

Progress Since PRAGMA 22

Look to the Future

PRAGMA 23 Overview

Konkuk University

Seoul Korea

10 October 2012

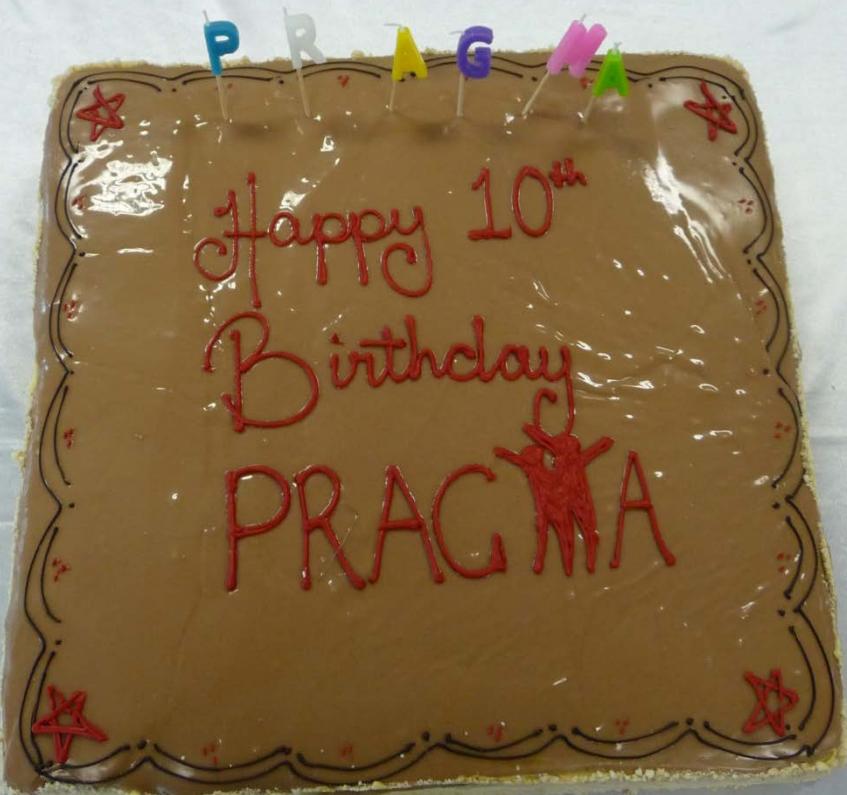
From PRAGMA 22 to PRAGMA 23

WELCOME TO PRAGMA 23 IN SEOUL, KOREA



The upcoming PRAGMA 23 Workshop is scheduled to be hosted by Konkuk University in Seoul, Korea on Oct 10-12, 2012.

From 10 Year Birthday to 5 More Years



April 2012

National Science Foundation
WHERE DISCOVERIES BEGIN

SEARCH
NSF Web Site

Home Funding Awards Discoveries News Publications Statistics About FastLane

Awards

Award Abstract #1234983
SAVI: PRAGMA - Enabling Scientific Expeditions and Infrastructure Experimentation for Pacific Rim Institutions and Researchers

NSF Org:	OCI Office of CyberInfrastructure
Initial Amendment Date:	September 20, 2012
Latest Amendment Date:	September 20, 2012
Award Number:	1234983
Award Instrument:	Standard Grant
Program Manager:	Kevin L. Thompson OCI Office of CyberInfrastructure O/D OFFICE OF THE DIRECTOR
Start Date:	October 1, 2012
Expires:	September 30, 2017 (Estimated)
Awarded Amount to Date:	\$5693064

UC San Diego
Indiana University: Data Provenance
U Florida: Overlay Experiments
Biodiversity Expedition
U Wisconsin: Lake Eutrophication

September 2012



Welcome New Members of NSF-Funded PRAGMA Team

- Jose Fortes, U Florida
 - Overlay Network Experiments
- Renato Figueiredo, U Florida
 - Overlay Network Experiments
- Reed Beaman, U Florida
 - Biodiversity Expedition
- Beth Plale, Indiana University
 - Data Provenance
- Paul Hanson, U Wisconsin
 - Lake Ecosystem Expedition

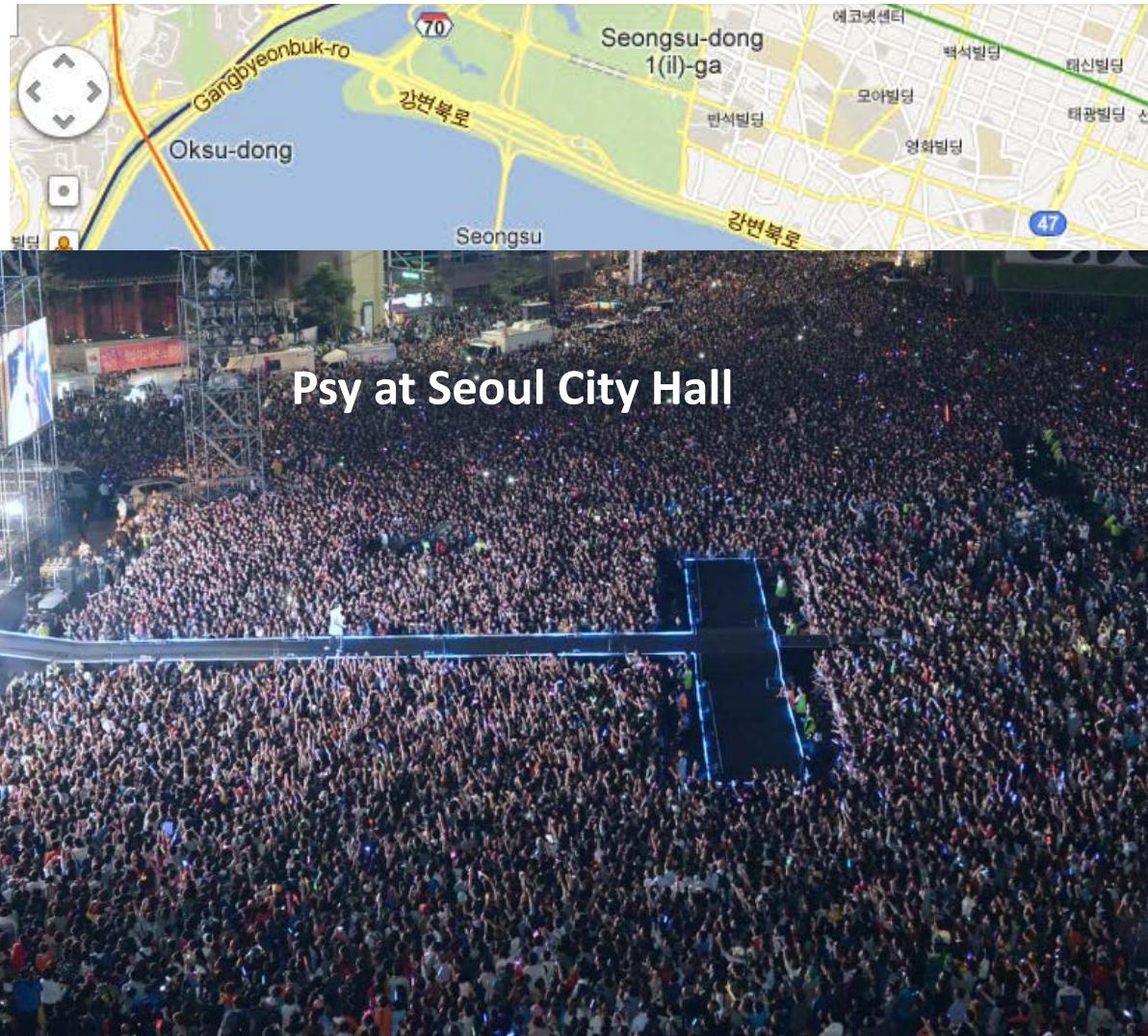


Overarching Theme in NSF PRAGMA Renewal: To Enable Team Science

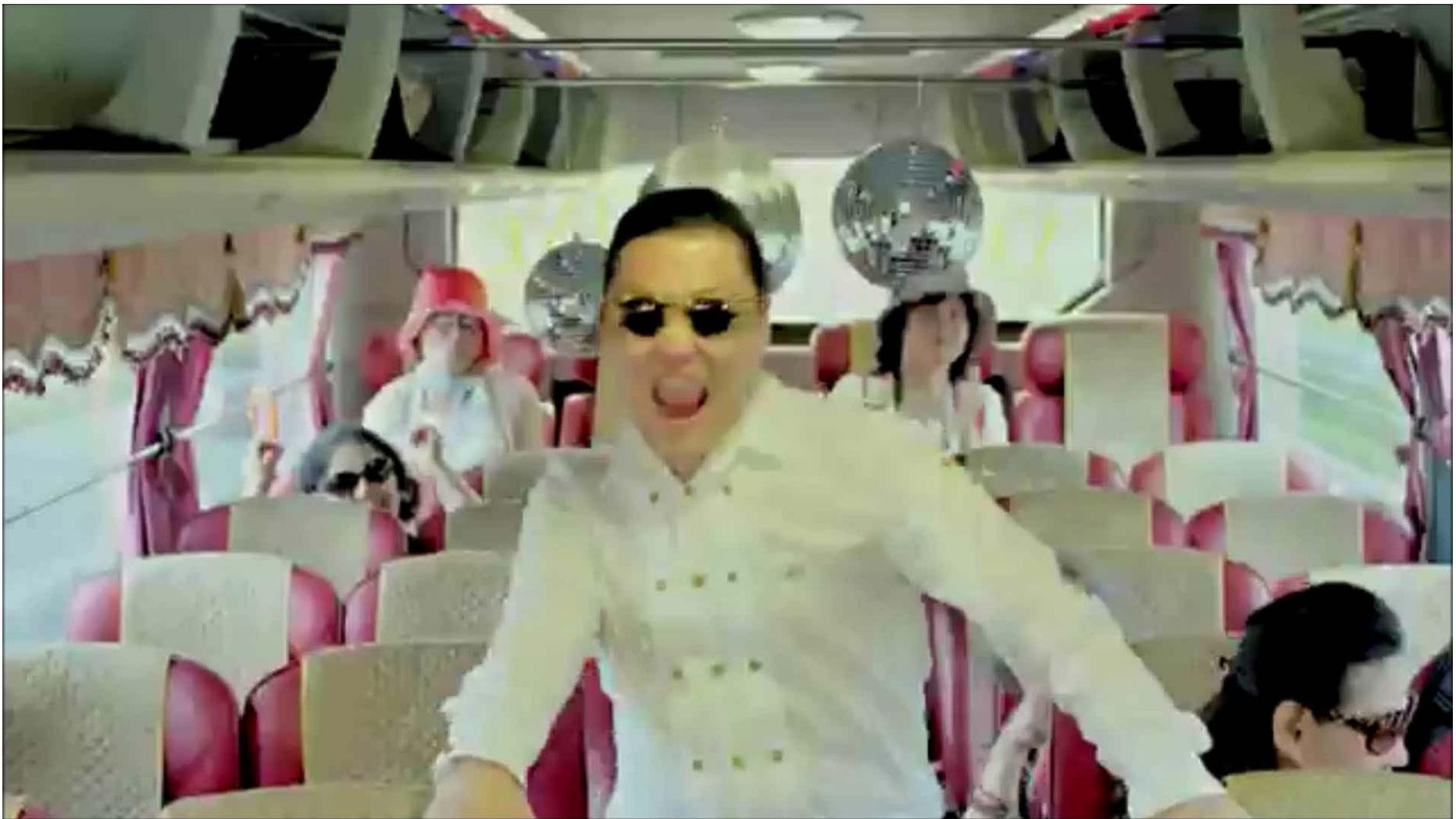
- Construct international scientific expeditions
- Develop and improve a grassroots, international cyberinfrastructure
- Infuse new ideas through students and strategic partners
- Build and enhance the essential people-to-people trust fabric



For our Renewal Karpjoo Promised A Celebration!



Celebrate Gangnam Style



Celebrate Gangnam Style

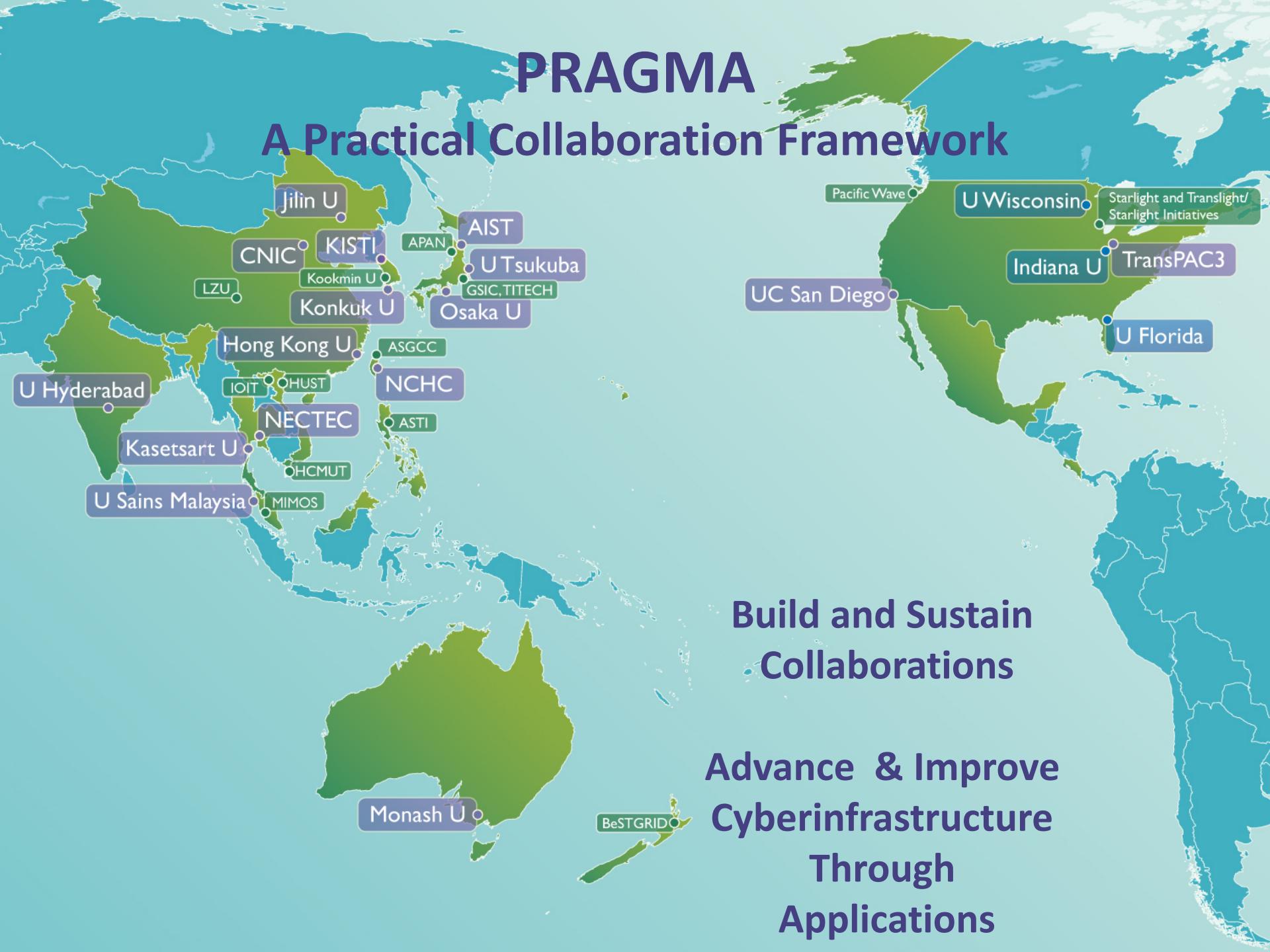


Time of Opportunity!

- Define Our Future
 - Best time to plan for the next renewal is when the award arrives
- Engineer Impact
 - Identify beneficiaries: The value of our tools is in their use by others
- Re-examine Processes / Procedures
 - Will the next ten years be like the last ten?

PRAGMA

A Practical Collaboration Framework



Build and Sustain
Collaborations

Advance & Improve
Cyberinfrastructure
Through
Applications

Highlights of 2011 - 2012



- Biodiversity “Expedition”
- Deployable Observing Systems
- VM & VC Migration: Phase 3
- Overlay Networks
- Data Clouds
- PRAGMA Students
- Strategic Outreach

“international-collaborative-research-diverse-inspirational-fun”

Understanding Adaptation in Extreme Environments: A Scientific Expedition*



- Advancing Science and Technology
 - Data discovery and sharing
 - Predicting species distribution
 - Focus: Mt Kinabalu

- First Step: 6 months
 - Biodiversity Exchange using PRAGMA Cloud: Demo – Uma Pavalanathan
- Longer Term:
 - Private networks
 - Satellite and Sensors
- Build people network
- Participants
 - Reed Beaman (UF), Beth Plale, Umashanthi Pavalanathan; Yuan Luo (IU), Shashir Shamshir (UTM, MY), Aimee Stewart (KU), Antony Van der Ent (UQ, AU), Yoshio Tanaka (AIST, JP)

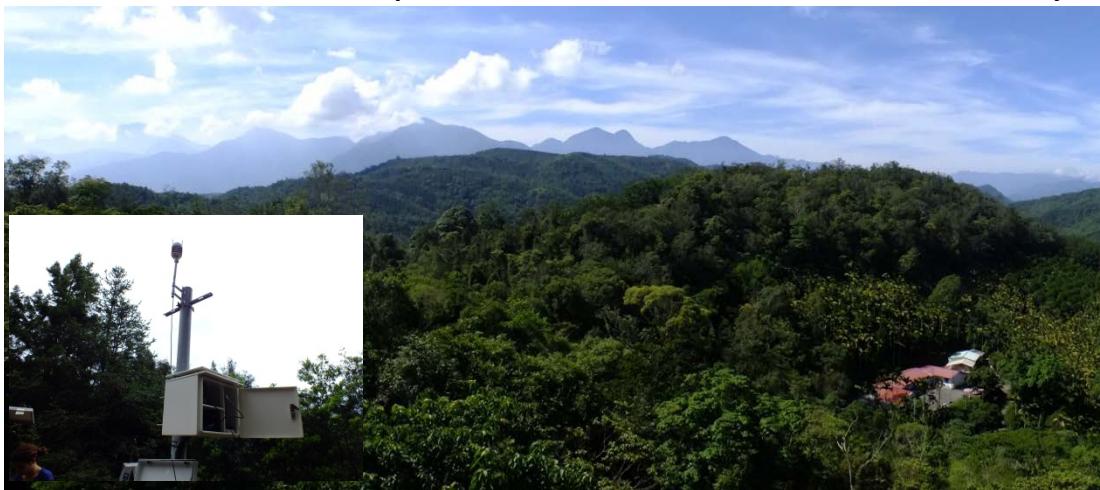
Re-deployable Sensor Networks Extending CI to Sensor Networks



Crystal Lake, Wisconsin, US
Experimental Management to
Control Invasive Species



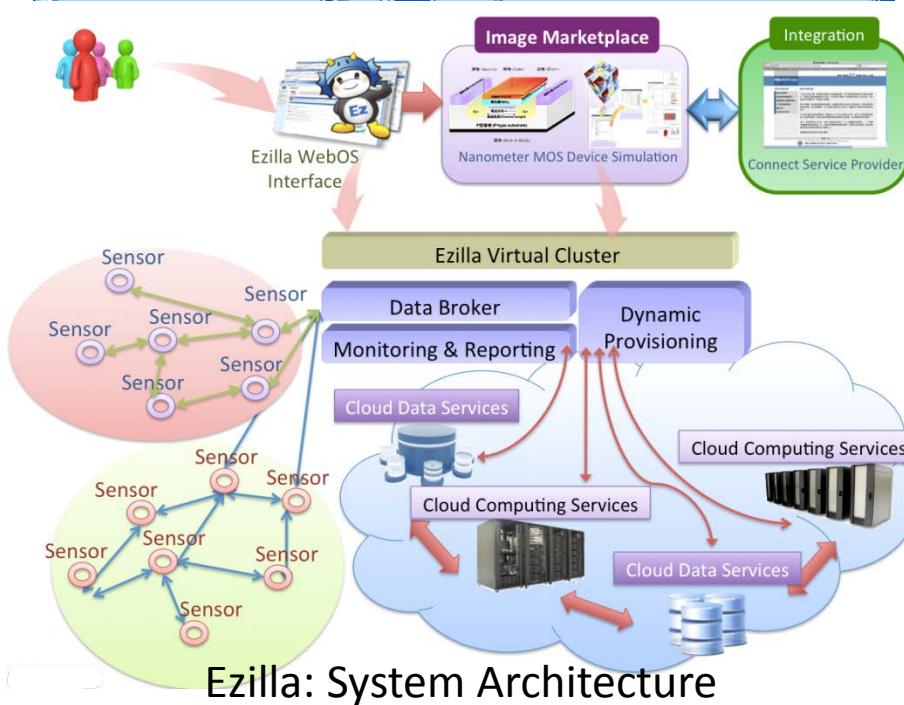
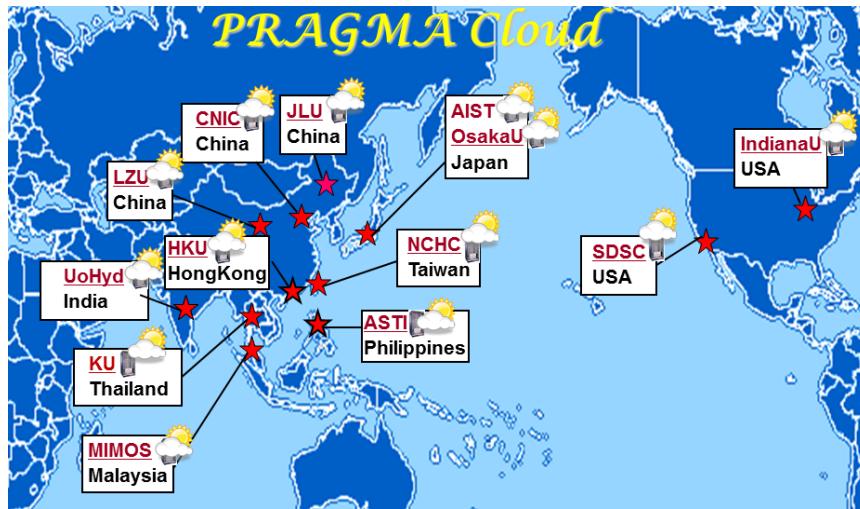
Moorea, French Polynesia
Ocean Acidification on
Coral Reef Ecosystems



Lienchauchih, Taiwan
Climate Change on
Forest Dynamics
PRIME 2012 Students

- Augment existing system: easily
- Stream data to EC2: little need for local infrastructure
- Science drivers
- Poster:
 - Sameer Tilak

VM Migration Experiment: Phase 3



- Expand PRAGMA Cloud Resources
 - From 3 to 13 sites in a year
- Deploy and Enhance Gfarm File System
- Authoring Real Science Application VMs
 - LZU and UCSD; Demo: Zhang Yang & Cindy Zheng
- Automating the VM Migration Process
- Develop VM Authoring Tools and User Interface
 - Demo: Weicheng Huang
 - NCHC – NEW AWARD
- On To Virtual Cluster Migration
 - Demo: Nadya Williams

Software Available Via PRAGMA GOC



Page Discussion View source

Software

Contents [hide]

1 Cloud/Grid

- 1.1 DataTurbine (CalIT2/UCSD)
- 1.2 Ezilla (NCHC, Taiwan)
- 1.3 Gfarm (UTsukuba, Japan)
- 1.4 INCA (SDSC, USA)
- 1.5 MDG (USM, Malaysia)
- 1.6 NAREGI-CA (NAREGI, Japan)
- 1.7 Rocks (SDSC, USA)

2 Collaboration

- 2.1 DUCKLING (CNIC, China)

3 Science

- 3.1 Biodiverse (UNSW, Australia)
- 3.2 CADD (NBCR, USA)
- 3.3 Opal (NBCR, USA)

Cloud/Grid

DataTurbine (CalIT2/UCSD, USA)

- **Description:** DataTurbine is a robust real-time streaming data engine that lets you quickly stream live data from experiments, labs, web cams and even Java enabled cell phones.
- **Application Examples:** coral reef monitoring, lake monitoring and limnology, biodiversity and animal tracking, structural health monitoring and earthquake engineering, airborne environmental monitoring, and environmental sustainability.
- **Availability/License:** Open source (Apache License Version 2), available to general public
- **Info link:** <http://www.dataturbine.org/>
- **Download link:** <http://code.google.com/p/dataturbine/>

Ezilla (NCHC, Taiwan)

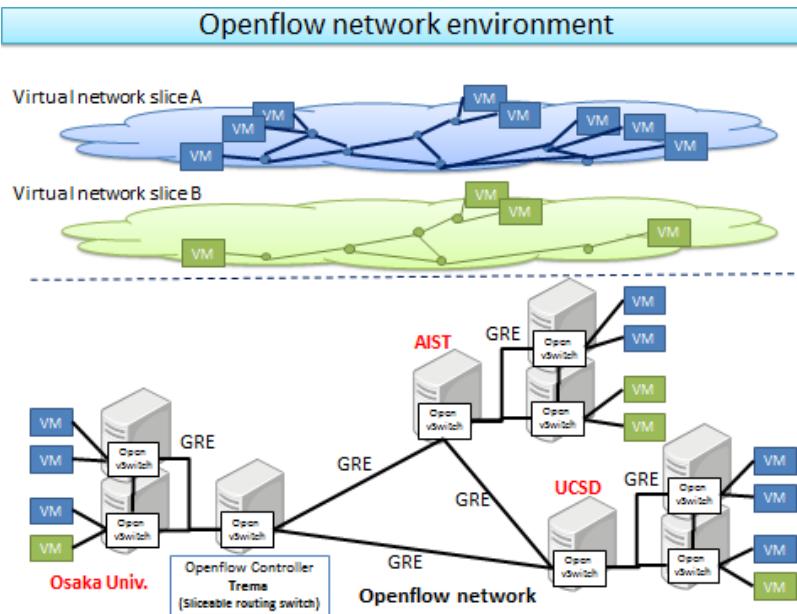
- **Description:** An easy user interface for creating and managing virtual machines and private cloud.
- **Application Examples:** virtual lab., computerized classroom, virtual machine hosting
- **Availability/License:** Open source, available to general public
- **Info link:** <http://ezilla.info>
- **Download link:** <http://sourceforge.net/projects/ezilla-nchc/>

Gfarm (UTsukuba, Japan)

- **Description:** A network shared file system for Cloud or Grid, supports scalable I/O performance in distributed environment
- **Application Examples:** Data Grid, Cloud file system
- **Availability/License:** Open source, available to general public
- **Info link:** <http://datafarm.apgrid.org/document>
- **Download link:** <http://sourceforge.net/projects/gfarm>

Enhancing the PRAGMA Cloud

Overlay Networks



Source: Taiki Tada, PRAGMA 22 Poster

- Poster: A proposal of SDN-based virtual network routing for virtual cluster deployment considering network throughput – Taiki Tada Osaka
- Demo: The ViNe Approach to Software Defined IP Overlays - Mauricio Tsugawa, Jose Fortes U FL

PRAGMA Data Cloud

- Interoperability Test of Catalogue Service for Web on GEO Grid and ESRI GeoPortal (Biodiversity Expedition)
- E-Rium (web portal for observation data – NECTEC) could retrieve in-situ observation data provided by GEO Grid via Sensor Observation service
- Important for biodiversity, lake, disaster management expeditions

Participants: AIST: Yoshio Tanaka, Isao Kojima, Hirokazu Yamamoto; Indiana U: Beth Plale, Umashanthi Pavalanathan, Yuan Luo; NECTEC: Sornthep Vannarat, Naiyana Sahavechaphan, Apivadee Piyatumrong

PRAGMA Students

- PRAGMA 22 (April)
 - Meeting
- ASLO (July)
 - Joint Graduate Student meeting with GLEON, ASLO
- PRAGMA 23
 - Workshop: 9 October 2012
 - PRAGMA Students Introduction and Update
 - This afternoon
 - Poster Session: 17 posters
 - This Afternoon

Thanks to Advisors: Karpjoo Jeong,
Shinji Shimojo, Beth Plale



- Interim Steering Committee
 - Meilan Jiang (Konkuk)
 - Taiki Tada (Osaka)
 - Uma Pavalanathan (IU)
 - Yuan Luo (IU)



HKU e-Research Community

Workshop on Building Collaborations in Clouds, HPC, and Application Areas Co-organized by HKU and PRAGMA



- Topics: Virtualization, Telescience, GEO Grid, Bioinformatics
- Participants: AIST, Konkuk, NCHC, UCSD, HKU, NSCCSZ, SIAT, ISCAS, HKO

17 July 2012, HKU

<http://community.grid.hku.hk/hpc2/mini-pragma>

Biodiversity, Ecosystems Services, and CI: Potential, Challenges and Opportunities

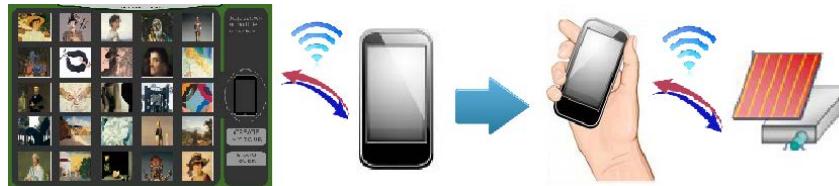
- Third workshop to build community
 - Taiwan December 2011
 - Australia April 2012
- Engaged Regional Players
 - Asia Pacific Biodiversity Observation Network
 - International LTER
- Agenda Overview
 - Science: Kinabalu and Kilamanjaro
 - Potential Partners: ILTER and AP-BON; KEITI funding
 - Update on Biodiversity Expedition
 - Technologies: Linked data, iDigBio, GEO Grid, redeployable sensors
 - Discussion

PRIME and MURPA

Training the Next Generation of Research Leaders

Highlights

- Prototyping Mobile Gallery Guide using Novel Location-Based Technology (NICT, Mo, Yao)



- Automating the Analysis of Microscopy Images: Nimrod and Kepler (Monash, Hu)

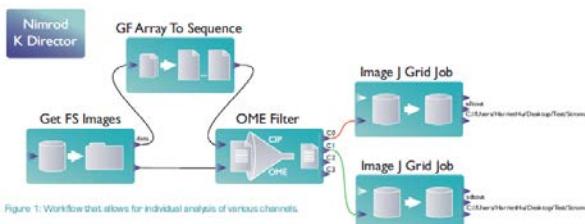


Figure 1: Workflow that allows for individual analysis of various channels.

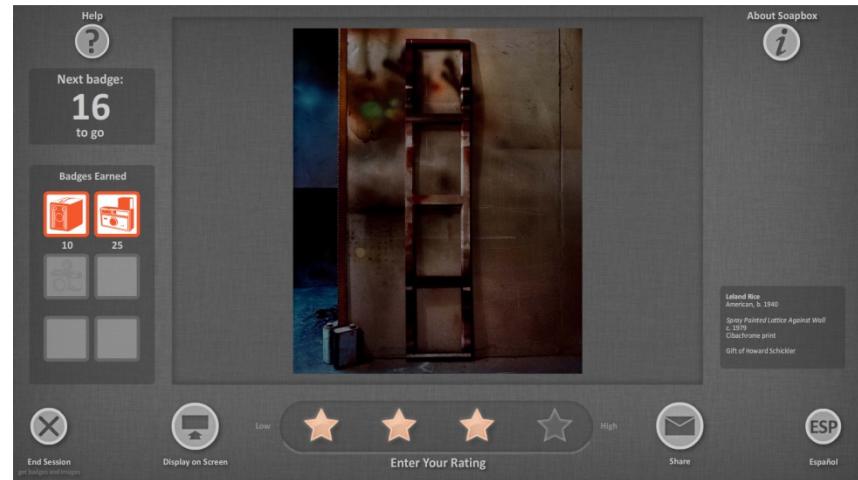
PRIME 2012

Participating Institutions

- Monash University
- Doshisha University
- National Institute for Information and Communications Technology (NICT)
- Osaka University
- University Sains Malaysia (USM)
- University of Auckland
- National Center for Research on Earthquake Engineering (NCREE)
- Taiwan Forest Research Institute (TFRI)

Creating A Cloud Sourced Museum

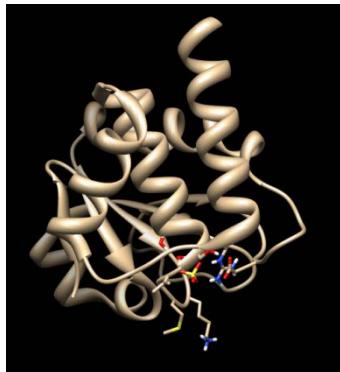
- Extending work of My Gallery* Interactive, with simpler user interface (Soapbox)
- Visitors to MOPA created individual galleries (Summer 2012)
 - October 2012 top 40 will be on exhibit
- PRIME Project 2010, 2011,
 - Winner of American Association for Museums 2012 MUSE Gold Award, in the Honeysett and Din Student category
- *NICT, UCSD, Museum of Photographic Arts (MOPA)



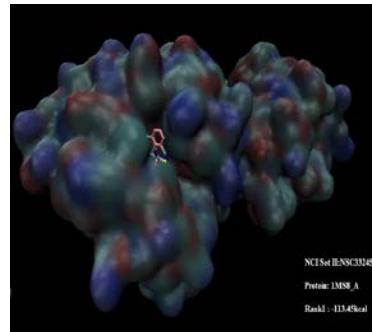
PRIME and MURPA Impact

PRIME Biosciences

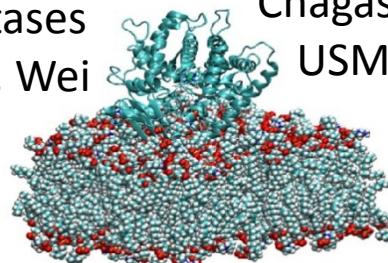
- Computational Studies



Dual Phosphatases
Osaka, Hwang, Wei
Yang



Chagas Disease
USM, Liang



Membrane-bound cytochrome
USM, Sun

MURPA 2012

- Sites: UCSD, NCSA at U Illinois, Israel Institute of Technology; U Warwick (next year)
- Topics: Parallel debugger for Eclipse, Automation of system definition in wireless sensor networks, clustering algorithms for data intensive computing; virtual machines; cardiac mechanics

PRIME Alumni Contributes \$100,000

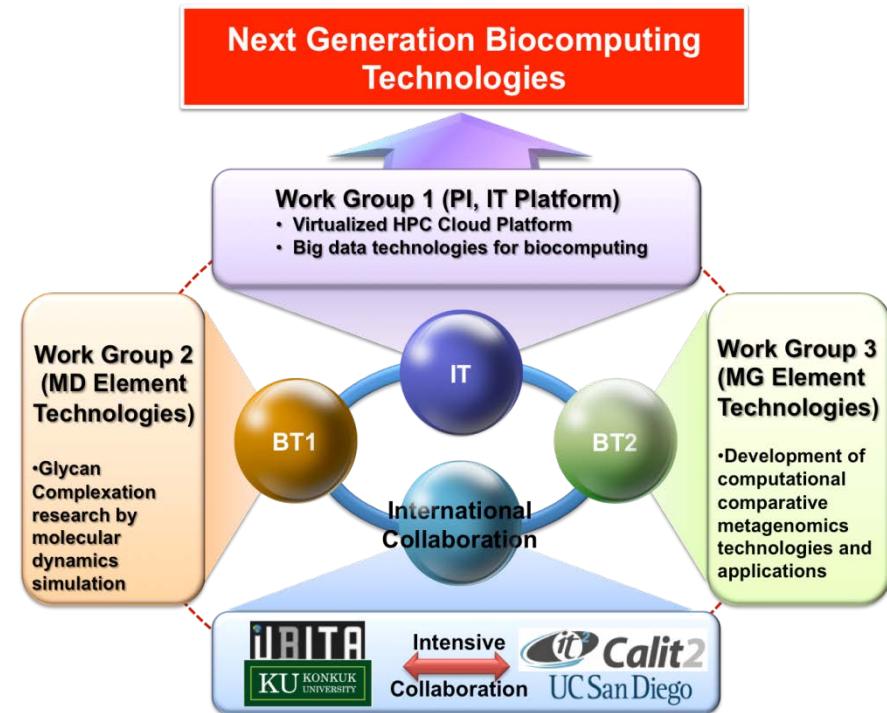
I think all students should study abroad ... It pushes students out of their comfort zone, which is important for future scientists in our increasingly global society. Haley Hunter-Zinck, PRIME 2008 Monash University

Time of Opportunity!

- Define Our Future
 - Best time to plan for the next renewal is when the award arrives
- Engineer Impact
 - Identify beneficiaries: The value of our tools is in their use by others
- Re-examine Processes / Procedures
 - Will the next ten years be like the last ten?

PRAGMA: Framework for Collaboration & Foundation to Build New Projects

- NSF Award offers a vision for PRAGMA
- PRAGMA much larger in terms of technologies, science, people networks
- What opportunities can we jointly create?
- Who are possible partners?



PRAGMA's Overarching Themes to Enable Team Science

- Construct international scientific expeditions
- Develop and improve a grassroots, international cyberinfrastructure
- Infuse new ideas through students and strategic partners
- Build and enhance the essential people-to-people trust fabric

Scientific Expeditions

Expeditions Planned

- Understanding adaptation in extreme environments
- Predicting impact of eutrophication on lake ecosystem services
- Addressing infectious disease through computer aided drug discovery

Challenges and Opportunities

- Recovering IT systems from disruptions
- Planning for or responding to disasters
- Expanding engagement in museums
- Conducting science with our virtual images on the PRAGMA cloud

GLEON and PRAGMA Partnership

Global Lakes Ecological Observatory Network

- Network of People, Sensors, Data
- Launched as a PRAGMA Expedition in 2003
- Grown to more than 300 researchers
- Research: data across >40 lakes
- Active Graduate Student Assoc.



Scientific Expedition 2012

- Predicting Lake Eutrophication
 - Tracking use of shared data (provenance) to promote data sharing
 - Differentiate algal communities
 - Provide insights into the drivers of phytoplankton dynamics
- Participants
 - Paul Hanson (UW), Beth Plale (IU), GLEON Working Group – US, NZ, Korea, China, Ireland, England

Grass-roots International CI

Components

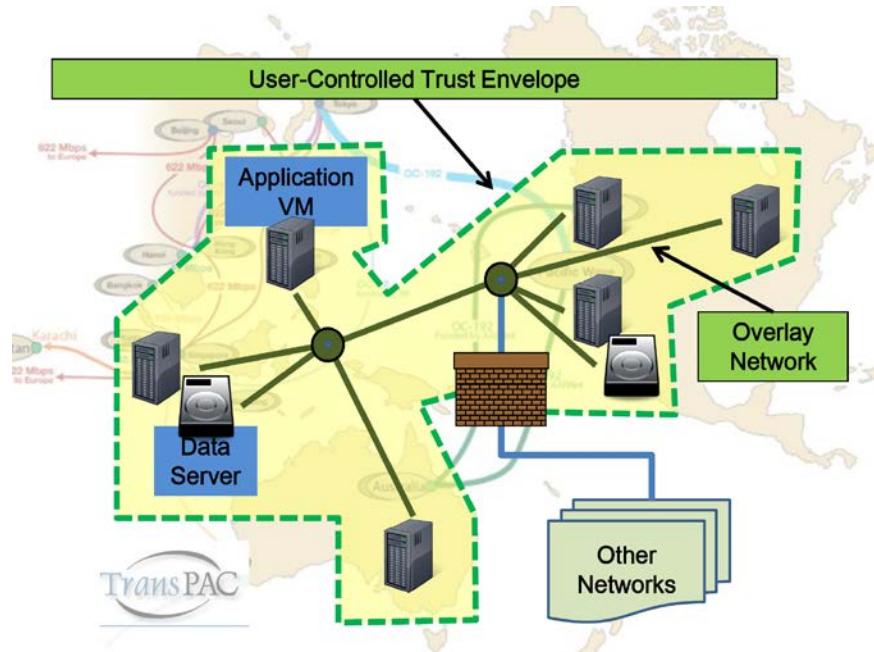
- VM Migration, images and clusters
- Overlay network experiments
- Data cloud
- Observing systems

Importance of Trust Envelop

- Provide an infrastructure that initially limits access to data
- Traverse firewalls and *simplify network re-configuration* of application VMs

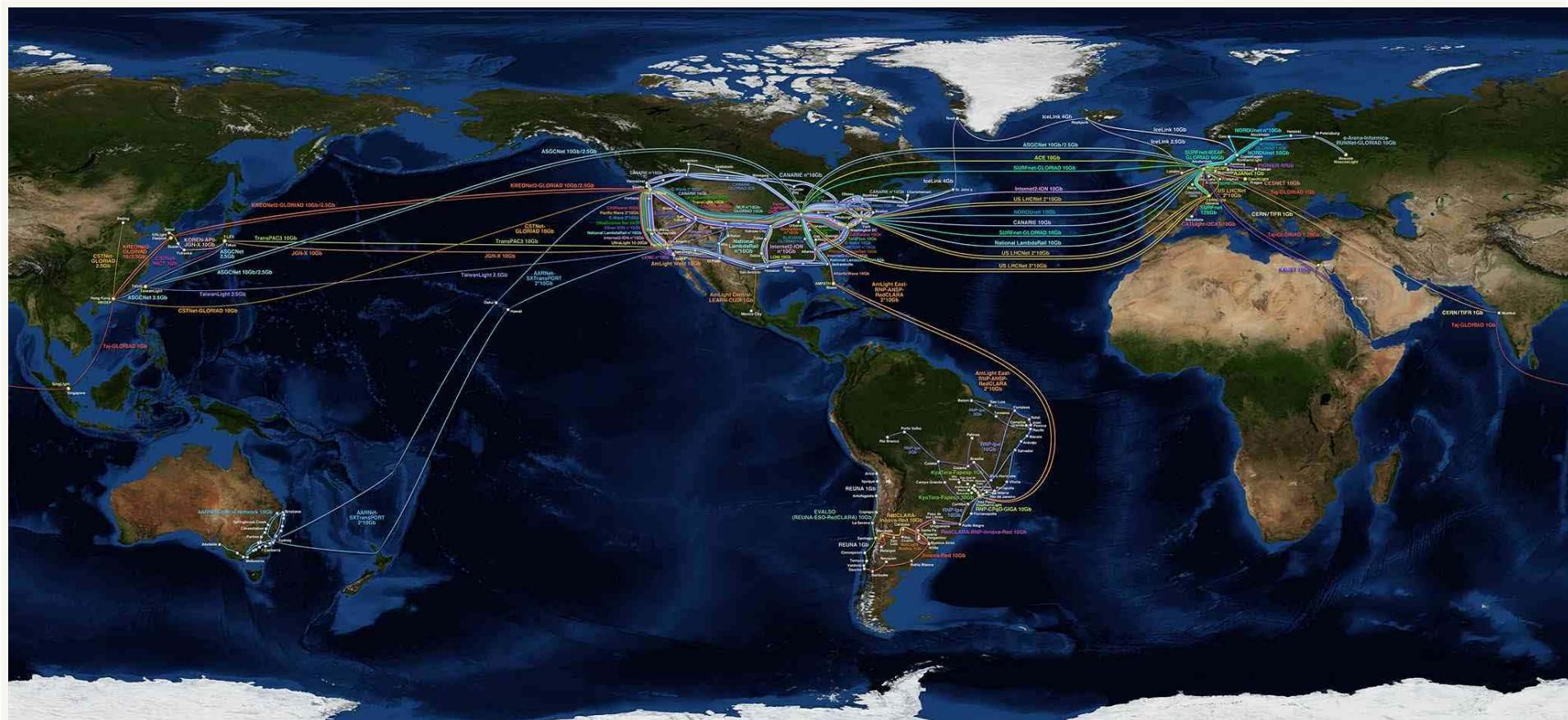
Challenge: Integration

and a Plan for Trust Envelop



Using the Expeditions to Drive
The Development of a
TRUST ENVELOPE

The Global Lambda Integrated Facility-- Creating a Planetary-Scale High Bandwidth Collaboratory **Research Innovation Labs Linked by 10G Dedicated Lambdas**



Source: L Smarr

www.glif.is/publications/maps/GLIF_5-11_World_2k.jpg

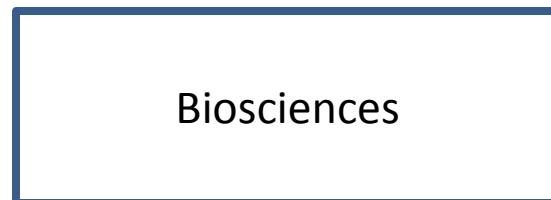
Working Groups and Expeditions

PRAGMA Cloud
VM/VC Experiments
Overlay Networks
Data Provenance

Interface to Integrate
Earth Observing

Sensor Networks
Remote Control
Network Applications

Avian Flu Grid



Scientific Understanding
Community Tools

Biodiversity
Expedition

Data
Discovery

Virtualization

Overlay
Networks

Earth
Observing &
Sensors

Challenges for Other Working Groups

GEO and Telescience

- How would you use the PRAGMA Cloud?
- Are there some short or long-term expeditions to further development of these technologies?
 - Cultural Heritage
 - Disaster Management
- Are there funding sources?

BIO

- Dramatic changes in biological sciences in last 10 years
- Thought Experiment: Starting PRAGMA today, what are the exciting frontiers where cloud infrastructure (data, virtualization, private networks) would benefit a biological expedition?

Steering Committee Issues

- Building the PRAGMA Cloud
 - Planning Components and Integration Path
 - Identifying, Building, and Mapping Expeditions to Develop and Integrate Components
 - Developing Users and Partners
 - Seeking Funding for Expanding PRAGMA's Impact
- Supporting PRAGMA Student activity
- Future Meetings
- Membership Update

New Participants

- Welcome
- Goal of Rotating Workshop Sites
 - Engage new participants, create new collaborations
 - Konkuk eager to host to use PRAGMA to create new ties, in Konkuk and in Korea and beyond
- Get Involved
 - PRAGMA succeeds through active participation

Acknowledgements

- General Chairs
 - Karpjoo Jeong: Konkuk U
 - ChoonHo Kim: SUNY Korea
- PRAGMA 23 Program Committee
 - Kevin Dong: CNIC
 - Reed Beaman: U Florida
 - Putchong Uthayopas: Kasetsat University, chair of PRAGMA 24
 - Seunho Jung: Konkuk U
 - Namseo Koo: Konkuk U
- Biodiversity Workshop Program Committee
 - Reed Beaman: U Florida
 - Eun Shik Kim: Kookmin U
 - Karpjoo Jeong: Konkuk U
- Student Interim Steering Committee
 - Meelan Kang: Konkuk U
 - Taiki Tada: Osaka U
 - Uma Pavalanathan: IU
 - Yuan Luo: IU
- Demonstrations and Technical Support Website
 - Kevin Dong 
- Poster Session Chair
 - Yuan Luo
- Local Organizers
 - Eu Joon Kim
 - Sang Boem Lim