

Department of Science and Technology

# Innovation in R&D

*Innovation Forum "Innovation for Learning and Development"*

19 February 2018; PHIVOLCS Auditorium

ROMENA CRISTINA L. GUEVARA, Ph.D.

Undersecretary for R&D

# Outline

- Definition of Terms
- Enabling Innovation in R&D
- 4 Examples of DOST R&D Programs
- R&D Results Utilization
- Innovation Capacity-building

# Innovation

A process, product or service that is **new, original, or improved**, which creates **value**

<https://www.freshconsulting.com/what-is-innovation/>

A great idea, executed brilliantly, and communicated in a way that is both intuitive and fully celebrates the magic of the initial concept that will either create a new market, or radically change an existing one

- *Pete Foley*

# Research and development (R&D)

Comprising of **creative** work undertaken on a **systematic** basis in order to **increase the stock of knowledge**, including knowledge of man, culture and society, and the use of this stock of knowledge to **devise new applications**

# Research and development (R&D)

- Fundamental/Basic Research
- Applied Research
- Experimental Development
- Pilot Testing

# Enabling Innovation in R&D

- Human Resource Development
- Harmonized National R&D Agenda
- Facilities
- Funding
- Technology Transfer

# S&T HUMAN RESOURCE Development

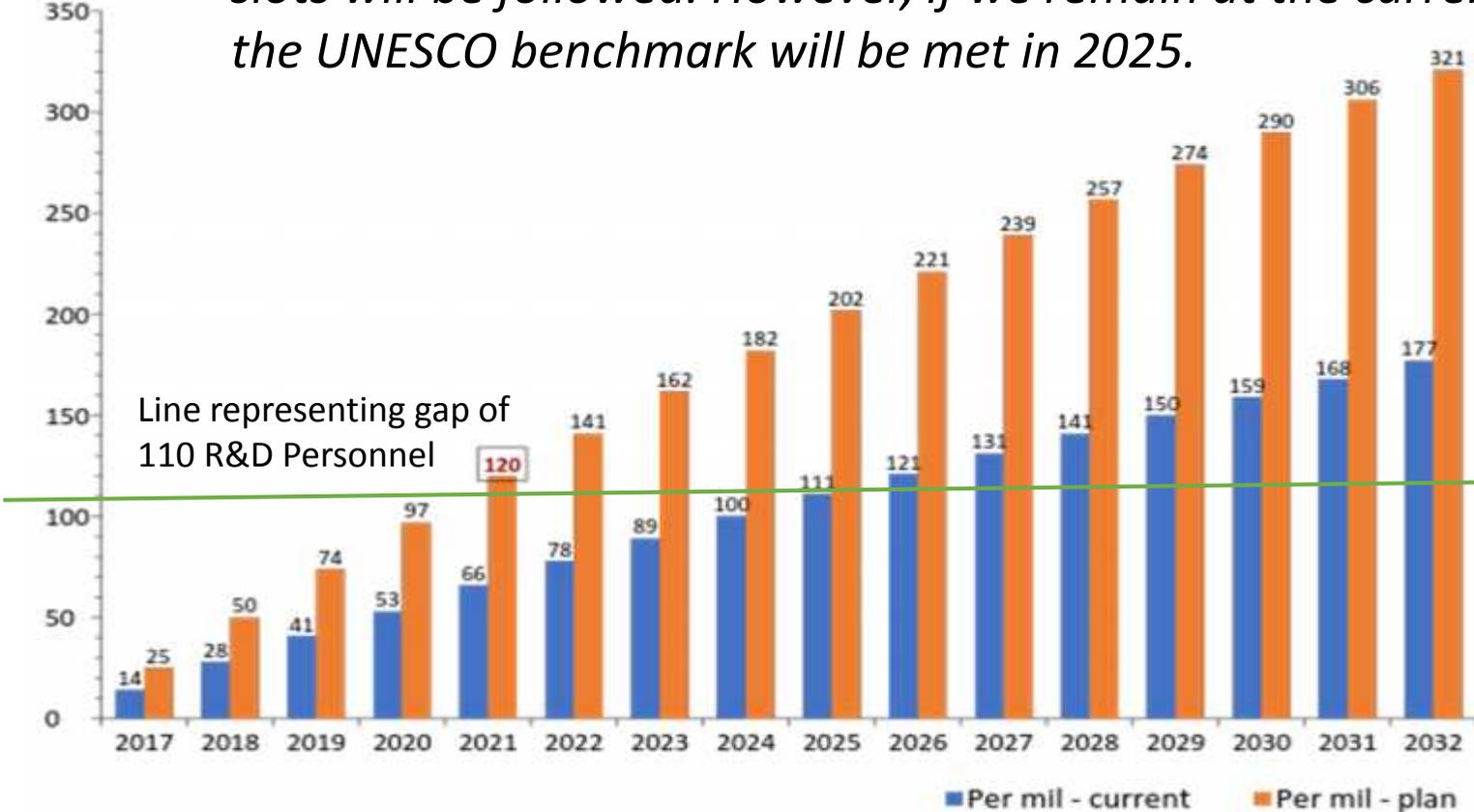
<b>UNESCO Benchmark</b>	<b>380 R&amp;D personnel per million population</b>
<b>Philippine Data</b> (Based on 2013 DOST R&D Survey)	<b>270 R&amp;D personnel per million population</b> (26,495 total headcount)
<b>GAP</b>	<b>110 R&amp;D personnel per million population</b>
<b>Total number of R&amp;D personnel required to meet benchmark in 5 years (2022)</b>	<b>46,462* STEM personnel working in R&amp;D</b> (headcount)
<b>Additional number of R&amp;D personnel required to meet benchmark in 5 years (2022)</b>	<b>16,652 STEM personnel working in R&amp;D</b> (headcount)

*Assuming 10% attrition, 3,663 STEM graduates should be added to the R&D pool every year*

# S&T HUMAN RESOURCE Development

## Number of years needed to meet UNESCO benchmark gap current vs. proposed

Assuming that all available slots are subscribed and that **only 30%** of the scholar-graduates go into R&D, the UNESCO benchmark **will be met in 2021** if the proposed no. of slots will be followed. However, if we remain at the current number of slots being offered, the UNESCO benchmark will be met in 2025.



<b>2018</b>	<b>P 5.0 B</b>
<b>2019</b>	<b>P 7.3 B</b>
<b>2020</b>	<b>P10.9 B</b>
<b>2021</b>	<b>P16.2 B</b>
<b>2022</b>	<b>P24.3 B</b>

# DOST COUNCILS



Philippine Council for Agriculture,  
Aquatic and Natural Resources  
Research and Development  
(PCAARRD)



Philippine Council for Health  
Research and Development  
(PCHRD)



Philippine Council for Industry, Energy  
and Emerging Technology Research  
and Development (PCIEERD)



National Research Council of  
the Philippines (NRCP)

## ***Functions:***

- *Formulation of policies, plans, programs, projects and strategies for S&T development*
- *Programming and allocation of Grants-in-Aid (GIA) funds for R&D*
- *Monitoring of research and development projects*
- *Generation of external funds*

# DOST RESEARCH AND DEVELOPMENT INSTITUTES (RDIs)



Advanced Science and  
Technology Institute (ASTI)



Food and Nutrition Research  
Institute (FNRI)



Forest Products Research and  
Development Institute (FPRDI)



Industrial Technology Development  
Institute (ITDI)



Metals Industry Research and  
Development Center (MIRDC)



Philippine Nuclear Research  
Institute (PNRI)



Philippine Textile Research Institute  
(PTRI)

## ***Functions:***

- *Research & Development*
- *Technology Transfer*
- *S&T Services (Testing & Calibration)*
- *Technical and Consultancy Services*

# DOST SCIENTIFIC & TECHNOLOGICAL SERVICE INSTITUTES



Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

- *Weather monitoring and forecasting*



Philippine Institute of Volcanology and Seismology (PHIVOLCS)

- *Volcano and earthquake monitoring*



Philippine Science High School (PSHS)

- *Specialized science high school program*



Science Education Institute (SEI)

- *S&T scholarship grants*



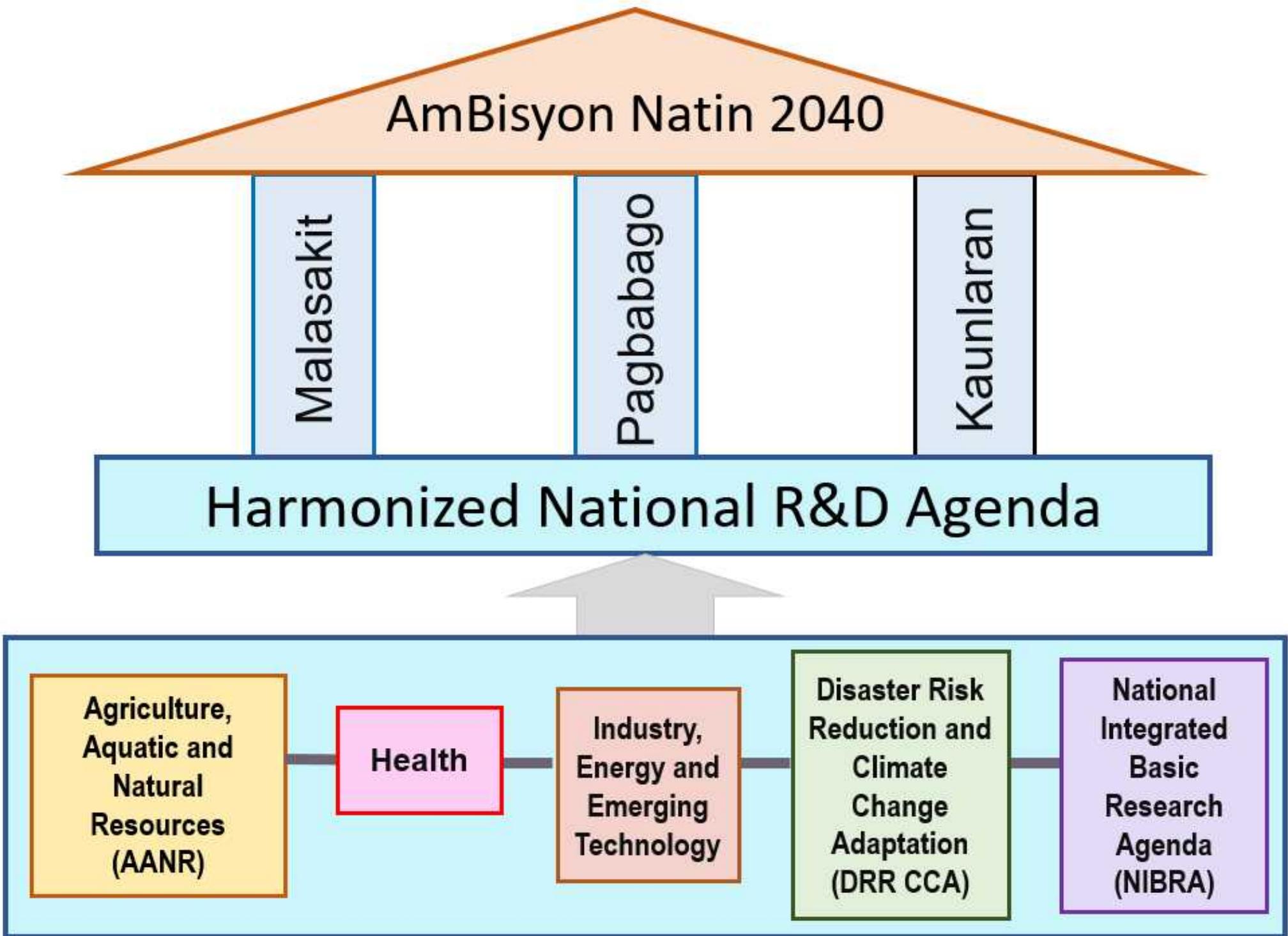
Science and Technology Information Institute (STII)

- *Information dissemination*



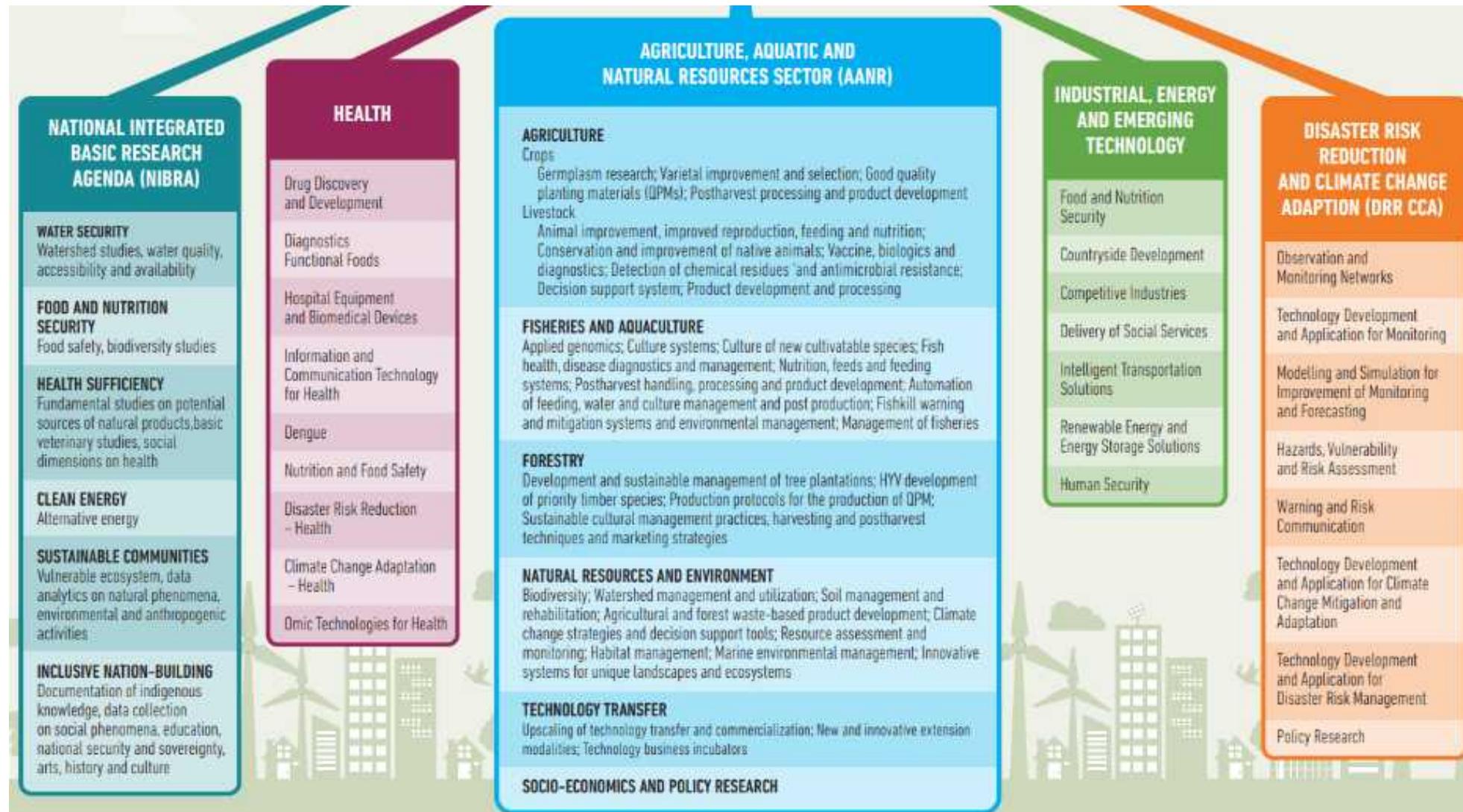
Technology Application and Promotion Institute (TAPI)

- *Promotion of technology; commercialization*
- *Assistance to inventors (RA 7459)*



# HARMONIZED NATIONAL R&D AGENDA (2017-2022)

## R&D PRIORITY AREAS AND PROGRAMS



# 6Ps Metrics: Evaluation of R&D Proposals

**P**ublications

**P**atents

**P**roducts

**P**eople Services

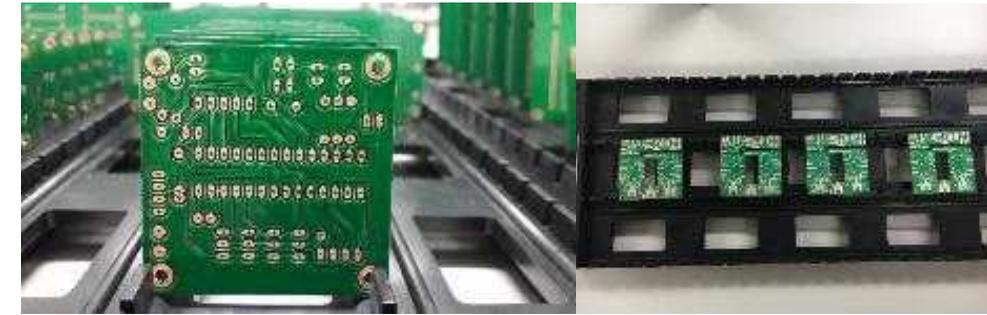
**P**laces and Partnerships

**P**olicies



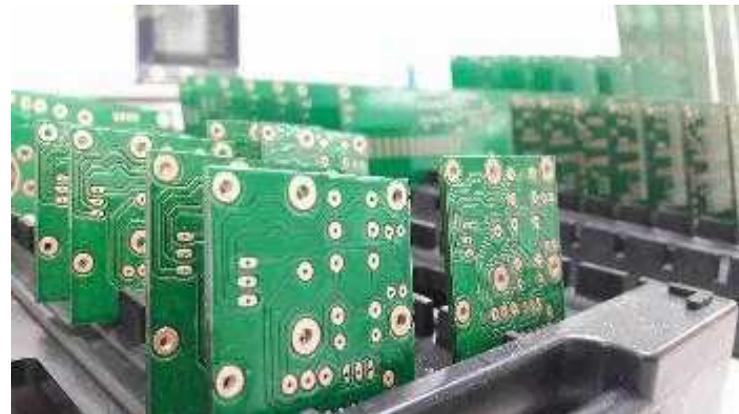
**EPDC**  
ELECTRONICS PRODUCT  
DEVELOPMENT CENTER

Address: EPDC Building, *MIRDC Compound*  
*Gen. Santos Ave., Bicutan, Taguig City*



## Services Available:

- **EMC Test**
- **Other Tests**
  - RoHS Checking (Olympus DELTA)
  - Logic Analyzer – 120 pins
  - 6½ digit bench multimeter
  - 2x Triple Output DC supply (0-60V; 3A/5V; 3A)
  - 200MHz 5GS/s Digital Storage Oscilloscope (with saving and supplying function)
  - 4GHz Oscilloscope
  - 9kHz-6GHz Vector Signal Generator
  - 10Hz-13.6GHz Signal/Spectrum Analyzer
- **Electronic Design**
- **PCB Prototyping**
- **Enclosure Prototyping**





**EPDC**  
ELECTRONICS PRODUCT  
DEVELOPMENT CENTER

# Equipment

**Signal Vector  
Generator**



**Handheld XRF  
Analyzer**



**PCB Prototyping System**



**Parametric Testers**

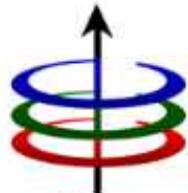


**High Definition  
Imaging (HDI) 3D  
Scanner**





EPDC CLIENTS



2017



37 EMC tests conducted

331 PCBs

Website – [www.epdc.dost.gov.ph](http://www.epdc.dost.gov.ph)

Facebook - <https://www.facebook.com/EPDC.DOST.GOV.PH/>

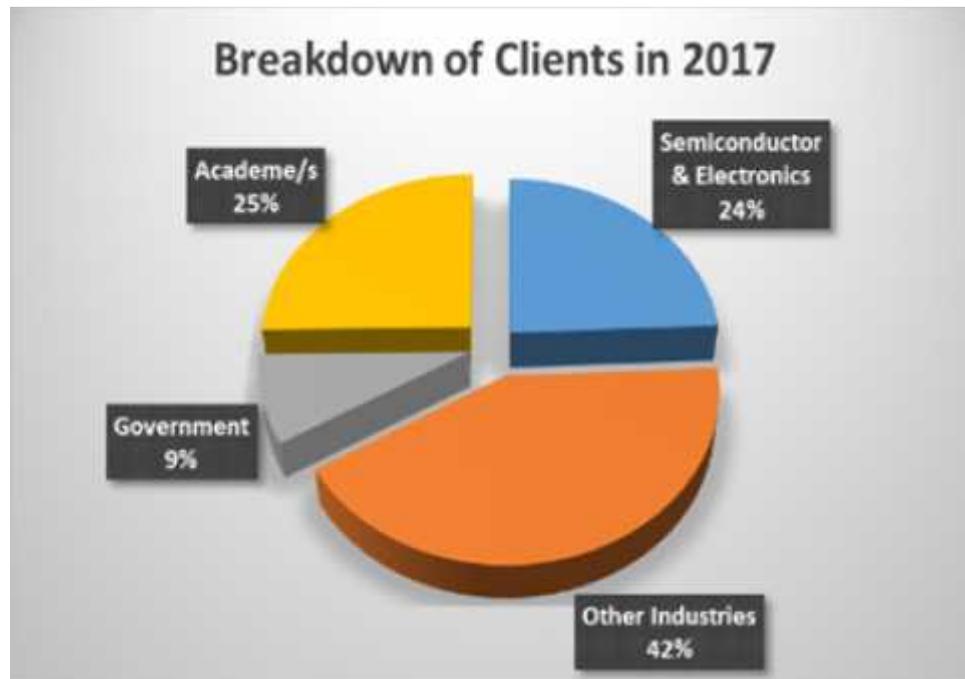
E-mail - [epdc@asti.dost.gov.ph](mailto:epdc@asti.dost.gov.ph)



# ADVANCED DEVICE AND MATERIALS TESTING LABORATORY

<http://www.admatel.com/base/>

- DOST lab equipped with state-of-the-art equipment for failure analysis (FA) and materials testing
- ISO 17025 accredited since 2015
- Serving more than 270 clients from many industries





# Equipment

ADMATEL houses three operational laboratories:



## Surface Analysis



Auger Electron Spectroscope

Time of Flight Secondary Ion  
Mass Spectroscopy

Focused Ion Beam - Field  
Emission Scanning Electron  
Microscope

Fourier Transfer Infrared (FTIR)



## Thermal Analysis



Thermogravimetric-  
Differential Thermal  
Analyzer (TG-DTA)

Differential Scanning  
Calorimeter (DSC)



## Met. and Chem.

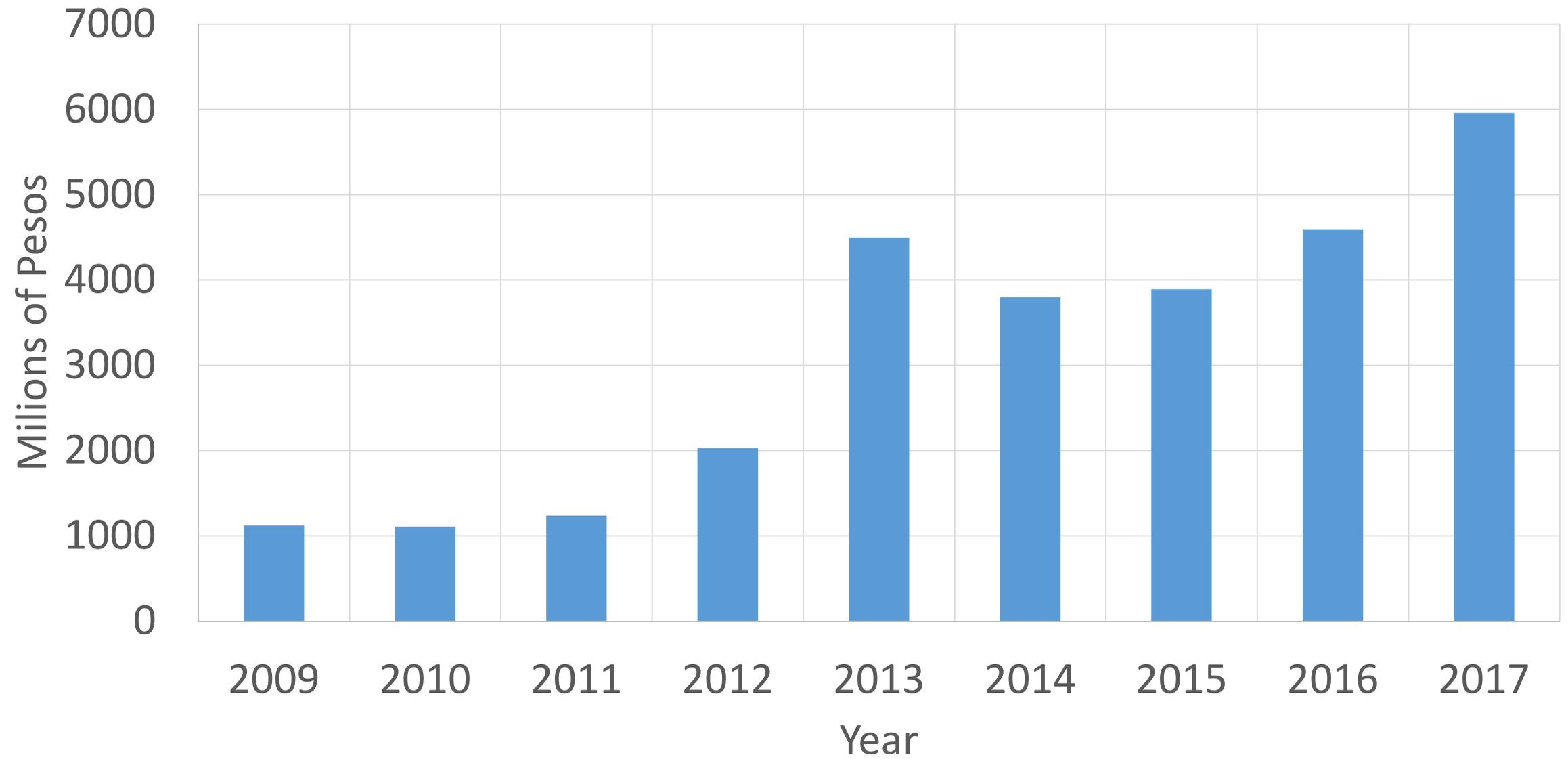


Ion Beam Cross  
Section Policer

Cutter, Grinder and  
Polisher & Optical  
Microscope



## DOST R&D Grant-in-Aid Funding



# 4 Examples of DOST R&D Programs

- Sustainable Mass Transport
- Food Innovation Center
- Tuklas Lunas – Drug Discovery and Development Program
- Philippine Microsatellite Program

# **Sustainable Mass Transport**

- Automated Guideway Transit (AGT)
- Hybrid Electric Road Train
- Hybrid Electric Train

# Automated Guideway Transport (AGT)



**DOST's 60-passenger AGT  
Test track in UP Diliman**



**DOST's 120-passenger AGT  
Test track in Bicutan**

- *Fully automated*
- *Employs rubber tires running on concrete track*
- *Powered through a built-in conductor rail along the guideway*
- *Locally designed and manufactured rapid mass transit system*

# Hybrid Electric Roadtrain

## 2 Prototypes:

- Hybrid Electric Road Train
- Light Hybrid Electric Road Train



- Diesel-electric powered (Generator and Battery)
- Regenerative Braking
- Rubber Tires
- Fully Air-conditioned Cabins
- Wide Automatic Sliding Doors
- Smaller Turning Radius
- Speed at 60kph

**RT 2m x 6m coaches  
48 passengers per coach  
6M Pesos per Coach**



**Hybrid Electric Road Train (40M)**

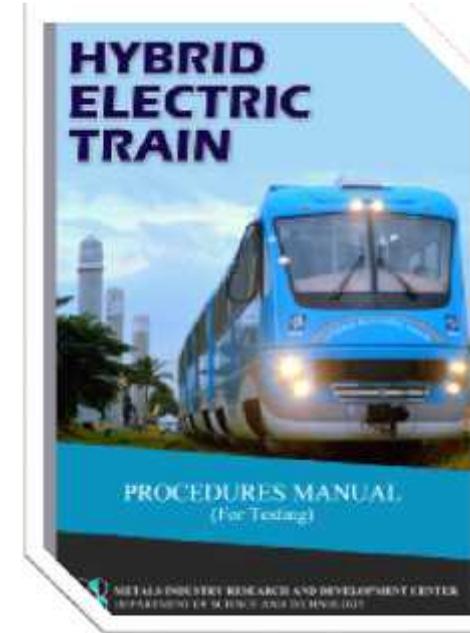
**RT 2.5m x 8m coaches  
80 passengers per coach  
8M Pesos per Coach**



**Light Hybrid Electric Road Train (30M)**

# Hybrid Electric Train

*An efficient, reliable and cost-effective rail-based commuter train*



Test Protocol Manual

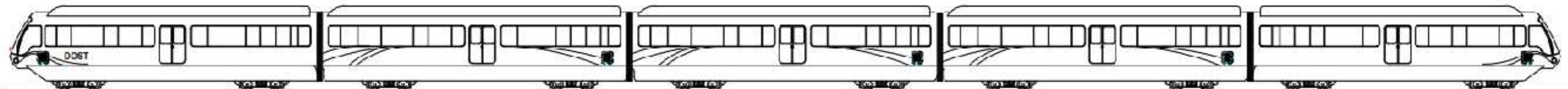


Sand Loading for Design Load and Crush Load

It has a 870 passenger capacity and it is powered by a hybrid-diesel and electric engine

## Main Technology:

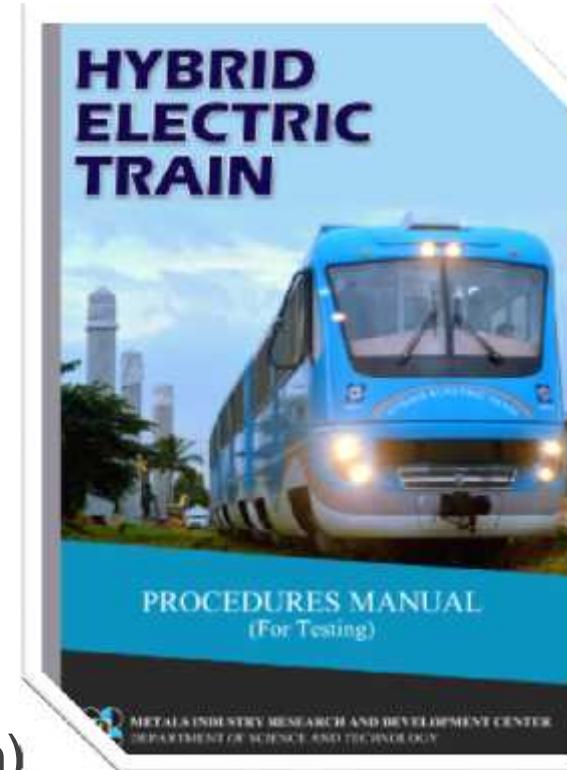
- ✓ Locally assembled parts and components
  - ✓ Diesel-electric powered
  - ✓ Regenerative braking



# ACCOMPLISHMENTS

- ❑ Tests Conducted
  - Speed Test
  - Acceleration Test
  - Braking Distance Test
  - Endurance Test
- ❑ Tests were conducted for the following loads:
  - No Load
  - Design Load (175 passengers board in each coach)
  - Crush Load (220 passengers board in each coach)

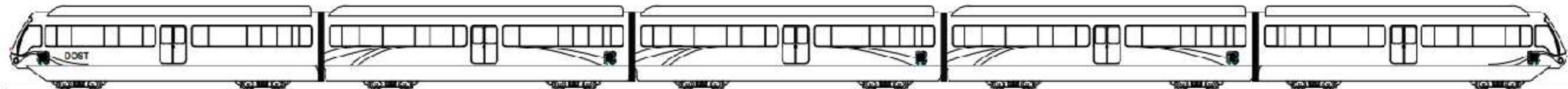
*Note: Test Protocol was established in coordination with PNR*



**Test Protocol  
Manual**



**Sand Loading for  
Design Load and  
Crush Load**



# ACCOMPLISHMENTS

## ❑ Speed Test

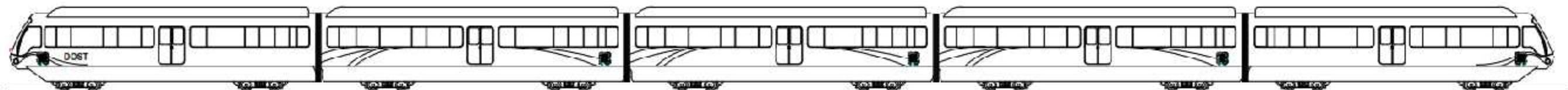
The maximum speed allowed by PNR is 40 kph only.



**Damaged rail track in Laguna**



**Rail track condition while conducting performance testing**

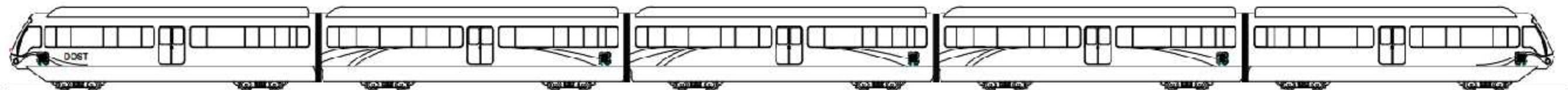


# ACCOMPLISHMENTS

## Acceleration Test

Test (from 0 kph to 40 kph) was conducted three (3) times.

LOAD TESTS	NORTH BOUND			SOUTHBOUND		
	TARGET SPEED	AVERAGE TIME	AVERAGE DISTANCE	TARGET SPEED	AVERAGE TIME	AVERAGE DISTANCE
NO LOAD	40 KPH	67.42 s	287.33 m	40 KPH	73.56 s	340.67 m
DESIGN LOAD	40 KPH	70.17 s	338.33 m	40 KPH	115.07 s	478.00 m
CRUSH LOAD	40 KPH	108.65 s	553.67 m	40 KPH	140.09 s	622.67 m

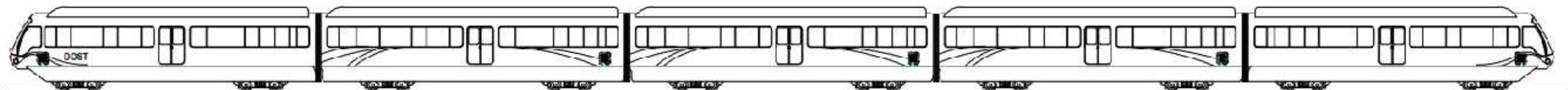


# ACCOMPLISHMENTS

## Braking Distance Test

Test (from 40kph to 0 kph) were conducted three (3) times.

LOAD TESTS	JOYSTICK			EMERGENCY STOP		
	STARTING SPEED	AVERAGE TIME	AVERAGE DISTANCE	STARTING SPEED	AVERAGE TIME	AVERAGE DISTANCE
NO LOAD	40 KPH	30.95 s	106.14 m	40 KPH	11.03 s	45.16 m
DESIGN LOAD	40 KPH	35.46 s	183.14 m	40 KPH	13.60 s	82.37 m
CRUSH LOAD	40 KPH	38.10 s	201.11 m	40 KPH	14.57 s	87.14 m

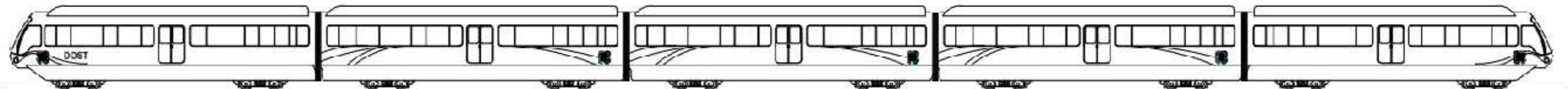


# ACCOMPLISHMENTS

## Endurance Test

The test has been conducted in a 2.7-km rail track between Cabuyao and Mamatid Stations in Laguna.

MONTH	TOTAL DISTANCE RUN (km)
June 2017	45.97
July 2017	97.03
August 2017	61.03
October 2017	151.38
November 2017	267.38
December 2017	380.29
January 2018	184.94
<b>TOTAL</b>	<b>1188.02</b>

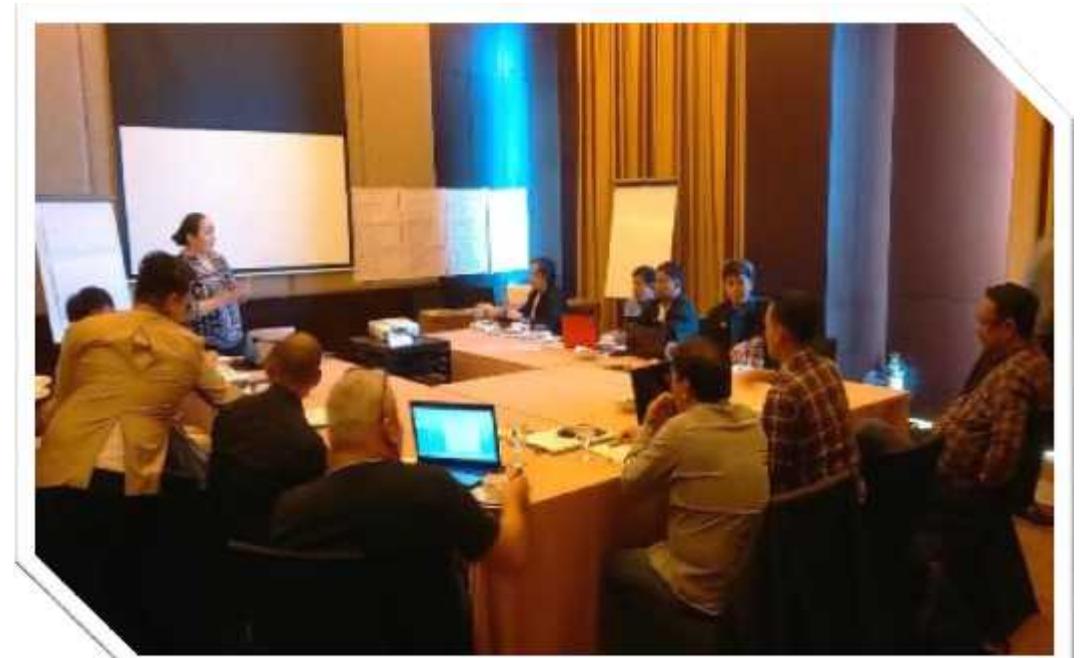


# ACCOMPLISHMENTS

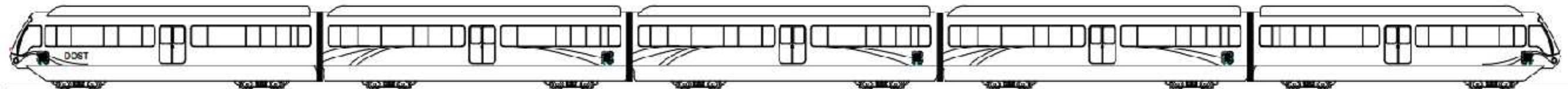
- ❑ Gap Analysis was conducted by **Systra Philippines Inc. (SPI)**.
- ❑ Scoping Workshop and Value Engineering/Value Analysis Workshop were conducted.



**Scoping Workshop headed by Mr. Herve Laumond**



**Value Engineering/Value Analysis (VE/VA) Workshop**



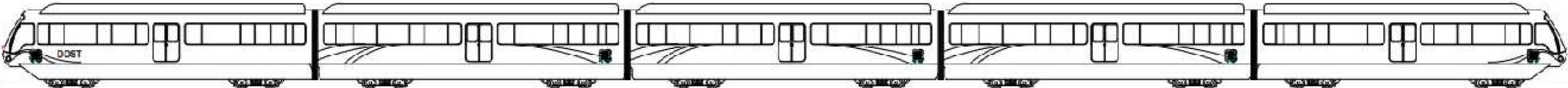
# ACCOMPLISHMENTS



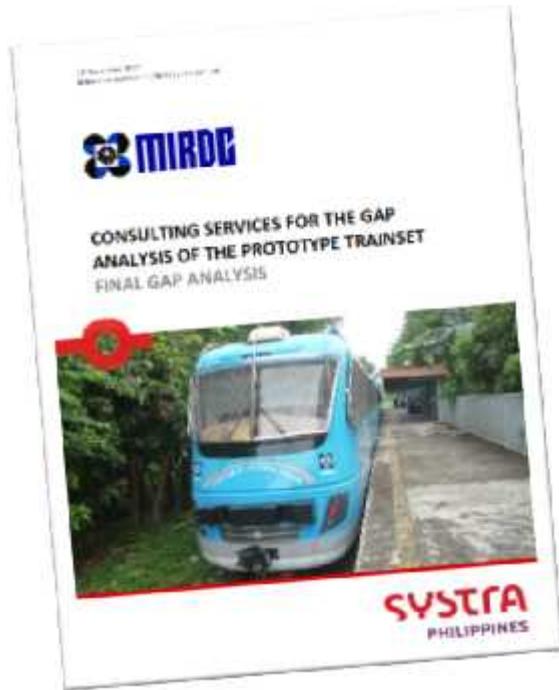
**Mr. Philippe Wessbecher of SPI inspecting HET**



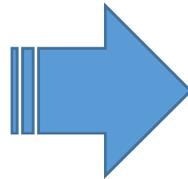
**Presentation of Final Gap Analysis Report**



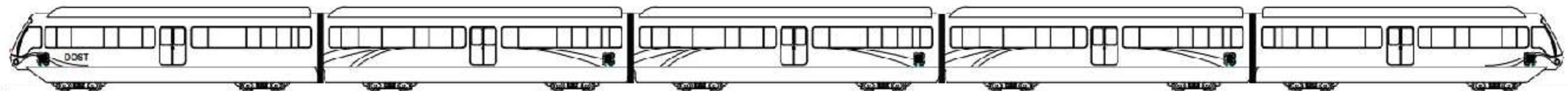
# ACCOMPLISHMENTS



**Final Gap Analysis Report**

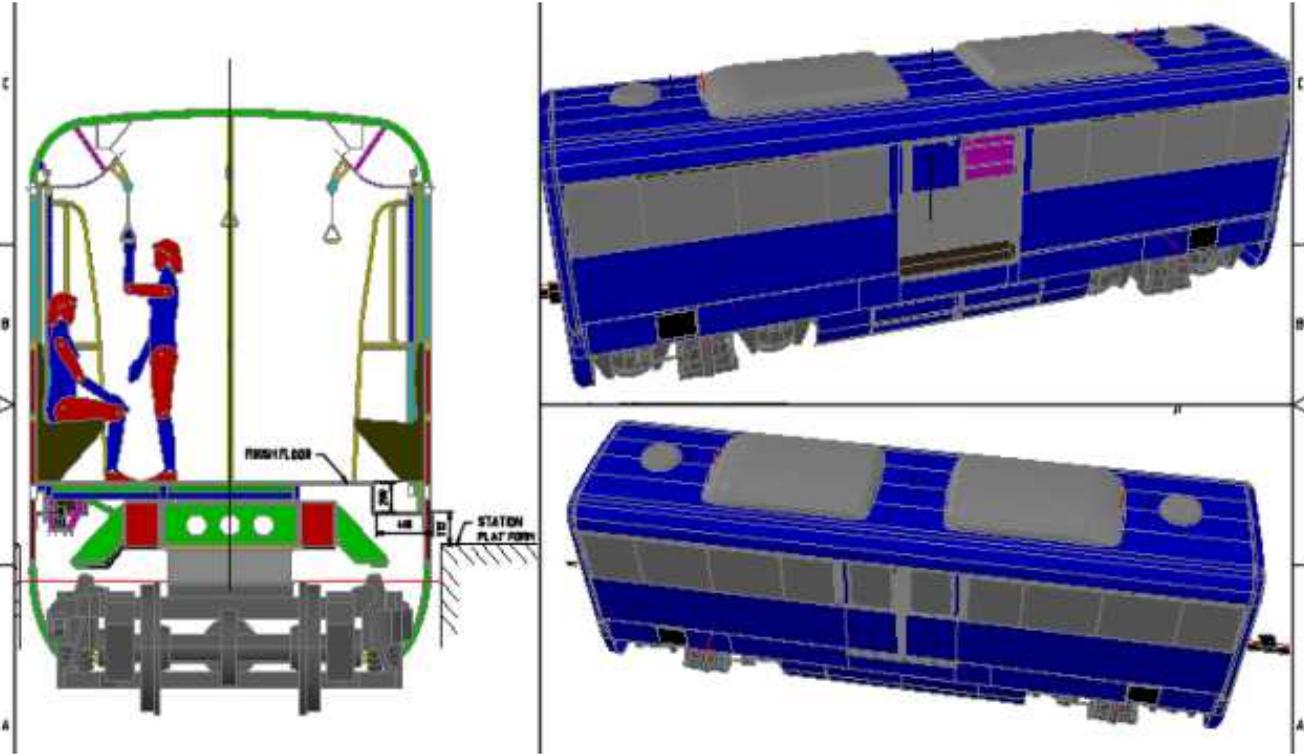


MANDATORY GAP AREA FOR IMPROVEMENTS	ACTIVITIES
Car Body and Shock Absorption	<ul style="list-style-type: none"> <li>• Adjust the position of the towing coupler</li> <li>• Fabrication of rail guard</li> <li>• Modification of local couplers</li> </ul>
Braking System	<ul style="list-style-type: none"> <li>• Addition of pneumatic lines to activate the existing parking brake</li> <li>• Installation of pressure sensor to monitor brake air pressure and add program to the control system</li> </ul>
Doors and Floor	<ul style="list-style-type: none"> <li>• Adding of emergency door opening device (buzzers and lights)</li> <li>• Adjustment of door height</li> <li>• Adjustment of floor level</li> </ul>
Deadman's Switch	<ul style="list-style-type: none"> <li>• Additional programming for other dead man activators</li> </ul>
Speed Monitoring	<ul style="list-style-type: none"> <li>• Installation and programming for additional speed monitoring device</li> </ul>
Certification for RAMS (Reliability, Availability, Maintainability, and Safety)	<ul style="list-style-type: none"> <li>• Identification of a third-party certifying body</li> </ul>



# ACCOMPLISHMENTS

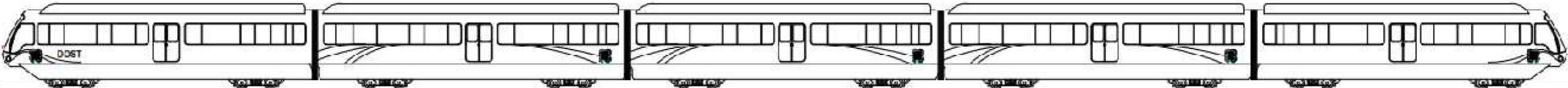
□ Fil-Asia has commenced their work for HET door and floor optimization



**Proposed 2-step entrance floor**



**Fabrication of components for the new entrance floor**



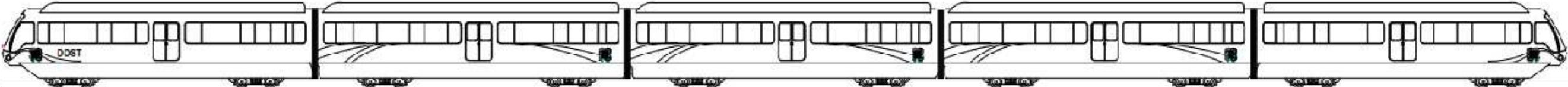
# ACCOMPLISHMENTS



HET Running at 40 kph



HET Running at 48 kph



## R&D for 2 industries (2011 – present)

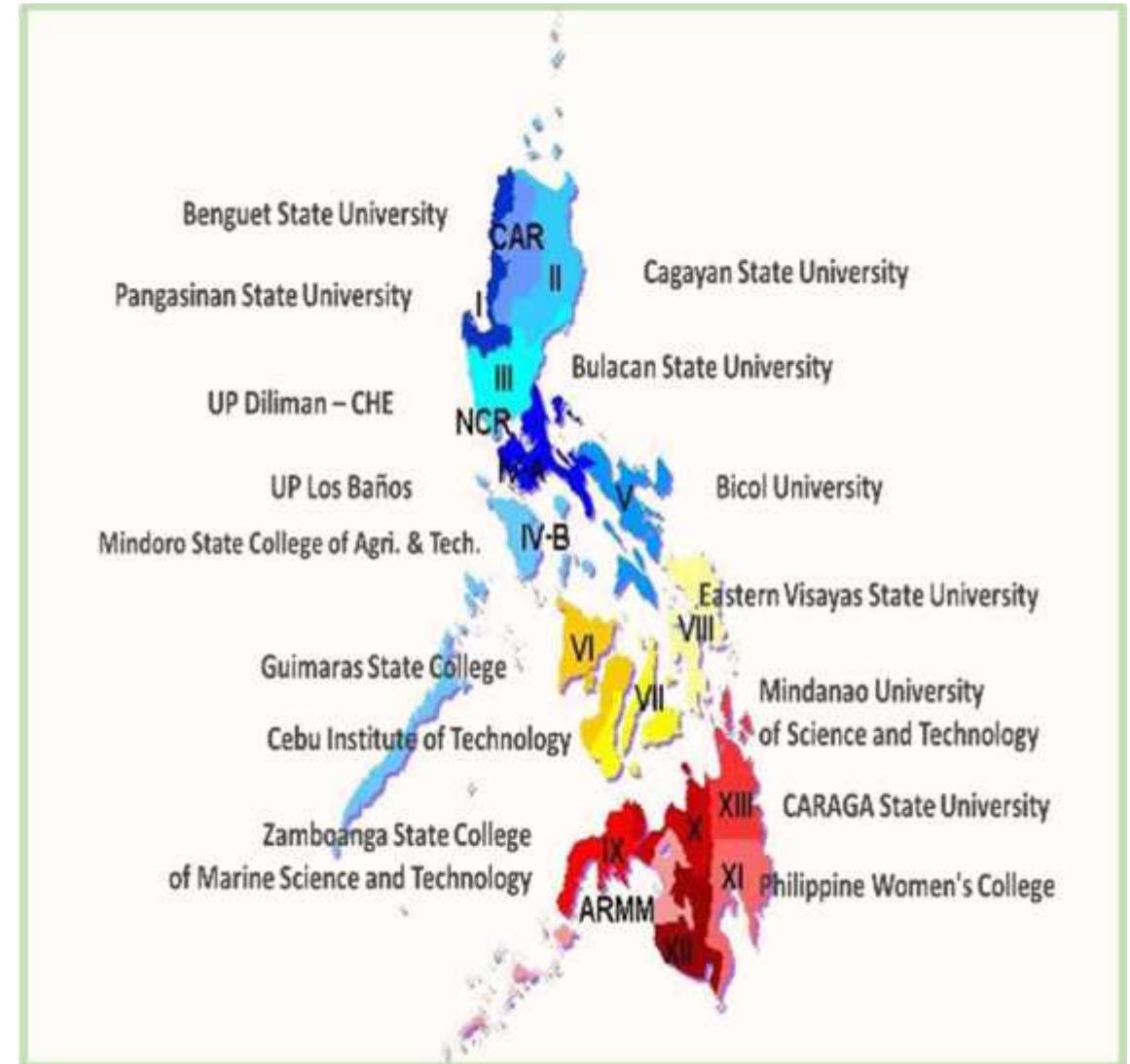
- Food
- Food Processing Equipment

Local food processors cannot produce new innovative food products due to high acquisition cost of equipment

# Food Innovation Center



- Setting up of several FICs
- Sourcing of Local Suppliers and Fabricators
  - Readiness of local fabricators VS imported units
  - Cost of customized equipment
  - Sourcing/availability of components
- Challenges in fabrication
  - Realization of prototype design
  - Functional and Performance testing
- Training in equipment operation





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# Food Innovation Center



**SPRAY DRYER**



**FREEZE DRYER**



**VACUUM FRYER**



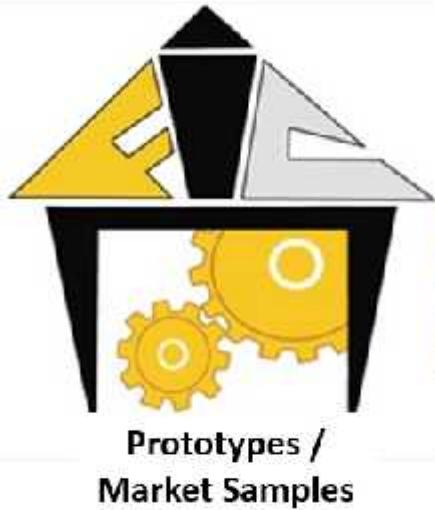
**WATER RETORT**



# Product prototypes from the FIC



# Food Innovation Center (FIC)



**SUCCESS INDICATORS**

- Products in the Market (consumer & intermediate)
- Available equipment
- Alternative toll services
- FIC network

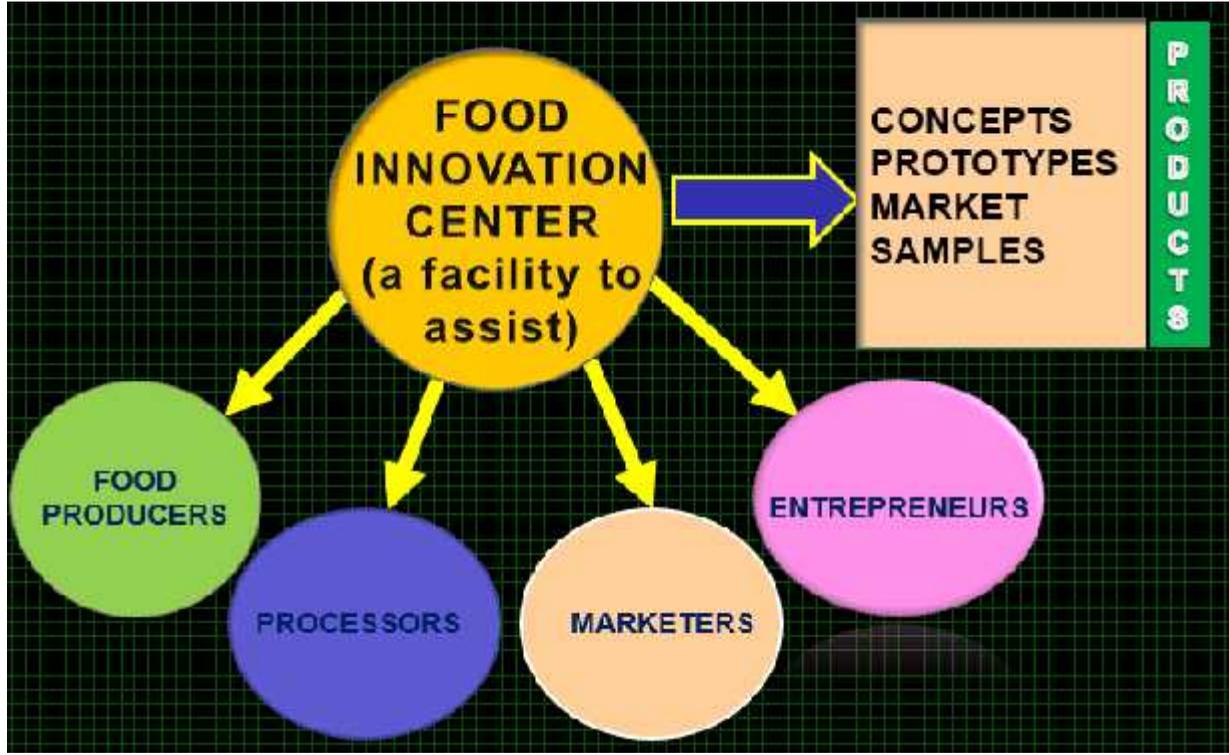
## CHOKe POINTS

Product development issues	Equipment issues	Technology transfer issues	Knowledge management issues
<ul style="list-style-type: none"> <li>• Gated approach</li> <li>• Technology validation</li> </ul>	<ul style="list-style-type: none"> <li>• Local fabrication</li> <li>• Scale (toll process; TBI)</li> <li>• Cost of imported eqpt.</li> </ul>	<ul style="list-style-type: none"> <li>• Marketing &amp; promotion</li> <li>• Techno-transfer protocol</li> </ul>	<ul style="list-style-type: none"> <li>• Inter &amp; Intra-control of knowledge</li> </ul>



# Food Innovation Center (FIC)

**GO** to market



Vacuum Fryer



Freeze Dryer



Spray Dryer



Water Retort

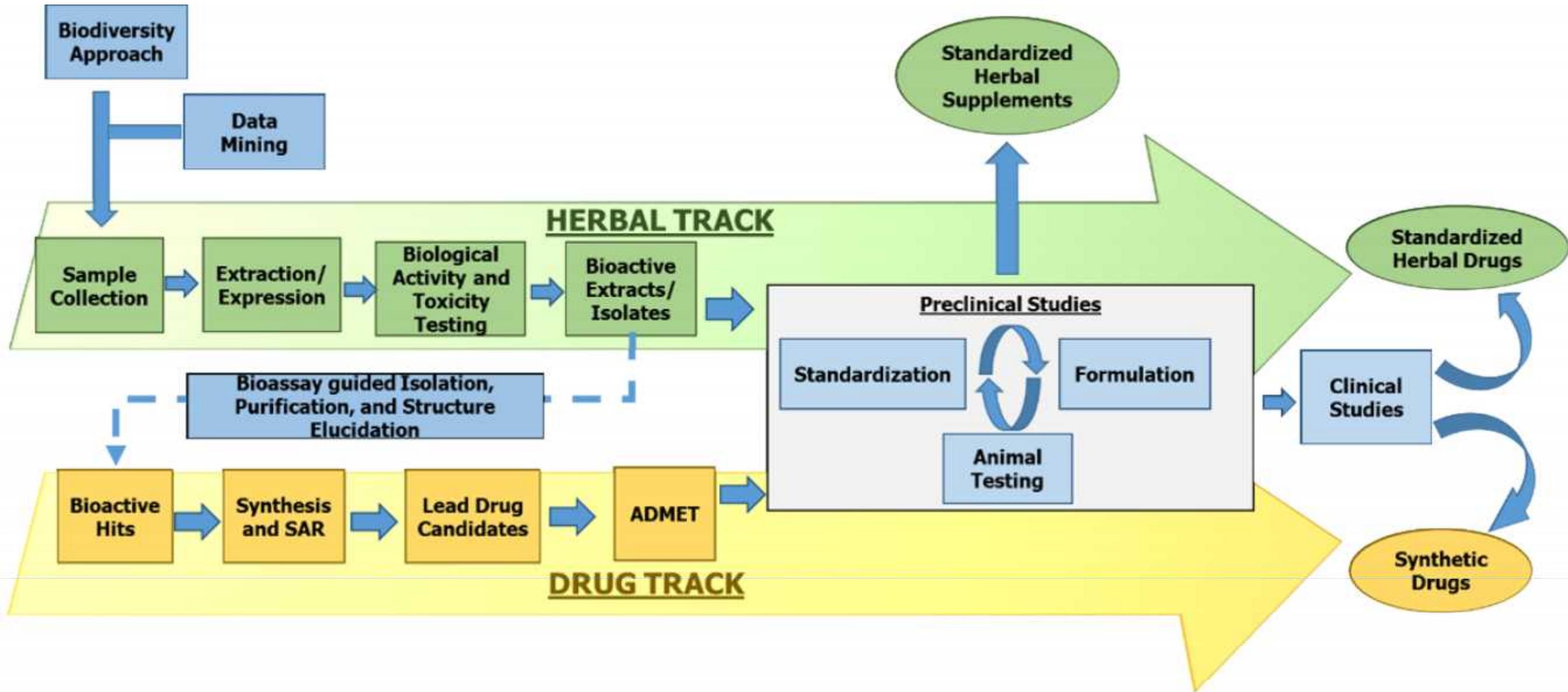




DOST TUKLAS LUNAS  
(Drug Discovery and  
Development) PROGRAM  
based on  
Philippine Biodiversity



# The Drug Discovery and Development (D3) Framework





# TUKLAS LUNAS CENTERS

Mariano Marcos State University (MMSU)

Central Luzon State University (CLSU)

Ateneo de Manila University (AdMU)

University of the Philippines Los Baños (UPLB)

Mindanao State University-Iligan Institute of Technology (MSU-IIT)

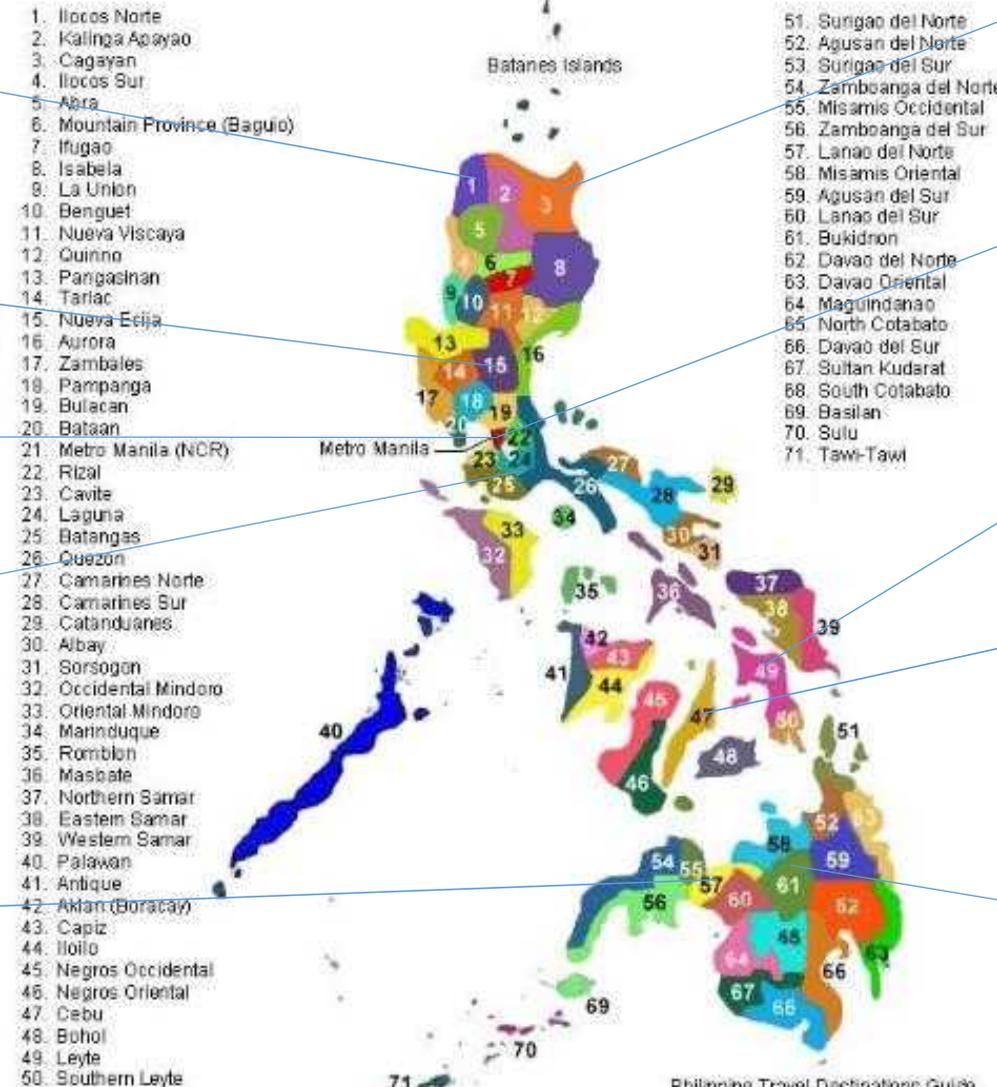
Cagayan State University (CSU)

University of Santo Tomas (UST)

Visayas State University (VSU)

University of San Carlos (USC)

Central Mindanao University (CMU)



Philippine Travel Destinations Guide  
<http://www.philsite.net>



DRUG DISCOVERY



# Bioactivity and Toxicity Facility

- Medium throughput facility for screening for:
  - Inflammation
  - Diabetes
  - Hypertension
  - Pain
  - Gout
  - Cancer
  - Cholesterol-lowering
  - Immunomodulation
  - In vitro hepatotoxicity and nephrotoxicity
- Established in UP Diliman (Institute of Chemistry, Institute of Biology, and National Institute of Molecular Biology and Biotechnology)



# Key Areas for Partnership w/ the Private Sector

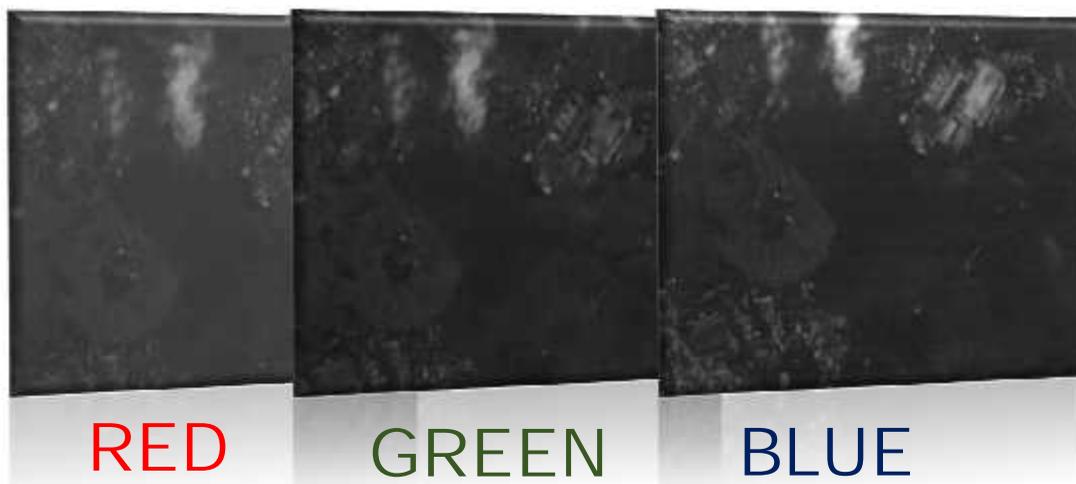
- Sharing of facilities
- Partners in R&D phase for discovery of herbal drug candidates/ drug leads
- Early licensing/partnership for development of herbal drug candidates
  - Licensing products after pre-clinical development
  - Co-funding of clinical trials
- Licensing/co-funding of drug leads for preclinical development





**Diwata-1** was launched to the International Space Station (ISS) in March 23, 2016 and was deployed into orbit from the ISS in April 27, 2016. This 50 kg satellite which can fly 400 km above the earth was designed, developed and assembled by a team of Filipino engineers.

Bringing color to DIWATA-1's images



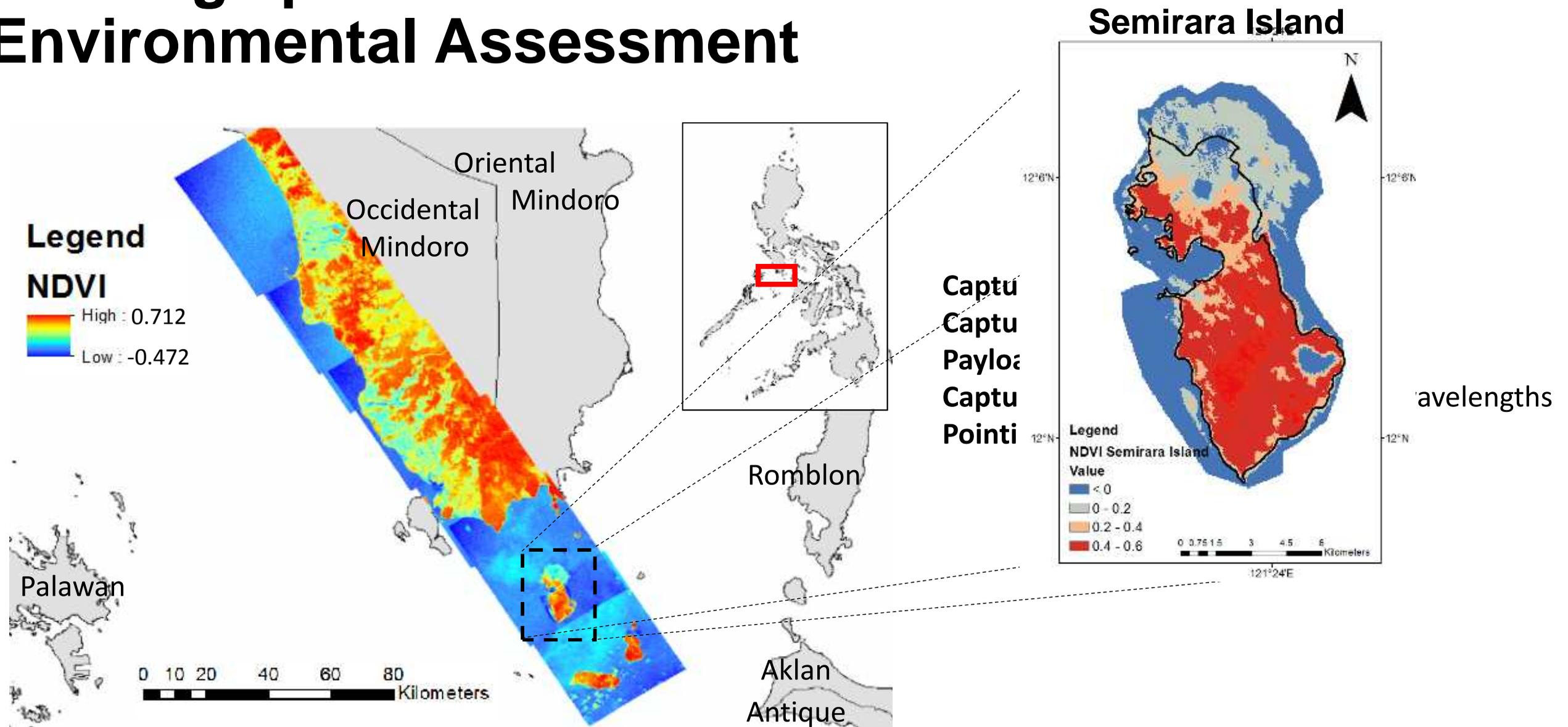
Captured Area: Bulacan  
Capture time: 15 August  
2017 09:02:00

# Post-typhoon damage assessment through HPT

Image taken by HPT on 24 Oct 2016 7:29:34 -  
5 days after Typhoon Lawin hit

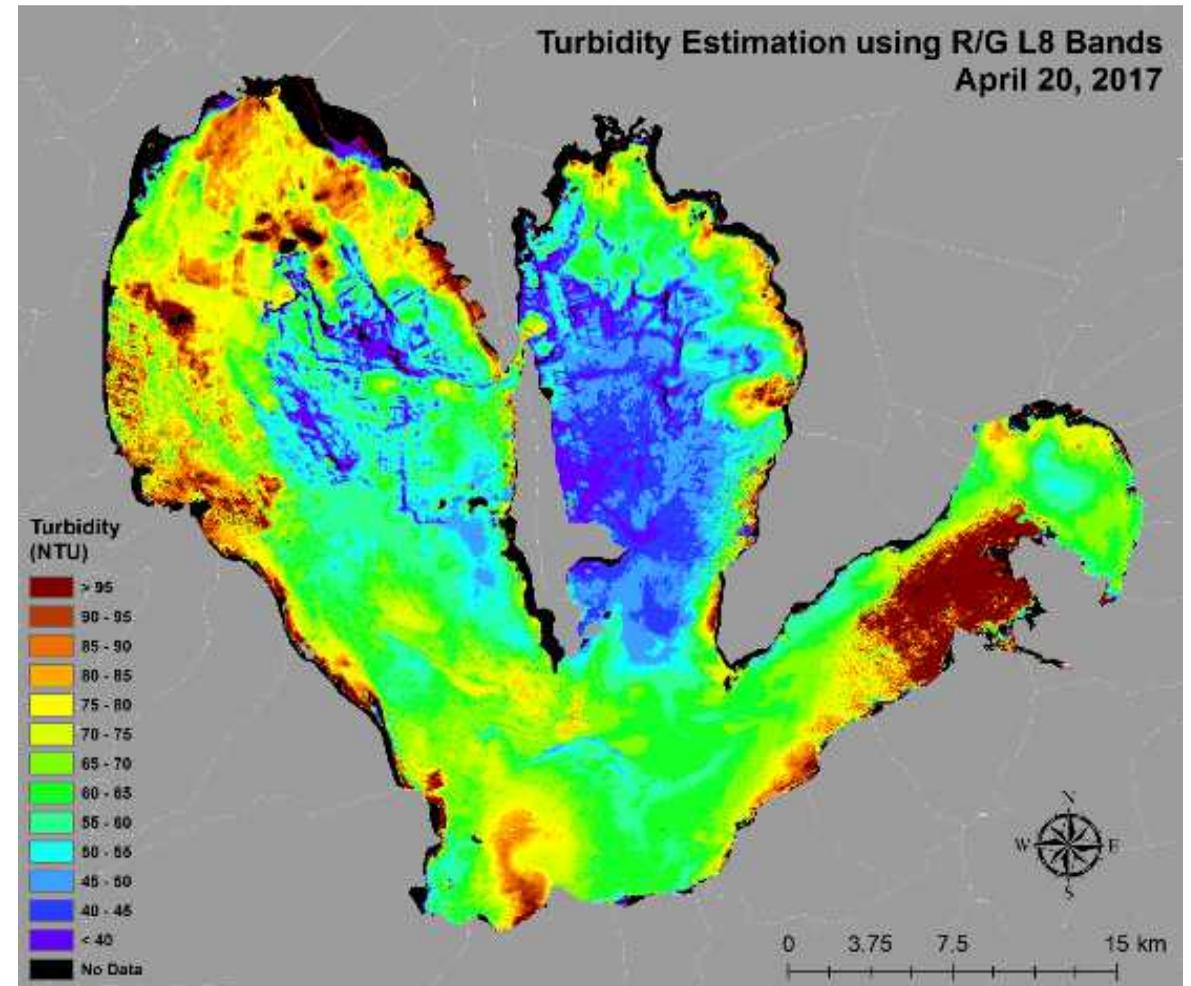
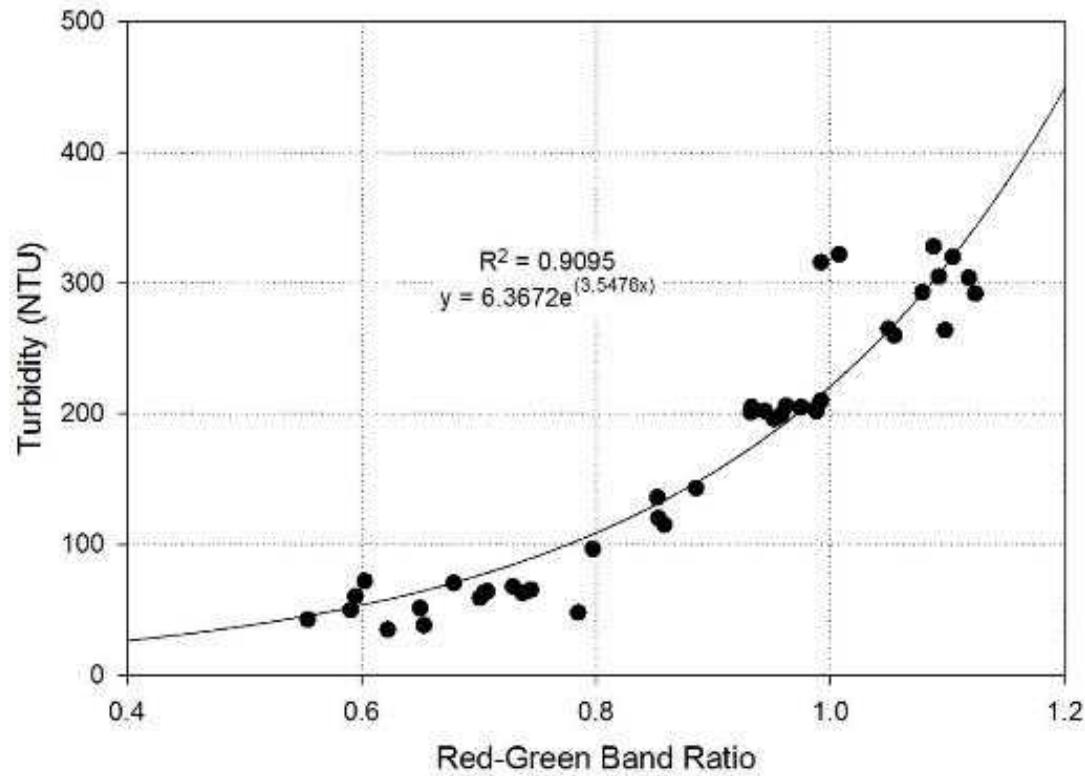


# Utilizing spectral Information for Environmental Assessment



# Case Study: Laguna Lake Turbidity

## Relation of R-G Ratio to turbidity



# Relating Actual Measurements to Satellite Images

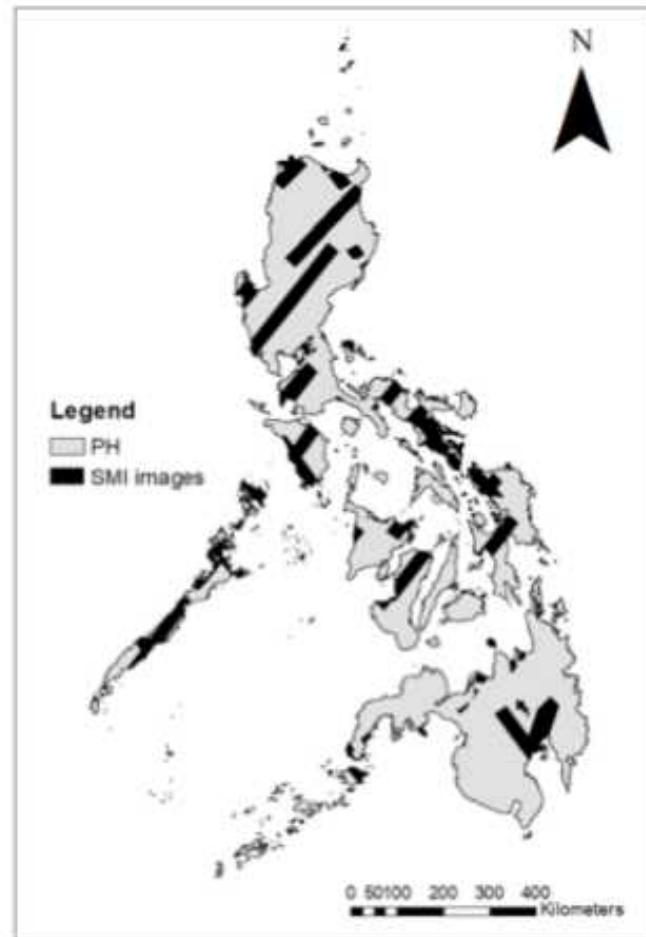
## Water Quality (turbidity)



## Vegetation Health (vegetation Index)



# Multispectral images of the Philippines

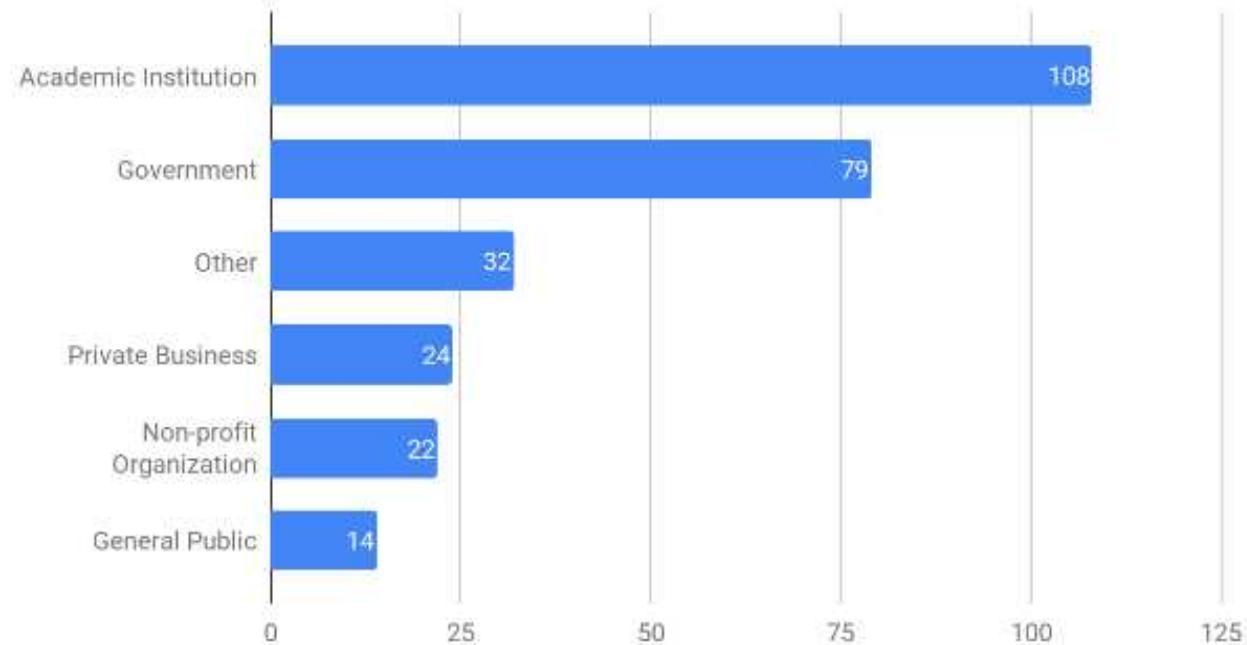


- Diwata-1 has acquired over **15,000** images in 2017
- Images captured by Diwata-1 since launch covered **22.52% of PH's land area**

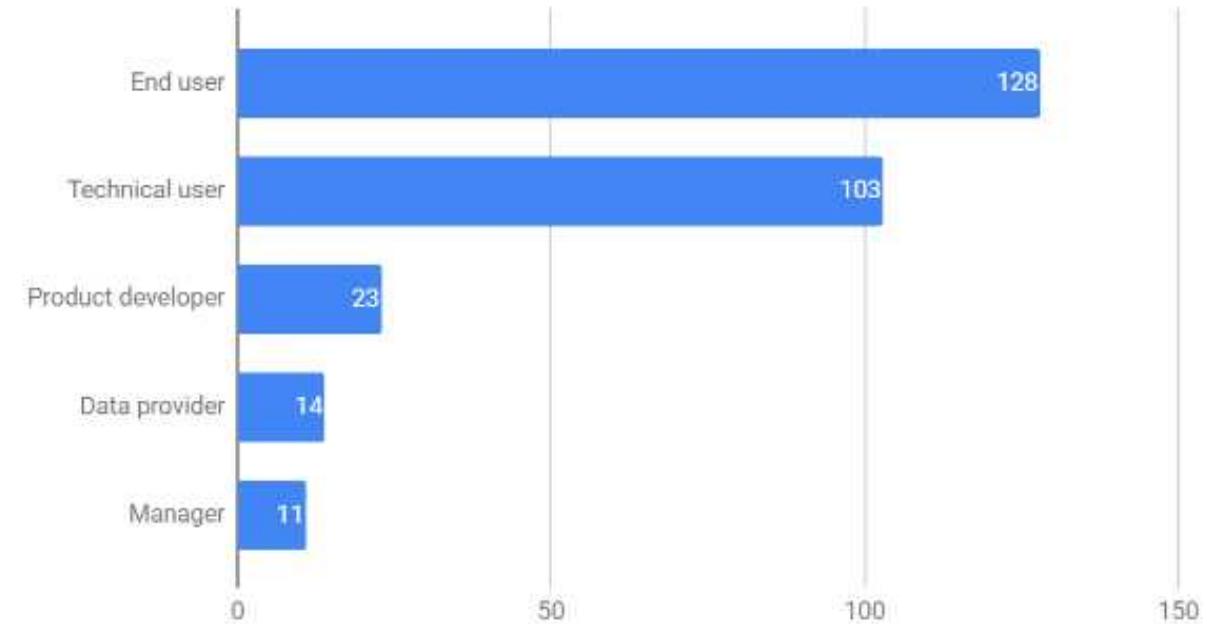


# User Distribution

## Distribution by Sector



## Distribution of User Types



\*As of January 11, 2018



# U.P. Small Satellite Research Facility



- Nurture and sustain education, training, and research in space S&T innovation
- Means to link with local industries for developing valuable products and services



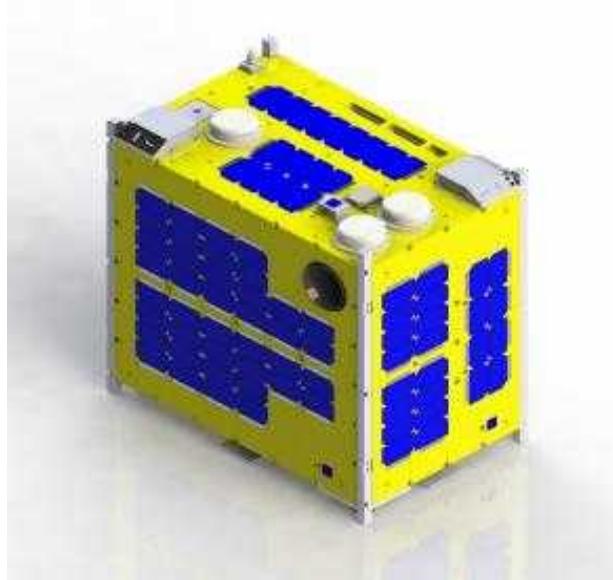
# PHL MICROSAT (DIWATA)

## U.P. Small Satellite Research Facility



Engineering Model of Diwata-2 (ISS) shipped to Philippines last 26 January 2018  
Disassemble and testing of components is currently being done

# DIWATA-1

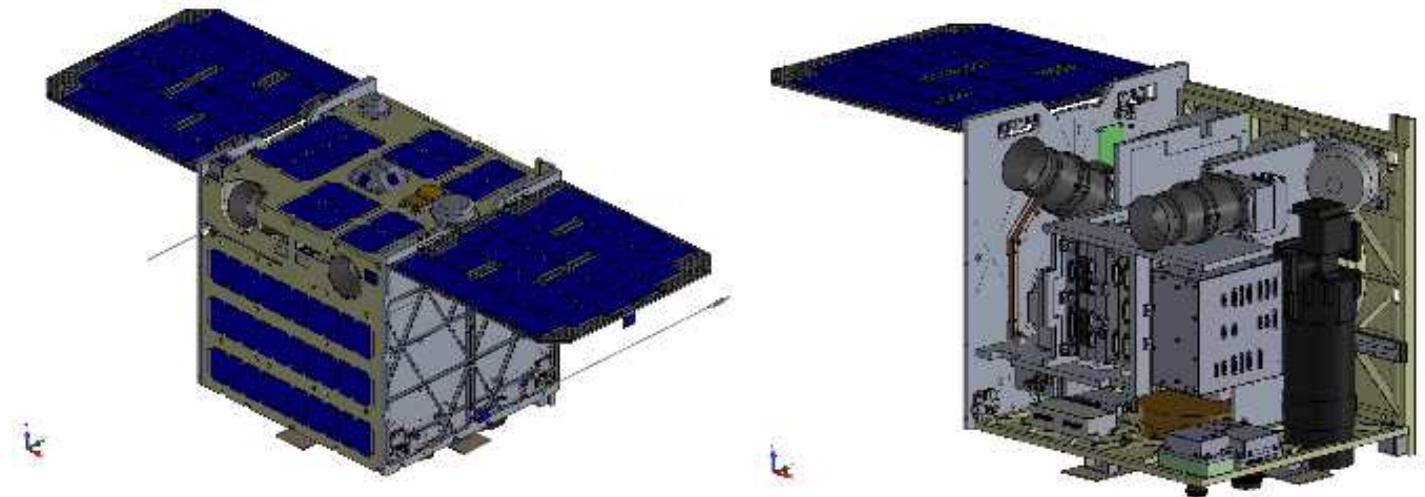


55 cm x 55 cm x 35 cm , 53 kgs.

Released from ISS at ~400km LEO / 51.6 deg inclination

High Precision Telescope (HPT)  
Spaceborne Multispectral Imager (SMI) w/ LCTF  
Wide Field Camera (WFC), Medium Field Camera (MFC)

# DIWATA-2



50 cm x 50 cm x 50 cm , 50 kgs.

Launch via H-2A Rocket into ~613km SSO

same payloads as Diwata-1 (w/ improvements)  
**+ Enhanced Resolution Camera (ERC)**  
**+ Amateur Radio Unit (ARU)**

# Summary of Program Outputs in terms of 6Ps



## Products

- Diwata-1, developed, launched and operated
- Diwata-2, developed and launched
- Support Software for Operation
- Remote Sensing products
- Distribution Site



## Places

- Ground Receiving and Control Station
- Small Satellite Research Facility



## Patent

- Antenna Design (pending disclosure)



## People

- Five master's degree holders, two on-going master's studies, three on-going doctoral studies, and one post-doctoral
- Over 50 personnel trained



## Policy

- Data Sharing Policy
- Inputs to the creation of the National Space Agency



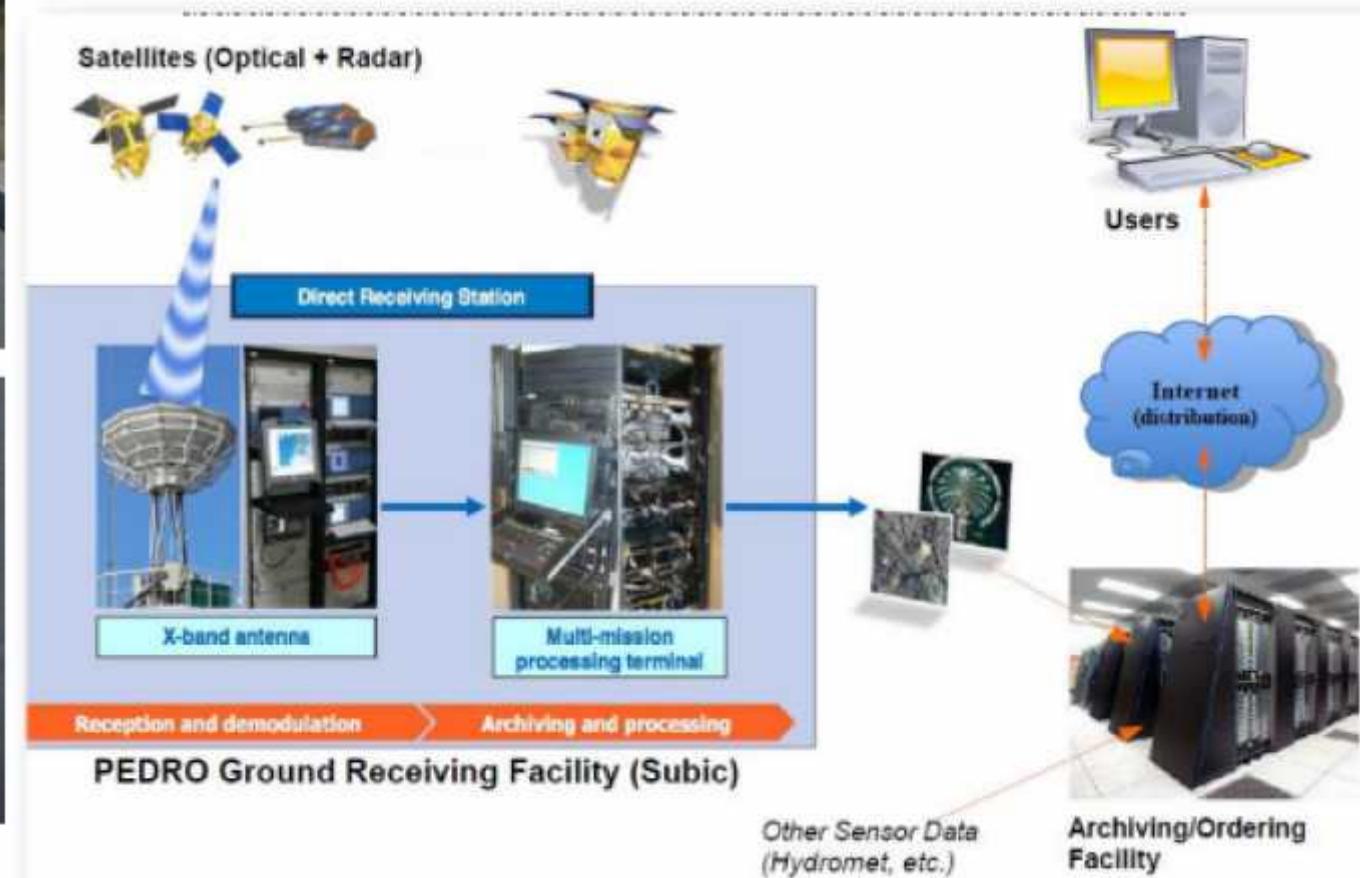
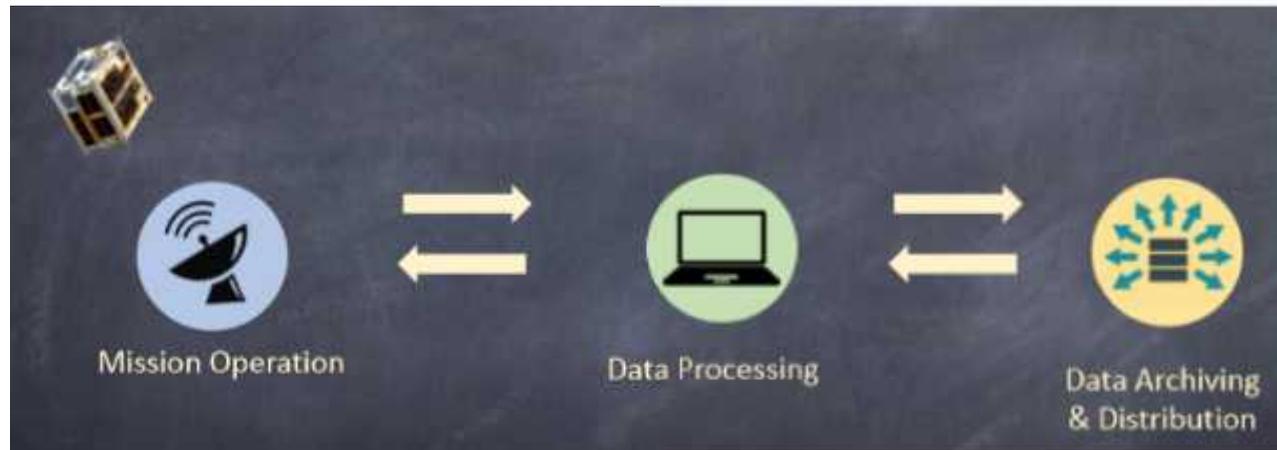
## Publication

- Over 25 papers and conference presentations



# PEDRO

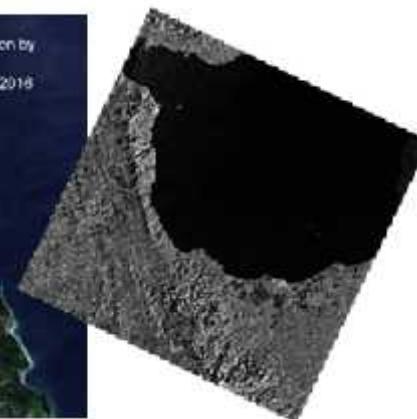
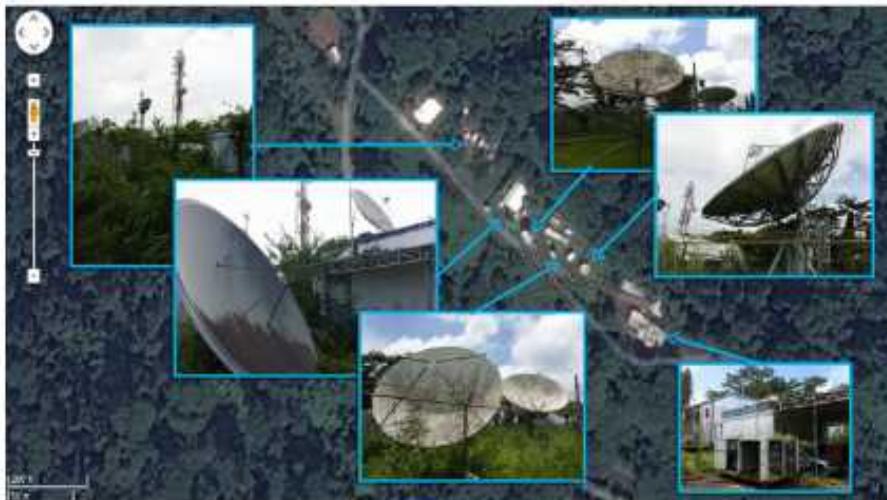
A Multi-Mission Ground Receiving Station (MMGRS) that can receive, process, and distribute space-borne imagery with high resolution optical and radar data to help in the country's resource utilization and mobilization.



The program generated the necessary geospatial information, mainly through the use of high resolution optical and SAR satellite technology

# PEDRO

Established a ground receiving station capable of direct reception, processing, and distribution of optical- and synthetic aperture radar (SAR)-based information thru remotely sensed images provided by various satellite constellations



Satellite image of Leyte taken by  
KOMPSAT 5 satellite  
Location: Capoocan & Carigara, Leyte  
Image Date: December 27, 2016

Satellite Name	DOST-ASTI Capacity	Data availability on PEDRO
DIWATA-1	Unlimited number of captures	Currently handled by PHL-MICROSAT program
Worldview constellation and Geoeye 1	39 Minutes of satellite usage for 2018	220 Images
KOMPSAT 3 & 5	1020+ Images for 2018	<ul style="list-style-type: none"> <li>•KOMPSAT- 5: 600+ Images covering 85% of the philippines</li> <li>•Kompsat-3: 46 Images</li> </ul>
Dove Constellation	93,000 sq. km of downloadable data per quarter for 2018	30,000+ images taken all over the Philippines since 2015 with 30% cloud cover

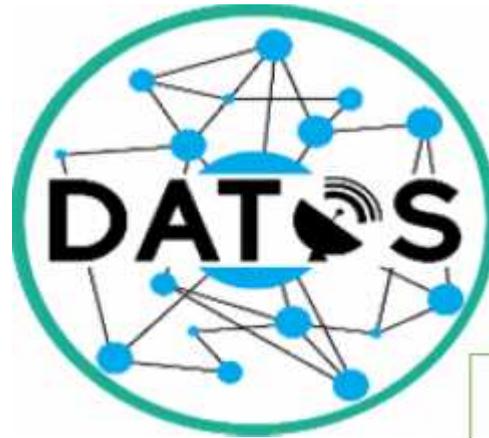




# COMPUTING & ARCHIVING RESEARCH ENVIRONMENT

## APPLICATIONS RUNNING ON COARE:

- Flood modelling (Gerris)
- Molecular Dynamics (NAMD)
- Numerical Weather Prediction Modelling (WRF, CCAM)
- Climate Modelling (RegCM)
- Bioinformatics Pipeline (BWA, GTK)
- Storm Surge Modeling (Gaussian)
- OGC Services (WMS, WFS)



# Remote Sensing and Data Science (DATOS) Helpdesk

### DATA STORAGE



**STORAGE SERVICE**

Repository of scientific data.  
Short- to long-term data archiving support.  
Storage can handle large quantity of files (GB to TB).



**SCIENCE CLOUD**

Delivers cloud-based services to researchers and students.  
Enables private sharing of data among specific groups.  
Provisioning of Virtual Machines.

### DATA DISTRIBUTION & SHARING



**DATA CATALOG**

Web portal for data gathered from CoARE research collaborations.  
Publicly accessible data sets.  
Supports open data for research and decision-support purposes.

### HIGH PERFORMANCE COMPUTING



**HPC**

Processing of large data sets.  
High-speed calculations and analysis.  
3,120 cores with 10Gbps network speed.



# Research and Development Results Utilization

- Technology Transfer
- Technology Receptor Capacity-building
- Innovation Capacity-building

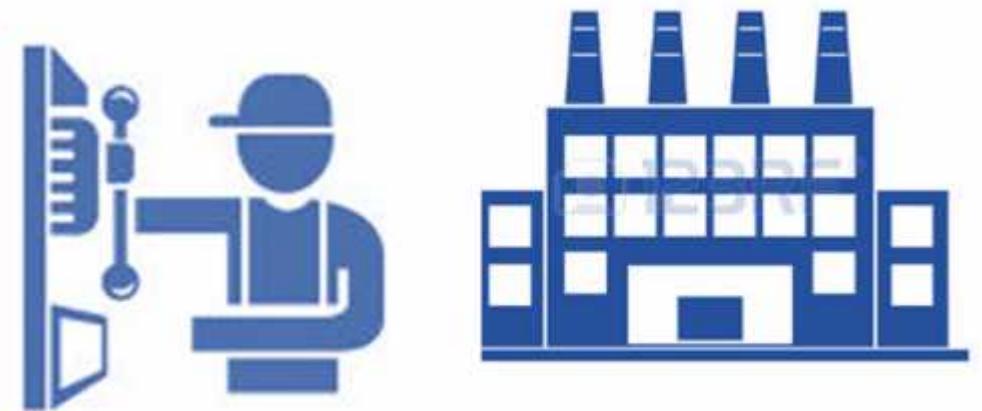
# Technology Transfer Act of 2009 (RA 10055)



- Ownership
- Management
- Use and Commercialization



© Can Stock Photo



clipart sources: <https://cdn.xl.thumbs.canstockphoto.com>  
<https://thumb7.shutterstock.com>, <https://us.123rf.com>

# **DOST IP Policies (6)**

1. Intellectual Property Policy
2. Data Sharing Policy
3. Guidelines for the Fairness Opinion Board (FOB) and the Issuance of Fairness Opinion Report (FOR)
4. Technology Transfer Protocol for R&D Institutes
5. IP Management Protocol
6. Establishment and Maintenance of Revolving Funds of DOST RDIs

# TECHNiCOM

Technology Innovation for Commercialization

✓ Developed by DOST with the aim to create a mechanism to fast track the market-readiness of innovations and technologies developed by the local and supported S&T communities.



UPM's BIOTEK-M Aqua Kit (Liquid Format)  
(Prototype Development, Field Testing)



FNRI Iron Fortified Rice  
(Scaling-Up Rice Fortification Program:  
Techno-Transfer to Private Mills)



PTRI's Neo-ethnic Philippine Tropical Fabrics  
(Nationwide Field-Testing and Technology Validation of Natural Fiber Blended Yarns and Eco-friendly Treatment and Dyeing Technologies)



Botanical Dewormer for Free Range Native Chickens, CSU-Dumarao



VSU's processing of dried grates and flour made from fresh cassava roots is scaled up to produce food products such as espasol, cassava sticks, cassava cupcakes and cookies



Shelf-life expansion of fortified ready-to-drink tropical fruit and vegetable juice blends of UP Diliman prepared by Aseptic Processing and Packaging



Neo-ethnic Philippine textile products of the DOST-PTRI (the convergence of science, art and tradition)

# Technology Business Incubation (TBI)

*one of the strategies to achieve the objective of diffusion of technologies*

## TBI Facilities and Services

**Common Facilities**

- Office space
- Internet access
- Business meeting/ Conference room
- Training room
- Storage room

**Basic Services Offered**

- Technical assistance
- Intellectual property management and Legal counseling services
- Analytical laboratory services
- Administrative services
- Janitorial services

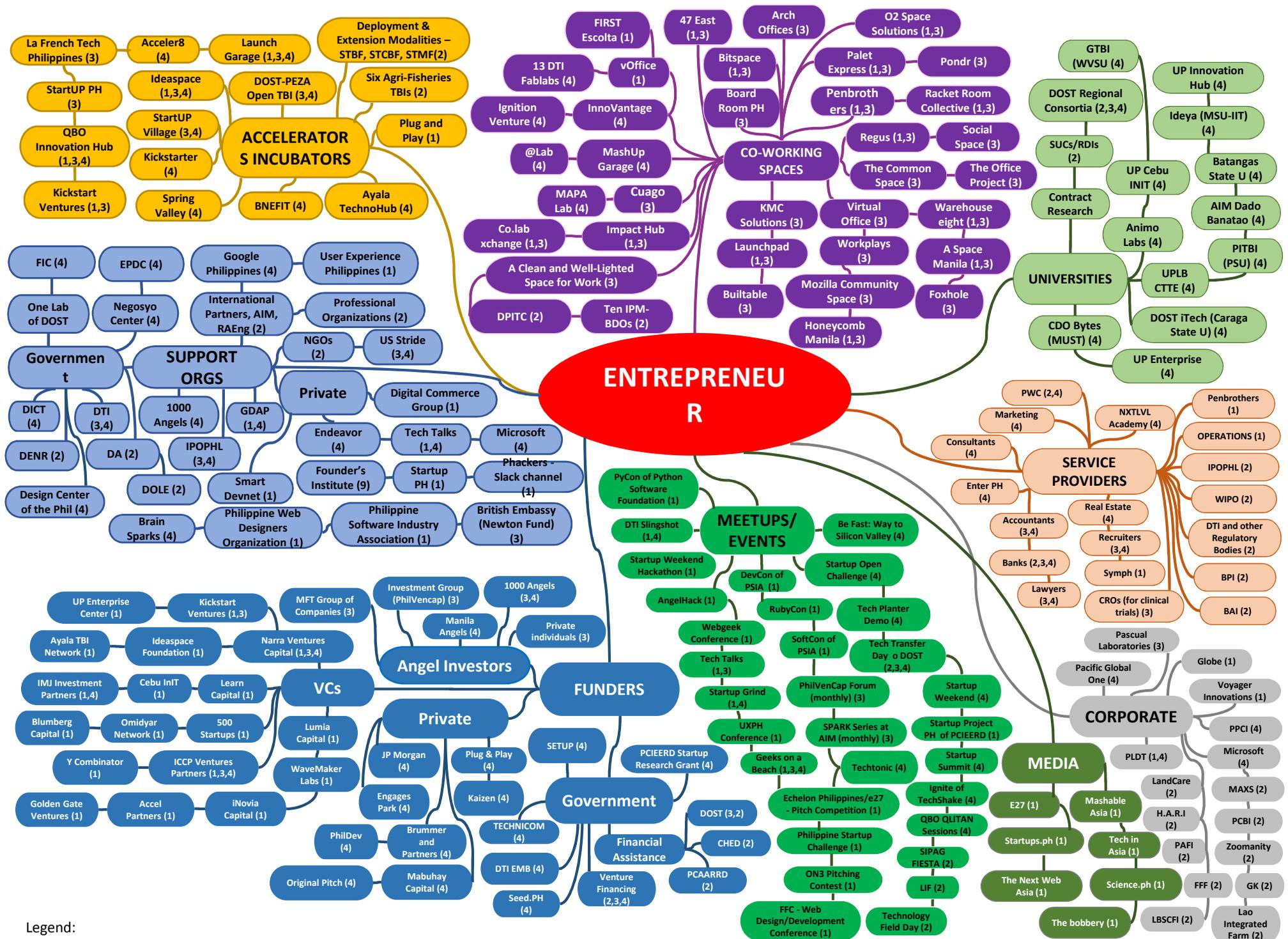
\* Incubatees may be Resident/In-wall or Virtual/Out-wall Locators



The DOST has invested on TBIs since 2009 and has assisted 116 tech startups where 38 surviving tech-based companies have sprung since 2013.



## Support for Starting Entrepreneurs Technology Business Incubator (PCIEFERD, MSMEs)



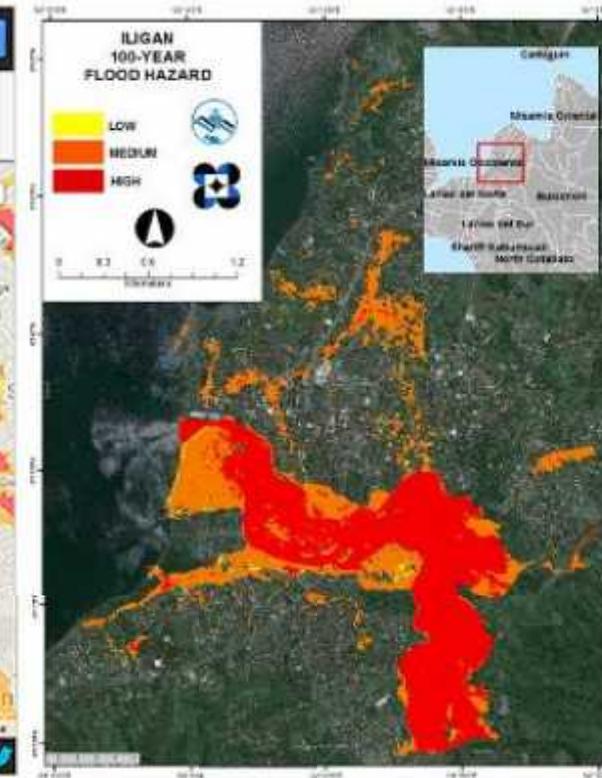
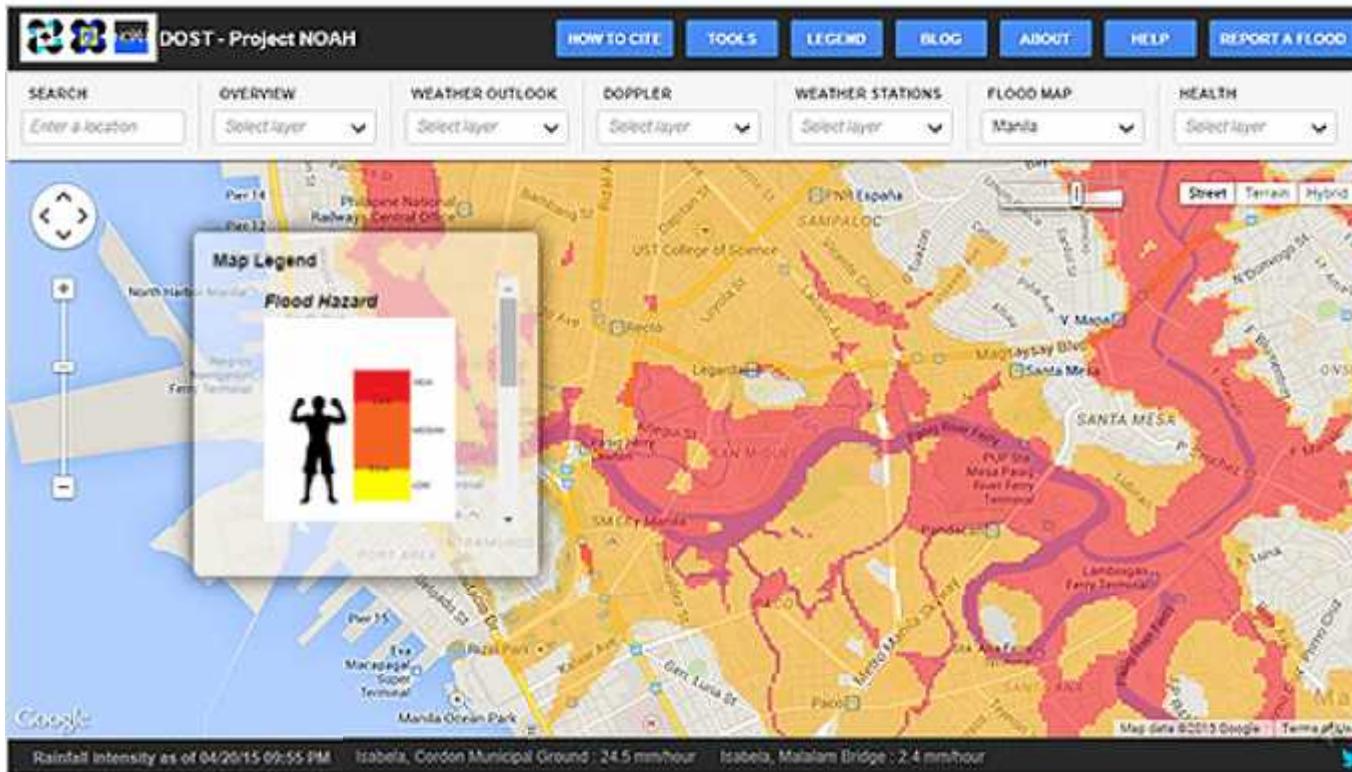
Legend:  
 1) DTI 2) PCAARRD 3) PCHRD 4) PCIEERD



# Flood Hazard Maps

Philippine Light Detection and Ranging (Phil-LiDaR) Program

Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program and the

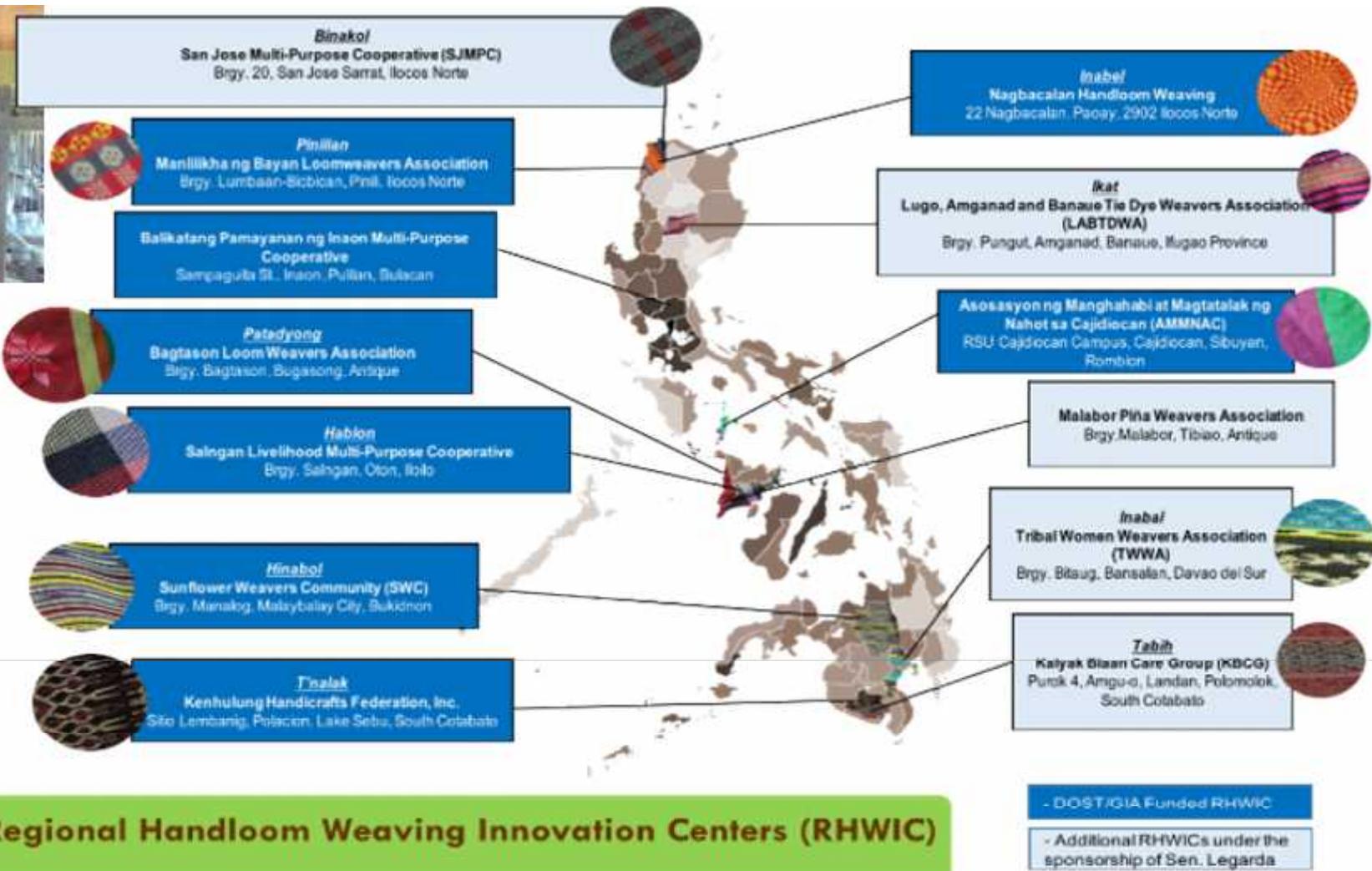


✓ *flood hazard maps were distributed to LGUs all over the country.*



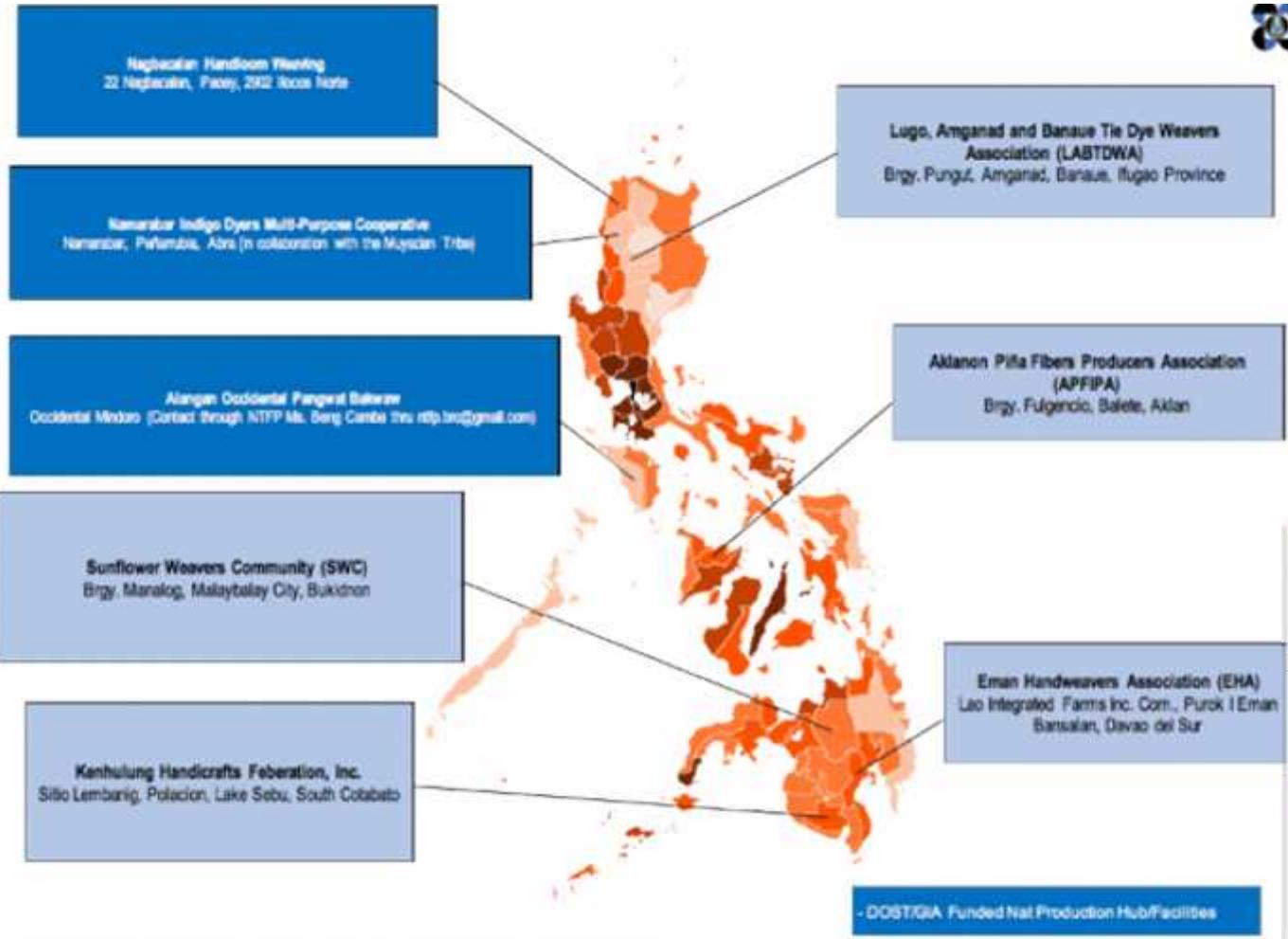
# Regional Handloom Weaving Innovation Centers

✓ Established 13 Regional Handloom Weaving Innovation Centers (RHWICs)



# Natural Dye Production Hub

✓ Established 8 Natural Dye Production Hub and Facilities



**Natural Dye Production Hub and Facilities**

- DOST/GIA Funded Nat Production Hub/Facilities  
- Additional Nat Dye Production Hub/Facilities under the sponsorship of Sen. Legarda

# Ready-to-Eat Emergency Food Products

- ✓ Lightweight and very handy packaging; shelf stable for at least one (1) year
- ✓ Can withstand aerial distribution of about 800 to 1000 ft.



## CHICKEN ARROZ CALDO

- 180 calories per 200g pouch
- First stage emergency food
  - can be consumed immediately after emergency when water and utilities are not available



## RICE MEALS

- 260 calories per 200g pouch
- Second stage emergency food
  - can be consumed when water and utilities are already restored



Technology Generator: Industrial Technology Development Institute

# Iron Fortified Rice and Iron Rice Premix



Technology Generator: Food and Nutrition Research Institute

# Monascus Red Colorant

- Natural colorant to substitute synthetic red dyes
- Tested and validated safe for consumption
- Soluble in water and alcohol
  - ▶ 2 years shelf-life
  - ▶ For beverage, meat, and bakery applications



Technology Generator: UP Los Baños - Biotech



# Complementary Food

## Rice-Mongo-Sesame Baby Food Blend

Prepared into porridge by boiling for 8-10mins with continuous stirring

- 140 kcal energy and 4 g protein per 30g pack
- Recommended serving: 2 sachets per day



Technology Generator: Food and Nutrition Research Institute



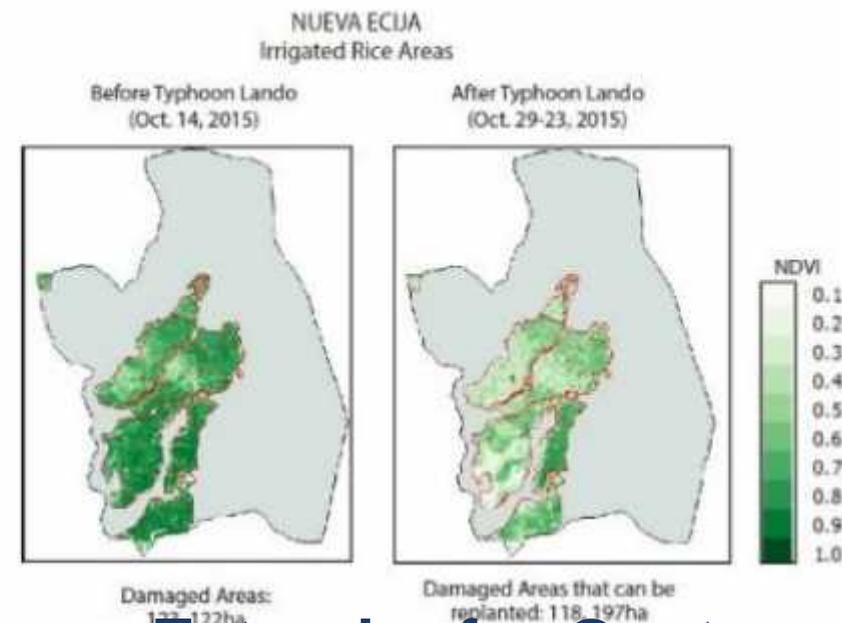
## Itik Pinas



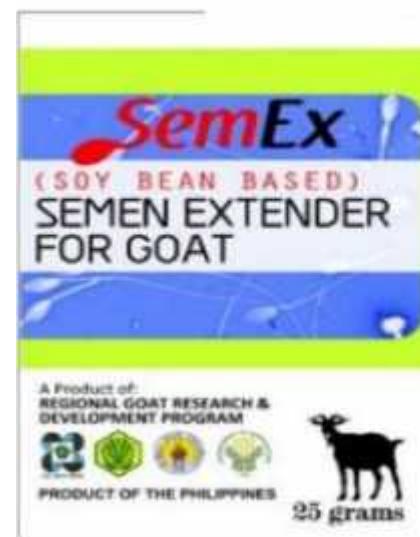
## Artificial Insemination for Goat



## SARAI-Enhanced Agricultural Monitoring System (SEAMS)

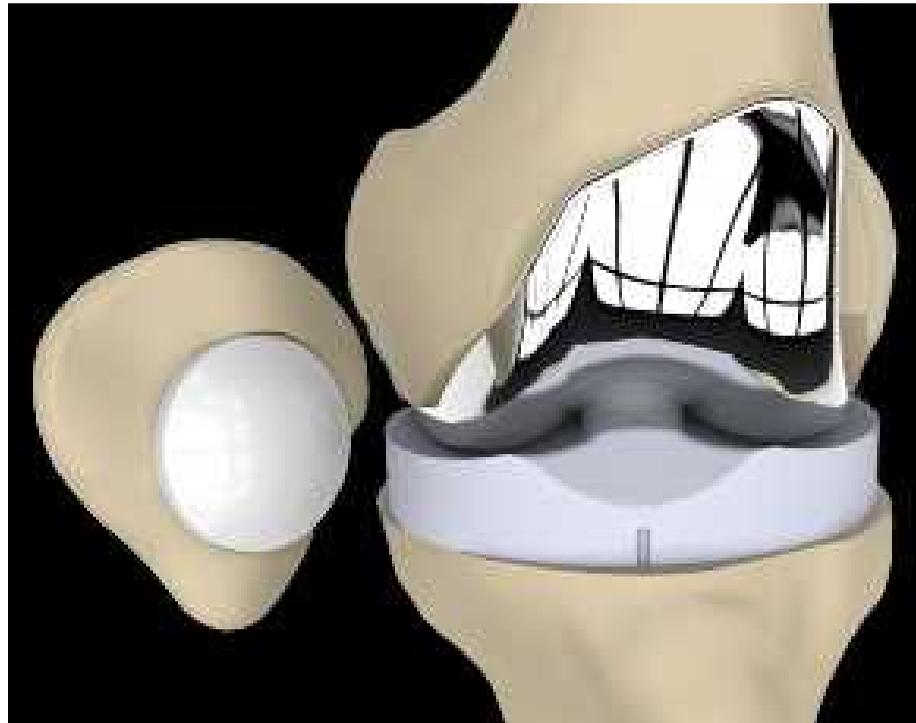


## Semen Extender for Goat



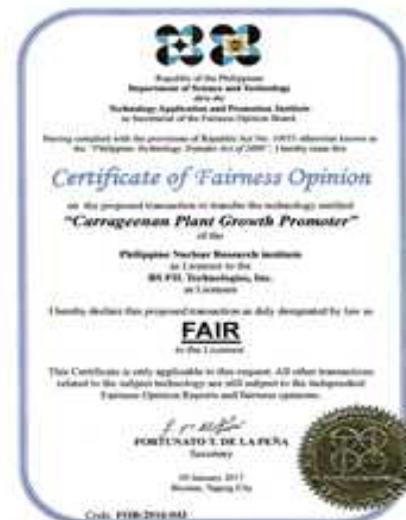
# Axis™ Knee system

- ✓ a **total knee replacement system** that is specifically designed for the Asian population.
- ✓ *very affordable, as it costs 50% less than other knee implants in the market.*



# Carageenan Plant Growth Promoter

**Enhances the crop vigor of rice** through the promotion of plant growth, seed germination, shoot elongation, root growth, flower production, suppression of heavy metal stress, and anti-viral and anti-microbiological activities



# STABILIZED BROWN RICE = Healthy Food CHOICE + Business Opportunity



# VIGORMIN

A mixture of **organo minerals** proven to be effective in **neutralizing strong wastewater** or septic odor. The solution can also neutralize strong, decomposing or rotten odor from organic waste in landfill or material recovery facilities.



[://boracaysun.com/organic-mineral-aids-boracay-in-waste-management/](http://boracaysun.com/organic-mineral-aids-boracay-in-waste-management/)



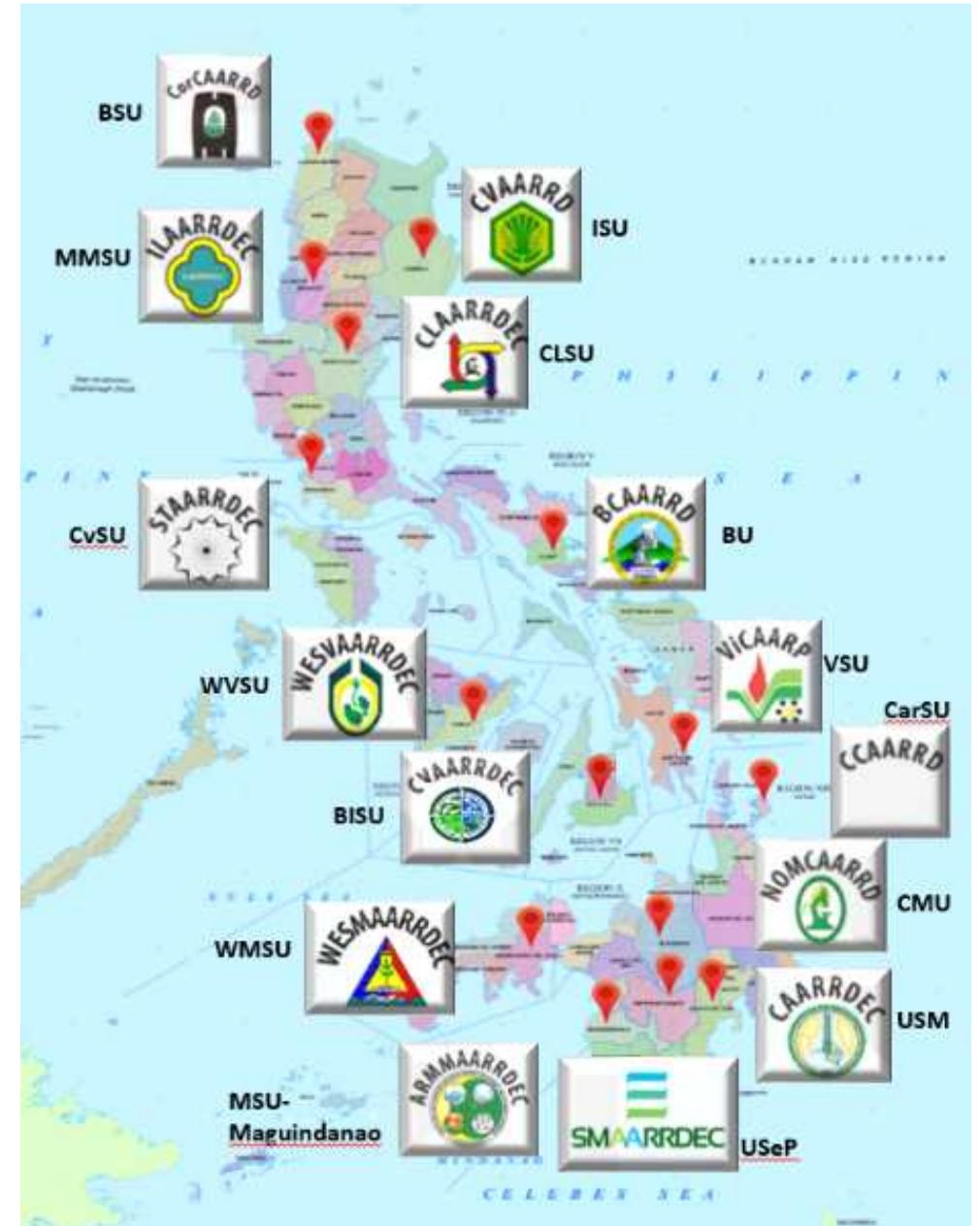
Organo minerals Pilot Production Plant at Tanauan, Batangas



Inauguration of the Pilot Plant last May 2, 2017

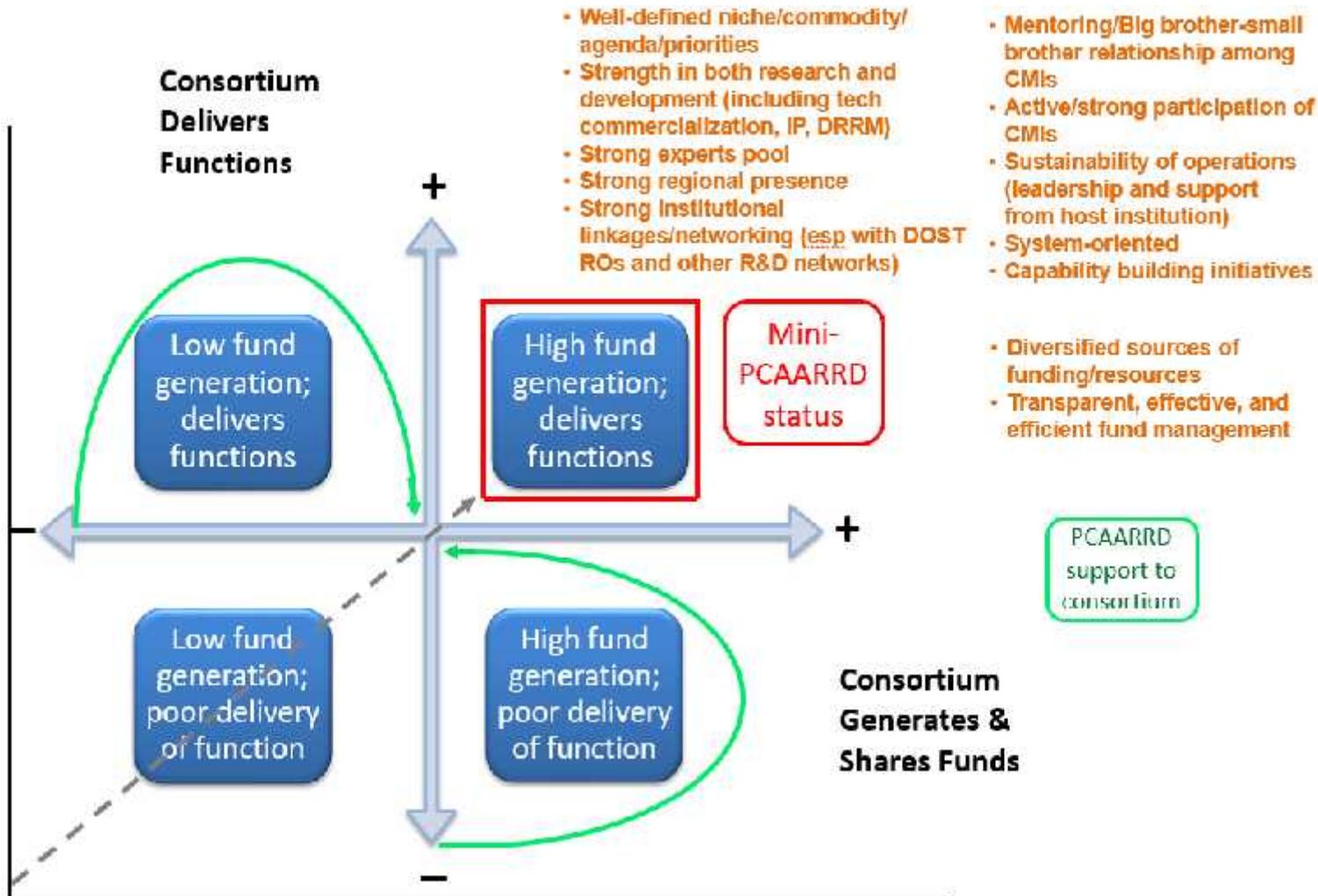
# PCAARRD R&D Regional Consortia

- Present in **15 regions** across the country
- **Membership** varies per consortium: SUCs, RDIs, agencies from other executive departments (DA, DENR, DOST, DAR, DTI), LGUs & NGOs
- **200 R&D** implementing agencies (SUCs, HEIs, RDIs)
- **84 Non-R&D** implementing agencies (NEDA, DTI, DAR, DBM, DOST, LGUs, NGOs, etc.)



# PCAARRD Handholding of the Consortium

# 2015-2017 PCAARRD Investment in the Consortia



# Innovation Capacity-Building

- Technology needs assessment and technology sourcing
- Enterprise Development
- Consultancy and Technical Advisory Services
- Technology Matching Service
- Preparation of technology commercialization plan, acquisition of equipment and provision of technology systems to encourage and enable the private sector to carry out technological innovation and related activities/services



<https://web.onelab.ph/>



A network of laboratories anchored on an IT platform which broadens public access to testing and calibration services at a single touch point

**WE are 35 at the moment**

**6** DOST Research and Development Institutes

**15** DOST Regional Standards and Testing Laboratories

**13** Non-DOST Laboratories

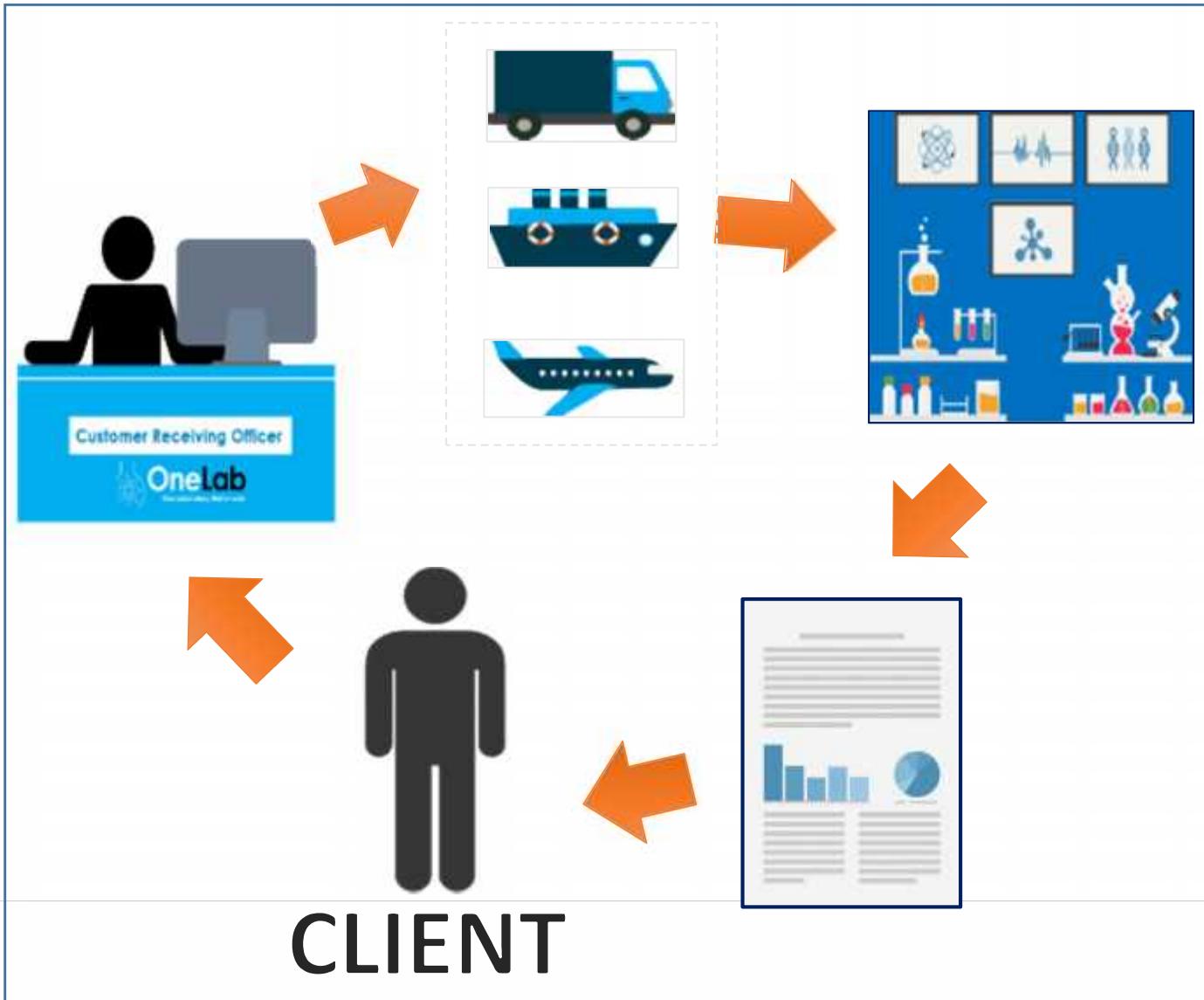
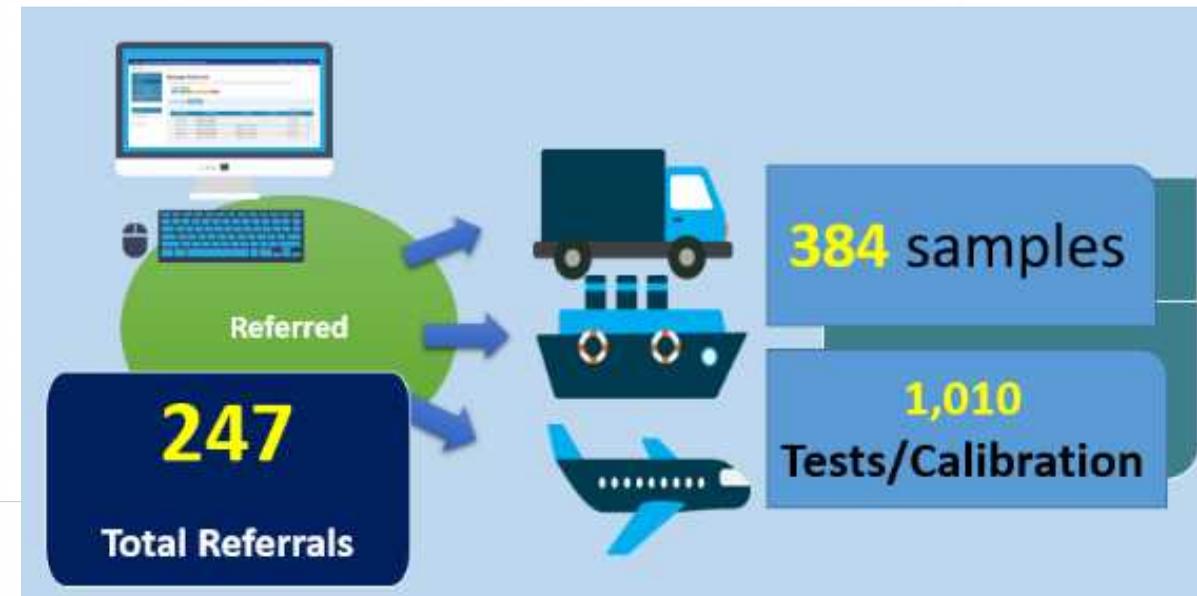
# How does OneLab work?



Service at one touch point



## 2017 Accomplishments



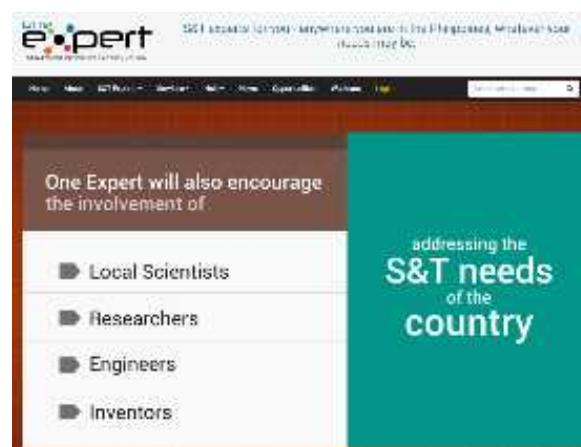


DEPARTMENT OF SCIENCE AND TECHNOLOGY

<https://oneexpert.gov.ph/>



an interactive web-based nationwide pool of S&T experts intended to provide technical advice and consultancy services to Filipinos anywhere they are in the Philippines, including private enterprises.



## Features:

- ✓ Database of experts
- ✓ Interaction with S&T experts
- ✓ Link to a searchable technology database
- ✓ Information about various DOST Consultancy Programs
- ✓ Forum where users can post questions and/or answers to existing threads

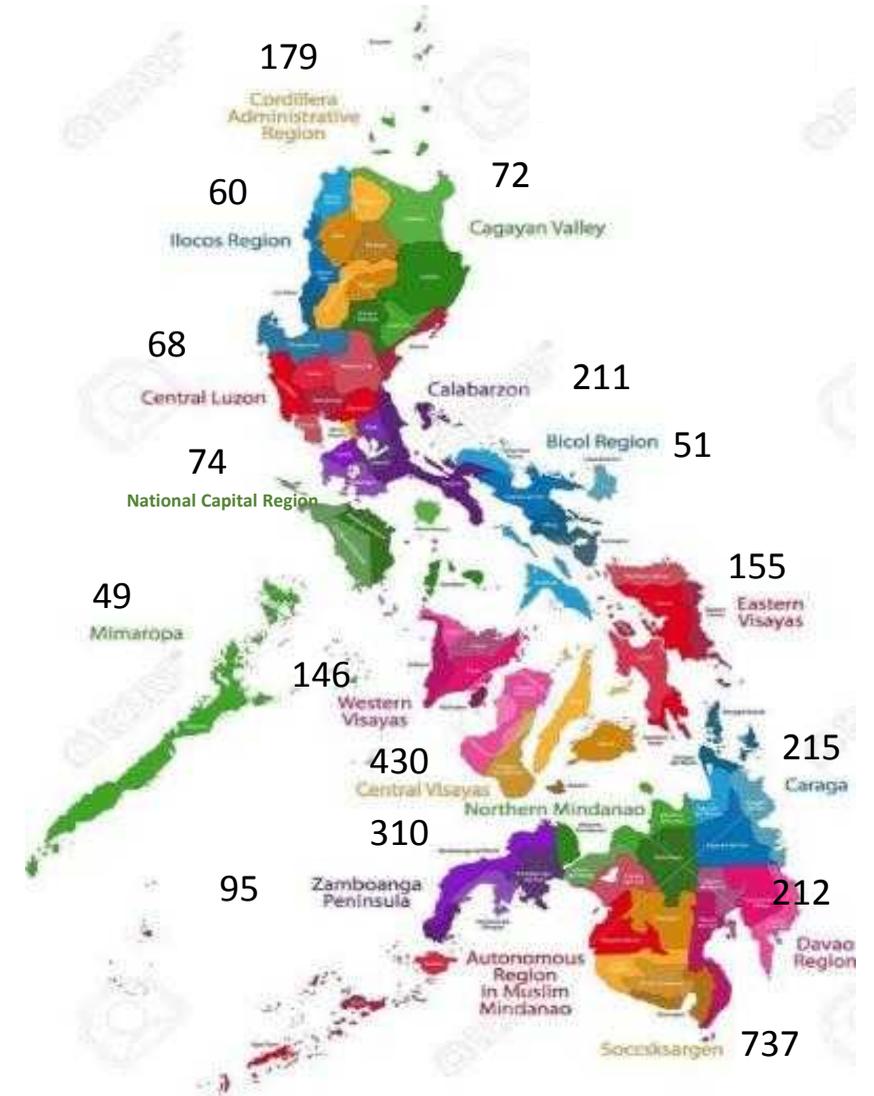


Science & Technology Experts Volunteer Program (STEVPP)  
(now under OneExpert)

# SETUP

S & T innovations for MSMEs

## Small Enterprise Technology Upgrading Program

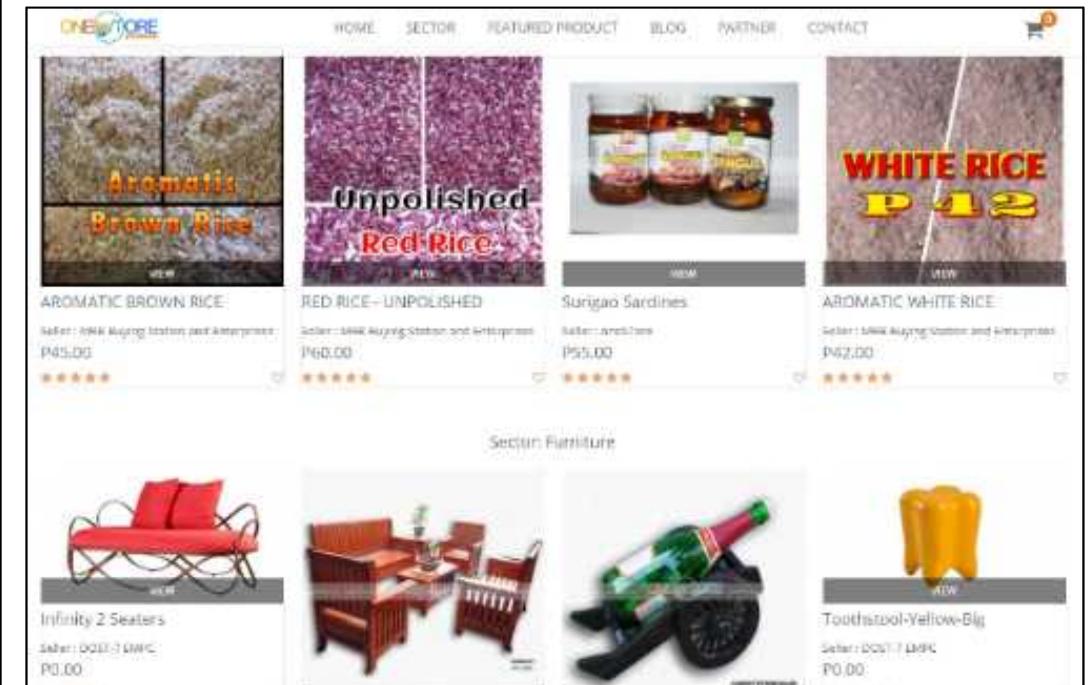
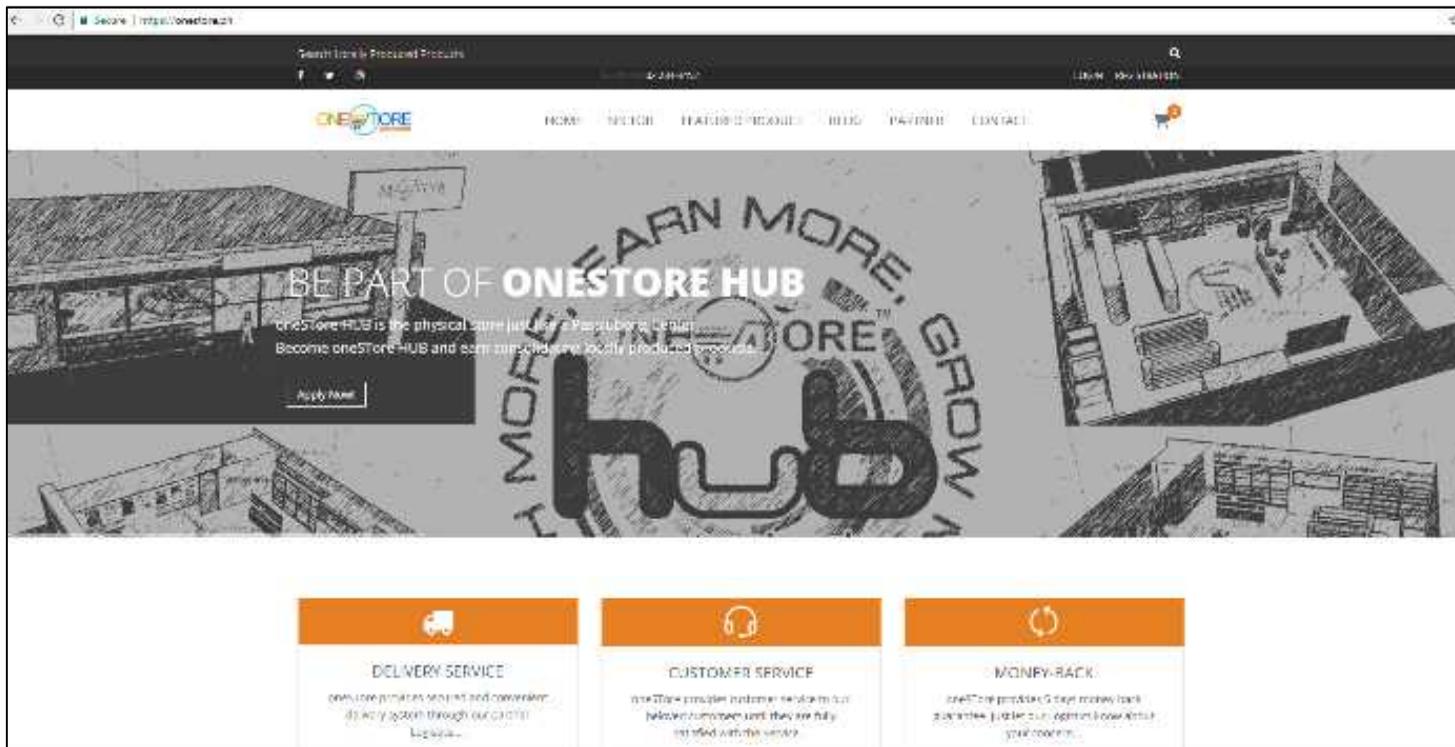




<http://onestore.ph/>

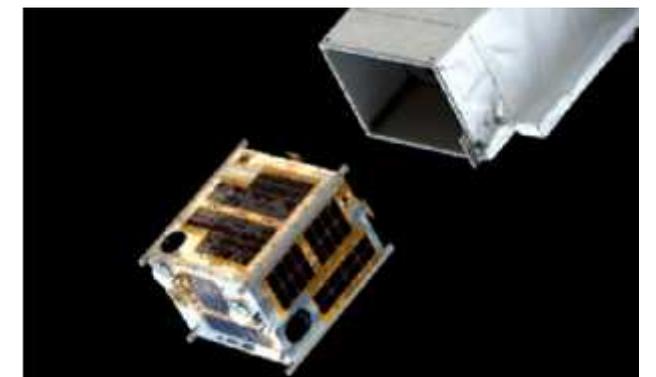
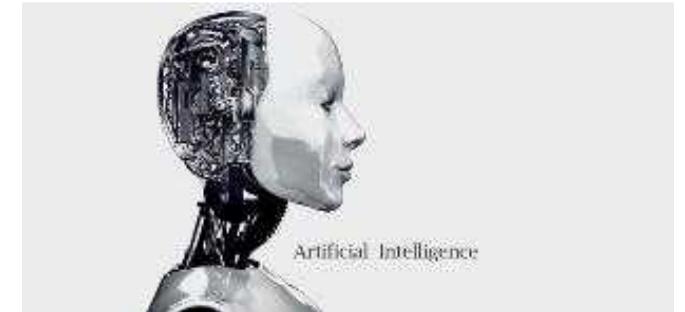
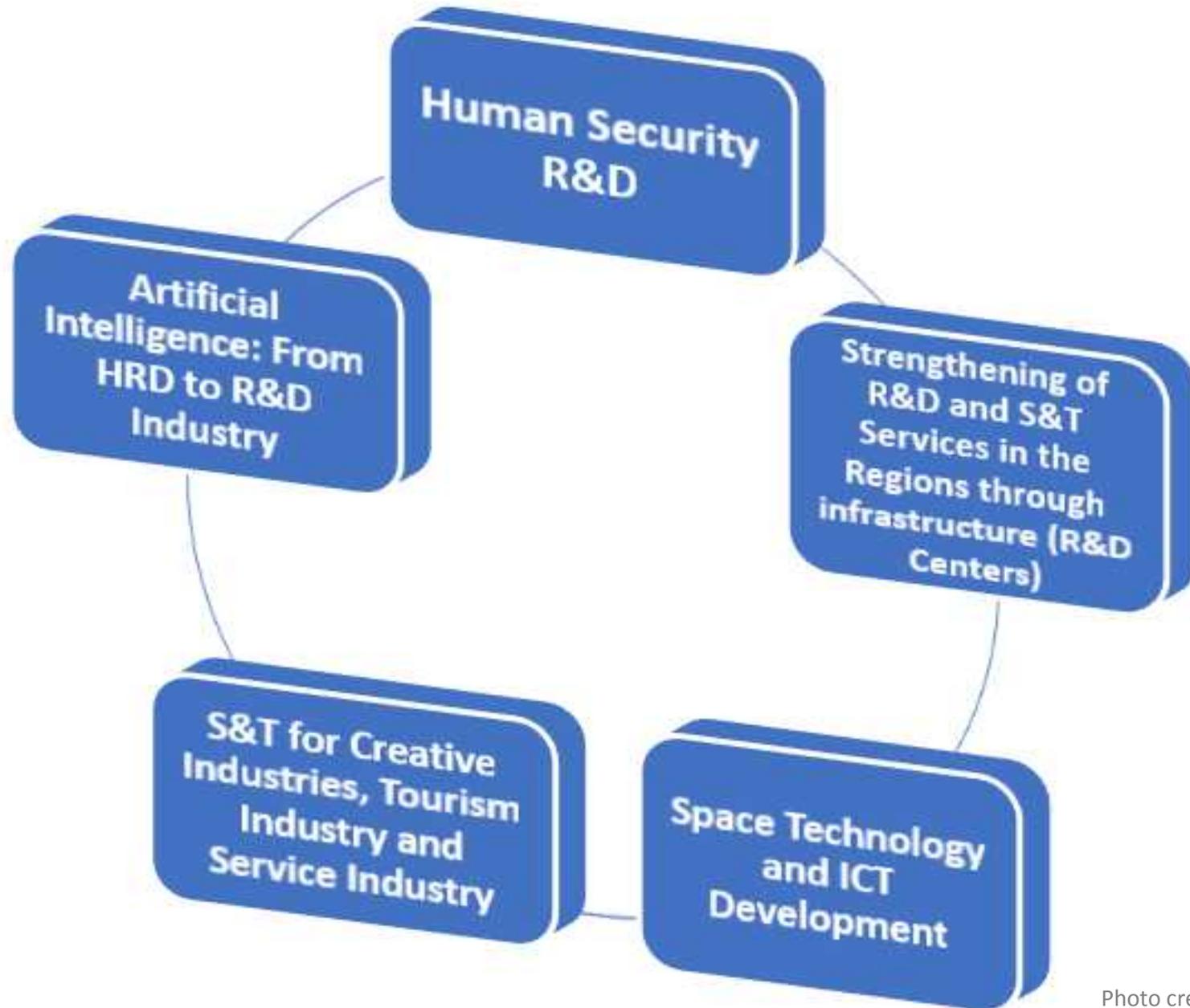
- ✓ OneStore provides customers with an effortless shopping experience and retailers with simple and direct access to one of the largest customer base system in the Philippines

## oneStore Partners:



- ✓ helps the DOST-assisted Micro, Small and Medium Enterprises (MSMEs) widen the scope of their target market

# NEW PROGRAMS



# ACCELERATED R&D PROGRAM for Capacity Building of Research and Development Institutions and Industrial Competitiveness

**NICER**



Accelerate industrial competitiveness by **capacitating HEIs in the Regions** to undertake quality research that will promote regional development

**RDLead**



**Engage experts** with strong leadership, management and innovative policy-making proficiencies to be in charge of strengthening the research capabilities of the HEIs

**CRADLE**



Create a synergistic **relationship between the academe and the industry** with the goal of invigorating R&D

**BIST**



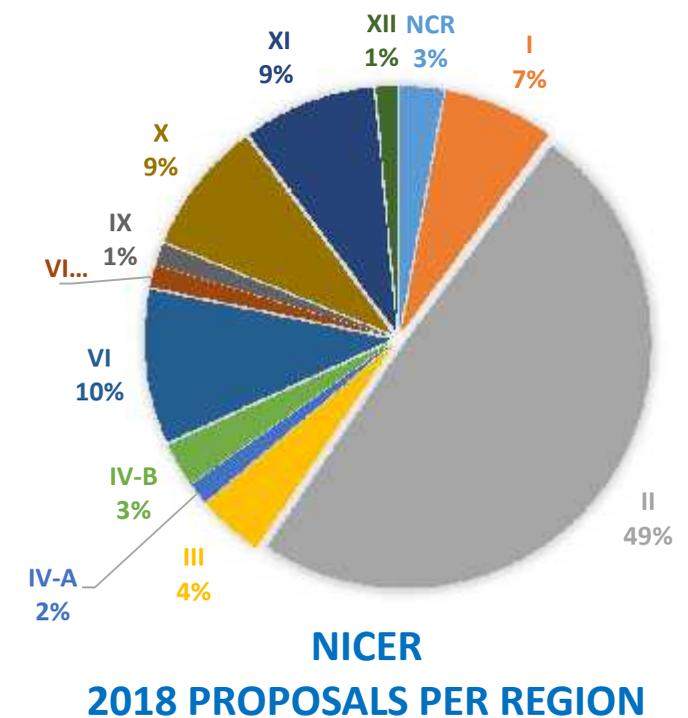
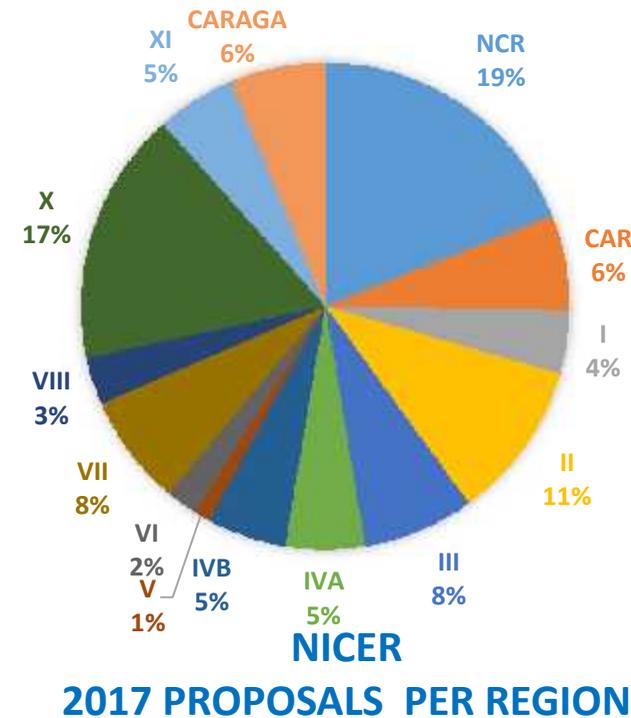
**Level-up the Philippine Industrial Sector** through the industry R&D, and acquisition of strategic and relevant technologies to enhance their technology level and production processes

# 1. Niche Centers in the Regions for R&D (NICER) Program

- ✓ Accelerates industrial competitiveness by capacitating Higher Education Institutions (HEIs) in the Regions to undertake quality research that will promote regional development
- ✓ Provide institutional grant for HEIs in the Regions for R&D capacity building to improve their S&T infrastructure



NICER Proposals	2017	2018
<b>Total Capsule Proposals Submitted</b>	<b><u>95</u></b>	<b><u>69</u></b>
Disapproved	70	20
Under Evaluation	0	44
Endorsed For Full-Blown	25	5
Approved	6	
Disapproved	4	
Still Under Evaluation	14	
Withdrawn	1	



## 2. R&D Leadership Program (RDLead)

- ✓ Intended to provide upgrading of existing R&D facilities in HEIs and Research and Development Institutes (RDIs) in the regions
- ✓ Engages experts with strong leadership, management and innovative policy-making proficiencies to strengthen research capabilities of HEIs or RDIs
- ✓ Improves and hasten the use of research results that will contribute to the socio-economic development of the country and help address pressing challenges

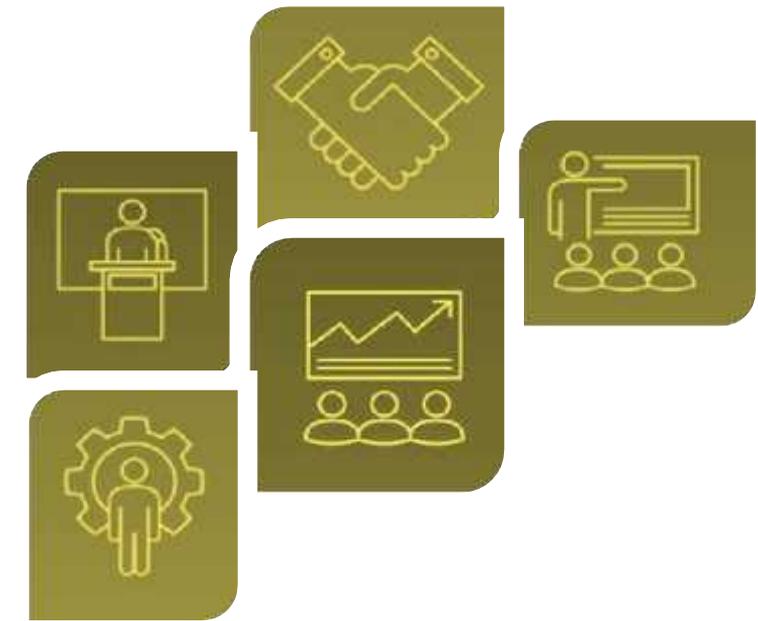


Photo credit: <https://www.vecteezy.com/>

### 3. Collaborative Research and Development to Leverage Philippine Economy (CRADLE)

- ✓ Creates a synergistic relationship between the academe and the industry with the goal of invigorating Philippine R&D
- ✓ The private sector industry will identify the problem and the HEIs or RDIs will undertake the research and development

CRADLE Proposals	Number of Proposals
<b>Total Proposals Submitted</b>	<b><u>51</u></b>
Disapproved	34
Endorsed For Full-Blown	17
Approved	3
Disapproved	6
Under Evaluation	8

*\*as of January 2018*

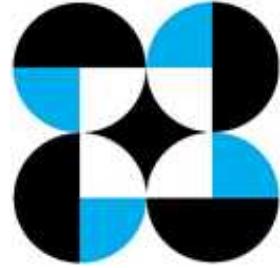
*The partner company will provide counterpart of **at least twenty percent (20%)** of the total project cost. Counterpart may be in cash, kind or person-hour support in the academe.*

# 4. Business Innovation through S&T (BIST) for Industry

- ✓ To strengthen the S&T innovation activities and technological capacity of private sectors
- ✓ To provide for the purchase of relevant high-tech equipment and machinery, technology licensing, and acquisition of patent rights

BIST Proposals	Number of Proposals
<b>Total Capsule Proposals Submitted</b>	<b><u>14</u></b>
Under Evaluation	4
Disapproved	7
Endorsed For Full-Blown	3
Approved	0
Disapproved	3

*\*as of January 2018*



Department of Science and Technology

# Innovation in R&D

*Innovation Forum "Innovation for Learning and Development"*

19 February 2018; PHIVOLCS Auditorium

ROMENA CRISTINA L. GUEVARA, Ph.D.

Undersecretary for R&D