

Promoting Regional Cooperation in Southeast Asia in R&D on ICT



NICT : National Institute of Information and Communications Technology
under the Ministry of Internal Affairs and Communications of Japan

29/August/2018

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< Non Asia Asai >

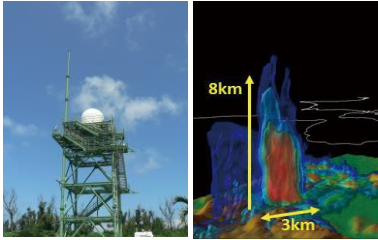
Applied Electromagnetic Research Cluster

This is the field where we “**watch**” the real world through ICT such as Sensing fundamentals.

Remote sensing technology



Ogata Korin “Eight Bridges”



Phased array weather radar Example of 3D structure of rainfall

Ex. Nondestructive sensing

Space-time standards technology



Strontium optical lattice clock



Cesium primary frequency standard



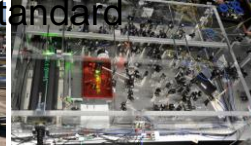
JST generation system



34-m antenna



Satellite receiver antennas



Optical frequency comb

Space environment technology

Space Weather Forecast Center



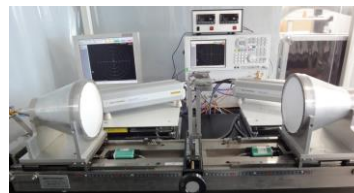
Solar wind observation satellite data receiving antenna



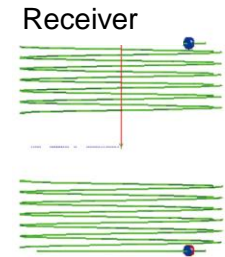
EMC technology



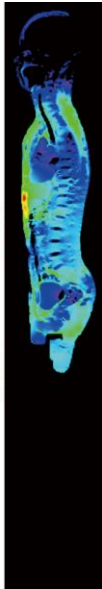
Electromagnetic wave absorber



Anechoic chamber



Receiver Transmitter



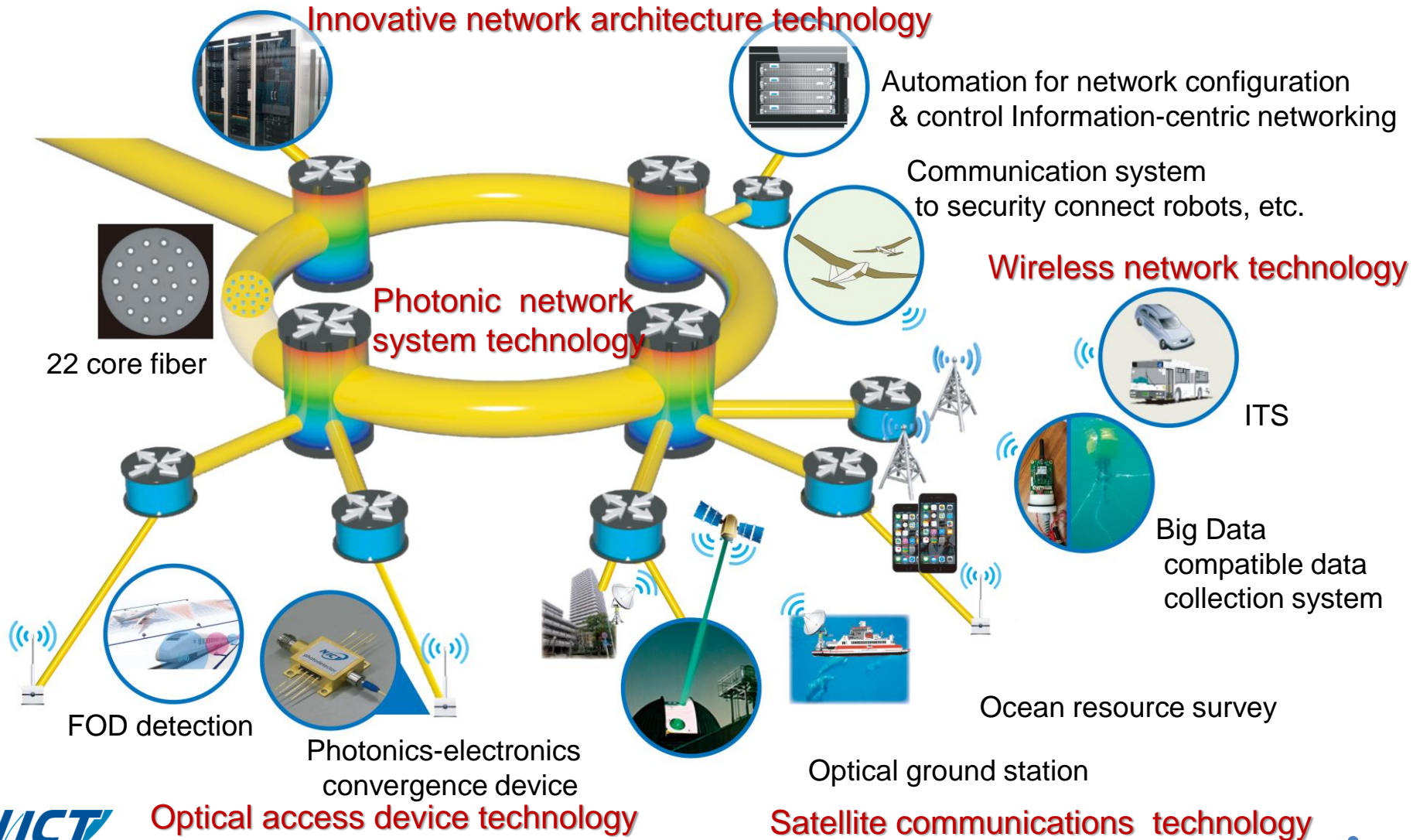
Numerical analysis of induced electric fields



Biological tissue measured in the millimeter-wave band

Network Research Cluster

Technological field that “**connects**” society through wireless and photonics communication technologies as Integrated ICT.

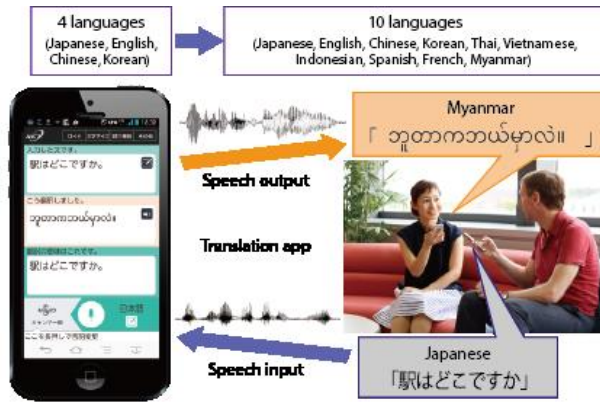


AI/Brain Networks and Communication Research Cluster

This is a fundamental area to **“create”** new value through data utilization .

Advanced speech translation and dialogue system technology

VoiceTra



Social wisdom analysis technology



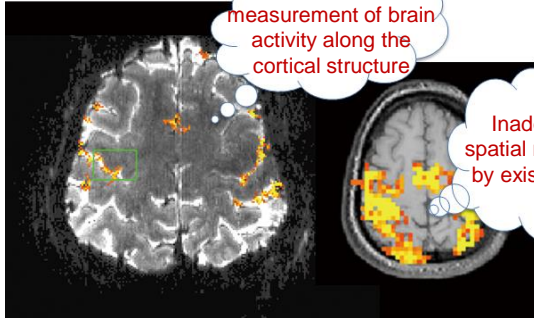
WISDOM X



DISAANA

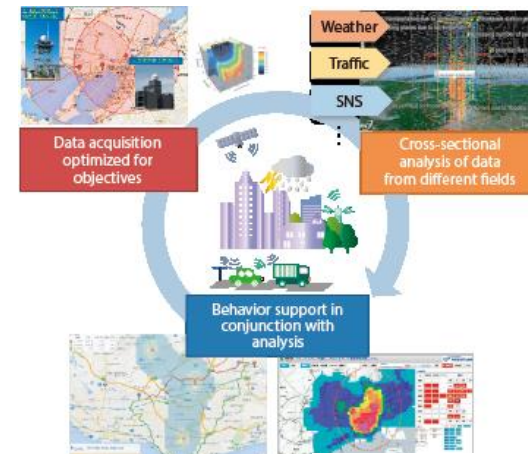
Brain-inspired and communications technology

7T-MRI



Ultra-precise brain function measurement Existing MRI

Real-space data analysis technology



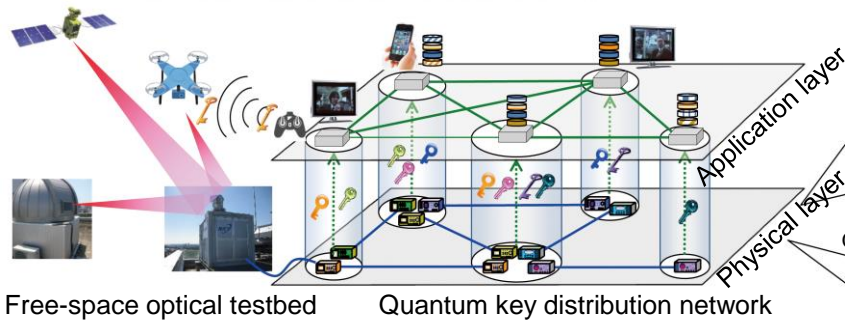
Route guidance for environmental risk red Localized torrential rainfall measures support system

Advanced ICT Research Cluster

“**Developing**” new horizons in the fields of research in information communication technology.

Quantum info-communications technology

Quantum optical network technology



Overview of quantum optical network and quantum node technology

Quantum node technology

- Quantum optical control
- Quantum interface
- Quantum metrology



Quantum key distribution devices



Frontiers in ICT

High-performance ICT device technology

Refrigerator internals Optical fiber-coupled package Organic EO polymers

SSPD chips Photosensitive surface Ultra-fine Nano-structured ultra-small optical modulators with low power consumption, conceptual diagram of THz generation and detector

Superconducting nanowire

Small GM refrigerator Superconducting single-photon detectors (SSPD)

Learn and create network controls for knowledge

Protein Cells Intercellular Insect brain

THz light source (quantum cascade laser: THz QCL) Nano-photonics waveguide structure

THz silicon integrated circuit

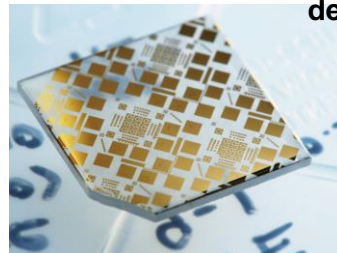
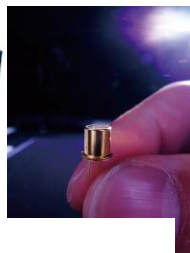
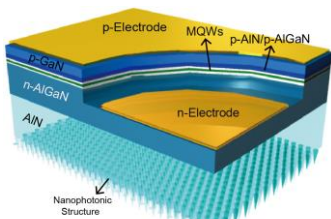
Bio-ICT device technology

High frequency and terahertz technology

Novel ICT devices

Deep-UV optical ICT devices

Oxide semiconductor electronic devices



Schematic and photograph of AlGaIn-based deep-UV LED device

Ga₂O₃ power device chip

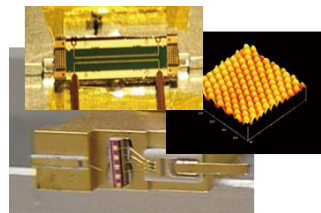
Advanced ICT Device Lab



High-quality, semiconductor crystal growth apparatus



High resolution lithography

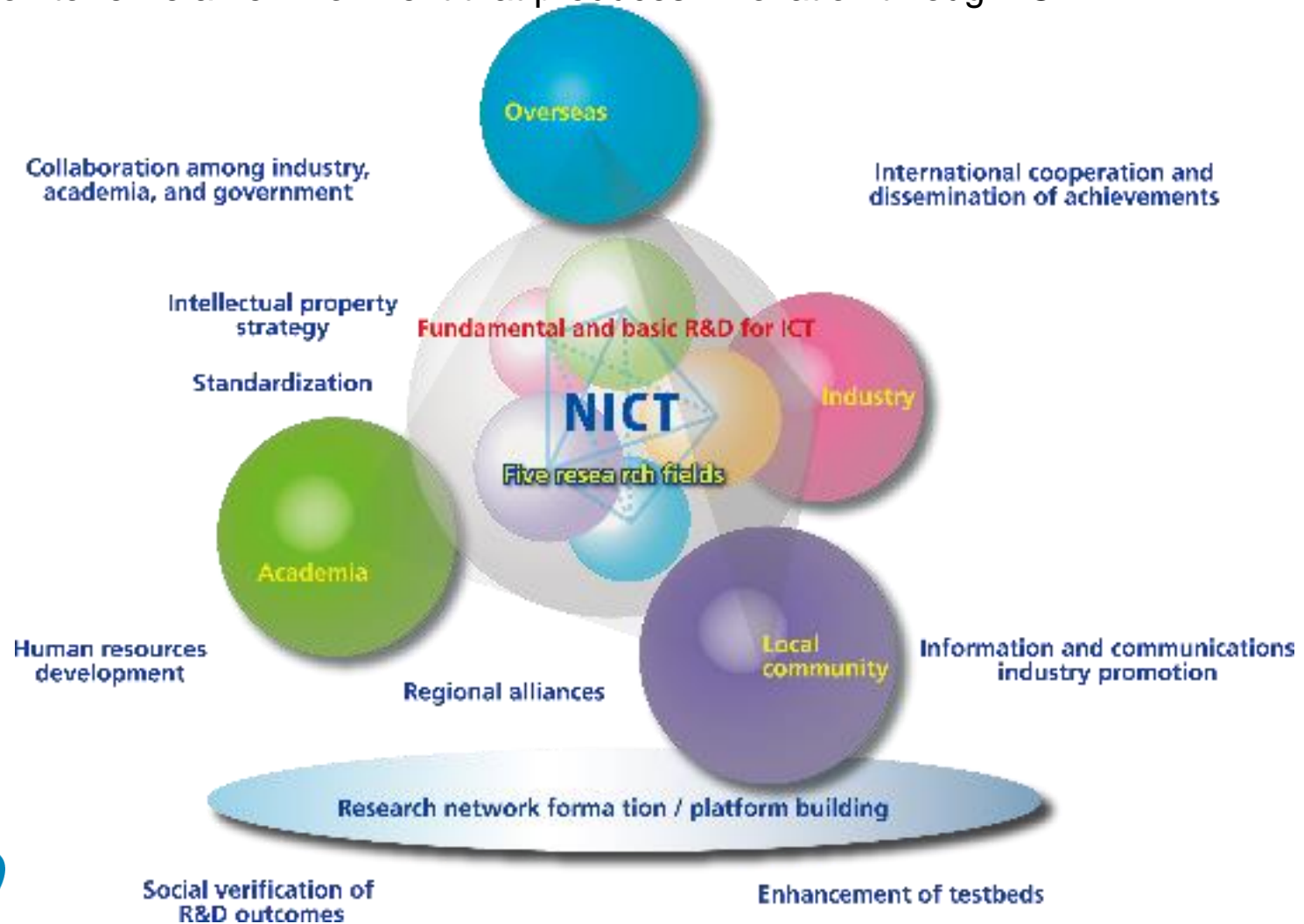


High-speed, broadband optical devices using Nano-structures



Promotion of R&D and social implementation of research result

As a public R&D organization, NICT is expected to serve as a base for open innovation to promote industry-academia-government collaboration, regional cooperation, and international cooperation to realize an environment that produces innovation through ICT.



Promoting Regional Cooperation in Southeast Asia in R&D on ICT

Introduction of Japanese Kanji Character

[Kuukan]

空間

< Here >



間³

[Jikan]

時間

< Now >



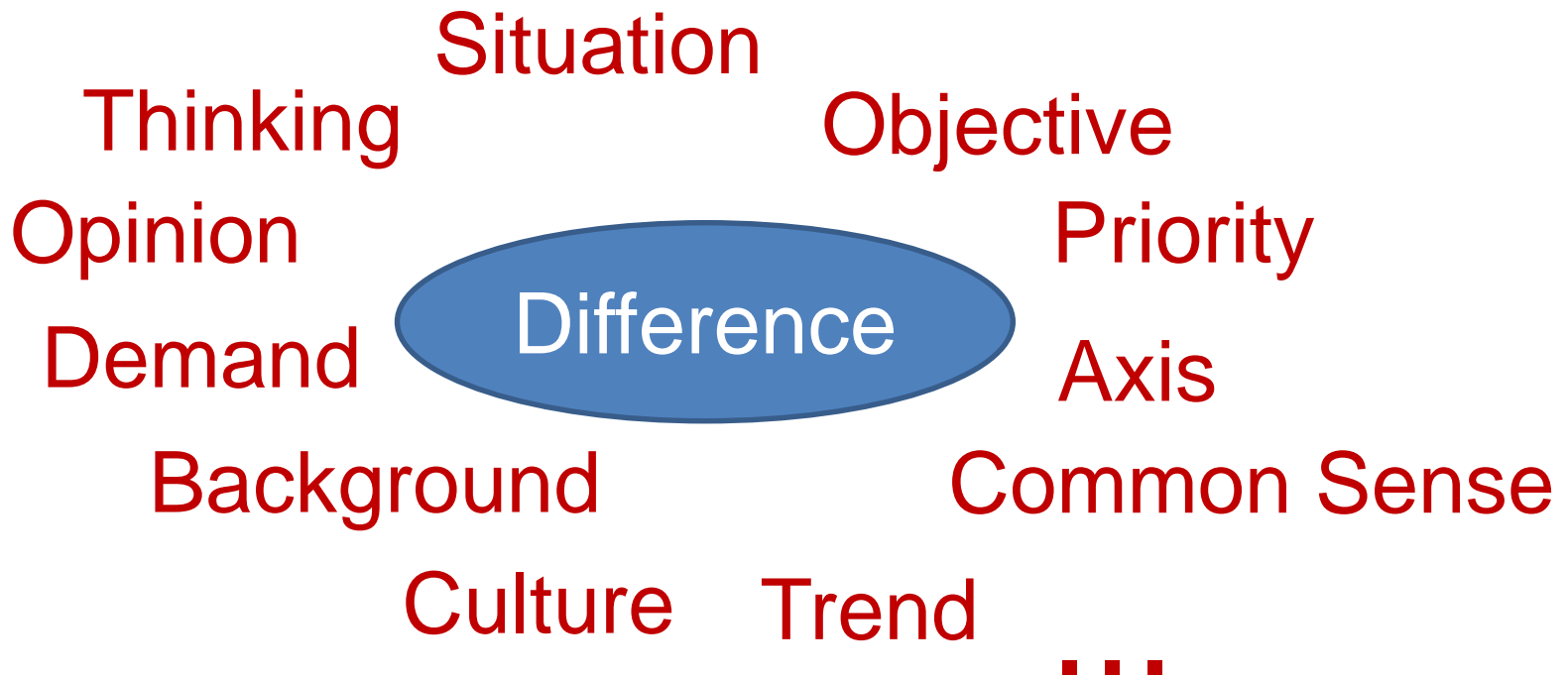
[Ningen]

人間

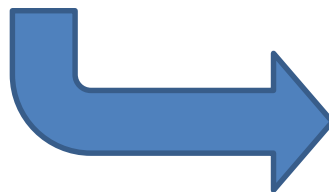
< Human >

間 [Ma, Aida] : Interval, Gap

Cooperation, Collaboration



Know each other
Understand



Larger View

Introduction of Japanese Kanji Character

問³

We should share in this space and just this moment
and work together.

Discuss about cooperation and come up to ASEAN IVO

ASEAN-NICT ICT Roundtable



First Roundtable Meeting,
Bangkok, 2013.11.20

7 countries
16 agencies
31 peoples



Second Roundtable Meeting,
Bangkok, 2015.2.26

9 countries
22 agencies
51 peoples



Established ASEAN IVO

ICT Virtual Organization of ASEAN Institutes and NICT

Activities:

- * Identifying collaborative research areas to address common needs in the region
- * Formation of collaborative research projects (joint R&D, demonstration experiments)
- * Joint organization of multilateral workshops and research exchange
- * International collaboration by dispatching and accepting researchers



ASEAN IVO Members

As of August. 2018



Myanmar



Thailand



Cambodia



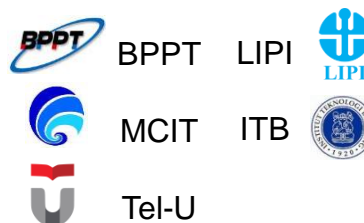
Malaysia



Singapore



Indonesia



Brunei



Japan



*NEC Solution Innovators, Ltd

Laos



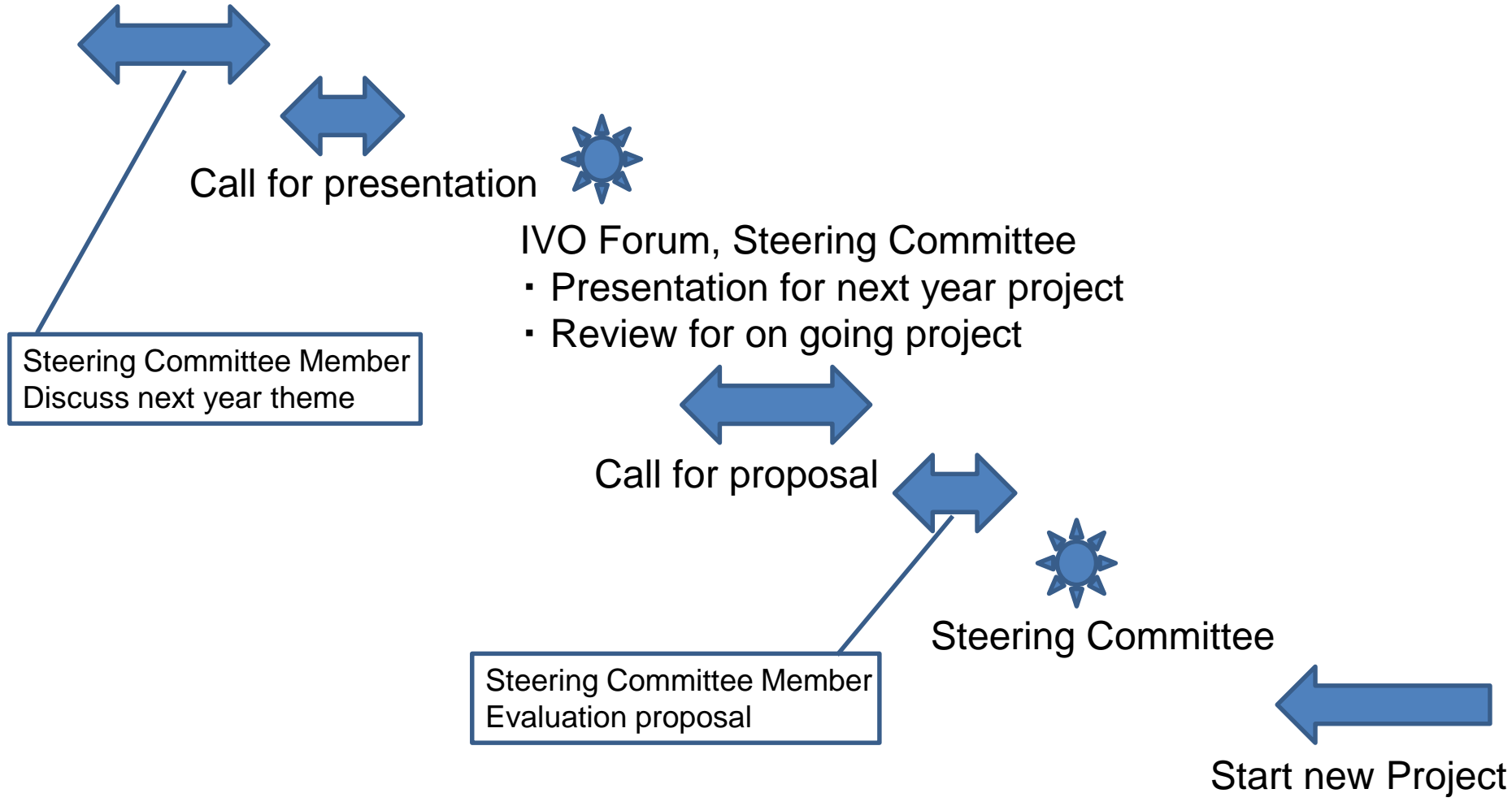
Vietnam



Philippines



ASEAN IVO: Schedule



ASEAN IVO Forum



ASEAN IVO Forum 2015
2015.11.26, Kuala Lumpur, Malaysia
70 participants, 29 presentations



ASEAN IVO Forum 2016
2016.11.24, Hanoi, Vietnam
113 participants, 36 presentations



ASEAN IVO Forum 2017
2017.11.23, Bandar Seri Begawan,
Brunei Darussalam
109 participants, 33 presentations

ASEAN IVO Each year's Themes



2016 themes

1. ICT Solutions to the Challenges surrounding Urbanization
2. Social Renovation in Rural Areas and/or Urban Areas

2017 themes

1. Cyber-Security and its applications
2. Smart Society: ICT applications for community and environment

2018 themes

1. Smart-Agriculture / Aquaculture / Farming
2. Smart Tourism
3. Smart Environment Protection
4. Information Reliability for Smart Society

ASEAN IVO Project 2016



26 institutions and 70 researchers involved.

No	Title of Project [Period(year)]	Project Leader	Project Member Institutions
1	Open Collaboration for Developing and Using Asian Language Treebank [3]	Masao Utiyama NICT	BPPT (IDN), I2R (SGP), IOIT (VNM), NIPTICT (KHM), UCSY (MMR), <u>NICT</u>
2	ASEAN Language Speech Translation thru' U-STAR [3]	Li Haizhou I2R (SGP)	NIPTICT(KHM), BPPT (IDN), UTM (MYS), UCSY (MMR), I2R (SGP), NECTEC (THA), HUST (VNM), IOIT (VNM)
3	IoT Open Innovation Platform [2]	Boon Choong Foo MIMOS (MYS)	MIMOS (MYS), <u>NICT</u> , I2R (SGP), HUST (VNM), VNU-ITI (VNM)
4	Research and development on short distance communication and imaging for applications in ASEAN region [3]	Vo Nguyen Quoc Bao PTIT(VNM)	LIPI (IDN), TI (IDN), CU (THA), PTIT (VNM), HCMC-DIC (VNM), UTM (MYS), TMRD (MYS), <u>NICT</u> , CMU (THA), RFD (VNM), SUT (THA)
5	Mobile IoT [2]	Sumei Sun I2R (SGP)	I2R (SGP), MIMOS (MYS), HUST (VNM), <u>NICT</u>
6	TV White Space (TVWS) Experimental for Application in Remote Area [2]	Hafizal Mohamad MIMOS (MYS)	MIMOS (MYS), USC (PHL), <u>NICT</u> , UKM (MYS)
7	ASEAN forum for Software Defined System on Disaster Mitigation and Smart Cities [3]	ONG Hong Hoe MIMOS (MYS)	SINGAREN (SGP), MIMOS (MYS), NECTEC (THA), UCSY (MMR), HUST (VNM), VNU-ITI (VNM), MU (PHL), ASTI (PHL), AIST (JPN), <u>NICT</u>
8	Cambodia NerveNet Field Testing (Operation Management and Content Development to Promote Connectedness of Cambodia Rural Area) [3]	Meas Chamnan NIPTICT(KHM)	NIPTICT (KHM), <u>NICT</u> , UCSY (MMR)

ASEAN IVO Project 2017



17 institutions and 49 researchers involved.

No	Title of Project [Period(year)]	Project Leader	Project Member Institutions
1	A Hybrid Security Framework for IoT Networks [2]	Hoang Dang Hai PTIT (VNM)	PTIT (VNM), NECTEC (THA), MIMOS (MYS), <u>NICT</u> , HUST (VNM)
2	Smart Lighting for Internet of Things and Smart Homes [3]	Pham Tien Dat <u>NICT</u>	<u>NICT</u> , VAST (VNM), HCMUT (VNM), LIPI (IDN), PTIT (VNM), Waseda U (JPN).
3	IoT System for Public Health and Safety Monitoring with Ubiquitous Location Tracking [2]	Chieng Heng Tze MIMOS (MYS)	MIMOS (MYS), <u>NICT</u> , HUST (VNM), UBD (BRN), Gifu U (JPN).
4	Evapotranspiration (ET)-Based Irrigation System with Internet of Things (IoT) Integration for Smart Farming Application Addressing the ASEAN Impending Water Crisis [3]	Jennifer Dela Cruz MU (PHL)	MIT (PHL), CLSU (PHL), UTM (MYS), UCSY (MMR), <u>NICT</u>
5	Study and evaluation of heterogeneous network for smart community and smart city applications [2]	Kultida Rojviboonchai CU (THA)	CU (THA), MIMOS (MYS), UTAR (MYS), <u>NICT</u>

ASEAN IVO Project 2018



26 institutions and 61 researchers involved.

No	Title of Project [Period (year)]	Project Leader	Project Member Institutions
1	Event Analysis: Applications of computer vision and AI in smart tourism industry [2]	Somnuk Phon-Amnuaisuk UTB (BRN)	UTB (BRN), NTU (SGP), <u>NICT</u> , NECTEC (THA), MUT (THA), NUOL (LAO), UCSY (MMR), MMU (MYS)
2	Cyber-Attack Detection and Information Security for Industry 4.0 [3]	Nguyen Linh Trung VNU-UET (VNM)	VNU-UET (VNM), NTU (SGP). UTS (AUS)
3	Scalable Distributed IoT Framework based on Mobile Robot Technology for High Performance Greenhouse Plants [2.5]	Thu Ngo-Quynh HUST (VNM)	HUST (VNM), NES (JPN), <u>NICT</u> , CHAM(LAO)
4	Smart Aquaculture Quality Monitoring (AQM) System with Internet of Things (IoT) [2]	Widad Ismail USM (MYS)	USM (MYS), UTM (MYS), MAMPU (MYS), Kyoto U (JPN), UNISSULA (IDN), UTP (MYS), RMUTSV (THA)
5	NAPC: Networked ASEAN Peat Swamp Forest Communities [2]	Borhanuddin Mohd Ali UPM (MYS)	UPM (MYS), PTIT (VNM), <u>NICT</u> , MIMOS (MYS), Bogor Agricultural U. (IDN), UTB (BRN), JIRCAS (JPN)
6	A mesh-topological, low-power wireless network platform for a smart watering system [2]	Udom Lewlompaisarl NECTEC (THA)	NECTEC (THA), UCSY (MMR), DAA (BRN), UTB (BRN), UTM (MYS), <u>NICT</u>

現場

Genba

If I want to see the real & actual situation,

All is there.

Example of one project

2016 IVO Project “Cambodia NerveNet Field Testing”

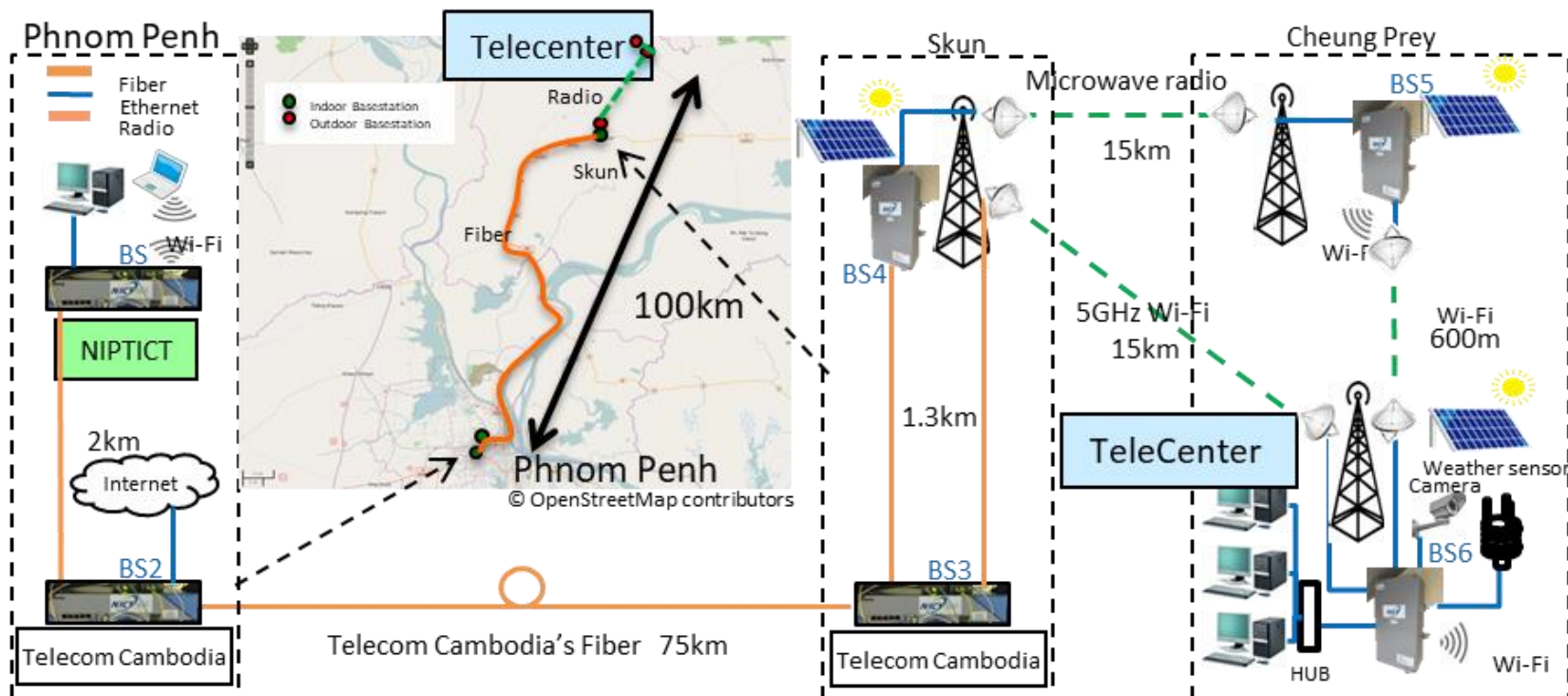
(Operation Management and Content Development to Promote Connectedness of Cambodia Rural Area)

■ Phase 1 : Off-Grid Rural Cloud for Smart Villages in Cambodia

NerveNet can be run independent of other infrastructure, making it ideal for rural areas with low resources.

The rural network in this project is directly connected to Phnom Penh to receive content, but if that connection is severed it can still distribute contents locally.

Current project: Developing E-learning environment and contents.

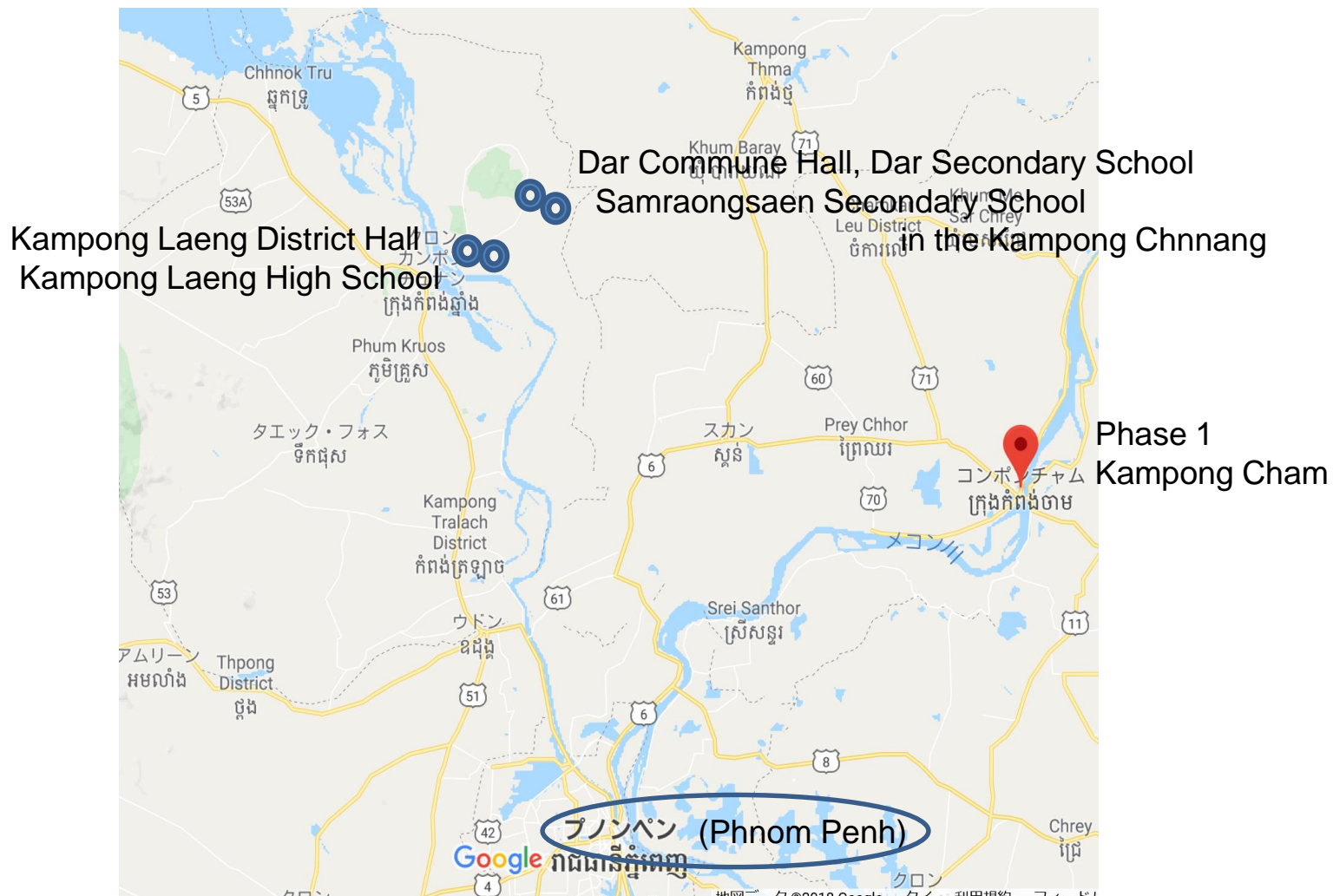


Example of one project

■ Phase 2 : Trial to more severe or tough location

Our trial challenge to more harsh environment of the outback.

What is the network infrastructure for contents distribution.



Example of one project



Our most important awareness is in this photo.

Thank you