

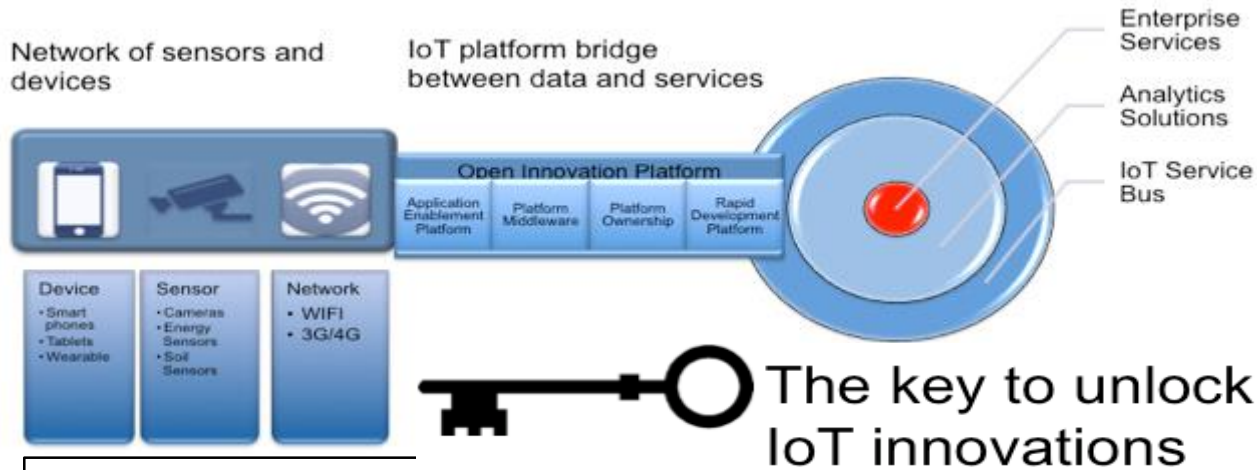
Project Title: IoT Open Innovation Platform

NICT ASEAN IVO FORUM 2018

Introduction :

The widespread usage of smart phones and smart devices in the network today has transformed the network into a connected web of smart devices. These devices are made smart by the applications developed to provide huge benefits and services to the users. This is the Internet of Things (IoT).

To stay competitive and to be able to capture the potential IoT market, it is important to have the IoT platform and acceleration tools to facilitate the rapid development and adoption of IoT solutions for public and private markets, especially in new upcoming developing ASEAN countries. A common platform would allow integration of data and services from different systems. Thus allowing the combined operation of many different heterogeneous IoT systems onto one common open platform, the IoT open innovation platform.



Project Members :

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DR. Dinh Van Dzong, Deputy director, Vietnam National University.

Application enablement platform provides abstraction layer to connect to the different devices available. Application dashboard tool to generate information visualization via easy to use interface.

Platform middleware provides the necessary integration by adopting common standards. Devices and sensors from different systems and protocols can be connected to the same platform, thus providing connectivity and functionality between heterogeneous platforms.

Platform scalability includes private cloud and embedded cloud adoption to provide platform ownership. Services need not be provided from an external party cloud services.

Rapid development platform provides the facility to develop and test applications rapidly.

IoT 4 Layers Architecture



Application Layer



Platform Layer

- Application enablement platform
- Platform middleware
- Platform ownership
- Rapid development platform



mist

MIMOS Internet Services of Things



Network Layer

- Wired and wireless connectivity
- Edge middleware
- Pervasive network



Sensor (& Actuator) Layer

- Sensors & actuators
- Embedded middleware
- Mobile devices



Purpose & Objectives



Application Layer



Objective 2: Develop Proof of Concepts (POC) applications in Rural Healthcare, Environmental & Aquaculture



Platform Layer

- Application enablement platform
- Platform middleware
- Platform ownership
- Rapid development platform

Objective 1: To provide software enablement platform that is flexible and cost effective in the interest of research and development in IoT solutions for ASEAN markets.



Network Layer

- Wired and wireless connectivity
- Edge middleware
- Pervasive network



Sensor (& Actuator) Layer

- Sensors & actuators
- Embedded middleware
- Mobile devices

Objective 3: Develop sensors, devices & gateways for POC applications in Rural Healthcare, Environmental & Aquaculture



2017: Rural Healthcare POC System



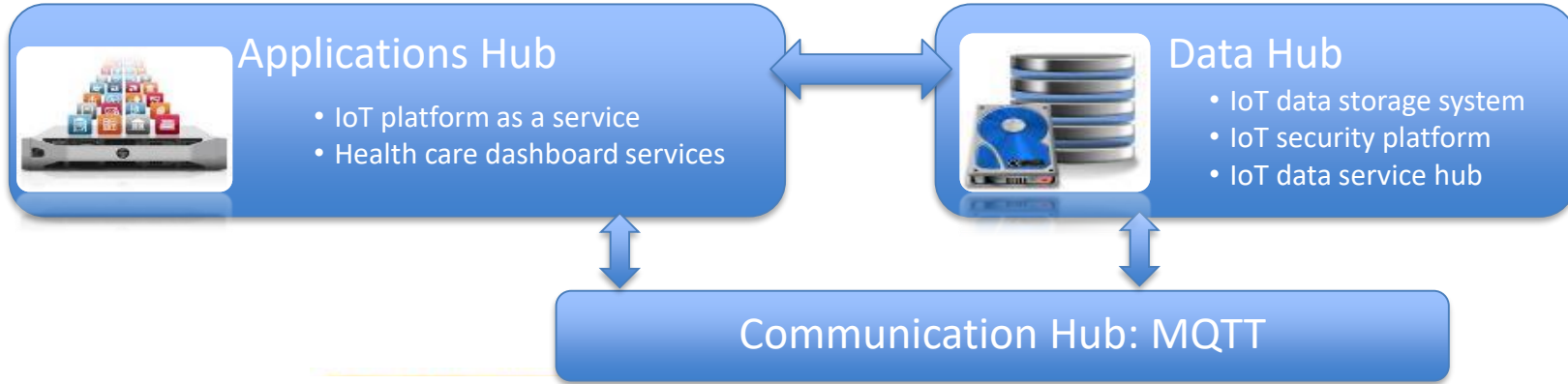
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Hanoi Institute of Science and Technology

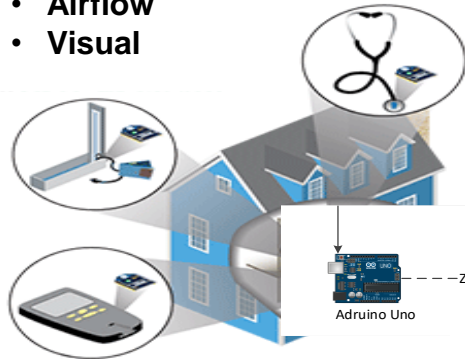


MIMOS BHD

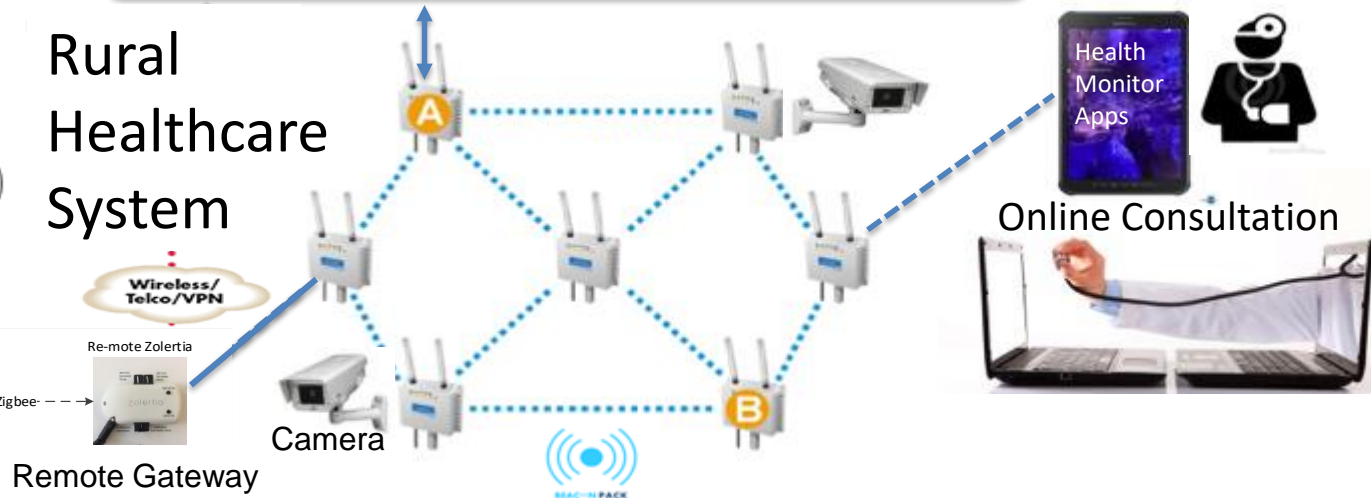


eHealth solutions

- Glucometer
- Blood pressure
- Airflow
- Visual



Rural Healthcare System



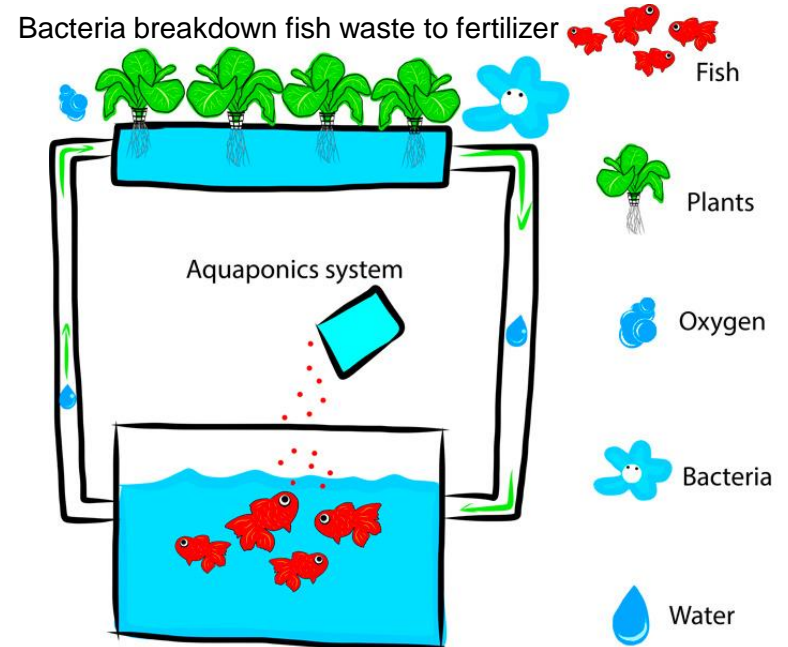
Aquaponics Organic Farming

Aquaponic: a system that combines conventional aquaculture (raising aquatic animals such as fish or prawns in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment.

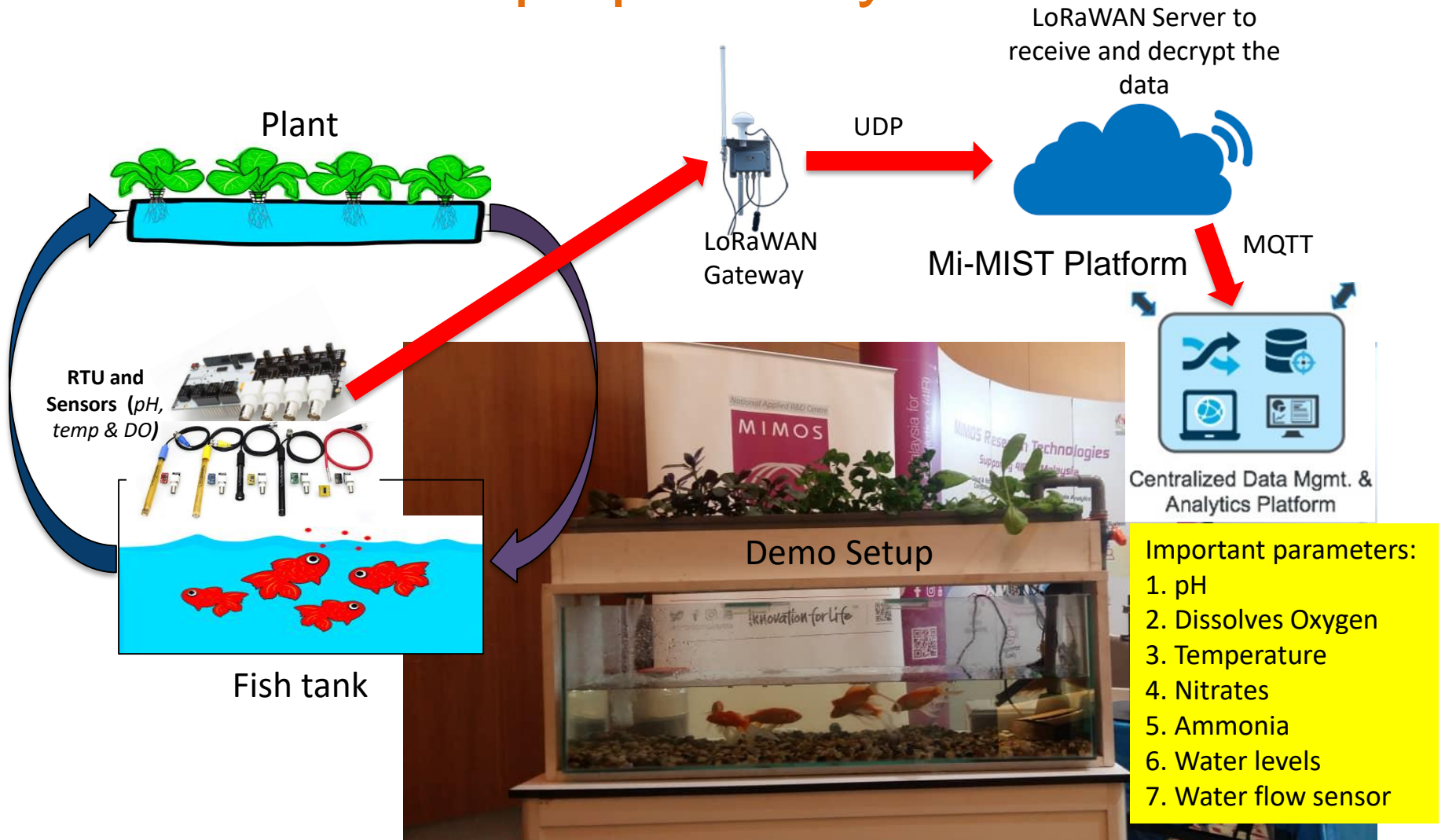


Important parameters are measured and aggregated on IoT Platform for monitoring and analytics for trends and improvement.

1. pH
2. Dissolves Oxygen
3. Temperature
4. Nitrates
5. Ammonia
6. Water levels
7. Water flow sensor



IoT-based Aquaponic System



ASEAN IVO IoT Hub

1. Setup a service and datacenter hub at MIMOS for the development and execution of applications in IoT solutions.
2. Service is available for collaboration among ASEAN IVO members, especially in IoT related projects.
3. Mi-MIST is provided as the IoT Platform as a Service (PaaS) tool.



Dashboard display for data visualization and analytics

Server room at the rear, housing computing and data servers for applications and data storage.

Project Progress in 2016

- Planning Meeting – July 28–29, 2016; Hanoi
 - 3 sites in Vietnam identified for 2017 Proof of Concept (POC) in Aquaculture, Environment and Healthcare.
 - Hanoi (Rural/Suburban Healthcare)
 - Haiphong/Bac Lieu (Aquaculture Scrimp Farming)
 - Hatinh (River & Ocean monitoring, Environmental)
 - Visits to IoT users:
 - Vietnam Posts and Telecommunications (VNPT) Technology IoT Center,
 - HOA LAC HI-TECK PARK (HHTP)
- Mi-Mist, IoT open innovation platform identified to provide the medium of collaboration in market deployment and technical development.
 - Mi-MIST 1.0 was released in August 2016.
 - BK-IoT platform to interface with Mi-MIST platform.
- Mi-MIST training workshop – Sept 27-29, 2016; Hanoi
 - Training by MIMOS provided to HUST and VNU in Sept 2016



Project Progress 2017

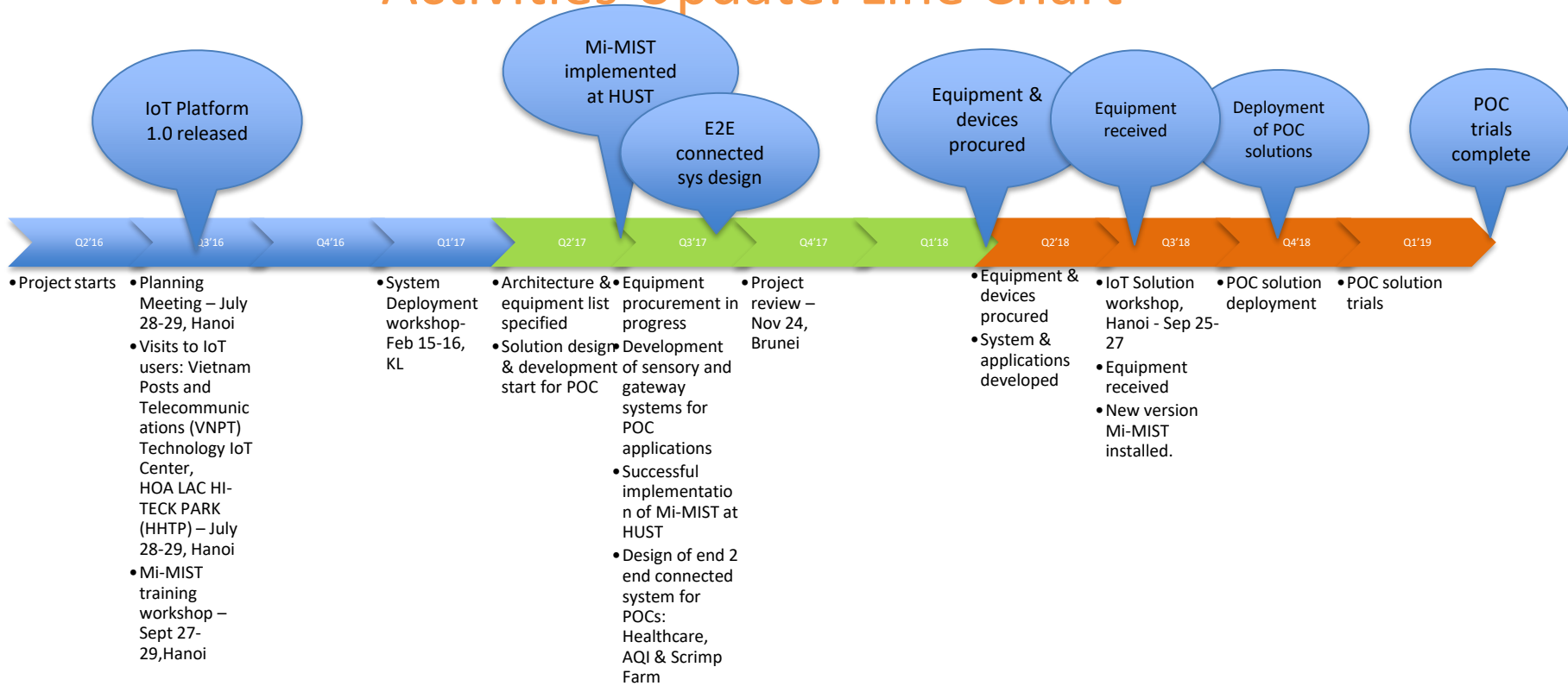
- System Deployment Workshop – Feb 15-16, 2017; Kuala Lumpur
 - 4 POC systems in Vietnam defined for 2017 Proof of Concept (POC) in Aquaculture, Environment and Healthcare.
 - Project planning for POC system and deployment.
 - High level architecture review.
- Equipment list and architecture for POC defined – Q2, 2017
- Procurement of equipment and devices – Q3, 2017
- Development of sensory and gateway systems for POC applications– Q3, 2017
 - HUST completed an IoT based AQI Monitoring and Notifying System prototype.
 - HUST completed CoAP/UDP/IPv6 Protocol Stack on ARDUINO MEGA under Contiki/Linux.
 - HUST completed a Communication Protocol based on Reinforcement Learning and 802.15.4e TSCH that can adapt to different traffic patterns of applications.
 - HUST completed a Communication Protocol based on Orchestra Scheduler of TSCH that can provide different levels of QoS.
- Mi-Mist, IoT open innovation platform PaaS (Cloud version) – Q4, 2017
 - Mi-MIST 2.0 developed by MIMOS and schedule for release in January 2018



Project Progress 2018

- IoT Solutions Workshop – Sept 25-27, 2018; Hanoi
 - IoT Open Innovation Platform training to staffs from Hanoi University of Science and Technology; and Vietnam National University.
 - IoT Solutions review
 - Latest installation of Mi-MIST IoT software platform
- Project equipment received – Q2 & Q3, 2018
 - HUST: Connects purchased equipment to Mi-MIST for next phase
- Mi-MIST, IoT open innovation platform (new version) – Q3, 2018
- Establishment of the ASEAN IVO IoT Hub at MIMOS, BITX Lab – Q4, 2018
- IoT Solutions – Q3 2018, Q1 2019
 - Discussion with with 2 hospitals in Hanoi, Hospital Saint Paul and Hospital Tri Duc; to implement patients monitoring systems.
 - Collaborating with HomeGrown to provide aquaponics monitoring system for their aquaponics organic farms.
 - Collaborating with MIMOS, UPM, BAU, UTB, PTIT, INTROP, NICT and JIRCAS; on using the ASEAN IVO IoT Hub to collect and analyse data on peat forests in Indonesia, Vietnam, Malaysia and Brunei. (NAPC: Networked ASEAN Peat Swamp Forest Communities)

Activities Update: Line Chart



Challenges:

1. Long procurement duration and logistics complexity to purchase and obtain equipment and devices.
2. Delays at importing companies and complicated administration of customs at Vietnamese airport.

Recommendation:

1. Even as the project concludes by Q1, 2019, continue to provide the IoT platform to all member collaboration projects.
2. Allocate budget to maintain the platform and hub for continuing service.