



**فرسيداغن فرخدمتن عوام**  
**PERSIDANGAN PERKHIDMATAN AWAM**  
SEMPENA HARI PERKHIDMATAN AWAM KALI KE-26, 2019

**Pengukuhan Integriti dan Inovasi  
Perkhidmatan Awam Dalam Era  
Revolusi Industri 4.0**

**23 RABIULAWAL 1441/ 19 NOVEMBER 2019,  
DEWAN TEATER JABATAN PERDANA MENTERI**



# Smart Nation Project Initiatives

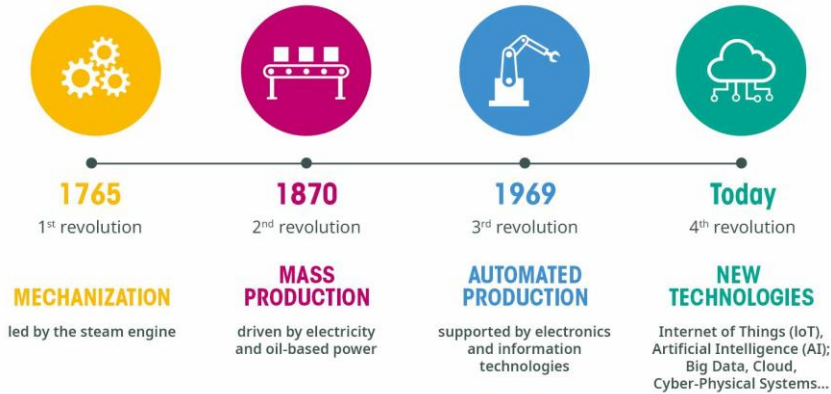
*Perspective Universiti Teknologi Brunei*

*Dr Wida Susanty Haji Suhaili, Assistant Professor*

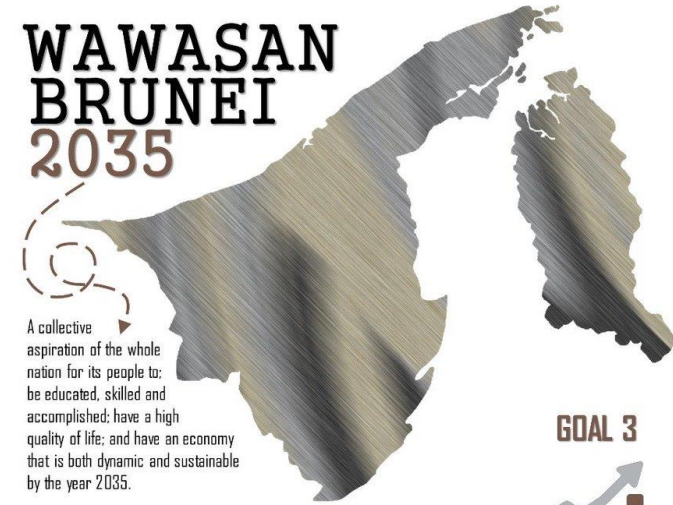
*Universiti Teknologi Brunei*



### Four Industrial Revolutions



Sources: <https://www.visiatiiv-industry.ch/industrie-4-0/>



**GOAL 3**

Dynamic & Sustainable Economy

**GOAL 1**

Highly educated, skilled and accomplished people

**GOAL 2**

Quality of Life



Secretariat Tetap Wawasan Brunei 2035  
 +673 2220744 / +673 2224645  
 stwb35@ijpm.gov.bn

"Bersama Menjayakan Wawasa Brunei 2035"

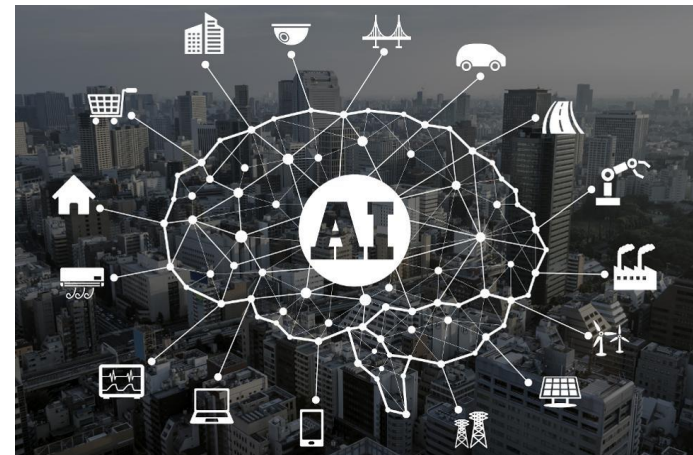
Contact us

# Research Direction



# Fourth Industrial Revolutions Bring along New Technologies

- ❑ Internet of Things
- ❑ Big Data Cloud
- ❑ Artificial Intelligence
- ❑ Cyber-physical Systems



### The Industry Revolution on Agriculture

SMACOM

PAST: Mechanized and GPS Tracking

PRESENT: Connected and Intelligent Agriculture

FUTURE: Data Driven

NEW GROWTH POTENTIAL FOR MARKETS

### IR4.0 in Construction

3D printing & additive manufacturing

Autonomous construction

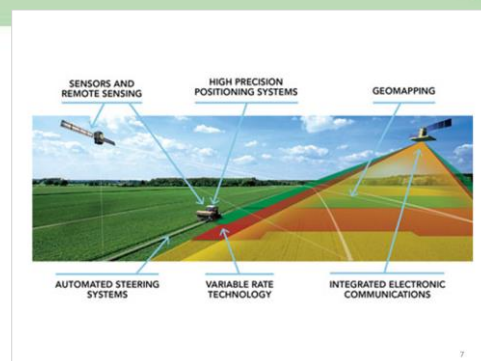
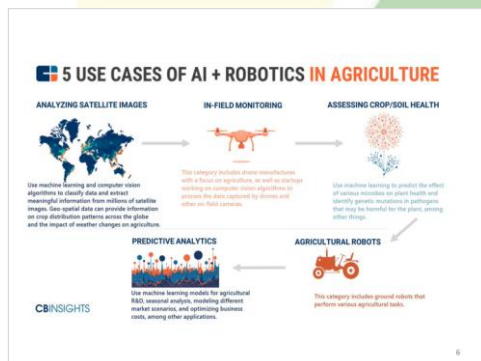
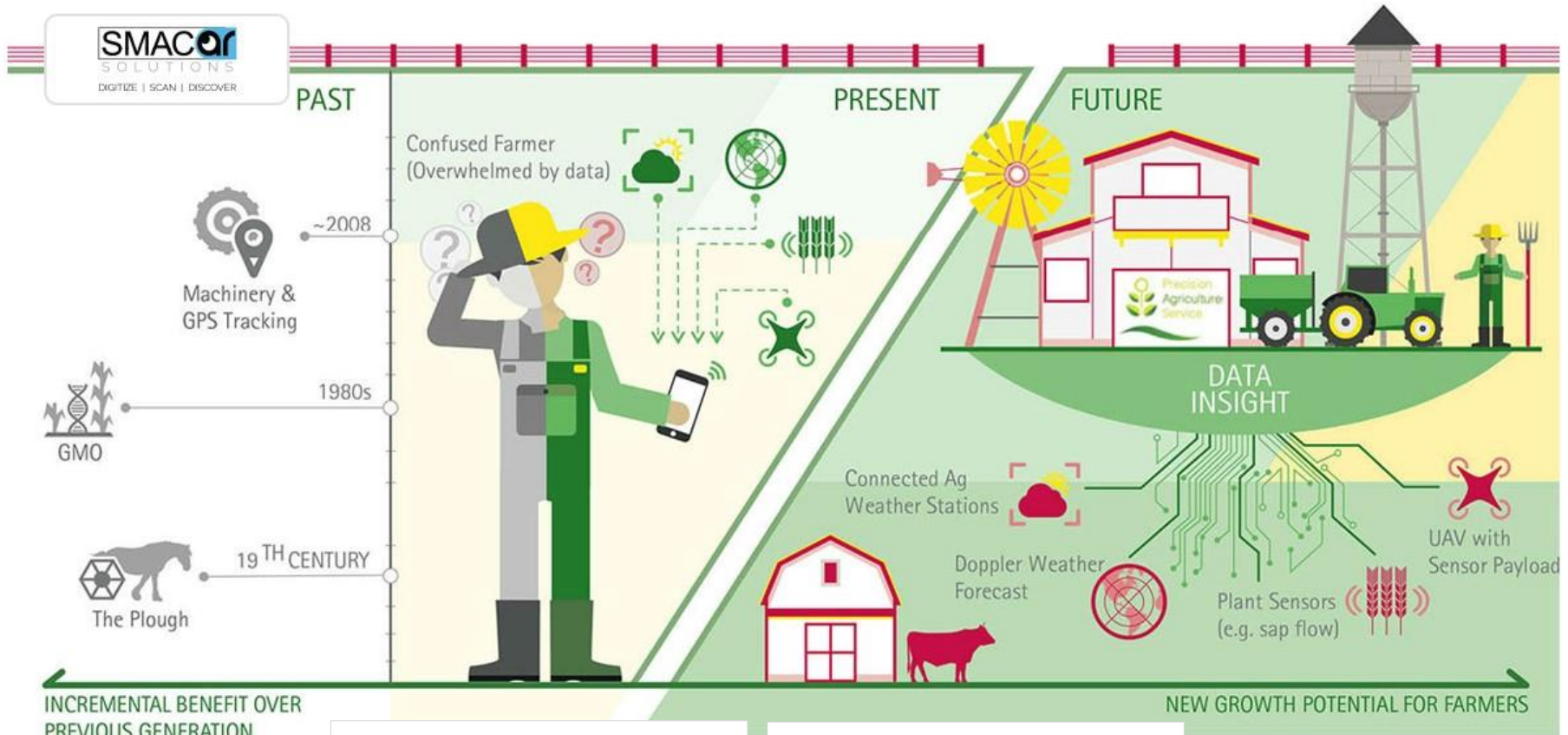
Augmented Reality & virtualization

Big data & predictive analytics

Buildings Information Modeling



# The Industry Revolution on Agriculture



# 5 USE CASES OF AI + ROBOTICS IN AGRICULTURE

## ANALYZING SATELLITE IMAGES



Use machine learning and computer vision algorithms to classify data and extract meaningful information from millions of satellite images. Geo-spatial data can provide information on crop distribution patterns across the globe and the impact of weather changes on agriculture.

## IN-FIELD MONITORING



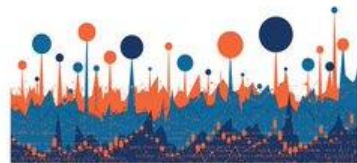
This category includes drone manufactures with a focus on agriculture, as well as startups working on computer vision algorithms to process the data captured by drones and other on-field cameras.

## ASSESSING CROP/SOIL HEALTH



Use machine learning to predict the effect of various microbes on plant health and identify genetic mutations in pathogens that may be harmful for the plant, among other things.

## PREDICTIVE ANALYTICS

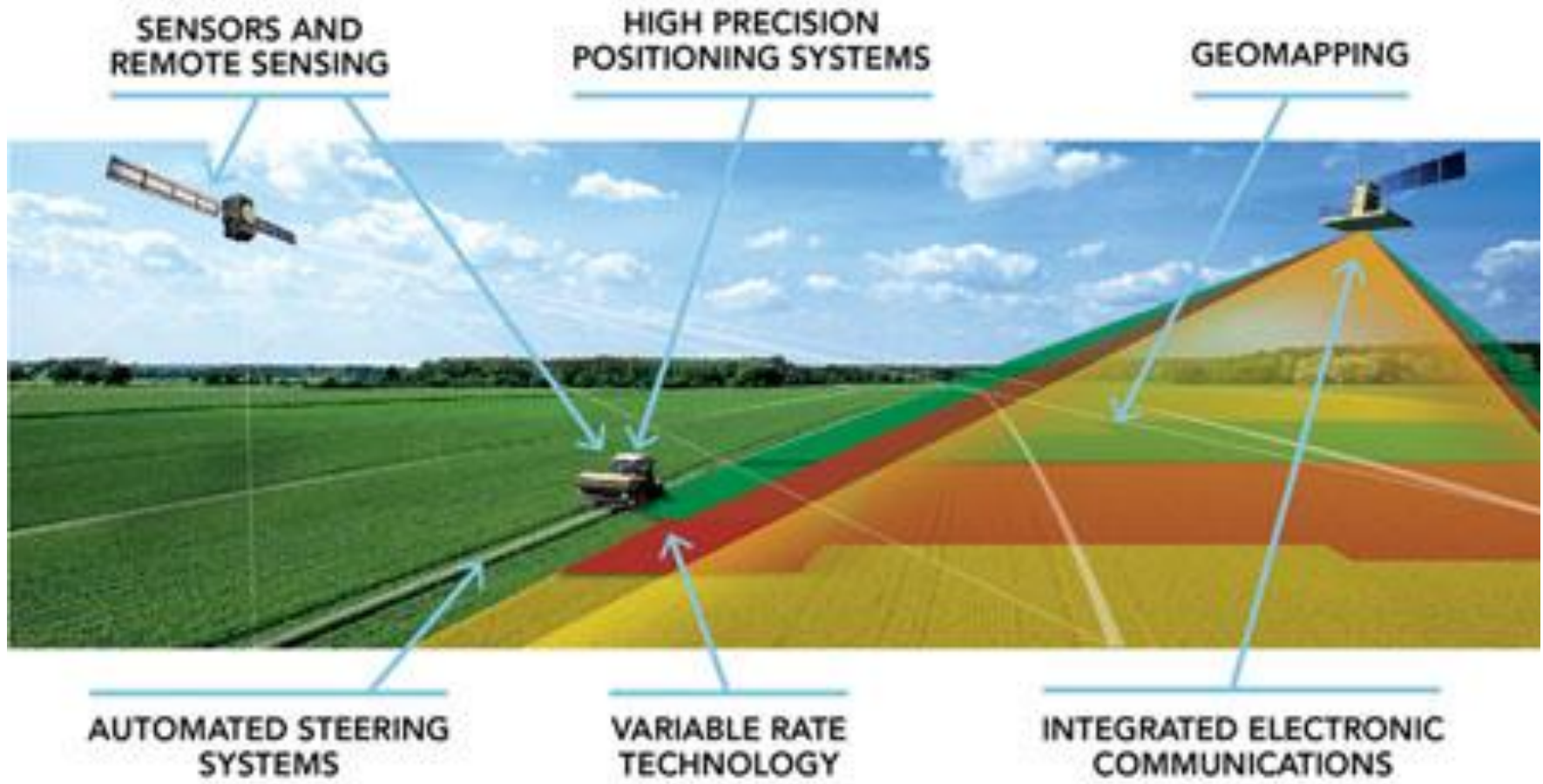


Use machine learning models for agricultural R&D, seasonal analysis, modeling different market scenarios, and optimizing business costs, among other applications.

## AGRICULTURAL ROBOTS

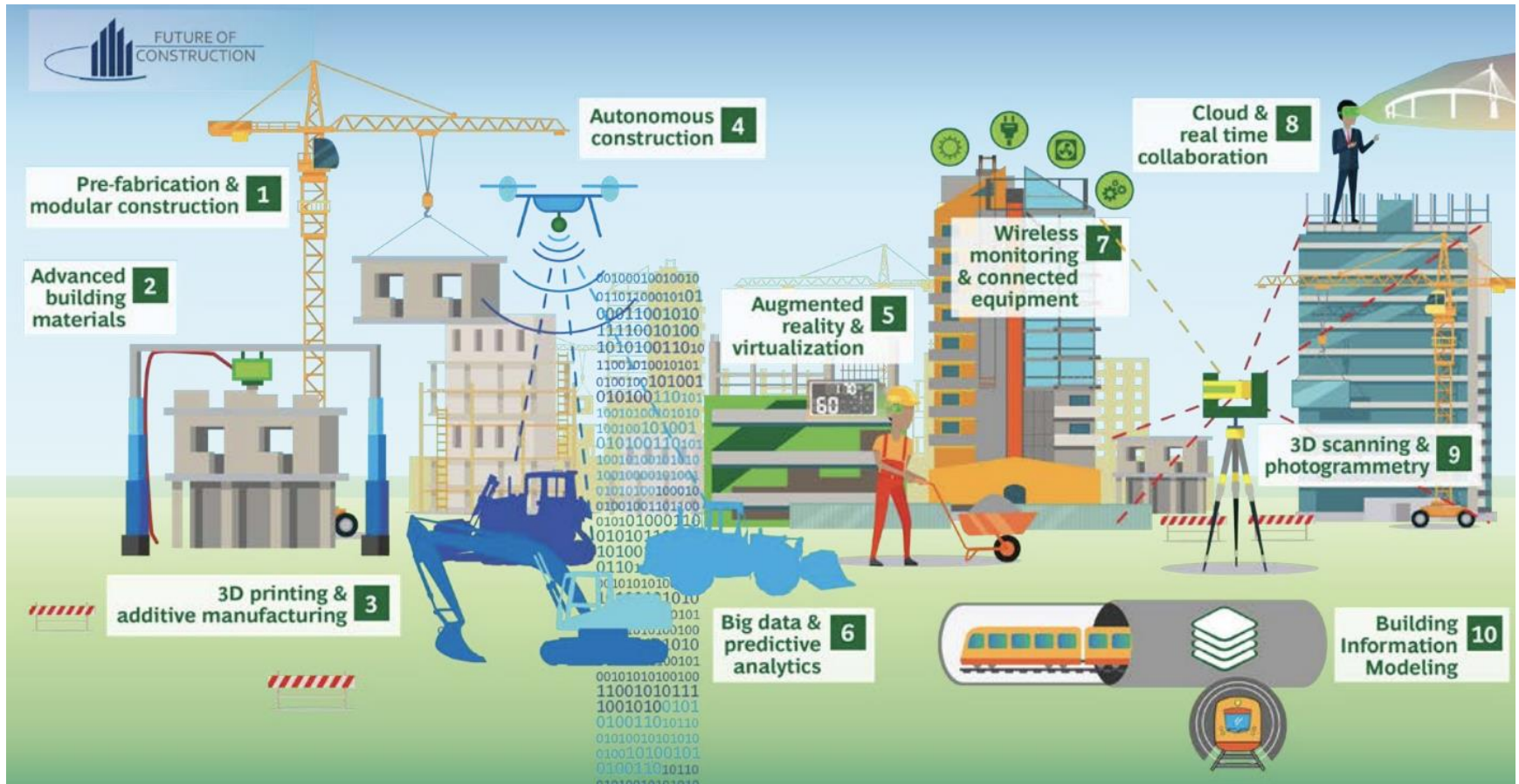


This category includes ground robots that perform various agricultural tasks.





# IR4.0 in Construction







# Will Fourth Industrial Revolution disrupt Jobs and Skills – YES

- ❑ His Majesty's New year 2019 Titah: which focus on IR4.0 where  
*“the advancement of technology brought by IR4.0 will challenge our existing conventional skills.”*
- ❑ Hence we need to prepare and equip ourselves with the correct **mindset** and **skillsets**.
- ❑ Government need to develop far-sighted policies in order to deal with this advancement.



# Questions to ask ourselves

IR4.0 is for sure to hit Brunei.  
But are we ready?

- ❑ What would the impact be?
- ❑ How will we adopt it?
- ❑ How to deal with it
- ❑ What will we adopt?
- ❑ When will we start to embrace it?
- ❑ Will it replace the public civil services?
- ❑ Where should we start to invest?



# Smart Related Initiatives in Brunei

- ❑ Online application – IR2.0
- ❑ Online radio – IR2.0
- ❑ Smart Parking in RIPAS IR3.0
- ❑ eWallet IR3.0

*Enabling a market-driven digital payment ecosystem that adopts cutting edge technology, redefines customer engagement and encourages both interoperability and market competition*







# RESEARCH IN UTB



## فرسیدائش فرخدمتن عوام PERSIDANGAN PERKHIDMATAN AWAM SEMPENA HARI PERKHIDMATAN AWAM KALI KE-26, 2019

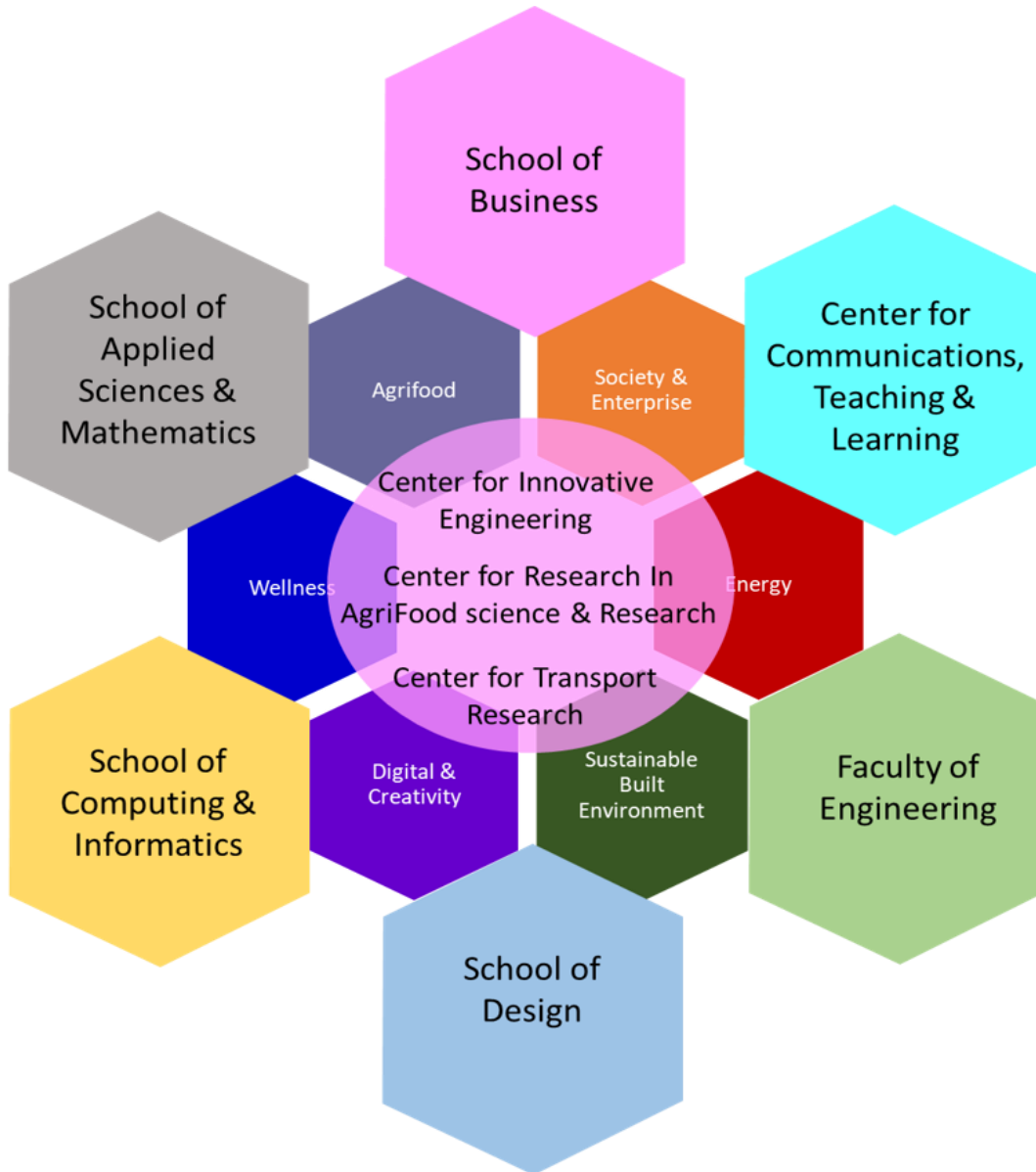
379



51

UNDER 50 YEARS





# UTB Research Organisation



# UTB Research Opportunities: Smart IoT projects

Hari Perkhidmatan Awam  
Penguatan Integriti dan Inovasi Perkhidmatan Awam Dalam Era Revolusi Industri 4.0

**SMART WASTE MANAGEMENT AND MONITORING SYSTEM, AN IOT APPLICATION**  
ALL TYPES OF GARBAGE COULDED TOGETHER

Smart Street Light

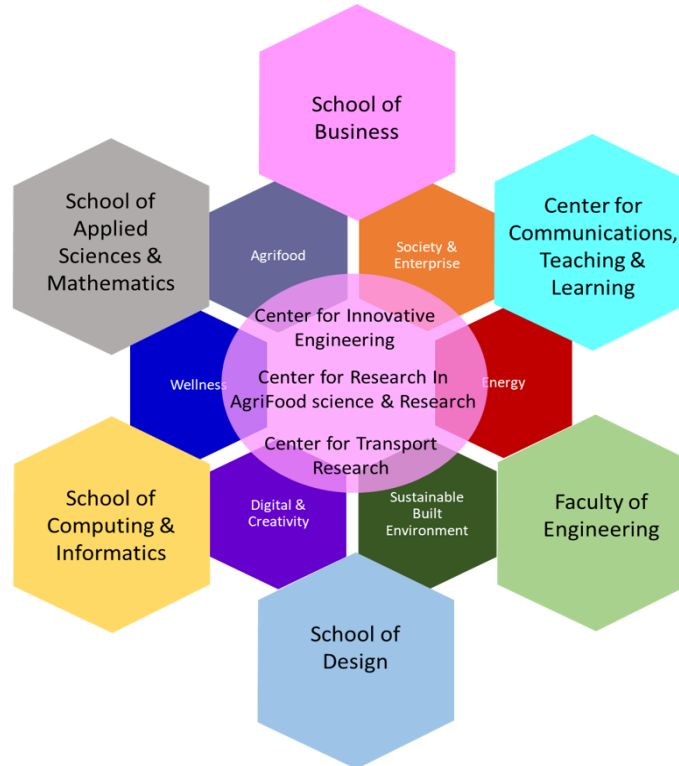
15

Hari Perkhidmatan Awam  
Penguatan Integriti dan Inovasi Perkhidmatan Awam Dalam Era Revolusi Industri 4.0

Smart Farming Data Collection Prototype using Arduino

Smart Farm Prototype with Plant Disease Detection, Diagnosis & Treatment Using IOT Device for Greenhouse

16



Hari Perkhidmatan Awam  
Penguatan Integriti dan Inovasi Perkhidmatan Awam Dalam Era Revolusi Industri 4.0

LoRa Based Smart Farm System

Brunei Forest Fire Prevention System

17

Hari Perkhidmatan Awam  
Penguatan Integriti dan Inovasi Perkhidmatan Awam Dalam Era Revolusi Industri 4.0

Smart AWD

Automated Water Gate

18

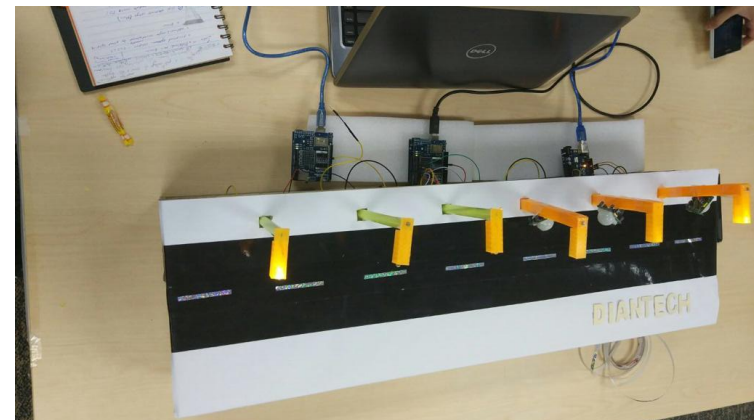




### SMART WASTE MANAGEMENT AND MONITORING SYSTEM, AN IOT APPLICATION



### Smart Street Light



ALL TYPES OF GARBAGE COMBINED TOGETHER

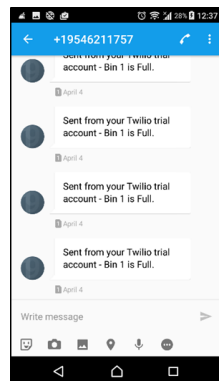
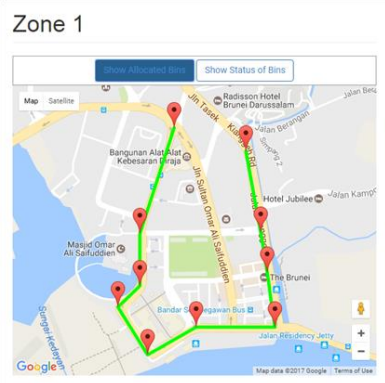
BEFORE



COMPRESSED



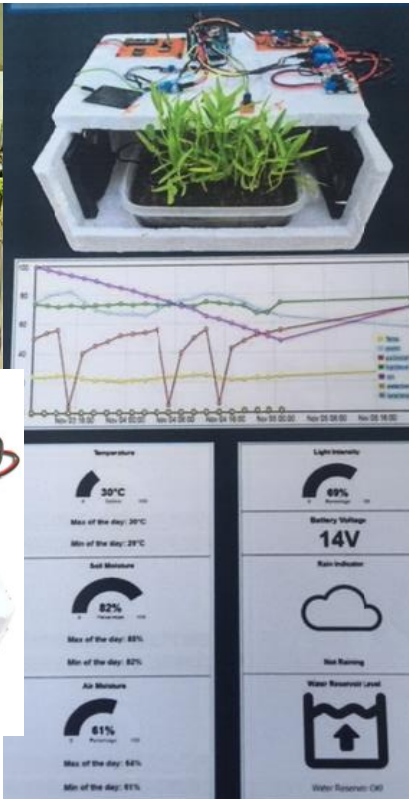
AFTER





### *Smart Farming Data Collection Prototype using Arduino*

### **Smart Farm Prototype with Plant Disease Detection, Diagnosis & Treatment Using IOT Device for Greenhouse**



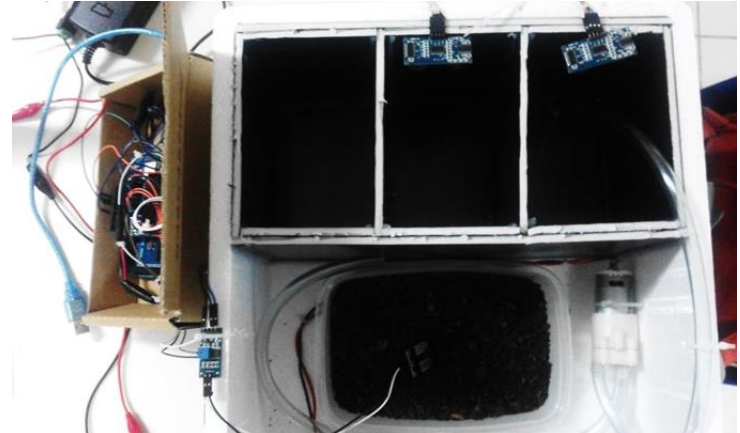
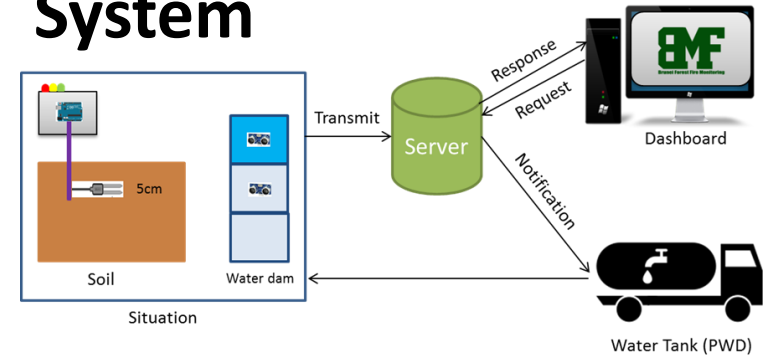




### LoRa Based Smart Farm System



### Brunei Forest Fire Prevention System







# Smart AWD

# Automated Water Gate





# SMART Nation Projects Through ASEAN IVO, NICT JAPAN Funding

Hari Perkhidmatan Awam.

Penguatan Integriti dan Inovasi Perkhidmatan Awam Dalam Era Revolusi Industri 4.0



## ASEAN IVO 2018 Smart Watering System For Paddy



20

Hari Perkhidmatan Awam.

Penguatan Integriti dan Inovasi Perkhidmatan Awam Dalam Era Revolusi Industri 4.0



## ASEAN IVO 2018 – Smart Environment- NACP



26



# ASEAN IVO 2018

## Smart Watering System For Paddy







# Through ASEAN IVO SWS paddy plantation

## User Requirement and site visits

- ❑ 3 years project fund of USD\$120,000.00
- ❑ Collaboration with
  - ❑ NECTEC – Thailand
  - ❑ UTM – Malaysia
  - ❑ UCSY – Myanmar
  - ❑ NICT – Japan
  - ❑ DAA & UTB - Brunei



**BACKGROUND OF PADDY PLANTATION IN WASAN**

| Planting Season | Months              |
|-----------------|---------------------|
| First Season    | May - August        |
| Second Season   | November - February |

- Rice varieties:
  - BDR5
  - MRQ76
  - TITIH
  - Sembada188

**Plot for testing**

Plot for Weather Station (1)  
Identified Plot  
Main Road

**Adopting AWD**

- Earlier version of AWD is simply a pvc pipe with several holes on it and a measuring tape.
- After years goes by, water level sensor are being introduce to the pipe to measure and take the water level reading. No more measuring tape involved.
- Then, moisture sensor are being added to know whether the soil is wet or drv.

Bamboo Testing

**Sensors to be deployed in the pilot plot**



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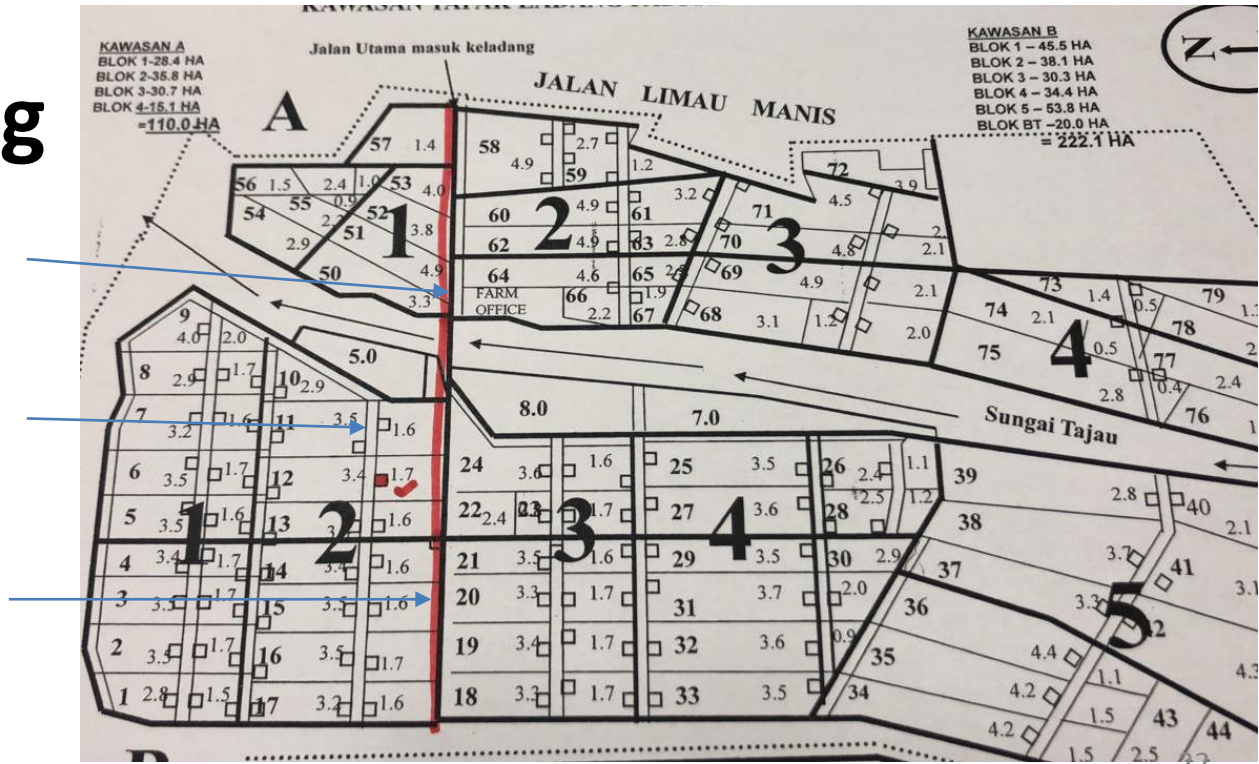
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## Plot for testing

Plot for Weather Station (1)

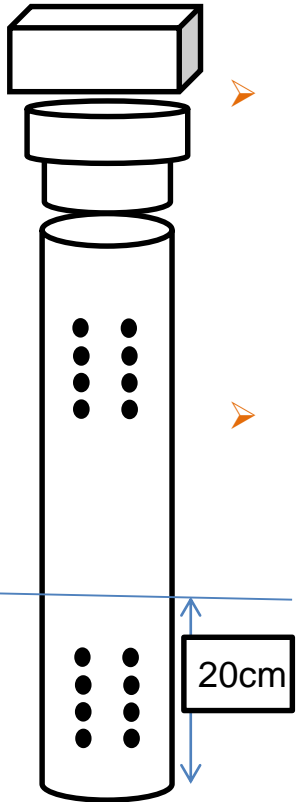
Identified Plot

Main Road

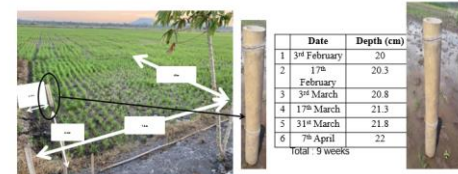


# Adopting AWD

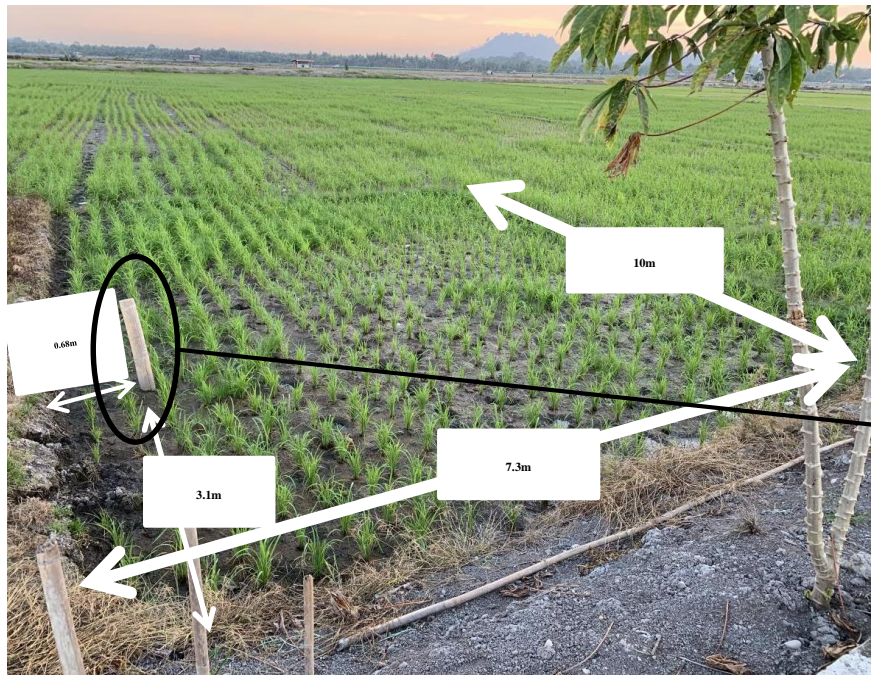
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- Then, moisture sensor are being added to know whether the soil is wet or dry



## Bamboo Testing



# Bamboo Testing



|   | Date                      | Depth (cm) |
|---|---------------------------|------------|
| 1 | 3 <sup>rd</sup> February  | 20         |
| 2 | 17 <sup>th</sup> February | 20.3       |
| 3 | 3 <sup>rd</sup> March     | 20.8       |
| 4 | 17 <sup>th</sup> March    | 21.3       |
| 5 | 31 <sup>st</sup> March    | 21.8       |
| 6 | 7 <sup>th</sup> April     | 22         |

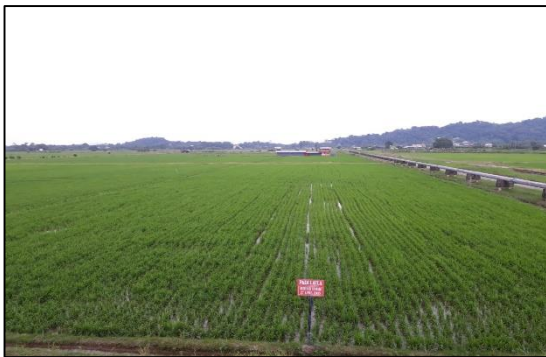
Total : 9 weeks







# Sensors to be deployed in the pilot plot







# ASEAN IVO 2018 – Smart Environment- NAPC

NICT National Institute of Information and Communications Technology

UPM UNIVERSITI PUTRA MALAYSIA

MIMOS

INSTITUT PERTANIAN AGROGOS

BPPT

**NAPC: Networked ASEAN Peat Swamp Forest Communities**

ICT Virtual Organization of ASEAN Institutes and NICT

ASEAN IVO NICT Japan

Badas, Brunei

Jambi, Indonesia

Raja Musa Forest Reserve, Malaysia

Project Leader:  
**Universiti Putra Malaysia**  
USD 76,000  
(1/7/2018 – 30/6/2020)

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

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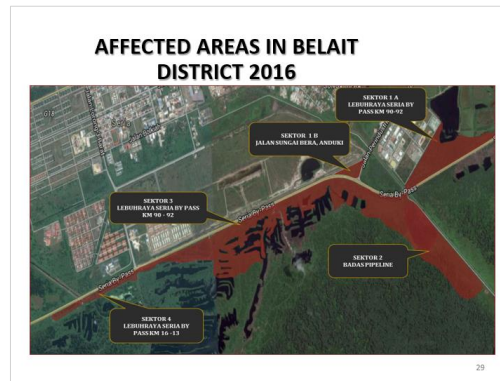
# ASEAN IVO 2018 – Smart Environment Communities

### Evolution of Peat Project

2017 2018 2018 2019 2019

2017 2018 2018 2019 2019

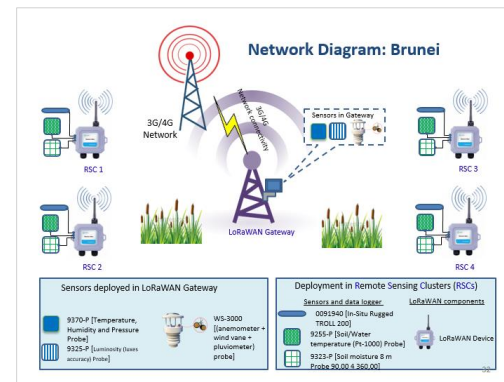
28



### BRU – NAPC Dialogue Session: 28 Jan 2019

UTB hosts dialogue session

30





# Evolution of Peat Project



2017



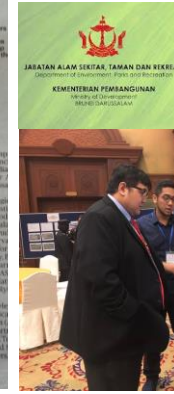
2018



2018



2019



2019



2017



2018



2018

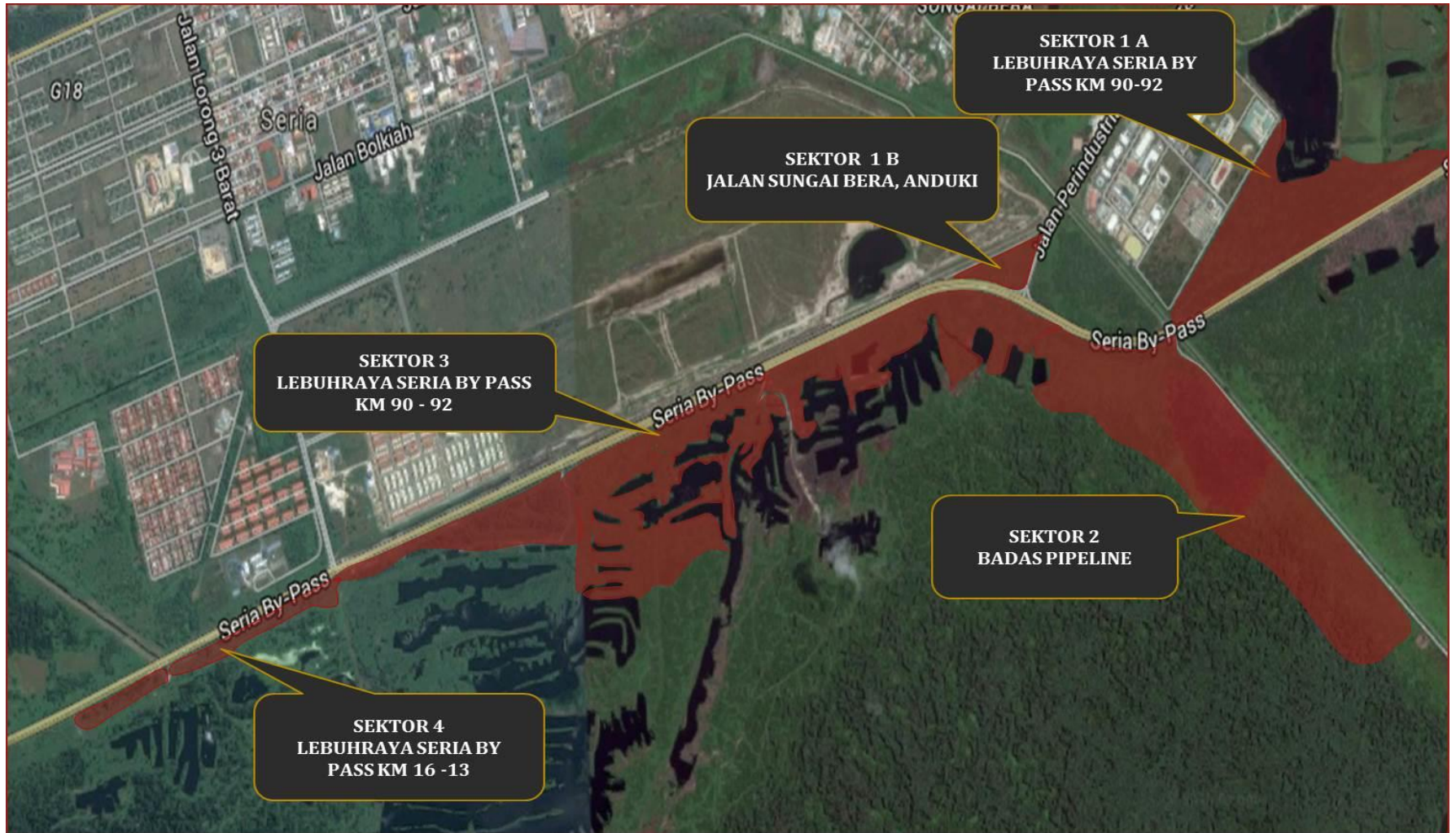


2019



2019

# AFFECTED AREAS IN BELAIT DISTRICT 2016





# BRU – NAPC Dialogue Session: 28 Jan 2019

bin Pehin Orang kaya samin muna... Paduka Haji Abidin in his capacity as the guest of honour and as the Chairman of TAP Board of the mosque.

Presenters and attendees in a group photo at the event



## UTB hosts dialogue session

A DIALOGUE session on Brunei-Networked ASEAN Peat Swamp Forest Communities (BRU-NAPC) under the ICT Virtual Organisation of ASEAN Institutes (ASEAN IVO) and National Institutes of Information and Communications Technology (NICT) was held at the Lecture Theatre 2, Library Complex, Universiti Teknologi Brunei (UTB) yesterday.

The session began with the recitation of *Surah Al-Fatihah* and *Doa Selamat* followed by welcoming speech by the Group Leader for Brunei NAPC for ASEAN IVO Project Dr Wida Susanty binti Haji Suhaili and an official opening by the guest of honour Assistant Vice-Chancellor (Research) of UTB Professor Dr Zuruzi Abu Samah.

Forum on Peatland Conservation and Mitigation Attempts was delivered by six local organisations and three regional members. The presenters were Forestry Officer from Heart of Borneo Zaeidi bin Haji Berudin, Senior Officer from Department of Environment, Parks and Recreation (JASTRE) Dayangku Haryanti binti Pengiran Haji Petra, Senior Superintendent of Fire and Rescue Muhd Shahreeni bin Haji Yusof, Environmental Affairs Advisor from Brunei LNG Sdn Bhd Alinayati binti Haji Perudin, Technical Officer from Wetland Internationals / Brunei Shell Petroleum Comp Sdn Bhd (BSP) Aziah Muhamad, and Princ Research Scientist from Singapore - MIT Allia for Research and Technology (SMART) Dr / Cobb on behalf of Universiti Brunei Darussalam (UBD).

Meanwhile, presentations from the regional members were delivered by Director of Insti of Tropical Forestry and Forest Prod (INTROP) from Universiti Putra Mala Professor Dr Ahmad Aimuddin Nasrva Chief Engineer of Nusantara Earth Observa Networks (NEOnet) from the Agency for Assessment and Application of Technology, E Indonesia Ingenieur Dr Yudi Adithyawan and Programme Coordinator of Japan-AS Science, Technology and Innovation Plat (JASTIP) from Kyoto University, Japan Ry Fukuhara.

Also in attendance at the session were dele from Authority for Info-communication Technology Industry of Brunei Darussalam ( Brunei Darussalam Meteorological Depart Forestry Department, Belait District Office, T ASEAN IVO members of NAPC project and S Watering System and UTB project members



# Site Visit and Data Gathering

The image is a composite of several elements related to a site visit and data gathering project. At the top, a large title reads "Site Visit and Data Gathering". Below this, there are several photographs: a group of people standing in a field, a long pipeline supported by concrete pillars, a red truck with people around it, and people walking through a field. A central Google Earth map shows a green path with three yellow pins. The path starts at a pin labeled "Whatsapp Message Sent", goes to a pin labeled "Monitoring Area", and ends at a pin labeled "Police Tower". A white box next to the first segment indicates a distance of "2 km", and another white box next to the second segment indicates "3.14km". A red pin on the map is labeled "Badas". A "Ruler" tool window is open in the bottom left, showing a "Line" measurement of 3.14 Kilometers. The ruler window also displays "Ground Length: 3.14" and "Heading: 130.29 degrees". At the bottom right, the "Google Earth" logo is visible, along with copyright information: "Image © 2019 DigitalGlobe © 2018 Google Image © 2019 DigitalGlobe Image © 2019 CNES / Airbus".

Whatsapp Message Sent

2 km

Monitoring Area

3.14km

Police Tower

Badas

Ruler

Line Path Polygon Circle 3D path 3D polygon

Measure the distance between two points on the ground

Map Length: 3.14 Kilometers

Ground Length: 3.14

Heading: 130.29 degrees

Mouse Navigation

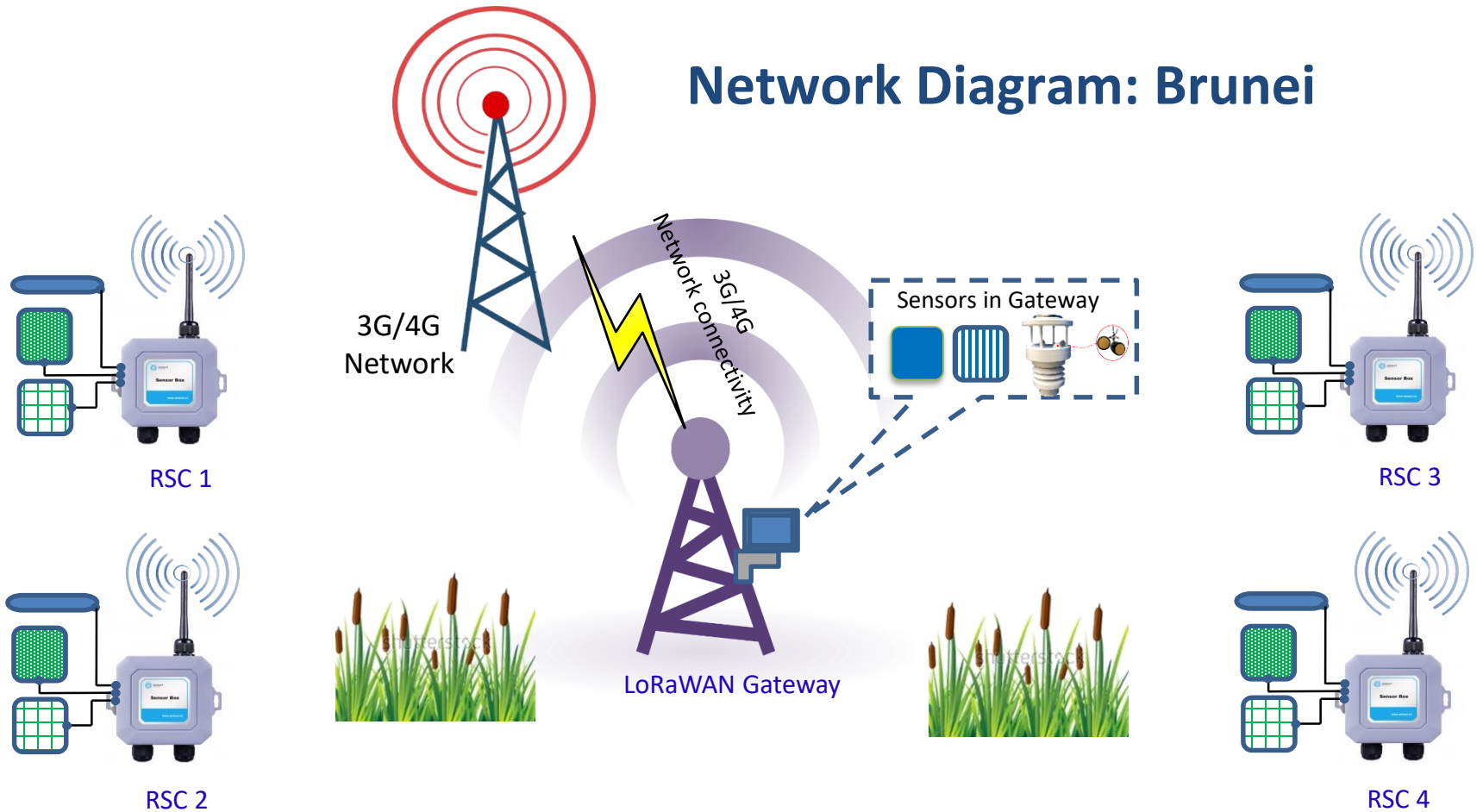
Save Clear

Image © 2019 DigitalGlobe  
© 2018 Google  
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Google Earth

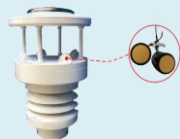


# Network Diagram: Brunei



## Sensors deployed in LoRaWAN Gateway




-  9370-P [Temperature, Humidity and Pressure Probe]
-  9325-P [Luminosity (luxes accuracy) Probe]



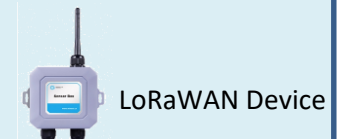
WS-3000 [(anemometer + wind vane + pluviometer) probe]

## Deployment in Remote Sensing Clusters (RSCs)

### Sensors and data logger

-  0091940 [In-Situ Rugged TROLL 200]
-  9255-P [Soil/Water temperature (Pt-1000) Probe]
-  9323-P [Soil moisture 8 m Probe 90,00 4 360,00]

### LoRaWAN components





# ASEAN IVO 2018: NAPC & SWS

## Involve communities directly & stakeholders collaborate together







# Stakeholders & Collaborators

## □ SWS paddy plantation

- DAA – paddy team, soil experts, technical (irrigation),
- MPRT
- Farmers
- Meteorological Department

## □ Collaborators

- AITI
- ANIAN
- DST



## □ NAPC

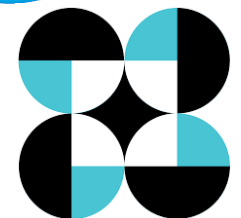
- BOMBA
- HOB
- JASTRE
- BSP
- BLNG
- SMART
- NDMC
- WETLAND INTERNATIONALS
- Meteorological Department





# Research Centre within ASEAN

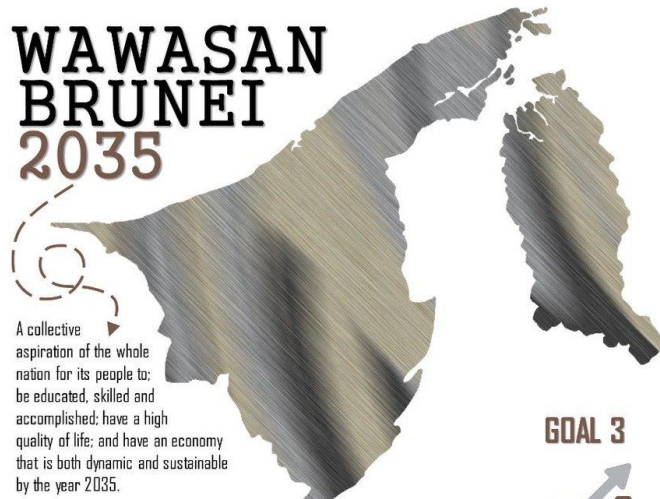
| Negara      | Centre/Badan   |
|-------------|--|
| Malaysia    | Malaysian Institute of Microelectronic Systems ( <b>MIMOS</b> )  |
| Thailand    | National Science and Technology Development Agency (NSTDA)<br>National Electronics and Computer Technology Centre, ( <b>NECTEC</b> )<br>Thailand Organic and Printed Electronics Innovation Centre (TOPIC) |
| Vietnam     | Vietnam Academy of Science and Technology ( <b>VAST</b> )  |
| Indonesia   | Badan Pengkajian dan Penerapan Teknologi ( <b>BPPT</b> )<br>Agency for the Assessment and Application of Technology  |
| Philippines | <b>DOST</b> , DOST-ASTI, DOST PAGASA<br>Department of Science and Technology   |
| Laos        | Technology Computer and Electronic ( <b>TCEI</b> )   |





## Take Away Message

### WAWASAN BRUNEI 2035



A collective aspiration of the whole nation for its people to: be educated, skilled and accomplished; have a high quality of life; and have an economy that is both dynamic and sustainable by the year 2035.

#### GOAL 1



Highly educated, skilled and accomplished people

#### GOAL 2



Quality of Life

#### GOAL 3



Dynamic & Sustainable Economy

Secretariat Tetap Wawasan Brunei 2035

+673 2220744 / +673 2224645

stwb35@jpm.gov.bn



Contact us

“Bersama Menjayakan Wawasa Brunei 2035”

- IR4.0 is all about being connected, hence we cant afford to be “aku-aku, kau-kau” its all about resource: **MAXIMISE AND FULLY UTILISED**
- **Gathering the correct info is very important**
- **Include the respective stakeholders to ensure stability and continuity**
- **Need to consider which one will be beneficial**
- **Not to do it in silo – holistic approach**
- **Learn from others and not to repeat the same mistakes**
- **Don't miss out on opportunity: Country is small easy to implement**



**Way forward:**

**WORK TOGETHER FOR THE  
COMMON GOAL**

**“Alone we go fast, together we  
go far”**

**THANK YOU**