AN INTELLIGENT REMOTE MONITORING SYSTEM FOR DAM SAFETY

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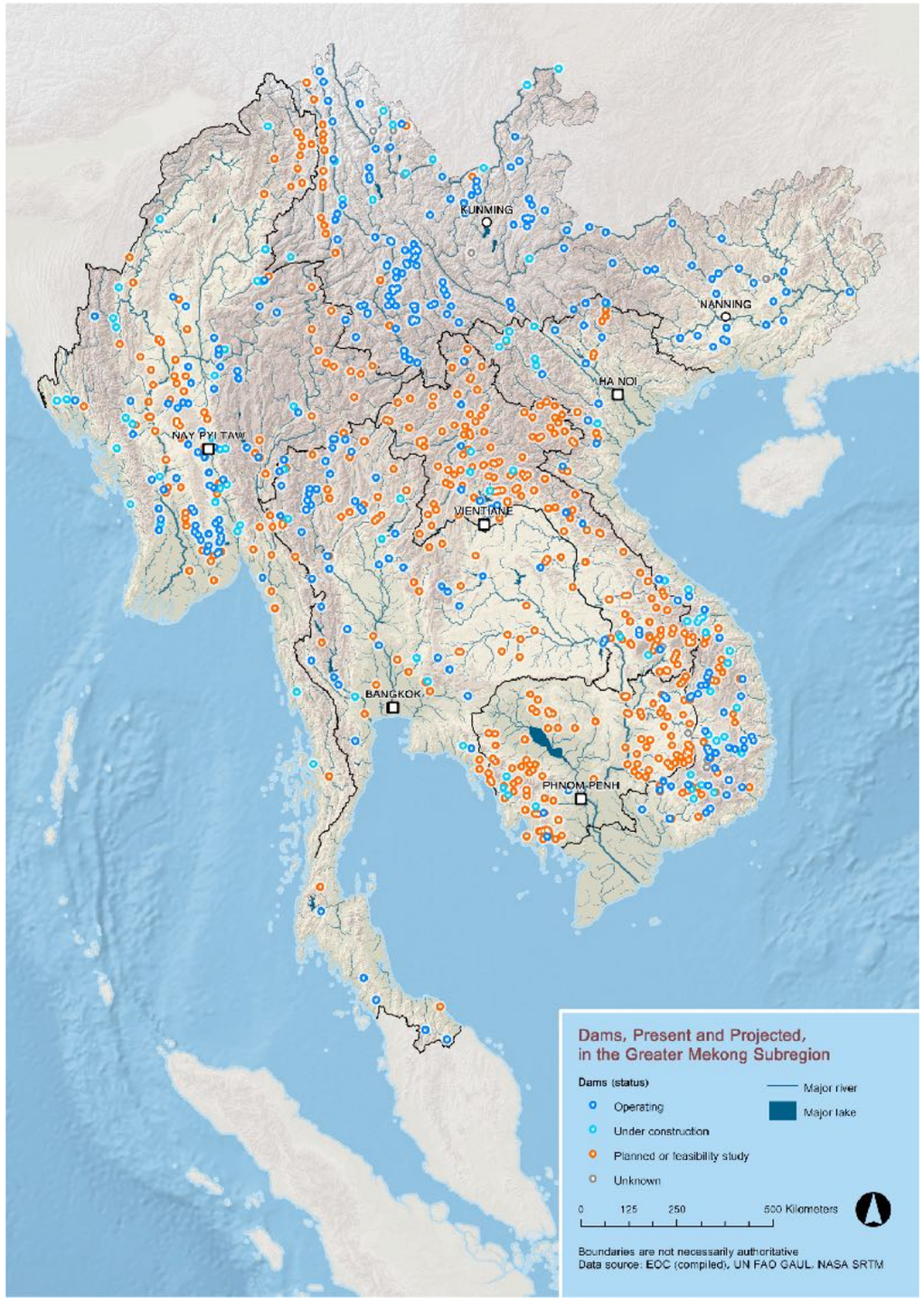
OUTLINE

- Background
- Objectives and Output
- Q&A

BACKGROUND

- Thailand
  - 4,000 dams
  - 35 large and medium dams under Electricity Generation Authority of Thailand (EGAT)
- Myanmar
  - 200 large dams
  - 2 hydropower projects by EGAT
- Lao PDR
  - 85 hydropower projects

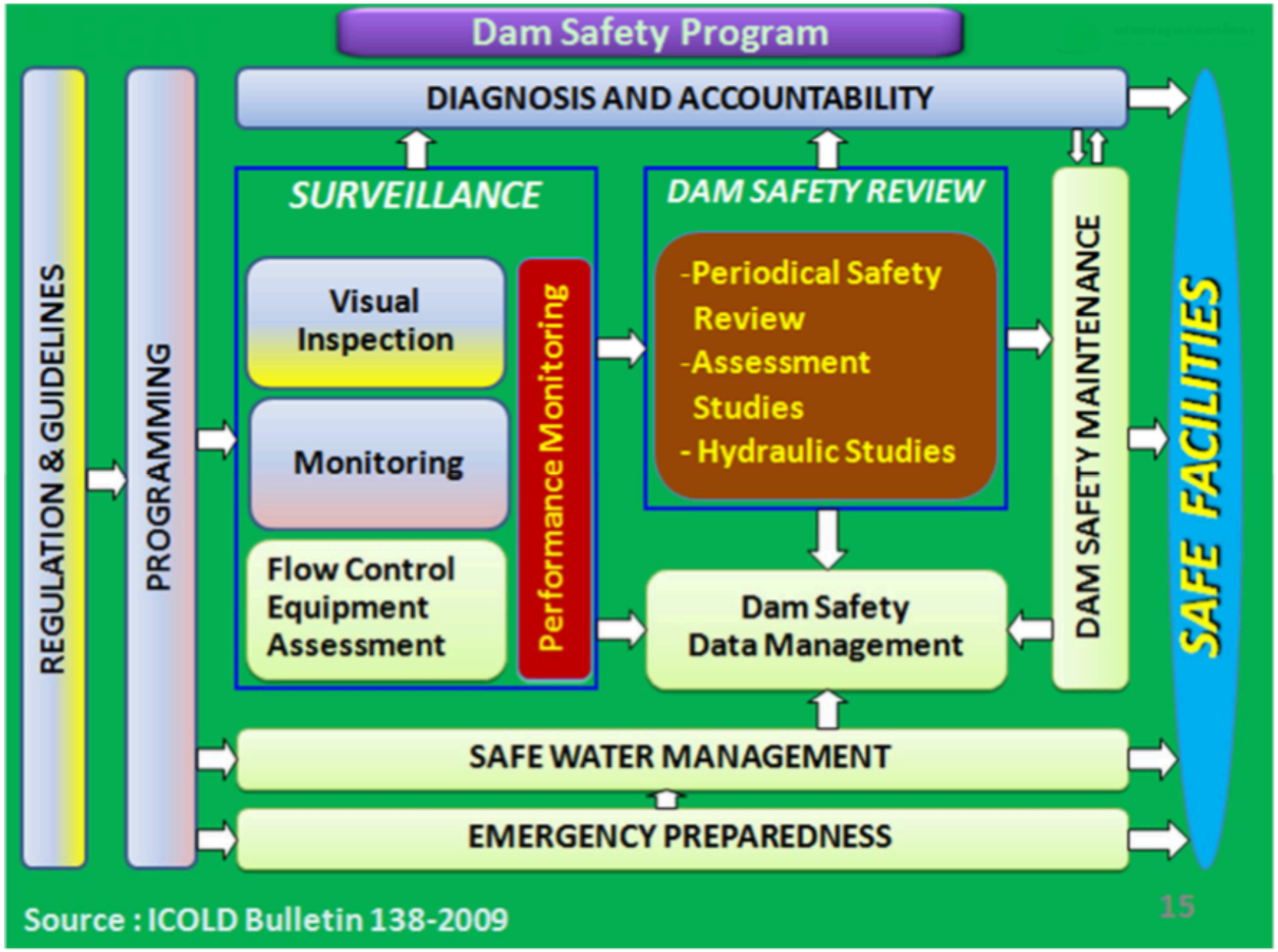


Source : Greater Mekong subregion information portal

http://portal.gms-eoc.org

DAM SAFETY PROGRAM RECOMMENDED BY ICOLD

- EGAT follow Dam Safety Program by International Commission on Large Dams (ICOLD)



DEVELOPMENT OF DAM MONITORING SYSTEM

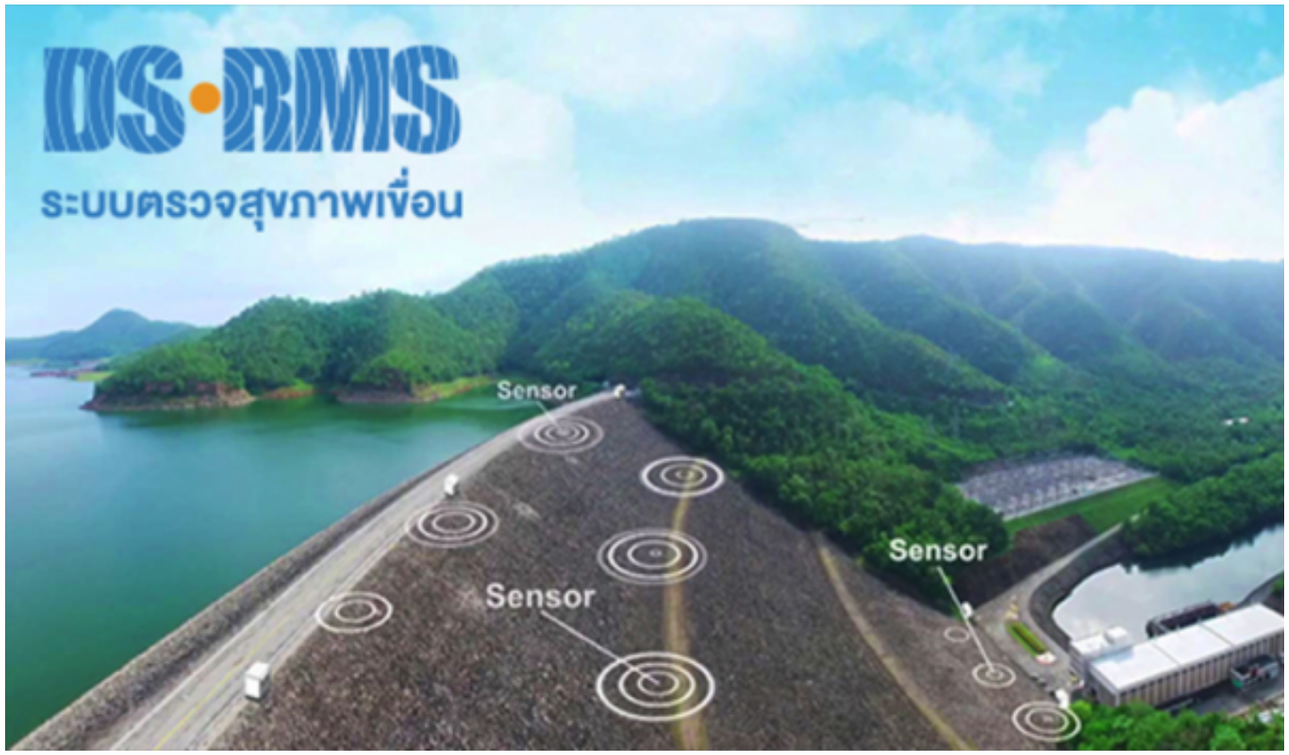
1991 MIDAS — IMPORTED

1997 ADAS I — IMPORTED

2011 ADAS II — EGAT, NECTEC (a member of NSTDA)

2016 DS-RMS — EGAT, ERD (Geotechnical Engineering Research & Development Center, Kasetsart University), NECTEC (a member of NSTDA)

- Turn-key solution
- Expensive
- Hard to maintenance
- Obsolete spare parts

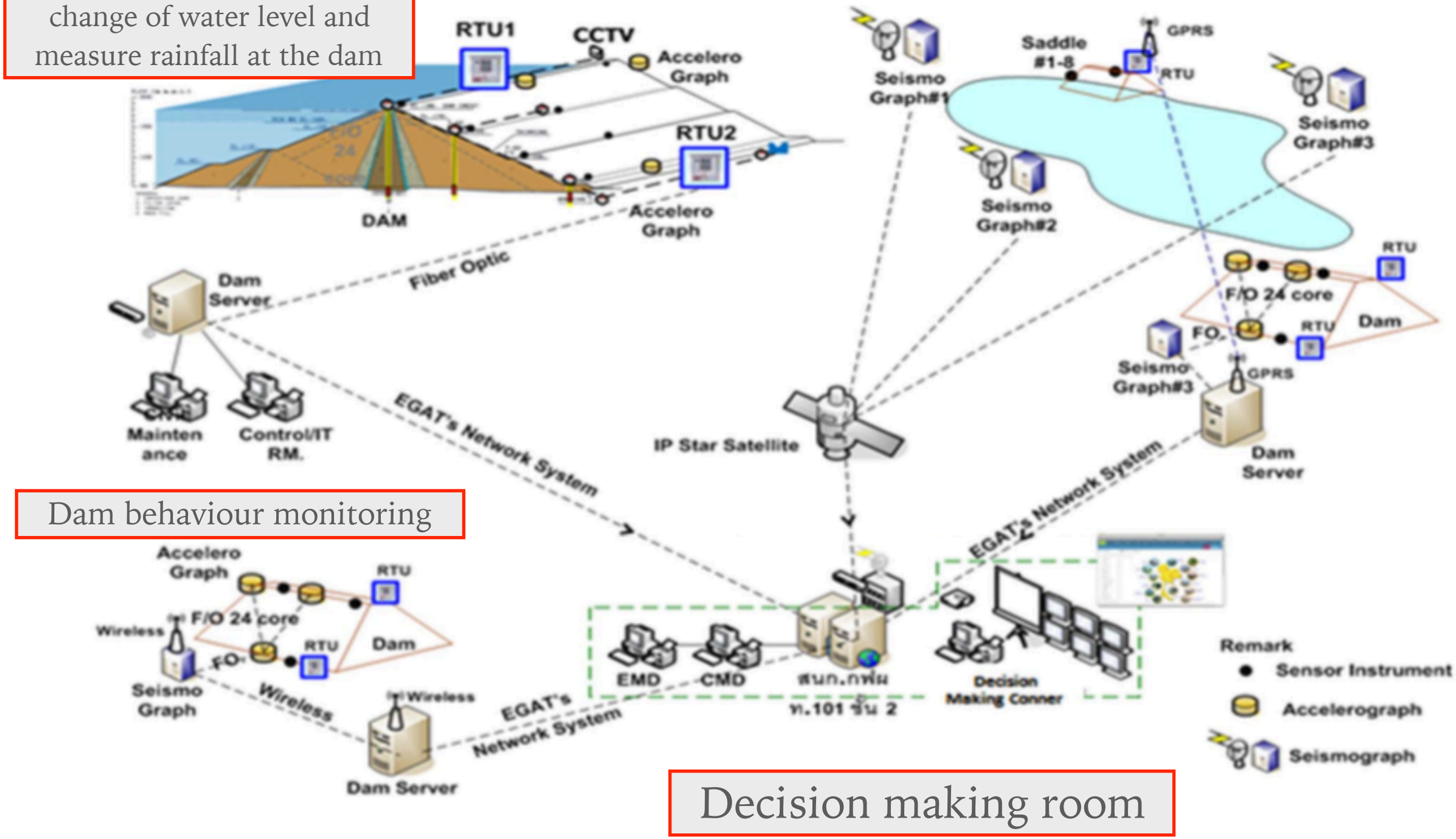


DS-RMS SCHEMATIC

Reservoir operation

Evaluate inflow based on change of water level and measure rainfall at the dam

Earthquake monitoring

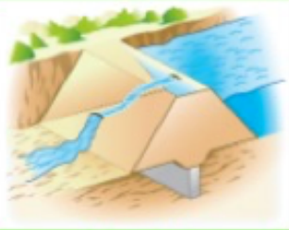


DECISION SUPPORT SYSTEM

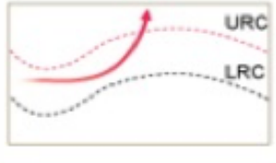
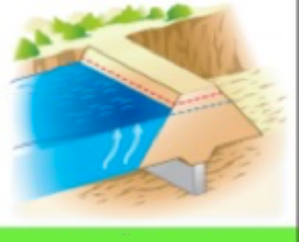
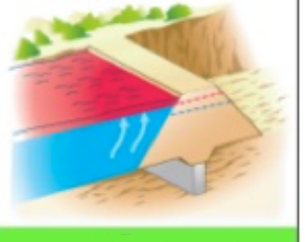
- Evaluate dam safety
- Display cause of problems

★ Expert system

Static condition

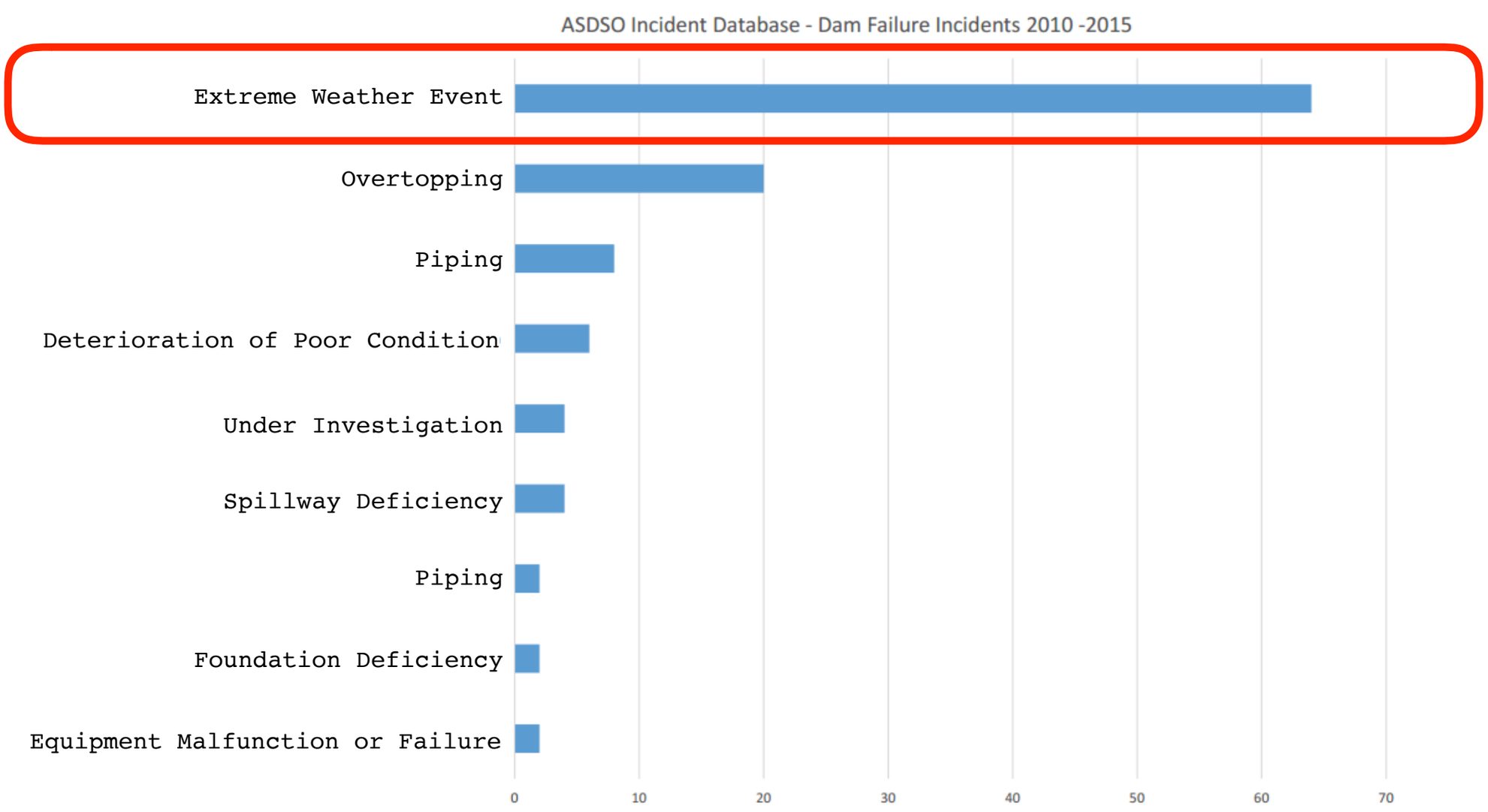
Normal	Normal	Normal	Normal	Normal
				
Seepage through embankment	Seepage through dam foundation	Seepage through embankment into dam foundation	Slope instability	Excessive crest settlement

Flood condition

Normal	Normal	Normal
		
Water level can be over URC	Water level can be over NWL	Water level can be over MWL

CAUSE OF DAM FAILURE INCIDENTS, 2010–2015

- 60% come form extreme weather event
- Association of State Dam Safety Officials
- https://damsafety.org/dam-failures

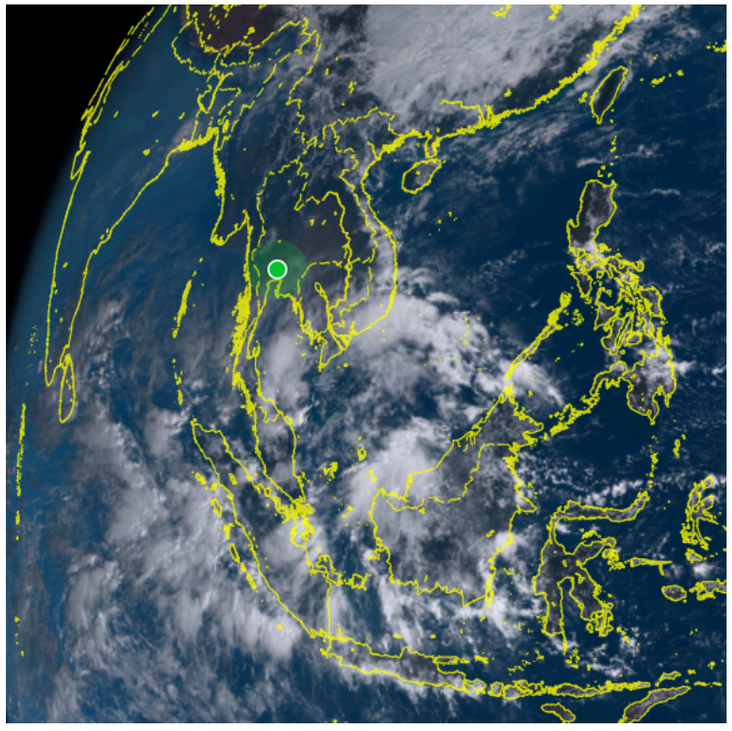


EXTREME WEATHER EVENT MONITORING

- ➤Evaluating inflow based on change of water level and measure rainfall at the dam can be too late
- ➤To forecast rainfall and storm by satellite images
- ➤To monitor upstream water level for evaluating actual inflow by visual IoT cameras

Source : https://google.com/maps

Source : https://www.egat.co.th



Source : https://himawari8.nict.go.jp

OBJECTIVES

- To forecast rainfall and storm
  - Using HIMAWARI-8 satellite images
- To enhance inflow measurement system
  - Using visual IoT camera to monitor water level
  - Using new low-power long-range-communication tropical-environment weather station to measure rainfall around reservoir

OUTPUT

- An Intelligent Remote Monitoring System for Dam Safety platform for this region
- Improve dam safety operation in this region

ASSOCIATION OF SOUTHEAST ASIAN NATIONS

Questions?