3. PRAGMA: Building Community

New ideas are critical for the health and growth of an organization. PRAGMA works to ensure an environment where new ideas can flourish through a mixture of open workshop discussions and by actively engaging new researchers. To this end, PRAGMA focuses on developing new talent and building new and strategic partnerships. Expanding the PRAGMA community is a key component of our strategy to remain vibrant and attract new talent and new challenges. In this section we discuss several activities we have undertaken in this last year to build community.

1. **Expanding the Biodiversity Expedition Focus**

One of PRAGMA’s key activities is fostering international “scientific expeditions” by forging teams of domain scientists and cyberinfrastructure researchers who develop and test necessary technologies to solve specific scientific questions and create usable, international-scale, cyber environments. Since PRAGMA 22, April 2011, PRAGMA has been developing an expedition in the biodiversity (see Highlight) of ultramafic (high magnesium- and iron-oxide concentrations) outcroppings to gain a better understanding how plants, animals and microbes adapt to extreme and/or changing environments and toxic conditions. With an initial focus on Mt Kinabalu, PRAGMA’s longer-term goals will include enlarging the participation of this expedition as well as expanding the scope of the expedition’s focus, both in geography and question.

The PRAGMA expedition members have organized or co-organized four workshops over the past year to expand the interest in biodiversity and to expand the focus. The four activities include:

* Workshop on Biodiversity, Ecosystems Services, and CI, hosted by Konkuk University on October 9, 2012, as part of PRAGMA 23;
* Bridging Big Data Infrastructure Workshop: Expedition on the Network Science Landscape, hosted by NCHC on December 3–6, 2012 (see below);
* Earth and Biodiversity Observing Workshop, hosted by Kasetsart University on March 23 and 24, 2013, as part of PRAGMA 24;
* Mini-PRAGMA Biodiversity, hosted by the University of Indonesia Computer Science Department on June 5, 2013 (see Min-PRAGMA below).

In each of these instances other organizations were made aware of the PRAGMA expedition. We became aware of other potential partners (e.g., Asia Pacific Biodiversity Observation Network (AP-BON); iDigBio Cyberinfrastructure; AsiaFlux), and new connections were made. Most notable has been the connection between GEOGrid and Green Network of Excellence (GRENE) on Environmental Information. Two interesting projects were discussed at the March meeting: Linking vegetation plots and satellite data to safeguard the biodiversity in tropical rain forests in Borneo; and documenting plant species distributions in tropical Asia. [Check with Reed]

1. **Organizing a mini-PRAGMA workshop in Indonesia**

With the intention of engaging more researchers from Indonesia in PRAGMA activities, Professors Suhartanto and Yanuar of Universitas Indonesia (UI) agreed to organize a mini-PRAGMA workshop to share some PRAGMA activities and engage researchers from Indonesia into collaborations.

The mini-PRAGMA spanned three days, June 3–5 2013, and was held on the UI campus in Depok. The first-day consisted of a Tutorial and Training on Cloud Computing and Software Defined Networks (SDN), led by Jose Fortes (U Florida) and Yoshio Tanaka (AIST), and included 37 student and researchers from UI. The second day, PRAGMA participants as well as by researchers from Indonesia presented a series of presentations and discussions. In total there were more than 50 participants. Finally, on the third day there was Mini-PRAGMA Biodiversity workshop, which was attended by researchers from UI, the Bogar Agricultural University, Indonesian Institute of Sciences (LIPI) – Bogor, and BIOTROP SEAME (Southeast Asian Regional Centre for Tropical Biology) – Bogor. There were 47 participants. Participants represented an active biodiversity research community in Indonesia and demonstrated their own advances in IT and a willingness to partner, adopt, and develop infrastructure to facilitate research and collaboration. Participants discussed possible future collaborations. One outcome is that Professor Yanuar will chair an International Conference on Medicinal Chemistry and Timmerman Award 2013, on October 29-20, 2013, <http://icmcta2013.com/>.

In building community efforts, it is important to retain a long-term perspective. Professor Suhartanto was first introduced to PRAGMA two and a half years earlier, in December 2010, at the Southeast Asia Institute Program, hosted and organized by the National Center of High-performance Computing (NCHC), Taiwan. The first mini-PRAGMA was held in July 2012 and hosted by the University of Hong Kong, with the goal of engaging more researchers from China in PRAGMA. We were able to realize part of that goal at the recent PRAGMA 25 workshop.

1. **Bridging Big Data Infrastructure**

The Bridging Big Data Infrastructure (BBDI) workshop reflects the growing interest among many disciplines in addressing data needs. The BBDI workshop was organized by NCHC, GLEON, and PRAGMA, and hosted by NCHC on December 3 – 6 2012. It brought together, perhaps for the first time, an extensive diversity of projects covering three topical areas (limnology, biodiversity, and disaster mitigation and recovery), across many organizations, internationally, in a single meeting room (see <http://event.nchc.org.tw/2012/datainfrastructure/index.php>).

The setting of Huisun Forest Station allowed for a great deal of interactive discussion across the groups. Several overarching themes emerged that are relevant to community efforts to bridge big data infrastructure:

* Workflows (distinct form workflow software) are increasingly important in the conduct of science in a data-rich world.
* Training in areas of data and use of data infrastructure (including software and workflows) is an immediate need.
* Three interwoven components of science practice are 1) scientific questions, 2) the underlying infrastructure (including software) and technology development, and 3) training..

At least two actions to date have resulted from this meeting. First, the Taiwan Forest Research Institute has been able to establish a DataONE node. Both TFRI and DataONE were participants in the workshop, and each gains by this step (a DataONE node allows for a way to both have persistence of data). Second, GLEON is working with DataONE on a new award (building international data sharing capacity in lake sciences, with implications for the broader environmental science community) to address issues of discovering data in the GLEON network.

1. **Extending SensorPods for Environmental Applications**

Over the last decade, scientists have begun to harness the advances in wireless networking and sensor technology through deployments of sensors throughout the world. The sensors are being used to observe and understand environmental processes, structures of buildings under stress and even the processes of the human body. To make this technology routinely usable by researchers,

there are several challenges that need to be overcome, including ease of deployment of both sensor networks and sensors into existing networks, streaming data to data analysis facilities, and developing new algorithms for interpreting data, as well as models to help understand and predict processes.

In PRAGMA there has been an interest in using issues of environmental observing to drive the development of sensor deployment approaches and data streaming technologies. Among the disciplines driving applications for environmental observing are forestry research, coral reef science, lake ecology, and flood monitoring and preparation. During the April 2013 PRAGMA24 meeting in Thailand, the cyberinfrastructure researchers from UC San Diego and scientists from Taiwan and Thailand recognized the need for an in-depth technical training workshop. One disruptive technology that combines mobile and cloud technology and has proven to be stable is the Open Source DataTurbine (OSDT) Android SensorPod (see highlight).

The First OSDT Android SensorPod Workshop was held from July 1-5, 2013 at Lienhuachih Research Center of Taiwan Forestry Research Institute (TFRI), Central Taiwan. An overarching goal of the workshop was to enhance existing collaborations and to create new opportunities for technology sharing and scientific research in the area of environmental sciences (which are broadly interpreted as ecology, marine science, agriculture, hydrology and natural resource management). The workshop attendees focused on advanced environmental observing technology with an emphasis on using the OSDT Android SensorPod. The workshop participants share experiences with wireless sensor networking applications and participate in a hands-on technical training course on the OSDT Android SensorPod. Furthermore, subsequent to the workshop, new sensors were deployed using these technologies, and in new areas of application (e.g. monitoring oyster farms or soils in medicinal forests). A report from the workshop is available

: <http://www.dataturbine.org/content/first-osdt-android-sensorpod-workshop-report-now-available>.

This type of training workshop, followed by deployment and continued interaction is a critical step to building a multidisciplinary community in environmental observing.

**Future activities include**

* Lower Mekong Initiative:

PRAGMA is partnering with Indiana University, the Network Startup Resource Center and UCAR/NCAR in organizing the Building Network-Enabled International Science and Engineering Collaborations in the Lower Mekong Region Workshop, to be held in Vietnam in March 2014.

The workshop will bring together operators and managers of Research and Education Networks (RENs) at the campus and national levels; researchers from institutions within the region and from the U.S. who collaborate in three main areas of science and engineering: disaster management, climate change and forestry; and policy-makers and leaders from government and academia involved in supporting the development of cyberinfrastructure and collaborative science in their countries and in the region.

* SEAIP 2013

The South East Asia Institute Program has been a forum for researchers, technologists, and administrators throughout South East Asia to share ideas and look for ways to collaborate. This year’s workshop will focus on Big Data, particularly in the areas of biodiversity, environmental observing, and disaster mitigation. The workshop will be held December 1 - 6 2013 in Taichung Taiwan (see <http://seaip.narlabs.org.tw/>).