



25th AI<sup>3</sup> & 20th SOI Asia Anniversaries

# The 52nd AI<sup>3</sup>/SOI Asia Joint Meeting

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August 30th - September 1st, 2021

14:00 - 17:00 (GMT +9) Each Day

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## The 52nd AI<sup>3</sup>/SOI Asia Joint Meeting

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## The 52nd AI<sup>3</sup>/SOI Asia Joint Meeting

### EXECUTIVE SUMMARY

#### About this meeting

AI<sup>3</sup> and SOI Asia Joint Meeting brings together members of both projects to share ideas, experience, and updates, network with peers, and design policies related to the future of the community. Since the first joint meeting, a partner institution is responsible for organizing and hosting the meeting at their facilities. This 52nd edition was scheduled to be hosted by TU in Nepal, but due to the COVID19 pandemic situation, it was decided to hold it in an online format.

#### About the AI<sup>3</sup> and SOI Asia projects <https://www.soi.asia/>

**AI<sup>3</sup> (*Asian Internet Interconnection Initiatives/read: ei-triple-ai*)** Project is an international research project established between research institutions in Asia in 1995 supported by WIDE Project and JSAT Corporation (currently, SKY Perfect JSAT Corporation). Started in October 1996 with the establishment of the NAIST-ITB KU-band link, this project aims to provide a resilient internet link infrastructure and technology to the Southeast Asian region, with Keio University and Nara Institute of Technology (NAIST) serving as the hubs.

**SOI Asia (*School on Internet Asia/read: soi-asia*)** Project was established in 2001 with the objective of achieving education collaborations between Southeast Asian universities on the internet, utilizing the infrastructure technology developed by AI<sup>3</sup> Project. SOI Asia has been implementing human resource development programs in Asia in various fields, including information technology, security, marine technologies, environmental issues, cultural understandings, disaster management, and entrepreneurship. And from 2008, with cooperation with UNESCO, SOI Asia also contributes to the development of the next generation of global human resources, especially in science and technology.

#### Conclusion

Five action items to address at the next meeting are the following.

- #1 Active participation in the development of ARENA-PAC, SARENA-PAC, and other RENs in the region.
- #2 Asia Pacific network engineering course, collaborating with APNIC and AITAC
- #3 Join course development for EBA (Evidence Based Approach), including the fieldwork design in Asian region
- #4 Developing a hybrid-flexible learning platform and a micro credential issuing system
- #5 Research collaborations in non-terrestrial networks, dynamic networking, data science, IoT and disaster recovery topics.

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### **Facts and figures**

- The number of registrations: 55 from eleven countries
- The number of participants:
  - DAY 1: 39
  - DAY 2: 40
  - DAY 3: 45

## PROGRAM

### DAY 1 - 8/30 (Mon): “Research Collaboration”

#### OPENING

- Welcoming and round table
- Keynote by Jun Murai (Founder of WIDE Project / Distinguished Professor, Keio University)
- Greeting from APNIC Foundation
- Agenda overview and project introduction, by Keiko Okawa (Director, SOI Asia Project / Keio University)

#### FUTURE DISCUSSION #1

##### **“Research collaboration opportunities”**

- Part 1: Presentation
  - APNIC ISIF Program by Hannah Durack (APNIC foundation)
  - AI<sup>3</sup>/SOI-Asia Internship and Fellowship by Keiko Okawa
- Part 2: Open Mic Discussion
  - USM: USM-BUET AsiaConnect grant
  - USM: India-ASEAN grant
  - SATREPS brainstorming etc.

#### RESEARCH PRESENTATIONS

- Adisorn Lertsinsruttavee (Asian Institute of Technology/InterLab)  
*“SEA-HAZEMON, a real-world field air quality sensors network”*
- Ai Sugiura (UNESCO Jakarta)  
*“Advancing member states’ SETI national development goals and SDGs in Asia and the Pacific”*
- Yuka Shori Kataoka (Keio University)  
*“Oral Repetition Practice Support System for Online Japanese Language Courses”*

### DAY 2 - 8/31 (Tue): “New Learning Style”

#### SITE UPDATE

#### WORKSHOP

##### **“Introduction to EBA”**

- Keiko Okawa, Keisuke Uehara, Eliko Akashi, Rika Ikeda (Keio University)  
*“Evidence Based Approach to the Emergent Issues in Asia”*
- Leandro Navarro Hundzinski (Keio University)  
*“Design & Implementation Directions for Virtual Fieldwork Activities”*

#### PANEL SESSION #1

##### **“Microcredentials and Hybrid-Flexible (Hyflex) to Support Course-Level Student Mobility”**

Moderator: Achmad Husni Thamrin (Director, AI<sup>3</sup> Project / Keio University)

Panelists:

- Rahmad Dawood (Universitas Syiah Kuala)  
*“The confusing Indonesia microcredentials regime: a lecturer perspective”*

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- Wan Tat Chee (Universiti Sains Malaysia)  
*“The status and direction of microcredential offering and student mobility at USM”*
- Pisut Koomsap (Asian Institute of Technology)  
*“Future Learning Factory Laboratory for Student Competence Development in Digital Era”*
- Keiko Okawa (Keio University)  
*“Redesign your course for hyflex learning”*

**DAY 3 - 9/1 (Wed): “Infrastructure”**

PANEL SESSION #2

***“Internet Engineers Education”***

Moderator: Noriatsu Kudo (Keio University)

Keynote:

- Prof. Kanchana Kanchanasut (Asian Institute of Technology)  
*“TEIN Human Resource Development”*
- Che-Hoo Cheng (Infrastructure & Development Director, APNIC)  
*“APNIC Academy Strategy”*

Panelists:

- Achmad Basuki, Ph.D (Universitas Brawijaya)  
*“Empowering Internet engineers education with the virtualized network laboratory”*
- Peter Blee (APNIC Academy Team Training Curriculum Manager, APNIC)  
*“‘Ingredients’ for making a great Asia Pacific Internet Engineering (APie) Program”*
- Prof. Yuji Sekiya (AITAC/University of Tokyo)  
*“Introduction of AITAC”*

FUTURE DISCUSSION #2

***“Infrastructure”***

Future development plans and research topics related to ARENA-PAC and SARENA-PAC

Speakers:

- Hirochika Asai (WIDE Project)
- Takashi Tomine (WIDE Project)
- Achmad Husni Thamrin (AI<sup>3</sup>)

FUTURE DISCUSSION #3

- ***“Wrap up and workshop plans”*** by Keiko Okawa
- Dr. Suguru Yamaguchi Memorial Award

CLOSING

## PROJECT INTRODUCTION

### AI<sup>3</sup>

AI<sup>3</sup> (Asian Internet Interconnection Initiatives/read: ei-triple-ai) Project is an international research project established between research institutions in Asia in 1995 supported by WIDE Project and JSAT Corporation (currently, SKY Perfect JSAT Corporation). AI<sup>3</sup> started its test-bed network operation in October 1996 with the establishment of the NAIIST-ITB KU-band link and then launched the C-Band based testbed from 2001. This project aims to provide satellite internet link infrastructure and technology to the Southeast Asian region, with Keio University and Nara Institute of Technology (NAIST) serving as the hubs. AI<sup>3</sup> Project developed an advanced international internet backbone with the cooperation between partner universities that is not dependent on the state of terrestrial infrastructure development by utilizing a satellite communication technology that covers the whole Asian region. As a founding partner, Keio Shonan Fujisawa Campus (SFC), with its satellite antenna located inside the campus, has played a central role since the inception of the project until now.

### SOI ASIA

SOI Asia (School on Internet Asia/read: soi-asia) Project is an international education consortium established in 2001 by WIDE Project with the objective of achieving education collaborations between Southeast Asian universities on the internet utilizing the infrastructure technology, developed by AI<sup>3</sup> Project. Asia SEED (a non-profit organization) supported SOI Asia to start the educational collaboration with top-level Universities in the Southeast Asian region at the first phase of the project. SOI Asia has implemented human resource development programs in Asia in various fields, including information technology, security, marine technologies, environmental issues, cultural understandings, disaster management, and entrepreneurship. These programs are conducted with the spirit of cooperation and mutual respect. This consortium has grown into a strong community, where it does not only share university courses but also establishes infrastructure to support university-based entrepreneurship and helps each other at the time of disasters. And from 2008, with cooperation with UNESCO, SOI Asia also contributes to the development of the next generation of global human resources, especially in science and technology.

### PROJECT ACHIEVEMENTS

AI<sup>3</sup> developed and deployed a unidirectional link (UDL) on the network test-bed, contributing to the standardization of the UDLR technology. AI<sup>3</sup> was running IPv6 and multicast on this UDL that contributed to connecting a wider area in Asia. The collaborative research activities of AI<sup>3</sup> along with the IT HRD programs of SOI Asia have played a major role in the development of satellite

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internet infrastructure in the Southeast Asian region. Through both projects, participating countries in the region have acquired the advanced technology and operation know-how of the internet. The partner organizations, as well as the researchers, have led the internet infrastructure in their respective countries, resulting in the development of the internet infrastructure as we have now witnessed in the region. In fact, from this community, we have three founding members who are recognized as inductees in the Internet Hall of Fame.



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**MEETING REGISTRATIONS**

<b>AITAC</b>	Dr. Yuji Sekiya Mr. Scott MacSdonald (e-side, inc.)
<b>APNIC</b>	Mr. Che-Hoo Cheng Mr. Peter Blee
<b>APNIC Foundation</b>	Mr. Duncan Macintosh Ms. Cathlene Corcoran Mr. David Dawson Mr. David Vivian Ms. Hannah Durack Mr. Marcos Sadao Maekawa Ms. Sylvia Cadena
<b>Asian Institute of Technology</b>	Ms. Kanchana Kanchanasut Mr. Adisorn Lertsinsrubtavee Mr. Olivier Nicole Dr. Pisut Koomsap
<b>Bangladesh University of Engineering and Technology</b>	Prof. Md. Saiful Islam Dr. Hossen Asiful Mustafa Mr. Mohammad Muntasir Hassan
<b>Eikei University of Hiroshima</b>	Dr. Yasuo Tsuchimoto
<b>Institut Teknologi Bandung</b>	Ms. Allya Paramita Koesoema Mr. Arry Akhmad Arman Mr. Basuki Suhardiman Mr. Mugi Sugiarto Dr. RS Joko Sarwono
<b>Indian Institute of Technology Hyderabad</b>	Mr. Kotaro Kataoka
<b>Keio University</b>	Dr. Jun Murai

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	Dr. Keiko Okawa
	Dr. Achmad Husni Thamrin
	Dr. Keisuke Uehara
	Mr. Noriatsu Kudo
	Ms. Eliko Akashi
	Ms. Rika Ikeda
	Ms. Fathima Assilmia
	Mr. Leandro Navarro Hundzinski
	Ms. Yuka Shori Kataoka
<b>UNESCO Jakarta Office</b>	Ms. Ai Sugiura
<b>Tribhuvan University</b>	Mr. Prabin Dhakal
	Mr. Sushant Chalise
<b>Universidade Nacional Timor Lorosa'e</b>	Mr. Bendito Freitas Ribeiro
<b>Universitas Brawijaya</b>	Dr. Achmad Basuki
	Mr. Adhitya Bhawiyuga
	Mr. Primantara Hari Trisnawan
	Mr. Raden Arief Setyawan
<b>Universitas Hasanuddin</b>	Mr. Muhammad Niswar
	Mr. Zulkifli Tahir
<b>Universitas Sam Ratulangi</b>	Mr. Alwin Sambul
	Mr. Arie Lumenta
<b>Universitas Syiah Kuala</b>	Mr. Hizir Sofyan
	Mr. Rahmad Dawood
<b>Universiti Sains Malaysia</b>	Dr. Wan Tat Chee
	Ms. Yung-Wey Chong
<b>University of Computer Studies, Mandalay</b>	Mr. Sai Maung Maung Zaw
	Ms. Mie Mie Oo
<b>WIDE Project</b>	Dr. Hirochika Asai
	Mr. Takeshi Tomine

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## **DAY 1 - 8/30 (Mon): “Research Collaboration”**

### **Day 1 – Opening**

Keio University’s Yuka Shori Kataoka opened the meeting with a self-introduction. She prompted participants to use Slack and their Padlets, asking them to add their locations on their devices, then handed over the microphone to Achmad Husni Thamrin, Director of the AI<sup>3</sup> Project at Keio University.

Husni welcomed participants, saying it was unfortunate that a face-to-face meeting was not yet possible this year but that they could still meet online.

Keiko Okawa, Keio University Professor and Director of the SOI Asia Project, introduced herself and said the group had hoped to meet in Nepal the previous year but had given up and held an online meeting. She said she was nonetheless delighted to get together, then invited Jun Murai, Distinguished Professor, Keio University and Founder of the WIDE Project, to take the floor.

Murai gave keynote remarks and welcomed the remote gathering, saying he realized the situation was not easy for important partners joining from Myanmar and that he was delighted that they were taking part. He said that while the pandemic has prevented participant movements, it has not stopped their initiatives and served as a prompt for activation.

Murai explained some recent changes and updates, sharing a slide that showed the global Internet population, where North America and Europe appeared to be reaching their full potential, while the numbers in Asia were huge. He said that with its accelerated growth, the Asia-Pacific was genuinely important during the pandemic period. “As a whole, the Asia-Pacific is going to be very important for the future of the Internet, and it’s very good to see that growing number coming from new areas.”

Murai also spoke about ongoing preparations for Arctic Fibre, a submarine cable project connecting the region directly from the North Pole. He said it would connect Japan, Guam, Australia, and Southeast Asia directly with Europe. With ongoing tests and shipments arriving in Japan, it had looked set to happen soon, but the project had been suspended. According to the media and academia, he surmised that the real reason for the suspension had been the Russian government’s decision to use the cable for domestic connections rather than international purposes, but that he was not giving up on the idea. In addition, he said his team had tried to set up a cable in Guam to connect research and educational network with Australia, Guam, Hawaii, and beyond as an alternative route to Asian-Pacific traffic.

He also touched on the Internet infrastructure SARENA-PAC (Satellite and Aero Research and Educational Network in the Asia-Pacific), a satellite for research and education in the AP region. It is growing rapidly in preparation, and services have already begun in Australia, New Zealand, Chile,

The 52nd AI<sup>3</sup>/SOI Asia Joint Meeting and possibly parts of Indonesia. Murai said non-terrestrial networks would become robust infrastructure and serve as backup for primary terrestrial infrastructure during disasters.

He said the evidence-based approach (EBA; to emergent issues in Asia data collection) was being resumed with a larger budget in the coming five years and that ARENA-PAC was now working in collaboration with APOnet to create Asia-Pacific Oceania Networking, with solid partners connecting into the region. Finally, Murai spoke about a new relationship with APNIC and mentioned approaching the APNIC foundation for collaboration for funding, training, and education, inviting Duncan Macintosh, leader of the APNIC Foundation, to say a few words.

Macintosh offered a warm greeting from Brisbane, Australia. He said the Foundation was firmly committed in terms of partnership and collaboration, that it would commit to supporting the activities discussed during the three-day meeting. He told participants they could be confident that the ideas, initiatives, and activities they would discuss would have the necessary support for successful implementation.

Keiko Okawa briefly went over the agenda for the three-day meeting, saying the first day would focus on research collaboration, the second day more on education and new learning styles, and the third day, infrastructure.

Significant progress had been made a year since the first online meeting held in September 2020, and discussions would continue, chiefly on technical details, topics for development research, and future plans. Conversations would be furthered on Day 3 on the group's Asia-Pacific network engineering course and collaborations with APNIC and AITAC.

Okawa said a workshop would be held on Day 2 on the design and accomplishments of joint course development for an EBA (evidence-based approach) to prompt participants to start thinking about designing fieldwork. In addition, Day 2 would see further discussion on developing a hybrid flexible learning platform and a system to issue micro-credentials. It would be a fundamental infrastructure for everyone in Asia-Pacific, and Okawa said she hoped to create a flexible learning platform jointly.

A small toast would be given on Day 2 Social to mark the 25th A13 and the 20th SOI Asia anniversaries, postponing the hosting of a party until participants could meet again physically.

**“Research Collaboration Opportunities”**

Husni said a featured discussion entitled Research Collaboration Opportunities would now begin. The first part would be a presentation, with Hannah Durack from the APNIC Foundation speaking about internship and fellowship programs, followed by an open-microphone discussion, following words from the Universiti Sains Malaysia (USM) on the Asi@Connect Grant.

Hannah Durack, grant management lead for the APNIC Foundation, said the APNIC’s executive council had established the APNIC Foundation to raise funds and create partnerships to expand Internet development activities. She spoke about the Foundation and its vision for a global, open, stable, and secure Internet in the Asia Pacific.

Durack explained one aspect of the Foundation’s work: grant-making, saying the Foundation made grants and awards available in the region and spoke mainly about the APNIC ISIF, or Information Society Innovation Fund, a grant program empowering organizations that research, design, and implement technical solutions that support Internet development and facilitate human and economic growth in the Asia Pacific. She explained the different funding types available: small grants, scale-up grants, impact grants, deployment grants, and awards and said this was a good time to start thinking about projects or ideas meeting participants might have coming up that might have some alignment with ISIF and that these grants might help support.

Durack spoke about the three program areas that ISIF Asia makes: Inclusion, Infrastructure, and Knowledge, broad buckets ISIF Asia uses to focus and organize their grant-making, and inclusion grants for efforts to ensure that everyone has meaningful and efficient access to the Internet, and online applications and services in terms of technical and operational developments. These could include expansions in areas covered by existing infrastructure to make the Internet more available in underserved communities, support for community networks to improve affordability, or improvements in Internet access for people with disabilities. She said ideas from universities could support inclusive infrastructure, meaningful access, and connectivity, which are vital to the success of the program area, as well as diversity, a cross-cutting value for all of the Foundation’s work.

The Knowledge program supports projects to develop technical capacity and research around Internet network operations as the Foundation.

The third and final program area for ISIF Asia is Infrastructure, concerning hardware and software development. Durack said potential projects could be initiatives to improve online security and privacy, efforts to address the environmental impact of Internet infrastructure, or disaster preparedness for Internet networks.

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Durack emphasized that the IPv6 grants will be rolling with no set deadline and applications assessed as they are received. Successful grant applications would come through until the year's funds became exhausted.

The Foundation is looking forward to receiving proposals for collaboration between partners in different APAC regions. For example, a university in Malaysia could partner with a university in Japan or a university or organization outside the APAC region, as long as an organization in the Asia Pacific leads the project.

Durack provided an email address, saying, "I hope to open the door to conversation with you. If you have an idea that you think might be a good fit with ISIF, but you aren't sure, just send me an email to give me some top-level ideas of what you're looking to do, then myself and other experts from the APNIC Foundation will look at that, and if there seems to be some alignment, we'll set up a meeting to discuss it. You don't have to start with a full-blown proposal. We can have a more informal conversation prior to the proposal level."

Husni asked how long the application screening process would take.

Durack replied that while it had yet to be confirmed, she expected it to be quicker than the standard open allocation competitive round and in the vicinity of three months, saying the rolling basis would make it closer to a month.

Macintosh asked Durack or Silvia Cadena to talk briefly about past university recipients. Cadena offered an example of the University of Auckland receiving several grants for network coding over satellite links and another example of the Swiss German University in Indonesia receiving a grant on cybersecurity threat analyses across many universities in Indonesia, which has since expanded in the ASEAN region. She said most grant recipients in the last couple of years had been universities because the grants focused on net operations research.

Okawa briefly explained plans to start internship and fellowship with a call for participation at SOI Asia, hoping to invite students to Keio or work remotely during COVID. While Keio University hosted such activities, she said participants were welcome to discuss their hosting mechanisms to help consider the type of scheme that could be used in development research and operations to come.

Husni indicated his desire to continue internships, which could expand to fellowships, and said the challenge was how to do that online, "Since until at least until early next year, we'll still have to deal with the online situation."

Rahmad Dawood commented that Indonesia has a mechanism for students to participate in an internship for a semester, transferrable to credits. He suggested that having interns serve as employees

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would have an enormous positive impact on both the organization and the individual. “For both young faculty and their networks, it would be good. Bring in collaboration, new blood to our community.”

Husni wrapped up the presentations and led the group in an open microphone discussion.

Tat-Chee Wan at the Universiti Sains Malaysia spoke about the background of the Asi@Connect Research Programme and TEIN (Trans-Eurasia Information Network), a European Union-supported research program. The project was a distributed and cloud-based network defense system for NRENs, submitted in 2017 that focused on implementation and capacity-building. Despite disruptions due to COVID, Wan said the workshops had been completed online. He said the deliverables were cloud-enabled security services, basically, a cloud-based Internet firewalling security platform to evaluate how to manage users using cloud-based platforms, and the establishment of a FIWARE node, currently being used to support a Distributed Botnet Detection System.

Murai commented that it’s good that this community has started to connect to each of the universities using satellite broadcasting methods that cover the entire region. Satellites can create special three-dimensional Internet infrastructure, meaning terrestrial Internet networks could join with video streams such as SOI Asia programs. TEIN then came to the region, and he touched on the importance of discussing plans with them, not only for regional development but also for connectivity to Europe.

Wan said he believed that many projects were unexpectedly called off in 2020 due to COVID and many unexpected delays encountered. Thus, many challenges could be expected this year if face-to-face capacity building, workshops, or other such actions were required.

Okawa mentioned discussing the possibility of common federated authentication between Asia and Europe. She suggested considering the adoption or authentication commonly used in Europe and Asia for the group’s platform, saying it would be a good collaboration with the EU team.

As to other research possibilities, Abazh (Achmad Basuki) said he hoped to create a type of club service for students who were unable to come to campus physically to use the facilities so they could practice on their own.

Okawa also spoke about a particular program at Keio University for inviting a co-advisor for Ph.D. students from outside Japan. She said it had worked well, and arrangements could also be made for a similar program for co-advisors at other universities.

**Day 1 – Research Presentations**

Akashi, chairing the presentation portion, thanked three presenters before they began.

Adisorn Lertsinsrubtavee, senior researcher at Internet Education and Research Laboratory (intERLab), Asian Institute of Technology (AIT), gave an overview of his SEA-HAZEMON project. The project had aimed to build a live platform that could monitor haze air quality disasters and air pollution in the region.

Lertsinsrubtavee said automated ambient monitoring had been verified in the United States; however, such equipment is very costly and only owned by the government agencies. Such that the number of monitoring tools is not sufficient to deploy in many locations, especially in remote/rural areas. . While NASA and other organizations make their past data available for downloads, he said there are limitations to the timing of the data collection. Thus, his team developed an alternative solution; a prototype low-cost IoT solution called a Real Field Air Quality Sensor Network equipped with many pollution-related sensors that send data from the field. With a built-in WiFi and LoRa transmission, the solution can quickly scale up and deploy in many locations, including both urban and forest areas. Sample data may be sent over the Internet every other minute, and a dashboard is used to indicate the level of pollution concentration that is potentially dangerous to human health. It works 24 hours daily, and community collaboration is crucial, with people in local communities deploying sensors and investigating where the team cannot go physically.

“Under our Asi@Connect project, one of our goals is to scale up the platform,” he said. “We’ve deployed in downtown Bangkok to capture pollution levels in dense traffic areas, high-rise apartments to check air pollution movements, and forest fire areas, working with the forest fire department, and also use solar panels to boost the power of our sensors in remote areas.”

Lertsinsrubtavee said his team has been working with Asian partners and have deployed active nodes in the Philippines, Indonesia, and Laos since 2018. In addition, the pollution data is available on an open platform for anyone to download. He looks to develop the model to send a text on forest fires and use an early warning system to warn the local authorities to stop disasters before they happen.

Keisuke Uehara asked Lertsinsrubtavee if he could tell how accurate the sensors were and if the sensors had heat protection. Lertsinsrubtavee replied that his team had conducted a batching test, passing all sensors with reference stations, and concluded that the leading data should not be (off by) more than 10 percent. While the sensors are protected against thunder, heat protection techniques are not yet available. However, Lertsinsrubtavee said no trouble has occurred to date, that residents help significantly by checking (the sensors), reporting to the team if something should happen.



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Next, Ai Sugiura from the UNESCO Jakarta office proceeded to give a presentation. First, Sugiura talked about the revival of STEPAN - Science Engineering Technology Innovation for Asia and the Pacific Policy Network. She said STEPAN is a network established to support the development and implementation of SETI (Science Engineering Technology Innovation) policies at the national and regional level, whose coordination structure and action plan had been revised.

Sugiura said STEPAN focused on three main thrusts:

First, SETI governance and attempted to support its members in developing and implementing policy frameworks for SETI. She stressed that it focused in particular on open science implementation mechanisms in the region, recommendations to ensure and maintain academic integrity and quality of science, and advocacy for data collection and analysis for SETI policies and instruments.

Second, pushing forward activities to initiate pilots in the Asia-Pacific, she said STEPAN would focus mainly on strengthening SDG technology, digital literacy, and reform and standardization in engineering education to enhance engineering capacities. Lastly, Sugiura stressed that STEPAN's newly elected executive board and new action plan support multi-spectrum STEM capacity-building for enhancing science services made available to society. She said it seeks to bolster links and promote both formal and non-formal education in relevant fields to promote science and science communication for the general public. She also said UNESCO Jakarta is working on needs and opportunities for women in science and innovation. Husni asked about what could be done to promote science communication, science museums, and science centers. Sugiura said that was the non-formal part, engaging other community actors in science, repeating her example of activities conducted with the Indonesian Association of Eco Printers. She said science museums and centers traditionally initiate hands-on activities for people to learn by doing things, which she and her team seek to strengthen. But while it is very effective in some countries, she said not all countries have such facilities.

Wan commented that as a current challenge in Malaysia, students have been taking online classes for more than six months and have not been going back to school when there is a hands-on component in science. Sugiura said the eco printer project worked out very well. The team sent small packages to all finalists in ASEAN, who then engaged in hands-on activities directly with their instructors live online. In addition, she said there was a platform for them to exchange pictures and chat, which created a small community discussing the activity including science principles behind and allowing to notice country to country differences in water pH for example.

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Yuka Shori Kataoka introduced herself as a doctoral course student at Keio University's Graduate School of Media and Governance and made the day's final presentation: an Oral Repetition Practice (ORP) support system for online Japanese language courses.

Kataoka introduced an online Japanese language course she conducted in 2020 with SOI Asia called "Introduction to Spoken Japanese," held on Zoom video conferencing. Twelve students completed the course, which aimed to help students acquire basic knowledge and skills in spoken Japanese, ease the way to explore Japanese language and culture, and prepare students planning fieldwork in Japan. Each lesson comprised a main session for instruction and a parallel breakout session to encourage ORP. She pointed out ORP was essential for beginners but that opportunities for ORP were generally insufficient during classroom hours due to time constraints.

Citing her teaching experience in India, Kataoka said she had attempted to install ICT in her language classroom. She mentioned oral corrective feedback (OCF) had been provided for students to notice and correct their errors during classroom hours. Explicit corrections, recasts, and prompts were provided one-on-one between teachers and students, and many errors were found when there were multiple numbers of students, while the class lessons also had to move forward. Kataoka insisted the focal issue had been an incomplete OCF process.

Previous studies have addressed this problem by introducing ICT for ORP opportunities outside classroom hours; however, little is known on the efficient and effective implementation of ORP in the classroom. She explained developing an online oral repetition support system called ORP Gym using a cost-effective Learning Management System (LMS) on Moodle.

The objectives were to increase ORP, detect more errors, improve student awareness of their mistakes, and have them repair those errors as teachers monitored those efforts in real-time for better OCF. Automatic Speech Recognition had been employed, which showed a reasonable accuracy rate greater than 80 percent to detect errors of Japanese basic learners' utterance in her previous study. However, it also has a low precision below 30 percent, which meant that teachers needed to listen in and double-check content. The approach provided students with sufficient opportunities to improve their errors while enabling teachers to monitor individual ORP to detect the errors and provide OCF on a priority basis.

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## **DAY 2 - 8/31 (Tue): “New Learning Style”**

### **Day 2 – Sites Update**

Kataoka opened Day 2, saying Fathima Assilmia would serve as master of ceremonies.

Assilmia welcomed participants and prompted them to use Slack. She said a social event would follow the meeting to celebrate AI<sup>3</sup>'s 25th and SOI Asia's 20th anniversary.

She said the topic for the day would be a new style of learning. First, participants would provide updates, followed by a workshop and panel session.

Husni invited Yung-Wey Chong and Raden Arief Setyawan, who did not attend the Day 1 meeting, to greet the group.

First, Husni introduced some responses in a registration survey that asked three questions on 1) best practices in working during the pandemic, 2) the challenges, and 3) what respondents wished to continue to do after the current situation ended. Respondents mentioned Zoom, combining work at home and the office as a best practice, lab work and group discussions, and Internet connectivity as their current issues. Husni noted that hybrid models for studying under the pandemic would be the way to go forward, with the need to allow people to work remotely and be physically present in the office.

Husni prompted discussion on site updates, asking participants to speak briefly about the points they wished to emphasize.

Participants proceeded to speak about changes in their academic committee members, offered updates on their distance learning environment, network research, and development, National Research and Education Network (NREN) initiatives, the situation dealing with the COVID pandemic, and lessons learned in 2020. Most participants indicated that little had changed in their administrative committees.

The University of Computer Studies, Mandalay (UCSM)'s Sai Maung Maung Zaw offered an update on the institution's distance learning environment with a Moodle Learning Management System in use since 2014. Together with other teaching strategies, UCSM had upgraded the Moodle-based online learning system as a blended learning technique.

Zaw spoke about the upgraded infrastructure of the UCSM network using fiber-optic lines, saying development was ongoing for the Myanmar Research and Education Network (mmREN), and that UCSM was connecting mmREN with UCSY and the TEIN community for research collaboration and cooperation.

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When Murai asked if mmREN connected all the universities, Zaw said that most of the teachers, including some 75 percent of the staff at his university, were engaged in the Civil Disobedience Movement (CDM).

Husni asked if there were no expectations when the academic calendar would be resumed; Zaw said his university collaborated with UCSY and other universities and held occasional meetings.

Murai thanked Zaw for giving an update and participating in the meeting at a difficult time, saying it was imperative that he shared the details with the participants.

Speaking for USM, Tat Chee Wan said the semester had shifted by about a month since 2020 for an October start rather than September due to delays caused by a lockdown against COVID. The university had been shut down for about six weeks, and he said its October start would be maintained in 2021. The increase in connection traffic had been a challenge during exams, conducted online, but Wan said he believed that improvements were being made.

Wan said a lockdown began in March 2020 and continued most of the second semester through February 2021. Although some face-to-face classes were resumed at that point, most classes chose to be online, except for lab work that required a physical presence. However, Wan said the lockdown had resumed after a few weeks of face-to-face classes, and everything had gone back online. A separate system was set up for online exams using Moodle Quiz. It used a restricted browser configuration so the browser that connected students to their exams would not allow other windows to be opened or other sites accessed in consideration of a design that would focus more on thinking to reduce cheating. Wan said the government aimed to vaccinate all students enrolling at university by October 2021, but so far, plans remained to continue online study activities in the first semester in 2021/2022.

Wan also said his university was in a new collaboration with the Indian Institute of Technology Hyderabad and Universitas Brawijaya to build a secure and scalable IoT-based healthcare network project, funded as an ASEAN-India Collaborative R&D project. He said Artificial Intelligence and machine learning were gaining importance as a future workshop idea for online-related activities.

Hossen Asiful Mustafa from the Bangladesh University of Engineering and Technology (BUET) said final exams were now starting after delays in the academic calendar, conducted by video. He said BUET's undergraduate and postgraduate programs used Microsoft Teams and Zoom for their online video classes and Teams and Moodle for LMS. Mustafa said BUET has been associated with the Bangladesh Research and Education Network (BdREN) since 2010 and indicated that its community had ties with academic networks such as TEIN3 and Cambridge University.

He said all educational institutions in Bangladesh, including BUET, remained closed since the start of the pandemic, and physical classes had been shut down since March 2020, adding that he hoped to resume classes in November.

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Mustafa said online classes began in August 2020, and the university was providing loans to teachers and students to purchase laptops or smartphones. He noted the issue of dealing with transient Internet requirements in areas with low capacity.

Okawa asked what specifically students received as mobile data support. Mustafa said students could choose a mobile operator with the best network, and the university provided SIM cards and phone numbers associated with mobile data packages.

Muhammad Niswar at Universitas Hasanuddin (UNHAS) said not much had changed in the UNHAS academic calendar that began in July. The university had been using an LMS for distance learning since 2016. He said UNHAS offered four options: a self-developed video conferencing system, zoom account subscriptions for every department or study program at the university, G-meet, or a Webex account for Cisco Networking Academy instructors.

Niswar said the pandemic had caused a suspension in face-to-face classes and required all lecturers and students to work and study at home, using LMS and the Internet. He said UNHAS permitted lab work as needed but that health protocols against COVID had to be observed wearing a mask, washing the hands, and maintaining a physical distance with peers.

Basuki Suhardiman at Institut Teknologi Bandung (ITB) also said his university continued to remain mostly online. It officially began using an ITB Learning Management System, called Edunex, where lecturers can use video conferencing facilities. Suhardiman said Indonesia had started a new program called MBKM, where courses are shared between universities, creating an opportunity for expanding courses between AI<sup>3</sup> and SOI members.

He said all academic activities were being conducted at home, and ITB internal management was around 25 percent of its total capacity.

He said the issue was that the pandemic was changing so much. It changed how we teach and collaborate with others; how students, lecturers, and researchers collaborate, discuss, and communicate. He stressed that it was changing our way of life.

Rahmad Dawood said Universitas Syiah Kuala's academic calendar had been pushed up by a month. Rather than starting the semester in mid-September, classes were commencing in mid-August, and the next semester would begin by January. Dawood said the university was using a unique Moodle-based learning system, Google Classroom, and Zoom or Google Meet. He said no one goes to campus now because everyone works at home. All physical laboratory practices had been canceled and replaced with simulation services or software where possible, except for the medical faculty. Everything was now online, and Dawood said that while lecturers had been unsure what to do at the start of the pandemic, they now preferred to teach online, or at least in a hybrid manner. The pandemic has made people more aware of the ease of working online.

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Universitas Brawijaya (UB) presented its academic calendar, saying several LMS, for example, Moodle and Google Classroom, were used, and that technical development continued to be underway.

In answer to questions from Okawa, the university had link capacity, but students could not access those facilities as they were currently staying at home and remained off-campus; thus, the institution was making efforts to provide VPN.

Commenting that a VPN can be used to extend a campus to wherever its students may be, Murai asked if that was how the set-up was being used. The response was that the way to utilize the VPN was to use the IP address from the campus because it already had a subscription and that the university attempted to randomize its IP address on the VPN server.

Sam Ratulangi University's Alwin Sambul said his institution's academic calendar remained unchanged. The semester began in August and ended in January, with the next semester from February through July. The institution uses LMS Moodle, Google Classroom, Microsoft Teams, and multimedia studio for content development in its asynchronous e-learning, and Zoom, Google Meet, Teams Meeting, and Jitsi for its synchronous e-learning.

Connected and involved in many activities through IDREN since 2017, the university went online for its lectures as of March 2020. It has also been using video recordings and LMS platforms. Sambul said the outlook remained uncertain due to the pandemic but that his government was making efforts to reactivate school activities soon, particularly in low-impact areas. However, some of the university's actions continued to be limited due to its medium-impact location. He said there weren't many R&D activities currently underway, particularly those related to local networks, and hoped the situation would improve.

Okawa asked if the authorities recommended Sam Ratulangi and other universities to go back to teaching in the classroom or if the decision would be autonomous. Sambul said the answer was both. The Ministry of Education and Culture oversaw both elementary and higher education and was united on elementary education. While elementary school pupils and junior high school students were prompted to go back to their schools, students also needed approval from their local government and parents. It depended on the situation and their location.

The session closed after a few words from a longstanding SOI Asia and AI<sup>3</sup> member Yasuo Tsuchimoto, currently with Eikei University of Hiroshima.

## Day 2 – Workshop

### **“Introduction to EBA – Evidence-Based Approach for Emergent Issues in Asia: Data Collection, Data Analysis, and Storytelling”**

Okawa opened the session, saying support from the APNIC Foundation now enabled the group to work together in developing the EBA program toward the future.

Associate Professor Keisuke Uehara gave an introduction to the EBA team, saying seven staff members supported the new EBA project: Keio University Graduate School of Media Design Professor Keiko Okawa; Keisuke Uehara, Associate Professor, Faculty of Environment and Information Studies; Keio University Global Research Institute Project Assistant Professor Eliko Akashi; Rika Ikeda, Project Researcher; Leandro Navarro Hundzinski, Doctoral student, Graduate School of Media Design; Fathima Assilmia, Doctoral student, Graduate School of Media Design, and Marcos Sadao Maekawa, Research & Education, Development Project Officer, APNIC Foundation.

Assistant Professor Uehara said Asia had many emerging issues, and universities needed to take on those challenges. But collaborations were necessary because such matters were too complicated for universities to resolve single-handedly.

Uehara introduced a conventional Japanese methodology which he called KKD, short for Kan (intuition), Keiken (experience), and Dokyo (courage). He said science was essential, now that data became available, and that issues had to be resolved and policies formulated based on evidence.

A data-driven approach requires data science skills, ICT skills, and the ability to get things done. Uehara said that while meeting participants were ICT experts, the skill to communicate with people in other fields and international communication skills were essential, citing that as the reason for the need to collaborate and jointly educate students.

Uehara explained the evidence-based approach. It consisted of collecting evidence through digital technology or fieldwork, analyzing data analysis to resolve issues, and storytelling skills for convincing others. Solutions would then be measured, and data would again be analyzed.

The mobility of students beyond their educational attachments was essential to acquire skills, resolve issues, and build a community. Uehara said that despite starting five years ago, projects had not been conducted during the past two years, and the group was now ready. He asked meeting participants to join efforts to educate and create human resources for resolving issues in Asia.

Okawa spoke about the philosophy behind EBA: to foster a collaborative community among universities and research institutions throughout Southeast Asia for designing a resilient future society based on evidence. Day 1 project presentations indicated that member universities and UNESCO were already making such efforts and had the skills and knowledge to produce much data as educational tools, stressing a desire to promote the EBA model among the younger generation.

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Okawa hoped that ASEAN EBA leaders would have skills in social innovation, information technology, expert knowledge on specific program areas, global collaboration skills, cultural understanding, and the ability to act in the field. Universities could give students core courses, specialized courses, specialization in EBA, fieldwork, and international experience to utilize their skills and knowledge with their peers in Southeast Asia.

She suggested that universities provide coursework while the group invited students to partake in fieldwork. The next stage could be an internship program for collaborations with industries, NPOs, NGOs, international organizations, and research institutions. Students could gain actual work experience; the community could issue a global certificate showing that students had completed activities and were ready to work in the field.

Okawa went on to give an overview of the EBA course curriculum. She indicated fieldwork and internship; practical subjects such as language and culture; energy and environment, life and health, and disaster management as specialized courses; and core EBA courses, such as data science, policy and governance, social innovation, and information technology. She said courses had been developed with nine partnering universities in seven countries and looked toward expansion.

She noted diversity among participants – students with or with limited communication skills, those from different universities, and various countries. More than a thousand EBA certificates have been issued, and various Asian locations have been visited.

She said the group supported the United Nations' sustainable development goals initiatives that aligned with its mindset. It had developed more than 33 types of fieldwork at various locations, each focusing on SDGs goals.

The course has also collaborated with several companies in Japan and other places for internships. More than 500 students have participated during the past five years, and Okawa hoped for further expansion in the time to come. Students who have previously attended said EBA has increased their research interest, provided them with brainstorming ideas from different perspectives, helped develop a global mindset, and created a good combination of friends and colleagues.

Akashi provided details on EBA fieldwork, a 10-day program for 10 to 20 students to study together. It comprised three components: online and offline social learning, learning from data outside the classroom, and developing skills to collaborate and share ideas. She gave an example of a participant from Universiti Sains Malaysia (USM), Malaysia, who took part in EBA Fujiyoshida Fieldwork hosted by Keio in 2014. The object had been to monitor and assess the biodiversity of mammals and biomass energy in the Mt. Fuji area. The computer science major had been aware of the importance of data, its collection, and analysis but had had no experience in biomass energy or other fields. After program participation, he became an EBA leader with skills in working with people with different



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backgrounds and tackling challenges through an evidence-based approach. The participant currently works for a global organization and says the friendship and experience of working with others from different countries will open up greater access to talent and knowledge and increase exposure to multiple areas, which is particularly important in business.

After project termination in 2016, Akashi said that it would restart this year, with more robust support and collaboration with SOI Asia and the member community, and prompted Leandro Navarro Hundzinski to explain a new Virtual EBA initiative.

Navarro talked about virtual fieldwork activities for EBA. He mentioned difficulties in conducting fieldwork amid the pandemic and its restrictions, saying the consideration of virtual fieldwork only as a quick fix or alternative could undermine its genuine value and asked participants to think about it as a new type of activity to develop.

He said virtual fieldwork was a way to observe fields from different standpoints and offered a new way to experience fieldwork activities.

New technologies presented new potential. Navarro gave examples of new technology that enabled powerful video and audio recordings, unique experiences of virtual exploration with more immersion, a faster Internet for live transmission, telepresence, remote sensing, and data visualization. He emphasized that technology created new formats for fieldwork activities that brought the field to the fieldworker and added a new way to work with fieldwork activities.

Fieldwork designers could diversify, innovate, and scale up to larger student groups; students could find fieldwork more approachable, novel, and accessible. In addition, qualitative or quantitative approaches were possible in a virtual environment, content either pre-designed or real-time, and communication could be asynchronous or synchronous.

He said the creation of a virtual fieldwork toolkit was underway to assist fieldwork designers. He went over the requirements for implementing virtual reality, possible outputs for students to report, discuss, and share, and gain experiences using the latest technology.

Navarro said an Asia Workshop consisting of a pilot and initial tests would start in September, to later be applied to fieldwork on Minamata and other EBA initiatives. He wrapped up his presentation by saying that fieldwork allowed people to use data to interpret reality. He said new technologies enabled different types of work with data and that those new experiences offered new ways to interpret reality.

Rika Ikeda then led a quiz using a computer tool. Participants answered questions on EBA, social issues in their countries, and locations desired for EBA fieldwork in their countries.

Okawa thanked participants for their contributions and said a call would be made in the coming months for participation in a concrete planning meeting. She then introduced Norrima Binti Mokhtar

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from University of Malaya (UM), an active EBA member, who greeted the session and expressed  
hope to conduct the program despite the challenges posed by the pandemic.

**“Micro-Credential And Hybrid-Flexible (Hyflex) to Support Course- Level Student Mobility”**

Husni opened the session and announced the discussion topic, Micro-credentials and Hybrid-Flexible (Hyflex) to Support Course-Level Student Mobility. He said he wished to see more of these among students experiencing limited mobility amid the COVID pandemic; then invited the panelists, Dawood, Wan, Koomsap, and Okawa, to give brief position statements, to be followed by a discussion.

Universitas Syiah Kuala’s Dawood gave a structural overview of “The confusing Indonesia micro-credentials regime: a lecturer perspective,” saying the regulator, Badan Nasional Sertifikasi Profesi (BNSP), provided all certifications in Indonesia. Its certification body, called LSP (Lembaga Sertifikasi Profesi), certified educational institutions under P1, the company-based P2, and P3, associations, a combination of industry, civil society, academia, and professional entities such as the oil and gas association. All such entities required accreditation from the BNSP.

While Indonesia’s micro-credentials require BNSP approval to show competency, Dawood said the question was how that competency was defined. They are Indonesia-centric within a rigid, bureaucratic structure and vary from those of global IT industries. A legal framework exists based on LSP 1. Still, the government or universities do not highly regard it. Dawood said he would choose certification from global companies such as Cisco or Oracle over legal certificates issued by LSP.

Wan from the School of Computer Sciences/National Advanced IPv6 Centre, Universiti Sains Malaysia, updated the session on the status and direction of micro-credential offerings and student mobility at USM. On the back of Malaysia’s higher education blueprint launched in 2015 for a more inclusive and non-traditional approach to education, the focus has shifted toward micro-credentials because it’s more manageable, better meets the demand for knowledge, the requirements are more flexible, and programs have been launched for professional upscaling certification.

Wan said the university hopes to enable credit transfers to be applied to other programs and mentioned a new program for the experiential learning of core competencies such as digital finance literacy, climate crisis resilience, innovative thinking, genomic and gerontology, and sustainable development goals. This short-term program, planned to be offered during summer break, has been on hold due to the lockdown, but Wan said that he thought collaboration might be possible after listening to the virtual fieldwork presentation. He spoke about proposing micro-credentials and credit transfers, dividing course components into online and face-to-face modules so online modules could be completed as micro-credentials.

Koomsap shared outcomes from an MSIE 4.0 on developing master’s degree curriculums to support Thailand’s sustainable smart industry. He said it was a vast project conducted jointly by three

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For 2025, he said the top 10 skills required for Industry 4.0 mentioned in the World Economic Forum's 2020 report had shifted toward entrepreneurship. The emphasis on complex problem-solving and critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision-making, service orientation, negotiation, and cognitive flexibility had changed to analytical thinking and innovation, active learning and learning strategies, complex problem solving, critical thinking and analysis, creativity, originality and initiative, leadership and social influence, technology use, monitoring and control, technology design and programming, resilience, stress tolerance and flexibility, reasoning, problem-solving and creativity.

While industries expect to see those skills in graduates, they are not all they are looking for. Koomsap said students need to develop technical and transversal competence through active learning experiences, both problem-based and student-centered learning, and be equipped with a genuine package and offered a curriculum to target groups with that in mind.

Concerning technical competence, Koomsap mentioned transitions from the industrial revolution to the digital era. From humans to human cyber-physical systems in the digital age and onto human cyber-physical networks, systems have become more complicated and smarter. The critical question will be whether school learning will move in line with industry movements or lag behind, which led to this project.

Noting learning factory laboratories in the United States, Germany, and Austria made to resemble actual factories, Koomsap said students needed to familiarize themselves with such facilities. There was a need to build such resources for his new curriculum, and with WiFi connections in place came his initial concept for a remote laboratory. Students could access a physical plant, acquire data through SCADA, and see demonstrations on Zoom. Connections to different classroom sites would enable them to see and learn what went on at a lab facility. Recap 4.0 was another project underway for training instructors under the Industry 4.0 Competence Development Training Program, and a center would be built to support Thailand's Sustainable Smart Industry to offer training, consulting, and networking.

As the last panelist for the day, Okawa spoke about redesigning courses for HyFlex, or hybrid and flexible, teaching and learning. Citing Columbia University Teachers College as a reference, she said HyFlex courses offered students different modes that were hybrid and flexible. She mentioned an example of Bologna University where students are at the core of governance and spoke about Student-Centred Learning (SCL) promoted in the EU, encouraged to fully exploit the benefits of digital technologies for learning and teaching.

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Okawa said a university needs to redesign three crucial points: a more supportive and inspiring learning environment, interactivity, and flexibility in the curriculum. For example, online classes are offered in synchronous and asynchronous modes for students to work at their own pace. She said HyFlex was a combination of these modes in a single class, and teachers needed the flexibility to design their courses.

She gave examples of re-designing classes at Keio University. Some had moved from physical to cyberspace; new student orientation had shifted from a three-day crash course to Communication Week, where students spent two weeks online. Student support had become online meetups, and student offices had changed form to a Slack helpdesk. Learning styles have also changed from classroom-based to interactive online-based, and hands-on classroom workshops have already shifted to HyFlex, where each group connects with remote participants.

With various micro-credential ideas in mind, Okawa said a course had been redesigned and transitioned into Mooc style that could be used for blended learning. She said different course modes could create more opportunities for students to learn flexibly and stressed the importance of teachers having the skills to redesign courses. Faculty members had already held workshops and were ready to work with other teams in the community to boost capacity.

After talking about an SOI-Asia platform for student mobility and micro-credentials, Okawa closed her presentation, indicating hopes for a flexible platform. For example, students at partner universities could access online learning modules managed on an open badge-based e-portfolio to provide certificates based on federated authentication that would be a platform for all EBA programs and other activities.

Husni asked the panelists for comments on incorporating experiences in a remote or future lab setting, using HiFlex for students who weren't physically present.

Koomsap said onsite learning was the most desirable method and the best way for students to gain the most experience, but remote learning would be an option if that couldn't be offered. For example, students in remote areas needed lab access, and haptic sensors could be used to send signals on devices to enable them to feel and gain more experience.

Dawood said he uses an online simulator for people in Banda Aceh. He said what they do physically is much quicker because they've done it online and know what to do. As to occupational training, he was developing materials for participant immersion to see what was happening and what they should be doing. These were small, intermediate steps to take before the actual fieldwork, which gave students a feel of the lab work and made the process much quicker.

Husni asked Wan for his thoughts on USM's strategy and making micro-credentials more practically available. Wan said the university was exploring converting badges and certification to credit

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transfers, and no specific experiences were yet known. Still, consideration was being made for their use as partial credit for course requirements. Since the micro-credential and physical session components would need to be specified, he said creating designs for new programs or courses would probably be easier than using them for existing classes.

Husni remarked that faculty development was a keyword that required thought and asked Okawa for a final comment to wrap up the session.

Okawa said the community could work together on faculty development. At future workshops, Keio was happy to work with its partners on micro-credentials or different learning modes and mode designs. She said that in a new program, EBA-specific skillsets could be interesting subjects for micro-credentials.

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**DAY 3 - 9/1 (Wed): “Infrastructure”**

**Day 3 – Panel Session #2 “Internet Engineer Education”**

Murai addressed the group before the session opening and spoke about the background of ARENA-PAC, or Arterial Research and Educational Network in the Asia-Pacific, and its plans.

He said ARENA-PAC, or Arterial Research and Educational Network in the Asia-Pacific, consists of a new format optical fiber submarine cable in the region. Leveraging Guam’s central location, he said the project had begun with the concept of Hawaii and Guam covering the Pacific islands together, and efforts had been ongoing for many years. It specifically targeted research and educational purposes.

Murai said it was a topological approach between Japan-Guam, with the Guam-to-Singapore link already funded and ready to be used to add more capacity to the community. Thus, it had decided to start with the Philippines and Indonesia because of the large number of partners.

He also mentioned that SARENA-PAC, the Satellite Arterial Research and Educational Network in Asia-Pacific research and development project, uses satellite connectivity to connect the Asia Pacific area even in disaster situations. Also unpopulated areas can be connected via such technology. The first target area will be East Timor, a community partner where connectivity remains insufficient. Indicating that that would be one of the first steps that SARENA-PAC would take, Murai said he hoped to see new Internet infrastructure in three-dimensional space, including space, the air, and between.

He said SARENA-PAC would be the community’s new infrastructure for the new era since it engaged in mobile device activities with connections that covered universities, cities, houses, the field, the ocean—everywhere—for totally new experiences. Both EBA and SOI Asia would now have unlimited, unrestricted space for accessing the Internet.

Panel discussion #2 on Internet Engineer Education began with Keio University’s Noriatsu Kudo moderating. He outlined the session plan and the history of SOI-Asia, which has provided training programs for operators since 2002 and transitioned from physical to online workshops. With ARENA-PAC and SARENA-PAC in 2021, he said more operators and researchers would be using its environment; thus, consideration was needed on training, education, and community-building.

Kudo introduced a program proposal for capacity-building that he, Husni, and Okawa had worked on that targeted Asia-Pacific university students, called the Asia Pacific Internet Engineer Program (APIe program). In collaboration with SOI-Asia, AI<sup>3</sup>, the APNIC Academy, AITAC, Interop, and other Internet community members, it would develop self-paced online and onsite classes and virtual labs as a training program for Internet engineers involved in ARENA-PAC, SARENA-PAC, and other initiatives.

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The Asian Institute of Technology's Professor Kanchana Kanchanasut gave a keynote speech on TEIN Human Resource Development and provided an overview of the Internet Education and Research Lab (intERLab). She spoke about its research projects, including networks and communication, IoT, and smart communities, offering various types of training to network engineers from industries, service providers, and REN. It also provides specialized training for international organizations such as the ADB.

She said intERLab had designed and implemented TEIN to build the capacity of network engineers to support TEIN operations and applicable areas, such as telemedicine and high-energy physics.

intERLab was expected to provide information on the network and promote collaborations with existing Asia-Pacific organizations as a member of the Asia-Pacific community.

APNIC Infrastructure & Development Director Che-Hoo Cheng spoke about the APNIC Academy's Strategy for Training and Development. He outlined its vision for a global, open, stable, and secure Internet and mission to provide essential services as a regional Internet registry and support Internet development in the Asia Pacific region.

Cheng said the Academy engages in human resources development and capacity building, focusing on Internet infrastructure-related topics and supporting technical and security communities and Internet infrastructure. It targets current and future Internet engineers and software developers and covers mostly layer three-related issues. As of 2020, he said the APNIC Academy is being used as branding for all APNIC training and technical assistance activities in its blended learning and flipped classroom approach.

He said surveys and feedback showed increasing demand for more training. Funding from APIDT and the APNIC Foundation starting in 2021 would enable high levels of growth in training capacity and scalability. Partnerships were crucial for scaling up the training, and he was looking at possible collaborations with NRENs and RENs, universities, and vocational, educational, and training centers.

AITAC/University of Tokyo Professor Yuji Sekiya made the following presentation. He said AITAC, established in 2017, which stood for Advanced IT Architect Human Resource Development Council, engaged in human development for the past three years. It targeted IT engineers and combined older infrastructure with the new and involved cyber security, one of the most critical issues today. Sekiya said the curriculum aimed to develop top architects, or engineers who could architect ICT systems with the appropriate technology; full-stack engineers who had skills in all areas; and operators, engineers who could understand system architecture and resolve system challenges.

Sekiya outlined AITAC's three-step education system, comprising lectures and exercises, practical training, and professional development. Step one was broken down into four categories and teaches networking, computing, cloud and virtualization, service design, automation, and operation. He said



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everything has shifted to e-learning, providing real-time lectures and on-demand sessions after  
COVID.

Kudo said the panel had three questions for Sekiya. In answer to the first question, Sekiya said RENS were very important because there was no proper venue for students to train elsewhere. The second question asked the type of human resources his REN needed for the next generation, to which he replied, the skillset of architecting was vital. Sekiya said the third, what was necessary to boost human resources at RENS, was a difficult question. He said that from AITAC's standpoint, career paths were very important.

Kudo then asked APNIC Academy Team Training Curriculum Manager Peter Blee to present his slides.

Blee spoke about the "Ingredients" for making a great Asia Pacific Internet Engineering (APie) Program. First, the Internet grew exponentially and rapidly; networks grew bigger, more complex, and diverse. The pressure increased on network operators to manage those networks, and skill gaps were real. And there were opportunities to make a big difference through the APie program.

He said there were four key ingredients, starting with just-in-time learning. Key points included the need for people to access subsets of courses such as on skill-sets, micro-credentialing, and modularized learning, for on-demand and relevant to job needs, a blend of class-based management, and content that was personalized for different learning paths.

He said it was also crucial to have continuing education programs to kick up and fill gaps as the industry changed. The fourth ingredient was to be authentic in making offerings, as it wasn't easy to balance the theories and the practical. It was essential to stay relevant and up to par with the industry and bridge the gap between education and practice. Blee closed his presentation saying the Asia Pacific engineering program has an opportunity for wide adoption within the region.

Universitas Brawijaya's Achmad Basuki talked about the decreasing number of students participating in network and ICT infrastructure courses. The challenges included a significant decline in the number of students who took part in these elective classes, and a need existed for many tools and hardware that weren't easy to provide, and he said most hands-on labs in ICT infrastructure were not easily virtualized or provided in a single integrated environment.

Basuki said a virtualized lab on ICT infrastructure was needed as an e-learning platform. It should be single and integrated, and easy-to-use hands-on for students to learn at their own pace.

Kudo wrapped up the session stressing the need to motivate students for program participation. He asked Blee for his thoughts on ways to encourage students to study networks and related topics.

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Blee said many different entry points and exit points existed, and the APNIC Academy had developed a pathways guide.

Kanchanasut said her institution faced the same problem, and any ICT discipline suffered a lack of student interest. Kanchanasut shared her belief that education on network engineering was suitable for people who were already working rather than bringing in new students. However, she indicated that she didn't know how to make the course attractive and commented on the need for a public relations expert.

Cheng added that it was necessary to ensure that for developers, his organization received comments from the industry that if they didn't have sufficient networking knowledge, then they might not make the best use of the Internet or the networking environment.

Okawa said she would like information on good internship opportunities for Internet engineers and suggested continuing discussions on Slack.

**“Infrastructure”**

Husni greeted the group, saying the session would cover infrastructure, research, future development plans, and research topics related to ARENA-PAC and SARENA-PAC.

The WIDE Project’s Hirochika Asai introduced ARENA-PAC, saying it was a new program founded in 2020 for funding submarine cables in the Asia-Pacific for collaboration with the global research network community. It is operated by the WIDE Project, supported by APNIC, and financing is based on APIDT (the Asia-Pacific Internet Development Trust). APIDT is a joint initiative of the WIDE Project and APNIC.

Asai reminded the session that the WIDE Project was an industry-academia research consortium whose motto is, “Research on our left hand, operation on our right hand. Supporting social infrastructure with both hands.”

Asai said the Tokyo-Guam link has been in service since February 2021 and showed a map that indicated the scope of the present submarine fiber cable and its scheduled expansion. He said ARENA-PAC provides Layer 1-3 interconnection with other research and educational networks, connecting to the WIDE Project in Tokyo and directly to the Guam Open Research and Education eXchange (GOREX) in Guam and the University of Hawaii, UoG, AARNet, SingAREN, REANNZ, and TransPAC through GOREX.

He said the National Astronomical Observatory of Japan (NAOJ) is one of ARENA-PAC’s traffic consumers and has a telescope in Hawaii for delivering vast volumes of data to Tokyo. While it previously sent data from Hawaii to Tokyo via Seattle, ARENA-PAC has provided a shorter path from Hawaii to Guam to Tokyo, showing how it contributes to research.

Asai showed a photo of the ARENA-PAC Tokyo PoP, explaining that one circuit went to Guam and the other went to WIDE. He then discussed plans to install ARENA-PAC equipment in Guam, extend it to Manila and Surabaya through Guam, contribute to research projects and experiments, and collaborate with other global RENS.

Raising some research challenges concerning ARENA-PAC, such as immutable infrastructure and automation for efficient operations, routing, and applications, Asai said a WIDE camp was being held the following week where the topics would be discussed.

The WIDE Project’s Takashi Tomine spoke about technical challenges in ARENA-PAC operations. He outlined ARENA-PAC’s interconnection with other RENS. While the Tokyo-Guam and Singapore links are currently the only operations, he said WIDE needs to accelerate its connection efforts with Surabaya and Manila soon. He noted several organizations operate ARENA-PAC and WIDE must initiate good communication and collaboration for project success.

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Tomine spoke about a routing challenge. He said it had some similarities with research issues as he shared a map that showed a physically short path and a logically short path. Stating that a logically short path is the best path at present, he said WIDE is currently monitoring the network to find problems such as topology changes and fix routing with network operations.

Tomine said every network has many security operations, but highly distributed security operations like these must gather packets from throughout their networks, and it is difficult to bring them in from all operation points. He also noted that a security information sharing system was needed for sharing security information with RENs and that collaboration and team-building were crucial.

AI<sup>3</sup>'s Achmad Husni Thamrin continued to present the community's current initiative for SARENA-PAC with funding from the APNIC Foundation. He said it was the way forward for the next five years.

Husni said the group was looking into the future for infrastructure and research, focusing on research, emergencies, and inclusion, and began with the third topic. While the previous day's sessions mentioned hundreds of Mbps or Gbps connectivity, Timor Leste R&E Infrastructure (UNTL) only appeared to have around eight Mbps. Husni said he hoped to provide greater bandwidth to partners at UNTL and the local research and education network through a satellite.

As for research and emergencies, Husni said that of the three layers that existed—sensor networks, overlay networks, and non-terrestrial and terrestrial networks, AI<sup>3</sup> had been working on overlay networks for a long time and explained the network structure. He then went over sensor networks, from Botnet monitoring, IDS, and IoT, using low power Edge ML, to sending back data to compute and storage servers at Keio and partner sites, which he believed to be a hot topic in machine learning.

Husni gave examples of sensor networks in network monitoring and IoT, spoke about non-terrestrial networks and the option to use satellites in an emergency, then opened the floor to questions and comments.

Basuki Suhardiman asked about the Starlink gateway in New York. Husni said there are many gateways up north and down south in Australia and New Zealand but none in Asia at present. Suhardiman asked about possibly using a tunnel or overlay network through the gateway, then connecting to a REN as a backup. Husni replied that that was the idea, to have the nodes the group had installed, ordering the Starlink service and installing it at various sites for good connectivity to REN. Then, the sites could be relay nodes. Husni said latency was slow, and financial institutions are looking into that.

Kanchanasut asked about licensing. Husni said negotiations were needed with the local authorities.

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Murai said gateways needed to communicate with aerial, after which any device could be reached, either wired or wireless; then a license would certainly be required. It would be challenging, but On the other hand, Murai said the stratosphere approaches are already allocated for existing mobile channels because they are so close in the air that they can communicate directly with our devices, such as a smartphone. As our smartphones are already licensed, those licenses could be used for communication with stratosphere stations. He said stratosphere technology is that they are essentially a flying ground station for our mobile phones. Licensing could be complex, but it was simply a standard roaming of ground stations with no need to notice the switch from a ground station connection to a stratosphere station, and existing licenses for mobile phones could be used.

Macintosh also expressed concern over regulatory issues. He said it could be interesting for projects in Asia to consider strengthening communications capacity, particularly in countries such as Indonesia and Thailand that had compelling cases to present to the authorities for using such new technology. Macintosh added that smart investments in communications could truly help push through the licensing and regulatory issues by showing the positive benefits, saying the information existed and could be given a higher profile.

Regardless of the type of satellite, Murai said everything could later be utilized as long as they carried the Internet. He said the group was experienced, and they were the experts in using the Internet via satellite. They had partners in each country and already used the infrastructure; it was only a matter of extending what already existed.

Husni wrapped up with a comment that everyone had to work with their governments on the licensing issue. They had to consider how to convince the authorities to allow them to use such services. These were the next wave in non-terrestrial networks for the Internet that would cover their operations and the entire globe.

Murai stressed that it was the community's mission to work together and document the importance of architecture for the future of society.

**Day 3 – Future Discussion #3**

**“Wrap-up and workshop plans”**

Okawa shared what she picked up from the meeting as **action items** to address at the next meeting. Calling it SOI-Asia/AI<sup>3</sup>'s next-day plans or plans for tomorrow rather than plans for the future, she began with **action item #1**, active participation in **developing ARENA-PAC, SARENA-PAC, and other RENs in the region**. She said they would follow up on Timor Leste's connectivity through collaboration with UNESCO, boost contribution to AP REN communities, and continue to follow up with aero/satellite technology, including items such as Starlink and the licensing issue.

She said **action item #2** would be the **Asia-Pacific network engineering course** collaborating with APNIC and AITAC. They would continue to review APie Course development, hold periodical discussions, including virtual lab experiments, and strengthen crucial collaboration with the Asia-Pacific community from the standpoint of training. They would look at other schemes to bolster commitment by the community.

Having picked up the **third action item** from the **EBA** workshop, Okawa said the group had agreed that many participants were interested in developing fieldwork and would hold a fieldwork design workshop. It would also plan joint courses for three critical areas: science communication, data science, and IoT, and call for participation and ideas for developing virtual EBA fieldwork.

Based on the panel discussion conclusion to make efforts for faculty development in HyFlex and online courses, **action item #4** was to develop a **hybrid-flexible learning platform** and system for issuing micro-credentials. In addition, the community would also develop and discuss a SOI-Asia platform for micro-credentials for EBA and Apie and consider the transfer of student achievements for accreditation at universities. While some countries have already started micro-credential systems, she said the community could think about what it could offer in the future.

**Action item #5** concerned research collaborations in non-terrestrial networks, dynamic networking, data science, IoT, and disaster recovery. She hoped to start research projects related to ARENA-PAC and SARENA-PAC with internships and fellowships collaborating with the WIDE Project.

Okawa said the **administration team** would share a meeting summary with the community in September and organize monthly workshops and seminars starting in October to address and share progress, a topic at a time, on the action items. To ensure student mobility and collaboration at universities, she said **MoUs** would be updated and called on participants to help maintain validity.

Okawa then said **fellowship and internship** applications would begin. And until the group assembled for the next meeting, the administration team would facilitate communication among partners so participants could continue their discussions.

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Mentioning the 25th AI<sup>3</sup> and 20th SOI-Asia anniversary party held online, Okawa said she hoped to have a face-to-face party in 2022 or 2023 when conditions allowed. Okawa said she would make her pickup summary available on Google drive and welcomed questions and comments from participants.

Husni suggested scheduling a workshop and directors' meetings due to a lack of time on this occasion.

Okawa added that research discussions would continue at a WIDE camp this month and that interested partners might consider participating. Tomine said technical issues on ARENA-PAC would be discussed and welcomed the group to attend.

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### Day 3 – Close

Akashi suggested holding a photo session before closing the three-day meeting and asked participants to turn on their web cameras so she could take a screenshot of everyone together. She said she would share the photo on the Slack channel, the Facebook page, and the SOI-Asia website. She went on to say a ceremony would be held and asked Husni to explain.

Husni provided an overview of the **Suguru Yamaguchi Memorial Award**, an honor in memory of a man who passed away in 2016, and said it had previously been presented in 2019 with no recipient in 2020 due to the COVID situation. However, this year, there was a winner. Husni asked Murai to announce the name.

Murai said the award went to **Yung-Wey Chong, Senior Lecturer at the National Advanced IPv6 Centre, Universiti Sains Malaysia**, to recognize her long-time contribution in advancing research collaborations at AI<sup>3</sup> and the SOI-Asia community.

Chong expressed her appreciation for receiving the honor, thanked Murai, Okawa, Husni, and everyone in the group for their support and collaborating in her projects. She said she looked forward to more collaborations and activities at SOI-Asia.

Akashi noted that the prize, trophy, and certificate would be presented to Chong when the group met physically, then asked **Wan for words to close the meeting**.

**Wan** said it had been very exciting to be able to join the meeting. He said the group had glimpsed SOI-Asia and AI<sup>3</sup>'s past projects, had physical interconnections, then moved on to human interconnections. It now looked like a new phase was starting with new physical interconnections with ARENA-PAC and SARENA-PAC activities. Albeit remotely, Wan said he was glad to see everyone again, noting that the methods had matured and video conferencing tools had become easy for anyone to use.

Wan said there was no telling what would happen with the SARENA-PAC activities, that perhaps in another twenty years, it would be so easy to use that everyone would be using it. He said it was encouraging and closed with a note of thanks to the group.

**Murai** then thanked all members for participating and said it had been very encouraging to have both the original faces and newcomers attending the meeting. He said their participation was significant, that they had a future climb ahead for sustaining activities, and hoped that each member would carry on their initiatives to the next generation. Finally, he invited the students to participate in various sustainable activities of the group in the only way they knew to continue for another quarter of a century. Murai expressed his appreciation to Assilmia, Hundzinski, .Kataoka, Akashi, Ikeda, and all the people involved in producing, preparing, and supporting the meeting and its design. He asked for a round of applause in appreciation of their efforts.



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Murai ended the three-day meeting with a “See you next time” as smiling members waved good-bye to each other.

