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
NICT Asia Center　:　Nobuyuki Asai
< Non Asia Asai >

Applied Electromagnetic Research Cluster

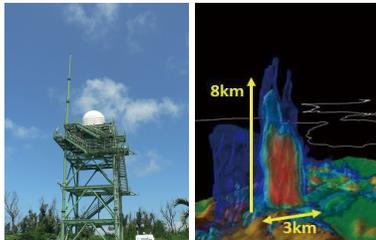This is the field where we "**watch**" the real world through ICT such as Sensing fundamentals.

Remote sensing technology

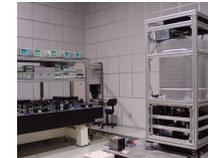Ogata Korin "Eight Bridges"

Ex. Nondestructive sensing

Phased array weather radar

Example of 3D structure of rainfall

8km

3km

Space-time standards technology

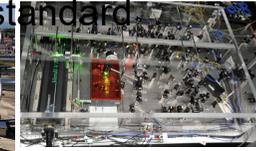Strontium optical lattice clock

Cesium primary frequency standard

JST generation system

34-m antenna

Satellite receiver antennas

Optical frequency comb

Space environment technology

Space Weather Forecast Center

宇宙天気予報センター

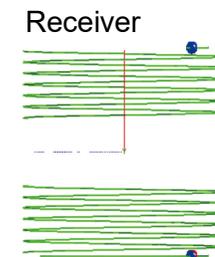Solar wind observation satellite data receiving antenna

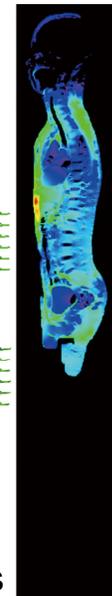## EMC technology

Electromagnetic wave absorber
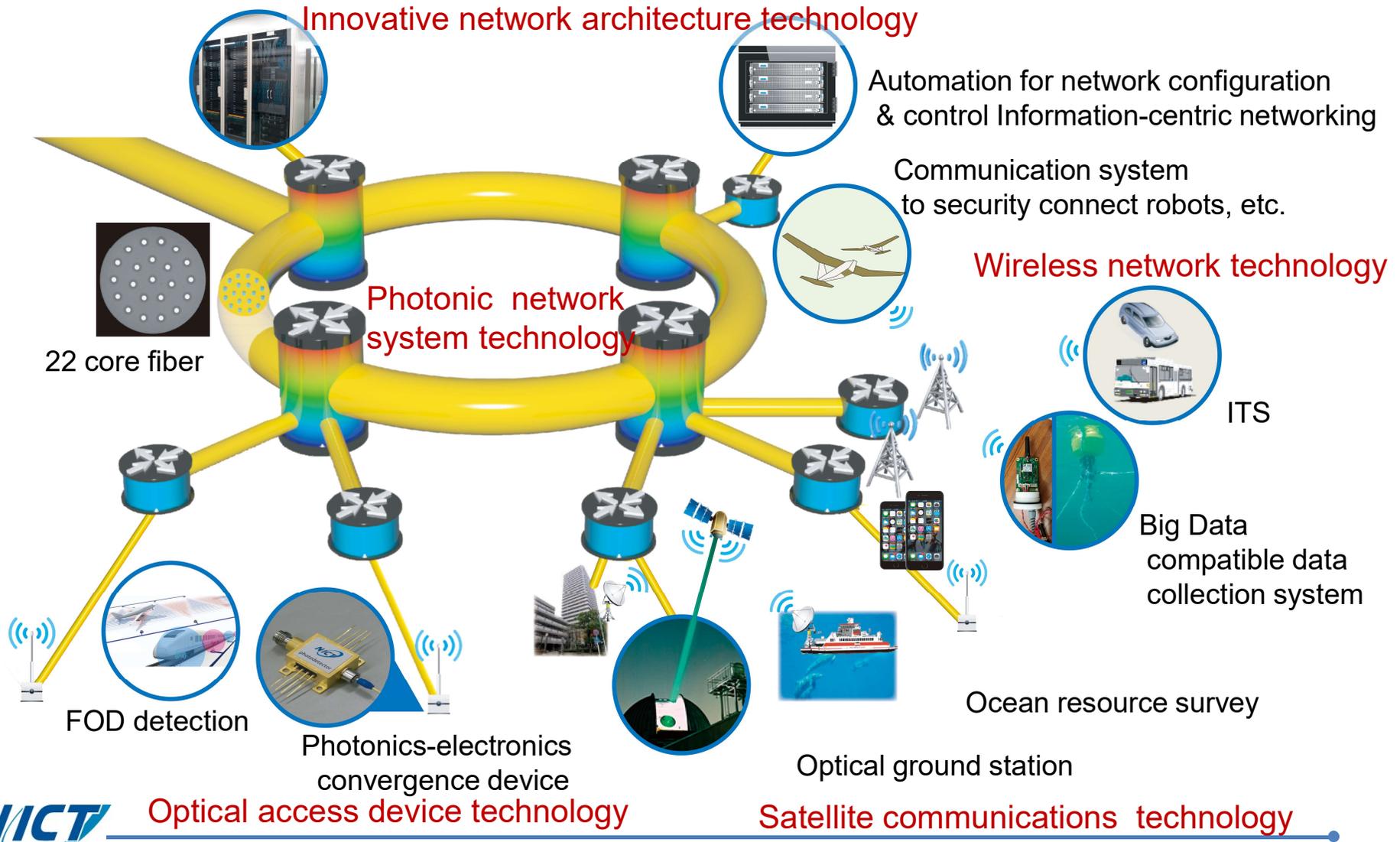
Anechoic chamber

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.

Innovative network architecture technology

Automation for network configuration & control Information-centric networking

Communication system to security connect robots, etc.

Photonic network system technology

Wireless network technology

22 core fiber

ITS

Big Data compatible data collection system

FOD detection

Photonics-electronics convergence device

Ocean resource survey

Optical access device technology

Optical ground station

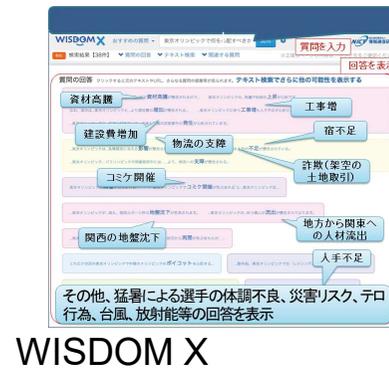Satellite communications technology

NICT

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

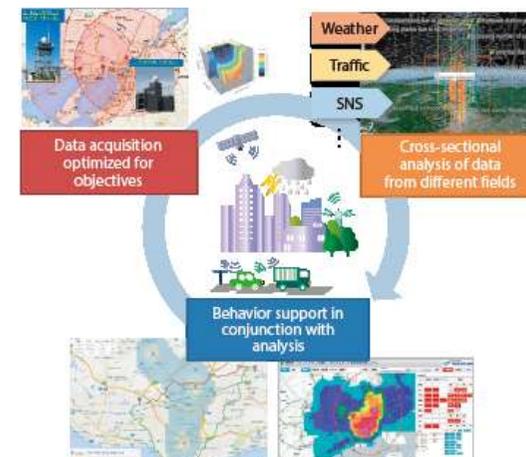### Social wisdom analysis technology

WISDOM X

DISAANA

Brain-inspired and communications technology

7T-MRI
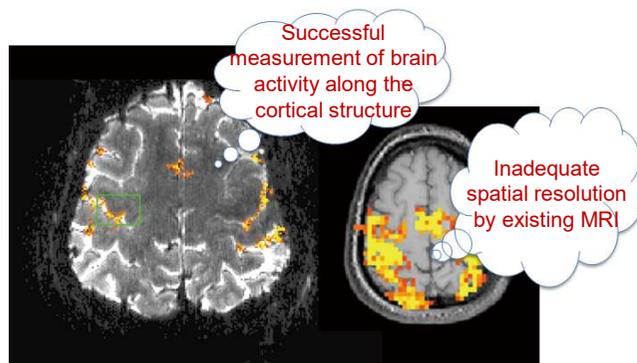
Ultra-precise brain function measurement

Existing MRI

Real-space data analysis technology

Route guidance for environmental risk redu...

Localized torrential rainfall measures support system

Cybersecurity Research Cluster

This is a technological field to "**protect**" society from cyber-attacks that are becoming more sophisticated and complex.

Cybersecurity technology
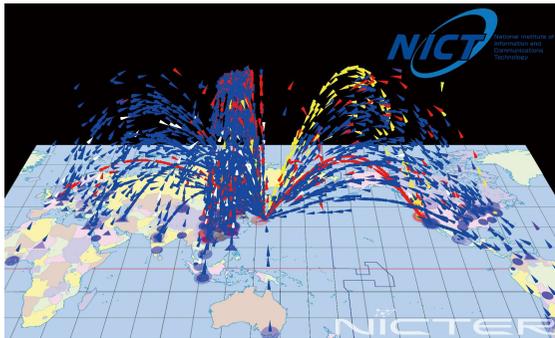
NICTER

DAEDALUS

NIRVANA Kai

Cryptographic technology

Security evaluation
in wide use in society

Data

Data

Data

Statistical processing
while encrypted

Decrypt and obtain
statistical result

Clustering big data while encrypted
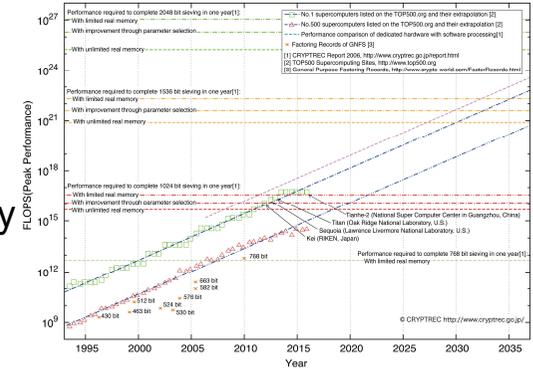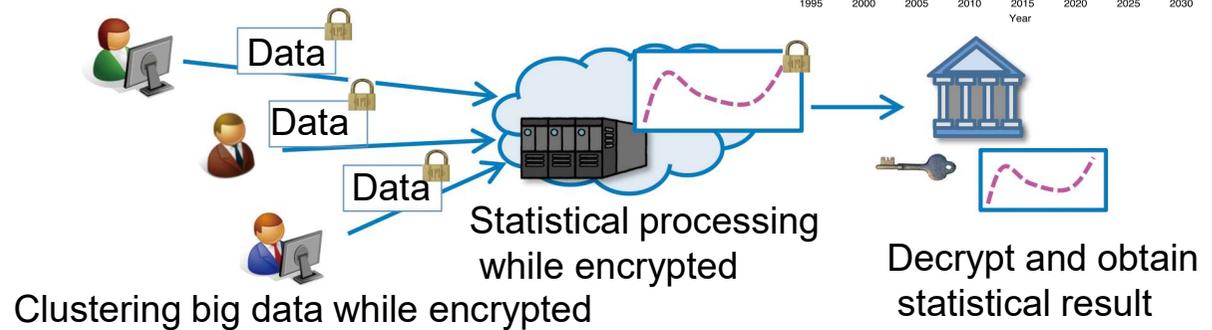
Security testbed development and operations technology

Portable cyber exercise pack

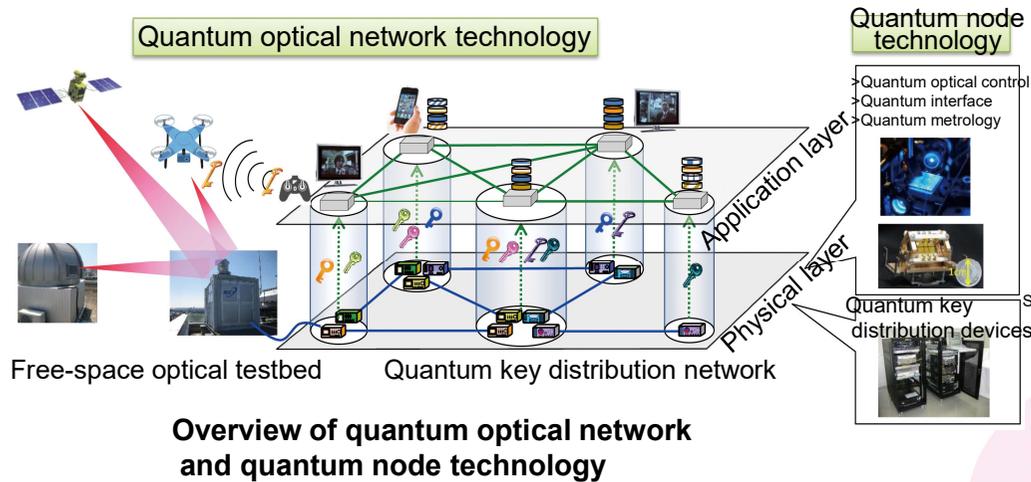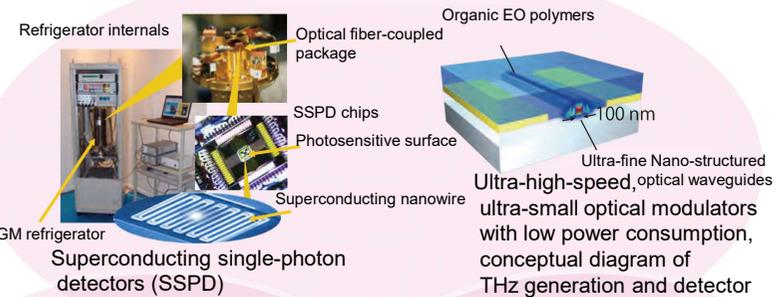# Advanced ICT Research Cluster

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

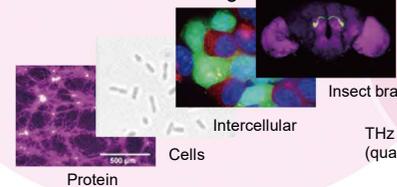## Quantum info-communications technology

Quantum optical network technology

Quantum node technology
> Quantum optical control
> Quantum interface
> Quantum metrology

Quantum key distribution devices

Free-space optical testbed   Quantum key distribution network

Overview of quantum optical network and quantum node technology

Frontiers in ICT

High-performance ICT device technology

Refrigerator internals   Optical fiber-coupled package   Organic EO polymers

SSPD chips   Photosensitive surface

Superconducting nanowire

Small GM refrigerator

Superconducting single-photon detectors (SSPD)

100 nm

Ultra-fine Nano-structured optical waveguides

Ultra-high-speed, ultra-small optical modulators with low power consumption, conceptual diagram of THz generation and detector

Learn and create network controls for knowledge

Insect brain

Intercellular

Protein   Cells

500 μm

Bio-ICT device technology

THz silicon integrated circuit

THz Waves

THz light source (quantum cascade laser: THz QCL)

Nano-photonic waveguide structure
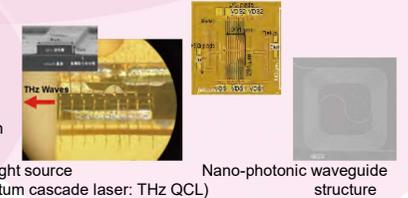
High frequency and terahertz technology

Novel ICT devices

Deep-UV optical ICT devices

p-Electrode   MQWs   p-AlN/p-AlGaN
p-GaN
n-AlGaN
AlN   n-Electrode
Nanophotonic Structure
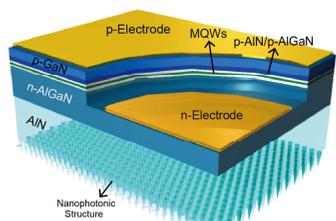
Schematic and photograph of AlGaN-based deep-UV LED device

Oxide semiconductor electronic devices
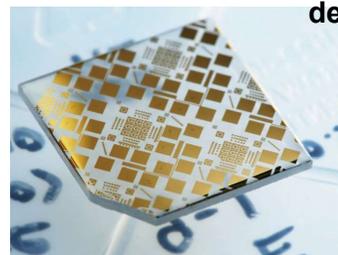
Ga_2O_3 power device chip

Advanced ICT Device Lab
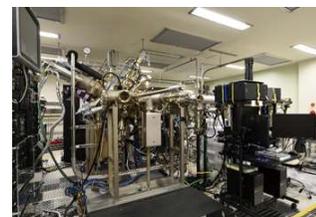
High-quality, semiconductor crystal growth apparatus

High resolution lithography
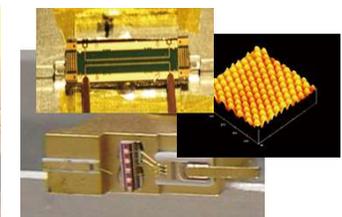
High-speed, broadband optical devices using Nano-structures

NICT

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 relize an environment that produces innovation through ICT.
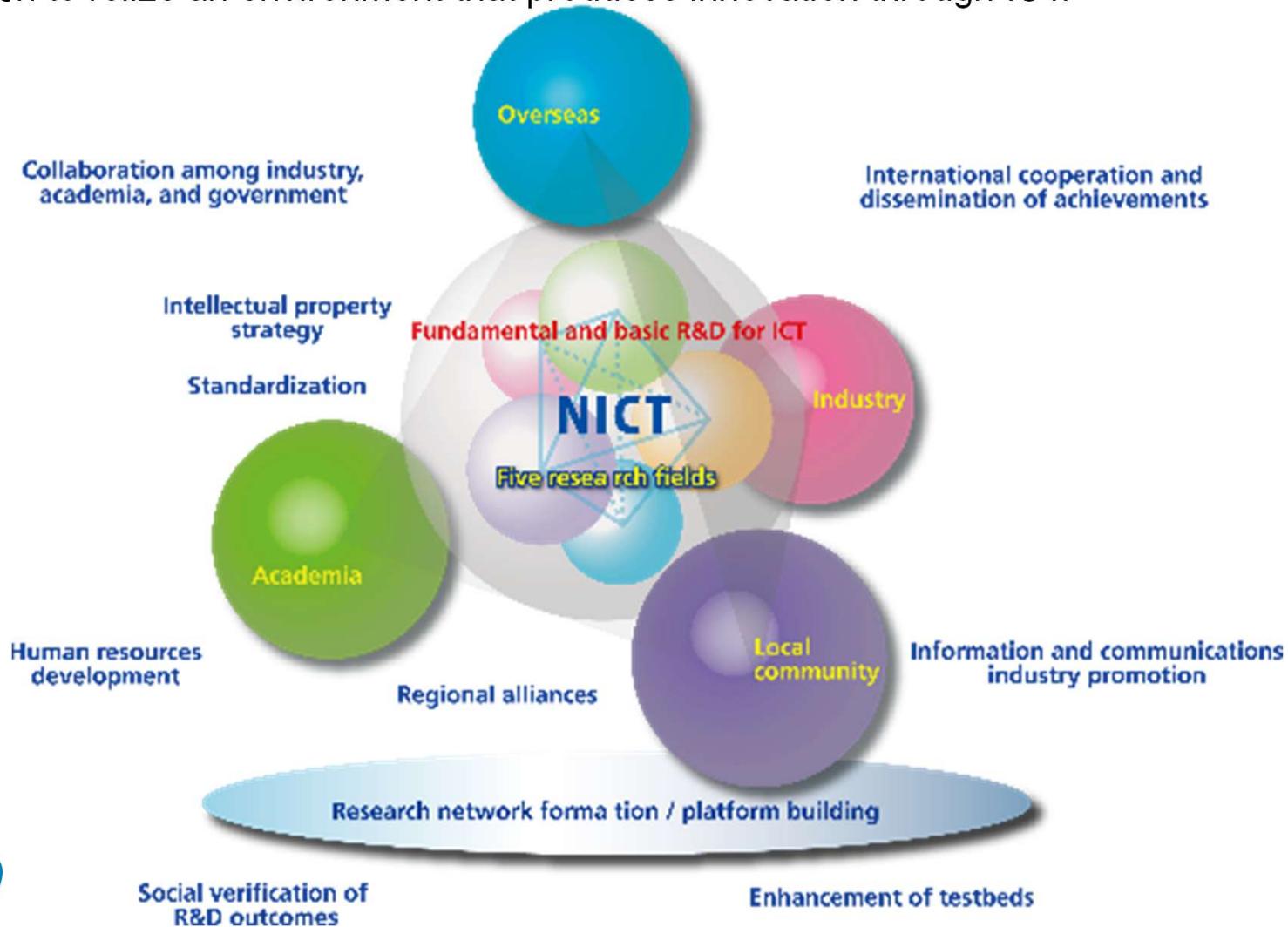
Promoting Regional Cooperation in Southeast Asia in R&D on ICT

Introduction of Japanese Kanji Character

[Kuukan]

空間

< Here >

There
Over there

間³

[Ningen]

人間

< Human >

[Jikan]

時間

< Now >

Past
Future

間 [Ma,Aida] : Interval, Gap

Situation

Thinking

Objective

Opinion

Priority

Difference

Demand

Axis

Background

Common Sense

Culture   Trend

...

Know each other
Understand
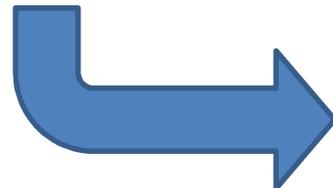
Larger View

Introduction of Japanese Kanji Character

間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

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
- UCSY
- UCSM

Thailand
- Chulalongkorn U.
- NECTEC
- CMU
- UniNet
- TNI
- NIMT
- KMITL
- KMUTT
- TISTER

Cambodia
- NIPTICT

Japan
- NICT
- NES*
  *NEC Solution Innovators, Ltd

Laos
- NUOL

Vietnam
- PTIT
- VNU-IFI
- VNU-UET
- VNU-ITI
- IOIT
- HUST
- DUT
- LQDTU
- UIT-HCM

Malaysia
- MIMOS
- UPM
- UTM
- USM
- UTAR

Singapore
- I²R
- SingAREN
- NTU
- NUS
- SUTD

Indonesia
- BPPT
- LIPI
- MCIT
- ITB
- Tel-U
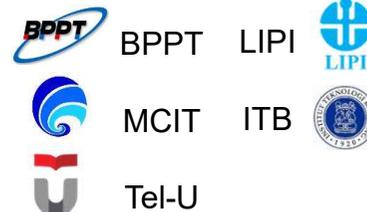
Brunei
- UBD
- UTB

Philippines
- Mapua University
- PUP

ASEAN IVO: Schedule

7	8	9	10	11	12	1	2	3	4	5	6

Call for presentation

Steering Committee Member
Discuss next year theme

IVO Forum, Steering Committee
・Presentation for next year project
・Review for on going project

Call for proposal

Steering Committee Member
Evaluation proposal

Steering Committee

Start new Project

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), NICT
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), NICT, 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), NICT, CMU (THA), RFD (VNM), SUT (THA)
5	Mobile IoT [2]	Sumei Sun I2R (SGP)	I2R (SGP), MIMOS (MYS), HUST (VNM), NICT
6	TV White Space (TVWS) Experimental for Application in Remote Area [2]	Hafizal Mohamad MIMOS (MYS)	MIMOS (MYS), USC (PHL), NICT, 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), NICT
8	Cambodia NerveNet Field Testing (Operation Management and Content Development to Promote Connectedness of Cambodia Rural Area) [3]	Meas Chamnan NIPTICT(KHM)	NIPTICT (KHM), NICT, 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), NICT, HUST (VNM)
2	Smart Lighting for Internet of Things and Smart Homes [3]	Pham Tien Dat NICT	NICT, 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), NICT, 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), NICT
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), NICT

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), NICT, 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), NICT, 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), NICT, 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), NICT

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.
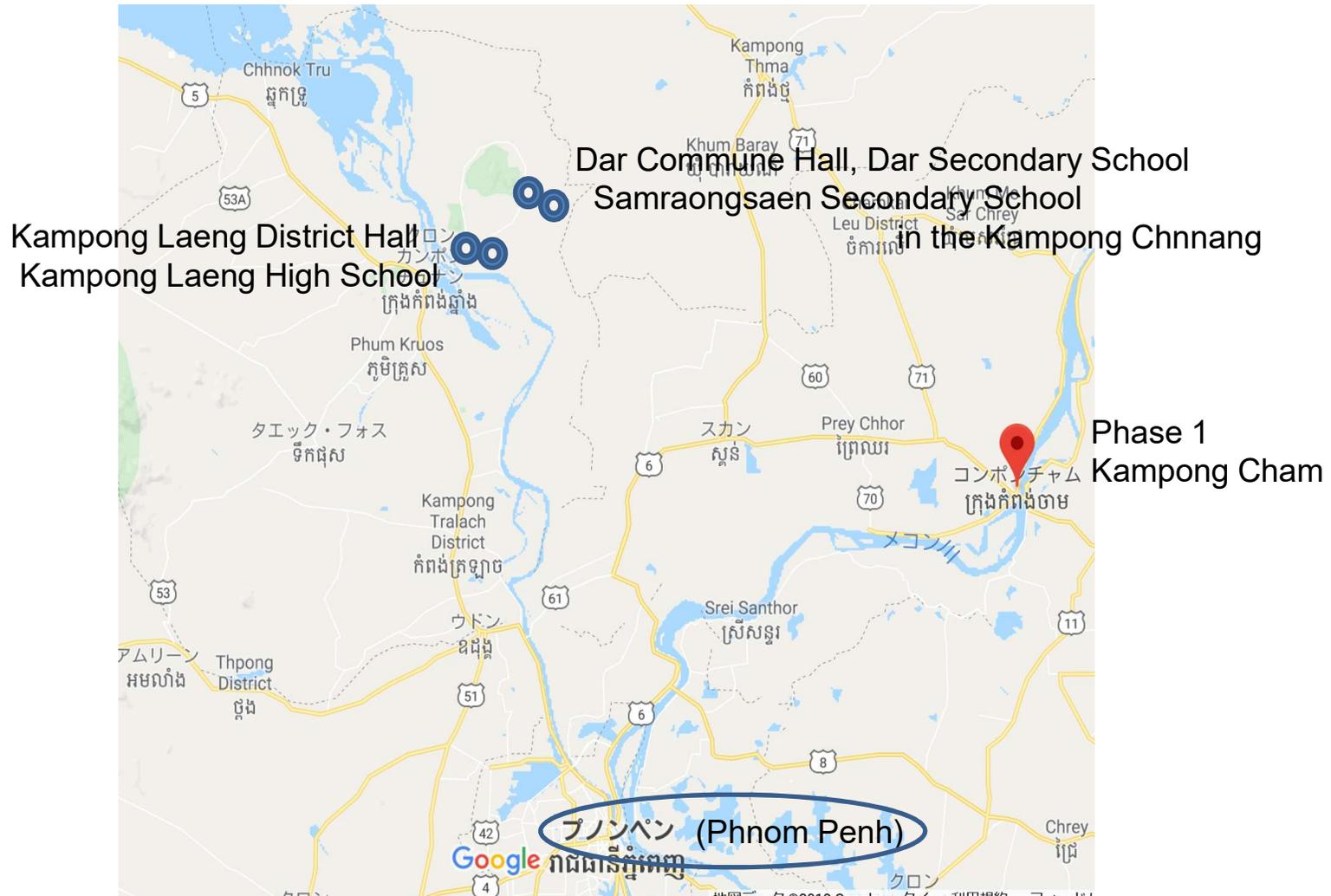Current project: Developing E-learning environment and contents.
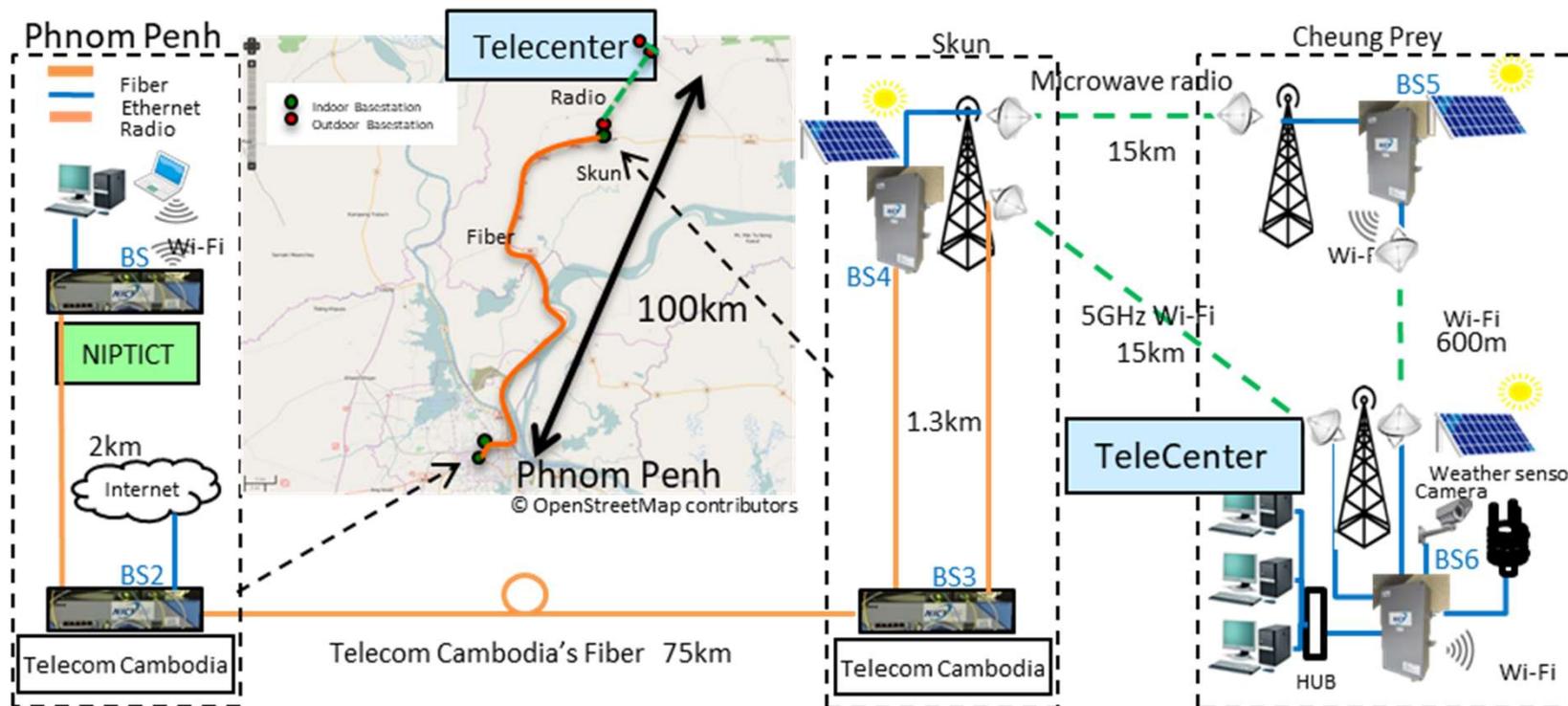
Example of one project

- **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.

Dar Commune Hall, Dar Secondary School
Samraongsaen Secondary School
in the Kampong Chnnang

Kampong Laeng District Hall
Kampong Laeng High School

Phase 1
Kampong Cham

プノンペン (Phnom Penh)

Example of one project

Our most important awareness is in this photo.

Thank you