ASEAN Forum for Software Defined System on Disaster Mitigation and Smart Cities

ASEAN IVO Forum 2018, Jakarta

28 November 2018, Jakarta, Indonesia

Outline

- Background
- Recap: Focus Areas
  - Visualization of Distributed Environmental Data
  - SDN-IP Peering for IoTs Data Transmission (Resilient Transnational Network with SDN-IP)
  - SDN/NFV Infrastructure for Disaster Mitigation and Smart Cities
- Project Activities
- Evolution of Reference Architecture/Blueprint
- Related Publications and Presentations
- Moving Forward

ASEAN Forum for Software Defined System on Disaster Mitigation and Smart Cities

Goals: This project addresses the impact of climate change on cities and urbanization, with particular relevance to the priority area of improving environmental resilience and more specifically in disaster mitigation.

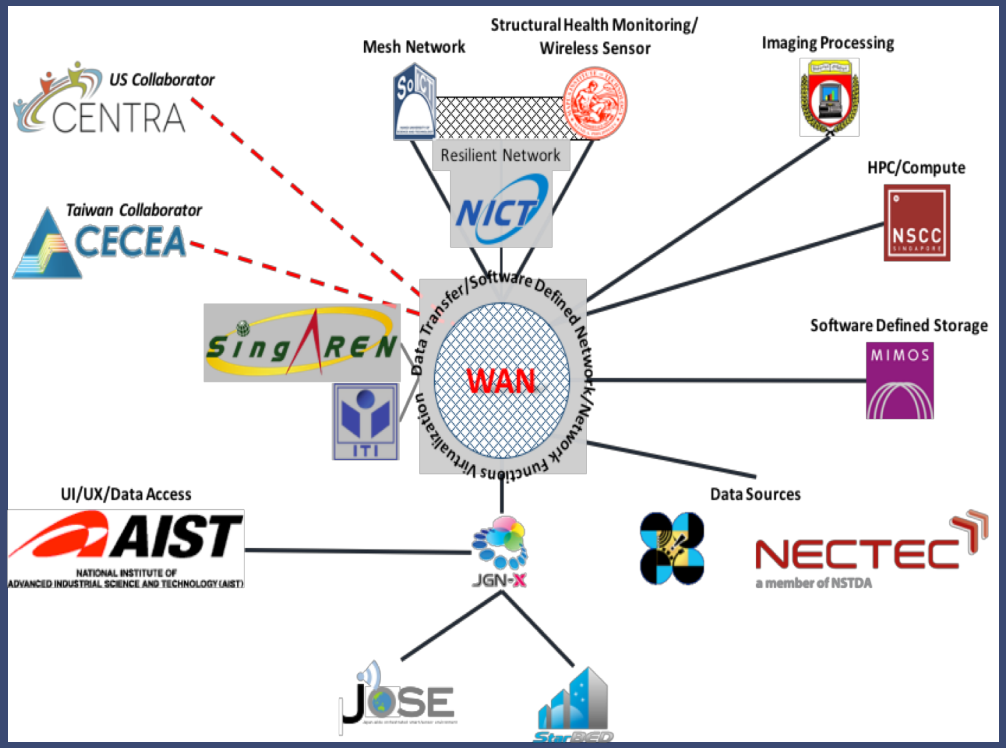
Activities:

- Develop a Software Defined System architecture blueprint for disaster mitigation, crisis communication, and emergency management that can monitor and report disaster events in near-real-time.
- Investigate programmability aspects of IoTs technologies, networking, and edge/cloud computing platforms.
- Conduct field testing of potential use cases using NICT's existing testbeds such as JGN-X, Starbed, and JOSE.
- Organize workshops with ASEAN members to disseminate R&D results.
- Dialogue with PRAGMA (NSF, US), CENTRA (NSF, US), and CECEA (Taiwan) on similar R&D challenges to accelerate project activities.

ASEAN Forum for Software Defined System on Disaster Mitigation and Smart Cities

	Member	Affiliate Institution	Country
1	Jason HAGA	AIST	Japan
2	Eiji Kawai	NICT	Japan
3	Hiroshi Kumagai	NICT	Japan
4	Hong H. ONG	MIMOS	Malaysia*
5	Jing Yuan LUKE	MIMOS	Malaysia
6	Myint Myint SEIN	University of Computer Studies, Yangon	Myanmar
7	Alejandro H. Ballado Jr.	Mapua Institute of Technology	Philippines
8	Jelina Tanya H. Tetangco	ASTI	Philippines
9	Bu Sung LEE	SINGAREN	Singapore
10	Kanokvate Tungpimolrut	NECTEC	Thailand
11	Hong Son NGO	Hanoi University of Science and Technology	Vietnam
12	Van Dzung DINH	Vietnam National University (Hanoi)	Vietnam

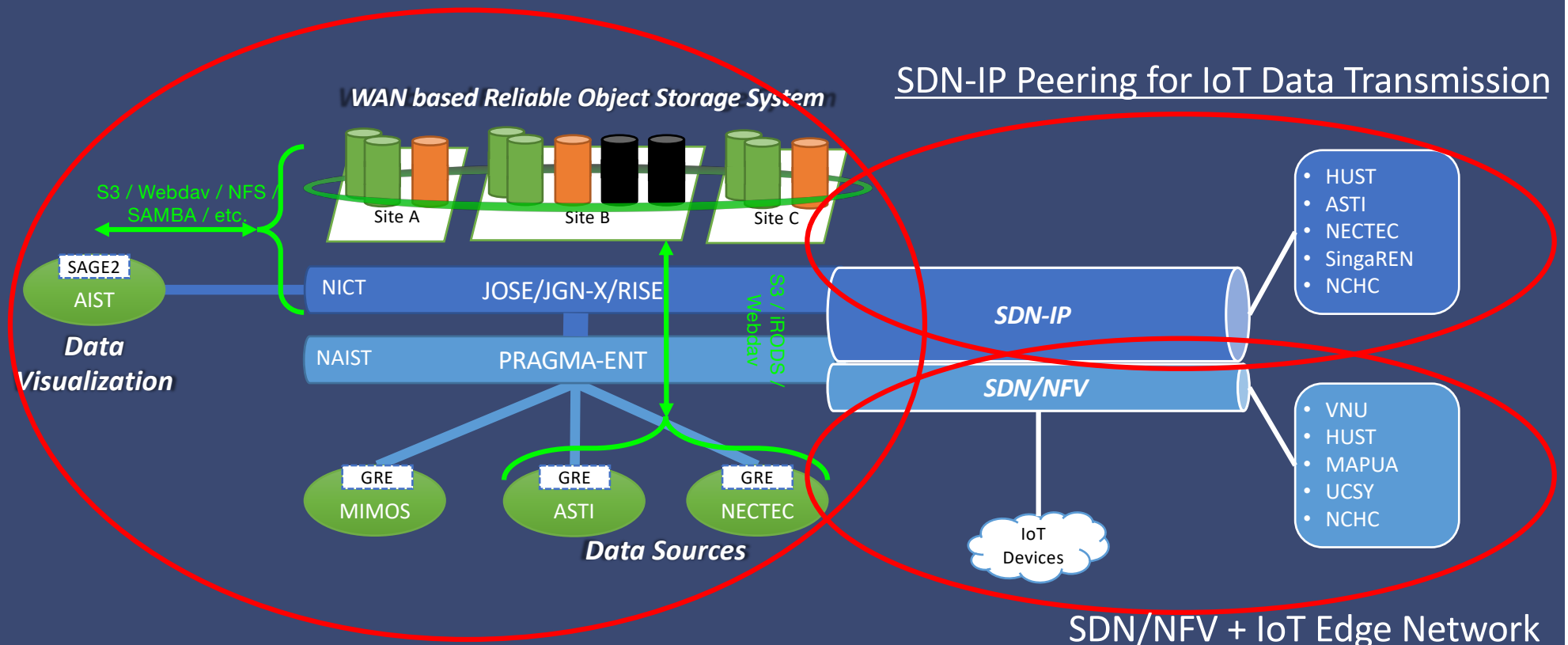
Project Partners
(7 countries, 10 institutions)



Project Partners Work Areas

Recap of Focus Areas (@December 2016)

Visualization of Distributed Environmental Data



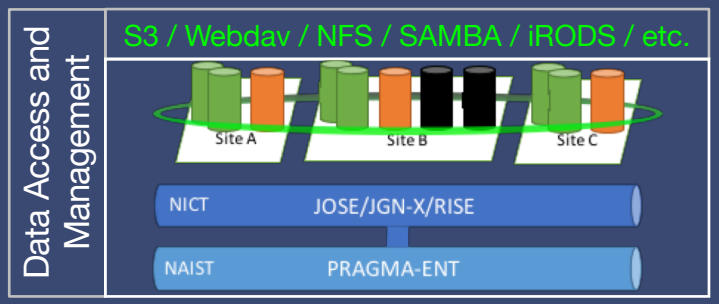
Recap: Visualization of Distributed Environmental Data

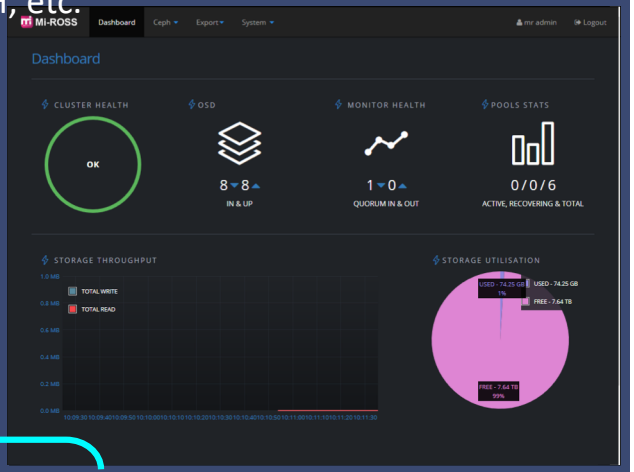
Data Visualization

SAGE2

More apps: e.g. 3Di Water Management, IFAS (Integrated Flood Analysis System), NOAH, etc.

WAN Based Reliable Distributed Object Storage System (Mi-ROSS)





Data Source(s)

NOAH Data

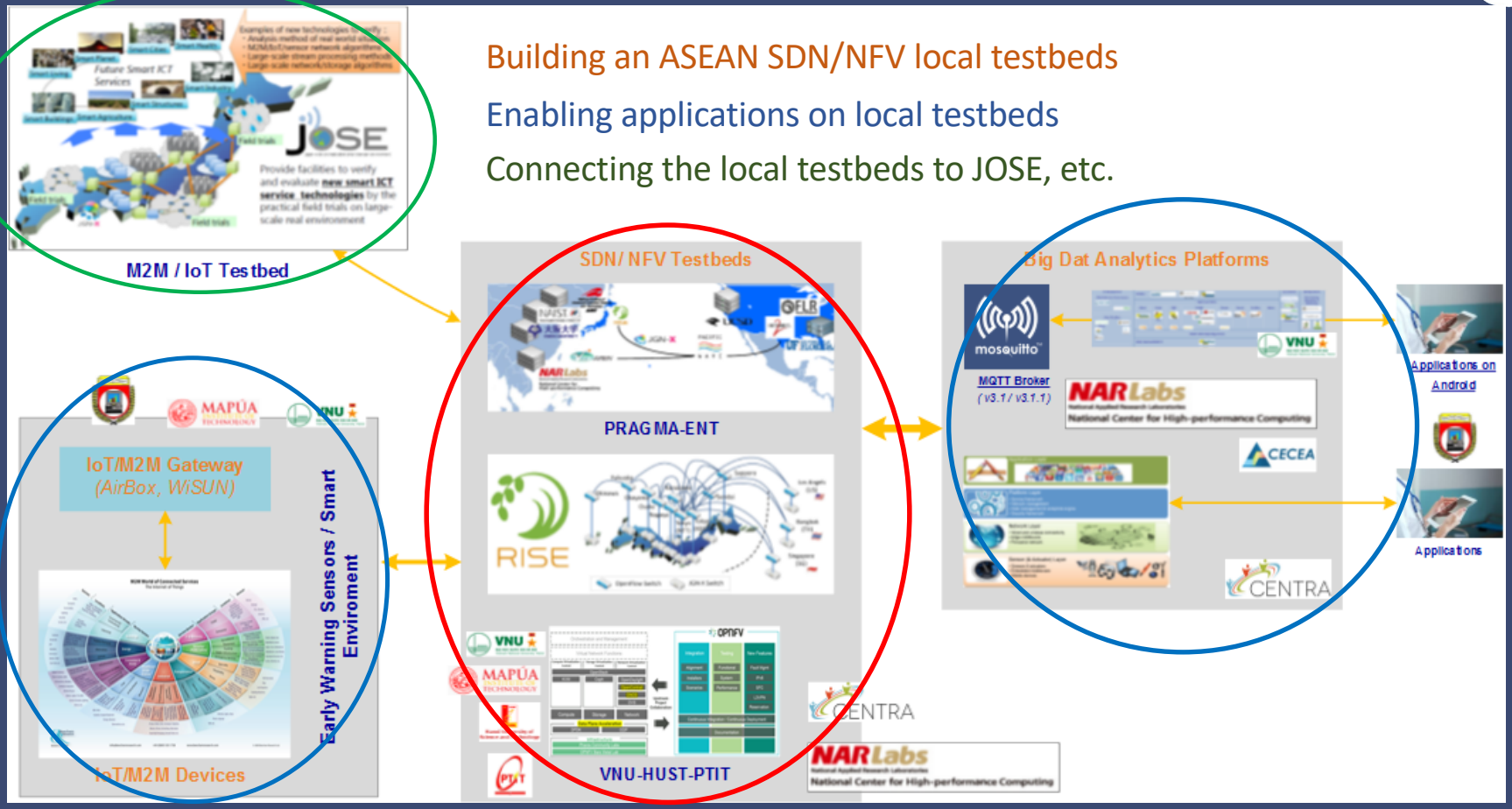
Weather Data/Satellite Imaging

Others: AirBox, River/Flood Models, etc.

Recap: SDN-IP Peering for IoT Data Transmission

Federate IP Networks with SDN-IP for resilient and effective infrastructure for disaster mitigation and smart city

Recap: SDN/NFV + IoT Edge Network



Project Activities

January - March 2016

- ASEAN IVO Forum @ Philippine in January
- Proposal submitted in February.
- Proposal approval received at end of March

April – August 2016

- Project Kick-off Meeting (via teleconference)
- Presentation @ APAN 42

September December 2016

- Project team 1st Meeting @ PRAGMA-31, Thailand
  - 3 sub-projects/work areas identified
- ASEAN IVO Forum @ Hanoi (Project review)
- Project team 2nd Meeting @ SEAIP 2016, Taiwan
  - Sub-project re-alignment
  - Draft blueprint/reference architecture prepared

January – April 2017

- Presentation @ CENTRA2 (via web presence)
- Project report submitted
- Confirmation on project continuation
- SDN-IP Peering between JGN-X and NCHC completed
  - Documentation completed

May - December 2017

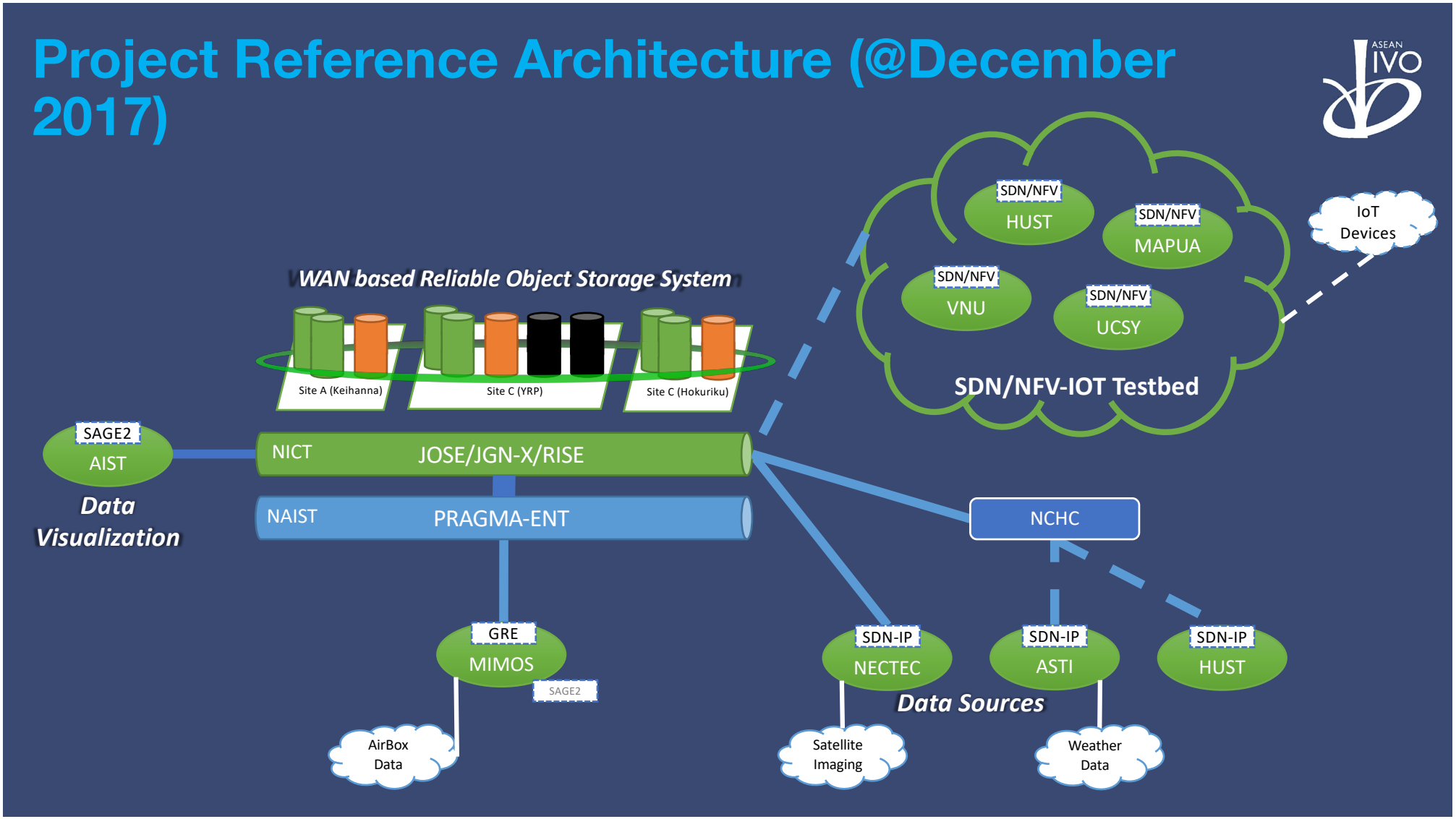
- Virtual Storage Cluster completed on JGN-X/JOSE
- ASTI NOAH test data set populated
- Project team 3rd meeting, KL
- SDN-NFV local testbeds in progress
- SDN-IP Peering between NECTEC and JGN-X Completed
- Sample AirBox data populated into virtual storage cluster
- ASEAN IVO Forum @ Brunei (Project review)
- SEAIP 2017

Jan – Nov 2018

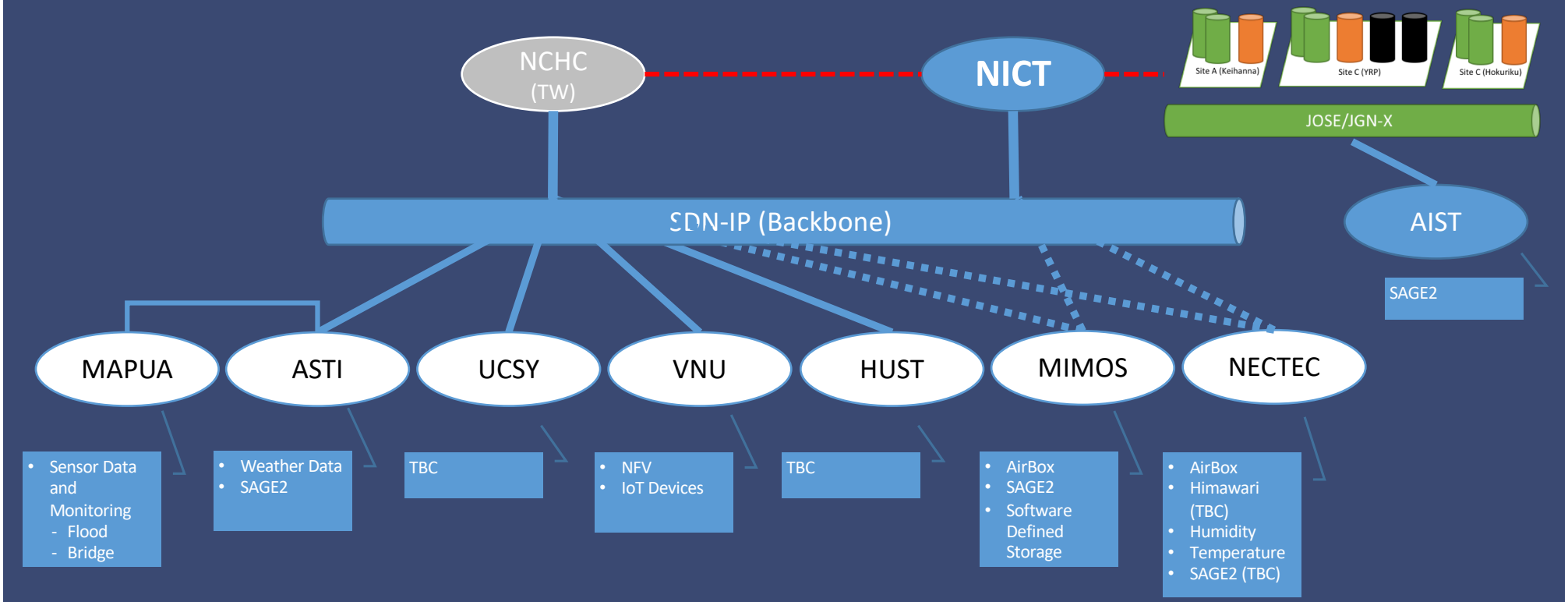
- SDN-IP Peering between HUST and NCHC completed
- Confirmation of final year funding from NICT (April)
- Project Meeting and joint-meeting with NICT, CENTRA, CECEA and ASEAN IVO @ CENTRA 3, Tokyo

Today

Project Reference Architecture (@December 2017)



Project Reference Architecture (@May 2018)



* *Work in progress*

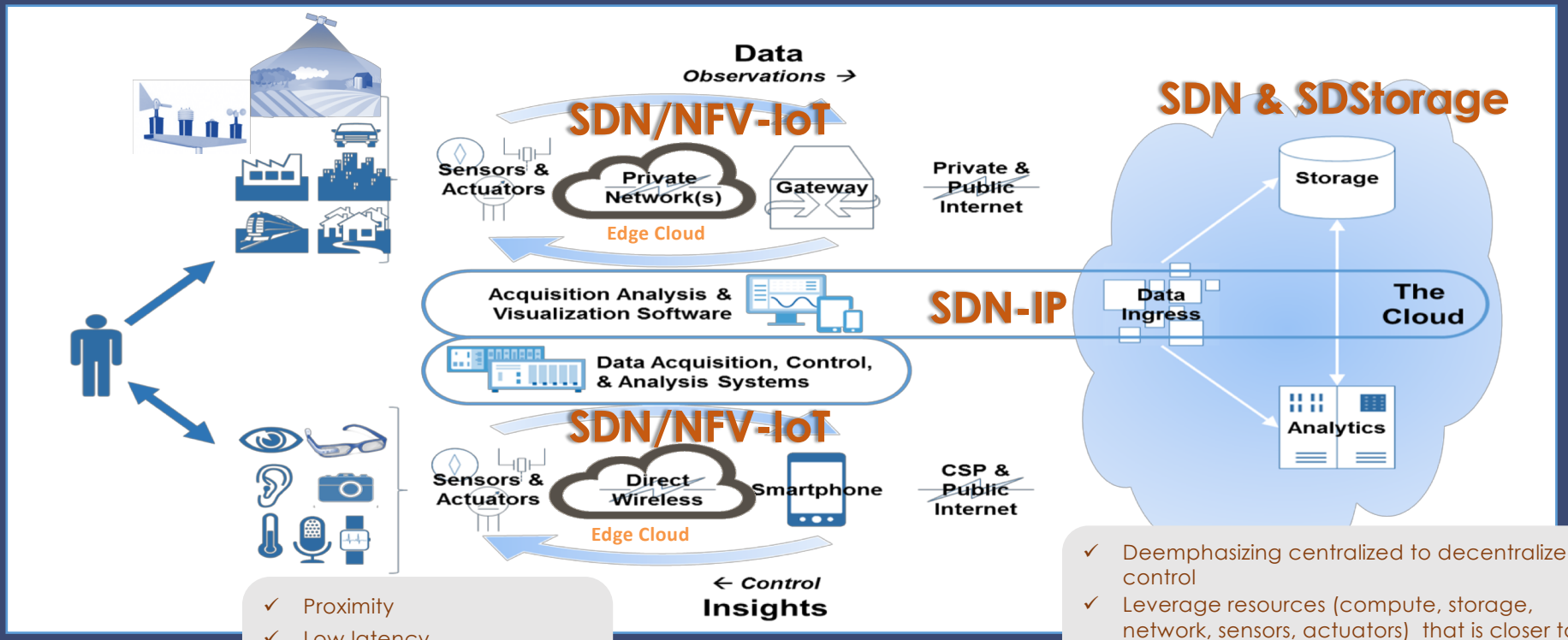
Related Publications and Presentations

- CENTRA 3, May 2018, Tokyo, Japan
- “Comparison of Traditional Network and Software-Defined Network using GNS3 and Mininet”, 2018 ICpEP National Convention, 6th National Conference on Computer Applications, Innovations, Technologies and Engineering (CAITE 2018)
- “Resilient Network and Data Transmission between Philippines and Vietnam via Software-Defined Network using OpenDaylight Controller and Mininet”, IEEE International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)
- “SDN, IoT and Fog Computing testbed for Smart Cities”, SEAIP 2018

Moving Forward (1)

- Developing demonstration applications
- “Persuading” institution’s legal team on the CRA’s terms
  - Requests for time extension in order to sort out CRA
- What to do after completion? How to do it (them)?
  - “Spinning Off” new ideas as new projects?
  - Actual field deployment?
  - New lead(s)?

Moving Forward (2)



- ✓ Proximity
- ✓ Low latency
- ✓ High bandwidth
- ✓ Enable real-time analytics
- ✓ Trust & Control?

- ✓ Deemphasizing centralized to decentralized control
- ✓ Leverage resources (compute, storage, network, sensors, actuators) that is closer to user, devices or data.

1. ETSI ISG Mobile Edge Computing. http://www.etsi.org/technologies-clusters/technologies/mobile-edge-computing
2. Cloudets: all about cloudlet-enabled mobile computing. http://elijah.cs.cmu.edu
3. Open Fog Consortium. http://www.openfogconsortium.org

Thank you

hh.ong (at) mimos.my
jyluke (at) mimos.my