

# Promoting Regional Cooperation on R&D in Innovative ICT Applications in Asia



NICT : National Institute of Information and Communications Technology  
under the Ministry of Internal Affairs and Communications, Japan (MIC)

23 October, 2018

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Director, NICT Asia Center



# INTRODUCTION - ICT research (2 perspective)-

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**ICT** : Information and Communications Technology

## 1. ICT research for **ICT itself**

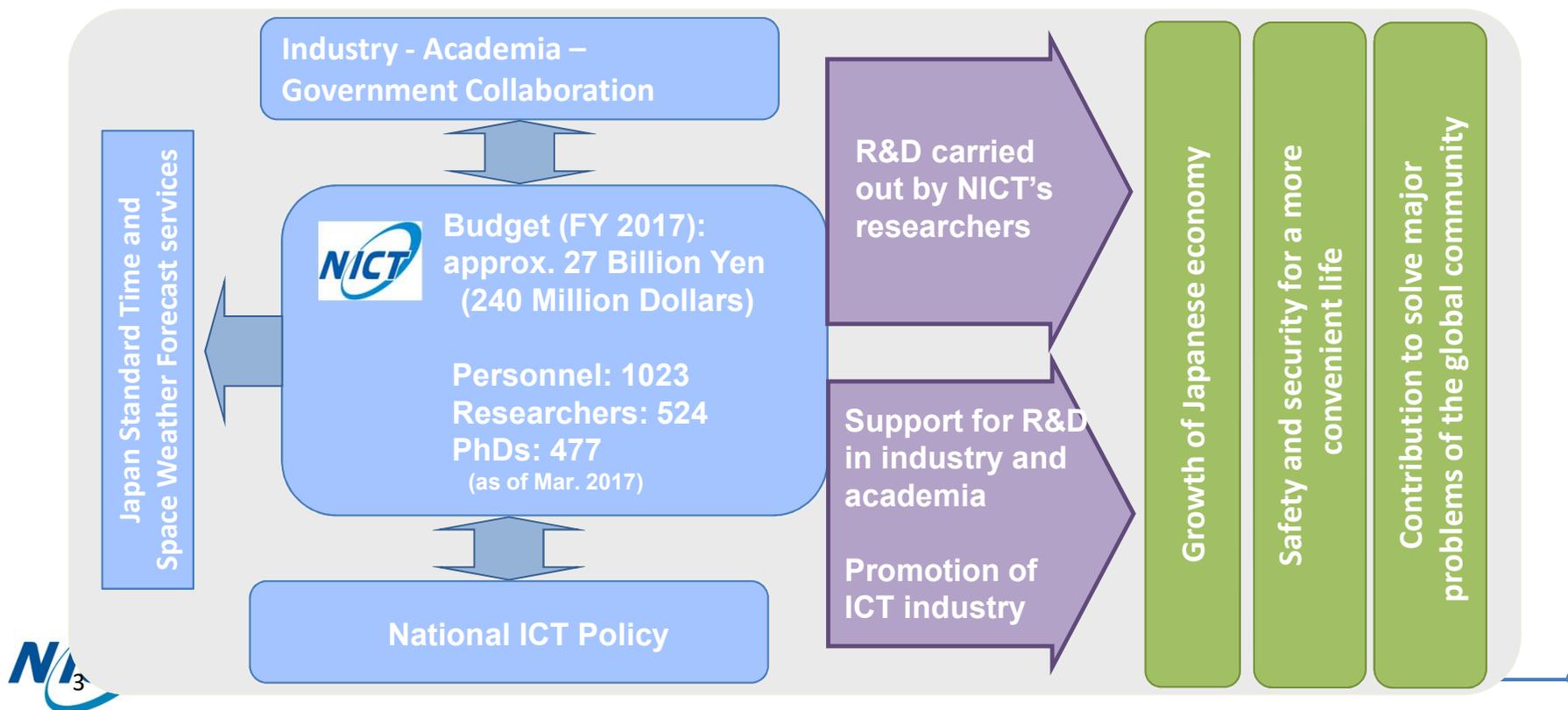
(Example of current ICT trend) IOT, AI, BD(Big Data), 5G, Network

## 2. ICT research for **problem solving in various fields by using ICT**

(Example of the fields) agriculture, disaster, education,  
medical health, transportation, tourism

# NICT's Role

As the sole national research institute in the field of information and communications technologies (ICT), NICT strives to advance technologies as well as contributes to national ICT policies, by promoting its own research and development and by cooperating with and supporting industry and academia.



# NICT Research

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1. Watch

2. Connect

3. Create

4. Protect

5. Develop

# Applied Electromagnetic Research Cluster

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

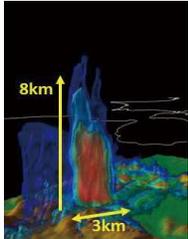
## Remote sensing technology



Ogata Korin “Eight Bridges”



Phased array weather radar



Example of 3D structure of rainfall

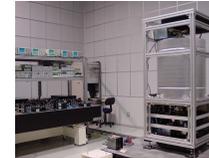


Ex. Nondestructive sensing

## 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

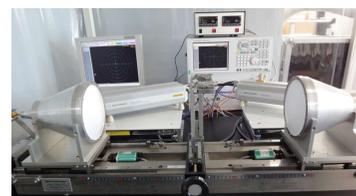
Space Weather Forecast Center



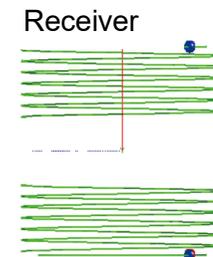
Solar wind observation satellite data receiving antenna



Electromagnetic wave absorber

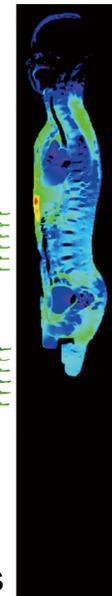


Anechoic chamber



Receiver

Transmitter



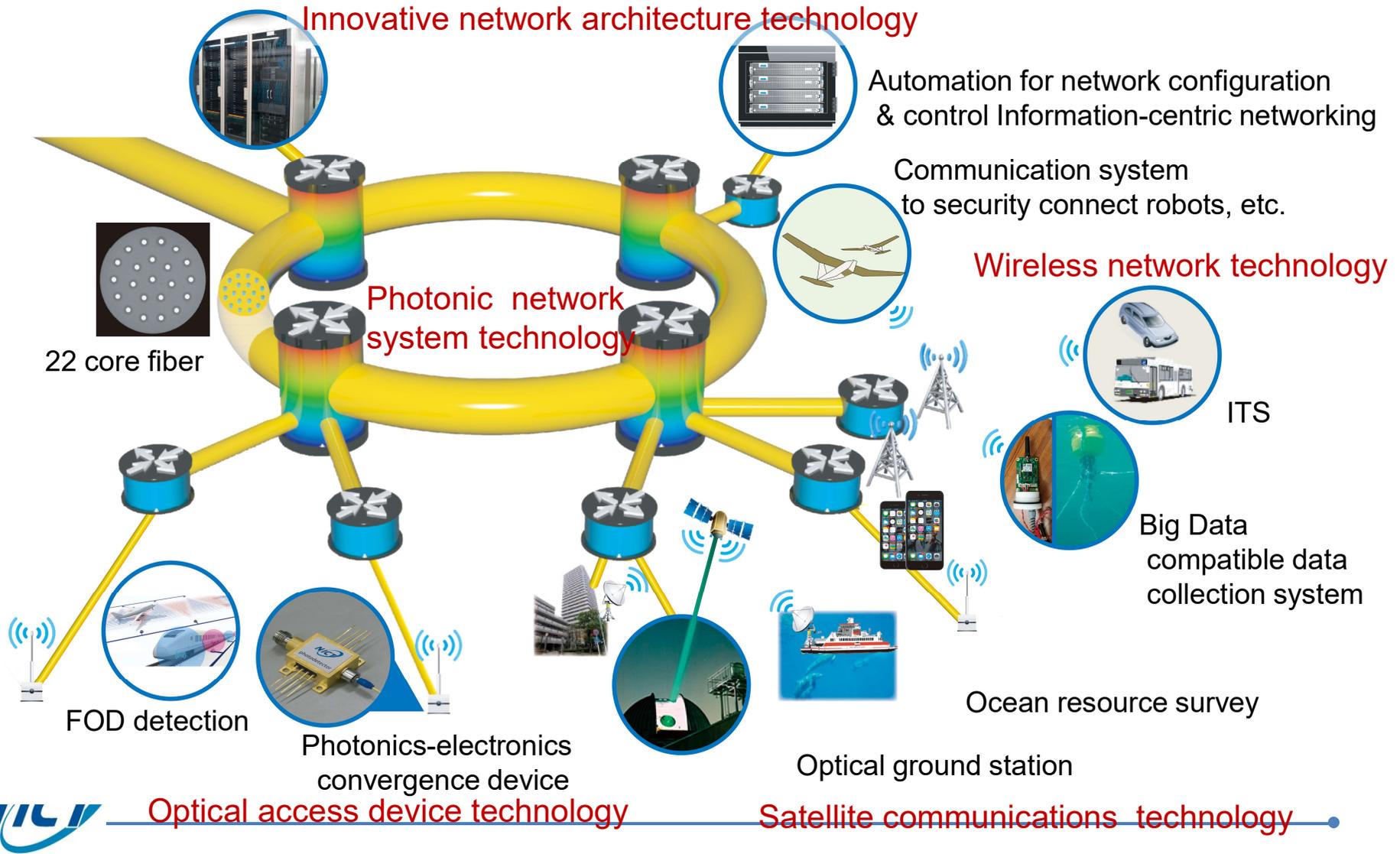
Numerical analysis of induced electric fields



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.



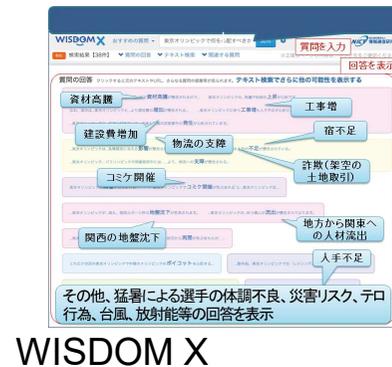
# AI/Brain Networks and Communication Research Cluster

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

## Advanced speech translation and dialogue system technology



## Social wisdom analysis technology

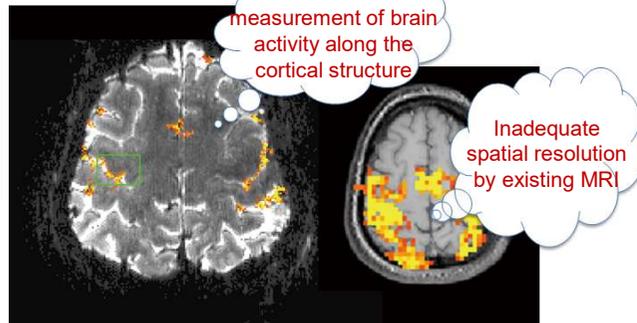


WISDOM X

DISAANA

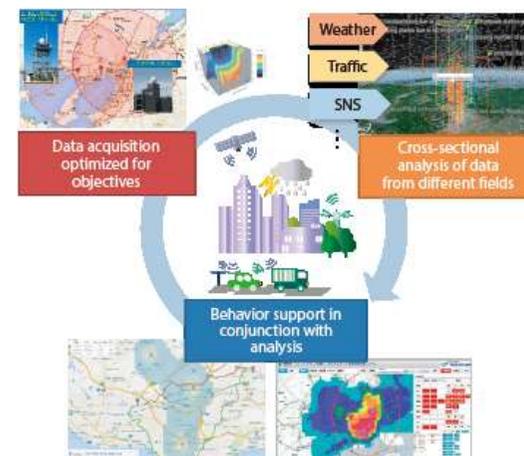
## Brain-inspired and communications technology

### 7T-MRI



Ultra-precise brain function measurement Existing MRI

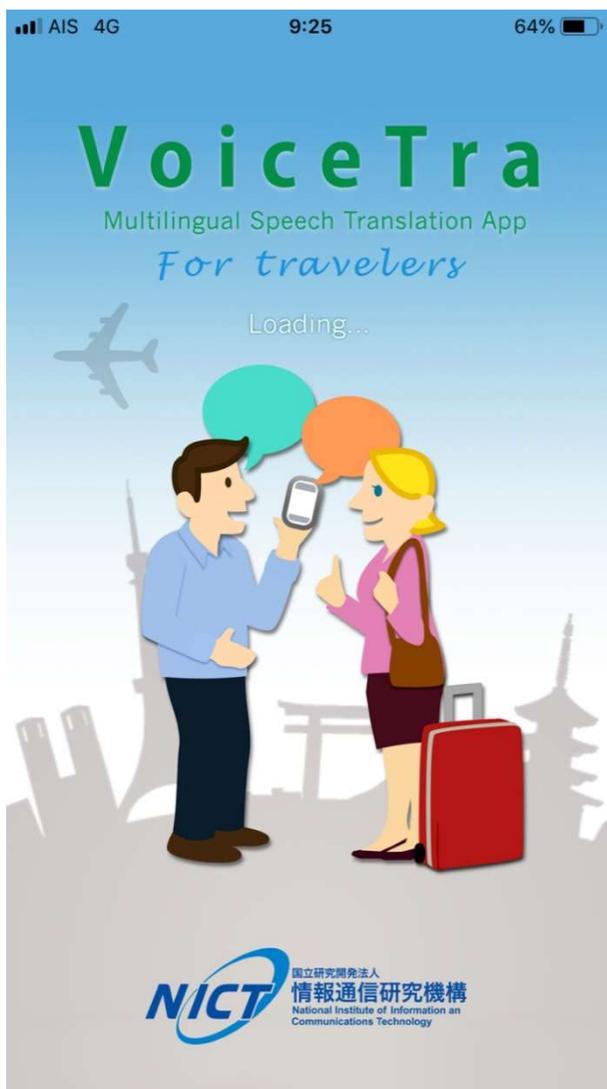
## Real-space data analysis technology



Route guidance for environmental risk red

Localized torrential rainfall measures support system

# Voice Tra



VoiceTra is a **speech translation app** that translates your speech into different languages. With an easy-to-use interface, you can also check whether the translation is correct.

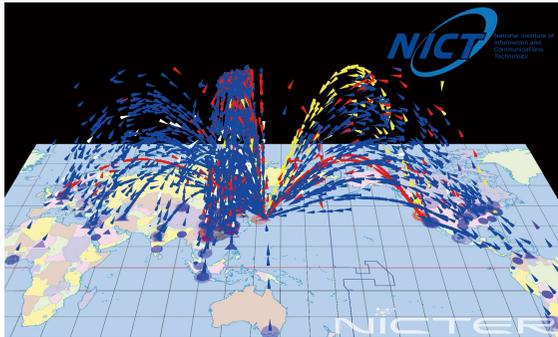
1. [Translate your speech](#)
2. [User-friendly](#)
3. [Check the translation results](#)
4. [Supported languages \(31 languages\)](#)
5. [Free Download](#)

<http://voicetra.nict.go.jp/en/index.html>

# 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

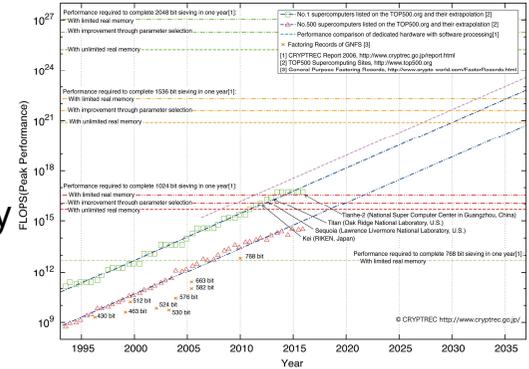
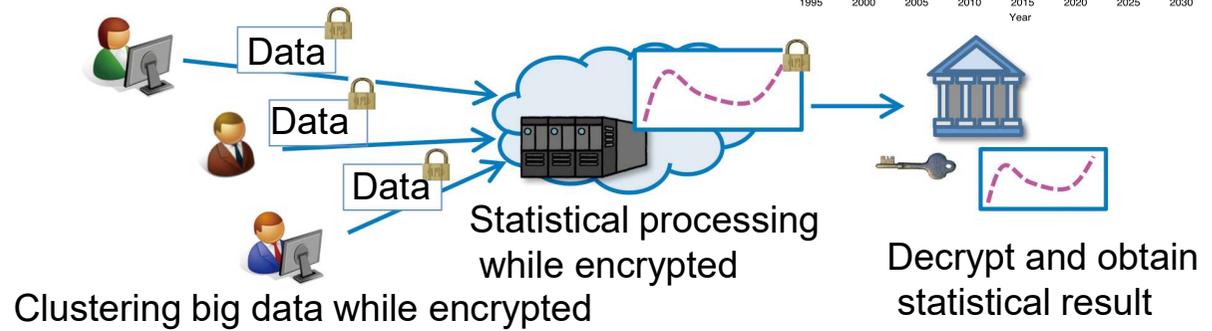


NIRVANA Kai



## Cryptographic technology

Security evaluation  
in wide use in society



## Security testbed development and operations technology



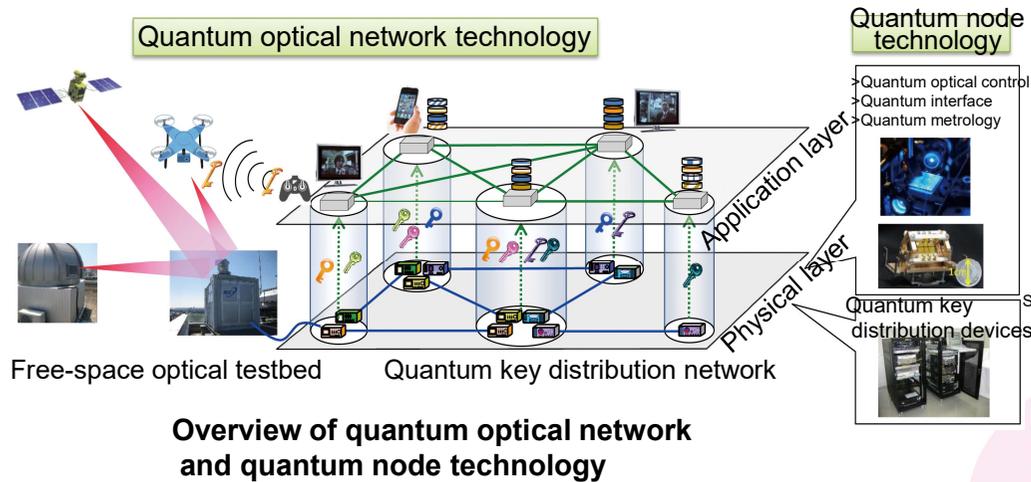
Portable cyber exercise pack

Cyber Defense Exercise with Recurrence (CYDER) program

# Advanced ICT Research Cluster

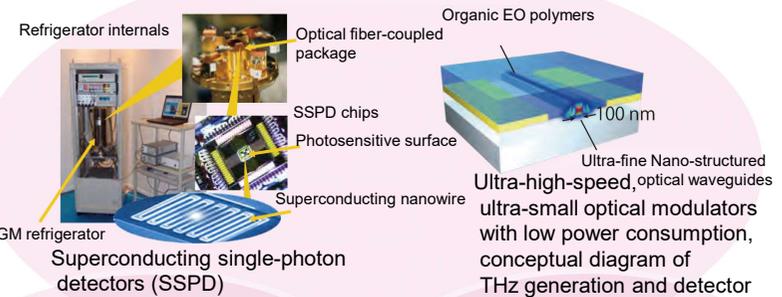
“**Developing**” new horizons in the fields of research in information communication technology.

## Quantum info-communications technology

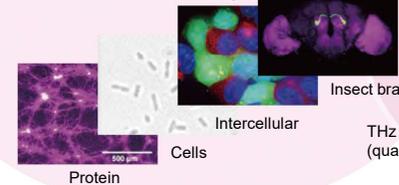


## Frontiers in ICT

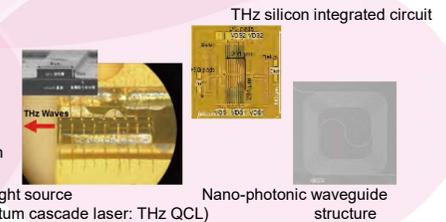
### High-performance ICT device technology



### Bio-ICT device technology



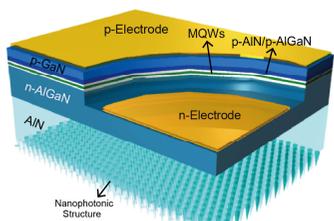
### Bio-ICT device technology



### High frequency and terahertz technology

## Novel ICT devices

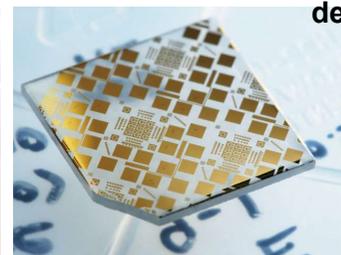
### Deep-UV optical ICT devices



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

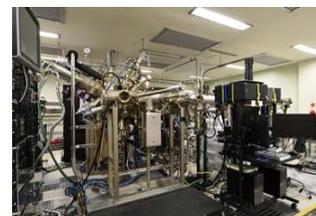


### Oxide semiconductor electronic devices



Ga<sub>2</sub>O<sub>3</sub> power device chip

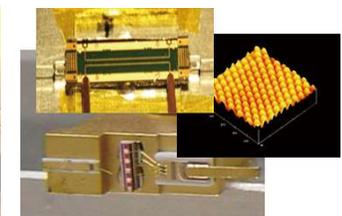
## Advanced ICT Device Lab



High-quality, semiconductor crystal growth apparatus



High resolution lithography

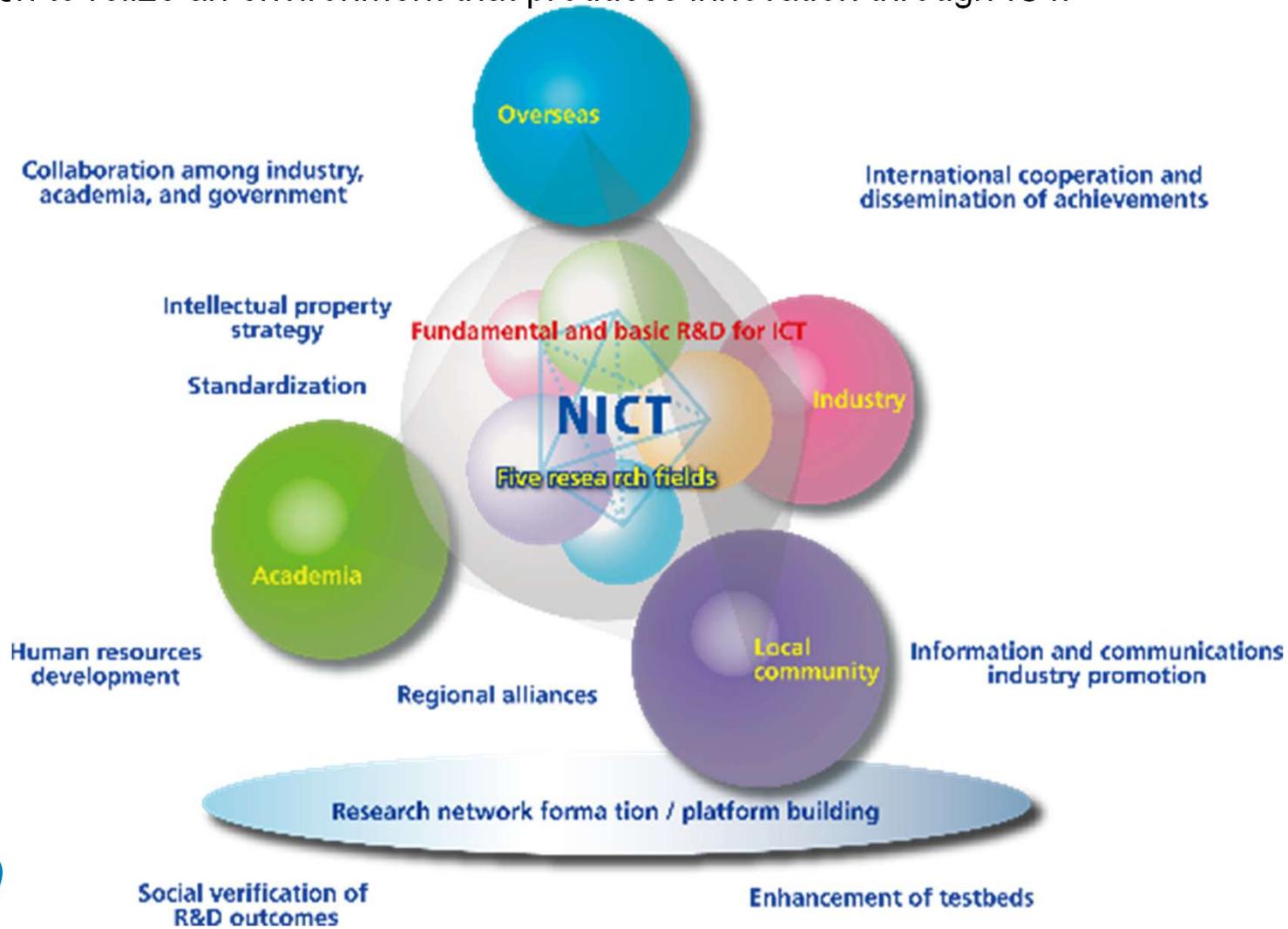


High-speed, broadband optical devices using Nano-structures



# Promotion of R&D and social implementation of research result

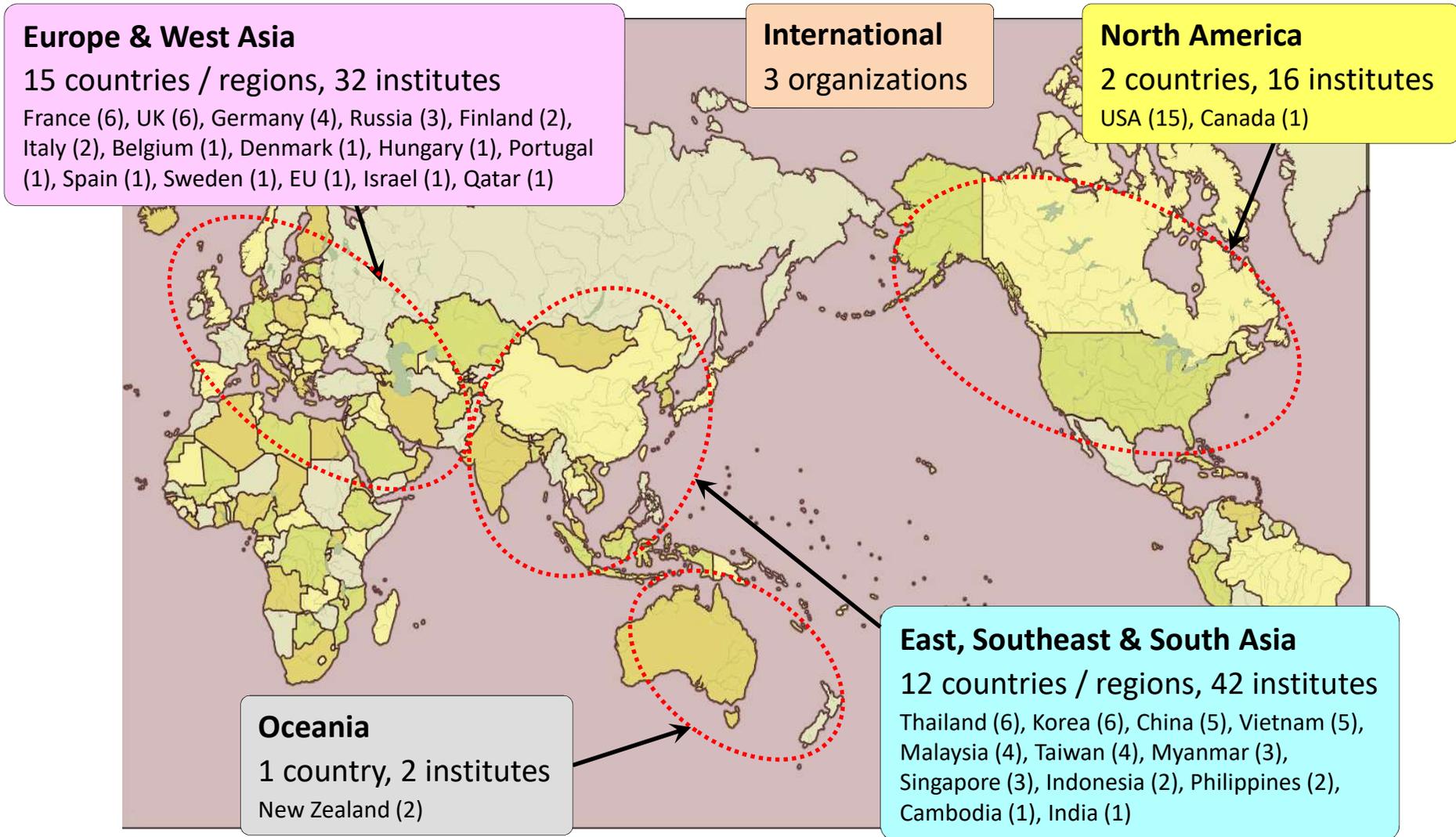
As a public R&D organization, NICT is expected to serve as a base for open innovation to promote industry-academia-government collaboration, regional cooperation, and international cooperation to realize an environment that produces innovation through ICT.

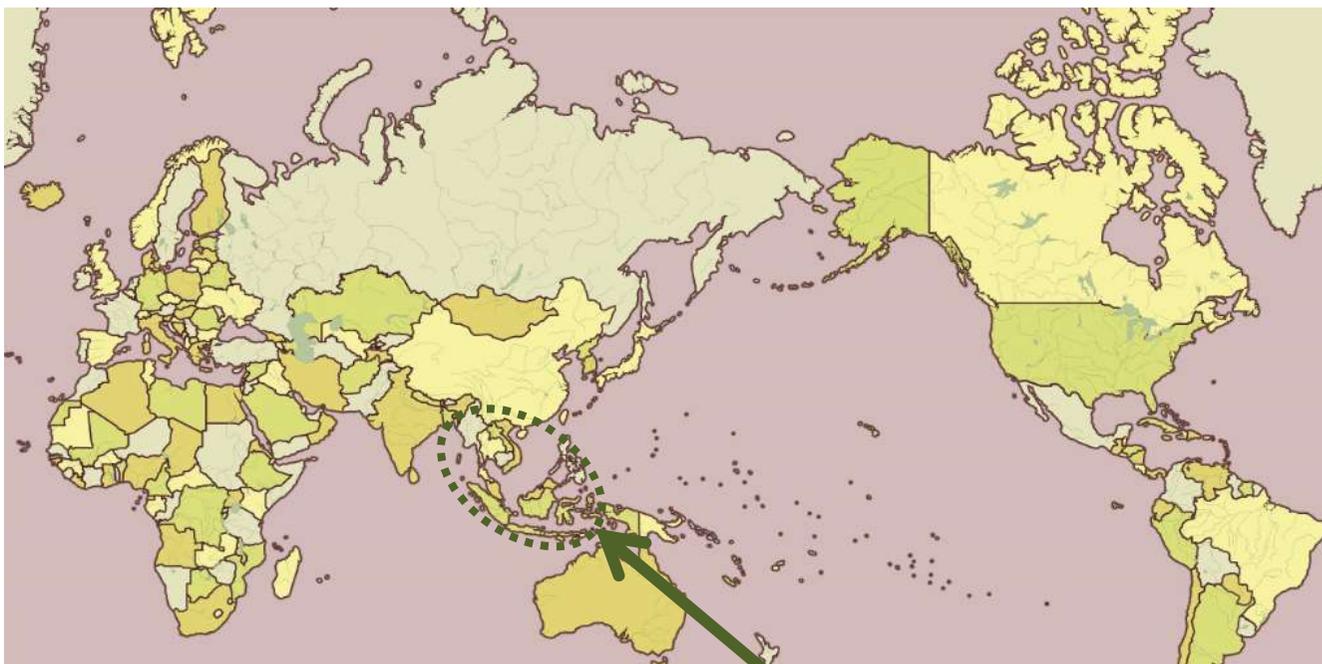


# Overview of MOU with Foreign Institutes

99 MOUs with 95 institutes in 30 countries and regions

<as of March 31, 2018>





**SOUTH AND SOUTHEAST ASIA 8 countries 26 institutes**

- |  |   |
|--|---|
| <p><b>【Cambodia】</b></p> <ul style="list-style-type: none"> <li>• National Institute of Posts, Telecommunications and Information and Communications Technology (NIPTICT)</li> </ul> <p><b>【Indonesia】</b></p> <ul style="list-style-type: none"> <li>• Ministry of Communication and Information Technology (ID-SIRTI)</li> </ul> <p><b>【Malaysia】</b></p> <ul style="list-style-type: none"> <li>• National Institute of Aeronautics and Space (LAPAN)</li> <li>• Multimedia University (MMU)</li> <li>• Malaysian Institute of Microelectronics Systems (MIMOS)</li> <li>• Telekom Research &amp; Development Sdn. Bhd. (TM R&amp;D)</li> <li>• Universiti Teknologi Malaysia (UTM)</li> </ul> <p><b>【Myanmar】</b></p> <ul style="list-style-type: none"> <li>• The Printing and Publishing Enterprise, The Ministry of Information (PPE)</li> <li>• The University of Computer Studies, Yangon (UCSY)</li> <li>• Yangon Technological University (YTU)</li> </ul> <p><b>【Philippines】</b></p> <ul style="list-style-type: none"> <li>• Mapúa Institute of Technology (MIT)</li> <li>• Information and Communications Technology Office (ICTO)</li> </ul> | <p><b>【Singapore】</b></p> <ul style="list-style-type: none"> <li>• Institute for Infocomm Research (I<sup>2</sup>R)</li> <li>• Nanyang Technological University (NTU)</li> <li>• Singapore Advanced Research and Education Network (Sing AREN)</li> </ul> <p><b>【Thailand】</b></p> <ul style="list-style-type: none"> <li>• Chiang Mai University (CMU)</li> <li>• Chulalongkorn University</li> <li>• King Mongkut's Institute of Technology Ladkrabang (KMITL)</li> <li>• Office of Information Technology Administration for Educational Development (UniNet)</li> <li>• National Electronics and Computer Technology Center (NECTEC)</li> <li>• National Institute of Metrology, Thailand (NIMT)</li> <li>• Thai-Nichi Institute of Technology (TNI)</li> </ul> <p><b>【Vietnam】</b></p> <ul style="list-style-type: none"> <li>• Posts &amp; Telecommunications Institute of Technology (PTIT)</li> <li>• Hanoi University of Science and Technology (HUST)</li> <li>• International Research Institute - Multimedia, Information, Communication and Applications (MICA)</li> <li>• Ho Chi Minh City Department of Information and Communication</li> </ul> |
|--|---|

# “HUB” in Asian region

## ~ **Expected Role and Mission of NICT Asia Center** ~

1. To promote ICT research in Asia region
2. To evolve fundamental ICT research to practical use
3. To strengthen international cooperation especially in Asia region
4. To collaborate with non-ICT research organizations as well as ICT research organizations

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

# ASEAN IVO

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ICT

Virtual

Organization

of ASEAN Institutes and NICT





# Mission



**The mission of ASEAN IVO:**

**To seek and identify strategic ICT research areas in the ASEAN region, and promote collaborative projects in them.**

# Launch of ASEAN IVO

## ASEAN-NICT ICT Roundtable



First Roundtable Meeting,  
Bangkok, 2013.11.20



Second Roundtable Meeting,  
Bangkok, 2015.2.26

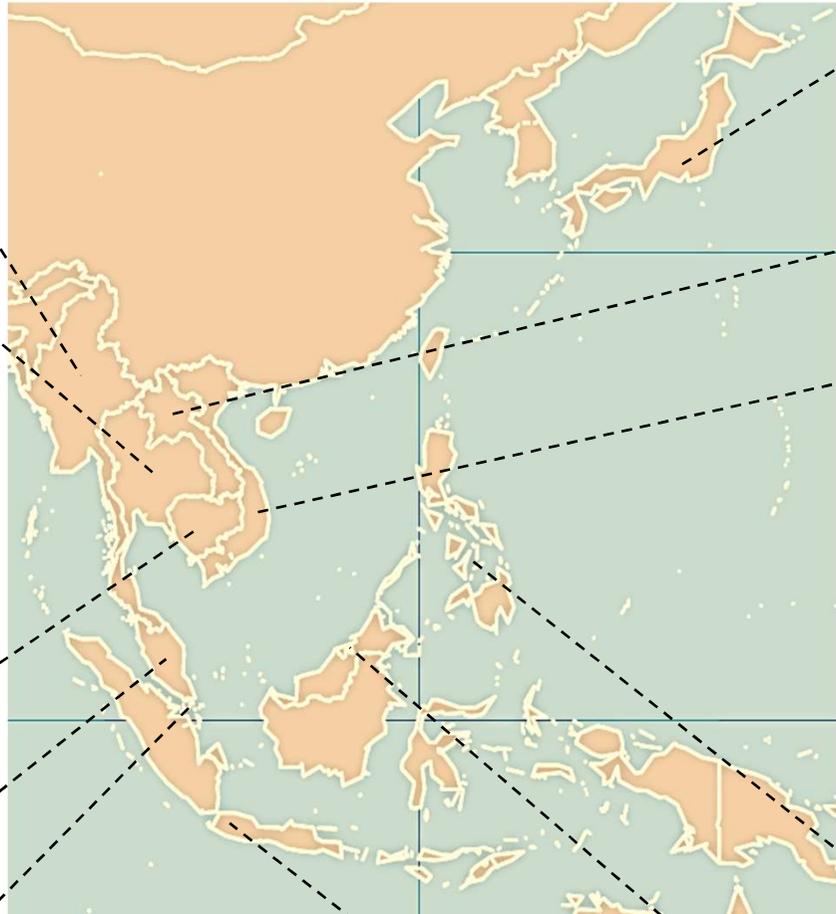


**Established**

	Country	Institution	Participant
1st	7	16	31
2nd	9	22	51

# ASEAN IVO Members

44 institutions from all ASEAN countries



## Myanmar



## Thailand



## Cambodia



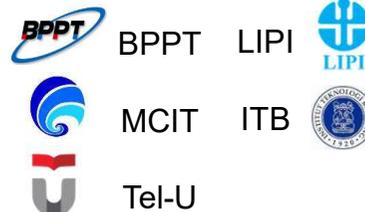
## Malaysia



## Singapore



## Indonesia



## Brunei



## Japan



## Laos



## Vietnam



## Philippines



As of August 2018

## Annual

### **ASEAN IVO Steering Committee**

To decide the R&D topics, operate the annual events, select the projects through email discussion and face to face meeting.

### **ASEAN IVO Forum**

The Forum provides a place for all ASEAN IVO members to exchange ideas, discuss R&D topics and coordinate projects. Any and all members of ASEAN IVO can apply for the Forum.

#### Past forum:

2015. 11: Kuala Lumpur (Malaysia)

2016. 11: Hanoi (Vietnam)

2017. 11: Bandar Seri Begawan (Brunei)

2018. 11: Jakarta (Indonesia) (\*planning)

### **ASEAN IVO Project**

at minimum 2 institutions total, and from at least 2 different countries in the ASEAN region  
(Max.: 3 years)

From 2016. 4: 8 projects

From 2017. 4: 5 projects

From 2018. 4: 6 projects

**ASEAN IVO HP: [http://www.nict.go.jp/en/asean\\_ivo/index.html](http://www.nict.go.jp/en/asean_ivo/index.html)**

# 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 Topics for Proposal



## 2016 Topics

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

## 2017 Topics

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

## 2018 Topics

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



# ASEAN IVO Project 2016, 8 projects



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



# ASEAN IVO Project 2017, 5 projects



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

Brunei: BRN

Cambodia: KHM

Indonesia: IDN

Laos: LAO

Malaysia: MYS

Myanmar: MMR

Philippines: PHL

Singapore: SGP

Thailand: THA

Vietnam: VNM



# ASEAN IVO Project 2018, 6 projects



No	Title of Proposed Project	Project Leader	Project Members
1	Event Analysis: Applications of computer vision and AI in smart tourism industry	Somnuk Phon-Amnuaisuk UTB(BRN)	UTB(BRN), NTU(SGP), NICT(JPN), NECTEC(THA), MUT(THA), NUOL (LAO), UCSY(MMR), MMU (MYS)
2	Cyber-Attack Detection and Information Security for Industry 4.0	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	Thu Ngo-Quynh HUST(VNM)	HUST(VNM), NES(JPN), NICT(JPN), CHAM(LAO)
4	Smart Aquaculture Quality Monitoring ( AQM) System with Internet of Things (IoT)	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	Borhanuddin Mohd Ali UPM(MYS)	UPM(MYS), PTIT(VNM), NICT(JPN), MIMOS(MYS), Bogor Agricultural University (IDN), UTB(BRN), JIRCAS(JPN)
6	A mesh-topological, low-power wireless network platform for a smart watering system	Udom Lewlompaisarl NECTEC(THA)	NECTEC(THA), UCSY(MMR), DAA(BRN), UTB(BRN), UTM(MYS), NICT(JPN)

Brunei: BRN

Cambodia: KHM

Indonesia: IDN

Laos: LAO

Malaysia: MYS

Myanmar: MMR

Philippines: PHL

Singapore: SGP

Thailand: THA

Vietnam: VNM

# Example of one project

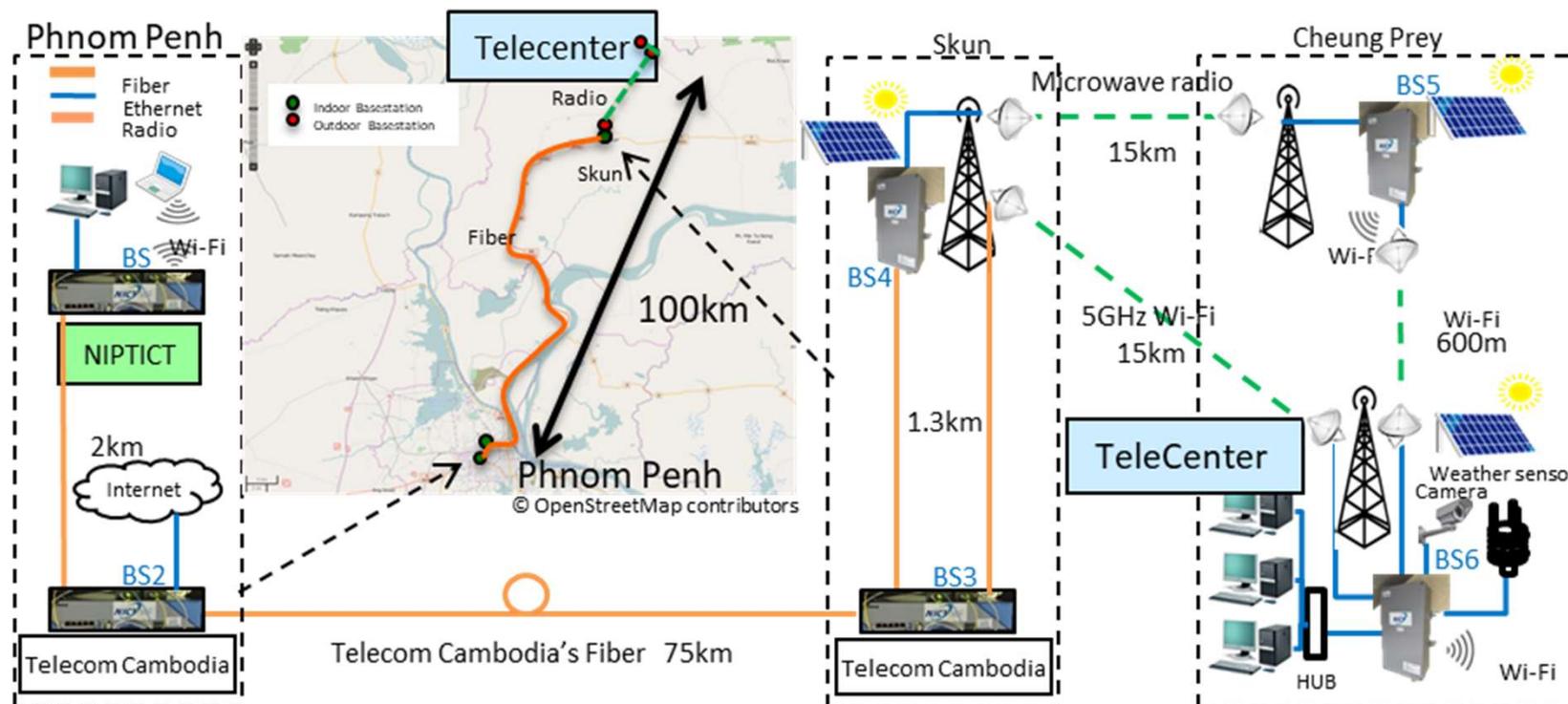
2016 IVO Project “Cambodia NerveNet Field Testing”  
(Operation Management and Content Development to Promote Connectedness of Cambodia Rural Area)

## ■ 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.

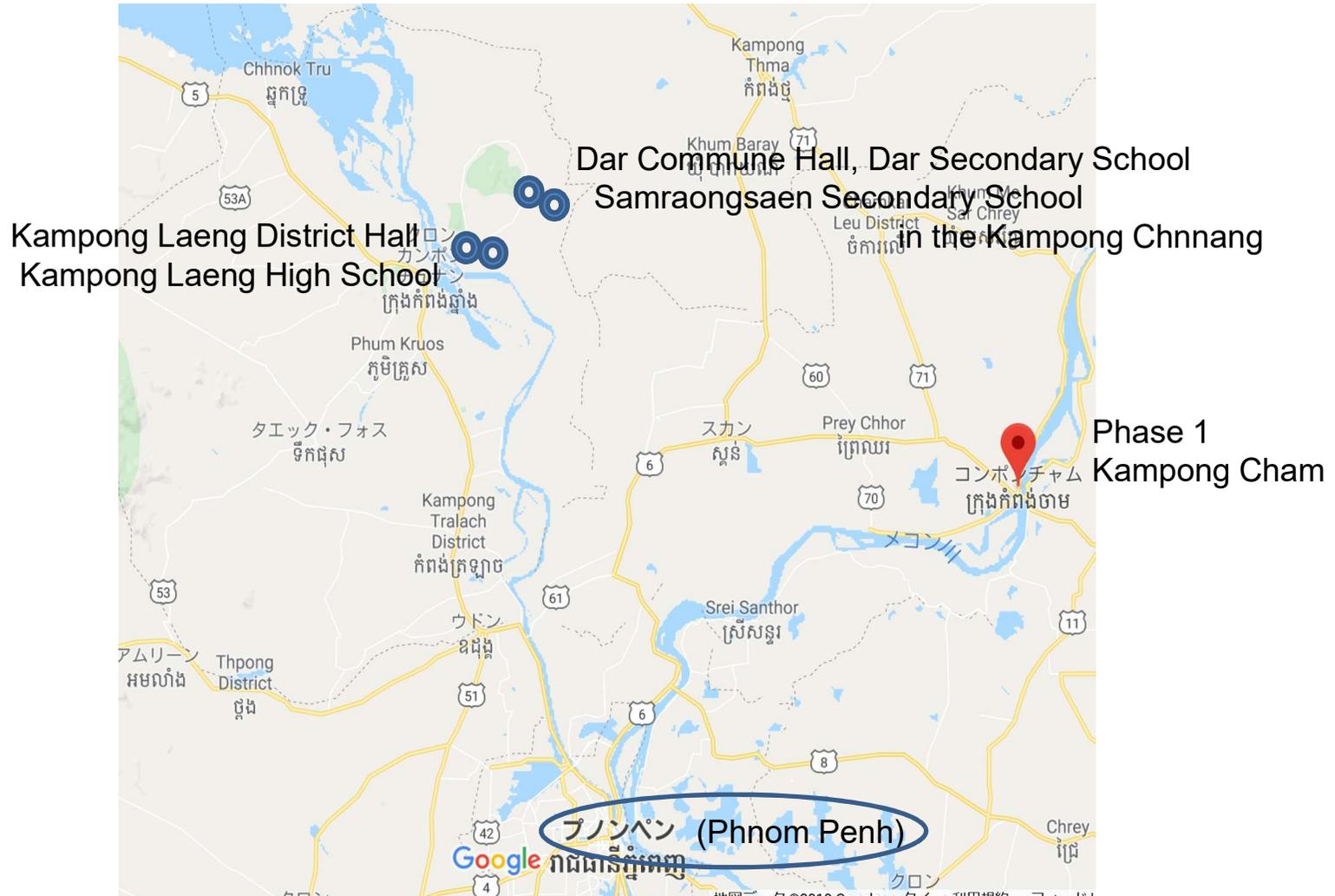
Current project: Developing E-learning environment and contents.



# 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.**

# 2019 ASEAN IVO Project : Schedule

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- Call for presentation : 31 Aug. - 15 Oct. 2018
- Presentation : 27 Nov. 2018 (ASEAN IVO Forum 2018)
- Call for proposal : Dec. 2018 – Jan. 2019 (TBD)
- Adopted : March 2019 (TBD)
- Start New Project : April 2019 (TBD)

# ASEAN IVO Forum 2018

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## 1. Date

- 27 Nov. 2018

## 2. Venue

- Sari Pacific Jakarta (Indonesia)

## 3. Host

- The Ministry of Communication and Information (MCIT)
- Technology and Telecom University (Tel-U)

## 4. Purpose

- To provide a place for all ASEAN IVO members to exchange ideas, discuss R&D topics and coordinate projects

# 2019 Topics for Proposal (1)



The topics of this year are connected to **ICT for a Secure and Sustainable Future**. As the population grows and becomes more urbanized, there is a massive increase in material needs and environmental impact as well as demand for a digital infrastructure to support people's lifestyles and communication. As society and economy digitize, the ICT solutions for supporting people's lifestyles require greater computational power and the energy demands increase. This in turn produces a greater demand on the environment.

As all these needs are interconnected, we need to look for sustainable and mutually complementing ICT solutions in each of these areas. Projects would ideally have a strong outlook **to conduct a demonstration by the final year of the project**. Proposals from all technical fields are welcome and they will be **evaluated on the potential benefit of output**.

1. ICT Solutions from Farm to Meal
2. ICT for Environment Protection and Disaster Prevention
3. Secure and Sustainable Connected Society

# 2019 Topics for Proposal (2)

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## 1. ICT Solutions from Farm to Meal

As food is a common need of all people, ensuring food security (i.e. food availability and regional self-sufficiency) is a key concern for every country. The focus of this topic is for **ICT applications providing specific solutions to food security issues in the ASEAN region**, specifically the development of applications and integrated systems for R&D in all fields addressing food availability, from environment and agriculture through the supply chain to consumption and waste management.

*Keywords: IoT Application, Climate Smart Agriculture, Disease Management, Pandemic Influenza, Waste and Pollution Management*

# 2019 Topics for Proposal (3)

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## 2. ICT for Environment Protection and Disaster Prevention

As an important issue in human society, **environment monitoring and protection** will once again be a focus in this call. Today, natural disasters are occurring more frequently and with increasing intensity. Also, as well as for **disaster prevention and response**, **environment monitoring** is key for stable infrastructure, for example space environment monitoring for ICT satellite positioning, affecting transport and agriculture. In this topic, we are not only focusing on land, but also on coastal resources as well as space and atmospheric monitoring. This topic does **not only focus on technologies, but also applications and integrated systems** for R&D.

*Keywords: Mangrove, Sea Grass, Coastal Resource Mapping, Disaster Mitigation, Assessment and Conservation, Rainforest Protection, Space Environment Monitoring, Environment Protection*

# 2019 Topics for Proposal (4)

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## 3. Secure and Sustainable Connected Society

With the internationalization and regionalization of ASEAN, we are facing many difficulties such as environmental noises, cultural differences and social adaptation. Additionally, with rapid urbanization, cities face a variety of risks, concerns, and problems. The unprecedented rate of urban growth creates an urgency to finding smarter ways to manage the accompanying challenges. There are several technologies addressing these challenges including **blockchain to secure transactions**, and **artificial intelligence for language processing** as well as **various smart city applications**. As these technologies develop to address the needs of a connected society, they also come with new issues. This topic is a challenging one which does **not only focus on technologies, but also applications and integrated systems**, including development of useable applications in real-life context.

*Keywords: Artificial Intelligence, Multilingual Speech and Language Processing, Real-life Context Application, Environment Adaptation, Speech Enhancement, Blockchain, Smart City, Administrative Cost, Digital Economy, Digital Identification, Energy efficiency, Sustainability*

# Conditions for Application (1)

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< TBD >

## (Reference) Last year's condition

1. The institution of the applicant should be an **ASEAN IVO member**, and the applicant should be the project leader. Non-members can submit proposals for new projects as project leaders, but they **must apply for membership and obtain approval before the deadline for proposal submission**.
2. The members of the proposed project must be at **minimum 2 institutions** total, and from **at least 2 different countries in the ASEAN region**.  
  
\*Multiple institutions from one country as well as NICT and other Japanese institutions are also welcome to be members of a project team, but will not count towards this minimum requirement.
3. Institutions that are **not members of ASEAN IVO can also be members of the project team**.
4. The leaders of ongoing projects cannot make new applications.

# Conditions for Application (2)

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< TBD >

(Reference) Last year's condition

1. Budget

Max. 40,000 US\$/project/year

2. Duration

6 – 36 months

3. Number of project to be select

6 projects

**Thank you**