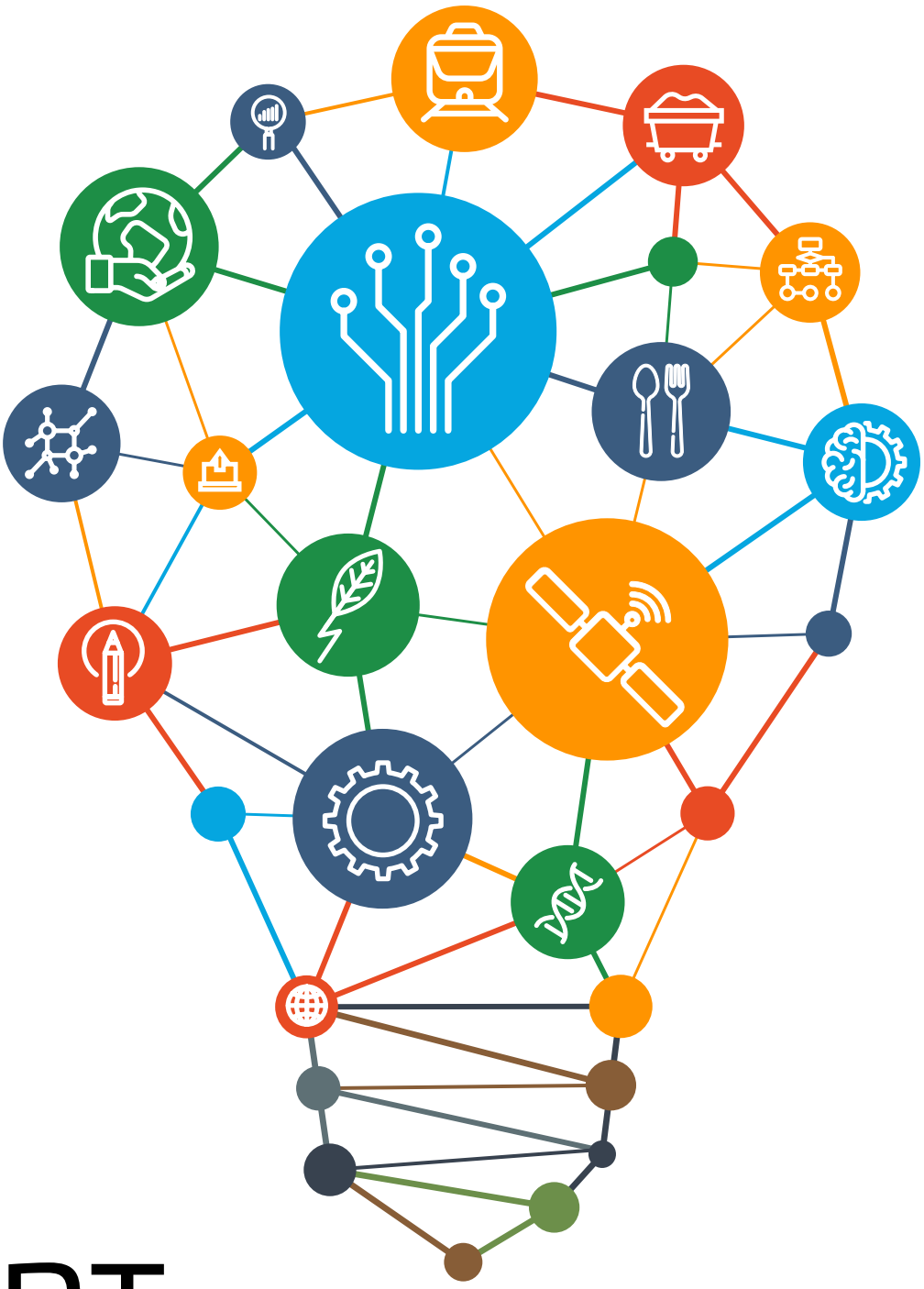
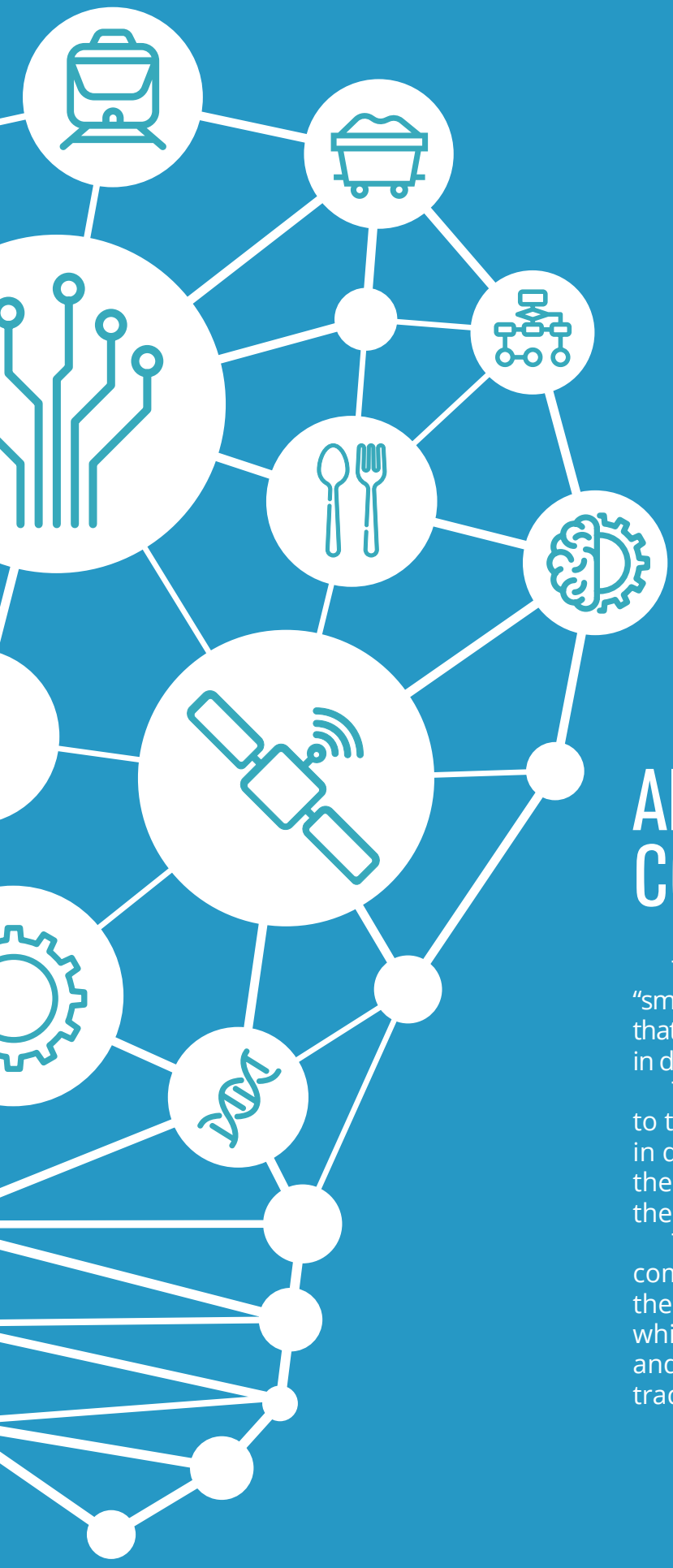


SMART INNOVATIONS

2019 ANNUAL REPORT

DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE COUNCIL FOR INDUSTRY,
ENERGY AND EMERGING TECHNOLOGY
RESEARCH AND DEVELOPMENT
(DOST-PCIEERD)



ABOUT THE COVER

The cover signifies the concept of "smart networks", a computer network that is fully automated thanks to the latest in digital innovation.

The light bulb shape pays homage to the metaphor of ideas shining light in darkness. Ideas that, as exemplified by the PCIEERD projects, will lead the way to the future.

The webbed structure which comprises the light bulb represents the smart network that is PCIEERD, which brings together not only academe and industry, but research areas that traditionally do not interact.

CONTENTS

PROFILE

The Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) is one of the three sectoral planning councils of the Department of Science and Technology (DOST).

DOST-PCIEERD is mandated to serve as the central agency in the formulation of policies, plans, and programs, as well as in the formulation of strategies in the industry, energy, and emerging technology sectors through the following science and technology (S&T) programs:

- Policy Development and Advocacy
- Support for Research and Development
- Human Resource and Institution Development
- S&T Information Dissemination and Promotion
- Support for Technology Transfer and Commercialization

MISSION

To lead and partner with the public and private institutions in generating S&T policies, strategies, and technologies that will contribute significantly to national economic development.

VISION

PCIEERD envisions to be recognized for the quality of its people, leadership, and performance, and contribute to the nation's productivity and competitiveness.

Towards this end, PCIEERD commits to pursue and make available S&T solutions and innovations to help create and sustain competitive industries, attain energy self-sufficiency, and ensure the efficient and effective use of emerging technologies for the inclusive growth and development of the country, through:

1. A well-defined Research and Development (R&D) thrust from innovative idea to technology development and knowledge generation, to technology transfer and utilization;
2. Active engagement of scientists, researchers, and engineers in R&D activities; and
3. Strengthened partnerships and significant collaborations with industry, academe, and government agencies to complement resources and expertise.

INTRODUCTION

For several years now, PCIEERD has put itself at the forefront of local science and technology. PCIEERD's annual report, Smart Innovations, showcases the most advanced, well-executed, and impactful science and research projects in its sectors. In 2019, PCIEERD brings the benefits of these advancements to Filipinos everywhere.

PCIEERD is the planning council of the Department of Science and Technology (DOST) focused in the sectors of industry, energy, and emerging technology. These are sectors that require one to be at the cutting edge of innovation and research.

The Council plays a leadership role in enabling innovations in these sectors by formulating national policies, plans, programs, and strategies for S&T development; allocating government funds, as well generating external funds, for research and development; and, monitoring research and development (R&D) projects. PCIEERD accomplishes this, guided by its core values of innovativeness, integrity, and excellence.

SMART INNOVATIONS, PCIEERD's 2019 annual report highlights some of the key programs and initiatives supported by the Innovation Council in its priority sectors. These programs and projects do not only involve supporting research and development (R&D), but developing human and institutional resources, disseminating information to stakeholders, supporting technology transfer and commercialization, and finally developing policy in aid of R&D.

In 2019, the Innovation Council has embraced the concept of "smart industry" with projects aimed at making, not only our local industries, but R&D capabilities globally competitive through the use of digital technology. By engaging with stakeholders in the industry, energy, and emerging technologies sectors, the Council is able to support the most innovative projects that will benefit the quality of life of ordinary Filipinos.

From developing innovative transport technologies that are sustainable, to researching food production methods that make the most of our resources, to applying new methodologies in disaster risk reduction, PCIEERD is ensuring that we have the means to address the issues and needs of today and the future.

MESSAGE FROM THE EXECUTIVE DIRECTOR

"SMART INNOVATIONS ARE THE GAME CHANGER IN PHILIPPINE SOCIETY AS IT PROVIDES NEW WAYS TO ADDRESS CHALLENGES AND ISSUES THAT IT FACES."

For many years, DOST-PCIEERD has brought to the country innovative projects, programs, and activities that have brought to the country solutions and opportunities aimed at sustaining the economic gains and upliftment of the lives of our fellow Filipinos.

Smart innovations are the game changer in Philippine society as it provides new ways to address challenges and issues that it faces. It is the catalyst for change that presents viable solutions in a more agile and flexible manner. For 2019, we put the spotlight on the importance of smart innovations and how it works for the people. Our neighboring countries have widely utilized science and technology to come up with smart innovations and improve services and provide opportunities and solutions to the population.

DOST-PCIEERD has supported several initiatives that lead to more efficient and accessible research and development outputs. Through the various programs and projects presented in this annual report, DOST-PCIEERD presents to the people how lives can be uplifted through science, technology, and innovation. We have calibrated our vision, mission, and core values to respond to the changing environment. The council has shifted its gears and redefined its main goal of uplifting the quality of life of many Filipinos by providing strategic leadership in enabling innovations in industry, energy, and emerging technology sectors. Smart innovations are our way into a more sustainable and developed future for the Filipino people.

Thank you and mabuhay tayong lahat!

DR. ENRICO C. PARINGIT
PCIEERD Executive Director

MESSAGE FROM THE SECRETARY

"WE ARE CONFIDENT THAT THE COUNCIL WILL CONTINUE TO PROVIDE SOLUTIONS AND OPPORTUNITIES THAT WILL BENEFIT THE FILIPINO PEOPLE."

The Department of Science and Technology (DOST) congratulates the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) for leaping forward and pushing the boundaries of research and development in the country for the year 2019.

As DOST-PCIEERD continues to shape the science and technology landscape in the Philippines, we celebrate its dedication in ensuring that the products of science, research and innovation are responsive to the needs and aspirations of our society - delivering better quality of life for our people, economic growth across the country, and bring sustainability to our environment.

We laud the Innovation Council for continuously supporting programs and projects that uplift the lives of the Filipino people through meaningful and innovative research and development activities. We look to the DOST-PCIEERD for championing agile and creative R&D ecosystems that support diversity of expertise, approaches, ideas, and ways of working together to deliver meaningful results while remaining efficient and resilient.

With DOST-PCIEERD taking the lead and partnering with key stakeholders in enabling innovations in the industry, energy and emerging technology sectors, we are confident that the council will continue to provide solutions and opportunities that will benefit the Filipino people. We hope that PCIEERD's initiatives will also inspire future generations to pursue careers in R&D in a wide range of sectors and show that science is indeed for the people.

FORTUNATO T. DELAPENA
Secretary

MESSAGE FROM THE UNDERSECRETARY FOR RESEARCH AND DEVELOPMENT

"THE DEPARTMENT OF SCIENCE AND TECHNOLOGY REMAINS AT THE FRONTLINES OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENTS..."

Smart innovations have been rapidly revolutionizing the lives of Filipinos. These innovations are intelligent solutions that address societal obstacles, provide a more proactive approach to forecast trends and events, monitor resources, and facilitate progress. These features of smart innovations pave the way to a country that we aspire to live in—a smarter, more sustainable, and resilient Philippines.

The Department of Science and Technology remains at the frontlines of scientific and technological developments with as the central agency that formulates policies, plans, and programs, as well as implements strategies in the industry, energy, and emerging technology sectors.

The wide range of smart innovations that Filipinos come up, from the minute nano-particles to the vast expanse of space, highlights the unbounded imagination and creativity of our race.

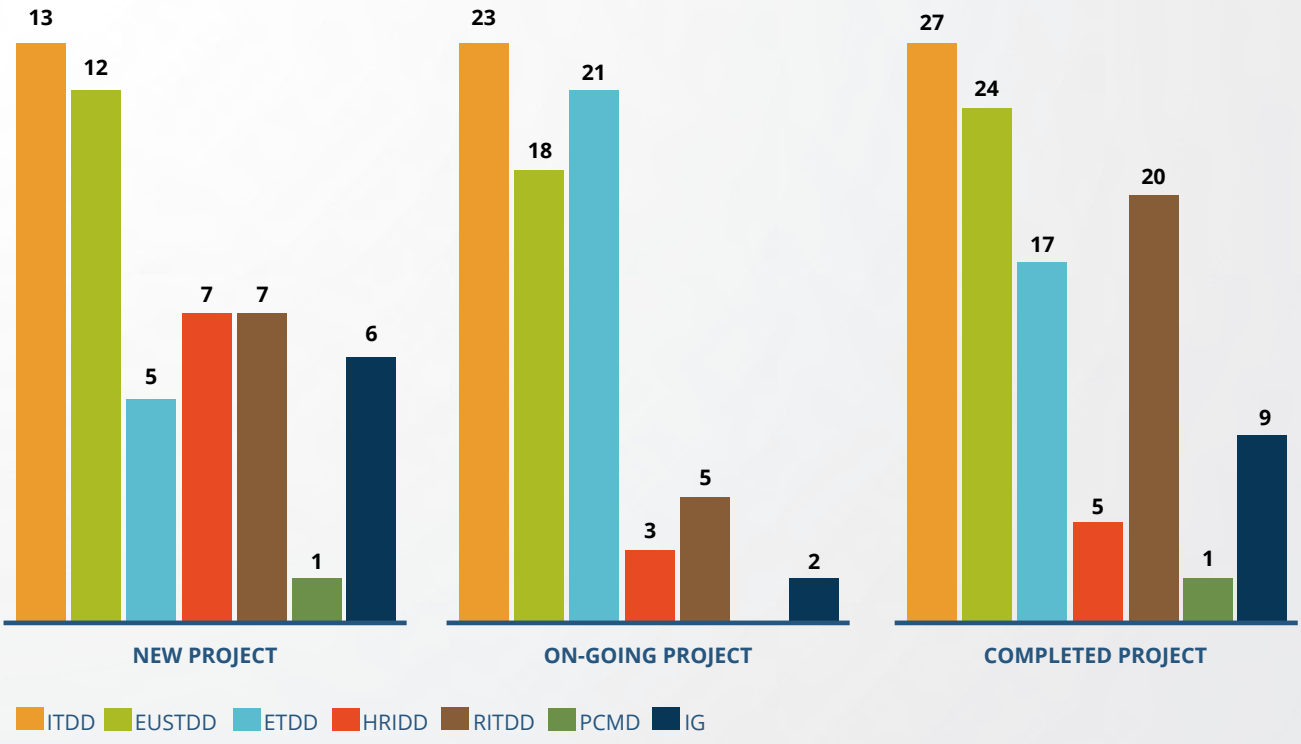
These game-changing innovations are just a glimpse to an impressive roster of smart innovations that we and brilliant Filipino scientists, engineers, and researchers have worked on for the year 2019.

As we make change happen in the country through research and development, we will continuously to support the creation of more innovations that transform our country into a technology-driven, smart nation.

DR. ROWENA CRISTINA L. GUEVARA
Undersecretary for Research and Development
DOST

SUMMARY OF 2019 COMPLETED PROJECTS

	New	Ongoing	Completed
ITDD	13	23	27
EUSTDD	12	18	24
ETDD	5	21	17
HRIDD	7	3	5
RITTD	7	5	20
PCMD	1	0	1
IG	6	2	9
TOTAL	**51**	**72**	**103**



CREATING SMARTER INDUSTRIES

Industrial Technology and Development Division (ITDD)

National development is driven by strong industries that not only provide job opportunities to Filipinos, but also provide products and services that will improve their lives.

PCIEERD aims to contribute to nation-building by providing support for research that enables the development of technology both for existing and new industries in the country. With these projects, industries such as mining, textile, and food production, will have access to homegrown technologies that will enable them to meet the demands of the 21st century.

USING NICKEL MINE WASTE AS CONSTRUCTION MATERIAL

3R Program: 3R Approach to Sustainable Management of Nickel Laterite Ore Mining Waste: Reuse, Recycling and Reprocessing for Environmental Remediation and Material Valorization

Program Leader:
Dr. Michael Angelo B. Promentilla
De La Salle University - Manila

Our country is one of the major suppliers of nickel laterite ore in the world. These ores, which are the source of 60% of the world's nickel supply, are mined through open pit mining. Despite its economic benefit to the surrounding communities, a lot of nickel mining operations in the country have had a negative impact on the environment and have damaged the original mountain ecosystem.

In recent years, for example, the government has ordered the closure of more than 20 mining companies in the country, most of them were nickel mining operations in the CARAGA Region. They have violations on cutting trees, polluting the waterways and siltation problems.

PCIEERD's ongoing 3R Program hopes to address the siltation of river beds and nearby seabeds and shorelines by looking closely at how to utilize mining waste. The siltation directly impacts not only the ecosystem, but the livelihood of those in the farming and fishery sectors. The program seeks to develop solutions toward the sustainable management of such mine wastes.

The program, officially called "3R Program: 3R Approach to Sustainable Management of Nickel Laterite Ore Mining Waste: Reuse, Recycling and Reprocessing for Environmental Remediation and Material Valorization," is a collaborative effort by researchers from three (3) universities. They are Central Mindanao University (CMU), Mindanao State University – Iligan Institute of Technology (MSU-IIT) and De La Salle University – Manila (DLSU).

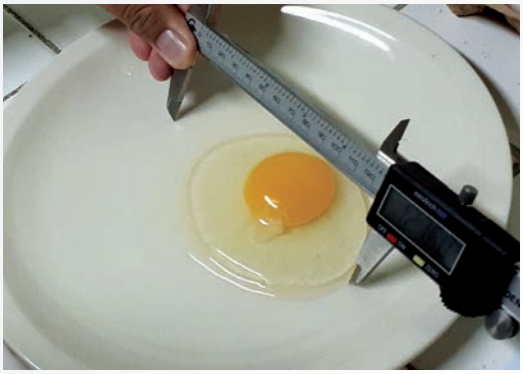
One of the main goals of the research is to look at on the possibility of using the mine tailings or waste as an alternative to ordinary Portland cement. This will be achieved by studying how the mine tailings might be converted to geopolymers, an inorganic polymer binder that has a lower carbon footprint than Portland cement.

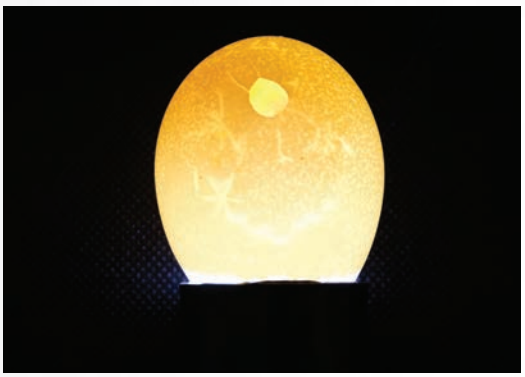
The research program, led by Dr. Michael Angelo B. Promentilla of the DLSU, can lead to the development of geopolymer bricks that can be used for construction. This will not only provide an alternative construction material, but an opportunity to develop a new industry, at the same time curbing the environmental impact of nickel mining.

TRANSFORMING LOW-VALUE EGGS INTO HIGH-VALUE PRODUCTS

Development of Chicken Egg White Powder and Granules from Low Value Edible Shell Eggs

Project Leader:
Dr. Maris Patricia V. Azanza
UP Diliman





In 2016, chicken egg production in the Philippines was estimated to be 461,719 metric tons with 23.01% contributed by the province of Batangas. The Batangas Egg Producers Cooperative (BEPCO), which was established in September 30, 2010 and registered with the Cooperative Development Authority, currently has 52 members composed of farmers, feed-millers, and businessmen involved in the egg industry.

As the egg basket of the Philippines, the City of San Jose, Batangas, where BEPCO is the top-producing cooperative, experiences surplus seasons where even good quality eggs are sold at much lower prices, or just thrown away. In addition to this, there are 2.81% "crack," "dirties," and soft shell eggs which amounts to 281,000 eggs with a corresponding value of P1,009,000.00.

During surplus season, the estimated revenue loss for the egg industry in Batangas amounts to P11M. This is a huge loss, any way one looks at it.

To address this problem, BEPCO, in partnership with UP Diliman, developed a project to research an innovative way of converting these surplus eggs into an enticing product with a more stable quality and longer shelf-life. On 14 August 2018, the project titled, "Development of Dried Chicken Egg White Powder and Granules from Low Value Edible Shell Eggs" was approved for DOST Grants-in-Aid funding under the Collaborative Research and Development to Leverage Philippine Economy (CRADLE) Program.

With this project, low-value chicken eggs such as "dirty" and "check," and soft shell eggs will be utilized to produce value-added products like instant Egg White Powder and Granules. This will be done through the use of spray-drying and agglomeration technologies. These products can be used as ingredients for specific bakery and dressing products.

The project will utilize equipment of the NCR Food Innovation Facility, UP Diliman Pilot Food Plant, Inno Hub, and the DOST OneLab to carry out the characterization of raw materials as well as the products. The spray-drying process will also be optimized so that the successors of BEPCO will be able to use these technologies in the long run. As of date, different spray-dried egg white powder prototypes were already developed for BEPCO.

With PCIEERD's support, the research will not only help grow the chicken egg industry even more, but provide consumers with new locally-produced egg products to use and enjoy.

MAKING THE PHILIPPINE TEXTILE INDUSTRY COMPETITIVE AGAIN

Establishment of the PTRI "Perfect Fit" Textile Product Development Center and Establishment of Regional Yarn Production and Innovation Center

Perfect Fit Project Leader:
Engr. Joanna Tess M. Manuel
Philippine Textile Research Institute (DOST-PTRI

RYPIC Project Leader:
Engr. Daniel J. Lavin
Philippine Textile Research Institute (DOST-PTRI)

The textile and garments industry in the Philippines is a sleeping giant waiting to be reawakened. Once a powerhouse in the export market, the industry has fallen behind other countries. One of the key factors in the local industry's decline is the automation of the textile industries of other export-oriented markets.

With the help of PCIEERD, the Philippine Textile Research Institute (PTRI), led by its Director Celia B. Elumba, hopes to jump-start the local textile and garments industry with twin projects that will hopefully make it competitive again.

The first project is the "Establishment of the PTRI "Perfect Fit" Textile Product Development Center". The project aims to provide an accessible research and development venue that will enable the development of a more efficient textile development process, as well as a standard uniform sizing system for DOST personnel.

Currently, the local garments industry still follows the traditional technique of producing clothes, which is slower and produces garments of inconsistent quality and inaccurate sizes.

With the Textile Product Development Center, the Philippine garment industry can develop mass customization. The project will also develop a specific sizing system based on anthropometric data. These would increase the efficiency and competitiveness of our garment manufacturers.

The second project, the "Establishment of Regional Yarn Production and Innovation Center" (RYPIC), aims to create a micro-scale yarn production facility in a region where indigenous fibers, such as abaca, banana, and pineapple, and handloom weaving communities are located.

This project builds on the PTRI's Innovation Center for Yarns and Textiles (ICYT), a spinning facility capable of spinning yarns blended with indigenous fibers, which was established in 2015. The facility enabled micro-scale and medium textile players gain access to our local indigenous yarns and fabrics. To capitalize on the abundance of natural textile fibers and the handloom weaving traditions and skills available in our countryside, PTRI established a micro-scale yarn in Region VI, where the DOST-Region VI Office and the Iloilo Science and Technology University (ISATU) in Miag-ao are the collaborators.

MOUNTING THE CAPABILITY OF OUR NAVAL FLEET

Project BUHAWI (Building a Universal-Mount for Heavy Barrel Automated Weapon Integration)

Project Leader:
Engr. Jonathan Q. Puerto
Metals Industry Research and Development Center (DOST-MIRDC)

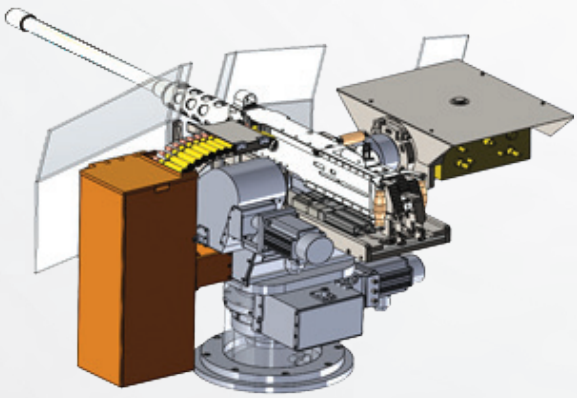
With the ever-present threat of terrorism and insurgency, the Department of National Defense (DND) has adopted a "Self-Reliant Defense Posture Program" (SRDP), which aims to make the Philippines self-sufficient by enabling the manufacture of weapons, small arms and ammunition, tactical communications equipment, basic land vehicles, and marine vessels in the country.

While the country already has a weapon manufacturing industry, it remains modest in size, and unable to provide products for the country's defense sector.

With the hopes of jumpstarting the arms industry in the country, as well as help our naval defense fleet, PCIEERD has provided its support for "Project BUHAWI (Building a Universal-Mount for Heavy Barrel Automated Weapon Integration)." The project is led by Engr. Jonathan Q. Puerto of the DOST-Metals Industry Research and Development Center (MIRDC) that aims to develop an Automated Gun Mount for Browning 0.50 Caliber Machine Gun, M2, (Heavy Barrel).

These gun-mounts are expected to be utilized by the Philippine Navy on their marine vessels. Developing an automated mount for the heavy barrel machined guns will not just increase the firepower capability of marine vessels, but will ensure the safety of the personnel operating them.

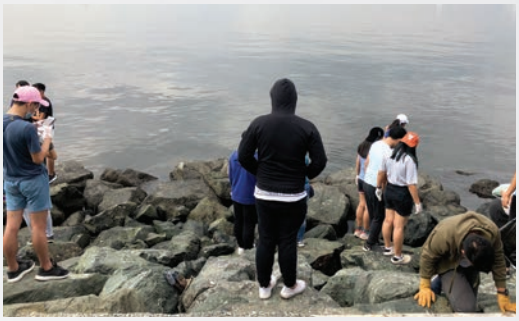
Engr. Puerto and his team will not only fabricate the gun-mounts, but will develop its control system, which will be used remotely. It is anticipated that the success of this project, not only the country's naval defenses will be updated but the local industry will be revitalized as well.



SUPPORTING THE REHABILITATION OF MANILA BAY

Integrated Mapping, Monitoring, Modelling, and Management System for Manila Bay, Pasig River, Laguna Lake and Watersheds (IM4ManilaBay)

Program Leader:
Dr. Ariel C. Blanco
UP Diliman



The Manila Bay is one of the most important bodies of water in the Philippines. In terms of the economy, Manila Bay is the hub of the country's international trade and commerce. At the same time, the bay has great environmental significance, being the home to a rich biodiversity and a wealth of biological resources for surrounding communities.

But the mismanagement and overexploitation due to urbanization of this precious natural resource has taken its toll, as harmful algal blooms and fish kills have become a regular occurrence in Manila Bay.

In order to respond to this issue, the Department of Environment and Natural Resources (DENR) launched the Manila Bay Rehabilitation Program in January 2019 which was participated by various agencies.

The multi-agency effort seeks to come up with a holistic strategy for the clean-up, rehabilitation and sustainment of Manila Bay area. PCIEERD, seeing the rehabilitation program's need for technological intervention has conceptualized the "Integrated Mapping, Monitoring, Modelling, and Management System for Manila Bay, Pasig River, Laguna Lake and Watersheds" (IM4ManilaBay) program in coordination with various stakeholders and researchers.

Led by Dr. Ariel Blanco of the University of the Philippines-Diliman, the team aims to institutionalize and operationalize a multi-scale integrated system for assessment, mapping, monitoring, modelling, and management not only in the Bay itself but all connected systems including, Pasig River, Laguna de Bay, and all watersheds and tributaries.

The program is comprised of several interrelated projects including the development and deployment of an integrated system for mapping and monitoring of water quality of Manila Bay and linked systems including major tributary rivers using geospatial technologies and citizen science modeling of the Manila Bay ecosystem; assessment of the solid waste management (SWM) activities in selected cities that are part of the Manila Bay watershed and development of an integrated solid waste information and technology management system considering current conditions and future scenarios. It also aims to set up appropriate waste utilization technologies to process biodegradable and plastic wastes in selected communities. Information regarding SWM, such as waste characteristics and available facilities including forecasted trends, will also be systematized and made available online.

Moreover, it will streamline solutions and interventions for the rehabilitation of Manila Bay through hydrodynamic and material transport analysis of the integrated Manila Bay-Pasig River-Laguna Lake and surrounding watersheds system using numerical modeling. Lastly, the program aims to provide technology solutions for the management and utilization of dredged materials from the bay or river bodies connected to the bay.

The IM4ManilaBay program hopes these projects contribute significantly to the actions and policies that aim to rehabilitate Manila Bay and its associated waterways.

ITDD COMPLETED PROJECTS IN 2019

24

COMPLETED

Program Title	Project Title	Institution	Project Leader
I-Salt: Improving productivity and efficiency of local salt producers towards a self-sufficient country in 2020	Development of Gourmet Salt Products and Micro-sized Salt in Laboratory Scale	DOST-ITDI	Annabelle Briones
Support for Eastern Mindanao Industry, Energy, and Emerging Technologies Research Alliance for Development (EMIEERALD) R & D Program	Project 5: Product Development of Talisay Nut Delights - SSCT	EMIEERALD - Surigao State College of Technology	Dr. Mauricio S. Adlaon
	Processing and Utilization of Senile and Unproductive Rubberwood (Hevea braziliensis) Trees for School Furniture and other High Value Furniture, Moldings, and Joinery Products	DOST-FPRDI	Engr. Victor Revilleza
Natural Dyes and Colorants R&D Program	Project 1. Commercial Scale Verification of Natural Dyes for Textiles	DOST-PTRI	Ms. Evangeline Flor Pascua-Manalang
	Project 4. Natural Food Colors from Local Source as Food Additive	DOST-FNRI	Ms. Tetchie Arcangel
	Development of Local or Indigenous Flavor Alternatives for Ice Cream	Benguet State University	Dr. Jao jao Somyden
	Development of Shelf-Stable Fermented Heirloom Rice (Binubudan)	Benguet State University	Mr. Leslie Umayat
	Performance Evaluation of Dipstick Assay for the Detection of Salmonellae in Selected Food Matrices	UPLB-BIOTECH	Ms. Susan A. Sedano
Improvement of Production and Utilization of Abalone (Haliotis asinina) in MIMAROPA	Development of Food and Non-Food Products from Abalone	Marinduque State College (MSC)	Dr. Ma. Edelwina M. Blase
Improvement of Production and Utilization of Abalone (Haliotis asinina) in MIMAROPA	Development of Bottom Housing System for Abalone Farming	Western Philippines University (WPU)	Dr. Lota A. Creencia
Assessment of Metal Content of Food and Water Resources in Volcanic Impacted Area	OneLab Capability Assurance System for Metal Content Assessment in Agricultural Produce, Water, and Environmental Samples- Project 1	DOST-ITDI	Ms. Rose Fuertes
	Metal Content of Water Supplies in Volcanic Impacted Area and its Impact to Vegetation- Project 2	DOST-ITDI	Dr. Emelda A. Ongo

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ONGOING

13

NEW PROJECT

62

TOTAL

Program Title	Project Title	Institution	Project Leader
	Household-Based and Community-Based Filters for Metals In Water-Project 3	DOST-ITDI	Dr. Blessie A. Basilia
Field-testing of the Integrated Copper and Gold Pilot Plant in the Regions	Field-testing of the Integrated Copper and Gold Pilot Plant in the Regions - Compostela Valley	DOST-XI	Dr. Anthony C. Sales
	Field-testing of the Integrated Copper and Gold Pilot Plant in the Regions - Caraga	UPD DMMME	Dr. Herman D. Mendoza
	Field-testing of the Integrated Copper and Gold Pilot Plant in the Regions - Bicol	UPD DMMME	Dr. Herman D. Mendoza
	RCUK: Water - Energy - Nutrient Nexus in the Cities of the Future	DLSU	Dr. Michael Angelo Promentilla
	Support to the Rehabilitation of Boracay Island Through the Upgrading of Material Recovery Facilities (MRFs)	DOST VI	Dir. Rowen R. Gelonga
	Development of a Future Earth Philippines Program (FEPP)	DOST-NRCP	Dr. Lourdes Cruz, NS
	Development of Ready-to-Eat Corn Grit Meals	UPD College of Home Economics	Dr. Alonzo Gabriel / Asst. Prof. Abigail Rustia
	DOST Food Safety Human Resource Development Project	DOST Regional Office No. 4A (CALABARZON)	Dr. Alexander R. Madrigal
	Monitoring and Evaluation of Batch II Complementary Food Technology Adoptors	DOST-FNRI	Mr. Alexis M. Ortiz
	ITDI Participation to IFEX PHILIPPINES 2019 "NXTFOOD ASIA"	DOST-ITDI	Ms. Nelia Elisa C. Florendo
	Tracing the Pathways of Mercury Concentration in Mined-out Area	DOST-PNRI	Dr. Jessie Samaniego
	Characterization and Recovery of Heavy Minerals in the Alluvial and Beach Sands in San Vicente, Northwestern Palawan	DOST-PNRI	Mr. Rolando Reyes
	Establishment of Common Service Facility (CSF) for Artisanal Small-Scale Gold Mining in Northern Mindanao	MSU-IIT	Dr. Ephraim Ibarra
	Geopolymerization and its Potential Application in Artisanal Gold Mine Tailings Stabilization	CMU	Dr. Einstine Opiso

EMPOWERING & CONNECTING THE PEOPLE

Energy and Utilities Systems Technology Development Division (EUSTDD)

Our world has always thrived on connection, be it virtual or face-to-face, as new ideas have always emerged from human interaction and communication. Key to the continued connectivity and mobility of Filipinos are the utilities and energy sectors.

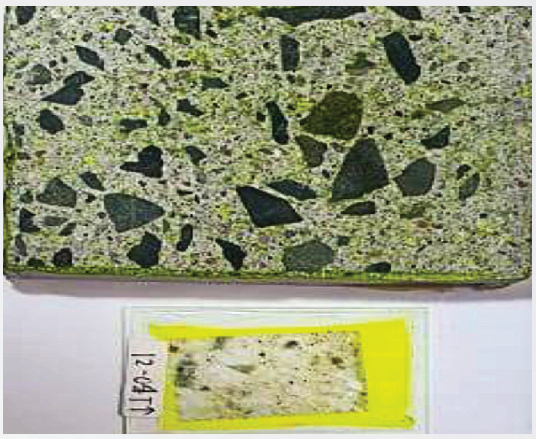
By supporting research and development programs and projects into energy, construction, infrastructure, and transportation, PCIEERD manifests its commitment to help each and every Filipino achieve their dreams.

TAKING A SNAPSHOT OF OUR CRITICAL INFRASTRUCTURE

Comprehensive Evaluation of Critical Infrastructures and Construction Raw Materials in the Philippines Using Concrete Petroraphy

Project 1 Leader:
Mr. Richard L. Ybañez
UP Diliman

Project 2 Leader:
Dr. Marlon T. Conato
UP Diliman



The upkeep of public infrastructure such as government hospitals, dams, and bridges is an important role performed by the government. These infrastructures are critical in providing services, and serves as a lifeline of millions of Filipinos.

While the traditional method of assessing the health of critical public infrastructure has worked well enough, it can be improved with the use of the latest technology. This is the aim of the PCIEERD-funded program "Comprehensive Evaluation of Critical Infrastructures and Construction Raw Materials in the Philippines Using Concrete Petroraphy."

The program is designed to provide the government with an assessment and plan of improving critical "lifeline" infrastructure through the use of concrete petrography and the assessment of the additives used in concrete. The program, led by Mr. Richard L. Ybañez, M.Sc. of the UP National Institute of Geological Sciences (NIGS), is composed of two complementary projects implemented by the NIGS and the UP Institute of Chemistry.

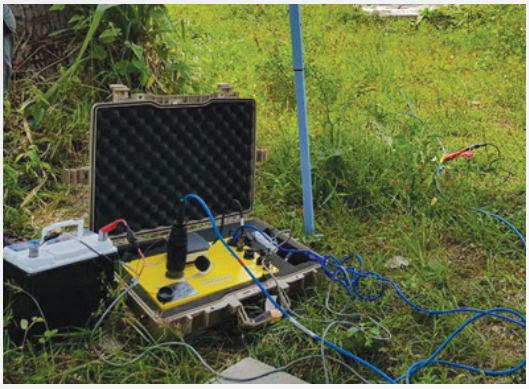
Petrographic analysis is done by obtaining a core sample from the site, in this case, the selected government infrastructure. The sample is analysed in the laboratory, through several component tests, to determine, composition the composition of the sample, cracking, air distribution, among others. The data collected will give the relevant agencies, not only an assessment of the health of the structures, but a plan of addressing its potential weaknesses.

During its first year of implementation, the program was able to assess several key government buildings in the NCR, many of which serve as critical agencies during a disaster. These include the Philippine General Hospital, the Quezon City General Hospital compound, the Metro Manila Development Authority office building, the Office of Civil Defense, and a number of other buildings.

ENSURING STRUCTURES STAND UP TO EARTHQUAKES

Specific Earthquake Ground-Motion to help enhance the seismic resiliency of residential and medium-to-high rise buildings in Metro Cebu and Metro Davao

Project Leader:
Engr. Rhommel Grutas
Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS)



As the Philippines is located in a seismically active part of the world, earthquakes are part and parcel of our lives. While earthquakes by themselves are not necessarily deadly, it does cause damage to structures, which in turn can cause injury or even the loss of human life.

Over the last few decades, as more and more parts of the country are developed economically and urbanized, the need for modern earthquake-resilient structures becomes more and more essential.

Engr. Rhommel N. Grutas and his team at the Philippine Institute of Volcanology and Seismology (PHILVOLCS) are trying to address this issue, with the support of PCIEERD. The project, called "Specific Earthquake Ground-Motion to help enhance the seismic resiliency of residential and medium-to-high rise buildings in Metro Cebu and Metro Davao", created Earthquake Models and Site Response Atlases for both metropolitan areas that can be used for free by civil and structural engineers, city-planners, disaster-risk managers, and the local government units.

The Earthquake Models and Site Response Atlases are seismic ground motion hazard assessments specific to both Metro Cebu and Metro Davao. They were the result of micro tremor array measurements conducted by the team, which provided them with a clear seismic profile of both metropolitan areas. These profiles included realistic ground motion levels that would affect the structures and specific site amplification that is needed by structural designers and engineers.

These can be used as reference in the design of structures by private enterprise, as well as a tool for earthquake impact assessment and risk reduction programs by the government. The Earthquake Models and Site Response Atlases, which were launched separately in Metro Cebu in 2018, and in Metro Davao in 2019, are both publicly available on the DOST-PHILVOLCS website for free.

These will not only save lives, but ensure the continued development of more urban and commercial centers across the country, improving the lives of many Filipinos.

IMPROVING EARTHQUAKE RISK AND DAMAGE ASSESSMENT

FEATURE: Feature-based Earthquake Analysis Toolset for Urban Response Estimation

Project Leader: Engr. Rhommel Grutas
Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS)

On average, hundreds of earthquakes occur around the world every single day, most of them barely detectable and causing no damage to property or loss of human life. However, once in a while, strong earthquakes occur that do just that.

Because of their unpredictable nature, risk and damage assessment of earthquakes are a difficult task. But with the project spearheaded by Engr. Rhommel Grutas of the Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS), that doesn't seem to be too hard.

Called "FEATURE: Feature-based Earthquake Analysis Toolset for Urban Response Estimation" the project seeks to enhance the agency's damage estimation capability by using building-specific analysis. This analysis will be done through the use of high-resolution geographic information system (GIS) data.

Conventional earthquake damage estimation is area-based, however FEATURE is designed to perform building-specific analysis and is widely applicable to different material characteristics and input ground motion. The output of the FEATURE toolset can be used by government agencies and local government units for disaster preparedness and evacuation planning.

This development of FEATURE significantly improves PHIVOLCS's damage estimation methodology, including personnel training in features-based analysis and a database of Metro Manila building responses obtained from analysis of different earthquake scenarios.

The toolset has been continuously improved through field survey to validate the virtual models, as well as conducting comparative studies of recent earthquake events by looking at simulated and actual events.

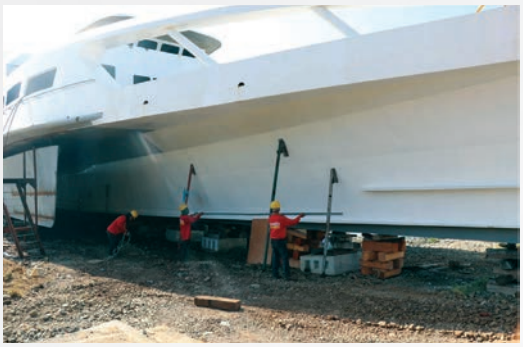
CREATING A SUSTAINABLE FLEET OF SEA VESSELS

Development of a hybrid trimaran fast craft passenger and cargo vessel using multi-engine and alternative energy source from ocean waves

Project Leader:
Dr. Yasmin H. Primavera-Tirol
Aklan State University

One of the unique challenges to our national development is geography. As an archipelago, the Philippines relies on sea vessels as much as land and air vehicles. The delivery of goods and services, not to mention passengers, between our islands are carried out by an assortment of sea vessels, many of which need to be updated for the safety of both crew and cargo.

In 2019, the Maritime Industry Authority (MARINA) started the gradual phase-out of wooden-hull bancas as part of its



Maritime Industry Development Plan (MIDP) 2019-2028. The MIDP calls for the shift to vessels with lower carbon footprint. This development provides an opportunity for the development of a modern domestic merchant fleet.

Dr. Yasmin H. Primavera-Tirol of the Aklan State University is taking on the task with the project "Development of a hybrid trimaran fast craft passenger and cargo vessel using multi-engine and alternative energy source from ocean waves." With the support of PCIEERD, Dr. Primavera-Tirol and her team are designing a fast craft that makes use of the ocean waves themselves to partially power it.

The proposed design is capable of carrying 100 passengers and 6 vans, a larger capacity than the conventional wooden-hull banca. The vessel will be powered by a diesel engine, as well as wave energy double action hydraulic pumps which are fitted in the craft's outrigger.

The wave energy hydraulic pumps convert ocean waves to electricity which powers the engines that complement the diesel engine. This design not only lessens the carbon footprint of the craft, but also ensures that there is a back-up propulsion system in place should the craft experience engine failure.

ENABLING A SWIFT RESPONSE TO WEATHER DISASTERS

Prototype Development of Severe Weather Amphibious Navigator Using Local Abaca Composites

Project Leader:
Engr. Ryan John De Lara
Wesleyan University - Philippines

With an average of twenty typhoons passing through the Philippines each year, the country is no stranger to the dangers of severe weather conditions, including flooding and landslides. These severe weather disasters have the potential to not only take people's livelihoods but their lives as well.

As Central Luzon is prone to severe weather calamities, Dr. Ryan de Lara of Wesleyan University of the Philippines, along with collaborators in the region, sought to provide the region's LGUs with the means to respond to emergencies during severe weather events. The project called "Prototype Development of Severe Weather Amphibious Navigator Using Local Abaca Composites", sought to create a prototype vehicle capable of travelling on land and through flooded areas.

The project also focused on using indigenous materials, in particular abaca, to fabricate the amphibious vehicle prototype. The vehicles' upper deck used abaca fiber composites woven into fabrics that are molded with a glass fiber to reinforce the hull. Because of this, the prototype is lighter and stronger than conventional amphibious vehicles.

The prototype, which was called S.W.A.N. (Severe Weather Amphibious Navigator), was unveiled during the Regional Invention Contest and Exhibit held at the Central Luzon State University in Muñoz, Nueva Ecija in November 2019.

The S.W.A.N is a conversion of an existing truck with its under chassis and engine mounted to the hull. It was designed to carry up to 20 individuals and transport 200 relief bags. The prototype, which is still being tested, will hopefully soon be a part in the country's response arsenal during weather-borne disasters.

EUSTDD COMPLETED PROJECTS IN 2019

24

COMPLETED

Program Title	Project Title	Institution	Project Leader
	AGT UP End of Project	DOST-MIRDC	Rodnel Tamayo
	Performance Testing and Evaluation of Prototype Trainset (Year 2)	DOST-MIRDC	Pablo Acuin
	Development of Wireless Sensory Network System for Structural Integrity Monitoring of Bridges (SMART BRIDGE)	Mapua University	Dr. Francis Aldrine A. Uy
	Regional scales of variability in precipitation (RSVP)	UPD-IESM	Dr. Olivia Cabrera
	Performance Testing and Evaluation of Prototype Train Set	DOST-MIRDC	Pablo Acuin
	Detection and Identification of Legitimate Public Utility Vehicles (PUVs) Along various road netWorks (DILAW)	UPD-DCS	Wilson M. Tan
	Development and Improvement of a Novel Rain Acoustic Sensor	ADMU	Maria Leonora Guico
	Utilization of Industrial By-product Currimao Steel Slag as Green Concrete - ICIEERD	Mariano Marcos State University	Engr. Kenneth Edra
	Specific Earthquake Ground-Motion to help enhance the seismic resiliency of residential and medium-to-high risebuildings in Metro Cebu and Metro Davao	DOST-PHIVOLCS	Rhommel Grutas
Climate and Disaster Resilient Communities Program: R&D Support for Philippine Civil Defense	National Loss and Damage Registry: A Disaster Management Information System for the Office of the Civil Defense	DLSU	Jocelyn W. Cu
Cyber-Physical Transportation Systems	Cyber-Physical Transportation System	UP-NCTS	Dr. Adrian Roy Valdez
Development of a fixed wing short take-off and landing (STOL) unmanned aerial vehicle (UAV) for disaster risk reduction and management	Cooperative UAV-UGV Missions and Applications with Custom Communications and Imaging Capabilities	ADMU SOSE	Nathaniel Libatique,, Ph.D.
	Development of a Flight Controller for a Modular UAV System	DLSU	Dr. Alvin Chua

18
ONGOING

12
NEW PROJECT

Σ 54
TOTAL

Program Title	Project Title	Institution	Project Leader
CY 2016 MECO-TECO Cooperation Program: Improvement of Forecast Capability on Weather, Marine Meteorology and Short Range Climate	Heavy Rain Monitoring and Forecasting in the Mountainous Area and Early Warning Landslides - Project 2	UPLB	Dr. Decibel V. Faustino-Eslava
	Observations and Dynamical Down-scaling of Seasonal and Sub-seasonal Forecast - Project 3	DOST-PAGASA	Flaviana Hilario
	Typhoon Formation, Structure and Intensity Change in Western NP and Wave Observation and Modeling - Project 1	DOST-PAGASA	Dr. Ezperanza O. Cayanan
Climate Resilience Infrastructure Initiative Program (CRII)	Automated Real-Time Monitoring System (ARMS) for Ambuklao, Binga, and San Roque Dams	Mapua University	Dr. Francis Aldrine A. Uy
	Climate Change Adaptation and Disaster Resilience Cluster PH-US Joint Cooperation		DR. CARLOS PRIMO C. DAVID
	Setting up a Concrete Petrography Laboratory for Quality Control of Construction Projects	UP-NIGS	DR. CARLO A. ARCILLA
	Development of a functional and durable pervious concrete pavement for local roads and parking lots	Central Mindanao University	Einstine M. Opiso
	Development of Earthquake Intensity Monitoring System	Mapua University	Dr. Francis Aldrine Uy
	Techo-Economic Feasibility Study of a Micro-Grid in a Remote Community (eAsia JRP)	MSU-IIT	Noel E. Estoperez
	Enhancing the hydro-meteorological hazards monitoring capabilities of PAGASA through the adoption and integration of NOAH operating systems	DOST-PAGASA	Dr. Landrico U. Dalida,, Jr.
	FEATURE: Feature-based Earthquake Analysis Toolset for Urban Response Estimation -Enhancing PHIVOLCS damage estimation capability using building-specific analysis aided by high resolution GiSdata	DOST-PHIVOLCS	Rhommel N. Grutas,, Ph.D

HELPING NEW TECHNOLOGIES EMERGE

Emerging Technology Development Division (ETDD)

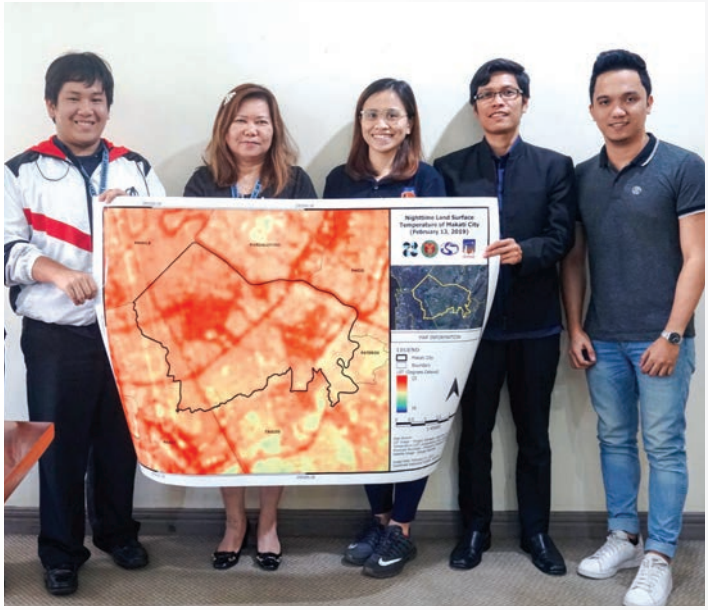
The fast-paced development of technology around the globe has impacted the lives of many Filipinos significantly. New and emerging technologies in the field of communications and computing, food production, and medical technology have changed the way we live our lives for the better.

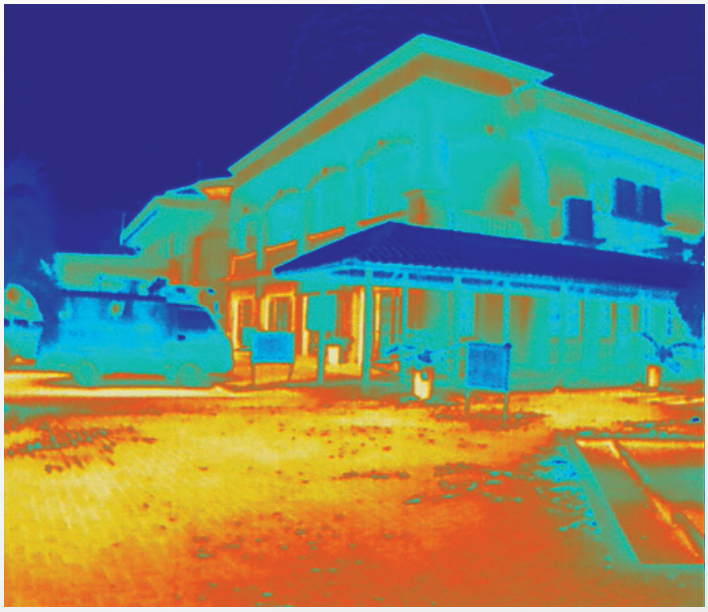
PCIEERD's support of research into emerging technologies by local scientists shows its commitment to not only help the development of homegrown technology for various industries, but to help improve the lives of ordinary Filipinos everywhere.

IDENTIFYING URBAN HEAT ISLANDS TO HELP CITY PLANNERS

Geospatial Assessment and Modeling of Urban Heat Islands in Philippine Cities (GUHEAT)

Project Leader:
Dr. Ariel C. Blanco
UP Diliman





According to the 2015 census on population conducted by the Philippine Statistics Authority, more than half of the country's population now lives in urban areas. Aside from Metro Manila, urbanization has spread across the country, and continues to do so.

One of the consequences of urbanization is the creation of urban heat islands (UHIs). UHIs are metropolitan areas that have a higher temperature compared to surrounding rural areas. They are a consequence of human activities such as the use of electricity and fuel-driven vehicles that generate heat, and urban infrastructures like concrete streets and building that trap heat.

The project "Geospatial Assessment and Modeling of Urban Heat Islands in Philippine Cities (GUHEAT)" led by Dr. Ariel C. Blanco of the UP Training Center for Applied Geodesy and Photogrammetry aims to study the occurrence of UHIs in the Philippines. With the funding support from PCIEERD, Dr. Blanco's research looks at key urban areas in the country to understand UHI in the local context and determine how to lessen them.

The project will examine the UHIs in Quezon City in Metro Manila; Metro Cebu, Mandaue City, and Iloilo City in the Visayas; and, Zamboanga City and Davao City in Mindanao, and Baguio City in Northern Luzon. By studying them, the researchers hope to understand the factors that cause UHIs in the Philippine context.

The data produced by the study will become key for future urban planners and city officials in assessing land use and the environmental impact of urbanization projects. With this knowledge base, our future cities will not only be more livable, it will also be more sustainable.

MAKING STORIES WITH COMPUTERS

Enhancing Man-Machine Interaction through Intelligent Conversational Agents

Project Leader:
Dr. Ethel Chua Joy Ong
De La Salle University - Manila

Computers and other digital devices such as tablets and smartphones have become an integral part of our lives. These devices are now part of the way we work, communicate, and even educate our young citizens.

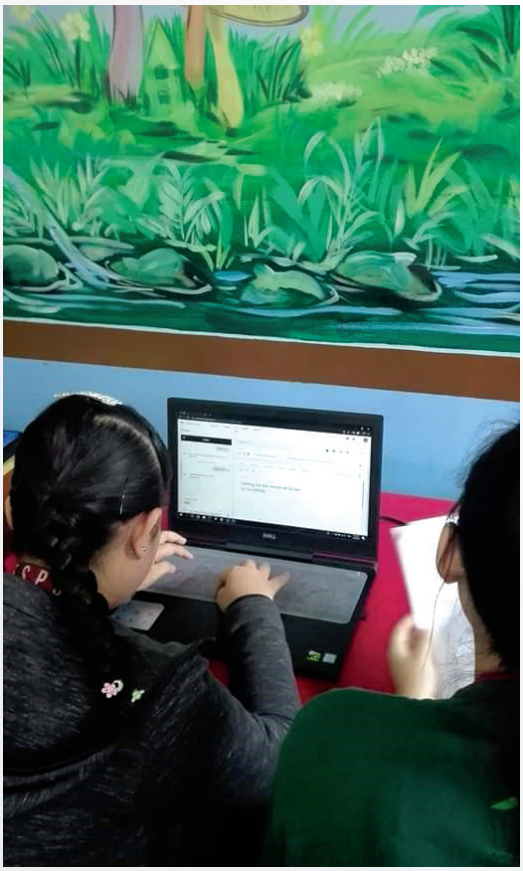
Combining techniques in Artificial Intelligence and Natural Language Processing, Dr. Ethel Chua Joy Ong of the De La Salle University - Manila, hopes to enhance the use of technology in education with the project "Enhancing Man-Machine Interaction through Intelligent Conversational Agents".

Supported by PCIEERD, the project is developing a narrative-based dialogue model that conversational agents or chatbots can use to engage better with their human users. The project builds on the notion that people engage more through narratives and stories. This is especially true for children, for whom the chatbots are being developed for educational purposes.

The project identifies the ways in which users and chatbots interact, and from there build a dialogue model centered on narrative or storytelling. Dr. Ong and her team has consulted with child educators and language teachers alike to build the chatbots' knowledge base or pool of responses.

So far, the chatbot can engage with children from 7-11 years old in shared storytelling using various dialogue strategies such as feedback, pumps, prompts, and suggestions. It communicates with them through text and voice interface. The chatbot can also learn new knowledge, such word concepts, from sharing stories with children.

The development of such technology will not only be a boost to the education sector, but to other industries and sectors where engagement between machine and human users are essential now and quite possibly in the near future.

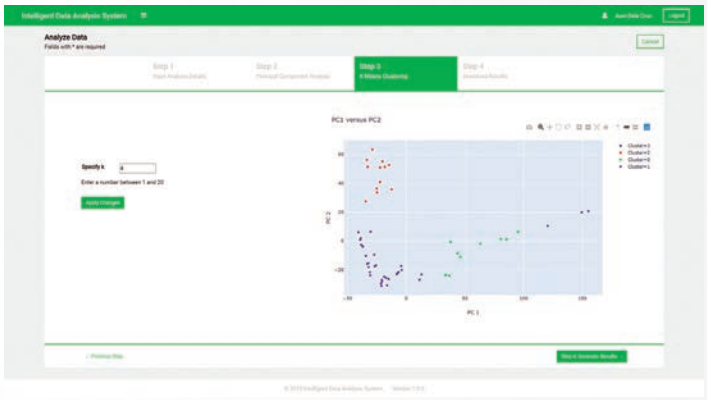


SUPPORTING THE CAMPAIGN AGAINST ILLEGAL DRUGS

Intelligent Data Analysis System (IDAS) for Drug Trafficking Investigation in the Philippines: Application of Predictive Data Analytics on Multivariate Analysis of Methamphetamine-HCl Chemical Fingerprint and Stability Assessment

Project Leader:
Dr. Araceli M. Monsada
Industrial Technology Development Institute (DOST-ITDI)

"The IDAS team undergoes training on GC - MS theory, principles and application. The exercise includes method development, processing of data, identification of unknown samples and determination of repeatability of results."



"The software's page for the clustering of the observations in the input dataset. Observations that are displayed with the same color in the 2D scatter plot belong to the same cluster. The user may set number of clusters to which the software will cluster the observations into. The observations are clustered using the K-Means algorithm, an unsupervised method for partitioning elements of a dataset."

The government's campaign against illegal drugs such as methamphetamine-hydrochloride, or shabu as it is popularly known in the streets, has been long and difficult. Even with active measures such as the seizure of drugs, the problem continues to persist.

To support this long-running government initiative, PCIEERD has supported the project "Application of Multivariate Analysis on Methamphetamine-HCL Chemical Fingerprints and Kinetic Stability Modelling" led by Dr. Araceli M. Monsada of the DOST-Advanced Materials Testing Laboratory (ADMATEL). The project is a collaboration between DOST-ADMATEL, the Philippine Drug Enforcement Agency (PDEA), and the Advanced Science and Technology Institute (ASTI).

The main goal of the project is to create an intelligent data analysis system (IDAS) for PDEA to aid in the campaign against illegal drugs. The system allows users to identify the origin of confiscated drugs and how they were produced. It also studies how seized drug samples react to different storage conditions in the Philippines to help the system analyze samples better.

The project makes use of available equipment at the DOST-ADMATEL to analyze the illicit drug samples provided by PDEA, with the help of ASTI in the development of the software for the intelligent data analysis system. Not only will this technology be a better help to law enforcement in the investigation of drug cases, but this can also be used by state prosecutors to strengthen court cases against drug traffickers.

The creation of this system will also enhance the capabilities of the forensic community in the Philippines, as knowledge on the stability of shabu is a critical consideration for the interpretation of analytical results. The data from this research will also be helpful in determining the proper handling and storage of samples since their integrity is vital in legal proceedings.

TURNING GOOD IDEAS INTO WORKING PROTOTYPES

Advanced Additive Manufacturing R&D Program (AMCen)

MATDEV Project Leader:
Dr. Blessie A. Basilia
Industrial Technology Development Institute (DOST-ITDI)
RAPPID-ADMATEC Project Leader:
Engr. Fred P. Liza
Metals Industry Research and Development Center (DOST-MIRDC)

In the Philippines, one of the major challenges in research and development (R&D) has to do with translating ideas into real world applications For many engineers and scientists, manifesting their designs to the prototype stage is often hindered by financial and material constraints, among many others. However, in the recent years, additive manufacturing technology, more commonly known as 3D printing technology, has changed the rules of the game.

Keeping up with pace of technological developments, the Advanced Additive Manufacturing R&D Program (AMCen) was conceived with a vision to be the country's leading center in 3D printing research. Balik Scientist and Case Western Reserve University professor Dr. Rigoberto Advincula spearheaded the development of the Center through his knowledge and expertise in the field, and with the assistance and implementation of equally able researchers from the Industrial Technology Development Institute (ITDI) and the Metals Industry Research and Development Center (MIRDC).

One of the two component projects of the AMCen program MATDEV or "Development of Multiple Materials Platform for Additive Manufacturing". The MATDEV project is led by the program leader, Dr. Blessie A. Basilia, from ITDI. It aims to develop various materials from local sources for use on single and multi-material additive manufacturing (MM-AM).

Part of the MATDEV project will be a laboratory for the design, development, and testing of additive manufacturing using materials such as ceramics, polymers, nanomaterials, and any combination of two or more of these materials to develop and optimize their usage. The facility will guarantee a reduction in material cost, lead time, importation, and wastage of materials.

Materials development for additive manufacturing application is coupled with the recommendation or adoption of applicable standards particularly those critical applications of the technology.

The second component project is called Research on Advanced Prototyping for Product Innovation and Development using Additive Manufacturing Technologies (RAPPID-ADMATEC). It is being implemented by the Metals Industry Research and Development Center (MIRDC) and headed by Engr. Fred P. Liza.

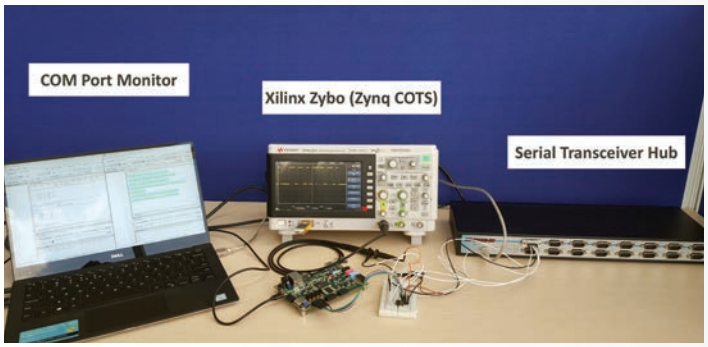
The goal of RAPPID-ADMATEC is to provide the technology needed to create more innovative designs and speed up prototyping by reducing fabrication and processing time of components and products. It focuses on the development and production of complex metal-based parts and materials using metal powders, cater to the production or localization of obsolete parts or repair and replacement of components to increase availability and reliability of existing equipment.

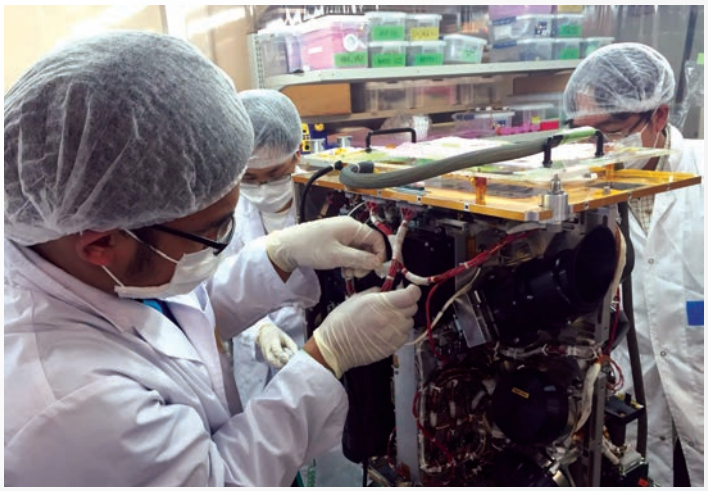
With this program, Filipino scientists will not only be able to put their grand ideas to the test, but also be able to increase their competitiveness towards Industry 4.0.

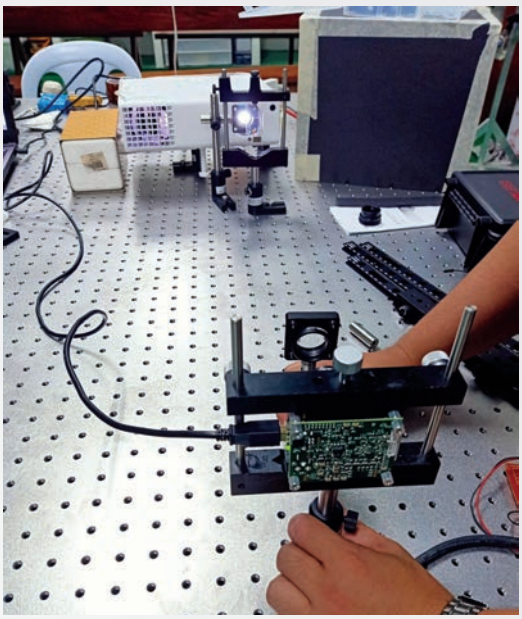
ADVANCING THE PHILIPPINES' SPACE-CAPABILITY

STAMINA4Space Program - Project 2
Building PHL-50: Localizing the Diwata-1 and Diwata-2 Bus System as the Country's Space Heritage 50kg Microsatellite Bus

Project Leader:
Dr. Marc Caesar Talampas
UP Diliman







The first microsatellites designed by Filipinos, Diwata-1 and Diwata-2, were launched into orbit in 2016 and 2018, respectively. Built in Japan as part of an ASEAN initiative to collect data on natural disasters for risk management, the microsatellites nonetheless highlighted the capability of Filipino engineers and scientists to design space-capable technology.

With the support of PCIEERD, the project "Building PHL-50: Localizing the Diwata-1 and Diwata-2 Bus Systems as the Country's Space Heritage 50kg Microsatellite Bus," is focused on building on the gains made from the development of Diwata-1 and Diwata-2.

A part of the larger "Space Technology Applications Mastery, Innovation and Advancement (STAMINA4Space)" Program, the project is led by Dr. Marc Caesar R. Talampas. His team of researchers and scientists at the University of the Philippines Electrical and Electronics Engineering Institute (UP-EEEI) aims to build and construct a localized version of a 50-kg microsatellite bus platform that is capable of accommodating future science mission payloads.

As launch opportunities become less expensive and more common, having a ready satellite platform that can support a diverse set of missions has never been more relevant. To enable this, the project focuses on the development of key components such as the satellite's main computers and communications blocks. The project leverages the teams' experience and know-how in developing Diwata-1 and Diwata-2, and the expertise of the local industry.

The project also enhances its capability to develop technologies with a wide range of ground-based applications. Its major activities also include establishing a small-satellite simulation system, engaging with private and public institutions, and educating stakeholders on small satellites.

On top of making the country space-capable, the end-goal of the project includes jumpstarting a local space industry that provides new avenues of livelihood for many Filipinos on the ground.

ETDD COMPLETED PROJECTS IN 2019

17

COMPLETED

Program Title	Project Title	Institution	Project Leader
	Uncooled Carbon Nanotube Microbolometers	UP Baguio	Dr. Ian Jasper A. Agulo
	Ultrafast MBE-grown Terahertz Photoconductive Antenna Devices	UP-NIP	Elmer S. Estacio, Ph.D.
Geospatial Monitoring System for High Value Projects funded by the Department of Budget and Management (DBM)	DIME Project 1: Monitoring and Assessment of Planting Activities and other Applications (MAPA2)	UPD & DOST-ASTI	Dr. Czar Jakiri S. Sarmiento
	DIME Project 2: Remote Assessment for Irrigation Networks (RAIN)	UPD & DOST-ASTI	Mark Edwin Tupas
	Project 8. Multi-Agent Systems for Simulating Policy Scenarios on Blue Carbon Ecosystems (BlueMASSPoliS)	UPD-TCAGP	Rizalino B. Cruz,, PhD
	Project 6. Suitability Models for Guiding Mangrove RePlanting Efforts (SuitMaPs)	UPD-NCPAG	Dr. Rene Rollon
	Project 4. Hydrodynamic Modelling for the Assessment of Protective Services of Mangroves and Seagrass (HMAPS-MS)	UPD-NHRC	Eugene Herrera
Development of Philippine Scientific Earth Observation Microsatellite (PHL-MICROSAT)	PHL-MICROSAT Project 3. Development of a Data Processing,, Archiving and Distribution Sub-System for the Ground Receiving Station of the Philippines Scientific Earth Observation Micro-Satellite	UPD-TCAGP	Mr. Mark Edwin A. Tupas
	Development of a Raman Microscopy and Spectroscopy (RMS) Setup	UPD-NIP	Armando Somintac
	Fringe-area Data Access by Transient Altitude Provision	DLSU	Clement Ong

21
ONGOING

5
NEW PROJECT

Σ 43
TOTAL

Program Title	Project Title	Institution	Project Leader
	Up-Scaled Solution-Phase Synthesis of Metal Nanowires and its Application in Transparent Metal Nanowire Touch Panel	UPD-DMMME	Mary Donnabelle Balela
	Development of Interactive Software and Teaching Guides for Grades 7-10 Mathematics	ADMU	Dr. Louise Delas Penas
Geo-SAFER Mindanao: Geo-Informatics for the Systematic Assessment of Flood Effects and Risks for a Resilient Mindanao	Project 1- Geo-SAFER Zamboanga Peninsula: Systematic Assessment of Flood Effects and Risks in the Zamboanga Peninsula, Mindanao, Philippines	ADZU	Prof. Mario Rodriguez
	Project 2 - Geo-SAFER Northern Mindanao/Cotabato: Systematic Assessment of Flood Effects and Risks in Northern Mindanao and Cotabato, Philippines	CMU	Dr. George Puno
	Project 3 - Geo-SAFER Agusan: Systematic Assessment of Flood Effects and Risks in the Agusan River Basin, Caraga Region, Mindanao, Philippines	CSU	Engr. Meriam Santillan
	Project 4 - Geo-SAFER Western Mindanao: Systematic Assessment of Flood Effects and Risks in Western Mindanao	MSU-IIT	Prof. Alan Milano
	Project 5 - Geo-SAFER Southeastern Mindanao: Systematic Assessment of Flood Effects and Risks in Southeastern Mindanao	UP Mindanao	Dr. Joseph Acosta

ENABLING OUR OWN COUNTRYMEN TO INNOVATE

Human Resource and Institutional Development Division (HRIDD)

Successful research and development and technology innovation come from capable research personnel and a well-developed research infrastructure. In order to continuously develop and upgrade the country's research capacity, PCIEERD provides various opportunities to increase the research capability of state universities and colleges, higher education institutions and other relevant research laboratories across the country.

Through this support, PCIEERD ensures that the country's research and innovation capabilities continue to grow and develop.

FOSTERING CONNECTIONS WITH HOMEGROWN SCIENTISTS

The Balik Scientist Program

While the talent of our homegrown scientists and researchers are without question, the perspective of someone who is coming from outside of the country is also an invaluable resource.

The Balik Scientist Program (BSP) is a brain-gain initiative which invites Filipino scientists, engineers, and experts now based outside of the Philippines to return to the country to work and actively participate in the country's efforts to strengthen the S&T capabilities of local researchers in the academe, public and private sectors, and industry, as well as to accelerate the flow of new strategic technologies that are vital to national development.

From 2013 to 2019, PCIEERD has approved 96 BSP engagements. For 2019, PCIEERD approved a total of 22 Balik Scientists; 14 under short-term category and 8 under medium-term category.

One of the Balik Scientist awardees in 2019 is Engr. Leo M. Almazan, a space communications expert, who made the first live contact session of Filipino students with the International Space Station (ISS) possible. He holds a master's degree in engineering management from West Coast University and took graduate courses in computer and software engineering from North Carolina State University.

His specialization is in the design and development of military satellites and worldwide ground stations.

Engr. Almazan was a Balik Scientist Program awardee in 2015, 2017, and 2018. Engr. Almazan said that he decided to take on the BSP engagement because he had a vision and to help the country's fledging space program.

During his previous stints at the UP Electrical and Electronics Engineering Institute (EEEI), Holy Angel University (HAU), and Philippine Navy Research and Development Center (PNRTDC), he assisted the Amateur Radio and Satellite Ground Station (ARSS) Project in the installation of AMSAT ground station radios and antennas at the new Microsat Development Center. He also developed a Technical Data Link project proposal together with the PNRTDC, and helped enhance the research capabilities of students in HAU in the field of space science and technology, among others.

For him, his most significant and valuable contribution as a Balik Scientist was the impartation of knowledge on systems engineering process and best practices to AMSAT/WXSAT students who mostly did not have radio frequency (RF) communication training. The most enjoyable was the first-ever live contact of Filipino high school students and researchers to an astronaut in space.

In 2020, PCIEERD is expected to award a total of 41 Balik Scientists.

ENCOURAGING S&T RESEARCH AMONG THE YOUTH

The Young Innovators Program

While the work of research and development is centered around higher education institutions such as colleges and universities, a lot of young people in high school with dreams of being scientists in the future are potential source of innovation.

Recognizing the importance of encouraging the youth to pursue scientific R&D, PCIEERD has set up the Young Innovators Program (YIP). The program aims to provide funding to students who want to pursue an innovative work leading to quality research paper, publication, or product.

The YIP ushers young researchers, as young as high school students, to conduct independent research to accelerate the production of scientific workforce and encourage new and innovative research areas.

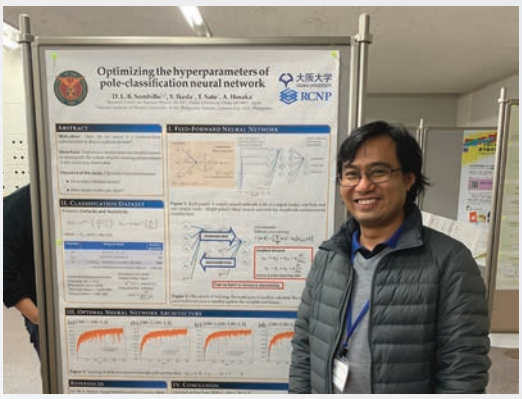
When the program was launched in 2017, seven young innovators from across the country were chosen from a total of 94 applications received. In 2018, six were granted support.

In its third year, 90 applications were received, out of these applications, seven were granted support.

Young Innovators Program Batch 3	
Pasig City Science High School	Collection of Microplastics Using Microplastic Isolation System (MPIS) Unit
Taguig City Science High School	Electricity Production Using Synchronous Motor on Door Movement
Angeles City Science High School	The Utilization of Arachis Hypogaea and Colocasia Esculenta for Hydrophobic Paper Production
Angeles City Science High School	JUAN WHEEL: Automated Foldable Solar-Powered Massage Wheelchair made of Bamboo
Bataan Peninsula University	Design and Development of Hybrid Solar and Wind Actuated Floating Island Aerators with Phytoremediation for Improvement of Sibacan River, Balanga, Bataan
PSHS -Central Luzon Campus	Project SUPERHEMP: Supercharged Capacitor from Carbon Materials of Abaca (Manila Hemp)
Cavite State University - Science Laboratory School	Egxiting: Egg Grading, Sexing, and Sorting using Image Processing and Artificial Neural Network

UPGRADING OUR RESEARCHERS' CAPABILITIES

Human Resource Development Program



In order to develop and enhance Filipino R&D and support capabilities so that it may address present and future human resource requirements in the industry, energy, and emerging technology sectors, PCIEERD set up the Human Resource Development Program (HRDP).

The program provides opportunities for trainings, paper presentations, research attachments, and other research-related activities.

The HRDP has four (4) sub-components: Visiting Expert Program, Research Attachment/ Fellowship, Paper Presentation in Conferences, Seminars, Training, Fora, Workshops/Attendance in Training, and Support for Conduct of Seminars, Conferences, and Trainings.

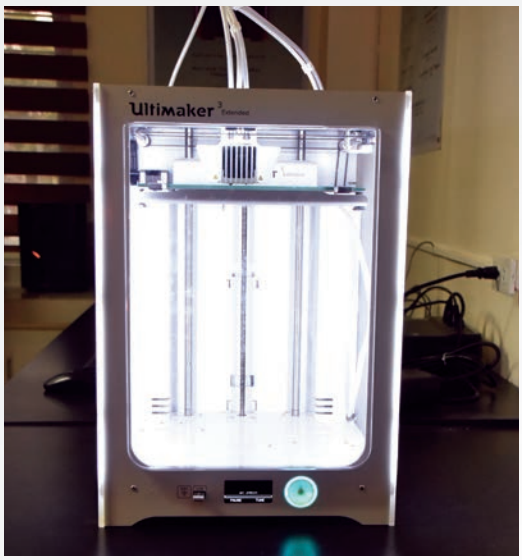
In 2019, 93 individuals were granted support. There were also two (2) ongoing and one (1) new grantee to undergo.

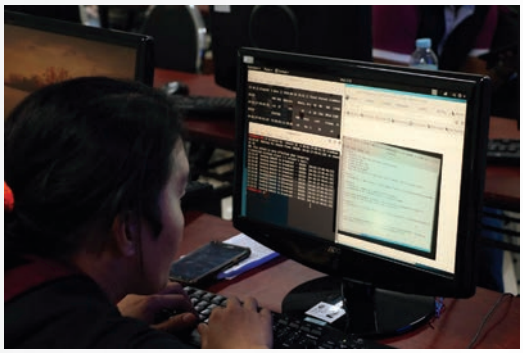
In 2019, PCIEERD provided support to two (2) ongoing and one (1) new grantee to undergo Training on Additive Manufacturing at the Case Western Research University (CWRU) under the supervision of Dr. Rigoberto Advincula. The two ongoing grantees, Mr. Alvin Palanca and Mr. Joseph Sta. Agueda, have completed their training this year while Mr. Vincent Joseph Garcia started his training on May 2019 and is expected to complete it in April 2020.

Component	Actual
Visiting Expert Program	8
Research Attachment/Fellowship	28
Paper Presentation in Conferences, Seminars, Trainings, Fora, Workshops/ Attendance in Trainings	47
Support for Conduct of Seminars, Conferences, and Trainings	33
TOTAL	**116**

GETTING THE RIGHT TOOLS IN THE HANDS OF OUR RESEARCHERS

The Infrastructure Development Program





The Infrastructure Development Program (IDP) aims to upgrade, or set up, research laboratories through provisions of laboratory equipment (including highly specialized software) and facilities, and small research grants aimed at developing research capabilities. Since its inception in 2015, the program has helped set up and upgrade 21 laboratories from 20 institutions all over the country, amounting to a total investment of P113.92 million pesos.

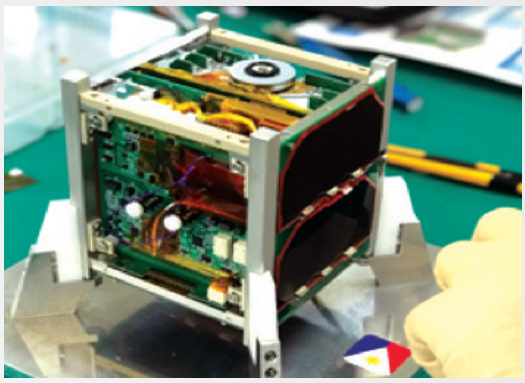
Some of the notable laboratories supported under the IDP is Bataan Peninsula State University Additive Manufacturing Research Laboratory (AMREL), and the Central Luzon State University laboratory.

For 2019, three (3) institutions received grants under the IDP.

Region	Institution	Facility	Project leader	Amount Granted
SOCCSKSARGEN	Mindanao State University - General Santos City (MSU-GenSan)	Intelligent Systems Laboratory	Dr. Cristina L. Dadula	5.0 M
NCR	Adamson University	Additive Manufacturing Center for Industrial Ceramics	Engr. Arnaldo D. Valino	5.98 M
BARRM	Mindanao State University - Marawi Campus	Optoelectronics Science Laboratory	Dr. Florencio C. Recoleto	8.46 M

PROLIFERATING SPACE SCIENCE THROUGH THEIR PARTNERSHIPS

Space Science and Technology Proliferation through University Partnerships (STeP-UP) Project



With the gains made by the country in space science and technology in the last few years, PCIEERD seeks to build the momentum by proliferating space S&T beyond the initial STAMINA4SPACE team.

The Space Science and Technology Proliferation through University Partnerships (STeP-UP) Project aims to address the need to create a mass of quality researchers, scientists and engineers and sustain initial efforts for the space science and technology applications (SSTA) sector in the country through the establishment of a nationwide consortium that will focus on the development of nanosatellites and the development and utilization of amateur radio-based satellite ground station network. The project is part of the STAMINA4SPACE program.

At the end of its first year, the MSEE/MEng-nanosatellite engineering track was established at the UP Diliman-EEE Institute, with Batch 1 consisting of eight graduate students. At the same time, three PhD graduate students are currently enrolled at the Kyushu Institute of Technology (Kyutech) in Kitakyushu, Japan and two MS graduate students at the National Cheng Kung University (NCKU), Taiwan. The DOST Science Education Institute provided funds for the local and foreign graduate degree scholarships.

During the project's four-year implementation, it hopes to develop 2 engineering models and 4 flight models of the cubesat. Under the Cooperative Research Agreement with Kyutech, both the local and foreign scholars will participate in the BIRDS project, with participation from other countries such as Paraguay, Nepal, Japan and Turkey. The local scholars were trained in the design, fabrication, assembly, integration and testing of a 1U cubesat under the BIRDS-2S cubesat. Development of the cubesat is ongoing. Consultations and coordination meetings were conducted with universities for possible partnership and membership to the consortium.

The university consortium was established with the following initial members namely: the Holy Angel University (HAU), University of San Carlos (USC) and Mindanao State University – Iligan Institute of Technology (MSUIIT). Other universities invited to be consortium members were the Mapua University, Adamson University, University of Perpetual Help, Rizal Technological University, STI College, FEATI University and UP Mindanao.

With the establishment of the university consortium, the Philippines became a member of University Space Engineering Consortium (UNISEC)-Global, through UNISEC Philippines, on 8 June 2019.

CAPACITY-BUILDING IN THE REGIONS THROUGH PARTNERSHIPS

PCIEERD Regional Consortia

One of the ways PCIEERD is accelerating regional development is by establishing partnerships in the regions. The PCIEERD Regional Consortia was established to sustain the holistic development of the regions' resources through enhanced partnerships and institutional collaborations among the member institutions from the academe, government and the private sectors. Each Regional Consortium are tasked to review and provide their respective S&T Agenda addressing their regional concerns through the guidance and template provided by PCIEERD.

The regional development initiatives geared towards the aggressive application of science and technology aligned with PCIEERD's sectoral concerns and priorities. Researchers, planners, and policy makers from member institutions shall have the opportunity to share their expertise in the development and implementation of programs and projects aimed at harnessing the effective use of resources in the regions through the pursuit of R&D and other scientific activities.

To date, there are sixteen (16) PCIEERD Regional Consortium that were able to submit their respective S&T Agenda. Included in the said agenda are programs and project initiatives aimed to address their regional S&T needs, challenges and development issues. The regional consortium are as follows:

Composition of the PCIEERD Regional Consortia

Regions		Name of the Consortia
1	Region I	Ilocos Consortium for Industry and Energy Research and Development (I-CIEERD)
2	Region II	Cagayan Valley Industry and Energy Research and Development Consortium (CVIERDEC)
3	CAR	Cordillera Industry and Energy Research and Development Consortium (CIERDEC)
4	Region III	Central Luzon Consortium for Industry and Energy Research and Development (CLIERDEC)
5	NCR	Metro Manila Industry and Energy Research and Development Consortium (MMIERDEC)
6	Region IV-A	Southern Tagalog Consortium for Industry, Energy and Emerging Research and Development (STCIEERD)
7	Region IV-B	Southern Tagalog Islands Research and Development Consortium (STIRDC)
8	Region V	Bicol Consortium for Industry, Energy and Emerging Technology Research and Development (BCIEERD)
9	Region VI	Western Visayas Consortium for Industry and Energy Research and Development (WVCIERD)
10	Region VII	Central Visayas Consortium for Industry, Energy and Emerging Technology Research and Development (CVCIERD)
11	Region VIII	Eastern Visayas Consortium for Industry and Energy Research and Development (EVCIERD)
12	Region IX	Zamboanga Industry and Energy Research and Development Consortium (ZIEERDC)
13	Region X	Northern Mindanao Consortium for Industry and Energy Research and Development (NORMINCIERD)
14	Region XI	Davao Region Industry, Energy and Emerging Technologies Research and Development Consortium (DRIEERDC)
15	Region XII	Cotabato Region Industry and Energy Research and Development Consortium (CRIERDEC)
16	CARAGA	Eastern Mindanao Industry, Energy and Emerging Technology Research Alliance for Development (EMIEERALD)

These consortia have sustained the holistic development of the regions' resources through networking and collaborations among the member institutions from the academe, government and the private sectors. As a result, regional consortia operations in 2019 saw an increas in its membership from 279 members in 2018.

PCIEERD REGIONAL CONSORTIA OPERATIONS Monitoring Report as of December 2019					
Regions	**Consortium Name**	**Regional Consortia Institution Members**			**Total**
		HEIs	**Government Agencies**	**Other Agencies**	
NCR	MMIEERDC	19	10	6	35
CAR	CIEERDEC	9	10	3	22
Region 1	ICIEERD	8	10	4	22
Region 2	CVIERDEC	15	7		22
Region 3	CLIERDEC	12	9		21
Region 4A	STCIERD	9	6		15
Region 4B	STIRDC	6	6		12
Region 5	BCIEERD	16	7		23
Region 6	WVCIEERD	18	3		21
Region 7	CVCIERD	12	3		15
Region 8	EVCIERD	10	2		12
Region 9	ZIEERDC	7	3		10
Region 10	NORMINCIERD	10	2		12
Region 11	DRIEERDC	11	4		15
Region 12	CRIEERDC	9	4		13
Region 13	EMIEERALD/ CARAGA	5	4	3	12
TOTAL		**176**	**90**	**16**	**282**

HRIDD COMPLETED PROJECTS

5
COMPLETED

3
ONGOING

7
NEW PROJECT

Σ 15
TOTAL

Program Title	Project Title	Institution	Project Leader
	Effectiveness of 21st Century Learning Environment Model as a Support System to Teaching and Learning of Science and Mathematics	DOST-CALABARZON	Dr. Alexander Madrigal
	One Expert (1E): A One-Stop Portal for Science and Technology Consultancy and Technical Services Former title Science and Technology Experts Network	DOST Regional Offices	Dr. Rowen R. Gelonga
Development of Philippine Scientific Earth Observation Microsatellite (PHL-MICROSAT)	PHL-MICROSAT Project 1. Microsatellite BUS Development for Philippine Microsat	DOST-Advanced Science and Technology Institute	Dr. Joel Joseph S. Marciano, Jr.
	Development of Material Science and Polymer Chemistry Laboratory	Caraga State University	Dr. Rey Y. Capangpangan
	Establishing Neutron Physics and Dosimetry Research through the Upgrade of the PNRI Neutron Laboratory	DOST-Philippine Nuclear Research Institute (PNRI)	Kristine Marie Romallosa

FOSTERING IDEAS INTO THE REAL WORLD

Research Information and Technology Transfer Division (RITDD)

Research and development (R&D) is a never-ending journey, as one discovery or innovation dovetails to other discoveries and innovations. While this might be fascinating to those in the R&D sector, for the average Filipino citizen, the impact of these innovations are not felt until they become tangible objects that affect their lives in meaningful ways.

PCIEERD's support for researchers does not end at the idea stage, but continues throughout the process of commercializing and making available to local consumers what were once only ideas. Through this support, PCIEERD shows its commitment to the development, not only of homegrown technologies, but also the growth of new industries.

BRIDGING THE GAP BETWEEN LAB AND CONSUMERS

The FASTRAC Program

While the search for new knowledge is enough to drive scientific research for years and years to come, stakeholders in industries and even the government also expect practical, applications of such new knowledge. For many researchers however, bridging the gap between research and practical applications is a challenge.

Seeing this issue, PCIEERD, through its Research Information and Technology Transfer Division (RITTD), strengthened efforts in commercializing technologies generated by universities through an assistance program called Funding Assistance for Spin-off and Translation of Research in Advancing Commercialization or FASTRAC.

The FASTRAC program is a researcher/technology-focused program established to bridge the gap between R&D and commercialization of PCIEERD-funded technologies. It is designed to translate research outputs into market-ready products or simulate a startup operation through a spin-off project for a period of one year.

According to Ms. Russell Pili, Chief of the RITTD, FASTRAC is a follow-up program for handholding technologies until commercialization. "It is a mechanism that pushes our researchers to pursue commercialization... and also eases their research into the field of doing business," she added.

Through the FASTRAC program, five PCIEERD-funded projects have now established their spin-off companies. These projects are: CATCH-ALL (De La Salle University), a system that enables contactless traffic violation identification; CharM (UP Diliman), a system for fast charging electric vehicles; USHER (Mapua University), a building-structure health monitoring system that allows building managers to monitor the structural integrity of the building; FISH-I (UP Diliman), a fish census hardware-software technology that allows for rapid reef assessment; and Smart Surface (UP Diliman), an electronic sensor system that can convert virtually any flat surface into an interactive interface.

The USHER spin-off was formally launched by Mapua University on 2 September 2019, while the CharM, Fish-I, and Smart Surface spin-offs were launched by UP Diliman on 7 October 2019.

Aside from these five projects, the FASTRAC Program is also funding two technologies: Marine Nanocoat (DLSU) and Monascus Colorants (UPLB) under its translation track to translate these research outputs into market-ready products.

IP MANAGEMENT PROGRAM FOR ACADEMIC INSTITUTIONS COMMERCIALIZING TECHNOLOGIES (IMPACT)

The IP Management Program for Academic Institutions Commercializing Technologies (IMPACT) is an "institution/university-focused" program established to capacitate and assist universities in setting up their technology transfer processes and facilitate commercialization of university-owned technologies. Funding support through this program may be used by the university technology transfer offices for the establishment of its technology protection and transfer policies/processes, capability building of university technology transfer officers, conduct audits/assessments of the results of the researches, disclosure, and protection of intellectual properties, promotion and the licensing of technologies.

As of 2019, the DOST-PCIEERD has funded seven (7) universities and one (1) DOST research and development institute (RDI) under the IMPACT Program. They are:

1. University of the Philippines Diliman
2. University of the Philippines Los Baños
3. University of the Philippines Cebu
4. Ateneo De Manila University
5. De La Salle University
6. Mapua University
7. Caraga State University
8. DOST-ITDI (Industrial Technology Research Institute)

The eight (8) IMPACT grantees have collectively accomplished the following: 101 technologies assessed, 14 license agreements signed, 2 IP and technology transfer processes and policies institutionalized, and 116 IPs filed. The Program was also able to organize several activities and workshops like the round table discussions and workshops for the spin-off policy.

To complement this Program, the Council has partnered with the United States Agency for International Development (USAID) through the Science, Technology, Research and Innovation for Development (STRIDE) Program for the KTTO-IMPACT Training Program. The Knowledge and Technology Transfer Office (KTTO) Program of the USAID STRIDE complements the IMPACT Program as the former provides the concepts, principles, and case studies, while the latter takes care of the execution and implementation. The KTTO-IMPACT Training Program is participated by 9 local mentors, 89 technology transfer officers (TTOs) from 44 institutions and facilitated by 2 international resource persons from the Innovation Advisors of the USAID STRIDE. At the culmination of this program, selected institutions will have the opportunity to undergo a proposal writeshop seminar, submit proposals for evaluation of PCIEERD, and become part of the IMPACT fund grantees.

MAKING REEF FISH CENSUS EASIER, A TECHNOLOGY DEVELOPED BY THE UNIVERSITY OF THE PHILIPPINES DILIMAN

FISH-I Technology

As an archipelago, one of the country's richest and diverse resources are its territorial waters. But with over 1,600 Marine Protected Areas (MPAs) and only a few fish experts in the country to conduct a fish census, we do not know the bounty of this resource.

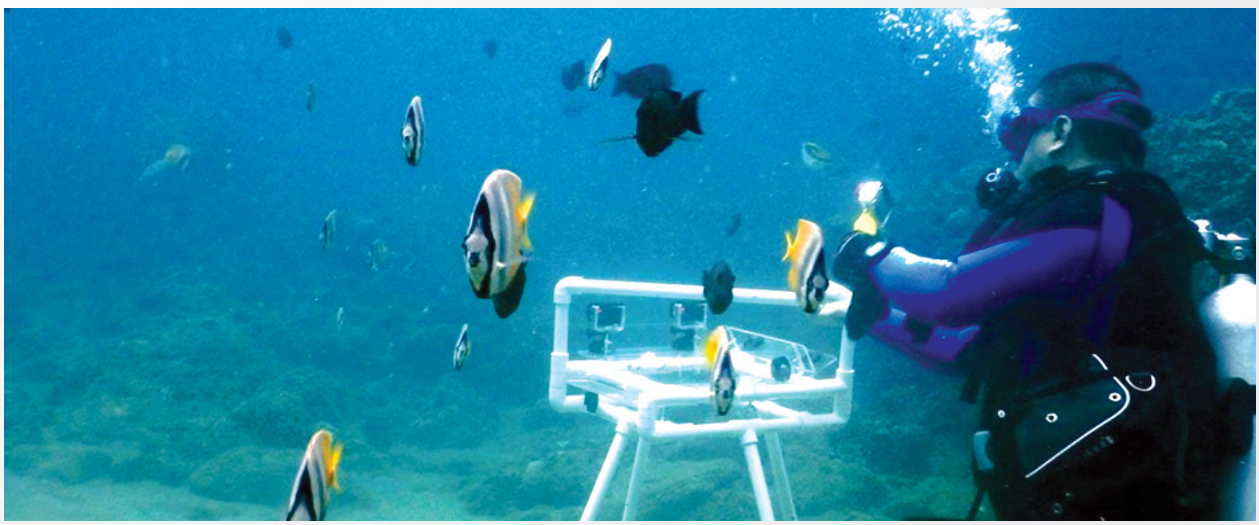
The FISH-I Technology, developed by Dr. Prospero C. Naval Jr. of the UP Diliman Department of Computer Science and Dr. Laura T. David of UP Diliman Marine Science Institute, is a cost-effective and efficient method of performing fish census using a camera and fish video software. Similar to a fish census, it generates data on fish count, biomass, fish size, and population. Using a hardware-software tandem, it semi-automates the process, allowing for rapid reef fish assessment, saving on time and resources.

Through the Funding Assistance for FASTRAC Program of PCIEERD, the team has improved upon their technology, turning it into a market-ready product, and establishing their own spin-off company under the company name "Fish i, Inc."

The funding from the program covered the improvement of their prototype, testing of their prototype in the intended environment, data collection and market validation to potential clients. Included as the output of the project is a Technology Licensing Agreement and SEC (Security and Exchange Commission) registration for their spin-off company. The FISH-I Technology was also previously funded by DOST TAPI (Technology Application and Promotion Institute) under the TECHNICOM Program (Technology Innovation for Commercialization Program).

The FISH-I Technology will allow local government units (LGUs) to obtain fish diversity and population faster and easier. This will help empower local coastal communities to conduct the reef assessment themselves, making them more conscious of their marine resources. In addition, the data collected will provide guidance on the best time to fish and declare open and close season for reef fisheries.

Currently, the team has completed its SEC registration under the company name Fish i Inc. The team has also serviced more than 16 LGUs with their technology and are currently working on other clients who wish to avail of their services. The FISH-I Technology also won the National Grand Prize of the 2017 Alfredo M. Yao (AMY) Intellectual Property (IP) Awards – Professional Level, at the 43rd Philippines Business Expo last October 18, 2017 at the Manila Hotel.



CHARGE FAST, CHARGE SMART, CHARGE IN MINUTES WITH THE TECHNOLOGY

Charge in Minutes (CharM) Fast Charging System

Electric vehicles or e-vehicles are starting to gain popularity both as a personal and public mode of transportation. However, one of the biggest challenges to e-vehicle users is the vehicle's battery life. Travelling long distances using an e-vehicle requires having charging stations readily available. One other concern is that charging an e-vehicle takes as much as six hours.

With this problem in mind, researchers from UP Diliman Electrical and Electronics Engineering Institute (UP EEEI) headed by Dr. Lew Andrew Tria, Engr. Leo Allen Tayo, Engr. Rovinna Janel Cruzate and Engr. Billy Joel Esquivel have developed "CharM", a fast-charging system for electric vehicles. With CharM, fully charging an e-vehicle battery can be done in quick as 30 minutes. CharM comes with an in-vehicle electronic management unit that performs battery protection, monitoring, and vehicle-charger communications.

Through the Funding Assistance for Spin-off and Translation of Research for Advancing Commercialization (FASTRAC) program of PCIEERD, the project team was able to conduct validation for e-vehicle charging system and set-up a CharM charging station in Cagayan, Muntinlupa, and UP Diliman Quezon City. More clients were obtained by direct communications with e-vehicle manufacturers and operators.

With CharM, e-vehicle drivers can maximize the usage of their e-vehicles as the technology will significantly lessen the charging time especially those operating as public mass transport vehicles. With the adoption of CharM by private firms, numerous e-vehicle charging stations can be established. CharM will help develop public acceptance of e-vehicles as it addresses the concerns that inhibit the growth of the EV Industry.

CharM has already developed two different types of chargers which are the DC Fast Charger/ CHRG-ETC-6B and AC Charging pod/CHRG Post. These chargers are being evaluated by several private sectors for adoption. The technology was also showcased during the Electric Vehicle Summit and National Science and Technology Week. CharM already applied for a license for Utility Model and Industrial Design. The spin-off company is already registered in the Securities and Exchange Commission (SEC) under the name of CHRG EV Technologies Inc.

UP-DEVELOPED PORTABLE INTERACTIVE SCREEN SOON TO HIT PH MARKET

Smart Surface and AdapSense Inc.

With the continuing popularity of trade and marketing events like car shows, bridal and wedding fairs, book fairs and conventions, the need for an easy and portable ways of displaying marketing materials has become an issue. At the moment exhibitors, carry around tarpaulins, posters, television sets, and LCD screens to and from the venue. At the same time, gathering data on attendance and engagement for later analysis is also a challenge.

The Smart Surface Technology of Adapsense Inc. seeks to address these issues. Smart Surface is a portable interactive screen developed by researchers from the University of the Philippines Diliman that will soon hit the Philippine market.

Developed by Dr. Nestor Tiglao and his team from the UP Electrical and Electronics Engineering Institute (UP EEEI), Dr. Tiglao has co-founded a spin-off company named Adapsense Technologies Inc. which will now take on the commercialization of the technology. This locally made system converts flat surfaces into an interactive interface for applications in education, food service, advertising, and consumer electronics.

Smart Surface offers unique features such as customizable content and wireless connectivity that can compete with already existing products in the market. The system is portable and affordable.

Through the FASTRAC program of PCIEERD, the team is improving and testing the prototype, looking into product certification, and marketing the technology to potential clients. The output includes a technology licensing agreement and SEC (Securities and Exchange Commission) registration for the spin-off company. Prior to the FASTRAC funding, the technology was funded by the Technology Innovation for Commercialization (TECHNICOM) Program of DOST, which covered the development of an industrial grade prototype, conduct of the pilot testing and market validation of the technology.

Currently, the team has been registered with the SEC under the business name Adapsense Technologies Inc. and has completed the design of the Smart Surface V2. A software application is in the works which can be partnered with the Smart Surface system, enabling users to design interactive content such as quizzes and customer surveys. They have also met with and demonstrated the technology to potential clients. The Smart Surface technology also won a gold medal award with jury distinction during the 46th International Exhibition of Inventions Geneva (Geneva Inventions) on April 11-15, 2018.

RITTD COMPLETED PROJECTS IN 2019

20

COMPLETED

Program Title	Project Title	Institution	Project Leader
	Filipinnovation Entrepreneurship Corps 2: Enabling Researchers to Assess Commercial and Societal Value of their Research	DLSU	Dr. Emilina Sarreal
Technology Business Incubator (TBI) Program	Technology Business Incubator (TBI) at DLSU-STC Campus	DLSU	Mr. Federico C. Gonzalez
Development of Nanosensors and Nanostructured Materials from Agricultural B-products for the Enhancement of Food and Agricultural Productivity and for Environmental Sensing and Remediation	Pilot Scale Production of Nanoencapsulated Plant Growth Regulators for the Production of High Value Crops	UPLB-BIOTECH	Lilia M. Fernando
	Development of Social Listening Tools for Filipinos	Senti TechLabs Inc.	Ralph Vincent Regalado
	AI-driven Software Systems for Tertiary Education Institutions. (STARTUP)	Edusuite	
	Establishment of the Technology Management System of the University of the Philippines Cebu	UP Cebu FabLab	Raymund L. Fernandez
	BayanSoC Phase1 & Phase2	Smartfox Data Solutions Inc.	Noeme Salazar
	Establishment of the AIM-Dado Banatao Incubator	Asian Institute of Management (AIM)	Jesusita Venturina
	Product Development and Commercialization of IQube Home Kit	Tactiles Corporation	
	Establishment of the Mindanao University of Science and Technology Digital Incubation Hub	Mindanao University of Science and Technology	Wendell Talampas
	Smart Vision: AI-Guided Vision System for the Blind	Grayscale Marketing Consultancy	Marx Vergel Melencio
	Prototype Development of Semi-Automated Foam Shredder Equipment (TECHNICOM)	Holy Angel University	Engr. Melani B. Cabrera

5
ONGOING

7
NEW PROJECT

Σ 32
TOTAL

Program Title	Project Title	Institution	Project Leader
	Rurok Bikes: Variable Geometry and Efficient Suspension Pedalling Platform	Rurok Industries	Pablito Tolentino Jr.
	CONDAMA & EEMA - Artificial Intelligence Vision System for Retail Analytics	RTL Gate Technologies Inc.	Miguel Remolona
	Establishment of the Technology Management System and Structure of the Ateneo de Manila University	Ateneo de Manila University	Dr. Janice A. Ragaza
	Enhancement and Market Validation of Easybus (a Total Digital Booking Platform) for Buses	Easybus Ph, Inc.	Janmar Dimaano
	Beta Testing of Biotechnology Kits for STEM Education (STARTUP)	Kinovett Scientific Solutions Co.	Lovette Cunanan
	Fabrication and Performance Evaluation of Abaca Fiber-Reinforced Composites for Boat Application	DOST-Industrial Technology Development Institute (ITDI)	Dr. Marissa Paglicawan
	Enhancement of Prototype and Market Readiness of R-TAP (an advanced pressure management system for water utilities)	Hiraya Technology Solutions, Inc.	Stephen L. Larcia
	Universal Sensing Meter for Instruction & Laboratory Experiments (U-SMiLE)	West Visayas State University	Dr. Joel De Castro

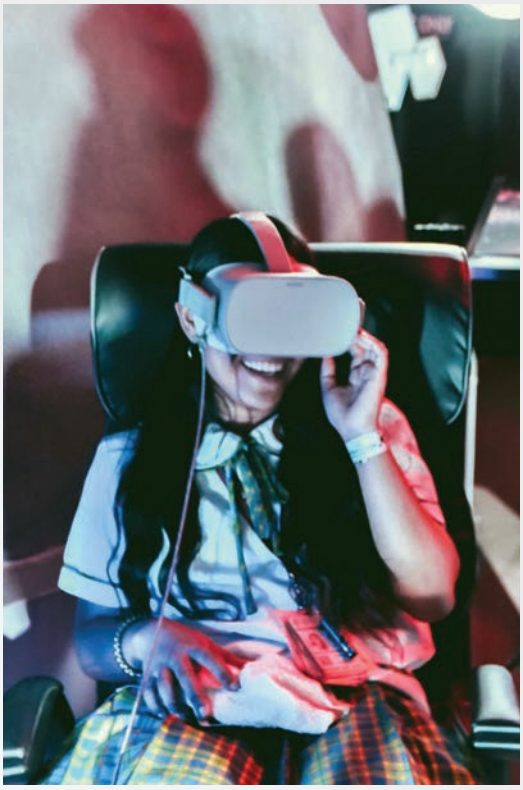
HELPING CITIZEN-STAKEHOLDERS LEVEL UP

While PCIEERD's support of innovative science and technology research impacts the lives of ordinary Filipinos, either directly or indirectly, awareness of the agency and its funded-projects are limited to direct stakeholders such as those in industry or the academe.

With events such as book-giving, the Luwas Pilipinas Caravan, and various exhibits, PCIEERD is not only able to raise awareness of its citizen-stakeholders, but also show them that Filipino ingenuity is alive and strong.

MAKING SPACE TECHNOLOGY WITHIN ARMS REACH

"The Philippines Goes to Space" Exhibit Launch



The Mind Museum at the Bonifacio Global City in Taguig was the venue for the launch of a special exhibit focused on popularizing space-capable technologies developed by Filipino engineers and scientists.

"The Philippines Goes to Space," which was launched on 28 March 2019, features the all-Filipino made microsatellites, Diwata-1 and Diwata-2; and cube satellite Maya-1, in an interactive and hands-on form.

The special exhibit has two versions. The first is the permanent exhibit that will stay at the Universe Gallery of the Mind Museum. The second version is a nook in the museum's Space Adventure Traveling Exhibition, which will go around the country for the next two years.

Both versions are interactive, and include games and even virtual reality tours to engage with users of every age. The exhibit shows how we all benefit from space technology in our everyday lives. It also highlight the purpose and function of the Earth-observing microsatellites Diwata-1 and Diwata-2, and cube satellite Maya-1, the Philippines' first nanosatellite.

The exhibit was a collaboration between PCIEERD, The Mind Museum, and the STAMINA4Space Program.

ENABLING SUSTAINABLE DEVELOPMENT GOALS

PCIEERD at the National Science and Technology Week 2019

The 2019 National Science and Technology Week held at the World Trade Center on 17-21 July 2019 focused on the 17 Sustainable Development Goals (SDGs) with the theme: "Science for the People: Enabling Technologies for Sustainable Development." PCIEERD spearheaded the cluster for Food Security, Energy, and Environmental SDGs

Titled "Innovation Park: Light the Future," PCIEERD's cluster exhibit was a futuristic park filled with eyecatching displays that highlight DOST-supported technologies that contribute to the attainment of affordable and clean energy (SDG 7), sustainable innovations, industrialization, and resilient infrastructure (SDG 9), and responsible consumption and production (SDG 12).

A total of 39 technologies and projects from PCIEERD, DOST-Industrial Technology Development Institute, DOST-Philippine Nuclear Research Institute, and various academic institutions and startups comprised the exhibit. Among the 39 technologies, projects, and startups in the Innovation Park, 31 were supported by PCIEERD.

More PCIEERD-supported projects were also located in other exhibit clusters, that is the Sustainable Cities and Communities Cluster by the National Research Council of the Philippines (NRCP) wherein the Severe Weather Amphibious Navigator (SWAN) was placed. The SWAN Project aims to develop a local ship tracking and monitoring program, and developing the means to provide clean water to disaster-stricken areas.

PCIEERD also organized and hosted several events during NSTW 2019. These included forums on a number of important topics including government and industry collaborations, food security, damage assessment mapping and the cacao industry.

But it wasn't all work and no play, PCIEERD also organized lighthearted activities for young and old alike. First, they collaborated with Counter Clockwise, an experienced group of improvisers who studied improvisational theater at the Philippines' premiere improv school to hold a workshop on improvisation. The aim is to help scientists, researchers, science communicators, and students easily convey complex science ideas.

Second, the PCIEERD Information Group (IG), as it does so yearly, organized a creative Pinoy Science game to make science more fun and accessible for young visitors. This year, the group created a high-stakes multiple choice game where the participants were culled from the running if they chose wrong answer. The questions in the game were about DOST, NSTW, and the projects featured in the Innovation Park.

PAVING THE WAY FOR SMARTER PHILIPPINES CITIES

PCIEERD 9th ANNIVERSARY

Faced with the challenges of rapid urbanization, not only in the national capital but also in the regional centers, the PCIEERD chose to make the theme of their 9th anniversary celebration about pushing for the development of infrastructure and information and communication technologies (ICTs) to make our urban centers into smart cities.

With the theme "Smart Governance for Smart Cities: The Role of Science, Technology, and Innovation," PCIEERD held their 9th anniversary celebrations in both Iloilo City and Makati City on 13 June and 28 June 2019 respectively.

Iloilo City was chosen as the venue for the first event, not only because of the rapid economic growth in the city in the last few years, but because it met half of the 12 specific components under the smart cities framework: smart health care, building, digital infrastructure, education, safety and security, and governance.

During the Iloilo event, 13 innovative technologies supported by PCIEERD were presented to the attendees coming from the industry, academe, and local government agencies. The technologies offered solutions to the country's transport system, critical infrastructure monitoring, protection of the environment, housing and infrastructure, education, disaster risk reduction, and food safety.

PCIEERD Executive Director Dr. Enrico Paringit, noted that with "smart governance, we (can) envision a future with greater efficiency of delivering public services" and science-based decision-making.

The Makati celebration also highlighted the innovative technologies supported by PCIEERD that can transform Philippine cities into smart cities. The event also highlighted the launch of the Data Science for Good Governance (GODDESS) Program, KTTO-Impact Program (a DOST-USAID STRIDE Partnership), and DOST Research Equipment and Facilities Portal; and the turnover of 20 e-trikes from the Department of Energy to DOST for the INTELECT Program, a DOST-USAID STRIDE Partnership; and the DOST Research Equipment and Facilities Portal.

SHARING IDEAS WITH REGIONAL STAKEHOLDERS

Luwas Pilipinas: Ang Kahibalo sa Agham, Yawe sa Kaluwasan (Knowledge in Science is Key to a Safe Philippines)

With the aim of sharing its programs, projects, and activities to its regional stakeholders, the DOST has tasked the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) to collaborate with DOST-CARAGA to conduct the Luwas Pilipinas Caravan.

The event, with the theme "Luwas Pilipinas: Ang Kahibalo sa Agham, Yawe sa Kaluwasan (Knowledge in Science is key to a safe Philippines)", was held at the Almont Inland Resort, Butuan City on 24-25 July 2019. It was designed to bring greater designed to bring greater awareness of DOST programs and projects, as well as develop possible collaborations on disaster resilience.

The participants came from the academe, industry representatives from tourism, mining, and DRRM, government agencies from the local government units of Caraga, DENR, MGB, and DOT, and entrepreneurs.

There a variety of activities held during the event including a forum with local tourism stakeholders to discuss how collaborative opportunities, as well technological interventions that can further grow the region's booming tourism industry. There were also talks that addressed the mining industry, as well as disaster risk reduction and management in the region.

A facility tour, aimed at presenting existing facilities of DOST-supported projects in the area, was held. The two sites visited were the Eco-Sep Facility in Lake Mainit, Kicharao, Agusan del Norte, and the Community-Led Integrated Non-Mercury Non-Cyanide Gold Extraction Method (CLINN-GEM) in Cabadbaran, Agusan Del Norte. Project leaders and staff presented how the facilities operates and answered questions from the participants

A research proposal workshop-clinic was also conducted to aid local researchers and scientists in preparing future projects to the Council. Talks were given discussing the national R&D agenda and the mechanics of preparing a project proposals to the Council. The discussion also covered the Harmonized National R&D Agenda and the mechanics of preparing a proposal. The project leaders and personnel presented how each of the facilities operate and answered questions from the guests.

There was also "mixer" aimed at helping researchers and startups in the region establish partnerships and possible collaborators.

SHOWCASING THE FILIPINO STARTUP COMMUNITY TO THE WORLD

The 1st Philippine Startup Week

The DOST has long-supported local technology-based startup companies through its network of Technology Business Incubators located all over the country.

In 2017, it further strengthened that support by offering the Startup Research Grant Program through PCIEERD. The program provides funding for startups to translate their early-stage technologies into market-ready products through research and development (R&D). The initial batch of grantees, 15 in total, received the funding after a series of evaluation, selection, and assessment.

The Philippine Startup Week 2019 (PHSW2019) showcased DOST-PCIEERD's support for the Startup Community. In collaboration with the Department of Trade and Industry, the Department of Information and Communications Technology, QBO Innovation Hub and various private agencies, PHSW2019 highlighted the Filipino startup community through simultaneous nationwide events.

PHSW2019, held on 18-22 November 2019, consisted of 3-day Summits, over 50 community events nationwide, and four night fests. The activities include the 3rd National TBI Summit and the activity, "ALL SET: The DOST Startups' Journey" which highlights the DOST Startup Grant Program recipients.

Aside from the Metro Manila events, several cities around the country hosted PHSW2019 events, namely Legazpi City, Albay; Baguio City, Benguet; Tagbilaran City, Bohol; Butuan City, Caraga; Tuguegarao City, Cagayan; Davao City, Davao del Sur; Dumaguete City, Negros Oriental; Iloilo City, Iloilo; Binan City, Laguna; and Angeles City, Pampanga. Each event highlighted the entrepreneurial spirit and technological innovations of Philippine startups and startup enablers.

Another highlight of the week-long event was the announcement that BCB Blockchain, a Singapore-based technology firm, has earmarked a 15M peso fund to support incubators and start up accelerators under the DOST. BCB Blockchain officially signed a Memorandum of Agreement (MOA) with PCIEERD during that week.

The company also signed a partnership agreements with a number of university-based technology business incubators to reinforce its commitment to work closely with its academic partners in critical areas such as co-incubation of projects, research and development, seminars and trainings, promotional activities, competitions, hackathons and collaborative endeavors for smart city or blockchain development.

DEVELOPING THE INDUSTRIES OF THE FUTURE

TBI 4.0 Program Launch at 3rd National TBI Summit

The Fourth Industrial Revolution, or simply Industry 4.0, is the ongoing automation of manufacturing and industrial practices through the adoption of smart technology such as Internet of Things (IoT), cloud computing, cognitive computing, and artificial intelligence. Many countries around the world have embraced Industry 4.0, and PCIEERD is making sure that Philippines keeps up.

Launched on November 20, 2019 during the 3rd National Technology Business Incubator (TBI) Summit, the DOST's TBI 4.0 program seeks to upgrade the capabilities of its existing TBI Network through transformational interventions. This includes entering into partnerships and collaborations with incubators and accelerators from other countries, developing and implementing startup programs with these new partners, and co-incubating and immersing Philippine startups in global environments.

The hope is that these interventions will help internationalize the 45 existing DOST TBIs, some of which were established as early as 2009. Altogether, these TBIs have housed over 320 startup companies, created more than 1,200 jobs, gave rise to more than 110 full blown companies and generated more than 280 million private investments.

The program aims to provide funding support to eight DOST TBIs to lead the assessment, co-development of incubation programs, capacity building, and co-incubation arrangements. The Program is led by the QBO Innovation Hub in partnership with UPSCALE Innovation Hub of the University of the Philippines, CDO BITES of the University of Science and Technology in Southern Philippines, Ideya of Mindanao State University – Iligan Institute of Technology, Center for Technopreneurship and Innovation (CTI) of Batangas State University, GTBI of West Visayas State University, Animo Labs of the De La Salle University, and UPLB SIBOL or Startup Innovation and Business Opportunity Linkage Labs.

Partners already on-board were Villgro Social Enterprise Ventures, Swinburne University, BCB Innovation PTE LTD., SPINOFF Acadasia PTE LTD., ThaiBISPA, and local partners Ideaspace and Spring Valley.

During the launch, DOST Secretary Fortunato dela Peña says the program will make the DOST TBIs "at par with well-known foreign incubators and put the Philippines on the map in terms of services and startup support."

DEVELOPING CURIOSITY FOR SPACE TECHNOLOGY

'R U D1?: Inspiring the Next Generation of Diwata Engineers Workshop

To celebrate the third anniversary of the first Filipino-designed microsatellite Diwata-1, the PCIEERD together with Museo Pambata Foundation, Inc. and STAMINA4Space Program, conducted "R U D1?: Inspiring the Next Generation Diwata Engineers", an activity-workshop aimed at inspiring children to pursue space science.

The workshop was conducted for Grade 5 and 6 students from Sta. Ana and Tondo, Manila. The goal was to make the students appreciate space science through a presentation by Engr. Benjamin Magallon, one of the Diwata engineers, about how it helps us in our daily lives.

The presentation was a hands-on activity where the participants were divided into teams to fabricate their own versions of a microsatellite.

This is not the first partnership between PCIEERD and Museo Pambata as it launched the first interactive exhibit on the Filipino-made satellite in December 2017. Titled "Discover Diwata-1", the exhibit aims to raise awareness, inspire, and encourage museum patrons to explore science and technology, specifically space technologies.

TEACHING CHILDREN TO BE MORE INQUISITIVE

Book-Giving Activity with Balik Scientist Dr. Deborah Tangunan

With the aim of promoting science and technology to young people through reading; and encouraging learning through creative storytelling, PCIEERD conducted "Iba na ang Panahon: Mga Kwentong Agham para sa Kabataan Ngayon" at the Museo Pambata, Ermita, Manila.

The activity-workshop is composed of storytelling session, documentation workshop, and creating microfossils and viewing them on microscope. The young participants were also asked to share their experience of the hands-on sessions to help them process it. They were also given science story books to read and enjoy on their own.

The activity was an initiative of Balik Scientist Dr. Deborah Tangunan, a paleontologist and paleoclimate scientist. Dr. Tangunan discussed about paleontology that is understandable for the young participants, piquing their curiosity about the topic.

The activity ended with a tour of the museum.

PCIEERD IN THE MEDIA

Top Stories

Hybrid
Electric Train

Philippine Space Agency

542
Media Placement

P127,713,015.27
AD Value

Startup Program
and the IRR of the
Ph Startup Law

2019 SOCIAL MEDIA ANALYTICS

DOST-PCIEERD Facebook Page (@dostpcieerd)

481
No. of Posts

4.2M
Total Impressions

DOST-PCIEERD Instagram (@dostpcieerd)

95
No. of Posts

452
No. of Followers

30.2K
Total Impressions

6,203
Average Reach

32,568
No. of Likes

452
Average Engaged Users

DOST-PCIEERD Twitter (@dostpcieerd)

133
No. of Tweets

13,912
Total Impressions

258
Average Engaged Users

277
No. of Stories

752
Total Engagement

7.3K
Average Reach

Pinoy Science Facebook Page (@pinoyscience)

44
No. of Posts

4,279
Average Reach

251,162
Total Impressions

35,436
No. of Likes

258
Average Engaged Users

POLICY COORDINATION AND MANAGEMENT DIVISION

Fostering an environment of innovation is the PCIEERD's main goal, and it has done so since its inception by supporting R&D and technology-transfer projects. Many of these projects have yielded benefits for its stakeholders and the Filipino people, in general. However, the council can only support so many projects as its resources will allow. And not every project bears fruit, despite the best of intentions.

Thus the work of ensuring that the Council's resources are used to their full potential is as important as the projects they support. This function is performed by the Council's own PCMD, which oversees the assessment of projects supported by the council, as well as suggesting policies that will maximize the council's impact on improving the lives of Filipinos.

PCIEERD IMPACT ASSESSMENT

The Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) has made significant investments on research and development (R&D), information dissemination and technology transfer activities to tackle technology-related challenges and barriers that hinder productivity and efficiency in varying industries. These activities in turn are expected to yield impacts that would positively contribute to the objectives of the Council in resolving challenges that confront the sectors that fall under its coverage and priorities.

Therefore, to estimate what real difference such efforts and activities could realize to target beneficiaries and to the society, PCIEERD has undertaken its impact assessment program for research and development and technology transfer programs/projects in industry, energy and emerging technology.

Impact Assessment is a method of determining the effectiveness and success of activities and initiatives, and assessing the significance of changes brought about by those activities. It aims to identify, provide a clear measure and evidence of the impacts and returns of its R&D investments. Impact assessment is neither an art nor a science, but both. It is closely related to the organization's Mission and is therefore an effective means of externally and internally communicating the contribution of programs/projects to the Mission of PCIEERD.

PCIEERD also underscores the need to institute and further strengthen the impact assessment process of the Council by prioritizing it in its policy arm's 2020-2022 strategic plan by creating a team that will manage the third-party assessment of project outcomes and impact, benchmarking other institutions' best practices, developing procedure/processes for project outcome and impact assessments and conducting of outcome and impact assessment of selected project outputs. Impact assessment studies on PCIEERD-funded projects are conducted to determine and measure the changes, both intended and unintended, that result from research, development and extension. The programs/projects to be subjected to impact assessment must be completed at least the last 3-5 years, with significant technology outputs adopted by intended beneficiaries, with available data/information such as proposal, terminal and progress reports, audited financial report, list of beneficiaries with contact information (if available), among other documents, and with a total approved budget greater than the IA project cost. Such studies serve as an assessment for the consistency of the programs/projects and the overall return of PCIEERD's research and development (R&D) investments.

The Council pioneered an in-house impact assessment study (IAS) on Vigormin technology, a white organo-mineral used in improving the quality of wastewater, undertaken in 2020. Vigormin is effective in neutralizing odor and reducing BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand) levels and coliform count in wastewater. It was deployed in several areas in the country and was launched during the Asia-Pacific Economic Cooperation (APEC) conference in 2015. Another completed IAS is the impact assessment of the Small Enterprise Technology Upgrading Program (SETUP) which was undertaken by third-party experts from Development Academy of the Philippines (DAP). Upcoming programs/projects to be subjected to impact assessment are the DOST One-stop Laboratory Services for Global Competitiveness (OneLab) project, Technology Innovation for Commercialization (TECHNICOM) program, Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA)/Philippine Institute of Volcanology and Seismology (PHIVOLCS) projects, Institutional Development Program (IDP) and Phil-LiDAR (Light Detection and Ranging) projects which are to be undertaken by commissioning a range of independent consultants and third party experts. This whole process will ensue the development and establishment of a more streamlined method and system of conducting impact assessment studies in the Council over time that will likewise further enhance the quality of this area of PCIEERD's monitoring and evaluation program.

PARTNERS AND LINKAGES

Partnerships with Public and Private Stakeholders and International Organizations

Adamson University (AdU)

Aklan State University (ASU)

Antipara Exploration, Inc.

Asian Institute of Management (AIM)

Ateneo De Davao University (ADDU)

Ateneo De Manila University (ADMU)

Ateneo De Zamboanga University (ADZU)

Bataan Peninsula State University (BPSU)

Batangas State University

Benguet State University (BSU)

Bicol University (BU)

Bulacan State University

Cagayan State University (CSU

Camarines Sur Polytechnic Colleges (CSPC)

Caraga State University (CarSU)

Cavite State University (CvSU)

Cebu Institute of Technology – University (CIT-U)

Central Luzon State University (CLSU)

Central Mindanao University (CMU)

Central Philippines University (CPU)

Citizen's Support Your Navy Foundation Phils., Inc.

Cropital Enterprises Corporation

De La Salle University (DLSU)

Department of Information and Communications Technology (DICT)

Department of National Defense (DND)

Development Academy of the Philippines (DAP)

Don Mariano Marcos Memorial State University (DMMMSU)

Easybus PH, Inc.

Edusuite, Inc.

Farmwatch Solutions, Inc

FEATI University

Food Development Center - National Food Authority

Futuristic Aviation and Maritime Enterprise, Inc. (FAME)

Grayscale Marketing Consultancy

Hiraya Technology Solutions, Inc.

Holy Angel University (HAU)

Ideaspace Foundation Inc. through QBO Innovation Hub

Infodynamics Technologies

Isabela State University (ISU)

Kinovett Scientific Solutions Co.

MachiBox Inc.

Mapua University

Marinduque State College (MSC)

Mariners Polytechnic Colleges Foundation

MATA VR

Mind Museum

Mindanao Autonomous College Foundation, Inc. (MACFI)

Mindanao Development Authority (MinDA)

Mindanao State University - General Santos City

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

Mines and Geosciences Bureau (MGB)

Miriam College

National Irrigation Administration (NIA)

National Water Resources Board (NWRB)

Northwest Samar State University (NwSSU)

Palawan State University

Pampanga State Agricultural University (PSAU)

Pangasinan State University (PSU)

Philippine Foundation for Science and Technology (PFST)

Po-lite Technology Inc.

Polytechnic University of the Philippines (PUP)

Restograph Inc.

Rise Against Hunger, Philippines Inc.

Rizal Technological University (RTU)

Rurok Industries

Saint Louis University (SLU)

Samar State University (SSU)

Senti Techlabs Inc.

Silliman University

Smartfox Data Solutions Inc.

Sultan Kudarat State University (SKSU)

Tactiles Corporation

Technological Institute of the Philippines (TIP)

Technological University of the Philippines Visayas (TUPV)

Tekton Geometrix, Inc.

Toon City Academy

University of Asia and the Pacific (UA&P)

University of Cordilleras

University of Mindanao

University of Perpetual Help System - Dalta

University of San Carlos (USC)

University of San Jose Recoletos (USJ-R)

University of Santo Tomas (UST)

University of Science and Technology of Southern Philippines

West Visayas
State University

Western Mindanao State
University (WMSU)

Western Philippines University
(WPU)

UP Open University

University of Southeastern
Philippines

University of Southern
Mindanao (USM)

UP Baguio
UP Cebu
UP Diliman
UP Los Baños
UP Mindanao
UP Visayas

Wela School System

Wesleyan University of the
Philippines (WUP)

MANAGEMENT TEAM

1. **Engr. Niñaliza H. Escorial**
   Chief, Industrial Technology Development Division (ITDD)

2. **Mark Ivan C. Roblas, MDC**
   Supervising Science Research Specialist, Office of Executive Director - Information Group

3. **Dr. Enrico C. Paringit**
   Executive Director

4. **Engr. Ermie M. Bacarra**
   Chief, Human Resource and Institution Development Division (HRIDD)

5. **Ms. Edna C. Nacianceno**
   Chief, Emerging Technology Development Division (ETDD)

6. **Ms. Russel M. Pili**
   Rch. MTM, LLM in IP
   Chief Science Research Specialist
   Chief Technology Transfer Officer

7. **Ms. Carlota R. Sancho**
   Senior Science Research Specialist Policy Coordination and Monitoring Division (PCMD)

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FINANCIAL
REPORT

FINANCIAL REPORT

The 2019 General Appropriations Act no. 11260 includes the PCIEERD Budget amounting to Seven Hundred Fourteen Million Five Hundred Seventy-Eight Thousand Pesos (P714,578,000.00). This is 17% lower than the council's 2018 approved budget. The breakdown are as follows: Personnel Services with P52,090,000.00, Maintenance and Other Operating Expenses with P660,668,000.00 and Capital Outlay with P1,820,000.00.
The largest portion of PCIEERD's budget were allotted for Financial Assistance to Non-Government Organizations' and National Government Agencies. For 2019, PCIEERD was able to utilize 99% of its' fund under the Council's thrusts and programs. The total Grants-In-Aid (GIA) fund amounted to Six Hundred Thirteen Million Nine Hundred Twenty-Two Thousand Pesos (P613,922,000) was fully utilized.

PCIEERD has also generated funds amounting to Fifty-Eight Million Nine Hundred Four Thousand Four Hundred Seventy-Four Pesos and 9/100 (P58,904,474.09) project funds from external sources. This fund is for the implementation of various projects from DOST and Attached Agencies, Department of Energy (DOE), Department of Environment and Natural Resources, National Water Resources Board for the monitoring and evaluation of DOST-funded projects.

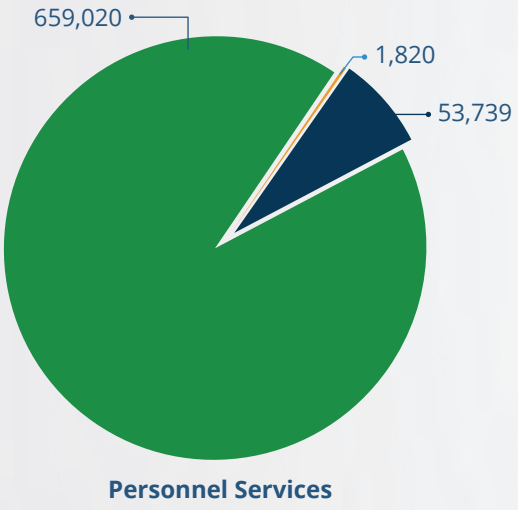
Breakdown of Allotment, Obligations and Balances:

A. By Programs/Activity

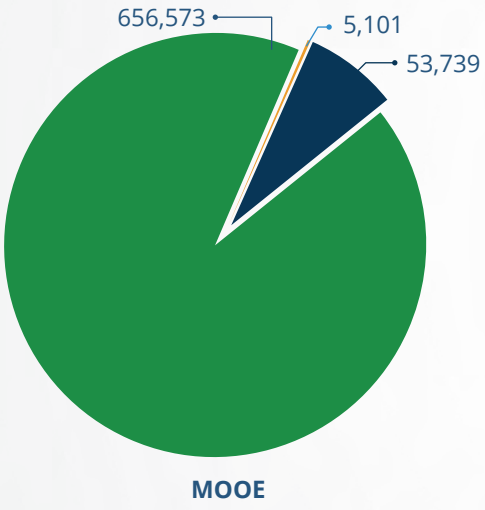
Program	Allotment	Obligations	Balances	Utilization
General Administration Services	58,920,000.00	57,449,279.80	1,470,720.20	97.50%
National Industry, Energy and Emerging Technology Sectors R&D Program	655,658,000.00	654,677,278.79	980,721.21	99.85%
a. Development, integration and coordination of the National Research System for Industry, Energy and Emerging Technology Sectors	652,367,000.00	652,140,692.75	226,307.25	99.97%
b. Locally-Funded Projects	3,291,000.00	2,536,586.04	754,413.96	77.09%
TOTAL	714,578,000.00	712,126,558.59	2,451,441.41	99.66%

B. By Expense Class

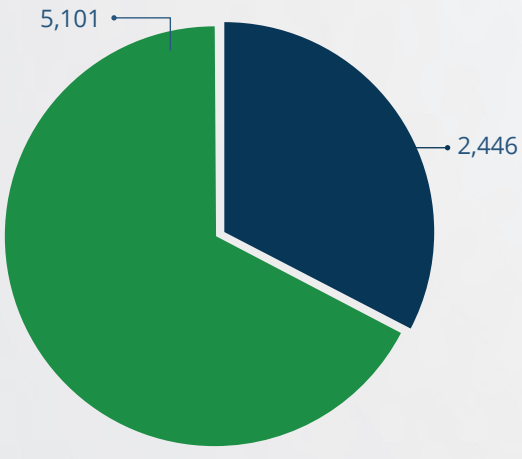
Expense Class	Allotment	Obligations	Balance	Utilization
Personnel Services	53,738,500.00	53,738,500.00	0.00	100%
Maintenance and Other Operating Expenses	659,019,500.00	656,573,158.59	2,446,341.41	99.63%
Capital Outlay	1,820,000.00	1,814,900.00	5,100.00	99.73%
TOTAL	714,578,000.00	712,126,558.59	2,451,441.41	99.66%



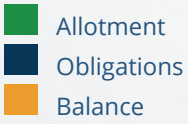
Personnel Services



MOOE



Capital Outlay



DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE COUNCIL FOR INDUSTRY,
ENERGY AND EMERGING TECHNOLOGY
RESEARCH AND DEVELOPMENT
(DOST-PCIEERD)

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