Technological challenges when introducing new technologies for risk reduction

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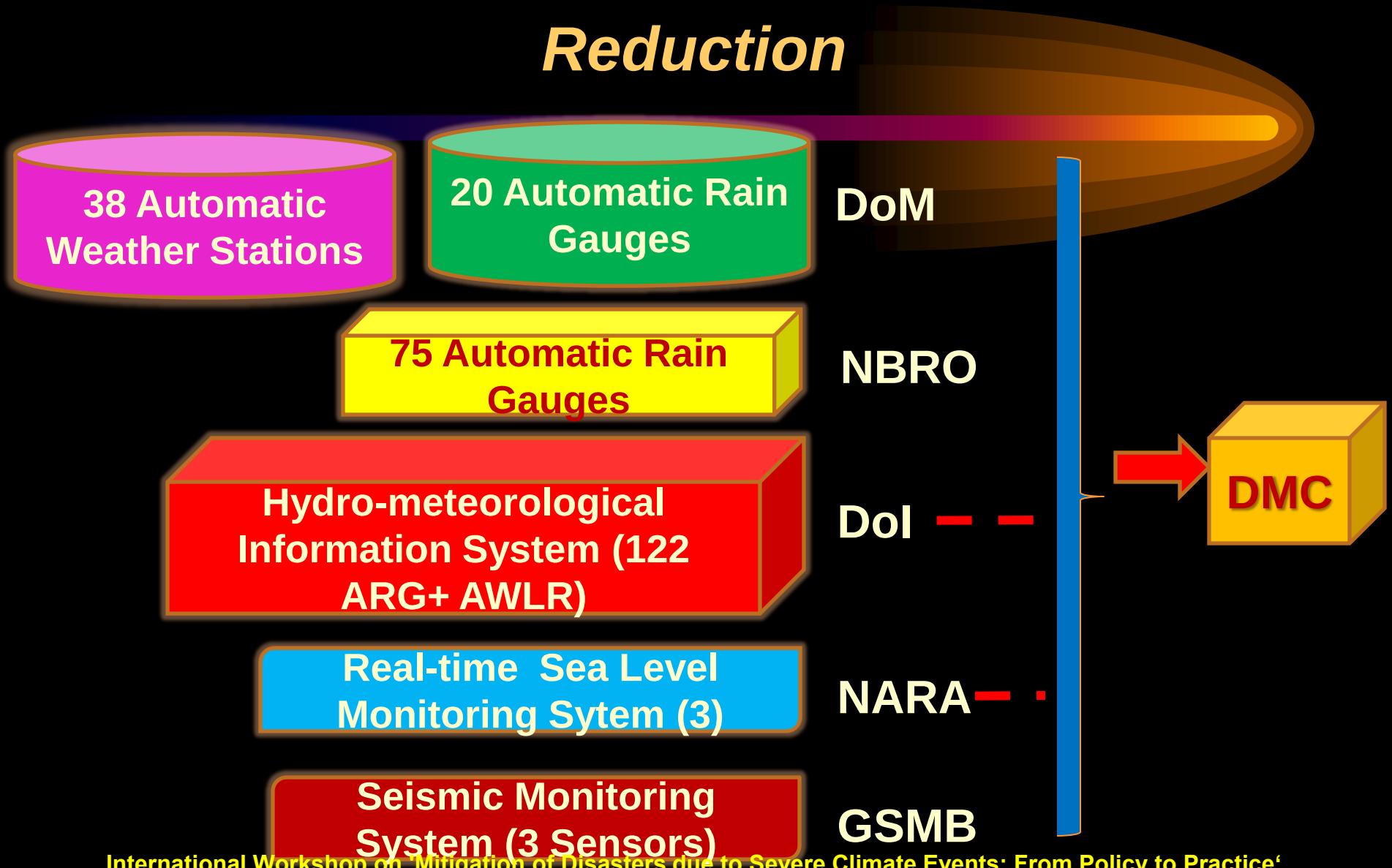
Natural Hazards in Sri Lanka

- Flood / Flash Flood
- Landslides

- Strong Winds
- Cyclones
- Drought
- Lightning

In Sri Lanka, over 90% of natural disasters are weather or climate related.

Automatic Data Acquisition Systems used in Sri Lanka towards Disaster Risk Reduction



Automatic Weather Station (AWS)

- **AWS play significant role in weather forecasting.**

- **With the advancement of modern technology, information gathered from AWS can be disseminated in more frequency.**

AWS Users

Government users

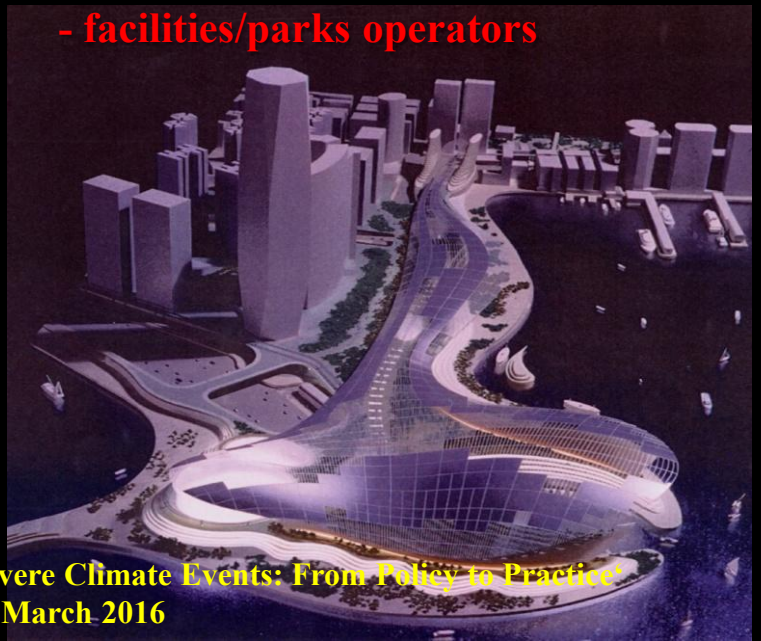
Forecasters, Engineers, Town Planners

AWS data for:

- building design
- airflow modeling
- air ventilation studies
- landslip monitoring/warning
- design storm profiles
- drainage design
- flood monitoring , forecasting & warning

-the public
- tourists
- facilities/parks operators

design storm profiles



AWS Network in Sri Lanka

20 Principal Stations

- Anuradapura
- Badulla
- Batticaloa
- Colombo
- Bandarawela
- Galle
- Hambantota
- Jaffna
- Katugastota
- Katunayake
- Kurunegala
- Maha Illuppallama
- Mannar
- Nuwara Eliya
- Pottuvil
- Puttalam
- Ratmalana
- Ratnapura
- Trincomalee
- Vauniya

18 Collaborative Stations

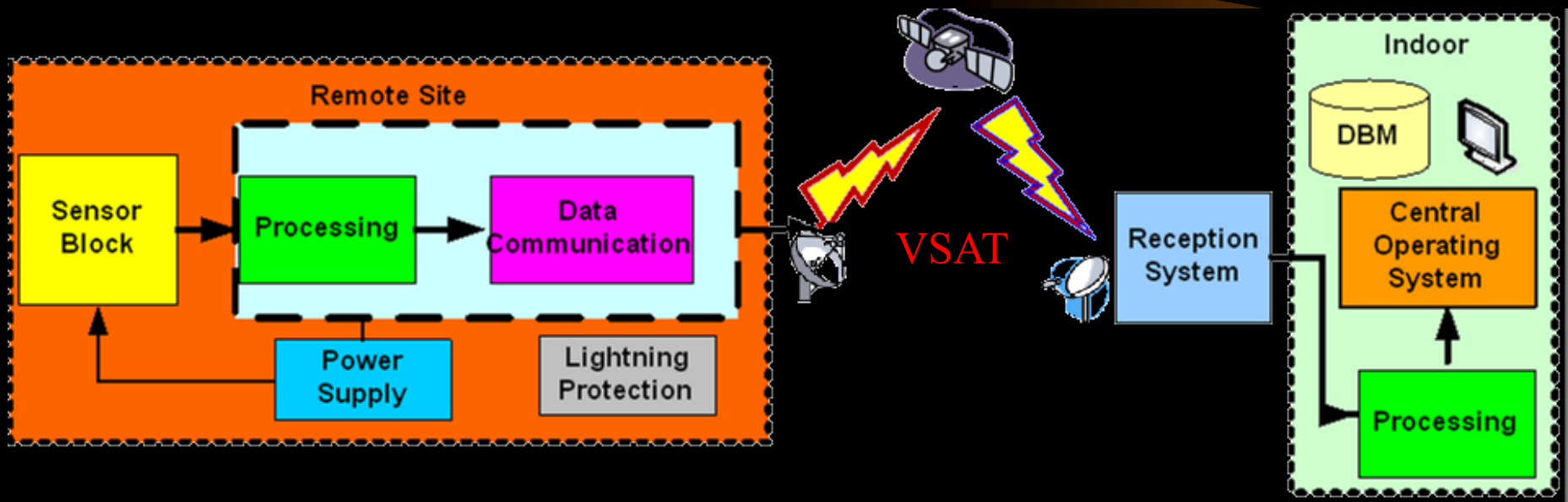
- Wagolla
- Polonnaruwa
- Moneragala
- Matale
- Sevanagala
- Angunukolapelessa
- Ampara
- Matara
- Deniyaya
- Horton Plains
- Mt. Pidurutalagala
- Aralaganwila
- Balangoda
- Maliboda
- Labugama
- Tawalama
- Kudawa
- Sirikandura

Main Objectives of the Study

- **Study performance or behavior of the AWS network during 2009-2015 period.**
- **Find possible causes for failures.**
- **Minimize such failures in future projects.**
- **Possibility to develop National Guidelines for Automatic Data Acquisition Systems.**

In this study we consider performance of 21 AWS

AWS System



- Sensors
- Solar Power
- Data Base

- Processing
- Lightning Protection
- COS

- VSAT
- Receiver
- Display

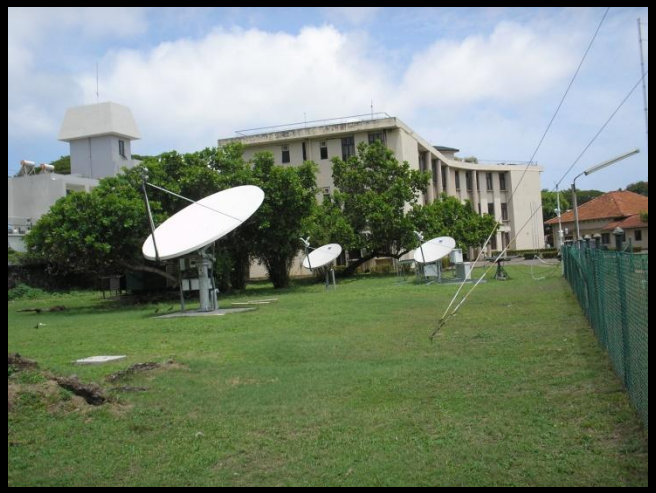
Sensors are the Heart of the System

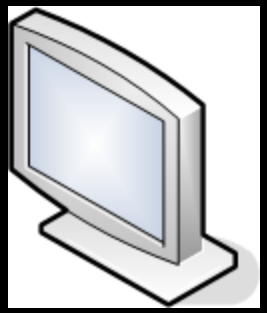
AWS Network

AWS System

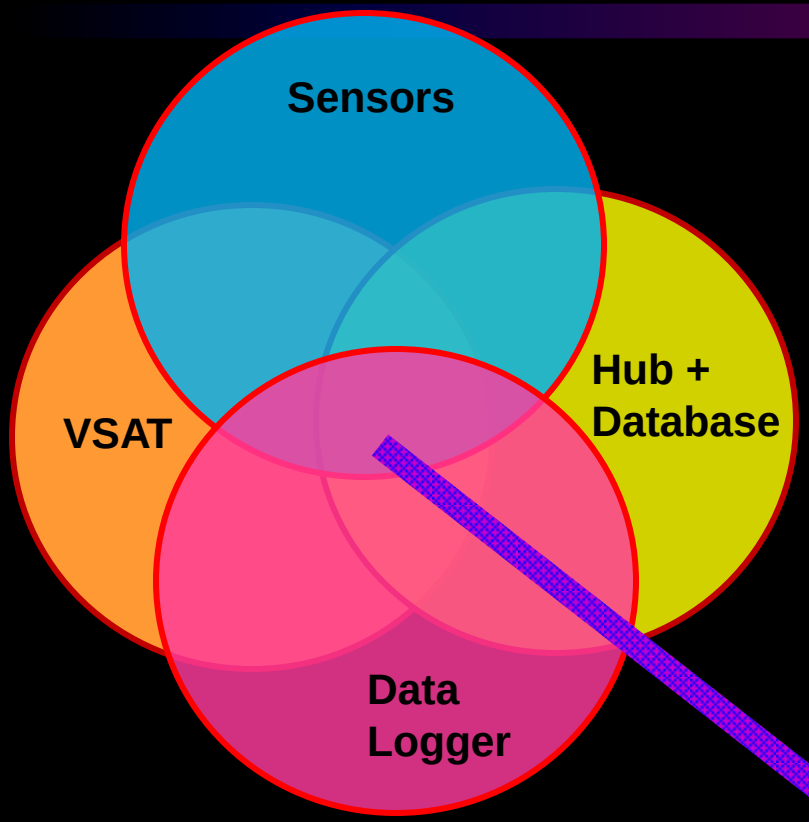
VSAT System

COS+ Display





Successful Operation of AWS Network



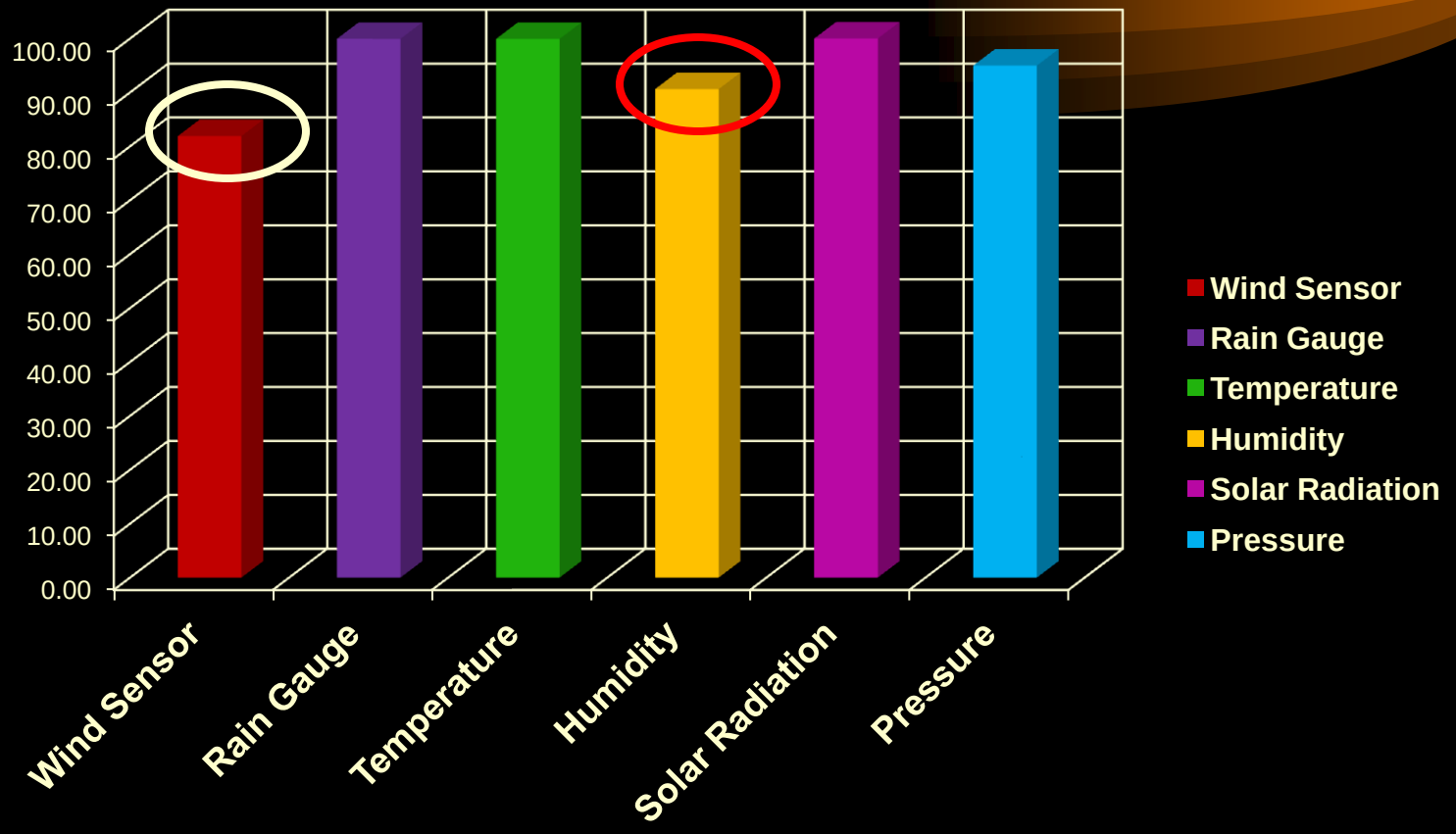
Performance of Sensors, Data Logger, VSAT , Hub and Data Base was verified. 10 Minute Data x 144 x 365x 6 years = 315,360 Data

"Successful Operation" is obtained when all these sub systems are in perfect operation.

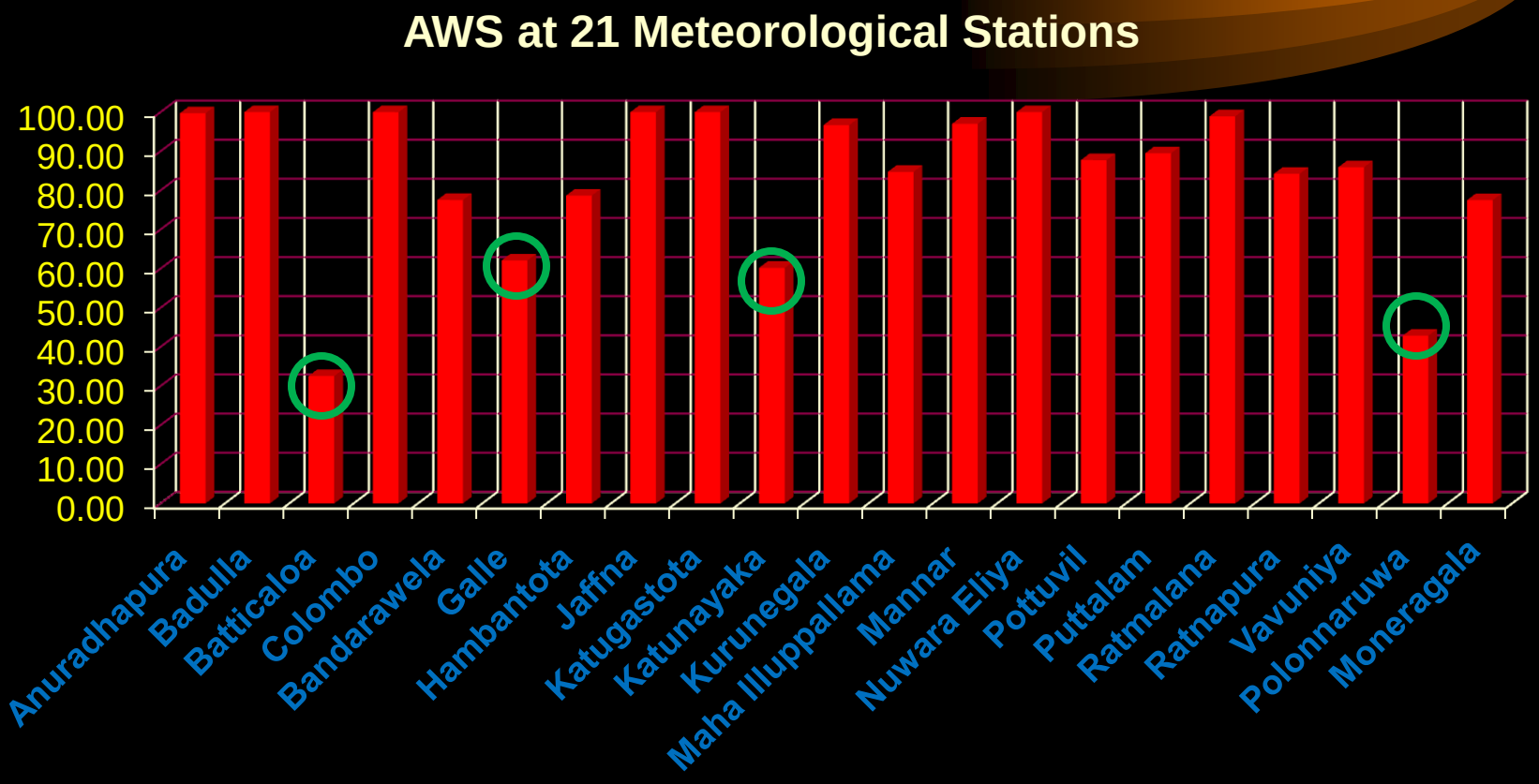
Successful Operation of AWS Network

Behavior of Sensors (2009-2015)

(AWS at 21 Meteorological Stations)

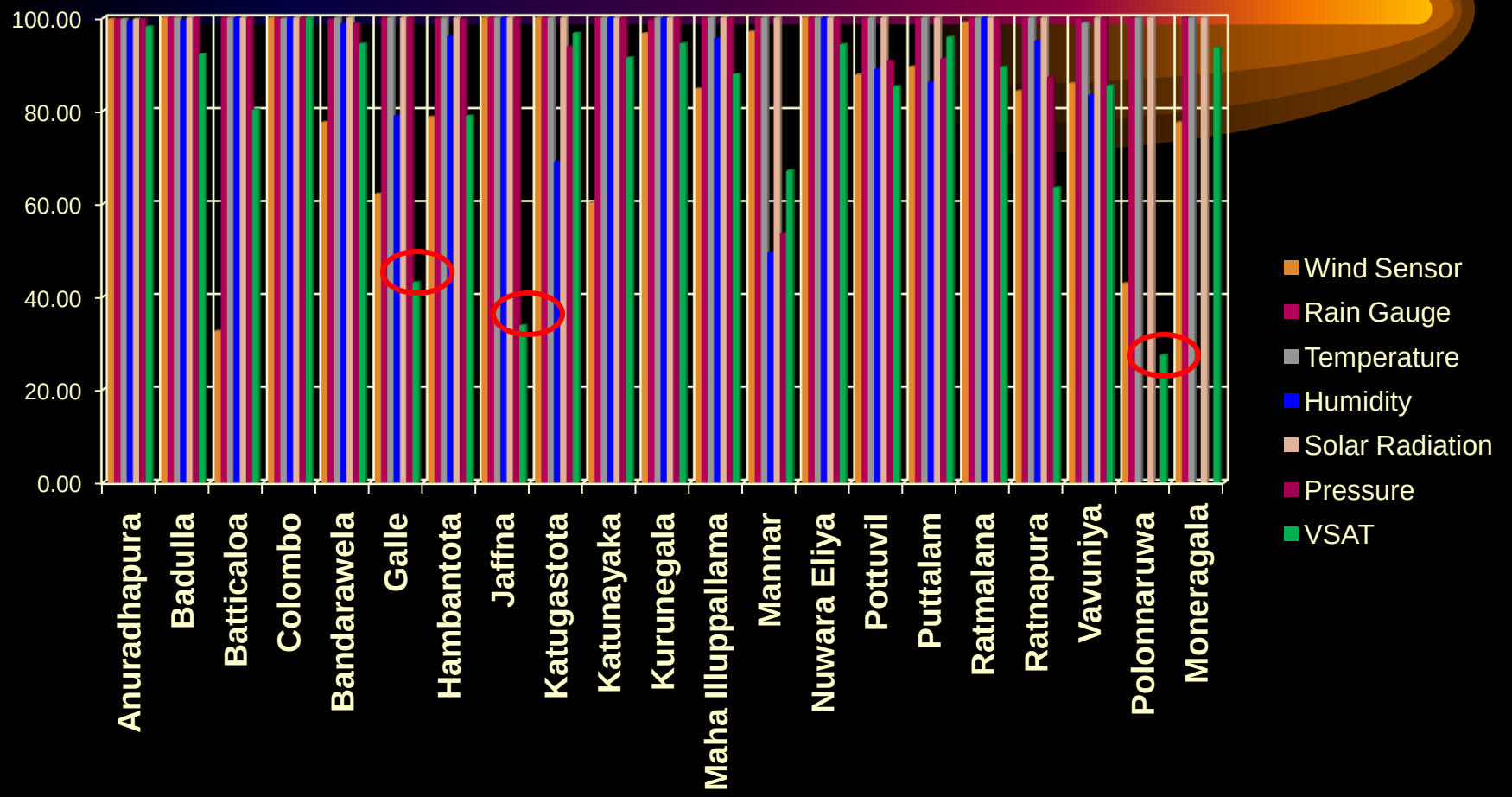


Performance of Wind Sensor (2009-2015)



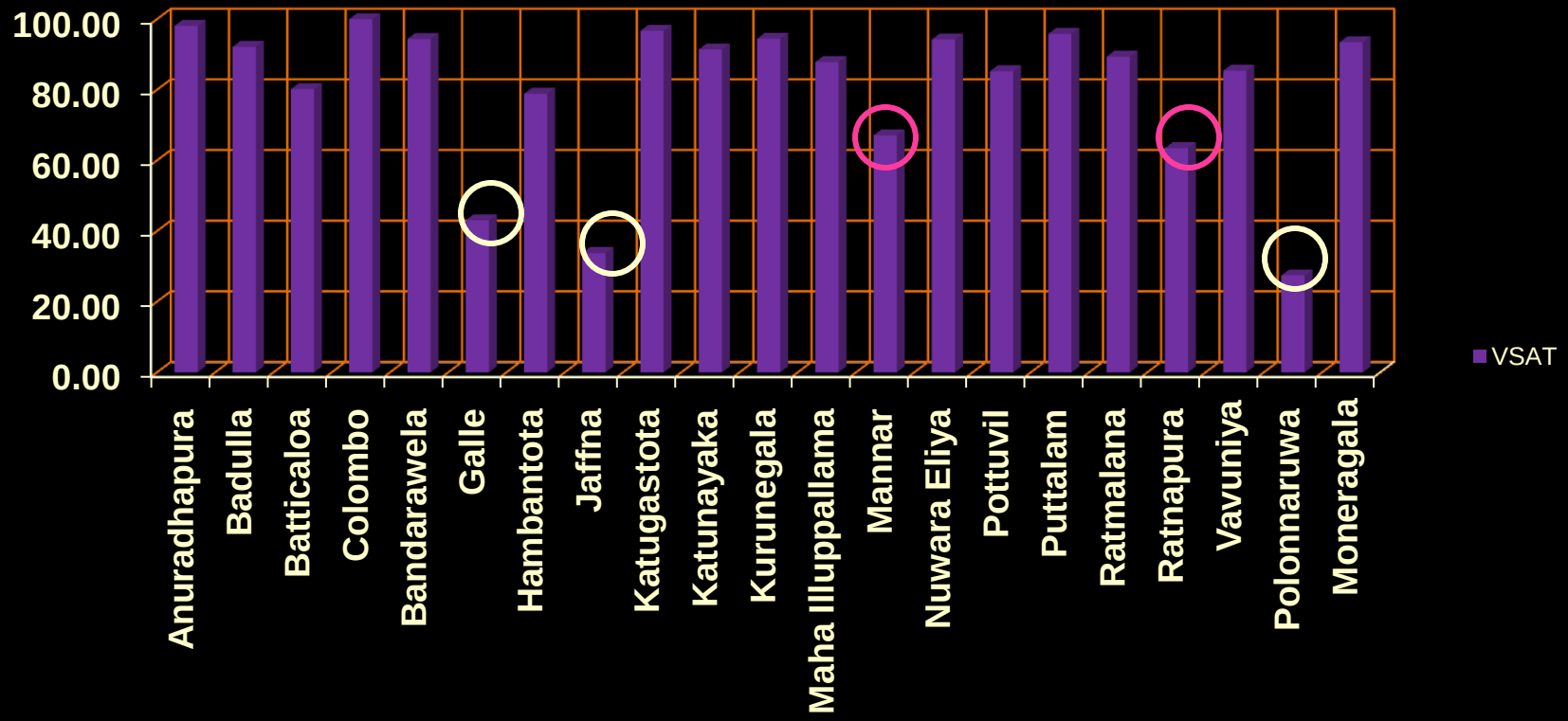
Performance of AWS (2009-2015)

AWS at 21 Meteorological Stations

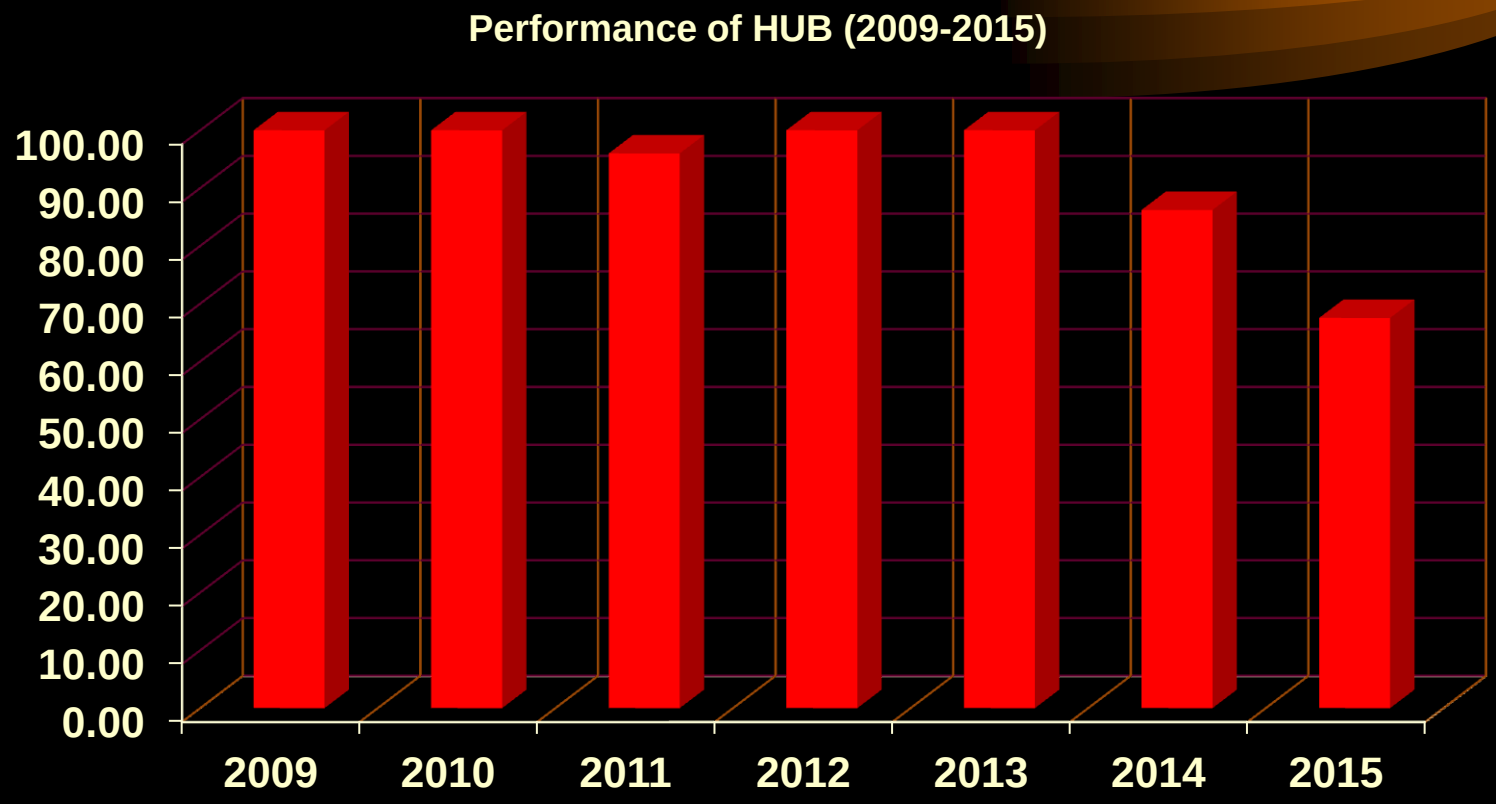


Performance of VSAT (2009-2015)

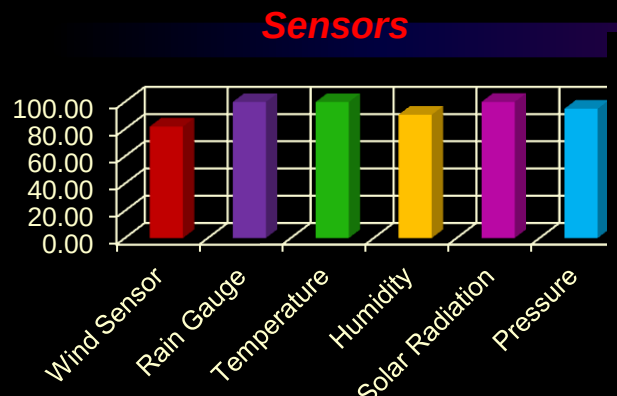
At 21 Meteorological Stations

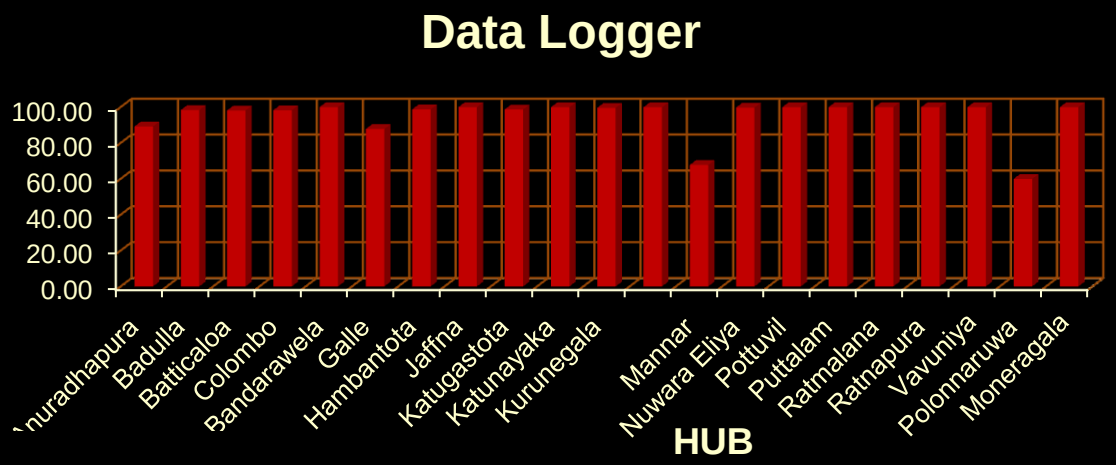


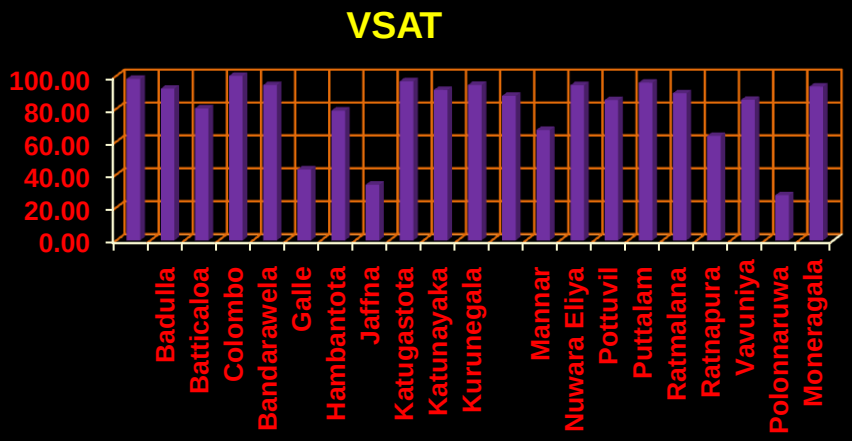
Performance of VSAT HUB

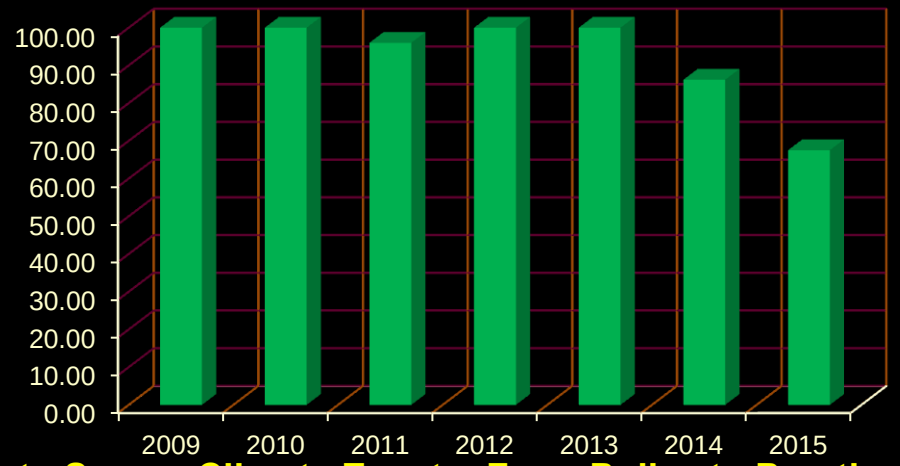


Performance of AWS









Reasons for Failures

Site Specific

- Signal Interference
- Obstacles

Environmental

- Corrosion
- Salinity
- Dusty

Natural Cause

- Lightning
- Overcast > 3 days

Unexpected

- Bird strikes
- Burglary /theft
- Insect Invade

Other

- Some sensors/equipment are not Hermetic Type.
- Satellite is aged.

Conclusion

- Signal Interference, Obstacles .etc shall be considered and avoided during Site Selection .
- Higher IP Standards (at least IP 54) shall use for Data Logger Enclosure, specially in coastal areas.
- Hermetic Type sensors shall be used specially for Wind.
- After introducing ‘Bird Protector’ for the wind sensor, considerable improvement is noted.
- Redundant Sensors shall be used for Wind and RH.
- Redundant Communication Link is essential.
- Solar Energy Index to be revalidated or Battery Capacity to be improved.

Future Work

- **Prepare National Guidelines for Disaster Risk Reduction oriented Automatic Data Acquisition Systems.**

Thank you for your kind attention