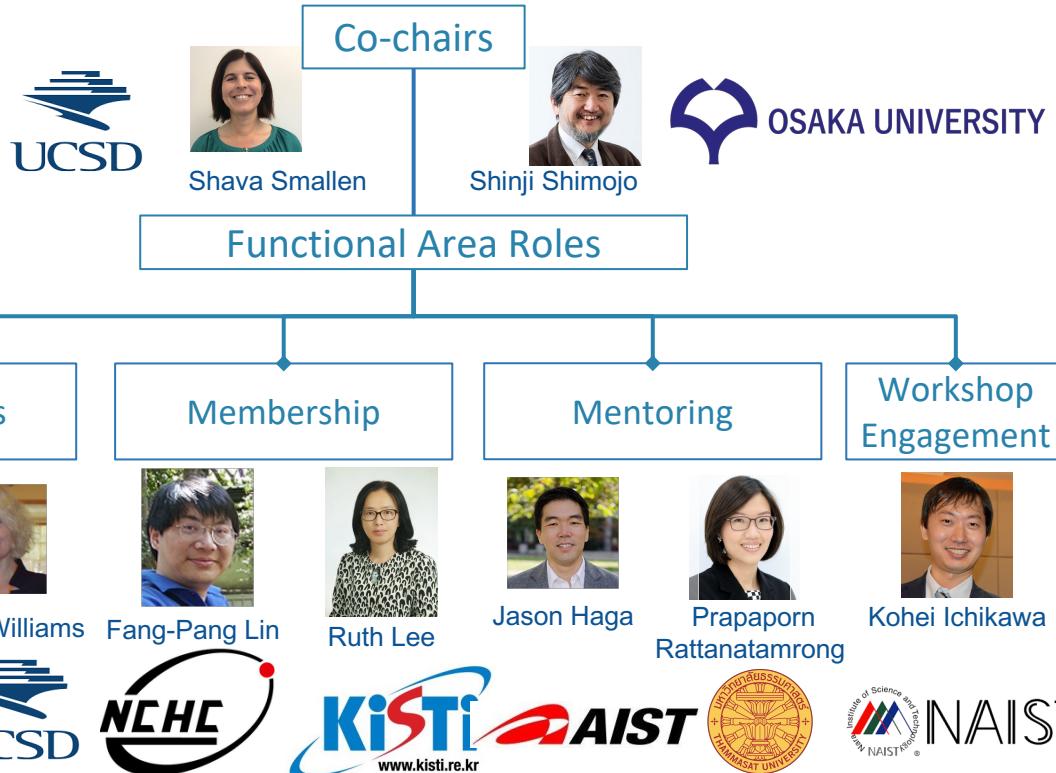
## PRAGMA Steering Committee (23 representatives)

### Operating Principles and Procedures

### Working Groups

- Bioscience
- Cyberlearning
- Resources and Data
- Telescience

### Student Committee



# Expeditions: A Model of Collaboration



Domain Scientists

Long-Term sustained effort to answer scientific question(s) through co-design



Technology Developers

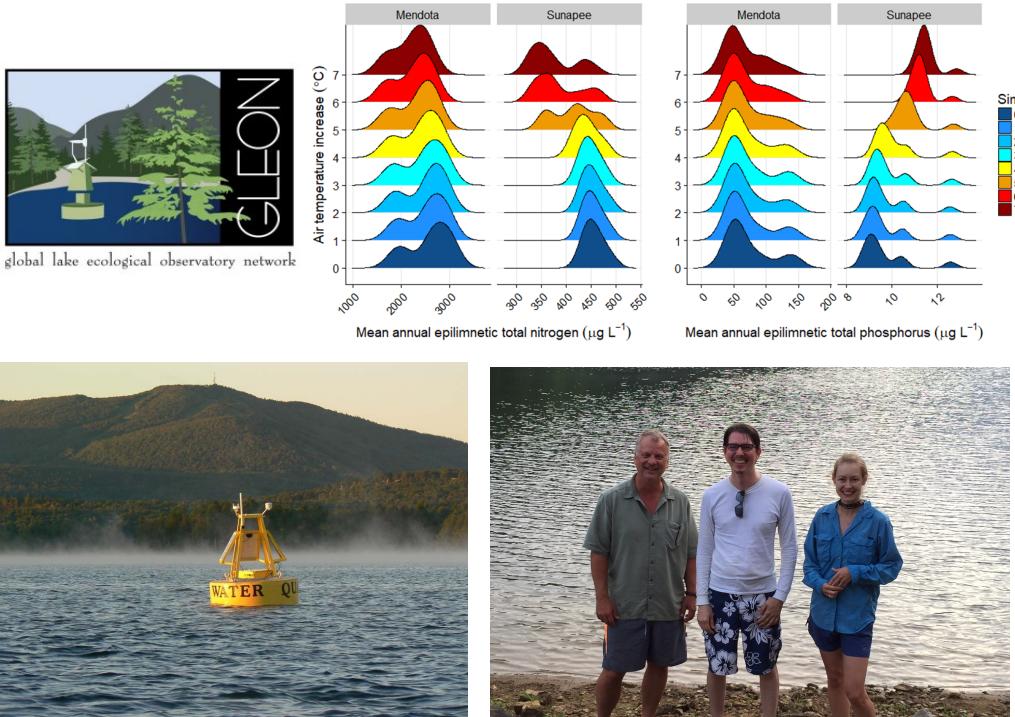
## Expeditions

**Lake Ecology:**  
understand the processes that govern lake eutrophication and predict water quality

**Biodiversity:**  
understand spatial patterns of biological diversity and how they emerged

**PRAGMA Experimental Network Testbed (ENT):**  
understand impact of software defined networking in international context

- **Eutrophication:** excessive richness of nutrients in a lake or other body of water, frequently due to run-off from the land, which causes a dense growth of plant life.
- **Lake eutrophication** is global issue, results in **degraded water quality**
- **Goal:** Integrate sensor data as inputs to **computational lake models** → science goal is to *predict water quality*

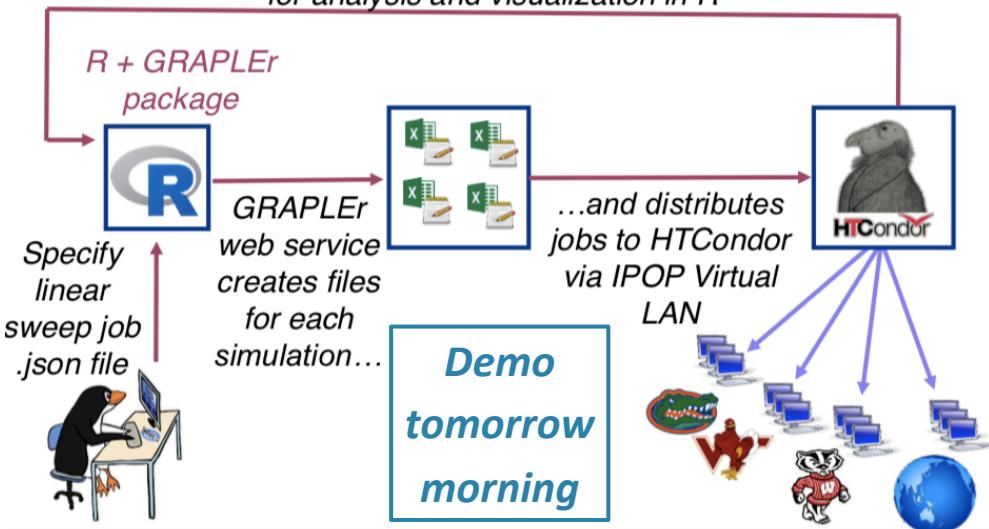


- **Sensor gateways** link sensors to internet (connecting to storage and models)
- **IPOP overlay network** create virtual private network for sensor data and computation
- **GRAPLER distributed computing** uses an R interface to allow ecologist access to distributed computing
- **Educational Modules** educate future generations in computational skills (currently at 12 universities)

*Prof Carey teaching students to use GRAPLER at VaTech*



*Outputs from model runs are aggregated and returned to user for analysis and visualization in R*



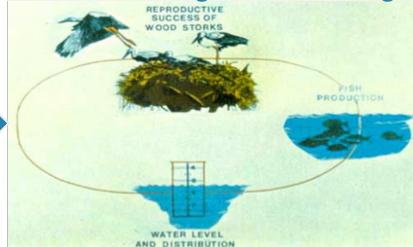
# Biodiversity Expedition: Virtualizing Lifemapper for distributed analysis of biological diversity

Lifemapper brings together

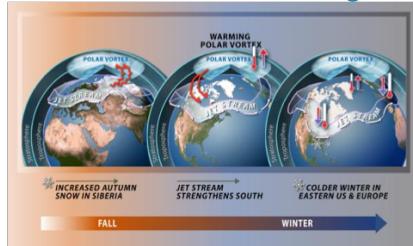
## Biodiversity Inventory



## Macroecological Modeling



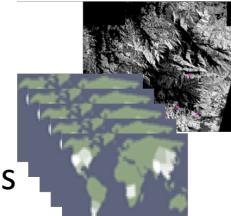
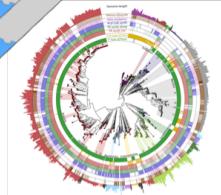
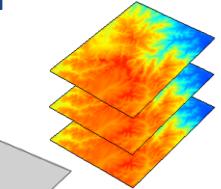
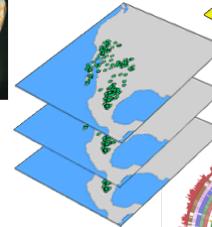
## Global Climate Change



**Biodiversity:** understand spatial patterns of species diversity and how they emerged

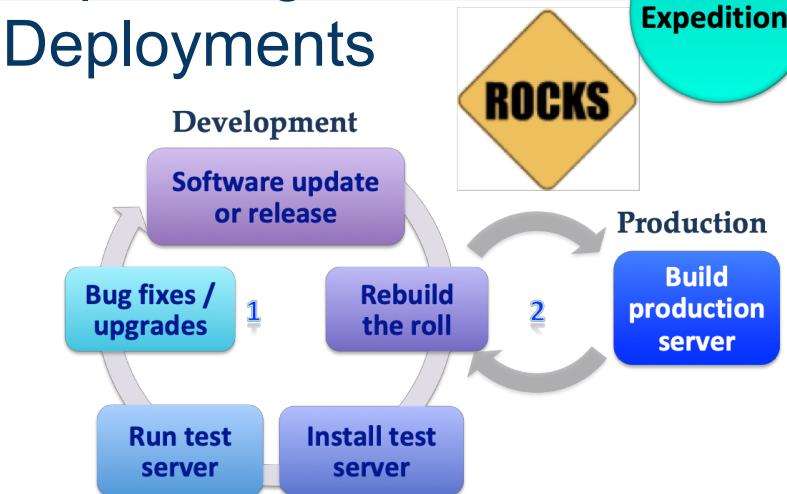
**Goal:** address large-scale biodiversity questions of ecological and evolutionary importance

- **Inputs**
  - Species occurrence points
  - Bioclimatic layers
  - Phylogenetic trees
- **Tools**
  - Species Distribution Modeling (SDM)
  - Macroecological analyses
  - Meta-Community Phylogenetic Analyses
- **Results**
  - Species potential habitat “niche” maps
  - Biodiversity / phylogenetic diversity analyses



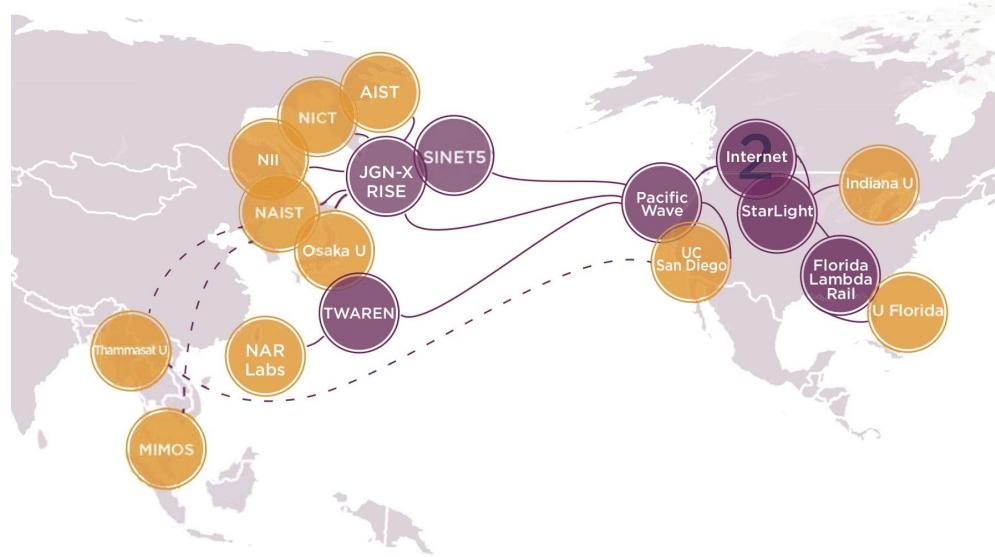
# Biodiversity Expedition: Expanding and Enhancing Lifemapper Deployments

- **Software engineering and using Rocks** clusters increased availability and flexibility of the Lifemapper platform as a complete system
- **Lifemapper deployed in a variety of environments** such as researcher laptops, project servers, HPC resources (US XSEDE Comet)
- **Working to facilitate data ingestion** to enable regional Lifemappers that use locally-available high resolution data
- **Training**



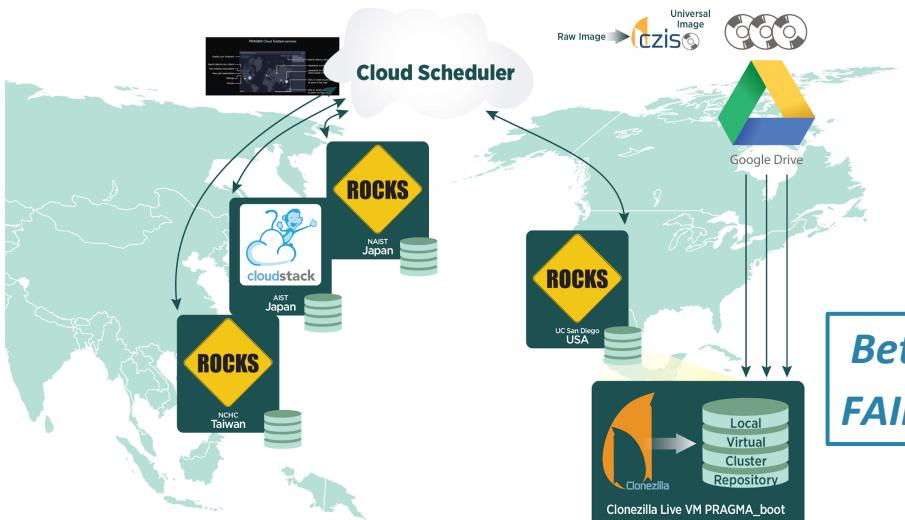
Kohei Ichikawa (NAIST)

- **Software-defined networking (SDN)** provides programmatic access to networking switches
- **Goal:** an international SDN testbed for use by PRAGMA researchers and collaborators
- **4 countries and 11 institutions** currently participate in testbed
- Using NAIST's **AutoVFlow** as a openflow meta controller
- **Numerous Publications** (e.g., Efficient Packet Header Rewriting (PARES) and Multipath TCP)



- **IPOP overlay network** allows tunneling of traffic from/to SDN-programmed switch ports across the Internet
- Integrate **Open vSwitch** (software-based SDN switches) at the edge

## PRAGMA Cloud Testbed

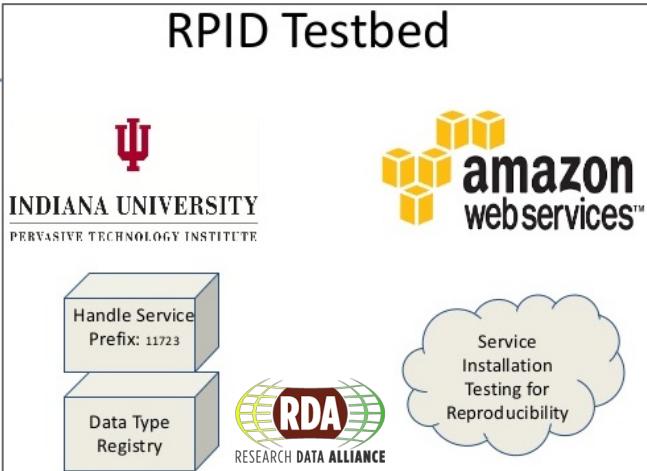


**AIST**  
NATIONAL INSTITUTE OF  
ADVANCED INDUSTRIAL SCIENCE  
AND TECHNOLOGY (AIST)

AI Bridging Cloud  
Infrastructure  
(37 PF - 5th in Top  
500)



Taiwania 2  
(15 PF - 20<sup>th</sup> in  
Top 500)



*Beth Plale will provide an overview of Open Science, FAIR data, and Cyberinfrastructure at 11:40am today*

*Weicheng Huang will provide an overview of Taiwania 2 tomorrow at 9:20am*

## PRAGMA Student Committee



Wassapon  
Watanakesuntorn



Can Wu



Chiao-Ning Chuang



Kundjanasith  
Thonglek



Suchanat  
Mangkhangcharoen

## International Research Experiences



# PRIME

Pacific Rim Experiences for UCSD  
Undergraduates (2004-2015)



MONASH University

MURPA  
(2008-current)



THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA

QURPA  
(2014-current)



 **AIST**  
NATIONAL INSTITUTE OF  
ADVANCED INDUSTRIAL SCIENCE  
AND TECHNOLOGY (AIST)

Internship Program  
(2014-current)

Undergraduate projects  
(2016-current)

  
**CNU**  
충남대학교  
CHUNGJANG NATIONAL UNIVERSITY

Undergraduate internships  
(2017-current)

# Workshops: Driving progress and fostering new ideas, launching new activities

PRAGMA  
as an  
organization

PRAGMA workshops held two times a year (location rotates) + affiliated workshops



*Jose Fortes will provide an overview of  
CENTRA at 11:20am later today.*



- **114 participants** registered for main PRAGMA workshop, pre-workshop, or student workshops, 70 participants are international
- **44 posters** (lightening talks and posters session today), 2X more than previous years!
- **11 demos** (Friday)
- Keynote from **Dr. Kim (Kookmin University)** and invited talks from **Dr. Han (KAIST)**, **Dr. Lee (KISTI)**, **Dr. Choi (Kyungpook National University)**, and **Dr. Ahn (KISTI)**
- Invited talk from PhD student **Annika Smith (Univ of Florida)** on **iDigBio**
- CENTRA & PRAGMA **Networking and Collaboration Day**

# Working Groups: Organizing our activities, goals, and structure

## Resources and Data

Investigates current technology trends and evaluates their potential beneficial impact on applications from PRAGMA's applications. **Current projects** include the PRAGMA Cloud Testbed, the Experimental Networking Testbed, Open Data Platform, Containers/Kubernetes, GPUs/Machine learning, and Monitoring

## Cyberlearning

Developing simulation-based learning technology with current focus on EDISON. Merging discussions with Resources and Data.

**3 EDISON demos tomorrow morning**



Nadya Williams



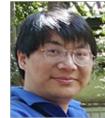
Hsiu-Mei Chou



Ruth Lee

## Telescience

Making and improving access to or use of remote equipment (e.g., tiled-display walls or sensors). **Current application areas** of the group include environmental monitoring and traffic flow.



Fang-Pang Lin



Shinji Shimojo

## Biosciences

Creating stable infrastructure to perform computational genomics analyses with a focus on rice breeding and integrating technologies to create an infrastructure to advance the screening of potential compounds to combat infectious diseases.

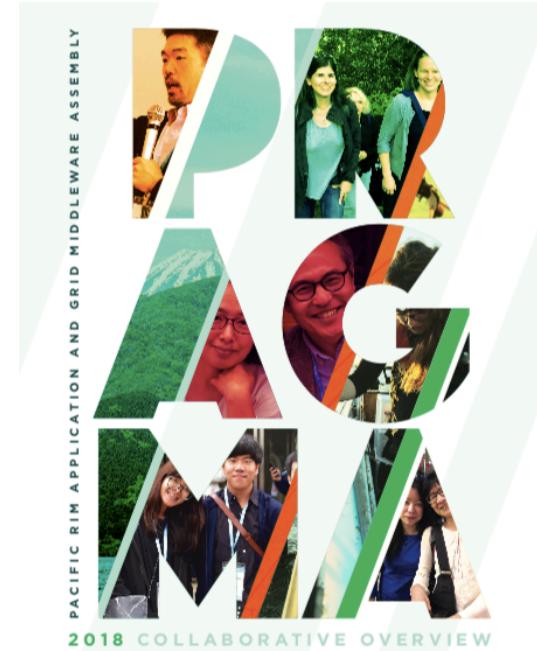


Jason Haga

**Meet twice during this meeting to review progress and decide on action items for next meeting. Everybody is welcome to participate and share your ideas.**

## Steering Committee Items this meeting

- Updates from FAR leads (Communications, Membership, Mentoring, Workshop Engagement)
- Membership
- Updates on US funding
- Upcoming workshops
- Revising format of Collaborative Overview
- Other topics



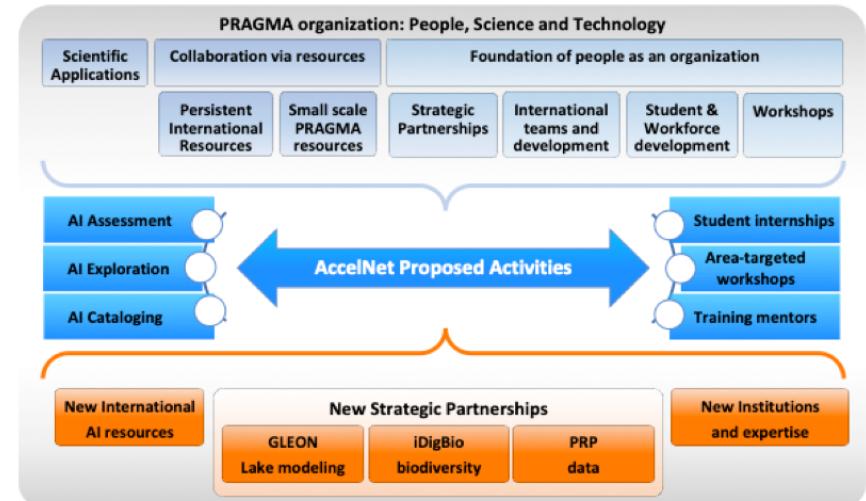
**Steering Committee members will meet tomorrow during lunch**



- 1-year NSF supplement proposal runs thru 2019, Smallen (PI), Williams (Co-PI)
- Renato, Shava, Nadya, Paul, Cayelan and Jim visited NSF in November 2018 to give formal presentation and meet with several program officers
- **“Glue” Money:** Training and AI-focused AccelNet proposal submitted end of February 2019, Smallen PI, Williams (Co-PI), Figueiredo (Co-PI)

*Thank you to Peter for mentoring support!*

- **“Do” Money:** TBD



**AccelNet:** Leveraging PRAGMA's international collaborative networks to accelerate scientific advancement and training of the next generation of researchers



UF UNIVERSITY of  
FLORIDA



WISCONSIN  
UNIVERSITY OF WISCONSIN-MADISON

Thank you to everyone who signed letters of collaboration!



Center of Excellence for Women in Technology



global lake ecological observatory network



INDIANA UNIVERSITY



香港大學

THE UNIVERSITY OF HONG KONG



UNIVERSITI SAINS MALAYSIA



THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA





## Thank you to our local PRAGMA 36 chair Ruth Lee and program committee



**Buyoung Ahn**, KISTI

**Jaeou Chae**, CDSSE Co.

**Jaiho Oh**, Pukyong National University

**James Junghun Shin**, KISTI

**Jongseong Lee**, KISTI

**Karpjoo Jeong**, Konkuk University

**Soohong Lee**, Yonsei University

**Soonwook Hwang**, KISTI

**Sik Lee**, KISTI

**Sungho Kim**, Konkuk University

**Woojin Seok**, KISTI





# Thank you to our PRAGMA 36 Program Committee



**Aimee Stewart**, KU Biodiversity Institute, USA

**Beth Plale**, Indiana University & NSF, USA

**Fang Pang Lin**, NCHC, Taiwan

**Grace Hong**, University of Florida, USA

**Habibah A. Wahab**, Professor, Universiti Sans Malaysia

**Heru Suhartanto**, Universitas Indonesia, Indonesia

**Hongliang Li**, Jilin University, China

**Hsiu-Mei Chou**, NCHC, Taiwan

**Jason Haga**, AIST, Japan

**Jelina Tetangco**, ASTI, Philippine

**José Fortes**, University of Florida, USA

**Kumwon Cho**, KISTI, Korea

**Nadya Williams**, University of California San Diego, USA

**Nurul Malim**, Universiti Sains Malaysia, Malaysia

**Peter Azberger**, University of California, San Diego, USA

**Renato Fuigeredo**, University of Florida, USA

**Shinji Shimojo**, Osaka University, Japan

**Siddeswara Guru**, University of Queensland, Australia

**Sri C. Haryanti**, Universitas YARSI, Indonesia

**Susumu Date**, Osaka University, Japan

**Weicheng Huang**, NCHC, Taiwan



INDIANA UNIVERSITY



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OF QUEENSLAND  
AUSTRALIA





## Next Meeting

PRAGMA 37 San Diego, USA, September 11-14 2019

PRAGMA 38 TBD

**Software:** <https://github.com/pragmagrid>

**Web:** [www.pragma-grid.net](http://www.pragma-grid.net)

**Info:** [pragma-discussion@googlegroups.com](mailto:pragma-discussion@googlegroups.com)

**US Participation enabled through SAVI: PRAGMA--ENABLING SCIENTIFIC EXPEDITIONS AND INFRASTRUCTURE EXPERIMENTATION FOR PACIFIC RIM INSTITUTIONS AND RESEARCHERS (NSF Award # OCI 1234983)**