Asia-Pacific Telecommunity

Publishing Programme for
ICT Policy and Development 2015

Survey Research Report

"A survey on collection, analysis and dissemination of information on ICT policy and solutions related to disaster, climate change and social issues between nations and regions"

Research Period: February to September, 2016

Ref: APT /PR2. 3 .1 /Publishing/ 26 November 2015

JTEC

Japan Telecommunications Engineering and Consulting Service

Tokyo, Japan

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Survey conducted by the following Experts
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Executive Summary

In recent years, issues related to multi-hazard, climate change and social events are hindering national development of many countries. This ICT applications research aims at possibility of developing solutions by collecting data related to cyclone/ typhoon, flash floods, river swelling, volcanic eruptions, earthquakes and tsunami.
The activities included observation of ICT facilities related to disaster management, Geo-hazard monitoring, meteorological stations, and existing facilities related to information dissemination to the public.
In particular the team visited and discussed with officials of Solomon Islands National Disaster management Office (NDMO), Solomon Is Telecom, Solomon Is Broadcast; Vanuatu Meteorological and Geohazards department (VMGD), Telecom Vanuatu Ltd (TVL), Vanuatu Broadcasting; related facilities and offices in Fiji. The team invited one official from Tuvalu to join the team and along with the High Commissioner of Tuvalu in Fiji, had discussions on matters in Tuvalu. The team visited cyclone, flash floods and river swell affected sites in respective countries to survey existing status of ICT system and applications related to human safety.
The team interviewed high officials, industry executives, had meetings and discussions with related Govt. officials, related to ICT and disaster management of that country. During the survey, "Workshop on ICT in disaster management, Resilience and Recovery for Public Safety" was organized and conducted in Solomon Is, Vanuatu and Fiji.

The following notable Issues & Challenges slowing down further developments.
- Poor Connectivity, and Low bandwidth hinders development and disaster related issues.
- During TC the copper wire network for landline phones affects with sea water, thereby limiting the speed of activities or improvement in all sectors.
- During emergency situations, satellite phones are provided by International Organizations but after a designated period the service is discontinued keeping the people in jeopardy. More tangible communication mode is to be considered for continued service.
- In many cases, market is very small to support and sustain investment in the communication sector.
- Commercial satellite phones are very expensive to operate in smaller economy.
- PSTN network and Domestic network to smaller outer islands need improvement.
- To improve communication system it is necessary to use available and economic satellite services in the region.
- Reliable telecommunications with outer islands for weather and climate information.
- Nationwide radio broadcast service necessary to improve disaster management and public safety.
- Inter island communications on a country should be improved to send warnings and receive observations.
- Provide training for the personnel related to climate change and disaster risk management.

The Emergency Telecommunications Cluster (ETC) is focused on preparedness activities under its Pacific Emergency Preparedness and Response (EPR) project, lead by WFP according to information received from the Authorities.
In case of disaster ETC responded upon the request of Govt with services and ICT coordination assistance. The ETC provided communications for operation in the country concerned. The ETC conclude its ICT assistance three months when the affected society is usually left with uncertainty no better than before.

Sustainability is not an issue with emergency assistance and supplies. More tangible ICT system is needed to assist the small nations on natural hazard observed almost every year.

In case of deployment of ICT equipment in small nations and Island states, it is necessary to establish the administrative system, organizational structure of disaster management, disaster prevention, information transmission system, and personnel allocation when needed. The overall system development is essential but the fact is that, in most cases human capacity in the island countries are inadequate which causes things challenging thereby needs more human resources development projects.

Actual situation obtained in this field survey may not necessarily match with the available published general information on ICT in disaster management. In reality the ICT status is more vulnerable, and services do not reach the local islands residents when they desperately need it.

During the present survey and study, cooperation from the governments and organizations was extremely friendly and useful which leads to the successful implementation of workshops and conducting interviews leading to the success of the mission.

During this survey, the team encountered the strongest ever Tropical Cyclone Winston (Feb 2016) forced the team to suspend and reschedule all activities for 6 months, experiencing the disaster destruction and mitigation complexity physically on the ground. From each country, natural disasters were physically experienced. Acute needs and expectations of the use of ICT were expressed by each Govt and enterprises.

To resolve regional issues, cooperation and assistance from the public donors, international agencies required to help the private sector of island nations is greatly appreciable.

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Glossary

Digicel	Digicel Inc.
ICT	Information & Communication Technology
INFORM	Index for Risk Management
ISP	Internet Service Provider
IT	Information Technology
J-ALART	Japanese Nationwide real time Alert system
Kb/sec	Kilo Bits per second
LAN	Local Area Network
Meteo	Vanuatu Meteorological Services Section
NDMO:	National Disaster Management Office
MIC	Ministry of Internal Affairs and Communications
OGCIO	Office of the Government Chief Information Officer
TAG	Technical Advisory Group
TelSat	TelSat Broadband service
TRR	Telecommunications and Radio-communications Regulator
PIF	The Pacific Islands Forum
PITA	The Pacific Islands Telecommunications Association
PTC	The Pacific Telecommunications Council
SPC	The Pacific Community
TC	Tropical Cyclone
TVL	Telecom Vanuatu Limited
VMGD	Vanuatu Meteorology and Geohazards Department
USP	The University of the South Pacific

(Glossary)
International Organizations related to Pacific Nations

PIF: The Pacific Islands Forum

In 1971 founded as the South Pacific Forum and in 2000, the name changed to the Pacific Islands Forum is a political group of 16 member countries; Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. There are also a few countries participating as Associate Member. The annual Forum meetings are chaired by the Head of Government of the Host Country who remains as Forum Chair until the next meeting.
The Secretariat to the Forum was initially established as a trade bureau in 1972 and later became the South Pacific Bureau for Economic Co-operation (SPEC). In 2000, when the name of the Forum changed, the Secretariat became the Pacific Islands Forum Secretariat. (http://www.forumsec.org/)

PTC: The Pacific Telecommunications Council

First organized in 1978, PTC held its first annual conference in 1979 in Honolulu, Hawaii. PTC was incorporated as a non-profit, non-governmental organization in the State of Hawaii in 1980.
An international, non-profit, non-governmental membership organization, PTC is the leading membership organization for telecommunications and information and communication technology (ICT) professionals with interests in the Asia-Pacific region.
Through its annual conference, committees, community, events, and initiatives, PTC brings together senior industry leaders and provides them with opportunities to build partnerships with one another and share insights on industry trends, business strategies, policy and regulations, best practices, and new communication technologies and services. (https://www.ptc.org/)

PITA: The Pacific Islands Telecommunications Association

The Pacific Islands Telecommunications Association (PITA) is a non-profit organization formed to represent the interests of Pacific Islands in the field of telecommunications.
PITA was formed in response to specific regional circumstances back in 1996 with the goal of providing a forum for those involved with telecommunications in the Pacific, to exchange experiences, to help formulate solutions relevant to the region, to provide training opportunities and the regular exchange of information, and to be a Pacific voice in the international communications environment.
The objective of the association is to improve, promote, enhance, facilitate and provide telecommunications services within Member and Associate Member countries. As of 2016, there are 40 Members, 131 Associate Members and 16 Government Members. PITA's Office is based in Suva, Fiji. (http://www.pita.org.fj/)

SPC: The Pacific Community

The Pacific Community (SPC) is the principal scientific and technical organisation in the Pacific region, supporting development since 1947. It has 26 members including, American Samoa, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati,

Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna, plus Australia, France, New Zealand and the United States of America.
The focus of activities are on major cross-cutting issues, such as climate change, disaster risk management, food security, gender equality, human rights, non-communicable diseases and youth employment. Using a multi-sector approach in responding to our members' development priorities, drawing upon skills and capabilities from around the region and internationally.
It supports the empowerment of Pacific communities and sharing of expertise and skills between countries and territories.

SPC GeoScience Division

The SPC GeoScience Division (GSD) (formerly SOPAC) began operation on 1 January 2011.
The mission of the SPC is "to help Pacific island people position themselves to respond effectively to the challenges they face and make informed decisions about their future and the future they wish to leave for the generations that follow."
The goal of the SPC Geoscience Division is to apply geoscience and technology to realise new opportunities for improving the livelihoods of Pacific communities.
In the GSD context, geoscience means any science concerned with the Earth. This includes geological, physical, chemical and biological processes that occur at the earth's surface or in its interior. It includes the tools used in GSD to assess whether the use of resources is viable, and to study natural disasters and their impact on island communities.
The SPC Geoscience Division (GSD) has been established as an outcome of the regional institutional framework reform process called for by the Pacific Island Leaders Forum over recent years. Part of that process was to transfer and integrate the core work programme of the Pacific Islands Applied Geoscience Commission (GSD) (GSD "The Commission") into the SPC.
The purpose of establishing SPC Geoscience "The Division" is to ensure the preservation of the identity of the GSD work programme that has built up an excellent reputation, amongst both Members and donor partners over nearly 40 years.
(http://gsd.spc.int/)

Region wide ICT Services at the University of the South Pacific

The University of the South Pacific is the premier institution of higher learning for the Pacific region, uniquely placed in a region of extraordinary physical, social and economic diversity.
Established in 1968, USP is jointly owned by the governments of 12 member countries: Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Samoa. The University has campuses in all member countries. The main campus, Laucala, is in Fiji. The Alafua Campus in Samoa is where the School of Agriculture and Food Technology is situated, and the Emalus Campus in Vanuatu is the location for the School of Law.
The University also offers programs through distance and flexible learning in a variety of modes and technologies throughout USP's 14 campuses and a number of small capacity learning centres based in its member countries.
Advanced communication technologies through *USPNet* are used to reach distance and flexible learning students across the Pacific Ocean. The USPNet is a satellite VSAT network that connects all the campuses and centers using satellite communication technology.
(http://www.usp.ac.fj/)

Chapter 1
Mission Objectives and Background

1.1 Objectives

Broadband networks and services can act as a powerful catalyst to accelerate development actions and transform lives and communities. This ICT applications research is aimed at possibility of developing broadband solutions by collecting data related to cyclone/ typhoon, flash floods, river swelling, volcanic eruptions, earthquakes and tsunami.

The activities will include visiting existing ICT and available facilities related to disaster management, Geohazard monitoring, meteorological stations, and other existing facilities related to information dissemination to the public including broadband applications. .

In particular, the research team will visit the facilities of Fiji National disaster management office (NDMO), Vanuatu Meteorological and Geohazards department (VMGD), and Tuvalu National disaster management office (NDMO), and Solomon Islands National Disaster management Office (NDMO) and related Govt. establishments as available.. The team will visit active volcano sites, flash floods and river swell affected sites to survey existing status of ICT system and applications related to human safety. Needless to say that the team will visit where available, the APT Pilot project activities and their sustainability status. Also find the status of ICT education by visiting university campus in that country.

The team will interview high officials, industry executives, have meetings and discussions with related Govt. officials, Telecom service providers, Academic institutions, where possible the political figures related to such functions of that country. Prior to visiting the country, a questionnaire will be mailed to the respective organizations to have a fair knowledge beforehand.

1.2 Research methodology

- Study documents prior to visits to that country
- Investigate current status by requesting to reply a questionnaire
- Interview high officials of respective country to correlate information
- Set up discussions seminars to share information (country wise)
- Discuss with donors resident in that country to affirm cooperation status related to ICT
- Coordinate with APT and seek cooperation from APT where necessary.

- Target APT Member countries

① Republic of Fiji
② Republic of Vanuatu
③ Republic of Tuvalu
④ Republic of Solomon Islands

- Possible research partner organizations/institutions in the APT Member countries

① Fiji: Ministry of Telecommunications; Ministry of Rural, Maritime and Disaster management, National Disaster management Office (NDMO)
② Vanuatu: Prime Minister's Office: Office of the Chief Information Officer (OGCIO), Vanuatu Meteorological and Geohazards Department (VMGD), Ministry of Climate Change and Natural Disasters; Telecom network service providers
③ Tuvalu: Ministry of Works Communications and Transport, Tuvalu Telecommunications Corporation

④ Solomon Islands: National Disaster Management Office, Meteorological Services Division; Telecommunications Commission of Solomon Islands
⑤ University of the South Pacific(USP); main campus in Fiji, and country campuses at Port Vila campus of Vanuatu, Nauru campus of Nauru, and Honiara campus of Solomon Islands.

- Reason for selecting the countries

While considering the facts for the research, needless to say that the South Pacific region is one of the worst affected in recent years. The region is prone to natural disasters like cyclone, earthquakes, tsunamis, and effects of eruption of the active volcanoes. The Solomon Is located in the region of so called "Ring of Fire" with active volcanoes, and affected by earthquakes, tsunamis and cyclones that causes river swell and flash floods.. Vanuatu is prone to cyclones that cause damage including river swell and flash floods, and also affected by active volcanoes in the country. Earthquakes and tsunamis are reported regularly, and in some areas earthquakes are experienced almost daily. Fiji being located almost in the middle of the region, it experiences heavy damage due to cyclone and flash floods, river swell due to that. Tsunami is experienced whenever any earthquake occurs as far as the south America's west coastal countries as well as near New Zealand.

Map showing the designated countries: Maps ref. CIA World Fact Book)[1]

Tuvalu is well known for its danger of submerging by even a sea level rise due to climate change. It is always affected by cyclone, tsunami and heavy rainfall. In recent years, these countries are seriously affected by disasters, and well known to the International community. According to World Risk Report, Republic of Vanuatu listed on the top, Republic of Solomon Islands 6th, and Republic of Fiji 16 out of 172 countries of the world. Tuvalu is not listed as it is the most affected country that is a victim of climate change and Global warming. However Tuvalu is affected by draught, heavy rain, King Tides and Tsunami.

The situation is very common in many other APT member states. For example, earthquake is experienced in Indonesia, Nepal, China and their neighboring countries. Volcanic eruption is experienced in Indonesia, the Philippines, and a few more. Cyclone causes devastation in Palau, Philippines, China, Myanmar, Bangladesh and India. River swell, flash floods, are

common in Laos, Cambodia, Pakistan, Nepal and many others.
Considering all the aforesaid factors and situations, the four countries are selected for survey and collect information (data) on almost all the natural hazards and climate changes factors and application of ICT in respective countries.

- Expected research outcome

- To find information gathering and information dissemination process, facilities, modes, and personnel available in those countries that can be utilized for national and/or regional hazard management process or disaster management activities using ICT.
- To identify the needs in the region, work out documents that may lead to project formulation in ICT sector, and to work out modes of possible application in other countries or regions.
- To work out cooperation procedures between adjacent countries to act promptly in the event of any disaster or hazard which in turn will be effective to save lives of the peoples.
- To find out the uses of ICT in economic activities that may be useful in other countries, and to locate possibilities of digital economy in these countries.
- To find the available ICT education modes, institutions and programs in the countries
- To study Governments plan on building digital economy and promote its further expansion for national development.

Based on the findings and the outcome, it could lead to the implementation of projects where Japanese technology and experience in disaster management and climate monitoring could be extremely useful. The disaster management organizations of the APT member countries may be benefitted by availing this outcome and by availing advanced technology.

1.3 Overall survey schedule

Items	2015		2016						
	DEC	JAN	FEB	MAR	APR	～	AUG	SEP	OCT
Preparations and document based survey: Prepare questionaire and mail them	⟷								
Study of received questionaire information and prepare for visits		⟷							
Survey in respective countries			⟷				⟷		
Data adjustment processing and Report preparations				⟷				⟷	
Final Report and Accounting report					⟷				⟷
Country wise Survey									
Fiji							⟷		
Tuvalu							⟷		
Solomon Islands			⟷						
Vanuatu				⟷					
Data formatting, editing and coordination								⟷	
Final Report and Accounting report									⟷

1.4 Selected country information and contents

1.4.1 Solomon Islands

Solomon Islands is an Island Nation consisting of six major islands and over 950 smaller islands lying to the east of Papua New Guinea and northwest of Vanuatu.

Basic Data:
Geographic coordinates: 8 00 S, 159 00 E
Area: total: 28,896 sq km (land: 27,986 sq km, water: 910 sq km)
Population: 622,469 (July 2015 est.)
Capital: Honiara (geographic coordinates: 9 26 S, 159 57 E)
Administrative divisions: 9 provinces Central, Choiseul, Guadalcanal, , Isabel, Makira and Ulawa, Malaita, Rennell and Bellona, Temotu, Western, and 1 city Honiara.
Elevation extremes: lowest point: 0 m;
highest point: Mount Popomanaseu 2,310 m
Natural hazards: typhoons, earthquakes, volcanic activity; tsunamis
Environment issues: deforestation; soil erosion; coral reefs are in danger
Telecommunication:
Telephones - fixed telephone subscribers: 8,500
Telephones - mobile cellular: total: 500,000

Map of Solomon Islands [1]

Solomon Telekom Company Limited (TCSI) provides telecommunication services in the Solomon Islands. It offers mobile, fixed line, Internet, and free-to-air television services. The company also provides business solutions like PABX, dedicated leased circuit, fixed line voice and fax, ADSL broadband, postpaid and prepaid mobile, and international roaming services.
TCSI operates a nationwide network based on Satellite and microwave system. It has 12o mobile towers connected to the national backhaul system. Within a province, it operates mesh network. Although satellite bandwidth is very expensive, there is no other alternative so far but using various types of services and circuits from a number of providers, TCSI is providing nationwide service. The most commonly used operators are SES, Intelsat, Speedcast and OB3 (planned). The cost per annum is fairly over 5million US Dollars.

BMOBILE Solomon Islands Ltd is one of GSM operators in the Solomon Islands. It was launched in Honiara in 2010. Recently bmobile partnered with Vodafone, a global leader in telecommunication, and is committed to providing quality, cost effective and cheaper GSM services and products to the people of Solomon Islands. bmobile-vodafone operates in four provinces across the country, namely Guadalcanal, Malaita, Western, & Central Province and is rolling out its mobile network to the other provinces in the coming years.

Internet users: total: 500,400 (est.)

Broadcast media:

Radio Broadcast:
, the British Solomon Islands Protectorate (BSIP) tuning to 1030 KHz in the medium wave band 0n 23rd September, 1952 and accessed to the message through their radio sets: "This is station VQO Honiara commencing the initial program of the Solomon Islands Broadcasting Service". The SIBS had been established by the British colonial Government to develop radio broadcasting within the Protectorate.
Today, Solomon Islands Broadcast Corporation (SIBC) is a public service broadcaster which facilitates educational programs, recording and promotion of local music and the unity of diverse cultures in the country.

Radio broadcast stations:

◇Honiara (central) : 1035 kHz (SIBC)
◇Honiara :Radio Hapi Isles (SIBC) - 5020 kHz
◇Honiara: Wantok FM (SIBC) 96.3 MHz)
◇Honiara: Radio Australia | sat feed) 107.0 MHz
◇Lata (Temotu):1386kHzRadio Temotu (SIBC)
◇Gizo (Western): Radio Happy Lagoon 96.3 MHz
◇Lata (Temotu): Radio Temotu 96.3 MHz
◇Streaming media: SIBC is available online at: http://www.sibconline.com.sb/

TV Broadcast:
A New Zealand company is appointed in 2016 to develop the plan for a national public television service after a Feasibility Study in early 2015 with an Australian Media Assistance funded Project. The SIBC approved a plan to commence with a pilot television service as soon as possible to establish a presence in the TV market and also enable staff to be prepared for the main project. SIBC expects that around 50 percent of the population will be served within the first five years of the TV service and other population centers will be provided access soon afterwards. Once the national TV service is in operation, SIBC will be the latest to join the ranks of pacific island countries that have introduced television services for their populations.

Survey locations and organizations
① Ministry of Communication and Aviation
② Solomon Telecom company Limited
③ Solomon Broadcasting Corporation
④ National Disaster Management Office
⑤ University of the South Pacific, Honiara Campus

1.4.2 Vanuatu

Vanuatu is an archipelago of 83 islands located in the SW Pacific. Most of the islands are mountainous and of volcanic origin, and have a tropical or sub-tropical climate.

Basic Data:
Geographic coordinates: 16 00 S, 167 00 E
Area: total: 12,189 sq km, includes more than 80 islands, about 65 are inhabited
Population: 272,264 (July 2015 est.)
Capital: Port Vila
Administrative divisions: 6 provinces; Malampa, Penama, Sanma, Shefa, Tafea, Torba
Elevation extremes: lowest point: 0 m; highest point: Tabwemasana 1,877 m
Natural hazards: tropical cyclones, volcanic eruption on Ambae volcanism also causes minor earthquakes; tsunamis.
Volcanism: significant volcanic activity with multiple eruptions in recent years; Yasur (elev. 361 m), one of the world's most active volcanoes, has experienced continuous activity in recent centuries, and even now it is active. other active volcanoes are: Aoba, Ambrym, Epi, Gaua, Kuwae, Lopevi, Suretamatai, and Traitor's Head.
Environment - current issues: most of the population does not have access to a reliable supply of potable water; deforestation

Telephones - fixed lines: total subscriptions: 5,700
Telephones - mobile cellular: total: 175,100

Telecom Vanuatu Limited (TVL) was created in 1978 and is Vanuatu's first provider for Landline, GSM, Internet and 3G+. TVL is a major operator in Vanuatu and 80% of the population covered by TVL mobile phone network. TVL is the largest corporate contributor to Vanuatu. TVL Provides WIMAX, Wireless limited to downtown Port Vila and various fixed and leased line services. VSAT is available for rural Vanuatu. Prepaid and Postpaid options are available.

Digicel Vanuatu Limited - Provides WIMAX, 3G & GPRS mobile internet services. Off-island connectivity is provided via submarine fibre optic cable. Digicel has the widest coverage of any operator in Vanuatu and is the only operator capable of providing fixed internet services in many outer island locations. Digicel covers 92% of population as of March 2016.

Telsat Broadband Limited - Provides Carrier-Grade Wireless coverage to Port Vila and surrounds via their own independent network. Telsat also supplies and maintains VSAT systems for the other remote parts of Vanuatu. Pre-Paid and Subscription options are available.

Interchange Limited, has constructed the Interchange Cable Network which connects Port Vila, Vanuatu to Suva, Fiji via a fiber optic cable. The capacity of the cable is over 200 times Vanuatu's previous capacity, with the ability to upgrade the capacity in the future should more bandwidth be required. Interchange plans to construct two more cables, one will connect Port Vila to the Solomon Islands with a spur to the Vanuatu island of Espiritu Santo. The other will connect Vanuatu to New Caledonia with a spur to the Vanuatu island of Tanna.

Broadcast media:

TV station; 1 state-owned multi-channel pay TV is available;
Radio Vanuatu operates 2 radio stations; 2 privately owned radio broadcasters; programming from multiple international broadcasters is available.
Radio broadcast stations:
FM 107 co. ltd: FM 107 in Espirito Santo, Port Vila and Tanna. Also heard in Pentecost and Ambae.
Daily post: FM 96 in Espirito Santo, Port Vila
Radio Vanuatu: FM 98 in Espirito Santo, Port Vila, and FM 104in Tanna
Religious station: FM 90 in Espirito Sano and Port Vila
One shortwave station in Port Vila.
Internet users: total: 82,000 (est.)

Survey locations and organizations
⑥ Office of the Govt. CIO (Prime minister's Office)
⑦ Vanuatu Broadcasting Corporation
⑧ Vanuatu Meteorology and Geohazards Dept.
⑨ National Disaster Management Office
⑩ Telecom Vanuatu Limited
⑪ Digicel Corporation

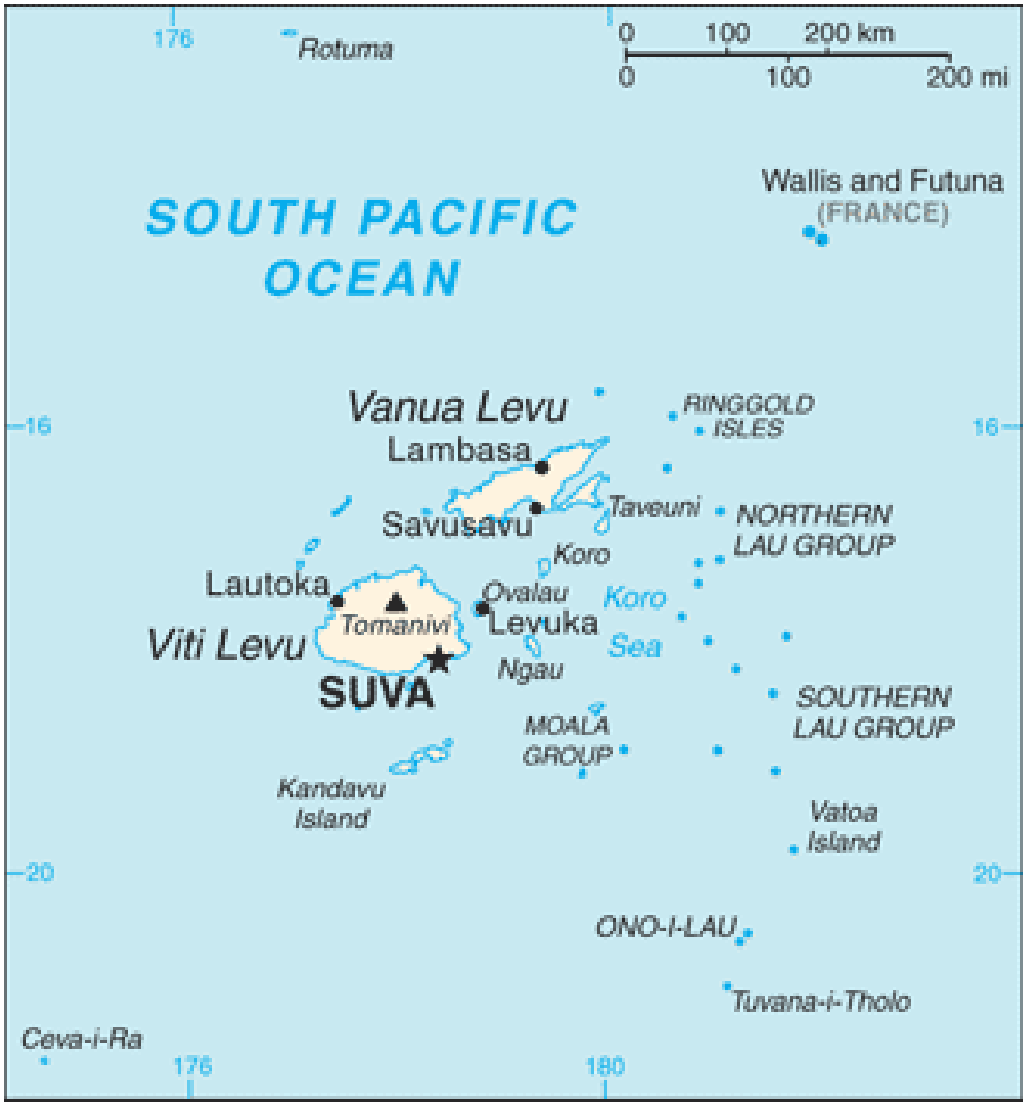
1.4.3 Republic of Fiji Islands

Fiji is an island nation located in the center of the South Pacific with more than 330 islands, of which 110 are permanently inhabited. About 85% of the population lives on the two major islands, Viti Levu and Vanua Levu.

Basic Data:
Geographic coordinates:18 00 S, 175 00 E
Area: total: 18,274 sq km
Population: 909,389 (2015 est.)
Capital: Suva

Administrative divisions:14 provinces; Ba, Bua, Cakaudrove, Kadavu, Lau, Lomaiviti, Macuata, Nadroga and Navosa, Naitasiri, Namosi, Ra, Rewa, Rotuma*, Serua, Tailevu
Elevation extremes: lowest point: 0 m, highest point: Tomanivi 1,324 m
Natural hazards: cyclone, storms, heavy rain, level rise.
Telephones - fixed lines: 74,700
Telephones - mobile cellular I: 876,200
Internet users: total: 420,700

Map of Fiji [1]



Telephone system:
domestic: telephone or radio telephone links to almost all inhabited islands; most towns and large villages have automatic telephone exchanges and direct dialing; combined fixed-line and mobile-cellular I.
International: access to important cable links between US and Canada, as well as between NZ and Australia; satellite earth stations.

Broadcast media:
Fiji TV, a publicly traded company, operates a free-to-air channel, as well as Sky Fiji and Sky Pacific multi-channel pay-TV services; state-owned commercial company, Fiji Broadcasting Corporation, Ltd, operates 6 radio stations - 2 public broadcasters and 4 commercial broadcasters with multiple repeaters; 5 radio stations with repeaters operated by Communications Fiji, Ltd; transmissions of multiple international broadcasters are available.

Challenges and Issues for further development
(1) Fiji being situated at the center of the South Pacific region, it has to take lot of responsibility whenever any disaster/ emergency situation occurs in the region. The Southern Cross submarine cable that provides ICT connectivity to the world, passes through Fiji. The Nadi International airport, Lautoka and Suva Harbour are important hub for logistics in normal as well as emergency situation.

(2) To cope with national and nearby country situations, Fiji remains a key player at all times.

(3) The NDMO is structured into three Units according to the core functions and responsibilities of the organization namely; Policy, Research & Risk Management Unit. Training, Education & Awareness Unit, and Emergency Planning & Coordination.

(4) The Information Technology (IT) Development unit develops IT capability within NDMO to support the national disaster risk reduction and disaster management activities. The envisaged IT development initiatives in line for Office are the NDMO Database, the NDMO Geographical Information System (GIS) and the NDMO Website. However network connection capacity is inadequate to provide timely and speedy access to these very important service initiatives.

(5) Operation and Management of the National Emergency Centre (NEOC) involves the process of staffing, planning, organizing, leading and controlling the efforts of the NEOC and all other response resources to achieve stated response goals and objectives.

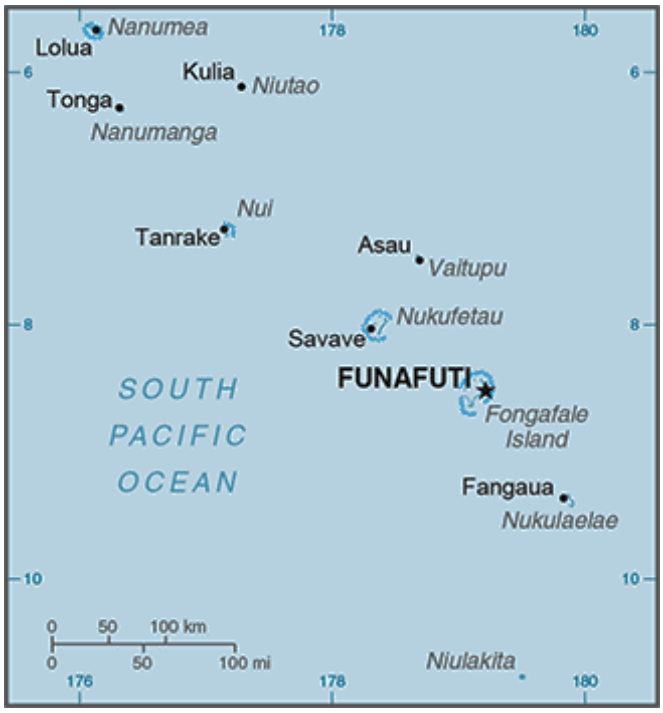
Survey locations and organizations
⑫ Ministry of Communication
⑬ Embassy of Japan in Fiji
⑭ Fiji Broadcasting Corporation
⑮ National Disaster Management Office
⑯ University of the South Pacific

1.4.4 Tuvalu

Tuvalu consists of nine separate islands, six of which are atolls and three are reef islands. Since an atoll typically consists of several islets, there is a total of more than 124 islands and islets. The three remaining islands are actually atolls, too, but they have a completely closed rim of dry land, with a lagoon that has no connection to the open sea or that may be drying up. Each island is surrounded by a coral reef.

Basic Data:
Geographic coordinates: 8.00 S, 178.00 E
Area: 26 sq km
Population: 16,900 (2015 est.)
Capital: FUNAFUTI ;geographic coordinates: 8 31 S, 179 13 E
Administrative divisions: 7 island councils and 1 town council*; Funafuti*, Nanumaga, Nanumea, Niutao, Nui, Nukufetau, Nukulaelae, Vaitupu. (administrative offices are in Vaiaku Village on Fongafale Islet).
Elevation extremes: lowest point: Pacific Ocean 0 m, highest point: unnamed location 5 m
Natural hazards: severe tropical storms are usually rare, but there were cyclones; low levels of islands make them sensitive to changes in sea level.

Map of Tuvalu [1]



Environment issues:
No rivers exists, and no potable groundwater available. Damage to coral reefs from increasing ocean temperatures and acidification observed. Tuvalu is concerned about global increases in greenhouse gas emissions and their effect on rising sea levels.
Telephones - fixed lines: total subscriptions: 1,500 (est.)
Telephones - mobile cellular: total: 3,800(est.)
Internet users- 900

Tuvalu Telecommunications Corporation (TCC) is the government-owned and sole provider of telecommunication services. and is the sole provider of Telecommunications in Tuvalu. TCC is established by the Tuvalu Telecommunications Corporation Act 1993. Funafuti atoll has a regular telephone service, and there are connections to all the outer islands through the post offices. Communications with the outer islands is also available by radiophone. Internet services have been available since late 1999.
Each island in Tuvalu relies on TCC for the use of satellite for inter-island telephone communication and internet access. TTC also provides mobile phone services on Funafuti, Vaitupu and Nukulaelae.
TCC is working to improve telecoms services across Tuvalu which is heavily based on satellite technology. In 2015 Asia Broadcast Satellite (ABS) and TTC announced they had signed a contract to improve capacity and offer higher speed Internet for schools, hospitals and banks as well increased IP backhaul capacity for the mobile network.

Kacific Broadband Satellites has signed a five year agreement with Tuvalu Telecommunications Corporation (TTC) to provide high speed bandwidth to the people of Tuvalu. Using a single dedicated beam directed from its Ka band High Throughput Satellite (HTS), Kacific will provide TTC with increasing levels of capacity over the period, starting with 80Mbps and ramping up to 150 Mbps after four years. To put this in perspective, today less than 20 Mbps of capacity is supplied to Tuvalu.

Broadcast media: There are no TV stations in Tuvalu but many households use satellite dishes to watch foreign TV programs. There is one government-owned radio station, Radio Tuvalu that also relays of programs from international broadcasters. Transmitted frequencies are 621kHz AM and 100.1MHz FM.
Radio Tuvalu broadcasts from Funafuti in English and Tuvaluan. When local programming is not on the air, the BBC World service is broadcasted over the same frequencies.

Issues & Challenges

① Poor Connectivity, and Low bandwidth hinders development and disaster related issues.
② During TC Pam (2015) most of the copper wire network for landline phones were inundated with sea water, thereby limiting the speed of activities or improvement in all sectors.
③ Market is very small to support and sustain investment in the communication sector
④ Commercial satellite phones are very expensive to operate in smaller economy.
⑤ PSTN network and Domestic network to outer islands should be improved as soon as possible.
⑥ To improve communication system using available and economic satellite services in the region.
⑦ Nationwide local broadcast service necessary to boost economy as well as to improve disaster management and public safety
⑧ Inter island communications should be improved to receive warnings and send observations.
⑨ Reliable telecommunications with outer islands for weather and climate information.
⑩ Provide training for the Curriculum Resources Development Unit on climate change and disaster risk management

Survey locations and organizations
⑫ Ministry of Communication (Director arrived in Fiji)
⑬ MOC Permanent Secretary (over Phone)
⑭ Tuvalu High Commission

1.4.5 The University of the South Pacific (USP)

The University of the South Pacific (USP) is the premier institution of higher learning for the Pacific region, uniquely placed in a region of extraordinary physical, social and economic diversity.

Established in 1968, USP is jointly owned by the governments of 12 member countries: Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Samoa. The University has campuses in all member countries. The main campus, Laucala, is in Fiji. The Alafua Campus in Samoa is where the School of Agriculture and Food Technology is situated, and the Emalus Campus in Vanuatu is the location for the School of Law.

The University also offers programs through distance and flexible learning in a variety of modes and technologies throughout USP's 14 campuses and a number of small capacity learning centers based in its member countries.

Advanced communication technologies through *USPNet* are used to reach distance and flexible learning students across the Pacific Ocean. The USPNet is a satellite VSAT network that connects all the campuses and centers using satellite communication technology. (http://www.usp.ac.fj/)

Japan-Pacific ICT Centre with two buildings and a multipurpose theatre was constructed by Japanese Grant Aid Project with JPY3,200 million completed in 2012. The vision for the Centre provide effective and high quality ICT learning, teaching and training to the people of the Pacific. ICT Centre is aimed to be the Information, Communication and Technology (ICT) "Hub" of the Pacific Region.

USP Satellite communication Hub in Suva Fiji

USP runs its own Telecom services, Telecom links 'USPNET' via Satellite and the service expansion beyond its 12 Member countries is possible.

To lead the ICT Center activities to a success and to achieve the goals, countries in the region must work out a program for ICT in the South Pacific. The Ku band satellite network is more favorable with smaller antenna, lower cost, easy installation than C band and is easily deployable in disaster and emergency situation. A few high schools around the region are now connected to the Internet services using the Ku band satellite networks which also provided service cyclones during recent years. The USP net services could be made available to act as Disaster Management Grass root network, and to coordinate with other Agencies: regarding Environment, Educational, agriculture (as mentioned by the top executive and senior ICT management).

Chapter 2
ICT Policy for Disaster Management in Japan

2.1 Framework of disaster prevention in Japan

The standard law on disaster management in Japan is "Disaster Countermeasures Basic Law". Within this Basic Law, there is a "Disaster Management Plan" created by the Central Disaster Prevention Council.

The plan includes disaster prevention, preparation, disaster emergency, and the disaster recovery and reconstruction. The central Govt., public agencies, local governments, businesses, each residents has a role to play in case of any event. In case a disaster occurs, a disaster control center is created under the central Govt or the respective local govt. to take care of the situation.

The Cabinet Office has the jurisdiction of the disaster management of the country, and has developed a disaster response operations office in each of the ministries and agencies.

In the Cabinet Office and disaster management agencies has the provision of coordination on disaster emergency related matters, and the information is published on the website and on the media regularly.

For example: Cabinet office website: http://www.cao.go.jp/en/disaster.html , and Disaster management team website : https://bosaijapan.jp/

A complete version of all related information of Japan is available as White Paper and can be found at the following website:

http://www.bousai.go.jp/kaigirep/hakusho/pdf/WP2015_DM_Full_Version.pdf

Disaster prevention white paper is based on the "Disaster Countermeasures Basic Law", since 1963, official white paper is reported every year in ordinary session of the national Diet (parliament).

Disaster prevention drill: The Cabinet Office has established a "comprehensive disaster prevention training Charter" and the drill is performed around the nation every year.

The purpose of the training, disaster drills are spelled out in the government and local authorities medium term plan, and thus drills are executed regularly. For details:

http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf

2.2 ICT policy and disaster management initiative in Japan

(1) ICT policy in Japan

The Ministry of Internal Affairs and Communications (MIC) is responsible for fundamental framework of Japan, such as the various organizations relating to the economic and social activities of the nation, and supports the basis of the nation.

The scope of functions of the MIC includes the management and administration of the basic administration system of the country, the administration of local autonomy (regional decentralization reforms and regional vitalization), and fire and emergency services, and the realization of growth strategies applying information communications technologies (ICT).

In the reconstruction after the Great East Japan Earthquake that occurred on March 11, 2011, the MIC has been promoting measures for the creative revival of the affected areas by means of ensuring the reliable funding necessary for the restoration and reconstruction of the region, enhancement of administrative consultation functions, initiatives for the efficient and effective resolution of the issues confronting public bodies in the affected regions using ICT, and strengthening of the fire prevention infrastructure, etc.

http://www.soumu.go.jp/english/soumu/index.html

(2) ICT utilization for effective disaster management in MIC Japan

The Ministry of Internal Affairs and Communications has been promoting ICT for effective utilization of disaster prevention and management.

Example of ICT Utilization in Disaster Management (Japan)

○ **ICT services case studies on disaster prevention and mitigation (MIC, Japan)**

http://www.soumu.go.jp/main_content/000203203.pdf

○ **The Booklet of Best Practices of resilient ICT systems in Japan**

http://www.soumu.go.jp/main_content/000372210.pdf

http://www.soumu.go.jp/main_content/000372211.pdf

(Contents of this Best Practices Booklet)
Introduction
・Purpose
・International Joint Program for Resilient ICT system

Resilient ICT Systems in Japan
・Types of the resilient ICT systems to be introduced
・How to view the information
・Resilient ICT Systems in Japan (Citizens' services)
・Resilient ICT Systems in Japan (Services for administrative agencies)

In addition, the Ministry of Internal Affairs and Communications, acts for the Cabinet Office on the matters related to disaster prevention and mitigation in the information and communication fields.
Correspondence of Efforts to natural disasters (Cabinet Secretariat):
http://www.cas.go.jp/jp/seisaku/resilience/dai1/sankou.pdf P.20～25)

Summary of disaster prevention items.

Example of disaster prevention and mitigation in the information and communications bureau of MIC.
At the time of disaster, to transmit accurate information accurately and smoothly.
○ Thereby ensure information and communication systems required for the public and private sectors, to assure business continuity, securing various information and communication means.
(Related Example)
(1) Safety and reliability of the information communication network according to established technical standards relating to telecommunications equipment, with mandatory compliance maintenance of equipment to the telecommunications and broadcasting operators.
(2) Financial support for information and communication means in the event of a disaster.
Securing reliable disaster information transmission infrastructure from the municipality to the residents, by controlling the information flow as required.

(3) Secure mobile communication equipment in order to lend to the affected areas, move power supply vehicles for the support.
(4) Advanced sensors through the utilization of big data technology, promoting efforts to improve disaster prevention capability

(3) ICT international promotion at MIC Japan

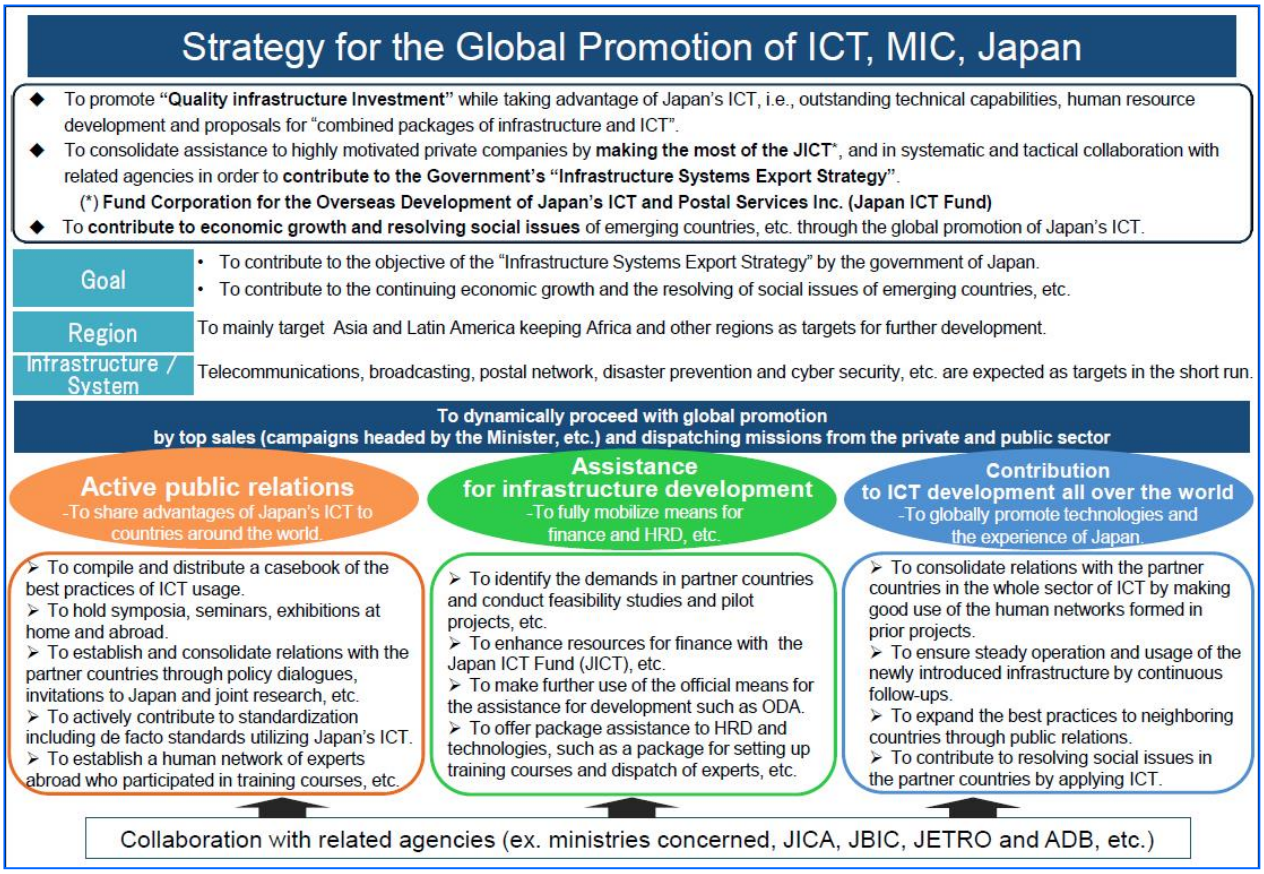
Global ICT Strategy Bureau of MIC is primarily responsible for information communication international strategy and ICT international promotion to contribute to the objective of the "Infrastructure Systems Export Strategy" by the government of Japan

- MIC's Role for Global ICT Promotion
  -International Cooperation
  -Support of Global promotion of leading technology and ICT solutions
  -Funding to International Organizations
  -Dispatch of Officials and Engineers
  -Assisting and Participating International Meetings and Activities

- MIC's Role for ICT Promotion in Disaster Management and Prevention
  -Introduction of trendy ICT for Disaster Management Bigdata, IoT, AI
  -International Cooperation in Disaster Management using ICT

The Strategy for the Global Promotion of ICT, of MIC, Japan

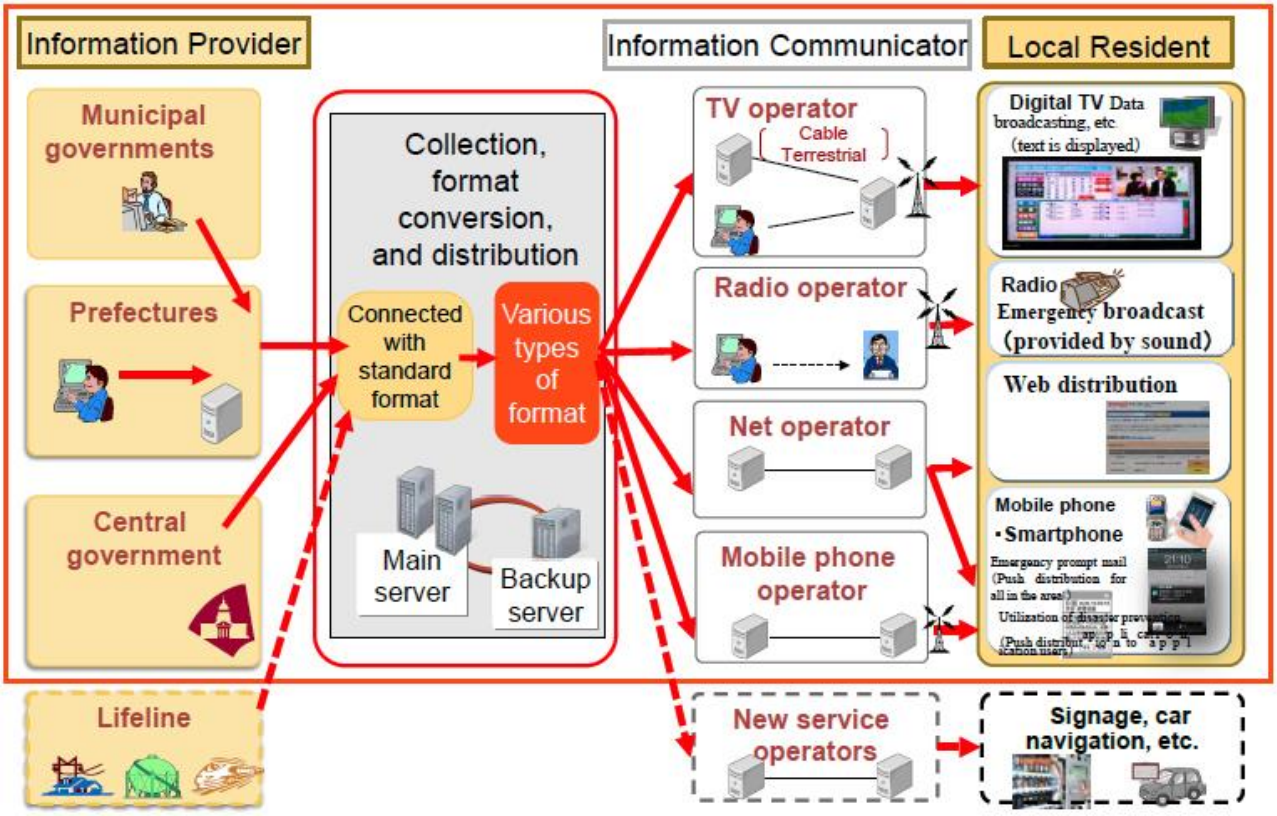
Reference： http://www.soumu.go.jp/english/gisb/pdf/100931.pdf



Japan contributes to “mainstreaming of disaster risk reduction” in the international society. “Mainstreaming of disaster risk reduction” is to make disaster risk reduction (DRR) the most preferential subject and to introduce disaster preparedness in all development policies and projects taking into consideration including the following points.

- To make communication networks resilient
- To enhance information security
- To utilize ICT to make social infrastructure resilient
- ICT utilization when disaster occurs to visualize disaster situation
- Sensor networks to collect big data
- Big data utilization to predict disaster with high precision
- Worldwide Disaster Situation and Japan’s Position
- Importance of ICT in the Field of Disaster Risk Reduction
- International Contribution by ICT for Disaster Risk Reduction

The seamless alert system known as L-Alert is described in the following diagram.

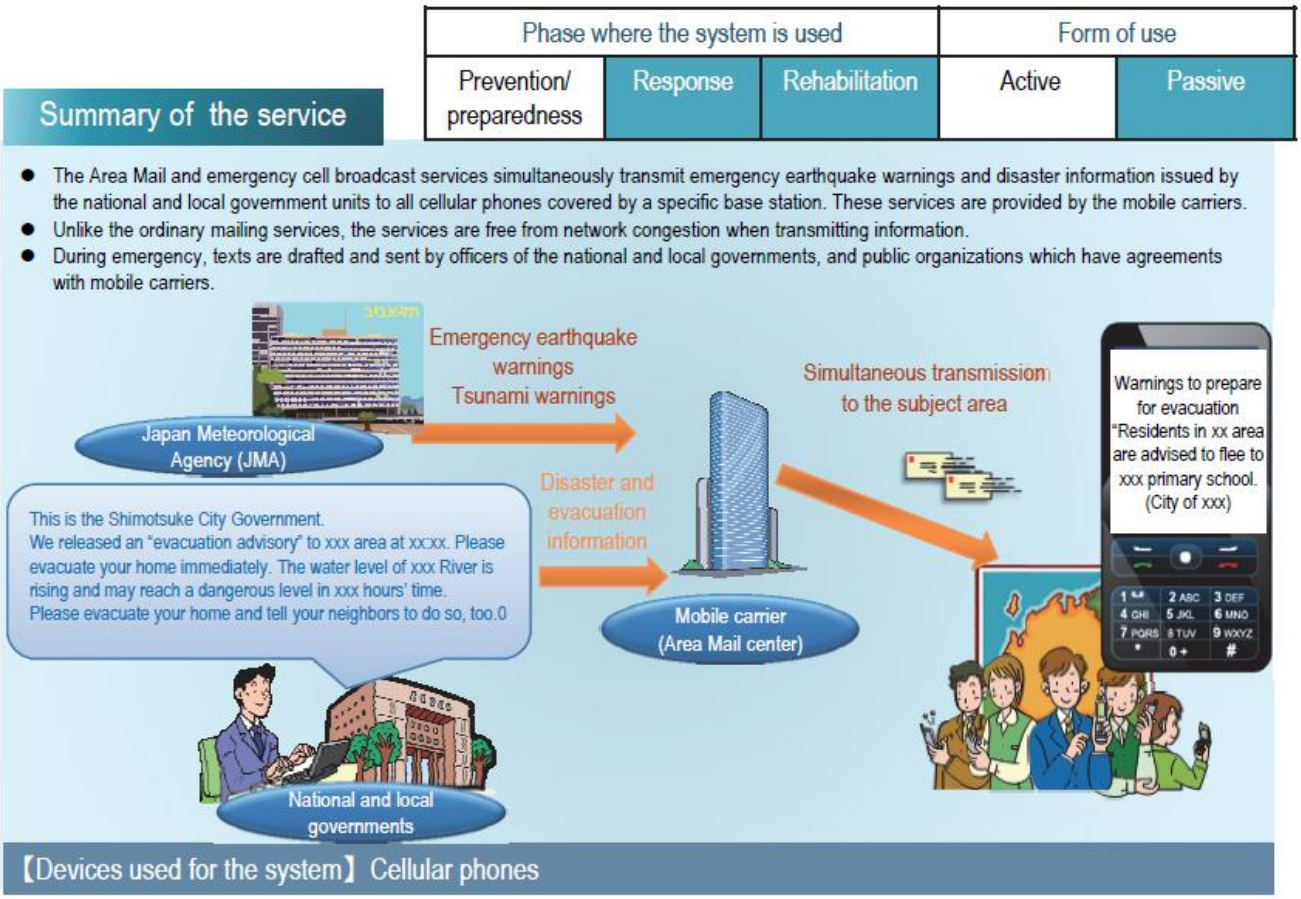


Reference: http://www.soumu.go.jp/main_content/000391490.pdf

More information on “Japan’s International Contribution in the Field of ICT for Disaster Risk Reduction” is available in the same document.

http://www.soumu.go.jp/main_content/000391490.pdf

Provision of early warning and disaster information through “Area Mail” and other emergency cell broadcast services



Cited from: MIC - The Booklet of Best Practices of resilient ICT systems in JAPAN
Reference: http://www.soumu.go.jp/main_content/000372211.pdf

- The Area Mail and emergency cell broadcast services simultaneously transmit emergency earthquake warnings and disaster information issued by the national and local government units to all cellular phones covered by a specific base station. These services are provided by the mobile carriers.
- Unlike the ordinary mailing services, the services are free from network congestion when transmitting information.
- During emergency, texts are drafted and sent by officers of the national and local governments, and public organizations which have agreements with mobile carriers.

- **Effectiveness of the System**
  The diffusion rate of cellular phones is 88.7%
  The system of emergency earthquake warnings is used nationwide.
- **Use of the system in the response phase**
  In principle, citizens, etc. within the subject area are able to receive “Area Mail” when it is transmitted.
  A survey shows that 46.3% of the respondents cited “Area Mail” as a means of obtaining information at the time of the disaster.

Document in full at: http://www.soumu.go.jp/main_content/000372211.pdf

2.3 ICT utilization for disaster prevention in other ministries, local governments and public institutions

Relevant ministries local governments agencies and institutions are actively promoting to introduce ICT in the fields related to disaster prevention.
Further, through the practical uses of ICT in disaster prevention drills, related offices are working to improve the maintenance skills.
Moreover, international deployment of disaster prevention ICT, there have been various efforts in each ministries and agencies.

Example International deployment of disaster prevention ICT in each Ministry and Agency.

◇ Japan's strengths towards the overseas expansion of the disaster prevention technology
Considering the growing importance of disaster prevention in emerging economies such as Asia, Govt decided to provide the proven disaster prevention technology of Japan , and thus organized three points to demonstrate the strengths, the national convention of the Japan disaster prevention platform "to lead the world of Japan disaster prevention technology, and its international development" presentation materials.

◇ How to cope with natural disasters? Disaster prevention and mitigation technologies with the advantage of the ICT.
The disaster prevention and mitigation technologies utilizing the ICTs in ① information gathering, ② information analysis and decision making, ③ information transmission are identified and explained with a common platform taking the case of Japan and foreign 6 examples.

◇ Disaster prevention technologies using special information
To create quickly high precision 3D image for building damage, interpretation from satellite images and aerial photographs, are used in case studies on the use of spatial information in Kumamoto earthquake as well as earthquakes in China and Thailand, and well recognizes for its future prospects.

◇ International science and technology cooperation aimed at reduction of flood damage and poverty in Myanmar
International Science and Technology Research Partnership for Sustainable Development (SATREPS), began with the understanding of the Disaster Prevention and Mitigation System case in Myanmar. Collaboration among government, industry and academia is indispensable for building safe cities. It has already been decided to establish the Research Center for Urban Safety (provisional title), which will serve as the core of a consortium to promote such collaboration. The solutions for the issues in Myanmar promise to serve as a model that can be applied to other Asian countries to improve their disaster response capabilities.
http://www.jst.go.jp/global/english/kadai/h2607_myanmar.html

◇ International deployment of disaster prevention technology of the Ministry of Land, Infrastructure and Transport
Focusing on water related disasters, it pointed out another problem, such as flood damage caused by income differences. Towards the disaster target that has been included in the "sustainable development goals (SDGs)", it explains four issues and the corresponding policies on the internationally expandable infrastructure.

Chapter 3
Information Gathering on Related Researches and Practical Cases of ICT Utilization in Disaster Management

3.1 Literature information concerning natural disaster management and the use of ICTs

The results of literature survey on disaster management on the use of ICT here was carried out from web information retrieval and printed literature available around.
The list is shown as **Attachment-1** at the end.
The following list is the excerpts of the information that could be particularly useful in describing the use of ICT in disaster management.

No.	Title / Content	URL	Source	Size
	(In English)			KB
E05	Disaster Management Plan/Japan	http://www.bousai.go.jp/taisaku/keikaku/english/disaster_management_plan.html	Cabinet Office/Japan	-
E10	The Booklet of Best Practices of Resilient ICT systems in JAPAN	http://www.soumu.go.jp/main_content/000372211.pdf	MIC, CTI Engineering	22718
E11	The Booklet of Best Practices of Resilient ICT systems in the Philippines	http://www.soumu.go.jp/main_content/000372209.pdf	MIC, CTI Engineering	3360
E13	MIC's International Cooperation in the field of ICT for Disaster Management	https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2016/.pdf	MIC Japan	3183
E29	Learning from Megadisasters / Lessons from the Great East Japan Earthquake	https://openknowledge.worldbank.org/bitstream/handle/10986/18864/9781464801532.pdf?sequence=1	Federica Ranghieri and Mikio Ishiwatari, The World Bank	10670
E34	Challenges with ICT in disaster management and ~~infrastructure for Disaster Risk Reduction	http://www.apt.int/sites/default/files/2016/04/WDMC-7_INP-27_JTEC_Challenges_with_ICT_in_DM_ver2.pdf	APT WDMC-7 Dr. Kader Hiroshi Pramanik	3886

(In Japanese)				
No.	Title / Content	URL	Source	Size
J11	日本の災害対策	http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf	内閣府	31851
J23	防災・減災等に資する ICT サービス事例集	http://www.cas.go.jp/jp/seisaku/resilience/dai2/siryou2.pdf	総務省	11163
J24	災害医療・救護活動において確保されるべき非常用通信手段に関するガイドライン	http://www.soumu.go.jp/menu_news/s-news/01tsushin03_02000176.html	総務省	3536
J34	東日本大震災後の情報通信への取り組み	http://www.riec.tohoku.ac.jp/sympo201106/pdf/2-2_izawa.pdf	井澤一朗/総務省東北総合通信局長	869
J37	防災 ICT システム及びサービスの日本におけるベストプラクティス集	http://www.soumu.go.jp/main_content/000372210.pdf	総務省/㈱建設技術研究所、㈱建設技研ｲﾝﾀｰﾅｼｮﾅﾙ	25524
J54	移動式ＩＣＴユニットに関するＩＴＵとの共同プロジェクト実施結果	http://www.soumu.go.jp/main_content/000406462.pdf	ITU/総務省/DOST	1815
J60	プロジェクト研究「開発途上国における情報通信技術の適用のあり方に関する調査」	http://open_jicareport.jica.go.jp/pdf/12245437.pdf	国際協力機構 社会基盤・平和構築部,	2706

3.2 Lessons learned from the Japanese disaster experience

A number of lessons and recommendations are compiled from the catastrophe of experience in Japan that are extremely useful to continue to help in future activities.
In particular, "the Great East Japan Earthquake" of March 2012, a huge earthquake and huge tsunami associated with it, caused extensive damage. Also by the complex chained catastrophe with the meltdown of a nuclear power plant caused by a power failure by huge tsunami, it can be reminded that the it is useful to hear the lessons learned and recommendations based on this experience.

Reference:
https://openknowledge.worldbank.org/bitstream/handle/10986/18864/9781464801532.pdf?sequence=1

Learning from Megadisasters / Lessons from the Great East Japan Earthquake
Federica Ranghieri and Mikio Ishiwatari, editors The World Bank
PART V Hazard and Risk Information and Decision Making
Chapter 27 Risk Communication

RECOMMENDATIONS FOR DEVELOPING COUNTRIES

Establish trust between information senders (for example, the government) and receivers (local communities). Trust is a big part of effective risk communication. If the information source cannot be trusted, real communication is impossible— and it takes a long time to establish trust. Complacency is also an issue. Overreliance on early warnings, hazard maps, and incoming information should be discouraged.

Use a variety of tools to communicate risk. Risk communication tools range from sophisticated communication systems to participatory emergency planning, including

community hazard mapping, disaster evacuation drills, neighborhood watches, instruction in schools, and the passing of experience from generation to generation based on previous events.

The way in which risk is communicated in the early warning system is also important. Although sophisticated early warning systems and technologies are important during a disaster, the public should understand limitations of prediction technology.

Leverage the interest that local leaders may have in community preparedness and be aware of social structures, which vary from country to country and place to place. Work with local change agents to provide training and to develop an appropriate risk communication strategy.

Take a multihazard approach. The difference in Japan's preparedness for the earthquake and tsunami versus its preparedness for the nuclear accident following the GEJE demonstrates the importance of considering all hazards, not just those that are most likely to happen (chapter 36). A good communication strategy is one piece of an overall response plan, which was lacking for the nuclear accident at Fukushima Daiichi.

Update and monitor. Risks are dynamic and change over time depending on population increases or decreases, the development of new industrial facilities and commercial properties, the availability of new hazard information, and scientific innovations. Risk information should be updated regularly and reflected in risk communication strategies.

3.3 ICT utilization of international donor agencies initiatives.

Donors	Initiatives of international donor agencies
JICA	●Cooperation Focused on Dealing with Small Size, Isolation and Remoteness Issues/The Pacific, JICA Annual Report 2015 https://www.jica.go.jp/english/publications/reports/annual/2015/c8h0vm00009q82bm-att/2015_09.pdf ●JICA International cooperation , JICA Annual report/Oceania JICA Annual report/Oceania https://www.jica.go.jp/english/publications/reports/annual/2014/c8h0vm000090s8nn-att/2014_09.pdf ●The project report "Survey on the nature of the application of information and communications technology in developing countries," October 2015, The challenges and directions to actively promote the use of ICT in development assistance.
Asian Development Bank	●ADB activities: "Technical Assistance Report"/March 2015 Applying Space-Based Technology and Information and Communication Technology to Strengthen Disaster Resilience: Technical Assistance Report https://www.adb.org/sites/default/files/project-document/157926/48333-001-tar.pdf

World Bank	●The World Bank, opened the home page of the disaster risk management introducing its efforts /disaster Risk Management http://www.worldbank.org/en/topic/disasterriskmanagement ●Efforts on the use of ICT in DRM; http://www.worldbank.org/en/news/feature/2015/12/16/drmhubtokyo-knowledge-program-information-and-communications-technology-for-drm >Information and Communications Technology for DRM; Japan-World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries" Knowledge Program >Many countries have developed policies to begin managing their disaster risk. However, most countries request and seek additional support to access the information, tools, and technology they need to implement these policies. >Japan is one of the global leaders in ICT and has applied this expertise to managing its disaster risks for decades. Using sensor networks and satellite imagery, among other tools, ICT-driven applications and data are the backbone of Japanese early warning systems and decision-making processes to address the risks posed by disasters such as earthquakes, tsunamis, and flooding. ICT solutions also enhance coordination among institutions at various levels during disaster response, recovery, and reconstruction phases. >The World Bank Disaster Risk Management Hub's ICT for DRM engagement is leveraging Japanese and global best practices to pilot a practical toolkit for practitioners to identify, prepare, appraise, and implement solutions for specific disaster types and DRM needs. The toolkit will showcase empirical case studies of ICT use for DRM in Japan, particularly from the 2011 Great East Japan Earthquake. ●A TOR issued by the World Bank related with DRM and ICT "Japan-World Bank program for mainstreaming disaster risk management in developing countries – smart disaster risk management (DRM) – ICT readiness and applications"
Inter American Development Bank	●Inter-American Development Bank's disaster risk management approach; Helping Latin America and the Caribbean manage natural disaster risks. http://www.iadb.org/en/topics/natural-disasters/natural-disasters,1441.html
UNDP	●UNDP: Disaster Risk Reduction http://www.undp.org/content/undp/en/home/ourwork/crisispreventionandrecovery/focus_areas/climate_disaster_risk_reduction_and_recovery.html?coun

	try= ●UNDP Innovation for 2030 / UNDP INNOVATION FACILITY | 2015 YEAR IN REVIEW http://www.undp.org/content/dam/undp/library/innovation/The%20IF%202015%20Report-%20Web%20version%202%20June.pdf ●UNDP and the World Conference for Disaster Risk Reductin (2015) http://reliefweb.int/sites/reliefweb.int/files/resources/UNDP_at_the_WCDRR_Introduction.pdf ●UNISDR Homepage (UN Office for Disaster Risk Reduction) https://www.unisdr.org/
ESCAP	●Disasters without Boarders / Regional Resilience for Sustainable Development http://www.unescap.org/our-work/ict-disaster-risk-reduction
ITU-D	●ITU-D National ICT Policy: Knowledge-Based Report https://www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/ICB4PAC/Documents/FINAL%20DOCUMENTS/national_ICT_policy.pdf ●ITU-T Resilient pathways: The adaptation of the ICT sector to climate change (Report 2014) http://www.itu.int/en/ITU-T/climatechange/Documents/Publications/Resilient_Pathways-E.PDF
DFID	(No particular Information)
USAID	●USAID /Bureau for Democracy, Conflict and Humanitarian Assistance USAID/OFDA Disaster Risk Reduction Strategy https://www.usaid.gov/what-we-do/working-crises-and-conflict/disaster-risk-reduction/usaidofda-disaster-risk-reduction ●Office of U.S. Foreign Disaster Assistance https://www.usaid.gov/who-we-are/organization/bureaus/bureau-democracy-conflict-and-humanitarian-assistance/office-us
AUSAID	●Development assistance in the Pacific/ Pacific Regional—climate change and resilience http://dfat.gov.au/geo/pacific/development-assistance/Pages/resilience-pacific-regional.aspx ●Australian Support for Climate Change, Environment and Disaster Risk Management in the Pacific https://dfat.gov.au/about-us/publications/Documents/pacific-climate-change-review-aug2013.pdf

Chapter 4
Global Development Strategy and Natural Disaster Management

4.1 Establishment of the Global Development Strategy
(From the MDGs to the SDGs)

1. The Millennium Development Goals (MDGs)
The United Nations organized "The Millennium Development Summit" in September 2000. World leaders agreed to establish the Millennium Development Goals (MDGs) at this summit and adopted the MDGs at UN General Assembly.
The Millennium Development Goals were consists of 8 goals, which were:
(1) Eradicate extreme poverty and hunger,
(2) Achieve universal primary education,
(3) Promote gender equality and empower women,
(4) Reduce child mortality,
(5) Improve maternal health,
(6) Combat HIV/AIDS, malaria and other diseases,
(7) Ensure environmental sustainability, and
(8) Develop a global partnership for development.
Targeted year of MDGs to be challenged to implement were 2015.

After 12 years global challenges to realize the MDGs, 2012 United Nations Conference "RIO+20 Summit" decided to start a process of designing new global development strategy called the Sustainable Development Goals.

2. The Sustainable Development Goals (SDGs)
The United National General Assembly decided to establish the Open Working Group (OWG). The task of OWG was to prepare a proposal on the SDGs. After intensive analysis and discussions, the Open Working Group submitted their proposal of the SDGs to the UN General Assembly in September, 2014.
The UN General Assembly adopted the Sustainable Development Goals (the SDGs) on 25 September 2015. Targeted years to be globally challenged are "2015 to 2030".

The SDGs are consists of 17 goals with 169 targets.
17 goals of the SDGs are:
(1) End poverty in all its forms everywhere,
(2) End hunger, achieve food security and improved nutrition and promote sustainable agriculture,
(3) Ensure healthy lives and promote well-being for all at all ages,
(4) Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all,
(5) Achieve gender equality and empower all women and girls,
(6) Ensure availability and sustainable management of water and sanitation for all,
(7) Ensure access to affordable, reliable, sustainable and modern energy for all,
(8) Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all,

(9) Build resilient infrastructures, promote inclusive and sustainable industrialization and foster innovation,
(10) Reduce inequality within and among countries,
(11) Make cities and human settlements inclusive, safe, resilient and sustainable,
(12) Ensure sustainable consumption and production patterns,
(13) Take urgent action to combat climate change and its impacts,
(14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development,
(15) Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss,
(16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels,
(17) Strengthen the means of implementation and revitalize the global partnership for sustainable development.

3. Important relations between the SDGs and ICT and Disaster Management

(1) Goal 4 related subjects: Education and Roles of school building at the time of disaster
Education on disaster risk reduction is essential factor for disaster management not only for school students but also for local residents, Human Capacity Building for disaster management related stuff including volunteers is also essential,
In many cases of disaster, school building play important roles as asylum and school facilities are used for emergency communication not only telephone communication but also various types of emergency communication using Internet connected computers at school including computer lab at school.
(2) Goals 2, 3, 6 and 7 related subjects
In case school buildings are used as an asylum, some types of emergency communication facilities are needed pre-install. Also, secure food, water and other materials should be reserved.
(3) Goals 9 and 11 related subjects
In order to build resilient infrastructure and to make cities and human settlements inclusive, safe, resilient and sustainable, various kinds of ICT will play important roles.
(4) Goal 13: Take urgent action to combat climate change and its impacts
At the time of the adoption of the SDGs at the UN General Assembly, there were common understandings among participants that the SDGs and the COP21 climate change policies are inextricably linked in actions to realizing the policy goals.

4.2 COP21: United Nations Framework Convention on Climate Change

(Adoption and Ratification of the Paris Agreement)

4.2.1 Adoption of the Paris Agreement

After many years intensive and critical discussions, delegates from 196 countries unanimously adopted the "Paris Agreement" at the Paris COP21 Climate Change Conference in December 2015.
The Paris Agreement replaces the Kyoto Protocol adopted in 1997.
Important Articles of Paris Agreement are as follows:

1. The long-term temperature goal (Article 2)

"This Agreement, in enhancing the implementation of the Convention, including, aims to strengthen the global response to the threat of climate change, in the context of sustainable

development and effort to eradicate poverty, including by:
(a) Holding the increase in the global average temperature to well below 2ºC above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5ºC above pre-industrial levels, recognizing that this would significantly reduce the risks and impact of climate change;
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

During the discussion phase at the COP21 Conference, delegations from the Pacific Islands countries together with other small islands countries worldwide, made widespread strong appeals on the serious adverse effects of temperature increase that their countries will sink under sea level, and so on.
Their efforts have successfully resulted in adding important words "and to pursue efforts to limit the temperature increase to 1.5ºC above pre-industrial levels," in Article 2 of the Paris Agreement.
In order to achieve the long-term temperature goal of the Paris Agreement, the world must restrict the use of fossil fuels. It will be vital to make steady efforts to realize so-called "low carbon society", in which emissions are limited by the efficient and effective use of the renewable energy.

2. Obligation of the Parties to achieve long-term goals (Article 4:selected)
(1) "In order to achieve the long-term temperature goal, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reduction thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.
(2) Each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve.
(3) Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.
(4) Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets. Developing country Parties should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.
(5) Support shall be provided to developing country Parties for the implementation of this Article, recognizing that enhanced support for developing country Parties will allow for higher ambition in their actions.
(6) The least developed countries and small island developing States may prepare and communicate strategies, plans and actions for low greenhouse gas emissions development reflecting their special circumstances.
(7) In communicating their nationally determined contributions, all Parties shall provide the information necessary for clarity, transparency and understanding in accordance with decision 1/CP.21 and any relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.
(8) Each Party shall communicate a nationally determined contribution every five years in accordance with decision 1/CP.21 and any relevant decisions of the Conference, and be informed by the outcomes of the global stocktake.

(9) Nationally determined contributions communicated by Parties shall be recorded in a public registry maintained by the secretariat.
(10) All Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies, mindful of Article 2 taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances."

3. Promotion of International Cooperation Activities (Article 6 and 7: selected)

(1) "A mechanism to contribute to the mitigation of greenhouse gas emissions and support sustainable development is hereby established under the authority and guidance of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.
(2) Parties recognize the importance of integrated, holistic and balanced non-market approaches being available to Parties to assist in the implementation of their nationally determined contributions, in the context of sustainable development and poverty reduction, in a coordinated and effective manner, including through, inter alia, mitigation, adaptation, finance, technology transfer and capacity-building, as appropriate. These approaches shall aim to:

(a) Promote mitigation and adaptation ambition;
(b) Enhance public and private sector participation in the implementation of nationally determined contributions; and
(c) Enable opportunities for coordination across instruments and relevant institutional arrangements. (Article 6)

(3) Parties should strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework, including with regard to;

(a) Sharing information, good practices, experiences and lessons learned;
(b) Strengthening institutional arrangements to support the synthesis of relevant information and knowledge, and the provision of technical support and guidance to Parties;
(c) Strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and support decision-making;
(d) Assisting developing country Parties in identifying effective adaptation practices, adaptation needs, priorities, support provide and received for adaptation actions and efforts, and challenges and gaps, in a manner consistent with encouraging good practice good practices. (Article 7)"

4. Areas of cooperation (Article 8)

(1) "Parties recognize the importance of averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events, and the role of sustainable development in reducing the risk of loss and damage.
(2) Parties should enhance understanding, action and support on a cooperative and facilitative basis with respect to loss and damage associated with the adverse effects of climate change.
(3) Accordingly, areas of cooperation and facilitation to enhance understanding, action and support may include;

(a) Early warning systems;
(b) Emergency preparedness;
(c) Slow onset events;
(d) Events that may involve irreversible and permanent loss and damages;
(e) Comprehensive risk assessment and management;
(f) Risk insurance facilities, climate risk pooling and other insurance solution;
(g) Non-economic losses;
(h) Resilience of communities, livelihoods and ecosystems."

5. Financial Resources (Article 9)

(1) "Developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention.

(2) Other Parties are encouraged to provide or continue to provide support voluntarily.

(3) As part of a global effort, developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, noting the significant role of public funds, through a variety of actions, including supporting country-driven strategies, and taking into account the needs and priorities of developing country Parties.

(4) The Financial Mechanism of the Convention, including its operating entities, shall serve as the financial mechanism of this Agreement."

6. Technology Transfer and Capacity-building (Article 10, 11 and 12)

(1) "Parties share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions.

(2) Parties shall strengthen cooperative action on technology development and transfer.

(3) The Technology Mechanism established under the Convention shall serve this Agreement."(Article 10)

(4) "Capacity-building under this Agreement should enhance the capacity and ability of developing country Parties, in particular countries with the least capacity, such as the least developed countries, and those that are particularly vulnerable to the adverse effects of climate change, such as small island developing States, to take effective climate change actions."(Article 11)

(5)"Parties shall cooperate in taking measures, as appropriate, to enhance climate change education, training, public awareness, public participation and public access to information, recognizing the importance of these steps with respect to enhancing actions under this Agreement."(Article 12)

7. Establishment of Transparency Framework (Article 13)

"In order to build mutual trust and confidence and to promote effective implementation, an enhanced transparency framework for action and support, with built-in flexibility which takes into account Parties'different capacities and builds upon collective experience is hereby established."

8. The first Conference and every five years thereafter (Article 14)

"(1) The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement shall periodically take stock of the implementation of this Agreement to assess the collective progress toward achieving the purpose of this Agreement and its long-term goals (referred to as "global stocktake").

(2)The Conference of the Parties serving as the meeting of the Parties shall undertake its first global stocktake in 2023 and every five years thereafter unless otherwise decided by the Conference."

9. Effectuation of the Paris Agreement (Article 21)

"The Paris Agreement will enter into force on the thirtieth day after the date on which at least 55 Parties to the Convention accounting in total for at least 55 percent of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession."

10. Withdrawal from the Paris Agreement (Article 28)

(1) "At any time after three years from date on which this Agreement had entered into force for

a Party, that Party may withdraw from this Agreement by giving written notification to the Depositary.

(2) Any such withdrawal shall take effect upon expiry of one year from the date of receipt by the Depositary of the notification of withdrawal, or on such later date as may be specified in the notification of withdrawal.
(3) Any Party that withdraws from the Convention shall be considered as also having withdrawn from this Agreement.
(This means that once the treaty is in place, all countries will be bound to it at least for four years.)

(Important Notice)
Research activities of our project have closed at the end of August and then we focused our activity on drafting project report. However, while we are drafting our project report, very important progress has occurred regarding the Ratification of the Paris Agreement. Therefore we added next new item in this project document.

4.2.2 Ratification of the Paris Agreement

"The Paris Agreement has entered into force on 4 November 2016"

At the time of G20 Summit held in Chine in September 2016, The United States and China (the world's two largest greenhouse gas emitters) have submitted the ratification instrument of the Paris Agreement to the UN Secretary General Ban Ki-moon. And the UN Secretary General urged to all participating countries to expedite the ratification process of the Paris Agreement.

Responding to this announcement, the European Union, India and many other countries have taken quick actions.
On 5 October 2016, United Nations officially announced "Entry into Force" of the Paris Agreement as follows:

Depositary Notification

PARIS AGREEMENT
PARIS, 12 DEDEMBER 2015
ENTRY INTO FORCE

The Secretary-General of the United Nations, acting in his capacity as depository, communicates the following:

On 5 October 2016, the conditions for the entry into force of the above-mentioned Agreement were met. Accordingly, the Agreement shall enter into force on 4 November 2016, in accordance with its article 21, paragraph 1, which read as follows:

"This Agreement shall enter into force on the thirtieth day after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55 per cent of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession." 5 October 2016

This means the world is entering into new stage from "Establishment of the Paris Agreement" to "Global Challenge for Implementation".

During the COP22 to be held from November 7-18, 2016 at Marrakech, Morocco, the first meeting of the Parties to the Paris Agreement (CMA1) will be held.
At this meeting, priorities include the implementation of the Agreement with a focus on capacity building, climate finance and technology transfer for the most vulnerable countries, especially Small Island Developing States (SIDS) and Least Developed Countries (LDC).

On 4 October, 2016, the United Nations also announced that number of ratified countries has increased to 76 and many Parties will follow within 2016.

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4.3 WSIS Global ICT Strategy

The United Nations and related international organizations such as ITU, UNDP, UNESCO and the World Bank co-organized "World Summit on the Information Society (WSIS)" in the year 2003 and 2005.
Outcome of the Summit in the year 2003 are "Declaration of Principles" and "Plan of Actions".

1. Declaration of Principles

(1) Our common vision of the Information Society
Our challenge is to harness the potentials of ICT to promote the development goals of the Millennium Declaration.
We also reiterate our commitment to the achievement of sustainable development.
(2) Important points of the Declaration of Principles are:
a) Building a people-centered information society;
b) Information and communication infrastructure development as an essential foundation for an inclusive Information Society;
c) Access to information and knowledge;
d) Capacity building and continuous life-long learning;
e) Building confidence and security in the use of ICTs;
f) ICT applications for benefits in all aspects of life;
g) Cultural and linguistic diversity and identity, and development of local content;
h) International and regional cooperation.

2. Plan of Actions to be achieved by 2015

(1) To connect villages with ICTs and establish Community Access Points;
(2) To connect universities, colleges, schools, research centers, public libraries, cultural centers, museums, post offices and archives with ICTs;
(3) To connect health centers and hospitals with ICTs;
(4) To connect all local and central government departments and establish websites and email addresses;
(5) To adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances;
(6) To ensure that all of the world's population has access to television and radio services;
(7) To encourage the development of content and to put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet;
(8) To ensure that more than half the world's inhabitants have access to ICTs within their reach.

3. WSIS beyond 2015

After 10 years global challenges to implement the policy goals and plan of actions, ITU coordinated WSIS+10 High Level Event in close collaboration with UN Agencies in June 2014. Outcome of this event was "WSIS+10 Vision for WSIS Beyond 2015".

According to this outcome, several new trends have emerged in the inclusive information society such as broadband, social networks, digital inclusion.
Many of these trends bring rapid innovation, diffusion and uptake of mobile technology, as well as, improved access to ICTs. Within the last 10 years, several efforts have been made towards international and regional cooperation in the implementation of Geneva Plan of Action. The WSIS Forum, co-organized every year by ITU, UNESCO, UNDP and UNCTAD, in close collaboration with all WSIS Action Line Facilitators, has proven to be an efficient mechanism to advance development goals.

At the WSIS Forum held 25-29 May 2015, UN Action Line facilitators have created a direct link and have derived all possible linkages between the Action Lines and the SDGs. We can access and read the complete document at www.wsis.org/sdg.

4.4 The United Nations World Conference on Disaster Risk Reduction

1. History of the United Nations World Conference on Disaster Risk Reduction

(1) International Decade for Natural Disaster Reduction: IDNDR (1990-1999)
International Strategy for the United Nations regarding Disaster Risk Reduction was started by the decision of General Assembly (1989), called "International Decade for Natural Disaster Reduction (1990-1999)".
(2) First World Conference on Disaster Risk Reduction (in Yokohama) in 1999
Outcome of this conference was "Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Actions."
(3) Second World Conference on Disaster Risk Reduction (in Kobe) January 2005
Outcome of this conference was "Hyogo Framework for Action (HFA) 2005-2015: a global blueprint for disaster risk reduction efforts during the next decade." Its goal was to substantially reduce disaster losses by 2015 – in lives, and in the social, economic, and environmental assets of communities and countries.
(4) Third World Conference on Disaster Risk Reduction (in Sendai) in March, 2015
Outcome of this conference is "Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030".
In this report, we will focus on the Sendai Framework for Disaster Risk Reduction.

2. Sendai Framework for Disaster Risk Reduction 2015-2030

(1) Expected Outcomes
The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries
(2) Goals
Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.
(3) Priorities for Actions
Focused actions at national and local level and global and regional level
Priority 1: Understanding disaster risk,
Priority 2: Strengthening disaster risk governance to manage disaster risk,
Priority 3: Investing disaster risk reduction for resilience,
Priority 4: Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction.
(4) Roles of Stakeholders
(a) Active participation of Civil society, volunteers, community,

(b) Establishment of networking among academia, scientific and research entities,
(c) Cooperation among business, professional associations and financial institutions,
(d) Strengthen media activities.

(5) International Cooperation and Global Partnership
(a) General considerations,
(b) Means of implementation,
(c) Support from international organizations,
(d) Follow-up actions.

4.5 Alliance of Small Island States (AOSIS) and Small Island Developing States (SIDS)

The Alliance of Small Island States (AOSIS) is a coalition of small islands and low-lying coastal countries that share similar development challenges and concerns about the environment, especially their vulnerability to the adverse effects of global climate change. It functions primarily as an ad hoc lobby and negotiating voice for Small Island Developing States (SIDS) within the United Nations system. 12 Pacific Island countries (PNG, FSM, Samoa, Fiji, Solomon Islands, Tonga, Palau, Vanuatu, Tuvalu, Marshall Islands, Nauru and Kiribati) are members of SIDS.

The Third International Conference on Small Island Developing States (SIDS) was held in Samoa from 1 to 4 September 2014. They discussed many items in this conference covering wide areas. However in this report, we summarize closely related issues on climate change, sustainable energy and natural disaster management subjects from the outcome document of the Conference called "SAMOA Pathway".

At the COP21 Conference held in December 2015, delegates from Pacific Islands Countries together with other Small Island States made strong appeals on Climate Change issues based on the conclusion of this conference and achieved successful conclusions as mentioned in the item COP21.

1. Important and critical subjects they must challenge regarding climate change and natural disaster risk reduction

(1) "We reaffirm that small island developing States remain a special case for sustainable development in view of their unique and particular vulnerabilities and that they remain constrained in meeting their goals in all three dimensions of sustainable development. We recognize the ownership and leadership of small island developing States in overcoming some of these challenges, but stress that in the absence of international cooperation, success will remain difficult.

(2) We recognize that sea-level rise and other adverse impacts of climate change continue to pose a significant risk to small island developing States and their efforts to achieve sustainable development and, for many, represent the gravest of threats to their survival and viability, including, for some, through the loss of territory.

(3) Small island developing States have demonstrated strong leadership by calling for ambitious and urgent action on climate change, by protecting biodiversity, by calling for the conservation and sustainable use of oceans and seas and their resources and by and adopting strategies for the promotion of renewable energy."

2. Climate Change

(1) "We reaffirm that climate change is one of the greatest challenges of our time, and we express profound alarm that emissions of greenhouse gases continue to rise globally. We are deeply concerned that all countries, particularly developing countries, are vulnerable to the adverse impacts of climate change and are already experiencing an increase in such impacts,

including persistent drought and extreme weather events, sea-level rise, coastal erosion and ocean acidification, further threatening food security and efforts to eradicate poverty and achieve sustainable development. In this regard, we emphasize that adaptation to climate change represents an immediate and urgent global priority.
(2) We note with grave concern the significant gap between the aggregate effect of mitigation pledges by parties in terms of global annual emissions of greenhouse gases by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2 degrees Celsius, or 1.5 degrees above pre-industrial levels.
(3) We reaffirm the decision of the Conference of the parties to the United Nations Framework Convention on Climate Change on long-term climate finance, noting the importance of climate finance in addressing climate change.
(4) We urge developed country parties to increase technology, finance and capacity-building support to enable increased mitigation ambition and adaptation actions on the part of developing country parties."

3. Sustainable Energy

(1) "We recognize that dependence on imported fossil fuels has been a major source of economic vulnerability and a key challenge for small island developing States for many decades and that sustainable energy, including enhanced accessibility to modern energy services, energy efficiency and use of economically viable and environmentally sound technology, plays a critical role in enabling the sustainable development of small island developing States.
(2) We urge the international community, including regional and international development banks, bilateral donors, the United Nations system, the International Renewable Energy Agency and other relevant stakeholders to continue to provide adequate support, including in the areas of capacity-building and technology transfer, on mutually agreed terms, for the development and implementation of national, regional and interregional energy policies, plans and strategies to address the special vulnerabilities of small island developing States. We welcome the Global Renewable Energy Islands Network of the International Renewable Energy Agency, which helps small island developing State by pooling knowledge and sharing best practices.
(3) We strongly support actions:

a) To develop a strategy and targeted measures to promote energy efficiency and foster sustainable energy systems based on all energy sources, in particular renewable energy sources, in small island developing States, such as wind, sustainable biomass, solar, hydroelectric, biofuel and geothermal energy;

b) To promote international collaboration to ensure the access of small island developing States to energy by strengthening their integration with regional and international markets and increasing the use of locally available sources of energy in the energy mix, joint infrastructure development projects and investment in production and storage capacities;

c) To fulfil their bold and ambitious renewable energy and energy efficiency targets in small island developing States for the next decade, taking into account national circumstances, the diversification of energy systems and the provision of funds and technology on mutually agreed terms;

d) To work on an integrate approach to establishing and strengthening innovative energy road maps in small island developing States, with detailed resource planning which takes into account social, environmental and economic considerations, as well as access to energy for the poor and people in remote areas."

4. Disaster Risk Reduction (Natural Disaster Management)

(1) "We recognize that small island developing States continue to grapple with the effects of disasters, some of which have increased in intensity and some of which have been exacerbated by climate change, which impede their progress towards sustainable development. We also recognize that disasters can disproportionately affect small island developing States

and that there is a critical need to build resilience, strengthen monitoring and prevention, reduce vulnerability, raise awareness and increase preparedness to respond to and recover from disasters.
(2) With this in mind, we strongly support actions;
a) To gain access to technical assistance and financing for early warning systems, disaster risk reduction and post-disaster response and recovery, risk assessment and data, land use and planning, observation equipment, disaster preparedness and recovery education programs and disaster risk management.
b) To promote cooperation and investment in disaster risk management in the public and private sectors:
c) To strengthen and support contingency planning and provisions for disaster preparedness and response, emergency relief and population evacuation in particular for people in vulnerable situations, women and girls, displaced persons, children, older persons and people with disabilities;
d) To increase participation in international and regional disaster risk reduction initiatives."

4.6 ITU and Disaster Management

1. ITU and Disaster Management
ITU has been playing key-roles regarding disaster communications and emergency telecommunications since early 1990s such as:
a) International Conference on Disaster Communications (Geneva, 1990)
b) Tampere Declaration on Disaster Communications (Tampere, 1991)

However, since the WSIS process and climate change have become critical global subjects, roles of ITU have become more and more important.

2. Areas of Action
(1) Disaster Risk Reduction: focuses on the mitigation and preparedness aspects of the emergency cycle,
(2) Disaster Management: a systematic process that aims to reduce the negative impacts or consequences of adverse effects,
(3) Climate change mitigation and adaptation: a response that seeks to reduce the vulnerability of natural and human systems to climate change effects.

3. ITU Policy for Natural Disaster Management
(1) Integrate National Emergency Telecommunication Plans into Disaster Management Plans;
(2) Develop and use ICTs for disaster prediction, detection monitoring and response;
(3) Design and develop Early Warning Systems;
(4) Establish collaboration platforms to share information for better preparedness and response;
(5) Strengthen institutional capacities through training;
(6) Link the Development and Disaster Management Agendas to optimize the use of resources.

4. Concept "3S": Features of ICT for Disaster Management
(1) Seamless
(a) Seamless in time: Information sharing, utilize past disaster information and prompt actions;
(b) Seamless in Space: Cross-regional and cross border;
(c) Seamless between Organizations responsible for DRR: Information sharing within respective organizations and information transmission to residents and communities through various media;

(2) Strengthen
  (a) To make communication networks resilient;
  (b) To enhance information security;
  (c) To utilize ICT to make social infrastructure resilient;
(3) Smart
  (a) ICT utilization when disaster occurs to visualize disaster situation;
  (b) Sensor networks to collect big data;
  (c) Big data utilization to predict disaster with high precision.

4.7 APT and Natural Disaster Management

Almost every year, APT has been organizing Workshop on Disaster Management.
Latest Workshop was "Sixth APT Workshop on Disaster Management/Communications (WDMC-6)" held in Fiji Islands (July 2015)
At the 13th Session of the General Assembly of the APT, "The Strategic Plan of the APT 2015-2017" was adopted.

"Disaster Management" in the Strategic Plan of the APT 2015-2017
(1) Share expertise on the use of communication technology for Public Protection and Disaster Management (PPDR) to assist the mobilization of equipment and other resources to help people during disasters.
(2) Facilitate promotion of the use of broadband networks for early disaster warning systems, data collection, information sharing and distribution of recovery information.
(3) Encourage the production of a legislative and standard strategy model for effective ICT use and broadband deployment to mitigate the damage from natural disasters.
(4) Organize APT high level senior officials meeting to expand information sharing activities.
(5) Collaborate to increase awareness on the importance of submarine cables and intensify regional cooperation.
(6) Encourage and promote the collaboration with relevant parties including international organizations and the private sector to facilitate implementation of necessary activities such as establishment of the PPDR disaster management/ICT expert teams.
(7) Collaborate to increase awareness of Satellite Communications platform and inclusion in PPDR Disaster Management plans and allocations.

4.8 Closing remarks of this chapter

By the adoption of the SDGs and the ratification of the Paris Agreement, world has established long-term policy and strategy on the global sustainable development and disaster management activities. As we stressed already, the SDGs and Climate Change policies are inextricably linked in actions to realizing the policy goals. One more important subject to be pointed out is ICT will play an important role as we explained in this report.

The WSIS Forum (co-organized every year by ITU, UNESCO, UNDP, UNCTAD, etc.) has already started policy discussions on new challenges at the WSIS Forum 2016.
At the annual meeting of the ICAO (International Civil Aviation Organization) held in Montreal Canada in September 2016, at least 60 nations have agreed to a new deal that caps international flight emissions at 2020 levels. Gas emissions from international flights account for approximately 2 % of global greenhouse gas emissions. Other international organizations will follow ICAO based on their special conditions.

In ICT sector, main subjects we should challenge are to organize and strengthen various types of international cooperation activities such as human capacity development, technology transfer, innovative technology development, strategy/policy making support and financial support suited for SIDS and LDC countries.

Chapter 5
Results of Survey Meetings and Workshops Visiting Specified Countries

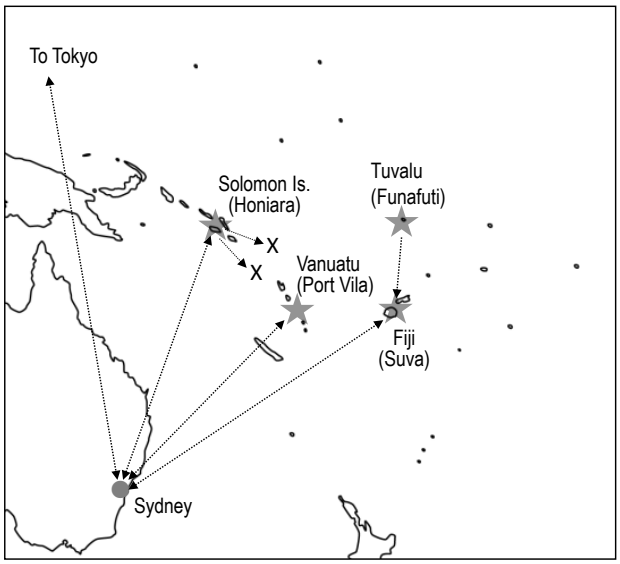
5.1 Visit schedule and activities of the survey mission

This region is frequently experience Tropical Cyclone (TC) and during this mission, the region was affected severely by the TC Winston. Fiji experienced severe unprecedented damage and ultimately, the team was unable to perform the work in Fiji and Tuvalu causing rescheduling the mission about six months later. The following route diagram shows the situation in brief. Survey route and schedule are summarized below.

First Mission : Solomon Is and Vanuatu	
15 Feb	Leave Tokyo
16 Feb	Arrive Honiara
16-17 Feb	Survey in Solomon Is
18 Feb	Workshop in Honiara
19-20 Feb	Survey in Solomon Is
21 Feb	Leave Honiara
22Feb	Arrive Port Vila
23Feb	Survey in Vanuatu
24 Feb	Workshop in Port Vila
25-26 Feb	Survey in Vanuatu
27 Feb	Leave Port Vila
28 Feb	Arrive Tokyo Via Sydney

Second Mission : Fiji and Tuvalu	
13 Aug	Leave Tokyo
14 Aug	Arrive Suva
15-16 Aug	Survey in Fiji
17 Aug	Workshop in Fiji Survey at Tuvalu Embassy
18-19 Aug	Survey in Fiji
20 Aug	Leave Suva
21 Aug	Arrive Tokyo via Sydney

Route of the survey and research



Officials interviewed and discussed

(1) Solomon Islands

Name	Title/Position	Organization
H.E.Kenichi Kimiya	Ambassador	Embassy of Japan in Solomon Islands
Mr.Alwin Danitofea	Director Communications	Ministry of Communications & Aviation
Mr. Loyley Ngira	CEO	Solomon Telecom company
Mr. John Usuramo	Director	USP Solomon Islands
Mr.Ashley Wickham	CEO	Solomon Islands Broadcasting Corporation
Mr.Kyoji Mizutani	Resident Representative	JICA Solomon Islands office
Mr. Masao Yamagata	General Manager	Kitano Mendana Hotel, Honiara

(2) Vanuatu

Mr. Gerard Metsan	Chief Information Officer	Vanuatu Govt.
Mr. Peter Korisa	Operation Manager	NDMO, Vanuatu
Ms. Esline Garaebiti	Manager	VMGD, Vanuatu
Ms. Dalsie Baniala	Regulator	TRR, Vanuatu
Mr. Yaser Maher	CEO	Digicel Vanuatu
Mr.Barlen Lutchmoodoo	Acting CEO	Telecom Vanuatu Ltd.
Mr. Arhtur Knight	CEO	FM 107, Group 107
Mr. Itsubo Toyoaki	Resident Representative	JICA Vanuatu Office
Mr.Denos Natunavuro	CTO	Interchange ltd (Cable Network)

(3) Fiji

Mr. Shivnesh Prasad	Senior Director	Ministry of Communications, Fiji
Prof. Rajesh Chandra	Vice Chancellor	University of the South Pacific
Mr.Kisione Finau	Director	I T services, USP
Mr. Fereti Atalifo	Deputy Director	I T services, USP
H.E.Mr.Takuji Hanatani	Ambassador	Embassy of Japan in Fiji
Mr. Hiroyuki Sawada	Resident Representative	JICA Fiji Office
Ms. Salma Farouque	Emergency Consultant	WFP, Fiji Regional office
Mr. Wolf Forstreuter	Team Leader GIS & RS	SPC Geoscience Division
Mr.Isireli Buwawa	Dy.Team Leader GIS & RS	SPC Geoscience Division

(4) Tuvalu

Mr. Taukave Poolo	Permanent Secretary	Ministry of Communications
H.E.Mr.Paulson Panapa	High Commissioner	Tuvalu High Commission in Fiji
Mr. Tauala Katea	Director	Tuvalu Meteorological Service

5.2 Outcome of meetings and visits

5.2.1 Solomon Is

(1) Telecom status

There is a gap between the requirement of ICT and the existing ICT facilities. In case of any disaster and even in the last disaster Solomon telecom stood up for help in all respects. Solomon Telecom buildings and equipment can stay on with M 8.3 earthquake.
Telecom is always a member of First Response Team. In case of any disaster Telecom uses in Iridium phones but it goes to telecom accounts.
In case of disaster, Telecom is there for First help, to help the people who actually need it. The national disaster management organization uses Telecom Network for disaster management.
Telecom needs to recommends dead the government should be prepared to buy network solutions for public network. The national disaster management office should be paying for the services they utilize.
Regarding the national network telecom uses microwave and satellite to connect all the provinces using mesh type Network. Regarding the facilities telecom has hundred and twenty mobile Tower that concern local communication as well as back haul. So far the satellite services are concerned telecom uses IS-19, NSS-9. Telecom also purchases services from other providers from other countries. They have also a plan to introduce or 3B to get more internet connectivity. The equipment art from various vendors.
Since it is an island nation mission sea transport is very crucial for this country thereby communication with ocean transport is very important, especially, in case of disaster and emergency.
Sea travel is very popular and necessary. In any 24 hours approximately 500 to 600 people are on boats traveling within the country. Once they leave before they are unable to communicate with anyone to. Telecom is now considering two introduce marine GSM. However nothing is earmarked for near future.
International circuit connection is available via Sydney through satellite. The second biggest island Auki and the second biggest port of Noro need more connectivity but because of high cost of satellite bandwidth, it is taking more time.
There is a gap between Operators Perspective and ICT requirements.
Solomon Telekom constructed buildings and installed equipment that can stand earthquake of M8.3. Solomon Telekom is always a member of emergency first response team.
Iridium phones were used in recent disasters but it was on Telekom account. Portable communication needed. Mobility is required when people in need (first help). NDMO uses Telekom network for disaster management. Govt. network WIMAX is used with VSAT access.
Govt should buy network solutions aside from public network and NDMO should be paying for the using it.

(2) Broadcasting status

Three years ago nothing was there but this time things are happening. SIBC is in data streaming or so to say radio programs on the internet.
All FM stations do streaming for every provincial and populated areas. For FM, already applying for government funds for basic radio of CD quality. There are radio broadcast to serve people on short wave and medium Wave.
A team from New Zealand is writing out project proposal for the government to set up television service, and hopefully describe options how to set up television service.
It is known that one is the Turn-Key project which will be very expensive, and another is incremental. Solomon Is has to train people, to have capacity building program. Most of the people don't have fully developed capacity for graphic design. Capacity building is very important, and need to design a system how it is linked to the current situation because if going to call it a national public television system, it should have at least 50% of the population covered as soon as possible at least within one or two years, and then another 25% in the next 5 years. It is not foreseen to serve one hundred percent which is very expensive with the television to all of the population in the country. Solomon Is have six hundred thousand people and they live in nearly on 1000 Islands.
To distribute television around the country a lot of Television transmitters should be there and how they are distributed, probably by the internet. So a person coming up to write up the design how to achieve 50% straight away and 25% within five years, and then the options within it. Then to put cost estimation and describe capacity building programs. This will be finished hopefully within 2 or 3 months, all the documentations is brought here to the directors of broadcasting, one of whom is the CEO of Telecom. The board will look at this if it is practical and see and with our support, and send it to the prime minister. In Solomon Is, the minister of broadcasting is the prime minister and he's already on the board has given a grant to SIBC to create the design. The budget professional development program that is the consultant also doing. Once that is done, the advice from the prime minister and the cabinet will be solicited.
The others who have different systems who can give us the same service, happy to consider all the options. Probably, over 5 years it will be possible to fund it from local resources but for additions, very likely to say, it should be hundred percent operational before the next election.

One very important thing is that there are lacked of good radio receivers. The available ones are very cheap quality maybe $10 US and does not last long. On the radio sets nothing is written with English words. 20 years ago most popular radio receiver available was Japanese brand National, Sony. In every house they don't have a radio, you are lucky if in one village you have one radio that can be listened. SIBC conducts surveys two or three times a year. SIBC stuff go to the village personally and ask if they have a radio in the house. They don't have a good Japanese make. Most people do not listen to the radio, they listen music on their mobile phones. That is SIBC competition. Program sound should be with CD quality FM transmission, and must be attractive to people.
If it is possible to convert broadcast system to digital, and as good as CD quality, then that will make people to listen to the radio. Now people don't get satisfaction from listening to old technology. The Govt will buy 10,000 units, for about 5000 villages(estimated) to cover the population. If we very good receiver is provided in every village, it will be possible to send news and messages to people who are hearing the broadcasting station. That is what another need that the country has now.
Two areas we surveyed in the last two years in Temotu Province in 6 villages, and found that there are about 10 houses had 4 radios in each village (est),

There is another side when talk about television. Discussing for a development assistance for delivering television, but most people in the villages do not have television. Some have but they

have analog. Not many have TVRO they can watch by logging on to the friends ID.

Solomon Is has to buy TV which is already digital and sell them at subsidized price. The analogue TV must be switched off by the end of 2018.

Transmitting frequencies are as follows and they can be found online at SIBC.com
Radio 96.30MHz FM, 1035KHz MW, 5020MHz & 9506MHz SW.
Most of our FM stations are using the same frequency unless they are too close.
Broadcast start 6 in the morning until 11 p.m. But our online service continue until 6 in the morning. There are listeners on the other side of world who sent text messages, face book, internet messages, and surprised to see that someone from Brazil listening SIBC radio.

5.2.2 Fiji

(1) Telecom Status

Fiji has operational Fiber network but last mile is not yet build.
The microwave network of TFL has improved substantially over the past years. However, redundant facilities are needed to make it fully reliable. More towers for redundancy is desirable.

Communication in Disaster management and situation
There is not enough communication circuits for the disaster management office. During the recent TC Winston havoc (2016), it was revealed that there was only one phone line to use. Initially communication was in jeopardy until the Govt took up immediate action to add more telephone lines. Many of the communication towers and the parabola antenna were damaged. During the visit of the team, about 90% of the communication was restored. There is not adequate bandwidth (BW) for data communication for the NDMO uses. Need more BW for future situation control. During normal days nobody feels for the need and that is how the communication situation remain unattended.
Right after the TC Winston, ITU provided Transceivers and the Govt. used them during the disaster recovery process. However, they were to use only for three months and went out of operation after that period. The hardware (handsets) were still lying with the Govt.

There is need to establish more centers to communicate with people at the remote villages and Islands. Fiji is looking forward to request APT for Category I/II Pilot Project after next year.

(2) Broadcasting Status

Fiji Broadcasting Corporation Limited.
operates a network of six radio stations. Radio Fiji One and Radio Fiji Two are public service broadcast stations. The others Bula FM, Gold FM, Mirchi FM and 2day FM of the FBC are the commercial stations. The FBC operates a television service called FBC-TV. FBC is fully government-owned with board of directors appointed by its shareholders. (http://www.fbc.com.fj/)

Fiji One TV
Fiji TV is the television broadcaster in Fiji and the Pacific region, operating the TV stations in Fiji and PNG; *Fiji One* and EMTV respectively, and also SKY Pacific, the Pacific's premium DTH. (http://fijione.tv/).

(3) SPC Geosciences Division in Disaster management

SPC uses GIS and remote sensing data and have the facilities to meet disaster needs by updating satellite data and radar data. SPC receives required data but the network is too slow to download images from GIS. In case of TC Winston SOPAC came in and provided telephones and email services. In case of disaster, SPC-GS sets phone conversation with the disaster management unit of SPC, download the data from remote sensing satellite, analyze data, compare before and after situation and send to the NDMO of the country concerned to use the data

The data includes disaster image maps, footprint of houses, pictures and the interpretation of disaster images send to SPC database. SPC keep the data in database but create no reports.

5.2.3 Recent ETC Activities

(1) Fiji

The capital Suva of Fiji located on the main island called Viti Levu is home to approximately 70% of the country's population of 870,000 people. The second major airport Nausori, is just outside of the capital Suva.

TC Winston struck the Pacific island of Fiji on 20 February 2016. The Emergency Telecommunications Cluster (ETC) was activated on 15 March with the World Food Programme (WFP) co-leading the cluster response with the Government of Fiji. The ETC is working with the Fiji NDMO to make improvements to their HF radio network and communications room at NDMO headquarters.

The ETC is focused on preparedness activities in Fiji and nearby Pacific Island countries under its Pacific Emergency Preparedness and Response (EPR) project, lead by WFP according to information received from the WFP -

(2) Vanuatu

The capital Port Vila of Vanuatu is located on the island of Shefa is the home of approximately 16% percent of the country's population of 272,000 people. Vanuatu has several active volcanoes both on land and undersea, leading to the threat of earthquake and Tsunami.

The Category 5 TC PAM hit Vanuatu on 14 March 2015 with 250 k/h wind and gusty wind of up to 35mkm/h creating havoc chaos and confusion in the island nation.

The Government requested when the ETC responded with services and ICT coordination assistance. The ETC provided communications for operation at 7 locations in the country. The ETC concluded its mission after three months according to Vanuatu Govt.

The ETC is focused on preparedness activities in Vanuatu its Pacific Emergency Preparedness and Response (EPR) project, lead by WFP according to information received from the Authorities

(3) Solomon Islands

Solomon Islands consist of six large islands and over 900 smaller islands. Only one third of the total 992 islands are populated. The capital Honiara of Solomon Islands is the home of 10% of the population of 622,000 located on the largest island is Guadalcanal. The ETC is focused on preparedness activities in Solomon Islands and nearby Pacific Island countries under its Pacific Emergency Preparedness and Response (EPR) project, lead by WFP. In every critical situation the ETC is activated and assisted in saving the inhabitants of this island nation with 900 islands.

(4) Tuvalu

The capital Funafuti of Tuvalu located on the Fongafale island of Funafuti Atoll is the home of approximately 58% percent of the country's population of 10,045 people.

Tuvalu is at extreme high risk5 for the following climate change impacts and associated disasters.

Intense storms and tropical cyclones and associated damages to livelihoods, infrastructures, biodiversity, and erosion and inundation, droughts and associated health and economic impacts including damages to livelihoods and ecosystems. Extreme rainfall and associated flooding and health implications, sea level rise and increased erosion and inundation, impacts on marine systems such as coral reef, sea grass and mangroves. Increase ocean acidification and its impacts on calcium carbonate, which will affect the growth and life cycle of corals, crustaceans and shellfish.
The implications and consequences of the above risks are huge for a small atoll nation like Tuvalu. For example, the average elevation in Tuvalu is one meter above mean sea level (MSL), with the highest being less than five meters above MSL. The islands are highly vulnerable to cyclones and sea level rise including tsunamis. Tuvalu is one of the most vulnerable countries in the world to climate change and rising sea levels. (ref: Tuvalu national strategic Plan 2012-2016)

5.3 Item wise results of countries surveyed

(1) Telecom Services status

Solomon Islands Telekom SI operates Domestic VSAT on various satellites and service providers. O3B / Kacific are also in line of future planning. Nationwide network uses Microwave and Satellite backhauls where Provincial connections are via Mesh Network with 120 mobile tower supporting local carrier. Microwave network is available at 34 local communities. A fibre-optic submarine cable will connect Honiara, Auki, Noro port to Sydney in coming years.	Vanuatu Telecom Vanuatu (TVL), Digicel Vanuatu, Telsat Broadband, and WanTok - offer internet services. Fixed broadband coverage is low, whereas mobile broadband services is prominent. A fibre-optic submarine cable, connects Port Vila to Suva, Fiji. The cable links Vanuatu to the high capacity Southern Cross Cable Network to Sydney and rest of the world. TVL's network covers about 80% of the population, and Digicel's around 90%.
Fiji Telecom Fiji Limited (TFL) is the major operator in Fiji and operates Fiji's only Public Service Telephone Network (PTSN). There are two mobile operators in Fiji. Vodafone Fiji Limited (VFL) and Digicel Fiji. FINTEL operates with capacity for high speed internet access. FINTEL provides Internet Services in Fiji called "KIDANET". Unwired Fiji is offers wireless high-speed internet but coverage is limited	Tuvalu Tuvalu Telecommunications Corporation (TCC) is the provider of telecommunication services. Funafuti atoll has a regular telephone service, and there are connections to all the outer islands through the post offices. Internet services have been available since late 1999. TTC also provides mobile phone services on Funafuti, Vaitupu and Nukulaelae. Kacific Broadband Satellites has signed agreement with TTC to provide high speed bandwidth from its Ka band High throughput Satellite (HTS)

A Few Activities on the APT Publication Program
Research and Survey in Pacific Island Nations

Director, MOCA Speaks at the Workshop

The Workshop at Honiara in Progress

The Workshop at Port Vila in Progress

The Workshop in Fiji in progress

Interview with CEO Digicel Vanuatu

Interview with WFP Consultant in Fiji

Director MOC Tuvalu (2nd from left)

Disaster Emergency assemble guidance at the USP campus in Suva, Fiji

(2) Country wise data information

Items	Countries			
	Solomon Is	Vanuatu	Fiji	Tuvalu
Geographic coordinates:	08.00 S, 159.00 E	16.00 S, 167.00 E	18.00 S, 175.00 E	08.00 S 178.00 E
Capital Coordinates	Honiara 09.26S,159.57E	Port Vila 17.44S, 168.19E	Suva 18.08.S, 78.25E	Funafuti 08.31S, 179.13E
Area: Km^2 EEZ: nm	Land: 28,896 EEZ:200	Land:12,189 EEZ:200	Land:18,274 EEZ:200	Land:26 EEZ:200
Population	622,469	272,264	909,389	16,900
Elevation extremes (m)	Lowest: 0 Highest: 2,310	Lowest: 0 Highest: 1,877	Lowest: 0 Highest:1,324	Lowest: 0 Highest:5
Telecommunication	Fixed: 8,500 Mobile:500,000	Fixed: 5,700 Mobile:175,100	Fixed: 74,700 Mobile:876,200	Fixed: 1,500 Mobile: 3,800
Internet	500,400	82,000	420,700	900
No. of Islands	950 +	80 +	330	9
GNI Per capita	1510	3130	4430	6630
Recent Disasters	2014 Flash Flood	2015 TC PAM	2016 TC Winston	King tide Draught
Telecom Subscribers	Fixed: 8,500 Mobile:500,000	Fixed: 5,700 Mobile:175,100	Fixed: 74,700 Mobile:876,200	Fixed: 1,500 Mobile: 3,800
Internet Users	500,400	82,000	420,700	900
Satellite (USPNet)	C & Ku	C & Ku	C & KU	C
Satellite Data	Solomon Telekom	TVL, Telsat BB	Telekom Fiji Ltd	Tuvalu Telecom
O3b Satellite	Planned	N/A	N/A	N/A
Kacific BB	-	-	-	Planned
Intelsat (IS)	In use	In use	In use	In use
SES Satellite	In use	-	-	-
Japan: JC-Sat (C, Ku band)	Available Not yet in use	Available Not yet in use	Available Not yet in use	Available Not yet in use
Fiber Cable	Planned	Operational	Operational	N/A
HF Radio	Available	Available	Available	Available
TV Broadcast (state)	DTV planned	1	1	N/A
TV Broadcast (Private)	Poor	2	1	N/A
Satellite TV	Sky Pacific	Sky Pacific	Sky Pacific	Sky Pacific
Radio Broadcast (state owned)	1	2	2	1
Radio Broadcast (Private)	exist	2	4	None
Disaster communication	Inadequate	Inadequate	Inadequate	Inadequate

(3) Telecom Services status

Solomon Islands Telekom SI operates Domestic VSAT on various satellites and service providers. O3B / Kacific are also in line of future planning. Nationwide network uses Microwave and Satellite backhauls where Provincial connections are via Mesh Network with 120 mobile tower supporting local carrier. Microwave network is available at 34 local communities. A fibre-optic submarine cable will connect Honiara, Auki, Noro port to Sydney in coming years.	Vanuatu Telecom Vanuatu (TVL), Digicel Vanuatu, Telsat Broadband, and WanTok - offer internet services. Fixed broadband coverage is low, whereas mobile broadband services is prominent. A fibre-optic submarine cable, connects Port Vila to Suva, Fiji. The cable links Vanuatu to the high capacity Southern Cross Cable Network to Sydney and rest of the world. TVL's network covers about 80% of the population, and Digicel's around 90%.
Fiji Telecom Fiji Limited (TFL) is the major operator in Fiji and operates Fiji's only Public Service Telephone Network (PTSN). There are two mobile operators in Fiji. Vodafone Fiji Limited (VFL) and Digicel Fiji. FINTEL operates with capacity for high speed internet access. FINTEL provides Internet Services in Fiji called "KIDANET". Unwired Fiji is offers wireless high-speed internet but coverage is limited	Tuvalu Tuvalu Telecommunications Corporation (TCC) is the provider of telecommunication services. Funafuti atoll has a regular telephone service, and there are connections to all the outer islands through the post offices. Internet services have been available since late 1999. TTC also provides mobile phone services on Funafuti, Vaitupu and Nukulaelae. Kacific Broadband Satellites has signed agreement with TTC to provide high speed bandwidth from its Ka band High throughput Satellite (HTS)

(4) Major Natural hazards experienced

Solomon Islands Tropical cyclones, earthquakes, volcanic activity; tsunamis Environment issues: deforestation; soil erosion; coral reefs are in danger	Vanuatu Tropical cyclones, volcanic eruption, earthquakes; tsunamis, flash flood, river swel.
Fiji Tropical cyclones, storms, heavy rain, Sea level rise, deforestation; soil erosion	Tuvalu There were cyclones but severe tropical storms are rare, low levels of islands make them sensitive to changes in sea level.

(5) Major Environment issues

Solomon Islands Deforestation, soil erosion; many of the surrounding coral reefs are dead or dying. Acidification process disrupts ecosystem nutrient flows causes to kill freshwater fish and plants.	Vanuatu Potable water problem; deforestation. Biodiversity is threatened by over harvesting of some reef and lagoon fish. Frequent tropical cyclones affecting the county causing damage to plants and fringing reefs.
Fiji Soil erosion, damage to coral reefs. Repeated tropical cyclones, damage to coral colonies and fringing reefs. Tropical fish dies from rising water temperature.	Tuvalu No potable water, rising sea levels , Soil erosion, coral reefs and fringing reefs under stress and in danger. Damage to coral reefs from increasing ocean temperatures and acidification.

(6) Vulnerability index of countries (%)

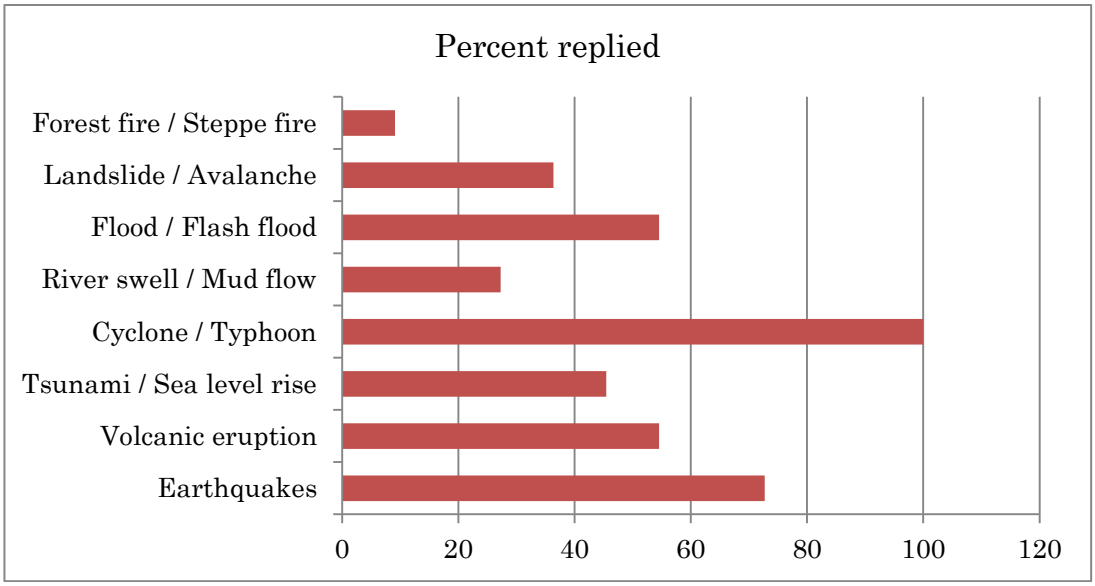
Items	Solomon Is	Vanuatu	Fiji	Tuvalu
INFORM Risk Profile (*1)	5.0	3.9	3.1	3.9
Hazard & Exposure	3.5	2.3	2.4	1.8
Vulnerability	5.1	4.2	3.5	5.8
Lack of Coping Capacity	6.9	6.1	3.7	5.8
Source: INFORM				
World Risk Index (WRI)(*2)	19.18	36.5	13.6	N/A
As a reference : WRI of Japan is 13.38 %				

(*1) The World Risk Index 2015
(*2) World Risk Report 2014

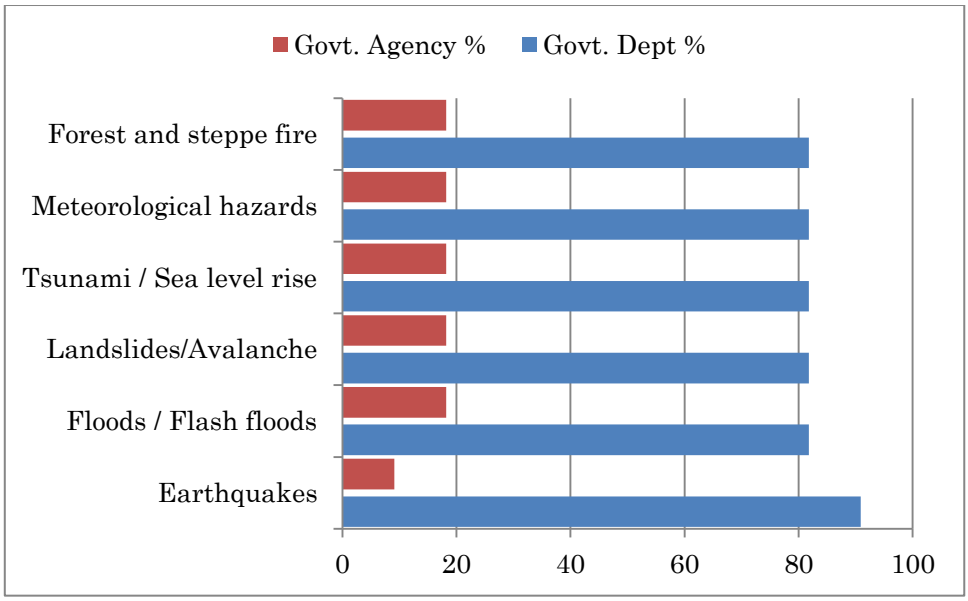
5.4 Questionnaire contents and data analysis

This questionnaire was presented in person and received the reply directly within the day ranging from top Govt. officials, CEO's on to person on the ground with a variety of responsibilities related to ICTs in four countries. Therefore the number of responses received is highly reliable.

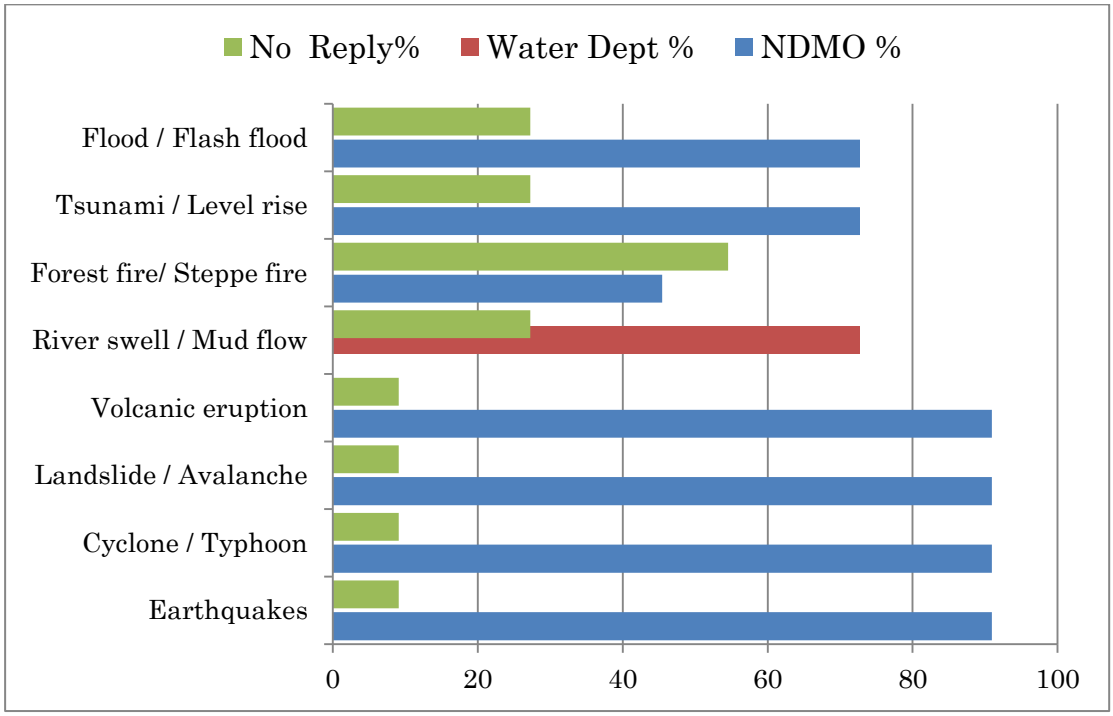
[1] Please identify the natural hazard that you experienced during the past 3 years.
(Multiple answer)



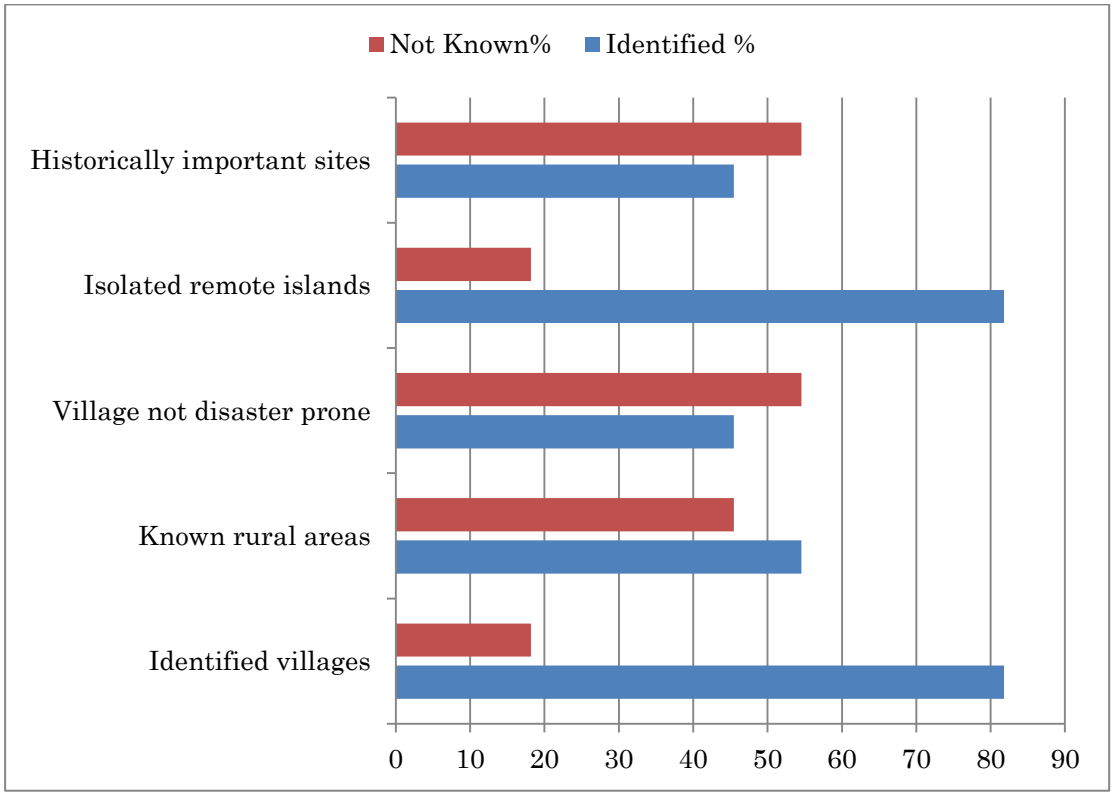
[2] Please mention type of organizations that keep records of disasters.



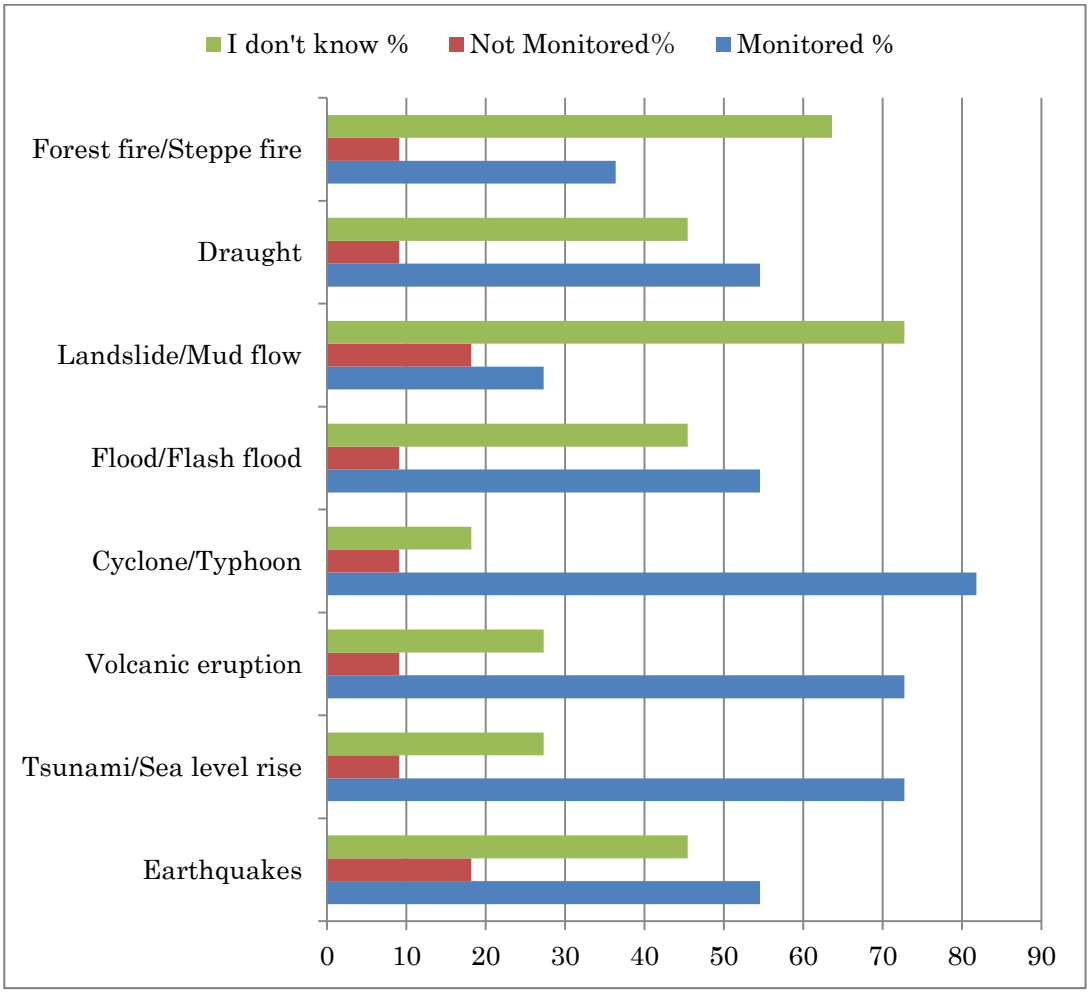
[3] Please mention names of organizations that keep records of disasters.



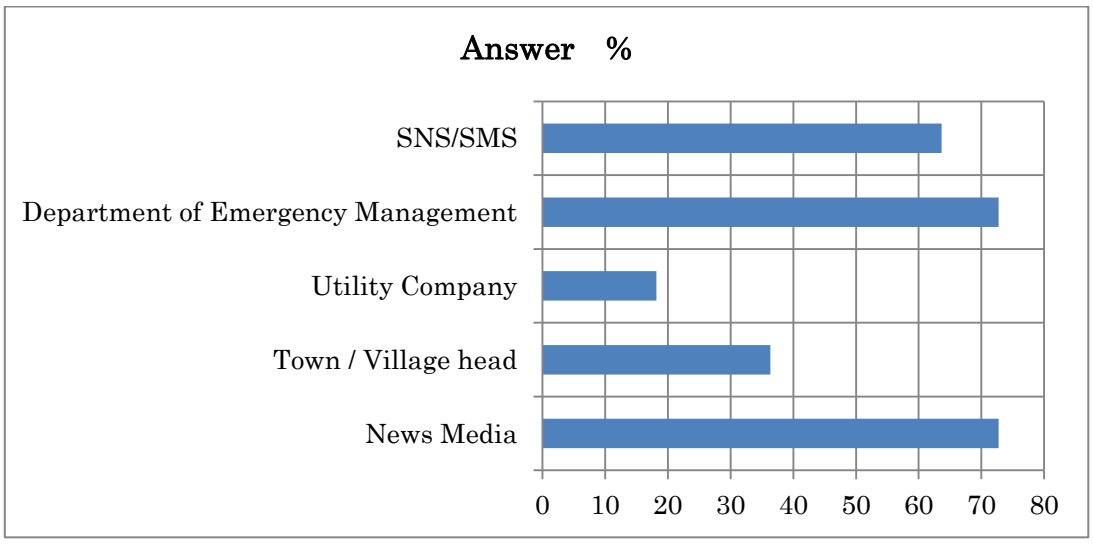
[4] Please identify disaster risk and vulnerable locations in your country.



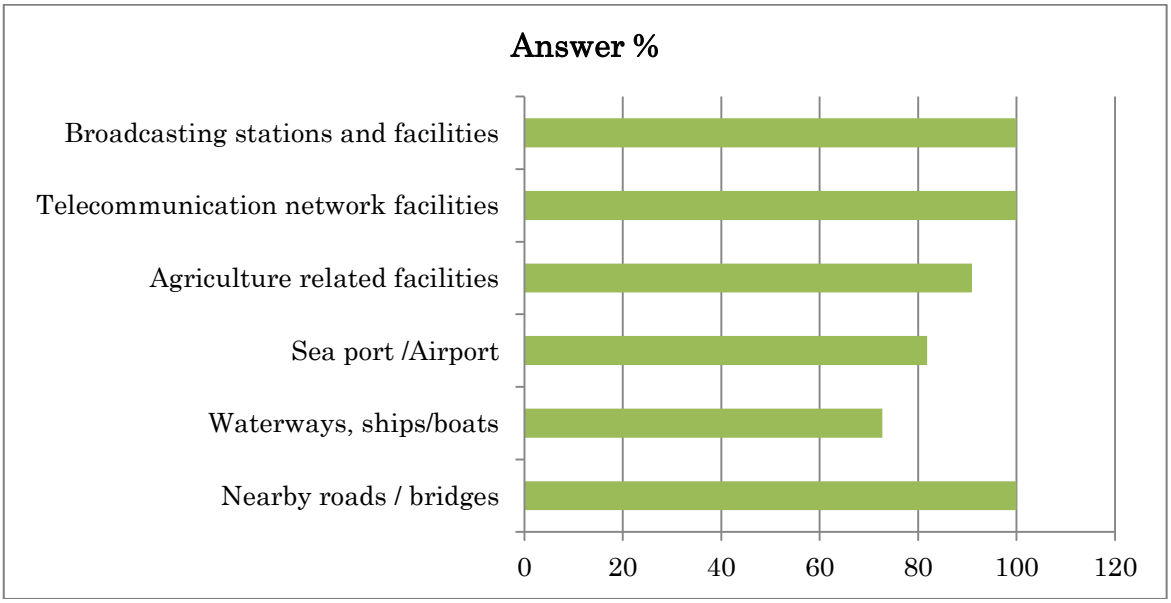
[5] Are the communities organize themselves to monitor disaster /emergency?



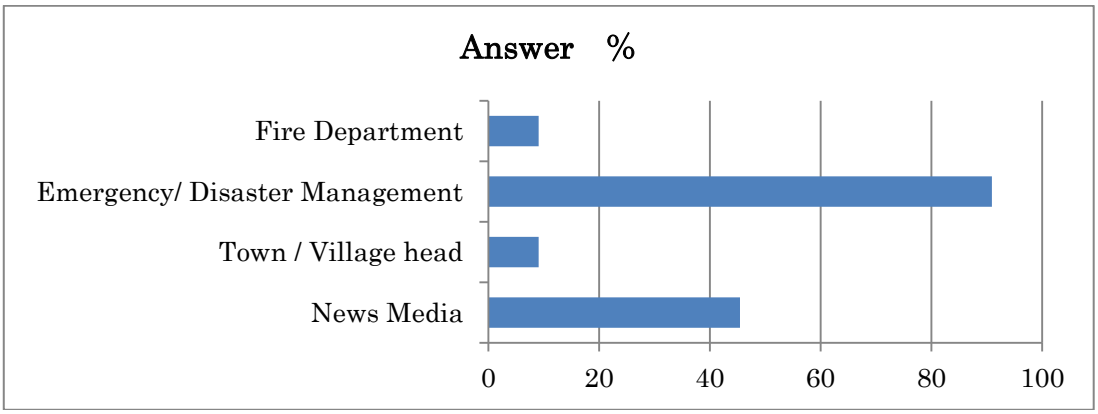
[6] From what source do you usually receive information about natural disasters?



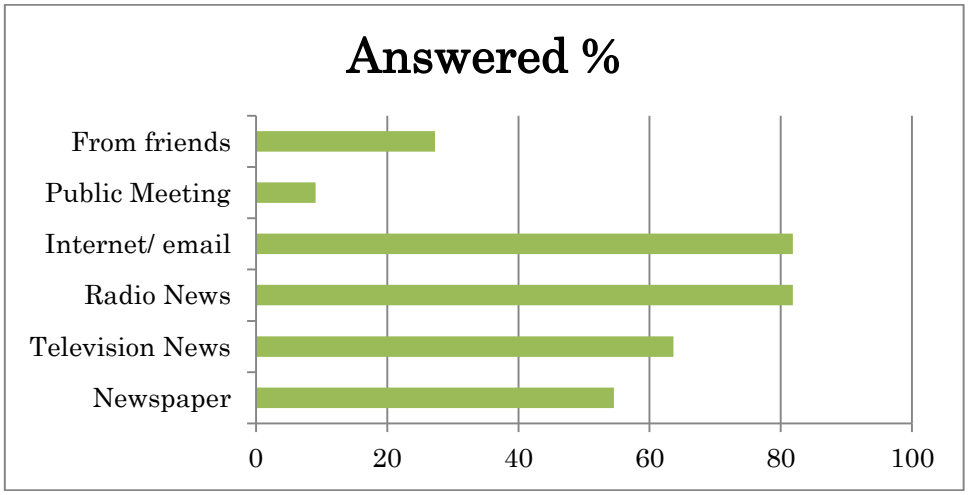
[7] What are the Infrastructure affected in recent Disaster (as known to you)?



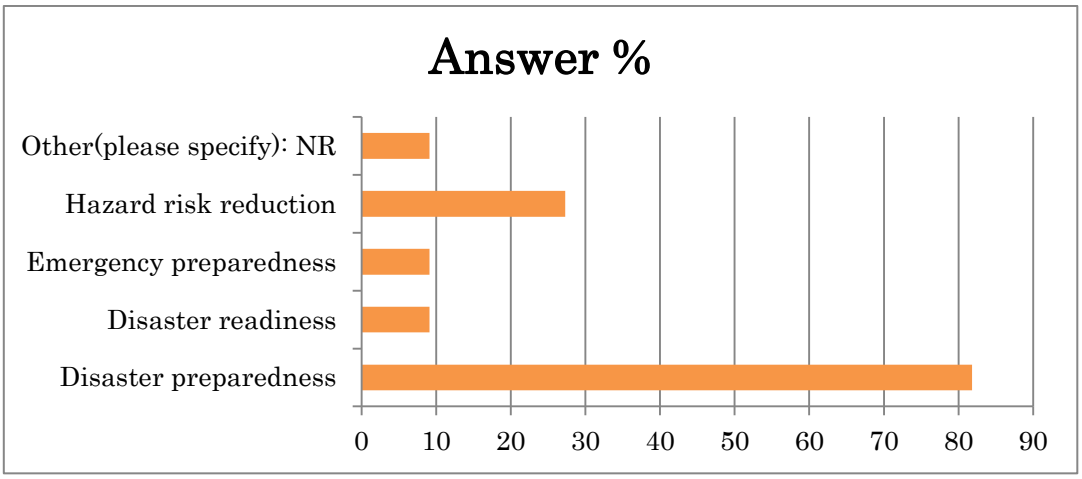
[8] Regarding disaster information who do you trust most?



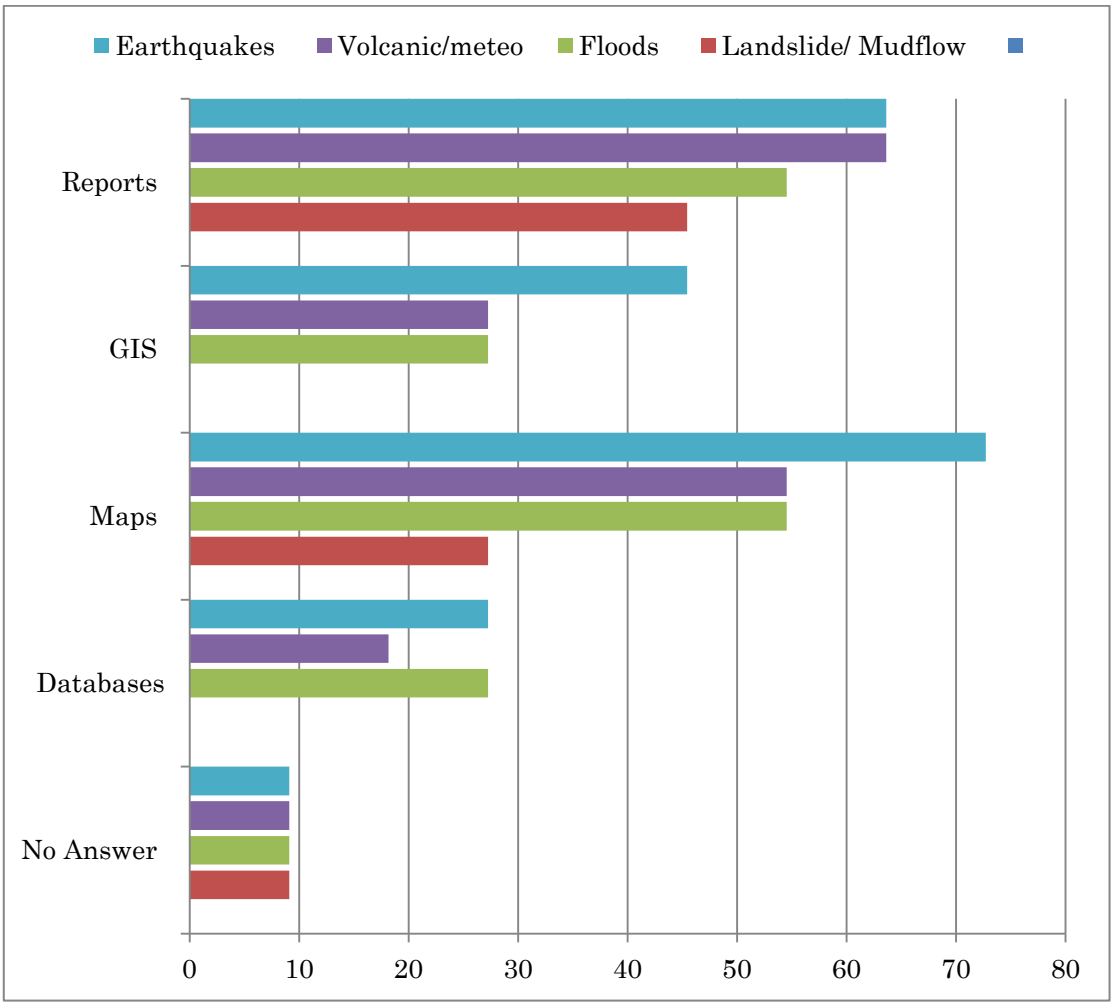
[9] What is the most effective way for you to receive disaster information?



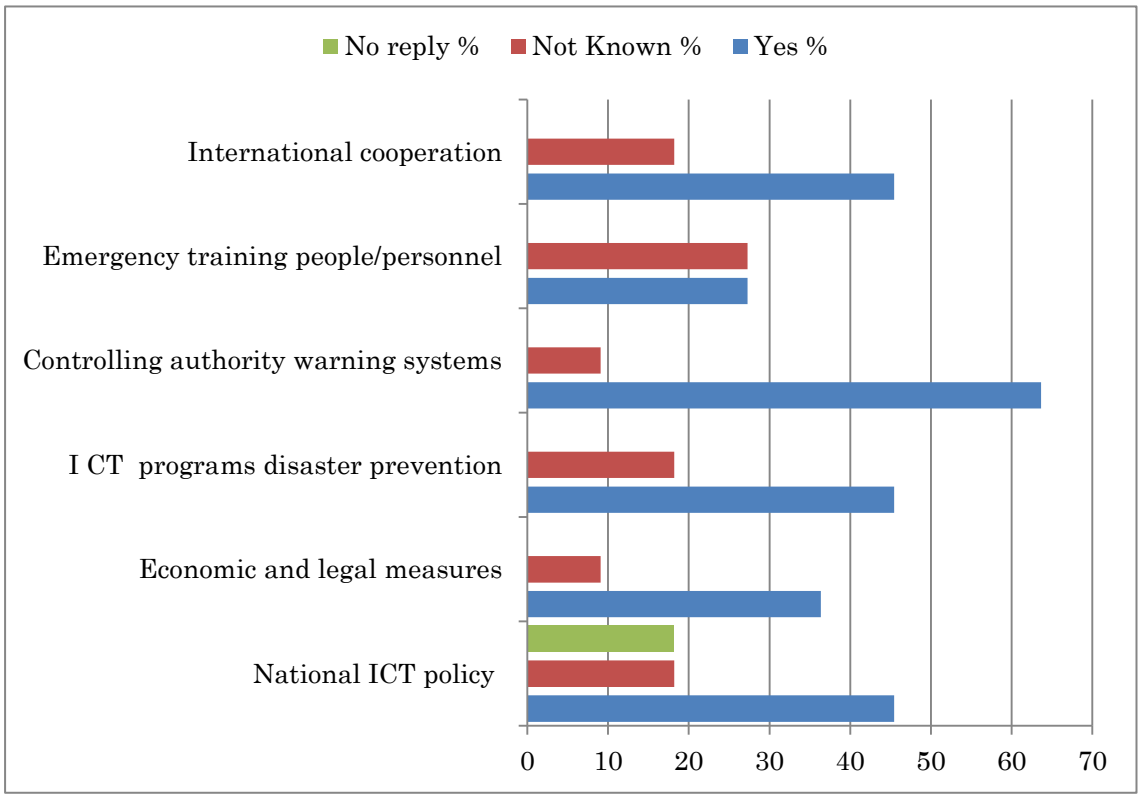
[10] Indicate one of the terms easy to understand in information communication



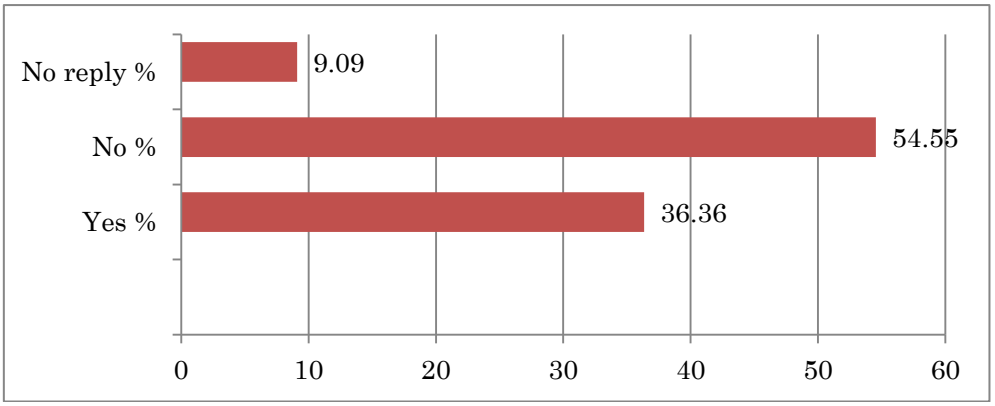
[11] How are risks identified and expressed? (by reports, database, maps, etc.)



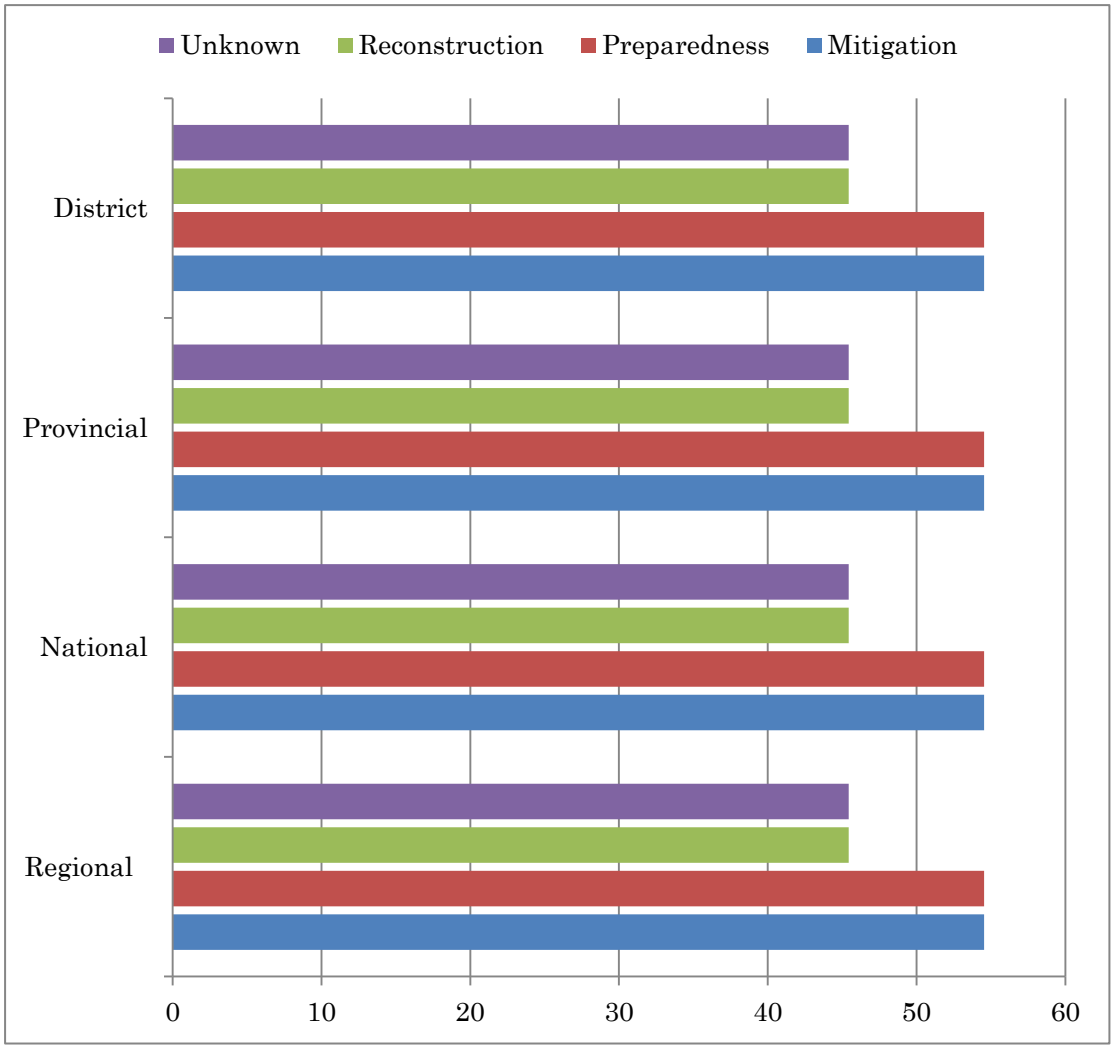
[12] Please mention Govt. initiative/ framework on ICT in Disaster preparedness/ management?



[13] What is the disaster management training strategy on ICT in the country?



[14] Communications for public safety: How are the warnings transmitted to officials and to the population? (Channels of dissemination)



5.5 Workshop contents and details

5.5.1 Solomon Islands

Workshop on ICT in disaster management, Resilience and Recovery for Public Safety
Thursday, 18th February 2016
Venue: Kitano Mendana Hotel, Honiara, Solomon Islands

Presenters	Time	Details
	8:30-9:00	Registration of Participants
JTEC	9:00-9:10	Welcome speech & explanation of the Program
MOCA	9:10-9:20	Speech from Ministry of Communication & Aviation
USP	9:20-9:30	ICT applications and education with USPNet in Solomon Is
Mr.Takahara	9:30-10:00	▪ Information on APT activities. Projects including this Publishing Program ▪ Outline of Japanese Govt. ICT Policy, ICT for DM, and activities in this region ◆ Outline of Technologies available
Prof. Saga	10:00-10:30	◆ New Global Strategy on Sustainable Development ◆ From MDGs to SDGs ◆ WSIS to New Plan of Action on ICT Strategy ◆ Climate change Matters as discussed in COP21 and WTIS-15 including challenges in the south Pacific island nations. ◆ Important subjects to be considered on the above
	10:30-10:50	Coffee Break
Dr. Pramanik	10:50-11:30	◆ ICT in Disaster Management, resilience and recovery at APT activities ◆ Coordination with other activities in this region. (SPC, SOPAC etc) ◆ Various Technical cooperation through USP, Success and challenges ◆ Status of USPNet, Possibilities of using in Disaster situation ◆ Need & benefit of a Regional Disaster Management Network. ◆ BIGDATA : its current status. Collection and protection of data. applications, benefits and challenges ◆ Introducing new form of Regional Network for gathering and fruitful timely uses. ◆ ICT applications in Climate change disaster management, Resilience and Recovery situations
Discussions	11:30-12:30	ICT in Disaster Management & Climate Change effects in Vanuatu
JTEC	12:30-14:00	Closing & Lunch

5.5.2 Vanuatu

Workshop on ICT in disaster Management, Resilience and Recovery for Public Safety
Wednesday, February 24, 2016
Venue: Conference Room, Melanesia Hotel, Port Vila Vanuatu

Presenters	Time	Details
	8:30-9:00	Registration of Participants
JTEC	9:00-9:05	Welcome speech & explanation of the Program
TRR, Vanuatu	9:05-9:20	Speech
Mr.Takahara	9:20-9:50	◆ Information on APT activities. Projects including this Publishing Program ◆ Outline of Japanese Govt. ICT Policy, ICT for DM, and activities in this region ◆ Outline of Technologies available
CIO, Vanuatu	9:50-10:00	◆ ICT application in various sectors of Vanuatu
Prof. Saga	10:00-10:30	◆ New Global Strategy on Sustainable Development ◆ From MDGs to SDGs ◆ WSIS to New Plan of Action on ICT Strategy ◆ Climate change Matters as discussed in COP21 and WTIS-15 including challenges in the south Pacific island nations. ◆ Important subjects to be considered on the above
	10:30-10:50	Coffee Break
Dr. Pramanik	10：50-11:30	◆ ICT in Disaster Management, resilience and recovery at APT activities ◆ Coordination with other activities in this region. (SPC, SOPAC etc) ◆ Various Technical cooperation through USP, Success and challenges ◆ Status of USPNet, Possibilities of using in Disaster situation ◆ Need & benefit of a Regional Disaster Management Network. ◆ BIGDATA：its current status. Collection and protection of data. applications, benefits and challenges ◆ Introducing **new form of Regional Networ**k for gathering and fruitful timely uses. ◆ ICT applications in Climate change disaster management, Resilience and Recovery situations
Discussions	11:30-12:30	◆ ICT in Disaster Management & Climate Change effects in Vanuatu
JTEC	12:30-14:00	Closing & Lunch

5.5.3 Fiji and Tuvalu

Workshop on ICT in disaster management, Resilience and Recovery for Public Safety
Wednesday, 17th August 2016
Venue: Cession Room Grand pacific Hotel, Suva, Fiji

Presentation	Time	Details
	8:30-9:00	Registration of Participants
JTEC	9:00-9:15	Welcome speech & explanation of the Program
MOC	9:15-9:30	Key note Address (to be confirmed)
Mr.Takahara	9:30-10:00	▪ Information on APT activities. Projects including this Publishing Program ▪ Outline of Japanese Govt. ICT Policy, ICT for DM, and activities in this region ▪ Outline of Technologies available
Prof. Saga	10:00-10:15	▪ Policy and Regulation related to Disaster management in the Pacific Island Nations (Video Presentation)
	10:10-10:25	Coffee Break
Mr. Tauala Katea MOC (Tuvalu)	10:30-11:30	▪ Issues and challenges with ICT in Disaster management and Climate change in Tuvalu
Dr. Pramanik	11:30-12:10	▪ ICT in Disaster Management, resilience and recovery at APT activities ▪ Relation between other activities in this region. (ITU, SPC etc) ▪ Various Technical cooperation through USP, Success and challenges ▪ Need & benefit of a Regional Disaster Management Network. ▪ BIGDATA and its current status. Collection and protection of important data, benefits and challenges ▪ Introducing New form of Regional Network for data gathering and fruitful timely applications.
All participants	12:10-14:00	Discussions and Q & A, Closing and Lunch

5.6 Research at respective facilities and sites

(1) Solomon Islands: National Disaster Management Office, Meteorological Services Division; ,Telecommunications Commission of Solomon Islands, Solomon Islands Broadcasting corporation

(2) Vanuatu: Prime Minister's Office, Office of the Chief Information Officer (OGCIO), Vanuatu Meteorological and Geohazards Department(VMGD), Ministry of Climate Change and Natural Disasters; Telecom network service providers, Vanuatu Broadcasting corporation.

(3) Fiji: Ministry of Telecommunications, National Disaster management Office (NDMO), World Food Program office.

(4) Tuvalu: Ministry of Works Communications and Transport, Tuvalu Telecommunications Corporation.

(5) University of the South Pacific(USP); main campus in Fiji, and Honiara campus of Solomon Islands.

(6) Secretariat of Pacific Community (SPC) Geosciences Division, in Suva Fiji

NDMO Vanuatu Interview

Telecom Vanuatu CEO Interview

USP Honiara Campus Director Interview

NDMO Solomon Is Interview

A Few Interview location on the APT Publication Program
Research and Survey in Pacific Island Nations

5.7 Overview of profiles and ICTs in selected countries

Items	Solomon Is	Vanuatu	Fiji	Tuvalu	Remarks
Land Area (Sq Km)	28,900	12,190	18,270	26	
Water zone (Sq.km)	1610	3130	4430	6630	
No. of Islands	950 +	80 +	330	9	124 islets
GNI Par capita	1510	3130	4430	6630	
Recent Disasters	2014 Flash Flood	2015 TC PAM	2016 TC Winston	King tide Draught	TC= Tropical Cyclone
Fixed Telephones	8,500	5,700	74,700	1,500	
Mobile Phones	500,000	175,100	876,200	3,800	
Internet users	58,400	82,000	420,700	900	
Satellite (USPNet)	C & Ku	C & Ku	C & KU	C	
Satellite Data	Solomon Telekom	Telekom Vu TelsatBB	Telekom Fiji	Tuvalu Telecom	
O3b satellite	Planned	N/A	N/A	N/A	
Kacific BB	-	-	-	Planned	
Intelsat (IS)	In use	In use	In use	In use	
SES satellite(NSS)	In use	-	-	-	
Japan: JC-Sat (C. Ku band)	South Pacific Beam coverage available				
Fiber Cable	Planned	Operational	Operational	N/A	
HF Radio	Available	Available	Available	Available	Need more
TV Broadcast (state)	DTV planned	1	1	N/A	
TV Broadcast (Private)	Poor	2	1	N/A	
Satellite TV	Sky Pacific	Sky Pacific	Sky Pacific	Sky Pacific	
Radio BC (state)	1	2	2	1	Need more
Radio BC (Private)	exist	2	4	None	
Disaster communication	Inadequate	Inadequate	Inadequate	Inadequate	ETC in Emergency

Chapter 6
Proposal / Conceptual Guideline for ICT Utilization in Disaster Management in Islands Countries

6.1 ICT Systems and equipment for disaster management

The following items could be cited as effective utilization of ICT applications in disaster information transmission and management.

Measurement, data analysis	Information gathering and processing for METEO, Geohazards office, etc.	Meteorological Observation /Measurement systems	
		Sensor devices	
		Weather radar	
		Meteorological satellite HIMAWARI image reception	
		Monitoring camera image processing	Include drone camera
		Various systems for forecast or warning related to disaster	
		Information sharing among counties	
		Geographic Information system (GIS)	

Relay, transmission	Communication infrastructure for Telecom carrier, etc.	Optical fiber backbone network	
		Microwave link, VHF/UHF radio network	
		Satellite communication network	
		Optical submarine cable line	
		Mobile phone base station, Entrance link	
		HF Radiocommunication equipment	
		AM/FM Radio Broadcasting	
		Mid/Long range wireless LAN	

Communication systems for Government/ Administrations office	Information gathering, processing and delivery	Unified information management by national level administrator	
		Disaster related information sharing using J-ALART	J-ALART: National emergency information transmission system
		Disaster related information sharing using L-ALART	L-ALART: Regional disaster information transmission system
		Observed data sharing by unified river information system	
		Simultaneous transmission of disaster related information by CMS	
		Report/information provision from residents	
	Communication systems	Telephone/FAX/Mobile phone	
		Communication/information exchange via Internet	Include "cloud computing"
		Priority telephone links in disaster situation	A service by telecom company
		Municipal Disaster Management Radio Communication Network	City/Prefecture government
		Multi-channel access radio system (MCA)	"Trunk radio"
		Mobile radio communication apparatus (VHF/UHF)	
		Satellite link telephone	A service by telecom company
		Movable and Deployable ICT Resource Unit (MDRU) Container type/ Minivan type/ Briefcase type	Satellite linked Wi-Fi communication

		Portable satellite communication system	A service by telecom company
		Satellite communication network	National / local communication network system

Communication and Information dissemination/ announcement to public	Telephone, e-mail	Public telephone	
		Fixed-line phone	
		Mobile phone/cellular phone	
		SMS/Mail/Information delivery though cellular phone	
	Broadcasting	Terrestrial TV broadcasting (Analogue/Digital)	
		Satellite TV broadcasting	
		Cable Television	
		One Seg (segment) terrestrial digital TV broadcasting	
		AM/FM radio	
	Internet	Website (Center/Local government office)	
		Website (Broadcasting institution, news media, press)	
		Website (Others)	
		SNS (Facebook, Twitter, Instagram etc.)	
		Internet broadcasting	
		Location-based information delivery service	
	Other measures	Announcement Broadcast via Municipal Disaster Management Radio Communication Network	Speaker, siren
		Disaster emergency message board service by phone	A service by telecom company
		FAX message transmission	
		Word-of-mouth news spreading	
		Electronic bulletin/sign board	
		A loudspeaker car	

6.2 Conceptual guideline for ICT utilization in island countries

In Island nations many of the islands are separated by hundreds of kilometers and therefore, it is very difficult or nearly impossible to pull fiber optic cables or install long distance microwave communication networks. Also it is not wise to build big structure parabola antenna due to possible damage by tropical cyclones. At the same time, it is very difficult to ship larger antenna structures to islands where logistics is a chronic challenge. Moreover the islands are sparsely populated causing very low cost merit for businesses results in reluctance in investment.
Here are a few points that could be considered while considering ICT utilization of island countries.

(1) While introducing or considering ICT system it is necessary to consider (a) functionality (such as data processing, transmission, information delivery, or specific measurements for data collection) is required to strengthen specific sector or industry; (b) selection of type of communication system (such as satellite, mobile phones/ devices, Internet access, broadcasting system). While selecting any of these system or equipment, consideration must be given that they should be simple, easily operable, cost effective, and of high reliability.

(2) Mobile phones are well penetrated into many remote areas and thus could be used where more and more resiliency is desirable.

(3) It is required that the newly introduced equipment be used in their day to day activities, otherwise it may not be useful at all during any emergency.

(4) The system must be beneficial to people directly at all times. In order to achieve the benefit of observation & monitoring system facilities at its best, the designated officials should be trained to avoid personal errors and differences.

(5) There exist a number of data items collected through various sources but unfortunately they ate limited within a certain level of experts and officials and intimately not much used for public safety mechanisms. There is a need to consolidate all the information and need for a mechanism or network to send to the designated area for effective means of public safety.

(6) There is a need to inform the public with exact 2dimentional information of location of cyclones or earthquakes as and when so occurs. This could be done on mobile phones as well as voice information through radio broadcasting mechanisms. There is need to improve / introduce such networks and facilities for the befit of people especially live in remote locations and small islands.

(7) There is an acute need for effective manpower development. It is necessary to train staff for newly introduced system or equipment without which it will be almost impossible to cope with emergency and disasters.

(8) Apply variety of knowhow from showcases etc.: There exist a number of knowledge and knowhow developed through a number of instances in the past which must be applied and used while considering any new initiative.

In order to achieve maximum out of any initiative, it is recommended to refer this survey report and consult experienced organizations to find optimum solutions.

6.3 Considerations, introduction and utilization of disaster management ICT system

Basic considerations of disaster management ICT system	Considerations, introduction and utilization of disaster management ICT system
Measurement. Analysis (equipment, sensor, camera etc.)	(Items should be avoided) Maintenance: Lack of adequate regular maintenance Analysis became the purpose of data collection. The analysis results are not utilized. Data is not provided to external users. In other words, equipment for measurements and analysis are left aside after installation.
Creation of outgoing information system for decision making (Information processing equipment, PC and others)	(Items should be avoided) Daily maintenance is not in effect. This step could be an automatically process. It is not known whether the data and the results are utilized as a prediction or attention for alarm information, responsibility. It is uncertain that if there is procedure to transmit the disaster related information to responsible agencies in an organized manner. Communication channel and staffing deficiencies. Regular drill is not in effect.
Information transmission (Transmission line, and equipment	(Items should be avoided) No daily tests or maintenance is noticeable. No noticeable means for transmitting information to another location, communication speed is slow, vulnerable to disasters.
Information delivery, mode of contact (related institutions and residents)	(Items should be avoided) No daily tests or maintenance is noticeable. Inadequate communication tools, no tangible transmission style. Residents are not regularly advised or alerted. Not enough training or drill.
Standard means of communication. Mobile phone, e-mail, and Internet	Communication tools are widely owned by residents noticed. They are familiar with the daily use the tools. Those tools are open a communication means, and very effective in the event of an emergency. Relatively weak to disaster situation like cyclone, endurance in disaster mitigation is essential. MDRU is very effective in mobile phone and emergency restoration measures to ensure Internet and communication.

6.4 Basic selection criteria of effective disaster management communication equipment and system in the island countries

Reason for selection: System should be simple, operation must be easy.

(1) Must be friendly to small organization with limited number of staff, routine maintenance should be easy. Even non ICT professionals should be able to handle basic operations.

(2) The system should be maintainable without any complicated organizational structure or social tradition. On the other hand, it should not have wider variety of stakeholders.

(3) The system should be useable at day to day activities.

(4) The facilities should be relatively inexpensive, efficient and with good performance. Further, it should not include excessive complicated for day to day use.

(5) Repairing at should be easy. In addition, , spare equipment should be secured to do the replacement at site.

(6) Unless otherwise necessary, the fixed installation should be avoided. It is better to deploy portable system/equipment for quick deployment in the event of a disaster.

(7) Power must be made available at emergency needs. (Solar power better be considered as primary power)

Chapter 7
Conclusions and Recommendations

Digital technological applications are transforming the business, work, and lifestyle. The technological advancement leading the economy and society to be more productive.
But the technology needs to be complemented by improvements in areas that can make effective beneficiary of new digital tools. In near future, technology investments will produce considerable digital dividends, and these dividends will be widely shared among all nations and stakeholders.
There is a need for follow-up consultations to identify individual need for Disaster management ICT and capacity building in the region. The development of Pacific friendly training materials, presentation materials are needed.

During this survey information obtained from publications, individual visits and observations, interviewing high officials, industry executives, from meetings and discussions with officials related to ICT and disaster management of respective countries and representatives from resident international organizations.
Workshops titled "ICT in disaster management, Resilience and Recovery for Public Safety" was organized and conducted in Solomon Is, Vanuatu and Fiji. Senior Govt. official from Tuvalu was invited to speak and attend the workshop. The team obtained important information from the visiting official as well as from the High Commissioner of Tuvalu accredited to Fiji.

7.1 Issues and challenges

The following notable Issues & Challenges apparently slowing down further developments.
- Poor Connectivity, and Low bandwidth hinders development and disaster related issues.
- During TC the copper wire network for landline phones affects with sea water, thereby limiting the speed of activities or improvement in all sectors.
- During emergency situations, satellite phones are provided by International Organizations but after a designated period the service is discontinued keeping the people in jeopardy. More tangible communication mode is to be considered for continued service.
- In many cases, market is very small to support and sustain investment in the communication sector.
- Commercial satellite phones are very expensive to operate in smaller economy.
- PSTN network and Domestic network to smaller outer islands need improvement.
- To improve communication system it is necessary to use available and economic satellite services in the region.
- Reliable telecommunications with outer islands for weather and climate information.
- Nationwide radio broadcast service necessary to improve disaster management and public safety.
- Inter island communications on a country should be improved to send warnings and receive observations.
- Provide training for the personnel related to climate change and disaster risk management.

The ETC is focused on preparedness activities under its Pacific Emergency Preparedness and Response (EPR) project, lead by WFP according to information received from the Authorities. In case of disaster ETC responded upon the request of Govt with services and ICT coordination assistance. The ETC provided communications for operation in the country concerned. The ETC conclude its ICT assistance three months when the affected society is usually left with uncertainty no better than before.

7.2 Survey results and recommendations

(1) Needless to say that due to global environment changes, natural disasters of the island countries is expected to increase in future. Through this survey it was revealed that the island nations could face increasingly serious crisis by natural disasters and environmental change.

(2) As discussions have been going on in various international conferences, it is desirable to continue efforts and assistance to help in the effective disaster prevention and mitigation.

(3) Actual situation obtained in this field survey may not necessarily match with the available published general information on ICT in disaster management. In reality the ICT status is more vulnerable, and services do not reach the local islands residents when they desperately need it.

(4) During this survey, the team encountered the strongest ever Tropical Cyclone Winston (Feb 2016) forced the team to suspend and reschedule all activities for 6 months, experiencing the disaster destruction and mitigation complexity physically on the ground. From each country, natural disasters were physically experienced. Acute needs and expectations of the use of ICT was expressed by each Govt and enterprises.

(5) In case of deployment of ICT equipment in small nations and Island states, it is necessary to establish the administrative system, organizational structure of disaster management, disaster prevention, information transmission system, and personnel allocation when needed. The overall system development is essential but the fact is that, in most cases human capacity in the island countries are inadequate which causes things challenging thereby needs more human resources development projects.

(6) It is desirable and necessary that the deployed equipment be utilized effectively as much as possible to get maximum output from the assets and assistance.

(7) During this survey, it did not lead to specific items and need for the equipment and systems.

(8) It is necessary to narrow down up to specific items needed in each country to identify details of requirements in the remote islands and villages.

(9) In future, if there is further investigation opportunity, more specific solution strategies and solutions could be proposed to enhance peoples safety in disaster situation.

(10) As stated in Chapter 4, cases studies projects and best practices research results are useful, but it is appropriate to select specific conditions and localized system to tackle disaster events which are very different from country to country, location to location.

(11) Sustainability is not necessarily an issue with emergency assistance and supplies. More user friendly and economic ICT system is needed to assist the small nations on natural hazard that hit the area almost every year.

(12) To resolve regional issues, cooperation and assistance from the public donors, international agencies required to help the private sector of island nations is greatly appreciable.

Editorial

During the present survey and study, cooperation from the governments and organizations was extremely friendly and useful which leads to the successful implementation of Workshops and conducting interviews leading to the success of the mission.
From each country, natural disasters were physically experienced. There are acute needs and greater expectations of the use of ICT systems expressed by each Govt and enterprises.
These expectations and needs should be shared within APT and member countries, and between the affiliated members which will lead to better understanding and international cooperation.
This survey which is the first of the efforts of this kind by APT could lead to an opportunity to resolve issues of the island nations. There are many intricate matters and confidential information that can be taken up in a different form.
To realize this it will be very important that we work continuously and seamlessly.

TC PAM Destroyed Telecom Tower in Vanuatu

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18. Govt of Vanuatu ; Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030
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Attachment-1

Reference Documents

Reference Documents

		Title / Content	URL	Source	File	KB
		(In English)				
	E01	Telecommunications and Information Working Group /APEC	http://www.apec.org/Groups/SOM-Steering-Committee-on-Economic-and-Technical-Cooperation/Working-Groups/Telecommunications-and-Information.aspx	Ministry of Foreign Affairs/Japan	URL	-
	E02	White Paper /Disaster Management in Japan 2015	http://www.bousai.go.jp/kaigirep/hakusho/pdf/WPDM2015_Summary.pdf	Cabinet Office/Japan	pdf	7838
	E03	Sendai Framework for Disaster Risk Reduction 2015-2030 /Third UN World Conference on DRR	(Flamework)http://www.mofa.go.jp/files/000071589.pdf	Ministry of Foreign Affairs/Japan	pdf	424
	E04	Sendai Declaration/Third UN World Conference on DRR	(Declaration)http://www.mofa.go.jp/files/000071587.pdf	Ministry of Foreign Affairs/Japan	pdf	75
	E05	Disaster Management Plan/Japan	http://www.bousai.go.jp/taisaku/keikaku/english/disaster_management_plan.html	Cabinet Office/Japan	URL	-
	E06	Oceania Countries Data /Countries & Regions	http://www.mofa.go.jp/region/asia-paci/index2.html	Ministry of Foreign Affairs/Japan	URL	-
	E07	The Seventh Pacific Islands Leaders Meeting (PALM7) Leaders' Declaration - Fukushima Iwaki Declaration - "Building Prosperous Future Together"	http://www.mofa.go.jp/a_o/ocn/page4e_000261.html	Ministry of Foreign Affairs/Japan	URL	-
	E08	Japan Hands Over New Equipment to the Vanuatu Meteorology and Geohazards Department /JICA	http://www.fj.emb-japan.go.jp/files/000166482.pdf	JICA	pdf	354
	E09	During the Handing Over of Meteorological Equipment to Vanuatu / Embassy of Japan Fiji	http://www.fj.emb-japan.go.jp/files/000166484.pdf	Embassy of Japan Fiji	pdf	86
1	E10	The Booklet of Best Practices of Resilient ICT systems in JAPAN	http://www.soumu.go.jp/main_content/000372211.pdf	MIC, CTI Engineering	pdf	22718
1	E11	The Booklet of Best Practices of Resilient ICT systems in the Philippines	http://www.soumu.go.jp/main_content/000372209.pdf	MIC, CTI Engineering	pdf	3360
	E12	Result Report on MDRU Joint Project	http://www.soumu.go.jp/main_content/000428538.pdf	ITU/MIC/DOST	pdf	1536
	E13	MIC's International Cooperation in the field of ICT for Disaster Management		MIC Japan	pdf	3183
	E14	Japan MIC's International Cooperation in the field of ICT for Disaster Management		Masashi Nakagawa/MIC Japan	pdf	3308
	E15	WHITE PAPER 2015 / Chapter8 ICT Policy Directions	http://www.soumu.go.jp/johotsusintokei/whitepaper/eng/WP2015/chapter-8.pdf	MIC Japan	pdf	2398
	E16	Japan's International Contribution in the Field of ICT for Disaster Risk Reduction	http://www.soumu.go.jp/main_content/000391490.pdf	Yasuo Sakamoto/MIC Japan	pdf	1632

	E17	ICT AND DISASTER RISK REDUCTION /ESCAP		ESCAP/ICT and Disaster Risk Reduction Division	pdf	1365
	E18	Coping with natural disasters in the Pacific // MPFD POLICY BRIEFS No. 35	http://www.unescap.org/sites/default/files/MPFD%20Policy%20Brief-Pacific-Natural-disasters.pdf	ESCAP	pdf	701
	E19	ESCAP-Japan partnership to strengthen disaster early warning systems in Pacific	http://www.unescap.org/news/escap-japan-partnership-strengthen-disaster-early-warning-systems-pacific	ESCAP	docx	52
	E20	UN ESCAP Session 72 Support Pacific SDG		ESCAP	pdf	257
	E21	CONNECTIVITY FOR PACIFIC ISLANDS/ITU	https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/June-Pacific-Ministerial-Meeting/ITU.pdf	Dr. Cosmas ZAVAZAVA/ITU	pdf	1615
	E22	Asia-Pacific Regional Development Forum 2016 (RDF2016)	http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2016/May-RDF2016/home.aspx	ITU	docx	489
	E23	ICT Facts & Figures 2015/ITU	https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf		pdf	177
	E24	2015 YEAR BOOK OF STATISTICS/ITU		ITU	pdf	6223
	E25	ITU Interactive Transmission Map	http://www.itu.int/en/ITU-D/Technology/Documents/InteractiveTransmissionMaps/Misc/Flyer_MAPS_FINAL.pdf	ITU	pptx	553
	E26	Addressing Connectivity for the Sustainable Development of SIDS	https://sustainabledevelopment.un.org/partnership/?p=8032	UN	docx	23
	E27	World Risk Report 2014	https://i.unu.edu/media/ehs.unu.edu/news/4070/11895.pdf	UNU-EHS	pdf	7611
	E28	The Coastal Community Adaptation Project (C-CAP)	https://www.climatelinks.org/file/604/download?token=7YKrXxDa	USAID	pdf	399
1	E29	Learning from Megadisasters / Lessons from the Great East Japan Earthquake	https://openknowledge.worldbank.org/bitstream/handle/10986/18864/9781464801532.pdf?sequence=1	Federica Ranghieri and Mikio Ishiwatari, editors The World Bank	pdf	10670
	E30	The World Bank Data /Internet Users	http://data.worldbank.org/indicator/IT.NET.USER.P2?cid=GPD_44&end=2014&page=6&start=1990&view=chart	World Bank	URL	-
	E31	CONNECTING THE LAST MILE THE ROLE OF COMMUNICATIONS IN THE GREAT EAST JAPAN EARTHQUAKE	https://www.internews.org/sites/default/files/resources/InternewsEurope_Report_Japan_Connecting_the_last_mile_Japan_2013.pdf	Internews	pdf	
	E32	Internet Users Worldeide by Region	http://www.internetlivestats.com/internet-users/#byregion	World Wide Web Foundation	URL	-

E33	JTEC, Japan Complexity in Disaster Management in the Pacific Island Nations //～Recommendations for Multi-hazard Risk Reduction with Common ICT Platform～		APT WDMC-6 Dr. Kader Hiroshi Pramanik	pdf	4188
E34	JTEC Challenges with ICT in disaster management and need of innovative resilient infrastructure for Disaster Risk Reduction	http://www.jtec.or.jp/file.php?id=598	APT WDMC-7 Dr. Kader Hiroshi Pramanik	pdf	3886
E35	9th APT POLICY AND REGULATION FORUM FOR PACIFIC (PRFP-9) //TENTATIVE PROGRAMME	http://www.pita.org.fj/_resources/files/APT-PRFP9_Tentative_Programme.pdf	APT	pdf	644
E36	Disaster Trends Database / CRED	http://www.emdat.be/disaster_trends/index.html	CRED	URL	-
E37	The Human Cost of Natural Disasters 2015/CRED	http://reliefweb.int/sites/reliefweb.int/files/resources/PAND_report.pdf	CRED, UN	pdf	6458
E38	Fiji Tropical Cyclone Winston - ETC Report	http://reliefweb.int/sites/reliefweb.int/files/resources/Fiji%20Cyclone%20Winston%20-%20ETC%20SitRep%20%233.pdf	EMERGENCY TELECOMMUNICATIONS CLUSTER(ETC)	pdf	401
E39	Global Assessment Report on Disaster Risk Reduction 2015	http://www.preventionweb.net/english/hyogo/gar/2015/en/home/data.php?iso=JPN	UNISDR	URL	-
E40	CLIMATE CHANGE MATTERS/SPREP	http://reliefweb.int/sites/reliefweb.int/files/resources/CCM-Nov-2015.pdf	SPREP	pdf	2031
E41	Role of Communication Systems - Great East Japan Earthquake		ITU-AJ	pdf	4017
E42	ICT recovery and restoration - Great East Japan Earthquake		ITU-AJ	pdf	1885
E43	The Role of Social Media in Emergency Response: The Case of the Great East Japan Earthquake	http://www.nids.go.jp/english/publication/kiyo/pdf/2014/bulletin_e2014_6.pdf	NIDS Journal of Defense and Security	pdf	121
E44	Strategy for Climate and Disaster Resilient Development in the Pacific	http://www.pacificdisaster.net/dox/1Main_SRDP_rev10v1_140814_Clean.pdf	SRDP	pdf	1375
E45	MESSAGE FROM THE PRESIDENT OF PITA	http://www.pita.org.fj/_resources/files/Message%20from%20IVAN(2)-.pdf	PITA	pdf	231
E46	Outcome of the Pacific ICT Ministerial Meeting	https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/August-RDF2015/Session-3/S3_Paula_MaU.pdf	Paula P. Ma'u/CEO, MIC, Tonga	pdf	289
E47	Event Wrap: PITA 20th AGM, Tahiti	https://blog.apnic.net/2016/05/06/event-wrap-pita-20th-agm-tahiti/	Robbie Mitchell	docx	68
E48	National ICT Policy: Knowledge-based Report ICB4PAC	https://www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/ICB4PAC/Documents/FINAL%20DOCUMENTS/national_ICT_policy.pdf	ICB4PAC/ITU-D	pdf	3294
E49	Pacific Possible Long-Term Opportunities and Challenges for Small Pacific Island Countries	http://pubdocs.worldbank.org/en/653801446538606596/Pacific-Possible-v0-16-for-circulation.pdf	World Bank	pdf	1016

	E50	Digital islands: how the Pacific's ICT revolution is transforming the region	http://www.lowyinstitute.org/publications/digital-islands-how-pacifics-ict-revolution-transforming-region	Lowy Institute for International Policy	docx	159
	E51	Climate change and health in Pacific island states/WHO	http://www.who.int/bulletin/volumes/93/12/15-166199/en/	WHO	docx	22
1	E52	ICT in the Pacific Islands: A "landscape" document for Pacific Leaders			docx	4144
	E53	HIRI DECLARATION "STRENGTHENING CONNECTIONS TO ENHANCE PACIFIC REGIONALISM"	http://www.fijitimes.com/story.aspx?id=321391		docx	61
	E54	SUVA DECLARATION ON CLIMATE CHANGE	http://pacificidf.org/wp-content/uploads/2013/06/PACIFIC-ISLAND-DEVELOPMENT-FORUM-SUVA-DECLARATION-ON-CLIMATE-CHANGE.v2.pdf	PACIFIC ISLAND DEVELOPMENT FORUM SECRETARIAT	pdf	309
	E55	FORTY-SEVENTH PACIFIC ISLANDS FORUM	http://www.forumsec.org/resources/uploads/embeds/file/2016_Forum_Communique_11sept.pdf	PIF	pdf	299
	E56	FORTY-SIXTH PACIFIC ISLANDS FORUM	https://sustainabledevelopment.un.org/content/documents/commitments/9139_7996_commitment_Attachment%202%20-%202015-Forum-Communique.pdf	PIF	pdf	77
	E57	Pacific Islands Forum Leaders Declaration on Climate Change Action	http://www.forumsec.org/resources/uploads/attachments/documents/Annex1_PIF_Leaders_Declaration_on_Climate_Change_Action,%2010Sept2015.pdf	PIF	docx	47
	E58	ITU Asia Pacific Regional Development Forum 2016	http://www.pita.org.fj/_resources/files/PITA%20presentation%20for%20ITU%20Reg%20Dev%20meeting%20S7%20v2%20C.pdf	Mr. Sione Veikoso, PITA PRESIDENT	pdf	2210
	E59	Digital Strategy Dev Summit Manila 2016		Mr. Sione Veikoso, PITA PRESIDENT	pdf	1079
	E60	Agenda and Program details(6)_PITA 20th AGM		PITA	pdf	561
	E61	PITA reiterates special needs at ITU Regional Development Forum		PITA	docx	318
	E62	PITA by DigitalWatch//Pacific Islands Telecommunications Association		PITA	pdf	29
	E63	Disaster Risk Reduction and Disaster Management in the Pacific	http://www.adrc.asia/events/Pacific/Presentation/7.%20SOPAC_Presentation.pdf	SOPAC	pdf	5642
	E64	Snapshots 87 DISASTER REDUCTION PROGRAMME	http://reliefweb.int/sites/reliefweb.int/files/resources/SPC_2015_Snapshots_87.pdf	SPC	pdf	1203
	E65	Mapping Village Damage Using Space Borne Image Data	http://star.gsd.spc.int/meeting_docs/presentations/Session3-8_Winston%20Damage%20Assmnt_ForsteuterW.pdf	SPC	pptx	10979

E66	Information Brochure SPC-GIS RS Unit		SPC	pdf	3455
E67	Pacific Community (SPC) Assistance to Fiji for TC Winston		SPC	pdf	534
E68	NATIONAL DISASTER COUNCIL CHAPTER 148 /Solomon	http://www.ifrc.org/Docs/idrl/360EN.pdf	IFRC	pdf	7468
E69	SOLOMON ISLANDS //Rapid Assessment of the Macro and Sectoral Impacts of Flash Floods in the Solomon Islands, April 2014	https://www.gfdrr.org/sites/gfdrr/files/Solomon%20RAI%20Flood%20.pdf	Government of Solomon Islands	pdf	2480
E70	SOLOMON ISLANDS Initial national communications	http://unfccc.int/resource/docs/natc/slbnc1.pdf	UNFCCC	pdf	2170
E71	National Disaster Risk Management Plan, 2010	http://reliefweb.int/sites/reliefweb.int/files/resources/Solomon%20Is_National%20Disaster%20Risk%20Management%20Plan_2010.pdf	SOLOMON ISLANDS GOVERNMENT	pdf	2053
E72	National Disaster Risk Management Plan	http://www.preventionweb.net/files/22085_14656ndrmpsolomonsfinaliseddraftff2.pdf	SOLOMON ISLANDS GOVERNMENT	pdf	1716
E73	NATIONAL REPORT - Disaster Management	http://www.adrc.asia/events/Pacific/Presentation/5.%20Solomon%20Presentation.pdf	NDMO, Solomon Islands	pdf	1261
E74	NDMO Corporate Plan 2010-2015 with 2010 Work Plan	http://www.pacificdisaster.net/pdnadmin/data/original/SLB_20101204_NDMO_Corporateplan_draftv6.pdf	Ministry of Home Affairs Solomon ISLANDS	pdf	1085
E75	NATIONAL CLIMATE CHANGE POLICY 2012-2017	http://www.gcca.eu/sites/default/files/catherine.paul/si_climate_change_policy.pdf	MECDM	pdf	909
E76	Country Profile: Solomon Islands /GFDRR	https://www.gfdrr.org/sites/gfdrr/files/region/SB.pdf	GFDRR	pdf	646
E77	SOLOMON ISLAND //Economic development documents-medium term development plan, 2016-20	https://www.imf.org/external/pubs/ft/scr/2016/cr1691.pdf	IMF	pptx	516
E78	e-Government in the Pacific Island states: ICT policy and implementation in small island developing states	http://pippr.victoria.ac.nz/bitstream/handle/123456789/30/Cullen%20&%20Hassall%20-%20Vanuatu%20eGovernment%20Report.pdf?sequence=1	Rowena Cullen./Graham Hassall	pdf	516
E79	Solomon Islands DRM issues & Plans to address them	http://www.pacificdisaster.net/pdnadmin/data/original/3_pdrmpn_nadi_2_02_SLB_NDMO.pdf	Loti Yates/NDMO, Solomon Islands	pdf	229
E80	The Solomon Islands Climate Assistance Programme		GCCA	pdf	151
E81	DISASTER COMMUNICATIONS IN SOLOMON ISLANDS	https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/Thailand_2006/final1/Session%203/SESSION%203%20[Solomon%20Islands]%20Country%20Paper.pdf	Rex Manilofia	pdf	72
E82	Fiji - Tropical Cyclone Winston - Lessons Learnt Summary 2016			pdf	536

E83	Issues and challenges with ICT in Disaster management and Climate Change in Tuvalu		Tauala Katea /Tuvalu Meteorological Service	ppt	21408
E84	How has ICT contributed to Vanuatu being resilient prior, during and after Pam?	http://dailypost.vu/news/how-has-ict-contributed-to-vanuatu-being-resilient-prior-during/article_5ae3f53e-a620-58c7-8af8-b6c2f6972153.html	VANUATU Daily Post	docx	45
E85	VMGD Strategic Plan 2013-2023 /VANUATU METEOROLOGY AND GEO-HAZARDS DEPARTMENT		VMGD/VANUATU	pdf	2336
E86	VANUATU NATIONAL CYCLONE SUPPORT PLAN //REVIEW 2015-2016		GOVERNMENT OF THE REPUBLIC OF VANUATU	pdf	1924
E87	Tropical Cyclone Pam Lessons Learned Workshop Report /Vanuatu	http://reliefweb.int/sites/reliefweb.int/files/resources/tc_pam_lessons_learned_report_final_170316.pdf	Pacific Community	pdf	1731
E88	Satellite Telecommunication For Disaster Recovery Demand Survey in Pacific Islands		JTEC、SKY Perfect JSAT	ppt	5143
E90	A global partner supporting development of ICT infrastructure and business in developing Nations		Kenji Saga/JTEC	ppt	1638
E91	Survey and Study to enhance the Vanuatu's proposal for ICT Development Program for Supporting ICT Pilot Projects on Disaster Management & Communication in Rural Areas of Vanuatu.		John Jack/OGCIO Dr.Kader Hiroshi Pramanik/JTEC	pdf	690
E92	How APT EBC-J projects are useful to small nations with advanced ICT networks and services		Dr. Kader Hiroshi Pramanik/JTEC	pdf	389
E93	Disaster Management, Developing Country Communities & Climate Change: The Role of ICTs	http://www.niccd.org/sites/default/files/YapDisasterManagementDevelopmentICTs.pdf	NONITA T. YAP University of Guelph, Canada	pdf	945
	(In Japanese)				
J01	仙台防災枠組20152015-20302030(骨子)	http://www.gender.go.jp/policy/saigai/pdf/sendai_framework_relation.pdfhttp://www.mofa.go.jp/mofaj/files/000071588.pdf	外務省	pdf	213
J02	仙台宣言（仮訳）	http://www.mofa.go.jp/mofaj/files/000071586.pdf	外務省	pdf	104
J03	2015年度版 開発協力白書//「日本の開発協力の具体的取組」	http://www.mofa.go.jp/mofaj/gaiko/oda/files/000137909.pdf	外務省	pdf	3128
J04	日本と太平洋島嶼国のパートナーシップ：太平洋・島サミットプロセスを通じた更なる協力強化に向けて		外務省アジア大洋州局大洋州課	pdf	1161
J05	PALM 7 日本の支援策	http://www.mofa.go.jp/mofaj/files/000082533.pdf	外務省	pdf	216
J06	ODA白書2015_大洋州	http://www.mofa.go.jp/mofaj/gaiko/oda/files/000137920.pdf	外務省	pdf	1770

	J07	ODA大洋州データブック2015	http://www.mofa.go.jp/mofaj/gaiko/oda/files/000142137.pdf	外務省	pdf	423
	J08	ODA白書2015_防災協力の実際		外務省	pdf	467
	J09	太平洋の島国	http://www.mofa.go.jp/mofaj/files/000068988.pdf	外務省資料を引用して作成	pptx	654
	J10	対フィジー共和国 事業展開計画	http://www.mofa.go.jp/mofaj/gaiko/oda/files/000072641.pdf	外務省	pdf	269
1	J11	日本の災害対策	http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf	内閣府	pdf	31851
	J12	自然災害リスクの特殊性とそのリスクマネジメントの困難性：企業の自然災害リスクマネジメントに関するサーベイ	http://www.esri.go.jp/jp/archive/e_dis/e_dis199/e_dis199a.pdf	田中賢治/内閣府経済社会総合研究所	pdf	1193
	J13	自然災害等への対応の取り組み事例	http://www.cas.go.jp/jp/seisaku/resilience/dai1/sankou.pdf	内閣府	pdf	9124
	J14	ICT国際競争力強化・国際展開イニシアティブ		総務省	pdf	10556
	J15	総務省ミッションとアプローチ2015 ―重点施策集―	http://www.soumu.go.jp/main_content/000314814.pdf	総務省	pdf	8301
	J16	ICT成長戦略～ICTによる経済成長と国際社会への貢献～	http://www.japan-cloud.org/consortium/pdf/GM6/gm06_lecture_02.pdf	中村裕治/情報通信国際戦略局 情報通信政策課	pdf	6554
	J17	総務省における情報セキュリティに関する取組について	https://www.jaipa.or.jp/event/oki_ict2013/sec_soumu_murakami130628.pdf	村上聡/情報流通行政局 情報流通振興課 情報ｾｷｭﾘﾃｨ対策室 調査官	pdf	5640
	J18	総務省における情報通信政策とイノベーション創出に向けた取組	http://www.human-media.or.jp/upload/55bf2446933a4.pdf	篠澤康夫/情報通信国際戦略局技術政策課 課長補佐	pdf	5344
	J19	地域情報通信振興関連施策集	http://www.soumu.go.jp/main_content/000349789.pdf	地域とともにあゆむ総合通信局・沖縄総合通信事務所	pdf	4347
	J20	ICT国際展開・国際政策	http://www.soumu.go.jp/main_content/000329459.pdf	情報通信国際戦略局	pdf	3595
	J21	質の高いインフラを実現する日本のICT	http://www.soumu.go.jp/main_content/000391860.pdf	総務省	pdf	2405
	J22	インテリジェント化が加速するICTの未来像に関する研究会	http://www.soumu.go.jp/main_content/000363712.pdf	総務省	pdf	2000
	J23	ICT国際展開	http://www.tronshow.org/2015/ja/data/20141211-04-02.pdf	阪本泰男/総務省情報通信国際戦略局長	pdf	1887
1	J23	防災・減災等に資するICTサービス事例集	http://www.soumu.go.jp/main_content/000203203.pdf	総務省	pdf	11163
	J24	災害医療・救護活動において確保されるべき非常用通信手段に関するガイドライン	http://www.soumu.go.jp/main_content/000427274.pdf	総務省	pdf	3536
	J25	震災復興と情報通信技術		谷脇康彦/総務省大臣官房審議官	pdf	7594
	J26	IoTの衝撃と総務省の取組	https://www.iajapan.org/iot/event/2016/pdf/3_02_yoshida.pdf	吉田正彦/総務省総合通信基盤局電気通信事業部 データ通信課長	pdf	5581
	J27	新たな情報通信技術戦略とIoT	http://kiai.gr.jp/jigyou/h27/PDF/1109p1.pdf	山口修治/総務省情報通信国際戦略局通信規格課	pdf	5102

	J28	スマート・ジャパンICT戦略	http://www.soumu.go.jp/main_content/000296880.pdf	総務省	pdf	4958
	J29	東日本大震災等を踏まえた取組と防災ＩＣＴの今後の展開	http://www.cic-infonet.jp/section/activity/pdf/120528_1.pdf	総務省総合通信基盤局	pdf	3976
	J30	我が国の防災ICT分野の国際展開		総務省情報通信国際戦略局 国際協力課	pdf	3517
	J31	防災・減災に関するICT分野の最近の主な取組について	http://www.kantei.go.jp/jp/singi/it2/senmon_bunka/bousai/dai4/siryou3.pdf	総務省	pdf	2353
	J32	平成23年版 情報通信白書 //「東日本大震災における情報通信の状況」	http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h23/pdf/n0010000.pdf	総務省	pdf	1850
	J33	東日本大震災に関する緊急アンケート調査の結果（通信機器メーカーからの提言）	http://www.soumu.go.jp/main_content/000115352.pdf	総務省	pdf	239
1	J34	東日本大震災後の情報通信への取り組み	http://www.riec.tohoku.ac.jp/sympo201106/pdf/2-2_izawa.pdf	井澤一朗/総務省東北総合通信局長	pdf	869
	J35	平成24年版 情報通信白書 //「国際戦略の推進」	http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h24/pdf/n5070000.pdf	総務省	pdf	685
	J36	平成27年版 情報通信白書（抜粋)第1部 ICTの進化を振り返る		総務省	docx	490
1	J37	防災ICTシステム及びサービスの日本におけるベストプラクティス集	http://www.soumu.go.jp/main_content/000372210.pdf	総務省/㈱建設技術研究所、㈱建設技研ｲﾝﾀｰﾅｼｮﾅﾙ	pdf	25524
	J38	防災ICTシステム及びサービスのフィリピン共和国におけるベストプラクティス集	http://www.soumu.go.jp/main_content/000372208.pdf	総務省/㈱建設技術研究所、㈱建設技研ｲﾝﾀｰﾅｼｮﾅﾙ	pdf	3500
	J39	ITUジャーナル Vol.46 No.4(2016,4)「情報通信の開発指標を考える国際シンポジウム（WTIS-15）」の結果について	https://www.ituaj.jp/wp-content/uploads/2016/03/2016_04-01-topicsWTIS.pdf	中島睦晴,石田泳志,尾﨑敦子,岩井優介/総務省情報通信国際戦略局国際政策課	pdf	1425
	J40	アジア・太平洋電気通信共同体（APT） 第6回災害／通信管理会合（WDMC-6）の結果について	https://www.ituaj.jp/wp-content/uploads/2015/10/2015_11-14-kaiAPT.pdf	総務省　情報通信国際戦略局 国際協力課	pdf	1178
	J41	国土交通省の防災技術の国際展開	https://bosaijapan.jp/shiryou/kokutai2016/JBP/5_okadaa.pdf	総務省　情報通信国際戦略局 国際協力課	pdf	1527
	J42	9世界に先駆けた次世代インフラの整備//10人類のフロンティアの開拓及び国家安全保障・基幹技術の強化//11東日本大震災からの早期の復興再生	http://www.mext.go.jp/component/b_menu/other/__icsFiles/afieldfile/2015/01/21/1354607_6.pdf	文部科学省	pdf	4344
	J43	防災ICTの国際展開資料（各省庁等）			docx	18
	J44	仙台市ICT利活用方針 2016-2020(中間案)		仙台市	pdf	1708
	J45	いわてICT利活用推進プランの概要	https://www.pref.iwate.jp/dbps_data/_material_/_files/000/000/007/042/iwate_ictplan_gaiyou.pdf	岩手県	pdf	150
	J46	ICT利活用事例集（Ver10.0）	http://www.applic.or.jp/infra/2015/ICTjireishu_Ver10.pdf	一般財団法人全国地域情報化推進協会	pdf	9725
	J47	離島におけるICT利活用促進に関する調査（途中経過報告資料）	http://ok-islands-ict.net/2014/files/141117/141117_06.pdf	都市科学政策研究所・野村総合研究所	pdf	5573

	J48	「離島におけるICT利活用促進に関する調査」自治体等における防災・災害関連のICT利活用事業事例集	http://ok-islands-ict.net/2014/files/141117/141117_06_ex.pdf	都市科学政策研究所・野村総合研究所	pdf	4605
	J49	防災・減災とICT	http://www.cas.go.jp/jp/seisaku/resilience/dai2/siryou2.pdf	坂村健/東京大学情報学環ﾕﾋﾞｷﾀｽ情報基盤ｾﾝﾀｰ長	pdf	3026
	J50	自然災害にどう立ち向かう？ICTを活用した防災・減災技術	https://bosaijapan.jp/shiryou/kokutai2016/JBP/2_nakamura.pdf	JBP防災ICT技術ｸﾞﾙｰﾌﾟ（NTTﾃﾞｰﾀ,NEC,富士通,日立製作所） 共同発表	pdf	3114
	J51	防災技術の海外展開に向けた日本の強み	https://bosaijapan.jp/shiryou/kokutai2016/JBP/1_kinehara.pdf	木根原良樹/JBP,MRI	pdf	2611
	J52	空間情報を活用した防災技術	https://bosaijapan.jp/shiryou/kokutai2016/JBP/3_shimamura.pdf	島村秀樹/空間情報技術G(アジア航測,国際航業,パスコ,RESTEC)共同発表	pdf	1833
	J53	フィリピンの台風被災地において「移動式ICTユニット」を活用した国連プロジェクトを開始	http://www.ntt.co.jp/news2014/1412/141225a.html	日本電信電話㈱/NTTｺﾐｭﾆｹｰｼｮﾝｽﾞ㈱	docx	287
	J54	移動式ＩＣＴユニットに関するＩＴＵとの共同プロジェクト実施結果	http://www.soumu.go.jp/main_content/000406462.pdf	ITU/総務省/DOST	pdf	1815
	J55	「移動式ICTユニット」の実導入を開始～報道資料	http://www.ntt.co.jp/news2016/1604/pdf/160404a.pdf	NTTコミュニケーションズ㈱	docx	364
	J56	災害時の通信確保に資する 移動式ICTユニットの紹介	http://www.soumu.go.jp/main_content/000395850.pdf	NTT未来ねっと研究所	pdf	4273
	J57	ITU-T FG-DR&NRR（災害対応）活動報告／NTT技術ジャーナル2014.10	http://www.ntt.co.jp/journal/1410/files/jn201410058.pdf	NTT	pdf	1122
	J58	NTTドコモの災害対策	https://www.nttdocomo.co.jp/binary/pdf/corporate/csr/disaster/saigai_torikumi.pdf	㈱NTTドコモ	pdf	5398
	J59	統合的な災害リスク管理のための業務計画2014-2020/ADB integrated-disaster-risk-management	https://www.adb.org/sites/default/files/institutional-document/149575/integrated-disaster-risk-management-operational-plan-jp.pdf	アジア開発銀行	pdf	1738
1	J60	プロジェクト研究「開発途上国における情報通信技術の適用のあり方に関する調査」	http://open_jicareport.jica.go.jp/pdf/12245437.pdf	社会基盤・平和構築部	pdf	2706
	J61	医療の国際展開における外務省・国際協力機構（JICA）の取組の現状 ～日本の優れた医療技術・サービスの国際展開支援～	http://www.kantei.go.jp/jp/singi/kenkouiryou/kokusaitenkai/dai2/siryou04-2.pdf	内閣官房	pdf	459
	J62	大洋州-島嶼国が抱える脆弱性を克服するために	https://www.jica.go.jp/about/report/2011/pdf/14.pdf	JICA	pdf	1888
	J63	JICA年次報告書2014//「活動報告：地域別取り組み　大洋州」	https://www.jica.go.jp/about/report/2014/ku57pq00001nohem-att/09.pdf	JICA	pdf	1024
	J64	「フィリピン地震火山監視能力強化と防災情報の利活用推進プロジェクト」事業事前評価表	https://www2.jica.go.jp/ja/evaluation/pdf/2009_0900311_1_s.pdf	JICA	pdf	340
	J65	広域防災システム整備計画	https://www.jica.go.jp/oda/project/1161620/index.html	JICA	URL	－

J66	アジア・太平洋国際地震・火山観測網構築計画に関する事前調査	http://dil-opac.bosai.go.jp/publication/nied_tech_note/pdf/n304.pdf	防災科学技術研究所	pdf	24750
J67	BHNによるテレコム人道支援と人材育成	http://www.kagawa-net.org/katsudou/h26/h26112 1seminar3.pdf	樽松八平/ＢＨＮテレコム支援協議会	pdf	6099
J68	情報通信学会誌 Vol. 33（2016）No. 4//「防災分野におけるICT国際展開支援」	https://www.jstage.jst.go.jp/article/jsicr/33/4/33_115/_pdf	高田義久/慶應義塾大学ﾒﾃﾞｨｱ･ｺﾐｭﾆｹｰｼｮﾝ研究所訪問研究員	pdf	851
J69	情報通信学会誌 Vol. 29（2012）No. 4//「太平洋島嶼国におけるデジタル・デバイド解消に向けての方向性―基幹通信ネットワークの整備について―」	https://www.jstage.jst.go.jp/article/jsicr/29/4/29_4_87/_pdf	高田義久、藤田宜治	pdf	1544
J70	ICTを活用した自然災害対策 ～ASEAN諸国ナショナルプロジェクトの取り組み～	http://www.fujitsu.com/jp/group/fri/column/opinion/201304/2013-4-1.html	湯川喬介、藤本光太郎/富士通総研	docx	395
J71	ミャンマーの水害と貧困の削減を目指した国際科学技術協力	https://bosaijapan.jp/shiryou/kokutai2016/JBP/4_kawasaki.pdf	川崎昭如/東京大学大学院工学系研究科 社会基盤学専攻特任准教授	pdf	2589
J72	ITUジャーナル Vol.42 No.9（2012,9）//「タイ洪水と防災システム～ICTで守る日本の産業～」	https://www.ituaj.jp/wp-content/uploads/2013/05/6dfbaf37ccaf7e8003dadb7c618505d9.pdf	長谷川哲雄/外務省在ﾀｲ日本国大使館	pdf	358
J73	ITUジャーナル　Vol.44 No.8(2014.8)//「太平洋島嶼国における情報通信国際協力～国際支援の現状と今後の展望～」		黒田知幸/国際開発センター RDI部長	pdf	517
J74	災害に強い情報通信技術の構築を目指して		村岡裕明/東北大学電気通信研究所	pdf	1426
J75	ITUジャーナル　Vol.40 No.6(2010.6)//「太平洋島嶼国における情報通信国際協力～国際支援の現状と今後の展望～」	https://www.jtec.or.jp/file.php?id=57	ﾌﾟﾗﾏﾆｸ・ｶﾃﾞﾙ博	pdf	567
J76	ITUジャーナル Vol.41 No.4(2011.4)//「太平洋島嶼国でODA支援により建設されたJapan Pacific ICT Centerの役割と最先端技術支援国際協力の地域貢献について」	https://www.jtec.or.jp/document/pdf/kaderu_fiji_ictcenter2011_4itujournal.pdf	ﾌﾟﾗﾏﾆｸ・ｶﾃﾞﾙ博	pdf	494
J77	アジア太平洋地域のテレビ局とインターネット 太平洋島嶼国のインターネット同時放送環境について		ﾌﾟﾗﾏﾆｸ・ｶﾃﾞﾙ博	docx	328
J78	太平洋島嶼国5か国に自然災害保険	http://www.worldbank.org/ja/news/press-release/2013/01/18/5-pacific-island-nations-to-be-insured-against-natural-disasters	世界銀行	docx	90
J79	気候変動と災害に強い大洋州の開発戦略（SRDP） Strategy for Climate and Disaster Resilient Development in the Pacific（SRDP）	http://www.wcdrr.org/wcdrr-data/uploads/819/SRDP%20Brochure%20March%202015%20Japanese.pdf	大洋州 SRDP	pdf	413
J80	太平洋島嶼国における持続可能な開発//太平洋地域における主な課題と解決策	http://www.env.go.jp/nature/biodic/ecdisso2014/pdf/key_note/chandra.pdf	ﾗｼﾞｪｼｭ・ﾁｬﾝﾄﾞﾗ/USP副学長	pdf	2189

J81	メディア・コミュニケーション研究所紀要 No.62 2012//「太平洋島嶼国におけるデジタル・デバイド」	http://www.mediacom.keio.ac.jp/publication/pdf2012/tuchiya.pdf	土屋大洋/慶應義塾大学大学院政策・ﾒﾃﾞｨｱ研究科教授	pdf	713
J82	アライズ・ネットワーク・ジャパンラウンチングフォーラム			pdf	5592
J83	太平洋地域における生態系を活用した対応と災害発生リスクの 低減の必要性について	http://www.env.go.jp/nature/biodic/ecdisso2014/pdf/subcommittee4/david.pdf	ﾃﾞｲﾋﾞｯﾄﾞ・ｼｪﾊﾟｰﾄﾞ/太平洋地域環境計画事務局	pdf	10001
J84	放送研究と調査 August 2012//「始動インド洋津波警報システム」	https://www.nhk.or.jp/bunken/summary/research/report/2012_08/20120804.pdf	田中孝宜/NHKメディア研究部	pdf	1565
J85	企業リスク 2015/04季刊//「世界の地域別にみる自然災害」	https://www2.deloitte.com/content/dam/Deloitte/jp/Documents/get-connected/pub/risk/jp-risk-47-gb.pdf	茂木寿/ﾃﾞﾛｲﾄ ﾄｰﾏﾂ企業ﾘｽｸ研究所	pdf	5039

Attachment-2

APT Invitation Letter and Selection

ASIA-PACIFIC TELECOMMUNITY
12/49 Soi 5, Chaeng Watthana Road, Bangkok 10210, Thailand

Ref: APT/PR2.3.1/Publishing/Inv 26 August 2015

Dear Sir/Madam,

Subject: Invitation to Apply for Publishing Programme for ICT Policy and Development 2015

I am pleased to inform you that the Asia-Pacific Telecommunity (APT) is inviting applications for "Publishing Programme for ICT Policy and Development in 2015". The Programme is funded by the Extra Budgetary Contribution from Japan (EBC-J).

The objectives of the Programme are to strengthen capability of information collection, analysis and dissemination and to share information and best practices in the region to resolve cross-regional social issues. The Programme will foster the conduct of research and survey and provide useful information to the members. The outcomes are expected to be published at the APT Secretariat and the published documents may facilitate the activities in the relevant Work Programmes. The outcomes may also be adopted as APTs reports, guidelines, etc. with necessary amendments for the Work Programmes.

This Programme supports:

- publishing activities about ICT Policy and Development for the APT Member countries especially about issues that cannot be solved by a single country, namely disaster management, global warming, energy, medical care, cyber-security and so forth; and
- researches on the cross-regional issues to be addressed on a priority basis in Asia-Pacific region.

The main conditions are:

- **The maximum amount of the APT support is $70,000.**
- **The project is to be completed within 6 months from the date of announcement of the adoption made by the APT Secretariat.**
- **Priority may be given to the proposals with support from the APT Members where the research will be held.**

Interested Affiliate Members in Japan are requested to complete and submit the attached Application Form and the Research Expense Breakdown to the APT Secretariat **by 30 September 2015** by e-mail:aptict@apt.int or fax no.: +66 2 573 7479 or +66 2 574 4226. Please see the attached Terms of Reference for more information.

I look forward to your involvement in this Programme which will contribute to the sharing of useful information among the APT members.

Yours sincerely,

Areewan Haorangsi
Secretary General

Encls:

Attachment 1 – Terms of Reference
Attachment 2 – Application Form
Attachment 3 – Expense Breakdown
Brunei Darussalam Statement of the Asia-Pacific ICT Ministers on Building Smart Digital Economy through ICT

All Affiliate Members in Japan

cc: Mr. Kimihiko KIMURA, Director, International Cooperation Division, Global ICT Strategy Bureau, Ministry of Internal Affairs and Communications, Japan

Attachment 1

Terms of Reference of the APT Secretariat and Research Organization/Institute

The following is the Terms of Reference of the APT Secretariat (hereinafter referred as "APT") and research entity that conduct research activity (hereinafter referred as "RE") regarding the implementation of APT Publishing Programme for ICT Policy and Development. Please be aware of these conditions before submitting your proposal to APT Secretariat.

APT:

- will make payment to RE upon the submission of the final report on the research
- will make the payment of the approved amount in the grant letter from APT
- may put the report on the APT website or use it in any APT activities
- may request an interim report to RE
- may send its staff to see the progress of the research
- will retain all intellectual property rights with regard to the output material.

RE is required to

- start the research soon after the proposal is approved by APT
- do the research based on the approved research proposal
- visit at least two APT Member countries for the research
- submit the final reports in PDF format to APT
- submit a presentation material of the final report as PowerPoint format to APT
- cooperate with APT in case APT sends its staff to see the progress of the research

ASIA-PACIFIC TELECOMMUNITY
12/49 Soi 5, Chaeng Watthana Road, Bangkok 10210, Thailand

Ref: APT/PR2.3.1/Publishing/Result 26 November 2015

Dear Sir,

Subject: Publishing Programme for ICT Policy and Development in 2015
(Supported by Extra Budgetary Contribution by Japan)

Please refer to the letter Ref: APT/PR2.3.1/Publishing/Inv dated 26 August 2015 inviting interested Affiliate Members in Japan to apply for the Publishing Programme for ICT Policy and Development 2015. I appreciate your kind cooperation in submitting the application for this Programme which was received by the APT on 30 September 2015.

After careful evaluation and examination by the APT Secretariat in consultation with the Ministry of Internal Affairs and Communications, the Government of Japan, I am very pleased to inform you that your project "**A survey on collection, analysis and dissemination of information on ICT policy and solutions related to disaster, climate change and social issues between nations and regions"** has been selected for this Programme. The detailed summary of the project budget is prescribed in the Annex attached herewith. Further process will be carried out upon receipt of the acceptance letter from your organization.

It is my great hope that this important project will be implemented smoothly and successfully through an excellent collaboration between the Japanese experts and experts of other related countries throughout the project period. I am certain that this initiative will significantly accelerate the telecommunication and ICT advancement and contribute to foster regional cooperation for ICT development in the Asia-Pacific region.

I look forward to fruitful collaboration with your organization in the future.

Yours sincerely,

Areewan Haorangsi
Secretary General

Encl: Details of Project Budget

Mr. Minoru Takahara
Vice President
Japan Telecommunications Engineering and Consulting Service

cc: Mr. Kimihiko Kimura
Director, International Cooperation Affairs
Global ICT Strategy Bureau
Ministry of Internal Affairs and Communications, Japan