



ASIA-PACIFIC TELECOMMUNITY  
7th APT Workshop on Disaster Management / Communications (WDMC-7)  
27-29 April, 2016, Bangkok Thailand

Document  
WDMC-7/INP-27  
29 April 2016

**JTEC**

**Challenges with ICT in disaster management and need of innovative resilient infrastructure for Disaster Risk Reduction**

Contact :  
pramanik@jtec.or.jp



**Challenges with ICT in disaster management and need of innovative resilient infrastructure for Disaster Risk Reduction**

The 7th APT Workshop on  
Disaster Management/Communications (WDMC-7)  
Bangkok, Thailand, 27 – 29 April 2016  
Document WDMC-7/INP-27

**Dr. Kader Hiroshi Pramanik**  
Advisor to the President  
Japan Telecommunications Engineering  
and  
Consulting Service (JTEC)  
Tokyo Japan

Email: [pramanik@jtec.or.jp](mailto:pramanik@jtec.or.jp)

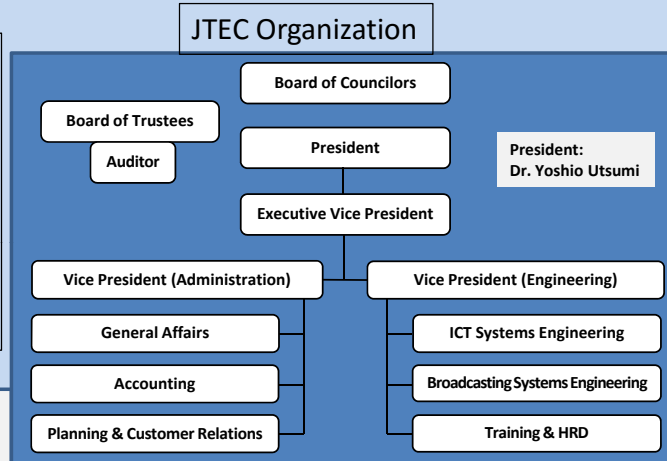


**Who is JTEC? : JTEC is the Global partner for ICT development of Developing Nations.**

Established in 1978. Specialized in Communication and Broadcasting sector, JTEC continues to support the activities in the developing nations through technical and advisory assistance promoting new initiatives. .  
JTEC is the only organization in Japan for international cooperation in the field of information and communication technology (ICT).

- ① **ICT Consulting Business**
- ② **Survey and Feasibility Studies**
- ③ **International Cooperation**
- ④ **Other Related Fields**
  - Human Resources Development Programs.
  - Intercultural Exchange Programs
  - Organizing Conferences & Forums
  - Introducing Japanese Technology to the world.

**JTEC** <http://www.jtec.or.jp/english/>



## Dilemma at Disaster Situation

- News media rush for headlines (big damage locations mostly)
- Telco's rush to restore communication (major spots initially)
- Engineers rush to locate weakness in systems (affirm service)
- Politicians rush to assist moral support & mobilization process
- International organizations wait for formal request (decision)
- Govt. officials take all the troubles & blames (work hard)

Who is right ?



Probably  
All of them

### Thereby Today's Topics are

- Recent disasters in the regions and ICT service challenges
- Disaster Information Volume and Public Safety Status
- Disaster Risk management considerations & the Data sources
- ICT in Disaster Management and Climate Change applications
- Recommendation for a broad type of Pacific Regional Network

/Pramanik2016/

## Type of Natural Disasters in Asia & the Pacific

Situations differ in various aspects. Related actions differ considerably.  
Ex: Land Mass, Population, Economy, Transportation, Culture, Society and Natural events

- **Sea level variations:** abrupt sea level rise due to climate change, causing tsunami
- **Atmospheric change effects:** River swelling, Flash floods, Mudslide
- **Volcanic activities:** Eruption,, submarine volcano, Prominent volcanic activities, pyroclastic flow
- **Seismic effects:** Earthquake due to plate movement, explosions underground, and subsequent tsunami.
- **Atmospheric effects:** Cyclone/typhoon storm heavy rain, flood, Forest fire and steppe fire, Drought and extreme temperature
- **Adverse weather:** Avalanche, Land slide, Mud Flow, Sand storm, and other natural events. Snow storm,

/Pramanik2016/

5

### Looking at the Pacific Nations



Countries:

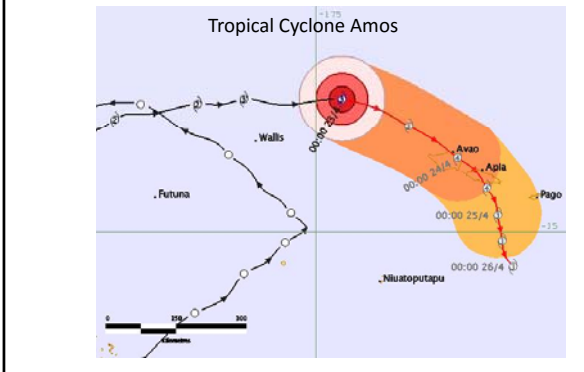
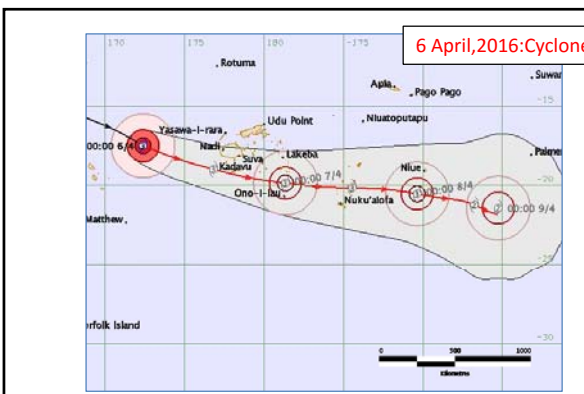
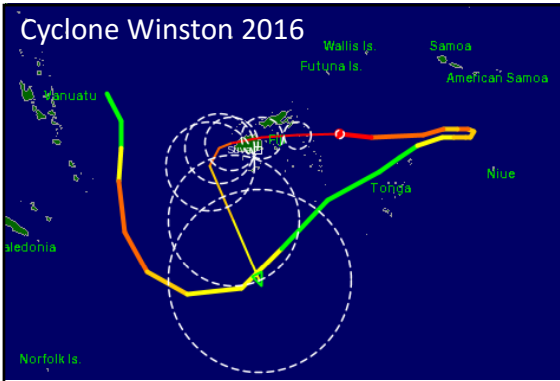
**Cook Is, Fiji, Kiribati, RMI, FSM, Nauru ,  
Palau, PNG, Samoa, Solomon Is, Tokelau,  
Tonga, Tuvalu, Vanuatu**

Bold=APT Member states

Volcanoes, Earthquakes, Tsunamis,  
Cyclones, Landslides, Flash floods,  
Sea level rise,.....

/Pramanik2016/

6



<https://www.facebook.com/DMOSamoa/> 8

Kumamoto Castle  
Earthquake Disaster  
April 16,17:2016

Before →  
After ↓



<https://www.facebook.com/KumamotoCastle/>

## Appropriate Disaster Information Gathering and Public Protection

## Disaster information and assistance needs

Assistance	Actions	Time Frame	Contents
Pre disaster	Preparation Drills	Round the year	<ul style="list-style-type: none"> <li>Information</li> <li>Awareness</li> <li>ICT Service support</li> </ul>
Nearing/ During emergency	Moral support	Event long	Information (Govt) Suggestion (at site) Cooperation (community)
Post disaster time frame:	Right away	Within 3 Days	Life saving need
	Immediate	within 1~2 weeks	Survival need
	Mid period	2 wks to 3 months	Restarting of daily livelihood
	Long term	Months ~ Years	Rehabilitation, Reconstruction

/Pramanik2016/

11

## Typical challenges in Islands/ Island Nations

Items	Islands & Island Nations	Situation
Logistics	Modes Limited	By Sea, By Air (at times)
Dependency	Depends on weather	Severe weather frequently
Disaster	Cyclone, Flash Floods, Earthquakes, Tsunami, and more .....	In all cases, <b>Sea turns unfriendly</b>
Post disaster support	By Sea : Immediate Not possible	Rough seas continue several days Water ways blocked by debris
	By Air : Difficult	Airstrips are not usable several days
	By Road: Barely possible	Rods blocked by fallen trees, Collapsed bridges, distorted power lines, damaged electric poles on road

/Pramanik2016/

12

## ICT in Emergency for Public Protection

- In disaster situation, difficult for public in remote areas to access **ICT services**.
- To create **ICT environment** that provides organized services to public
- Create Common Platform with a Regional Network that can **Strengthen communities**, Contribute to **Developing Strategy** , Facilitate **sharing of experiences** with Disaster Resilient infrastructure.

**Timely accessible ICT services reduce chaos Confusion & save lives.**

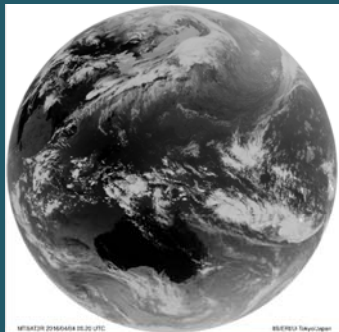
### There are Significant challenges

- **Unequal access** to **ICT** is more prominent **when disaster** strikes.
- Appropriate **ICTs service solutions** can **reach the most in need** when a disaster strikes.
- In emergency situations, **basic communications tools** able to connect remote and isolated areas through a **satellite multipoint and Wi-Fi Mesh network**.

13

## Disaster Risk Management Considerations and Data Utilization

Infrared  
Picture



Visual  
Picture



Ref:MTSAT/GMS (HIMAWARI) database at IIS, U-Tokyo

14

## Risk and Vulnerability assessment

- Create a hazard risk map to assess local risk prone area, and available disaster information.
- Use GIS Image to support analysis of disaster risk and vulnerability

- Need of Aerial photographs and Satellite Images
- Estimation of disaster damage information by area or volume
- Use of pre and post disaster satellite and other images/data
- Use of sensors and wireless technology in search and rescue

- Disaster affected area Investigation
- Use satellite IR images and optical images
- Compare pre & post images
- Facility/Property wise damage assessment
- Collate various information

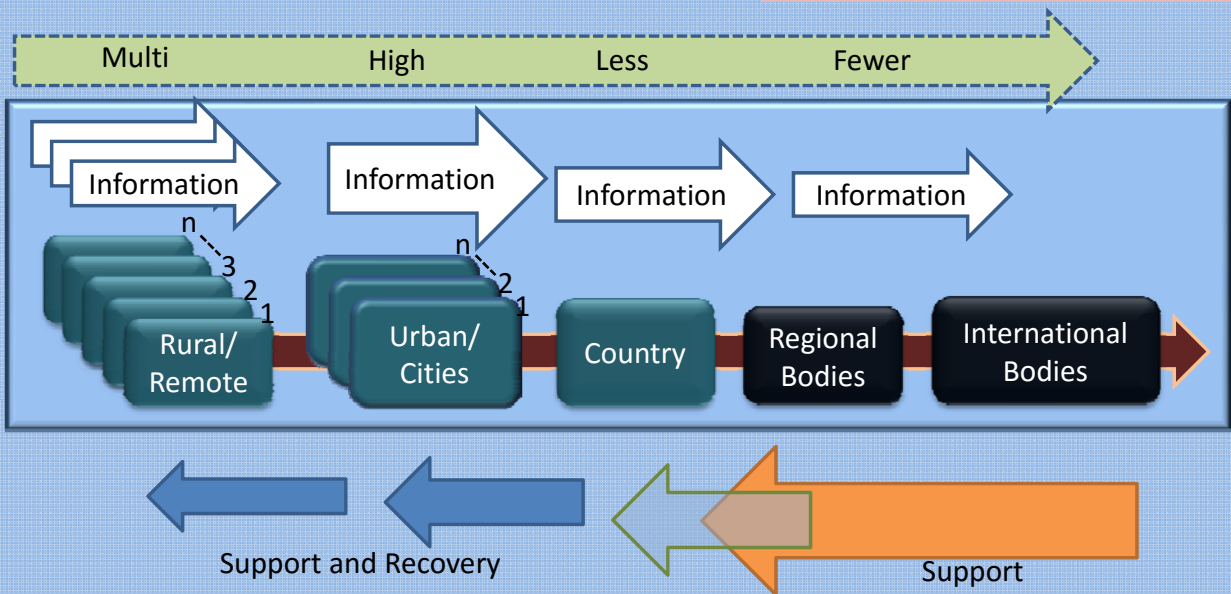
/Pramanik2016/

15

## Disaster Information Volume & Safety Assurance

Information Sources & Volume **in the form of ICT Data**

ICT Services ? Inadequate or None



/Pramanik2016/

16



## Modify Disaster Risk management Strategy

### Need of

- Participation in a multiparty environment to share ICT skills
- Community capacity building for ICT
- Local ICT assistance manpower development
- Disaster preparedness culture development
- Open data sharing

### Data from the ICT sector:

The ICT sector is one of the richest sources of data  
Data from mobile operators are real-time and low- cost

A major portion of data be available on disaster prediction, management and recovery.

/Pramanik2016/

Leads to  
The big data  
Situation

Challenges

Developing countries

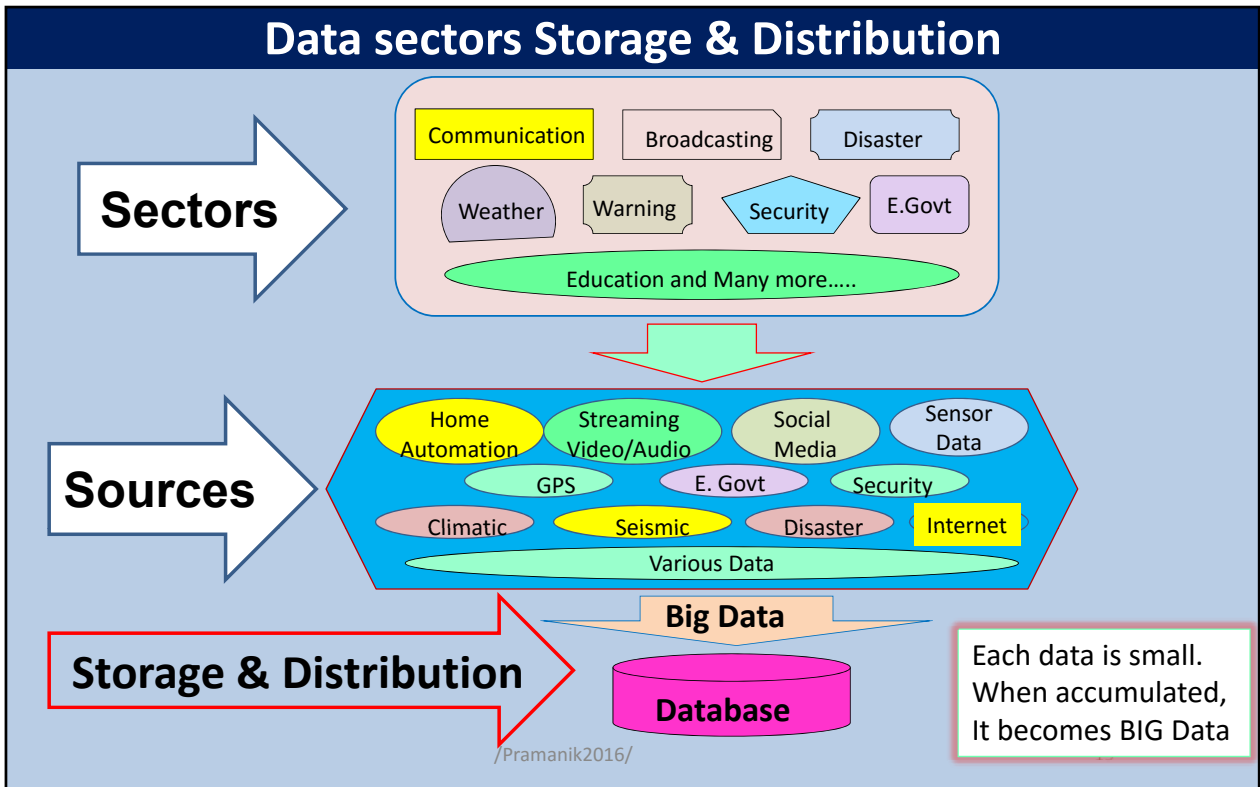
- Quality of life.
- Big data skills gap
- Lack of infrastructure (technical)
- Lack of good quality data

The contents

## Data types leading to Big Data

➤ **Structured Data** comes from:  
**Customer databases, GPS data, meteorological data, accounting, medical receipt, log, POS, e-commerce sales, RFID.....**

➤ **Unstructured Data** comes from:  
Disaster information, surveillance camera, sensor log, email, blogs, SNS, electronic medical records, image diagnosis, business log, fixed IP telephone voice, mobile phone voice, access log, traffic & traffic congestion (land sea air) movie/ video viewing logs and many others.



## ICT in Disaster Management and Climate Change applications

/Pramanik2016/

20

## Satellite Usage: Examples for Disaster Recovery

### ◆ Initial Phase on disaster strike

- **Critical phone line and facsimile line** between disaster management center and stricken area such as prime minister's hot-line
- **Photo transmission / sharing** from stricken area to disaster management center to share damage situation
- **Relief planning** discussion between disaster management center and stricken area through **video/voice conference system**
- **Distance medication** between central hospital and stricken area thorough **video conference system / phone line**
- **Video transmission** from stricken area to broadcasting center by TV broadcaster.

### ◆ Recovery Phase

- ✓ **Data sharing and video/voice conference** for recovery planning of utility services: Roads, telecommunication, electric power, gas, water,
- ✓ **Internet connection and MOBILE service** at evacuation area

21

## Disaster Warning: Communication Channels Used in Disaster Warning

Message Mode	Benefits	Constraints
Television	Benefit for all	Tine required to issue message. Limited use at night
<b>Radio</b>	<b>Benefit for all</b>	<b>Voice message all through to all</b>
Satellite Radio	Reachable Everywhere	Usable at specific points
Amateur Radio	Rural & remote communities	Only interested person can receive. <b>People loose interest at emergency.</b>
Cell Broadcast	Addressable group wise	Language barrier. Does No reach to non users
Transceivers	point o point contacts	Person to person. Only designated people
Fixed Telephone	Quick Message transfer	Does not reach to non users
Mobile Phones	Direct and person to person	Does not reach non users. Difficult to reach at no power situation
<b>SMS</b>	<b>Quick message to groups</b>	<b>Quick response. Message can be sent to groups.</b>
<b>Internet /Email</b>	<b>Interactive message. To multiple sources</b>	<b>Internet &amp; Email</b>
Loud Speakers	Possible all times with power	Only possible in local situation
Sirens	Unspecified message all times	For rural people. Possible at night.

22

## Information for the public

The types of Information message for the public should contain data as shown below and should be transmitted through main Telecommunication Network.

### Type of information

- ① Climatological data
- ② meteorological data
- ③ Surface observations on land and sea, including data from ships and buoys
- ④ Seismic data , tsunami and other types of data.
- ⑤ Upper-air observations including data from aircraft
- ⑥ Selected satellite data

## Network and Data gathering

- **Wired and wireless internet** required to collect data.
- (Big) **Data utilization** will increase considerably in near future
- **Flexible operation** of Broadband Internet will be demanding
- Each Govt. to take **action along with data needs** (infrastructure).
- **Region wide data collection and coordination**, at fairly low CAPEX & OPEX, Ku-band or higher band satellite service is essential.

**It is essential to create a test bed** for the Pacific island nations, using existing facilities with a few addition using Japanese or any other available regional satellite services.

## Service Operation & Management

- ✿ Information for immediate **things required within 3 days** (before the relief arrives) : e.g., **Drinking water, Baby milk, critical Medicine**
- ✿ Medical stores within 5~10km that can supply medicines.
- ✿ Food store within 5~10km that can sell food items, water, drinks and groceries.
- ✿ Need to care for Loss of body temp., Psychological panic, Economy Syndrome

### Therefore, What ICT can do here ?

- ◆ The Mobile operators can confirm operating shops if they are on business before sending SMS via mobile phones (Area mail).
- ◆ To ensure this, Operators should have an updated contact list of those businesses and establishments.
- ◆ Broadcasters will provide wider range of information

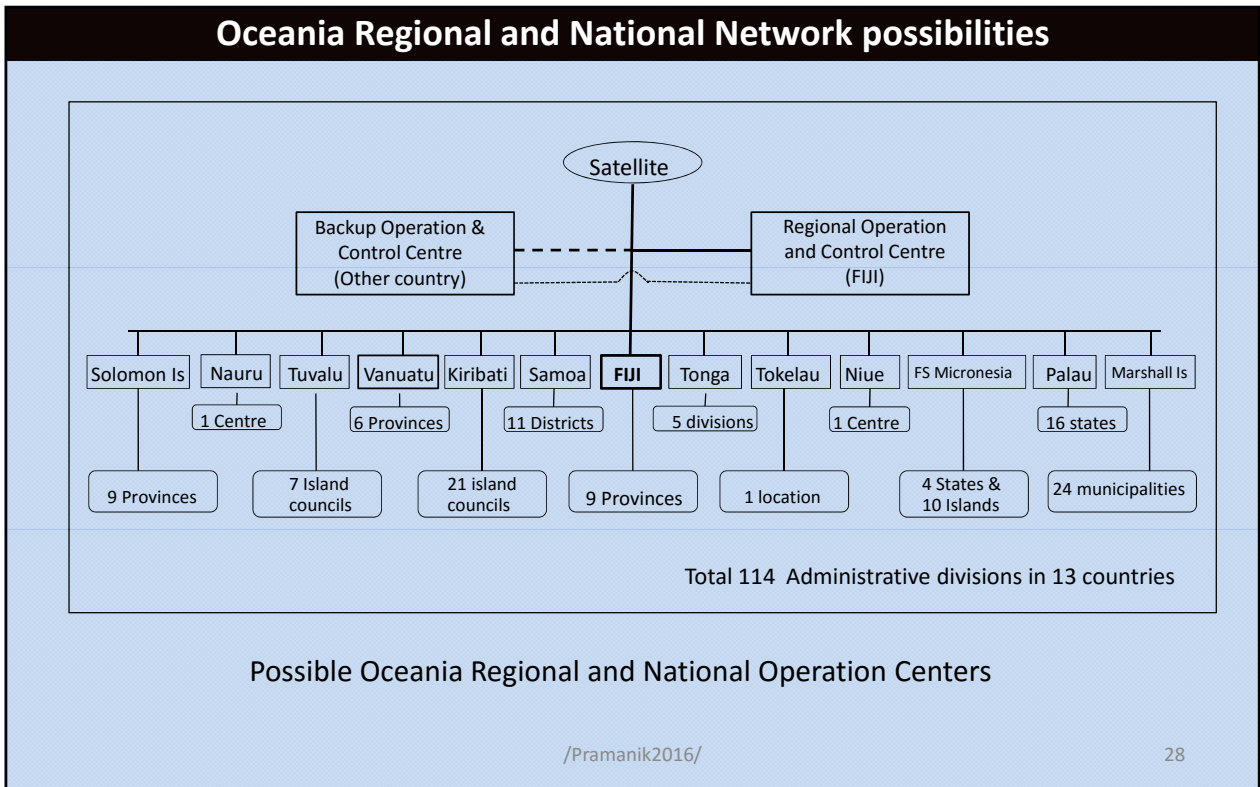
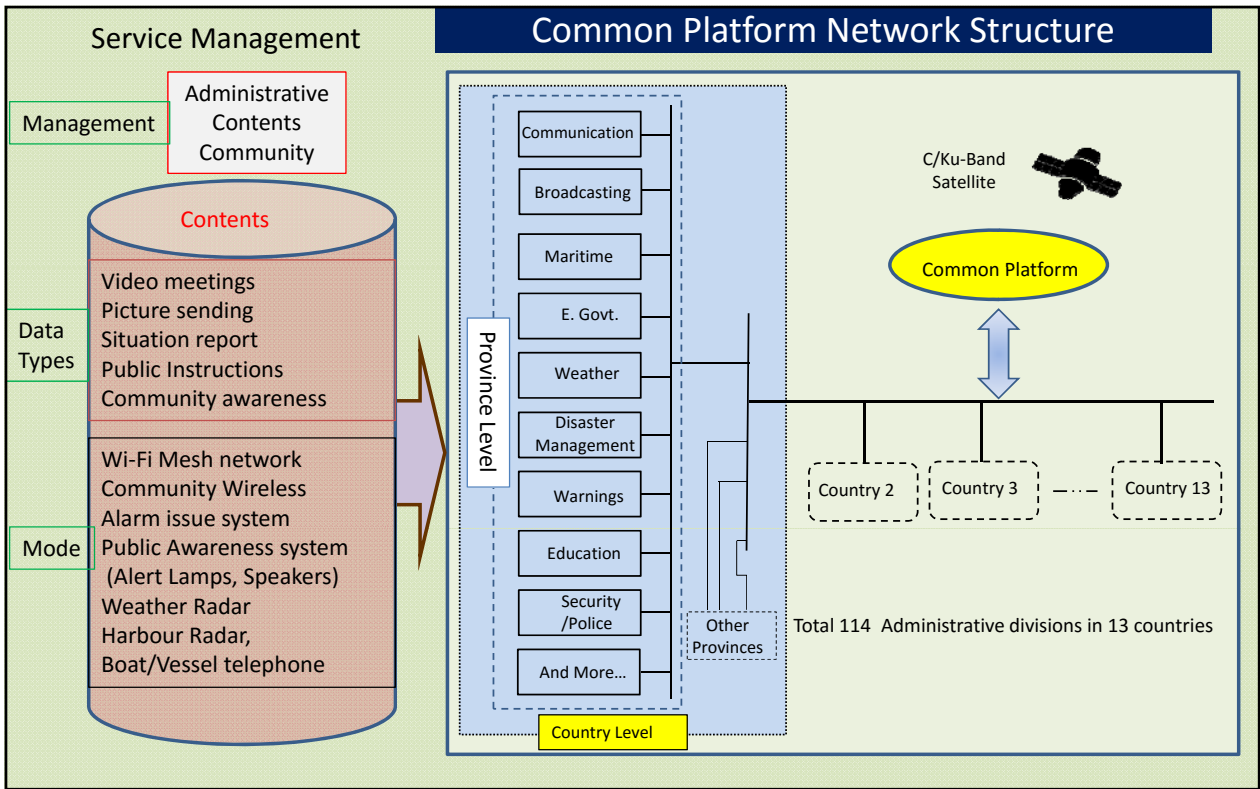
/Pramanik2016/

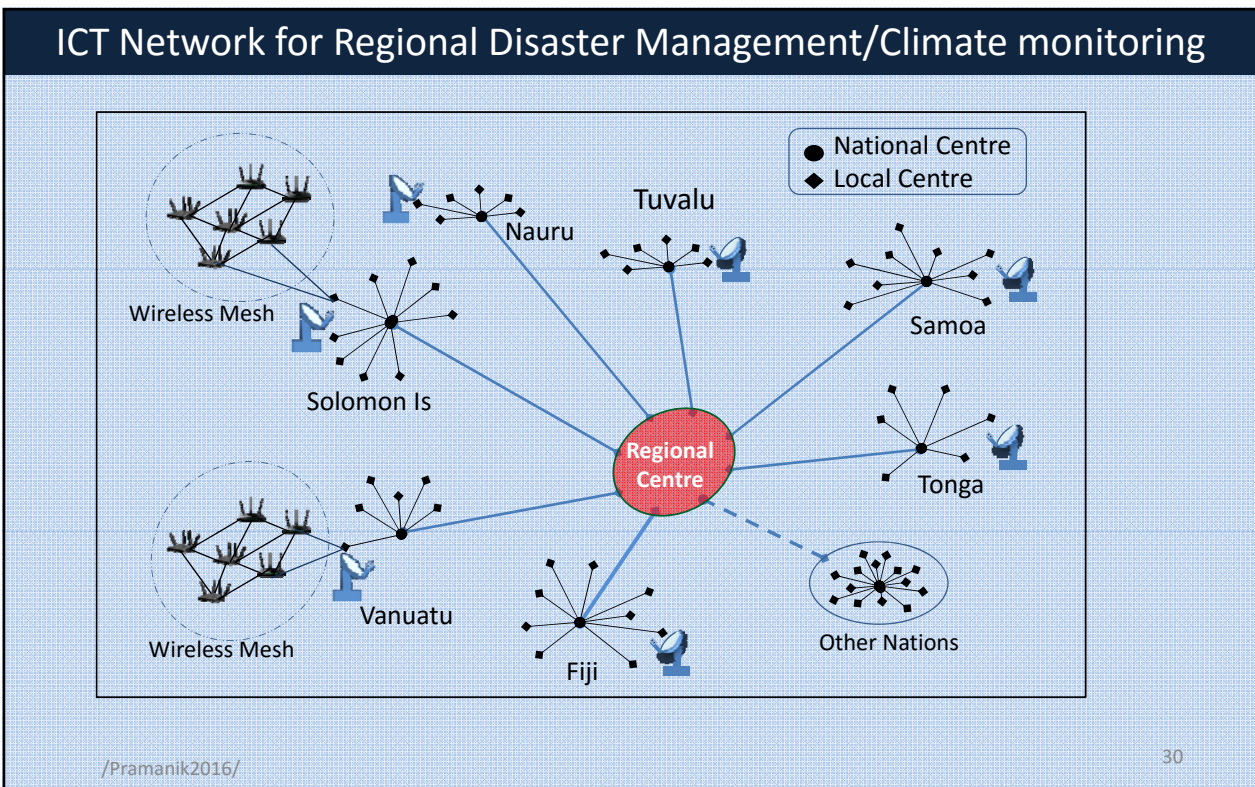
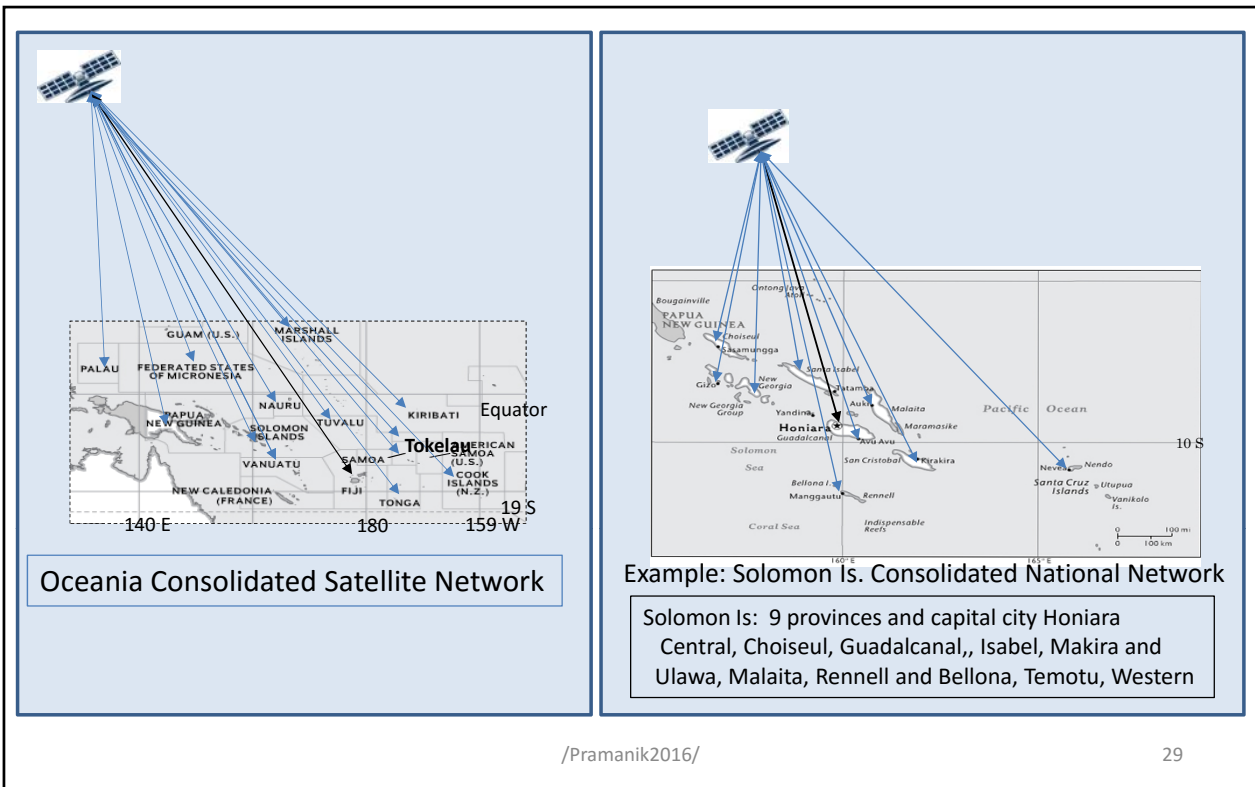
25

Recommends :  
A Satellite based  
Pacific Regional Advanced Network

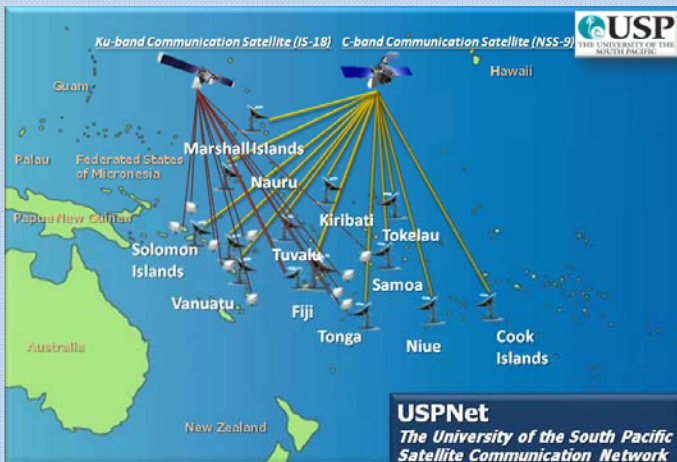
/Pramanik2016/

26





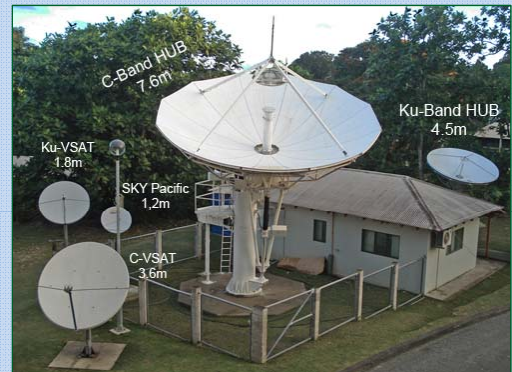
## Available Infrastructure example: The USP Net



- 7.6m C-band antenna accessing NSS-9
- 4.5m Ku-band antenna accessing IS-18

USP operates its own Telecom services for over 20 campuses in 12 countries via 'USPNET' Satellite Telecom links.

/Pramanik2016/



## To Sum up

- ① **Develop a Satellite Based Telecommunications System** for Disaster Management and Climate Change Applications for the South Pacific & Island Nations starting with existing available resources.
- ② **Considering developments in the pacific framework**, this project is to develop optimum cost, reliable, disaster management and early warning communications system for the socioeconomic development of the Pacific Islands region utilizing satellite based network.
- ③ In an effort to achieve **appropriate Return On Investment**, the same ICT infrastructure and resources for emergency telecommunications to be used for usual ICT network services including; climate change data gathering, distance education support and public awareness information transmission, to ensure public protection before, during and after any disaster strikes the area.
- ④ Roles of ICT in mass data situation
  - To gather/transmit, seismic/meteorological, climate change data
  - To share information on ensuing disaster risks
  - To disseminate warning message to residents

/Pramanik2016/

32



## Recommendations

- Identify localized services and appropriate management style and share them with other regions and countries.
- Ensure Operation & Management of appropriate services at least as hinted here in this presentation. (Regulators & Operators).
- Formulate/Participate in regional efforts on resilient infrastructures as a risk-mitigation instrument.
- Integrate disaster risk reduction (DRR) into service planning.
- Develop greater cooperation among government sectors and Private Public Partnership for resilient infrastructures and facilities sharing.
- Utilize GIS, ICT based distribution networks & technology for disaster mitigation and warning.
- Incorporate open data policies to ensure responsibility for disaster response and facilitate access to data required.

/Pramanik2016/

33

Recovery from Disasters make life moving again



Photo: Pramanik

## Career of Pramanik

### Dr. Kader Hiroshi Pramanik

Advisor to the President, (Telecommunication & Broadcasting), JTEC, Tokyo Japan

#### Japanese Citizen

#### Academic Career:

Ph.D. Degree in Electrical and Communication Engineering, Tohoku University Japan (1977).

#### License:

- Specialized Maritime Radio-communication Operation • Specialized Terrestrial Radio-communication Operation

#### Awards:

- Received ICT Accomplishment Award 2013' from the Ministry of Internal Affairs and Communications (MIC) Japan (executed by the ITU Association Japan) .
- Received "The International Cooperation Award 2007" from the Ministry of Internal Affairs and Communications, Japan(executed by the ITU association of Japan).
- Received Letter of Appreciation from the President of the Federated States of Micronesia on the successful Planning and Implementation of Telecenters under APT Program.

#### Professional Career in brief

1. OKI Electric Ind. Ltd: Senior Engineer, Engineering Services Division; Engineer, Telecom Engineering Division Tokyo, Japan
2. ITU: Technical Cooperation Dept (early retirement in 1988)
3. Japan International Cooperation Agency(JICA): Expert, "ICT Capacity building at the University of the South Pacific" a grant aid project under the Japanese Govt., Fiji & Pacific region
4. Recruit Co. Ltd, Tokyo, Japan: Executive Engineer, Information & Network Department; General Manager, Information & Networks Department; General Manager, Information Systems Department and; Project Director, LAN/WAN Refurbishment and Expansion Project; General Manager, Technical Development Division ; General Manager, Satellite Communication Department and, Project Director, New Telecom Network Development and Implementation Project.
5. APT Research project (2006), Network Expert in Expert Mission (2007), and execution of Telecenter Project(2008); Federated States of Micronesia (FSM), Palau (2012), Vanuatu (ongoing).
6. Japan International Cooperation Agency (JICA): Expert in Satellite Communication Systems, and Curriculum Advisor (Net-Centric Computing); ICT for Human Development and Human Security (2010-2013), Fiji & Pacific region.

## References & Related Readings

1. Kader Pramanik, Complexity in Disaster Management in the Pacific Island Nations, ~Recommendations for Multi-hazard Risk Reduction with Common ICT Platform, Doc. WDMC-6/Doc.Inp-11, July 2015, Nadi, Fiji.
2. Kader Pramanik, Ku Band Satellite Network Initiative at USP~ Promoting ICT Broadband Enhancement in the South Pacific: APT - WS-FTIPPM/Doc.11/63, 28 – 30 September 2011, Tokyo, Japan.
3. Keping Yao, Open Government Data for Disaster Risk Reduction: UNPAN workshop, March 2016Bangkok, Thailand.
4. Marius Portmann; Wireless Mesh Networks for Public Safety and Disaster Recovery Communications: University of Queensland, Australia and National ICT Australia Limited.
5. Kotaro Tada, *Emergency Communications and Warning Systems*: WDMC-5, Doc/Doc.Inp-15 , June 2014, Tokyo, Japan
6. Wilson Leguvaka, Disasters in the Solomon Islands: National Disaster Risk Overview, WDMC-5 /Doc.Inp21, June 2014, Tokyo, Japan
7. Sarwar Alam, Bangladesh Disaster Warnings and Communication Systems in Bangladesh: Issues and Challenges, WDMC-5,Doc./Doc. INP-21 , June 2014, Tokyo, Japan
8. Shuichi Inoue, Harmonization if ICT and Disaster Management System: WDMC-5/ June 2014, Tokyo, Japan.
9. Yuko Sato,Technology of Weather Radar System for Disaster Reduction, WDMC-5/Doc. Inp-13 June 2014, Tokyo, Japan.
10. Loyley Ngira, Disaster Response,,: APT/ITU Pacific Forum –Doc/PF-29, Apia Samoa, April 2013.