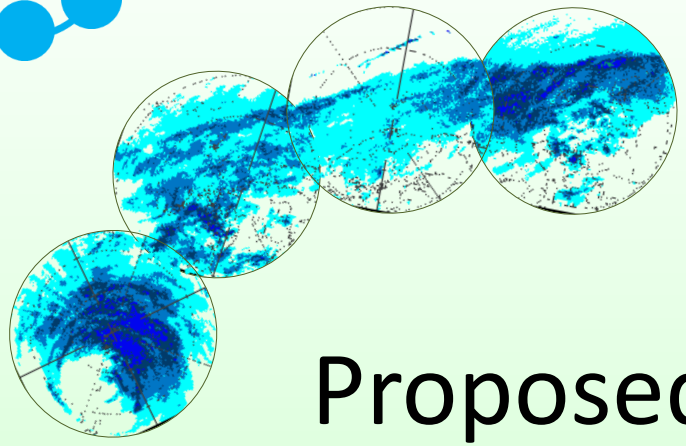
WIGOS WORKSHOP 2019



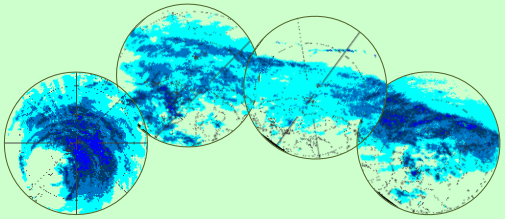
Session 2.3

Proposed Framework for Integrated Regional Radar Network

Soshi Iwata*, Hideshige Iida, Chiho Kimpara

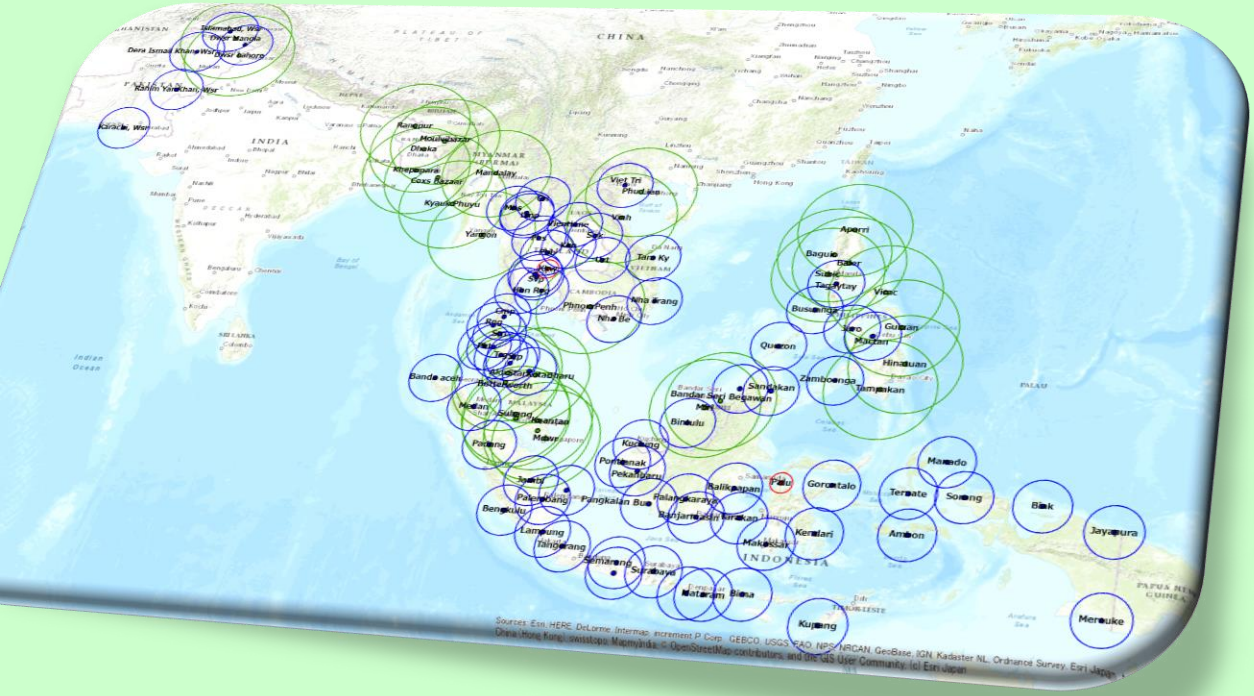
Japan Weather Association

Background and Outline of Survey



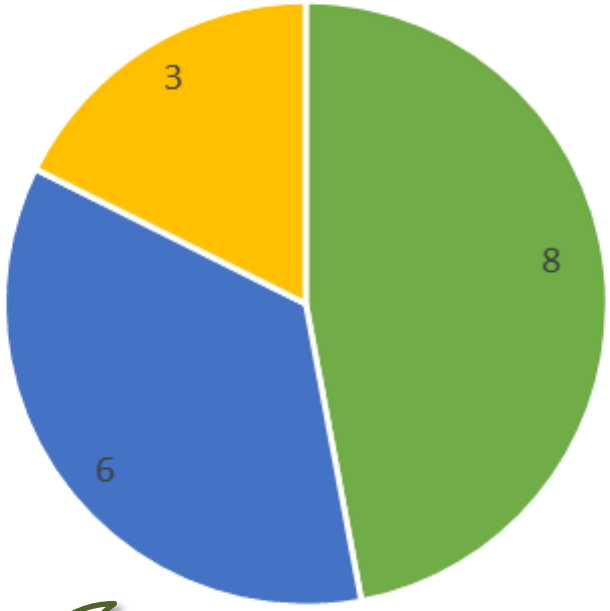
Background:

- Since 2011, JMA has been coordinating international cooperation for establishing ***weather radar network among some Asian countries*** as part of ***WIGOS***.



Q&A for this WIGOS WS Attendees

Q. Does your organization participate in an international regional radar network?

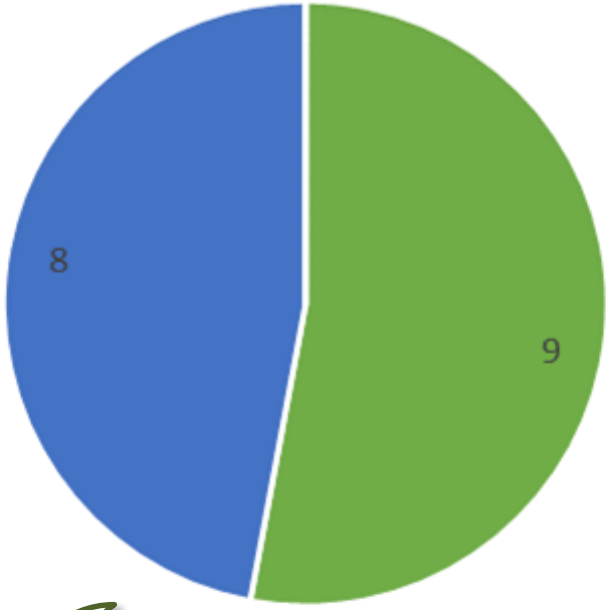


- *1. Yes*
- *2. No, but we want to participate*
- *3. No*

Among this WIGOS Workshop attendees, more than 80% of the NMHSs already/want to participate in an international regional radar network.

Q&A for this WIGOS WS Attendees

Q. Does weather radar observation contribute a lot to weather disaster prevention or mitigation in your country?

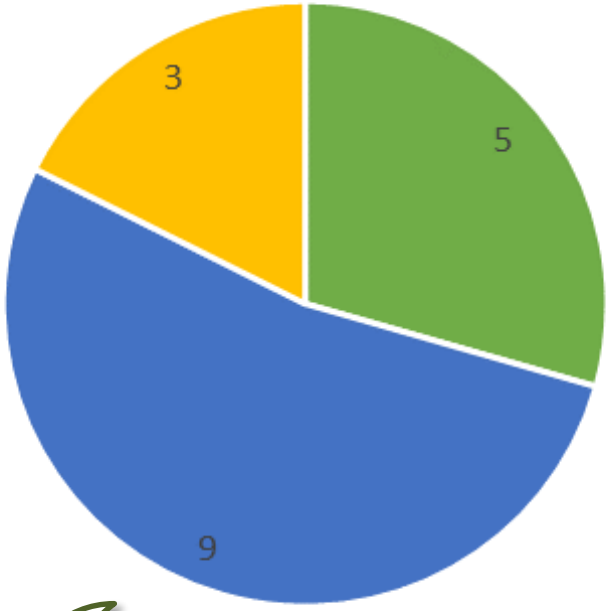


- *1. Yes, a lot*
- *2. Need improvement to contribute*
- *3. Not expected*

The countries answering "Yes" can contribute more to disaster prevention not only domestically, but regionally by exchanging data.

Q&A for this WIGOS WS Attendees

Q. Does your organization have experts acquainted with radar, satellite, surface observation?



- *1. An expert acquainted with all areas*
- *2. Each expert acquainted with in each area collaborates*
- *3. No expert acquainted with those areas*

Not only the countries with no experts, but all the NMHSs must keep experts for giving technical education to the future generations by themselves.

Background and Outline of Survey

Background:

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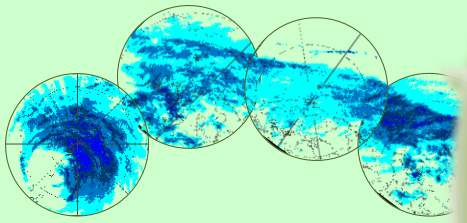


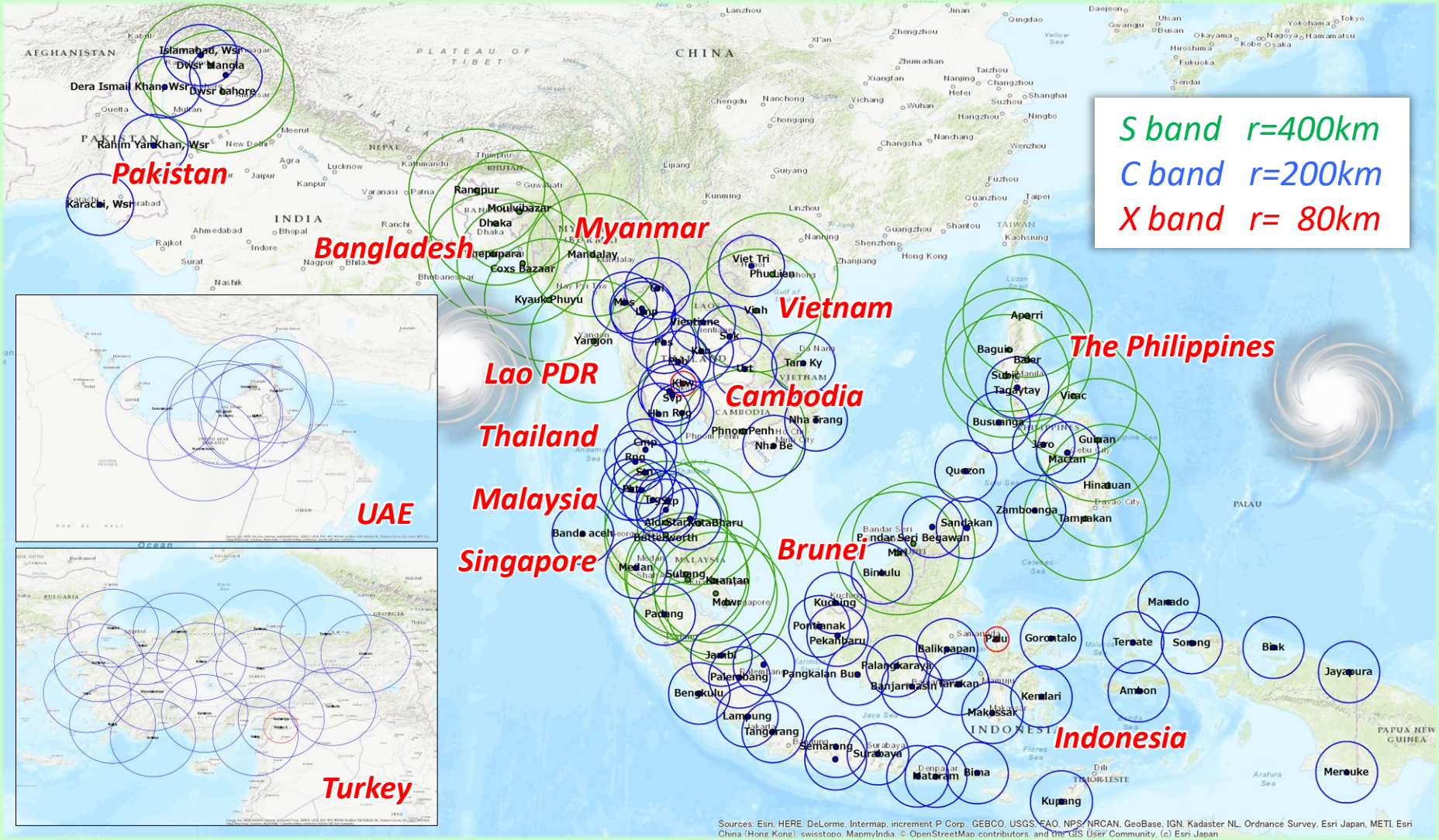
Purpose of Our Survey:

- Understanding the current status of ***weather radar operation, maintenance and data utilization*** in each country in order to develop a framework of ***Integrated Regional Radar Network***.
- JMA has commissioned JWA to conduct the survey.

Approach:

- Conduct ***questionnaire survey*** to ***14 countries*** in Asia on the weather radar operations in each country. *Dec. 2018*
- Conduct ***field survey*** in ***the four selected countries*** with interviews for further understanding. *Jan. & Feb. 2019*

Operated Weather Radars in the 14 Surveyed Countries

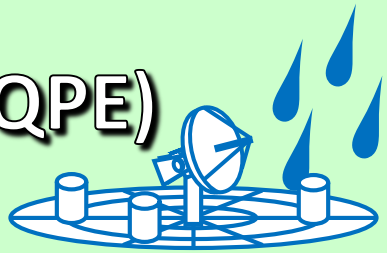


Steps toward Integrated Regional Radar Network

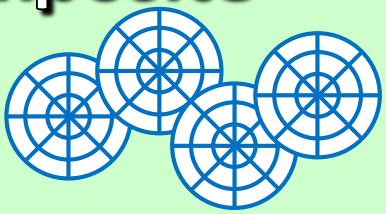
Better Radar Operation

Quality Control (QC)

Quantitative Precipitation Estimation (QPE)

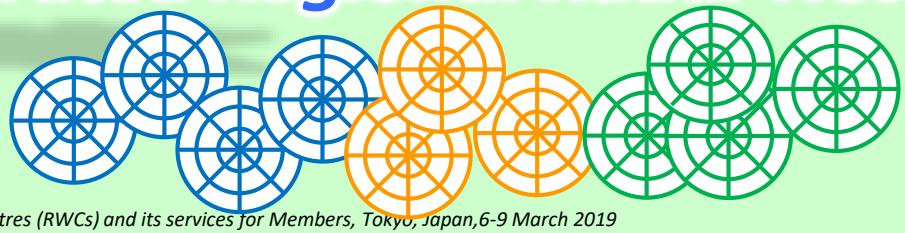


Domestic Radar Composite



Mutual cooperation and data exchange among the countries…

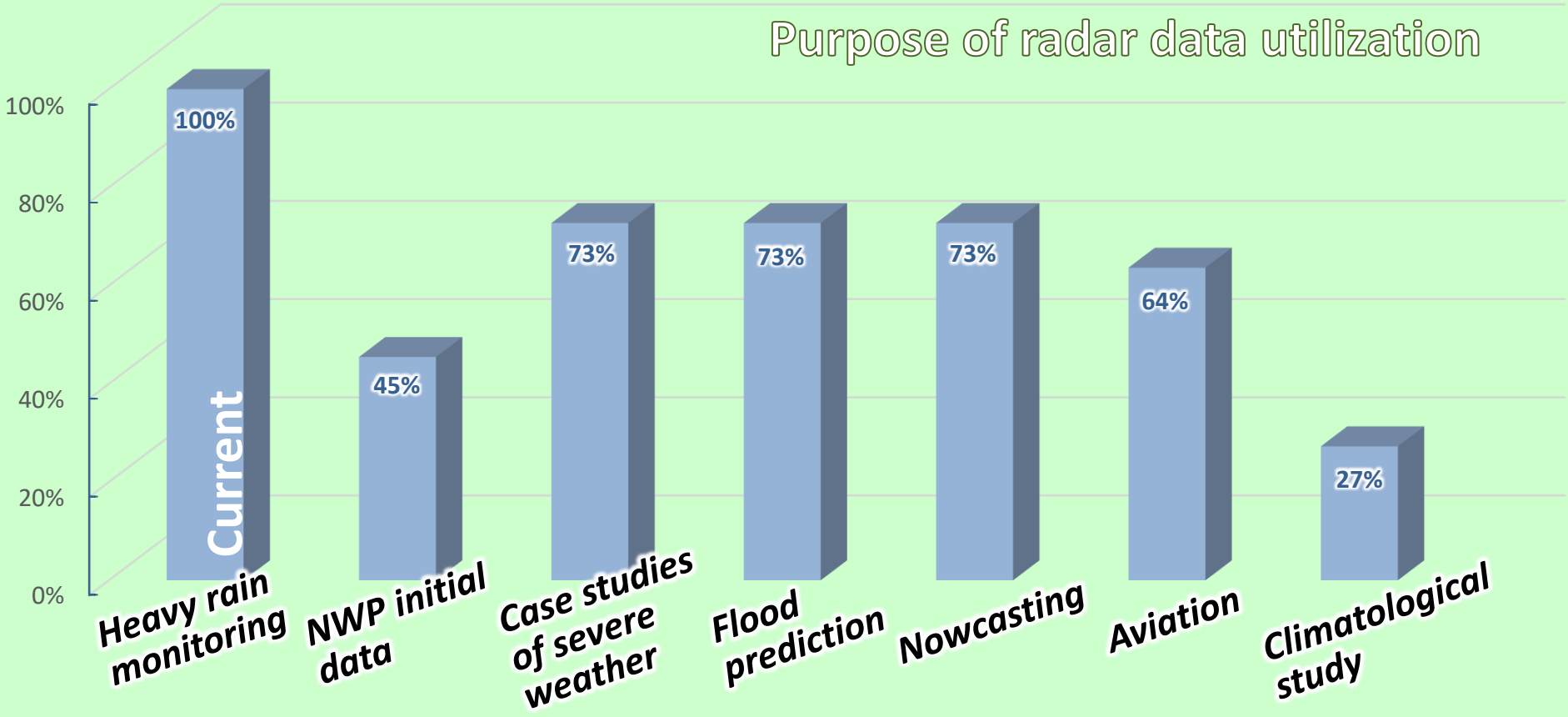
Integrated Regional Radar Network



Results of Questionnaire Survey

Q. Currently, for which Purposes do you operate weather radars?

Answers are…

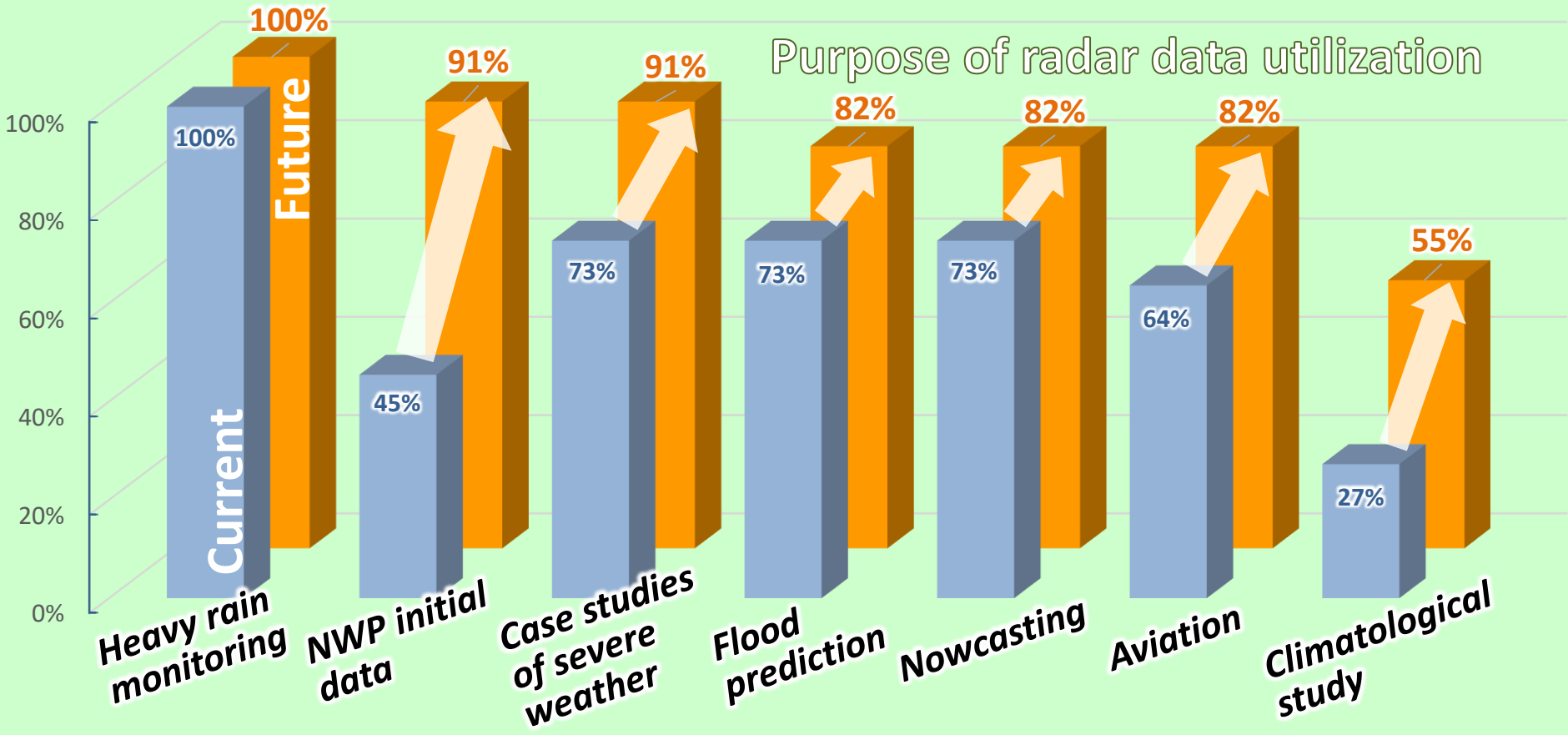


Results of Questionnaire Survey

Q. Currently, for which Purposes do you operate weather radars?

Q. In the future, for which Purposes are you going to operate weather radars?

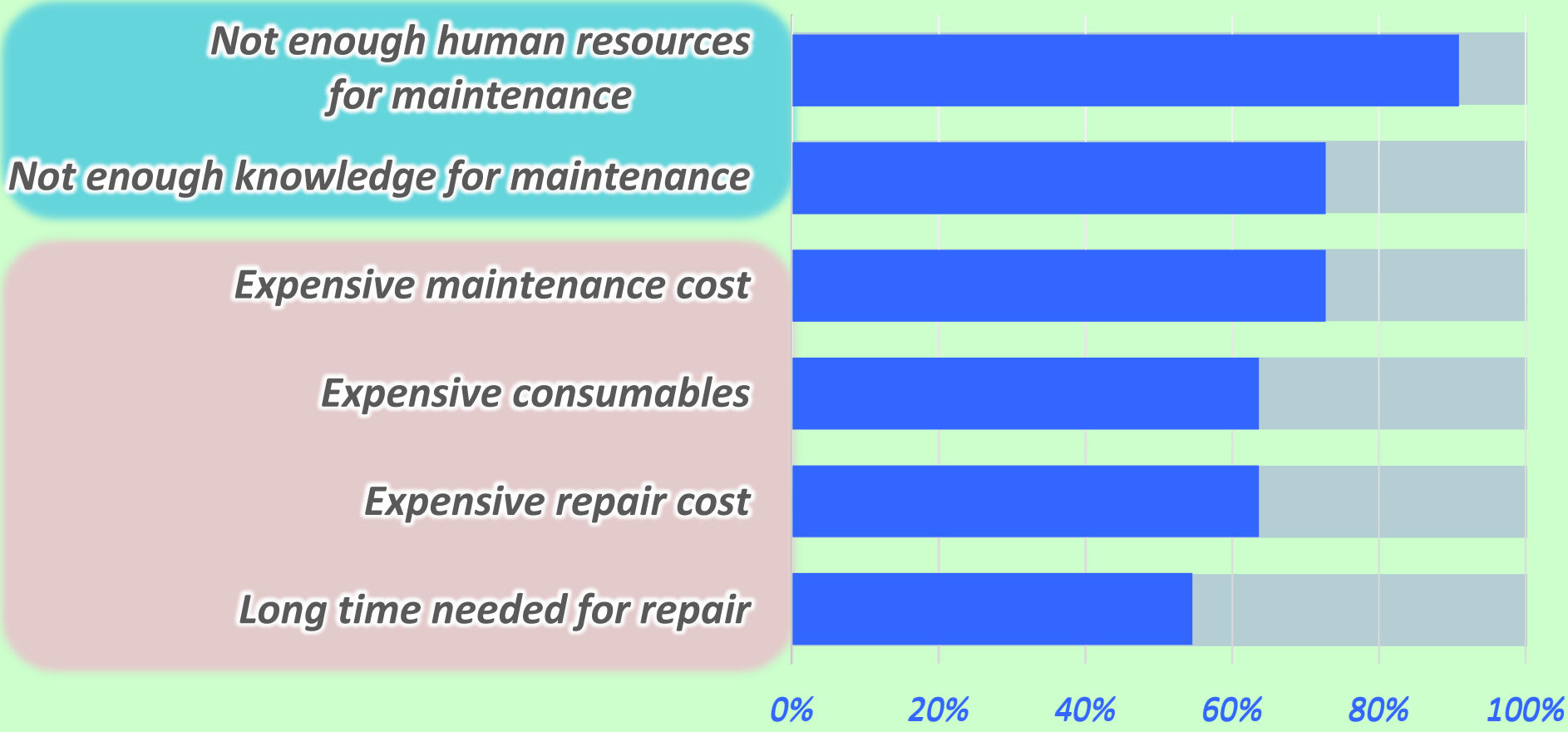
Answers are…



Results of Questionnaire Survey

Q. What bothers your Service most in operation of your radars?

Answers are…



Results of Questionnaire Survey

Q. Challenges for your Service to deploy/replace radars?
Q. Challenges for your Service to promote utilization of radar data?

Operation
Installation / Replacement

- *Ensuring budget 91%*
- *Ensuring land, power supply & communication line 73%*
- *Maintenance 73%*
- *Operation 64%*

Observation
QC / QPE / Rainfall Monitoring

- *Knowledge for considering radar specification 64%*
- *Quality control 82%*

Utilization
Data application (e.g. Nowcasting)

- *Better understanding of the necessity of radar data (by Users) 73%*
- *Learning techniques of radar data utilization 73%*

Survey in Indonesia

×41

21-22 Jan 2019

NMHS/BMKG HQ in Jakarta

- Extension of radar coverage by installing additional radars
- Expensive maintenance cost and limited spare-parts availability

- Unstable power supply and data network access (especially in the eastern part)
- Radio wave interference in urban areas
- Needs more number of skilled radar and IT technicians

Survey in Lao PDR

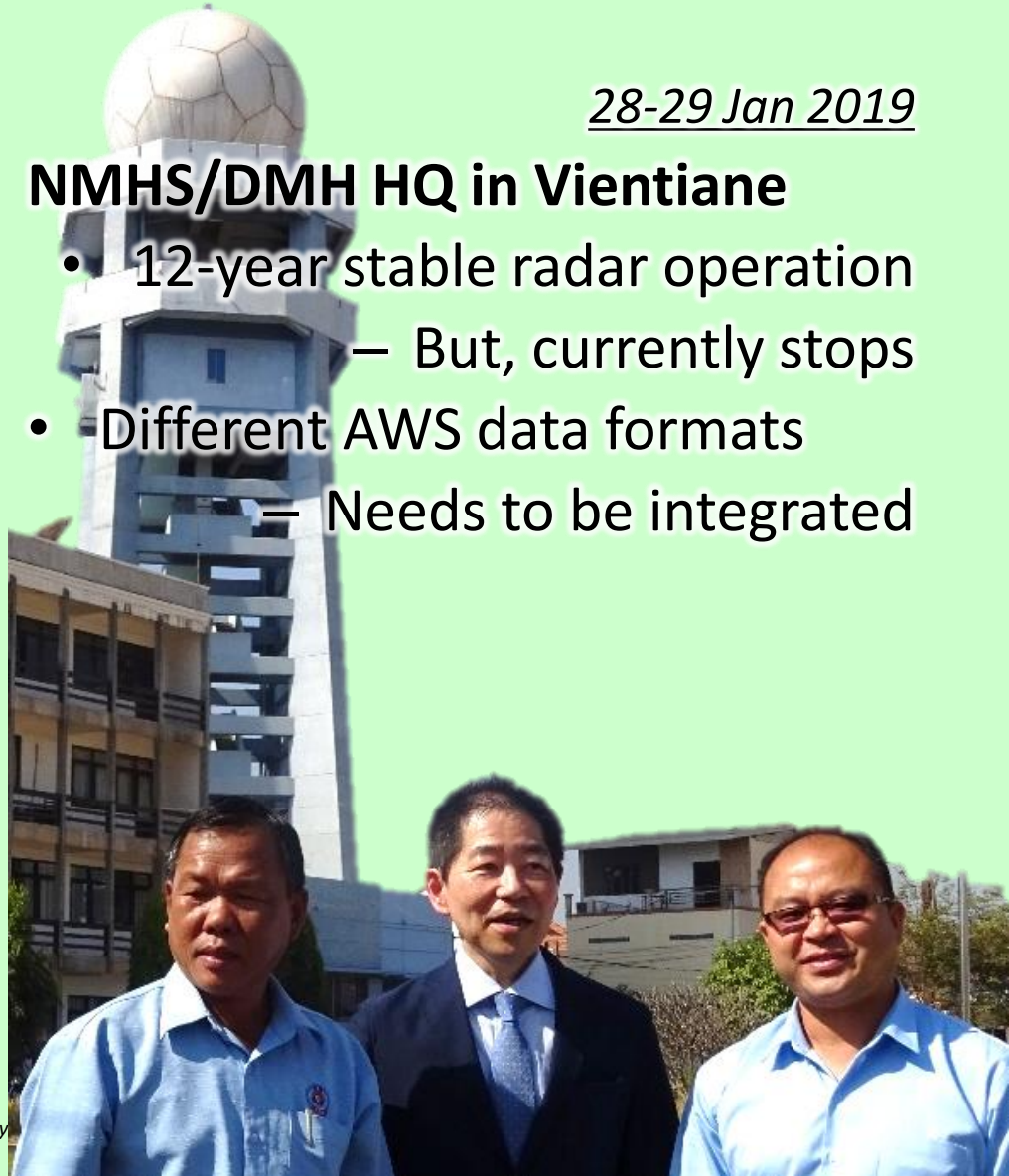
×1

28-29 Jan 2019

NMHS/DMH HQ in Vientiane

- 12-year stable radar operation
  - But, currently stops
- Different AWS data formats
  - Needs to be integrated

- Network access
  - Unstable and high cost
- Not enough human resources
  - Requirement for Nowcasting



Survey in Cambodia

×1

31 Jan to 1 Feb 2019

NMHS/DOM HQ in Phnom Penh

- Not enough human resources
- Expensive maintenance cost
- Radar beam cut due to tall buildings

Survey in Myanmar ×3

4 Feb 2019

NMHS/DMH HQ in Naypyidaw

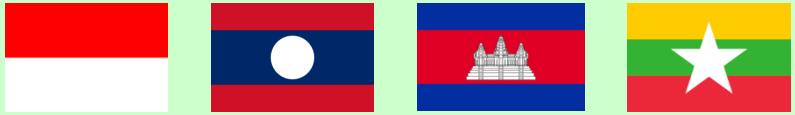
- Extension of radar coverage by installing additional radars
- Data sharing with different AWS systems
- Preparation of spare parts

5 Feb 2019

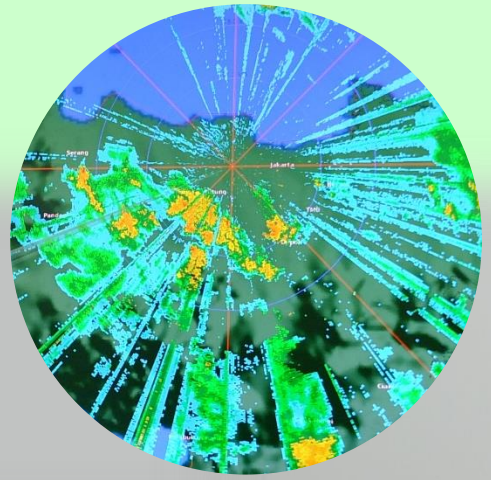
NMHS radar site in Yangon

- Possibility of increasing radar beam cut due to tall buildings
- Not enough skilled radar mechanics and meteorologists

Summary of Survey in the Four Countries

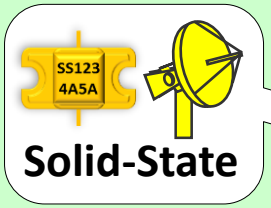


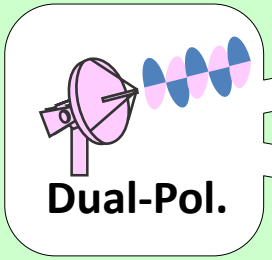
- **Not enough human resources**
  (Mechanics, IT engineers and radar meteorologists)
- **High maintenance costs**
- **Various data formats from various donors**
  (Needs to be integrated)



- **Radio wave interferences** due to other radars, WiFi, etc.
- **Radar beam cut** due to urbanization.

Steps toward Integrated Regional Radar Network





Better Radar Operation

Quality Control

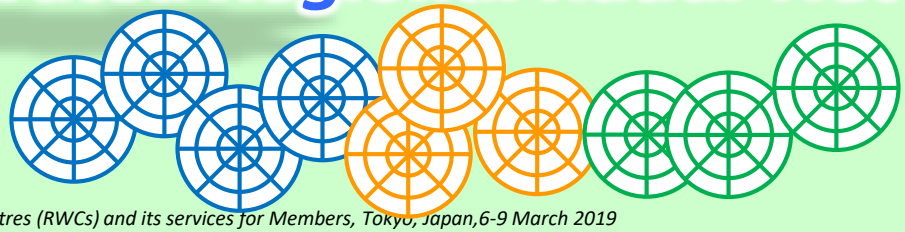
Quantitative Precipitation Estimation

Domestic Radar Composite

Capacity Building

Mutual cooperation and exchange of information among the countries…

Integrated Regional Radar Network



One solution: Solid-State Weather Radar

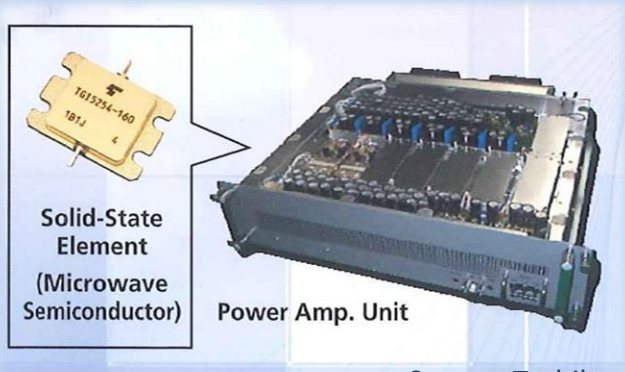
Conventional Radars

Magnetron Radar 1950~

Klystron Radar 1990~

Solid-State Weather Radars

- ✓ Downsizing
- ✓ Longer lifecycle
- ✓ Easer maintenance
- ✓ Lower power consumption
- ✓ Effective frequency utilization



Source: Toshiba

Higher cost-performance and more reliable

S band

Source: JICA

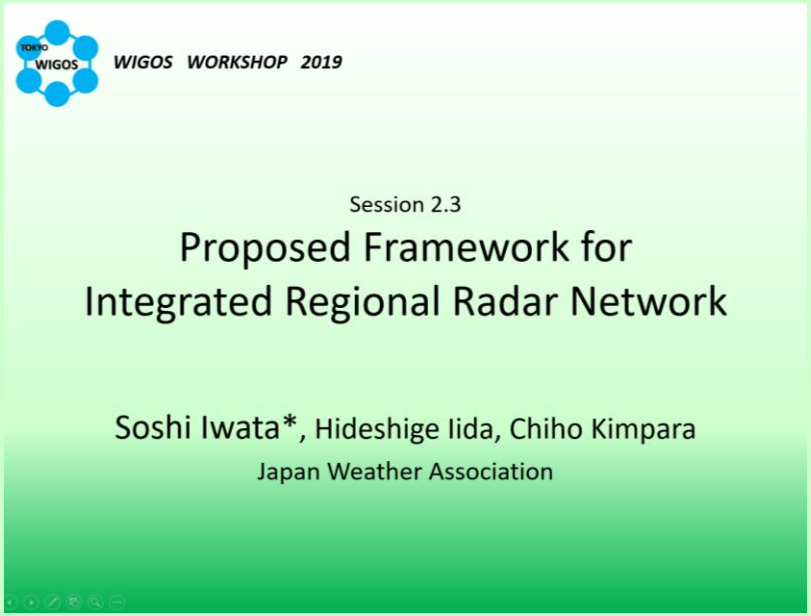
C band

Source: JMA

X band

Source: MLIT

Thank you very much for your kind attention!



S band

Source: JICA

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Solid-State Weather Radars

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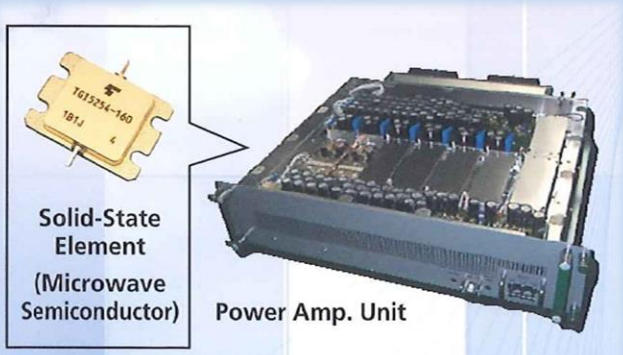

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Higher cost-performance and more reliable