NEXUS

2022 ANNUAL REPORT

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

Annual Report

20

NEXUS OF INNOVATION

NEXUS OF INNOVATION

22

2022 ANNUAL REPORT

NEXUS

ABOUT THE COVER

This year's DOST-PCIEERD Annual Report reflects the organization's vision for 2040 – to be the Nexus of Innovation that drives the nation's productivity and competitiveness through Science and Technology solutions.

The cover features a vibrant and futuristic design, symbolizing the organization's commitment to exploring emerging technologies and pushing boundaries. The use of bold colors and dynamic shapes conveys a sense of energy and momentum, indicative of Council's role as a driving force in the industry and energy sectors.

The cover serves as a visual representation of the report's one-liner, **"Innovation thrives with Nexus,"** and underscores PCIEERD's dedication to innovation, good governance, and shaping a brighter future for the Philippines.

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE COUNCIL FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT

WE ARE DOST-PCIEERD

The Department of Science and Technology - Philippine Council for Industry, Energy and Emerging Technology Research and Development

Mission

Provide strategic leadership in enabling Innovations in industry, energy, and emerging technology sectors. PCIEERD commits to:

- Formulate national policies, plans, programs, and strategies for S&T development in the industry, energy, and emerging technology sectors
- Allocate government and generate external funds for research and development
- Monitor research and development (R&D) projects

Vision

By 2040, PCIEERD is the Nexus of Innovation, the leading contributor to the nation's productivity and competitiveness by enabling Science and Technology solutions in the industry, energy sectors, and emerging technologies, while upholding the tenets of good governance.

ENERGY

Energy Efficiency

Transportation

INDUSTRY

Electronic & Semiconductor Indutries

Mining & Minerals

Metals & Engineering

Food Processing

Process

EMERGING TECHNOLOGIES

Materials Science/ Nanotechnology

Genomics/ Biotechnology

Information & Communications Technology

Space Technology Application

Photonics

Artificial Intelligence

Data Science

SPECIAL CONCERNS

Climate Change Adaptation

Disaster Risk Reduction & Management

Environment

Human Security

Creative Industries

Science Communication

Policy

In support of the Department of Science and Technology's (DOST) mandate of leading the Philippines' scientific and technological efforts to achieve maximum economic and social benefits for Filipinos, the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), one of its sectoral planning councils, serves as the central agency in the formulation of policies, plans, and programs, as well as in the implementation of strategies that boost the country's industry, energy, and emerging technology sectors.

PCIEERD aggressively undertakes the application of science and technology (S&T) to upgrade the country's capabilities and Filipinos' quality of living. It provides continuing support to research and development (R&D), technology transfer, and information dissemination in these priority areas:

Message from the

DOST Secretary

"PCIEERD proactive approach in strengthening research and development and in making innovations relevant yet accessible to Filipinos, particularly in promoting economic development, job creation, climate and disaster resilience, human well-being through health, education, access to water and energy, and the protection and conservation of natural resources – all while pushing to bounds of science and the exploring the depths of technological breakthrough".

We extend our warmest felicitations to the Department of Science and Technology (DOST) and the Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) for their remarkable achievements in advancing research and development in the Philippines in this edition of Annual Report.

Amidst the unprecedented challenges brought about by the COVID-19 pandemic, DOST and DOST-PCIEERD have demonstrated a steadfast commitment to the four pillars of wealth creation, wealth protection, sustainability, and well-being. PCIEERD proactive approach in strengthening research and development and in making innovations relevant yet accessible to Filipinos, particularly in promoting economic development, job creation, climate and disaster resilience, human well-being through health, education, access to water and energy, and the protection and conservation of natural resources – all while pushing to bounds of science and the exploring the depths of technological breakthrough.

DOST-PCIEERD has continuously poured efforts into actualizing innovative ideas and technologies that benefit specific sectors and stakeholders, in line with the government's 8-Point socioeconomic agenda, which is truly commendable.

Their dedication to supporting the government's initiatives is a testament to their unwavering commitment to public service.

We acknowledge the crucial role that science plays in our daily lives, and DOST-PCIEERD's numerous projects and technologies developed by Filipino scientists and innovators, as showcased in this Report, demonstrate its power in driving progress and creating a positive impact on society.

We are confident that DOST-PCIEERD's commitment and efforts will pave the way for the present and future landscape of research and development in the Philippines to reach more stakeholders, support government initiatives, and ultimately benefit the entire nation.

Once again, our hats off to DOST-PCIEERD for yet another successful year of bringing innovation and progress to the Filipino people. We eagerly anticipate the continued success of their endeavors in the years ahead.

Congratulations and *Mabuhay tayong lahat!*

DR. RENATO U. SOLIDUM JR.
Secretary, DOST

Message from the

DOST Undersecretary for R&D

"We would like to emphasize the importance of DOST-PCIEERD's new vision, which states that by 2040, it aims to become the Nexus of Innovation—the leading contributor to our nation's productivity and competitiveness".

We commend the Department of Science and Technology – Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) for another year of excellence in the fields of industry, energy, and emerging technologies. We are privileged to witness firsthand the remarkable contributions made by DOST-PCIEERD in driving innovation and fostering progress in our nation.

We would like to emphasize the importance of DOST-PCIEERD's new vision, which states that by 2040, it aims to become the Nexus of Innovation—the leading contributor to our nation's productivity and competitiveness. This vision aligns perfectly with President Bongbong Marcos' 8-Point Economic Agenda, and we applaud DOST-PCIEERD for actively supporting this agenda through its research and development efforts.

The socioeconomic agenda outlined in President Marcos' 8-Point Economic Agenda represents a comprehensive roadmap for the near and medium-term growth of our country. This edition of Annual Report serves as our tangible support to these goals, addressing critical areas such as mitigating the impact of the COVID-19 pandemic, improving bureaucratic efficiency, promoting investments, enhancing infrastructure, ensuring energy security, increasing employability, encouraging research and development, fostering innovation, boosting the digital economy, pursuing a green and blue economy, establishing sustainable communities, upholding public order and safety, and fostering market competition and entrepreneurship.

We firmly believe that the innovations presented in this Annual Report will pave the way for the economic development of the Philippines. Through cutting-edge scientific advancements, technology transfer, and strategic collaborations, DOST-PCIEERD continues to drive progress in key sectors, enabling sustainable solutions and economic growth.

As the Nexus of Innovation, the Council plays a pivotal role in bridging the gap between research and real-world application. By upholding the principles of good governance and ensuring the effective utilization of science and technology, PCIEERD empowers our industries, energizes our energy sector, and unlocks the potential of emerging technologies.

We extend our deepest appreciation and congratulations to the entire DOST-PCIEERD team for their unwavering dedication, hard work, and exceptional achievements. Let us continue to work together, pushing boundaries and exploring new frontiers, as we strive to transform our nation into a hub of innovation and a global leader in science and technology.

Mabuhay ang DOST-PCIEERD! *Mabuhay ang Pilipinas!*

DR. LEAH J. BUENDIA
Undersecretary for Research and Development, DOST

Message from the

Executive Director

"Our efforts in 2022 saw bountiful harvest with successful completion of 224 R&D projects, with 11 directly related to addressing the challenges posed by the COVID-19 pandemic. We proudly supported 193 new initiatives, ensuring the continuous progress of 169 ongoing projects. Moreover, we diligently supervised 409 programs out of the 791 requests received last year. This collaborative approach led to the engagement of 499 project managers from 93 higher education institutions."

The Department of Science and Technology - Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) takes pride in its 12-year journey of cultivating partnerships and fostering innovation through tireless efforts and unwavering dedication, we have made remarkable strides in 2022, benefiting the Filipino people through our supported programs, activities, and projects.

At the heart of our success lies the indefatigable team at DOST-PCIEERD, whose tenacity and focus have propelled us forward. This year, we ventured into the dynamic fields of data science and artificial intelligence, harnessing their immense potential to drive innovation in various sectors. We have also made significant advancements in the energy industry, providing support for project management and electronic transportation across land, sea, and air. These accomplishments, alongside our Smart Cities projects, reflect our vision of a better, more digitally empowered Philippines, leveraging the intelligence of our labor force.

Our efforts in 2022 saw bountiful harvest with successful completion of 224 R&D projects, with 11 directly related to addressing the challenges posed by the COVID-19 pandemic. We proudly supported 193 new initiatives, ensuring the continuous progress of 169 ongoing projects. Moreover, we diligently supervised 409 programs out of the 791 requests received last year. This collaborative approach led to the engagement of 499 project managers from 93 higher education institutions. Additionally, we forged 46 partnerships, including eight international collaborations, forming a nexus that drives our quest for inventive brilliance.

This persistent dedication to promoting research and development has not only advanced our nation but also laid the foundation for sustainable economic prosperity. As we move forward, we remain committed to surpassing boundaries and embracing the transformative power of innovation. Our unwavering focus on creating game-changing technologies will enable us to make a lasting impact in the lives of the Filipino people.

As we navigate through changing times, we are resolute in our pursuit of excellence. We will continue to leverage emerging technologies and cutting-edge research to bring about positive change. By harnessing the collective intelligence and passion of our stakeholders, we are poised to overcome challenges and seize new opportunities.

We extend our deepest gratitude to our partners, academic institutions, and international cooperative businesses who have been instrumental in our journey. Your unwavering support and collaboration have been crucial in driving our success. Together, we will forge ahead, pioneering innovative solutions and transforming the landscape of science, technology, and research in the Philippines.

With our sights set on a future of endless possibilities, we reaffirm our unwavering commitment to excellence, collaboration, and the relentless pursuit of innovation. Together, we will shape a brighter tomorrow.

DR. ENRICO C. PARINGIT
Executive Director- DOST PCIEERD

PCIEERD in 2022

by the Numbers

224
Projects Completed

791
Proposals Received

213
New Projects

193
Funded Projects

169
Ongoing Projects

8
International Cooperation

93
HEIs/SUCs

11
Covid-related Projects

23
Government

499
Project Leaders

46
Private Non-Profit Institution

NEXUS

NURTURING AN INCLUSIVE INNOVATION ECOSYSTEM

Harnessing S&T Capabilities

- Support to Research Laboratories and Facilities (IDP)
- Support to Regional Networks
- Support to Balik Scientist (BSP)
- Building the capacity of Researchers, Scientist and Engineers (RSEs) for IEET

Fusing Technology and Business

- Technology Business Incubation Program
- Startup Development Program
- Technology Transfer Program (FASTRAC and IMPACT)

Establishing an Enabling Policy Environment

- Policy Development & Advocacy

PCIEERD Sectoral Roadmaps

Providing S&T Interventions for Resilient and Sustainable Communities

- Energy
- Transportation
- Utilities
- Environment Sector (Solid, Air, Water Quality)
- Disaster Risk Reduction and Climate Change Adaptation Sector
- Construction
- Convergence of Emerging Technologies (Smart Cities)
- Human Security
- Pandemic-related Initiatives

Providing S&T Interventions for Industry Productivity and Competitiveness

- Food Sector
- Textile Sector
- Agro-industrial processing Sector
- Chemical and biological Sector
- Creative Industries – Footwear and Furniture, Game, Film and Animation
- Metals and Engineering
- Mining and Minerals
- Industry 4.0

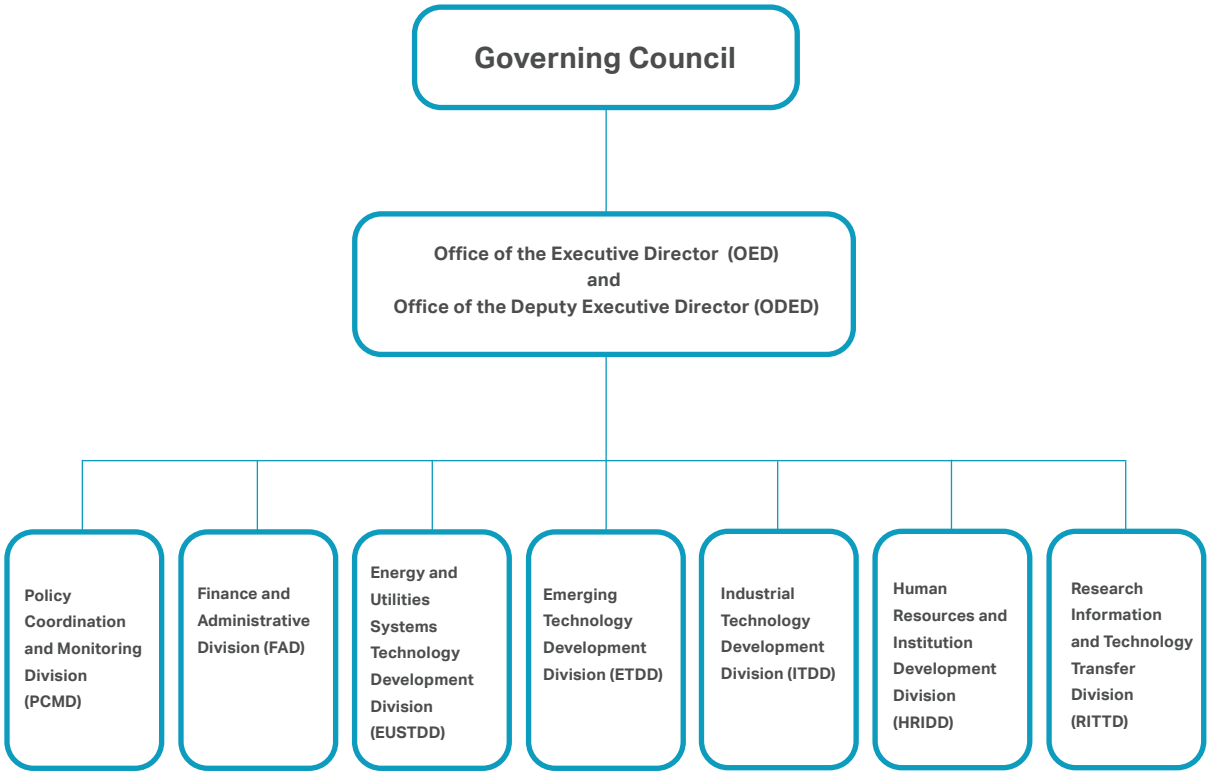
Impact Assessment

Enabling/Development of Core Technologies

- Advanced Materials
- Electronics
- ICT Innovations
- Artificial Intelligence
- Data Science
- Unmanned Vehicle Systems
- Nanotechnology
- Optics and Photonics
- Space Technology Applications
- Quantum Computing

Science Communication

PCIEERD
Organizational Structure



Contents

REPORT OVERVIEW

i Message from the DOST Secretary

iii Message from the DOST Undersecretary for R&D

v Message from the Executive Director

vii PCIEERD in 2022 by the Numbers

ix Nexus Graph

x PCIEERD Organizational Structure

SUPPORT FOR R&D

1 Non-Invasive Geophysical Techniques for Liquefaction Hazard Assessment: Towards Resilient Schools in GMMA

5 Mitigating Lahar Hazards through Quantitative Assessment and Modeling

7 Project SINAG: Revolutionizing Solar PV Assessment and Installation in the Philippines

11 Harnessing the Power of Machine Learning for Reliable and Cost-Effective Solar Home Energy Storage System

15 Bayan Ko-Ops: An Innovative Solution to Address Retail Store Stock Shortages

17 Enhancing Pandemic Response through Checkpoint Analysis and Social Distancing Detection in Metro Manila

19 Every drop counts

24 Passive Seismic Stratigraphy of Irregular Topography (PSSIT) Applicable to Mountainous Areas of Baguio City

27 Summary of EUSTDD's Projects

29 Philippine Sky Artificial Intelligence Program (SkAI-Pinas)

33 Onto a Quantum-Enabled Economy: The Quantum Innovation Laboratory in the Philippines

37 Additive Manufacturing Program

39 MATDEV: Developing Local Materials for Additive Manufacturing

43 RAPPID-ADMATEC: Advancing Additive Manufacturing for National Development

47 Summary of ETDD's Projects

51 IM4MANILABAY Program

53 IM4ManilaBay: Integrated Waste Analysis, Survey and Technical Options

55 IM4ManilaBay: Development of an Integrated Mapping, Monitoring and Analytical Network System

57 IM4Manilabay: Management of Dredged Material

59 IM4Manilabay: Ecosystem Modeling and Material Transport Analysis

63 Establishment of the PTRI Medical Textile Testing Laboratory

67 Counting Plastics

71 Revolutionizing Surface Mines through SMART Mines Automation and Telematics Platform

75 Metrology Program

77 Boosting Food Safety: Enhancing the National Metrology Laboratory's Dissemination of Traceability in the Analysis of Organic Contaminants in Food

81 Improving water quality and food safety through Chemical Metrology

85 Building National Capacity for Biological Metrology in the Philippines: Advancing Food Safety through Proficiency Testing

89 Strengthening the National Metrology Laboratory: Advancing Accurate Measurements and Calibration Services in the Philippines

93 Summary of ITDD's Projects

TECHNOLOGY TRANSFER AND COMMERCIALIZATION

99 PCIEERD Startup Grant Fund Program

107 Twala: Transforming Document Management with Blockchain Innovation

109 Technology Business Incubation

113 HEIRIT: Fueling Higher Education Institutions for Sustainable Innovation and Technopreneurship

115 WHWISE Program

119 Empowering Women Entrepreneurs: WHWise Program Sparks Innovation and Inclusion for a Thriving Nation

121 Empowering Women through EdukSine: Transforming Independent Films in the Philippines

123 Homegrown Heroes Unite: Philippine Startup Week 2022 Sparks Innovation and Collaboration

125 6th National Technology Business Incubator (TBI) Summit

127 TEXCHANGE: Technology Exchange Summit 2022

129 Summary of RITTD's Projects

HUMAN RESOURCE DEVELOPMENT

135 HRDP

147 Blockchain Technology Training Program:

153 2022 Balik Scientist Program (BSP) Awardees
167 Empowering the Next Generation of Innovators in the Country
183 Enhancing Regional Development through Collaborative Partnerships
207 Institution Development Program
211 Summary of HRIDD's Projects

POLICY DEVELOPMENT AND ADVOCACY

219 Boosting the Food Processing Industry Through Sustainable Food Innovation Centers
223 Powering Missionary Areas with Solar Energy
227 Water Pollution: Health and Economic Hazard
231 Robust Optical Aerosol Monitor as a Requirement for the Issuance of Environmental Compliance Certificate
235 Policy Forum for Local Government Units in Visayas and in Davao
241 Summary of PCMD's Projects

INFORMATION DISSEMINATION

245 Science Communication Fellowship Program
249 SIBOL 2022
251 Innovate Pinas
253 The Rising STARs (Science and Technology Advocates for Research): Mainstreaming S&T Innovations Through TikTok
257 Space Technology Application: The Country's First Traveling Space Exhibit
261 Summary of Information Group's Projects

263 Financial Report
277 Expanding S&T landscape one scholar at a time

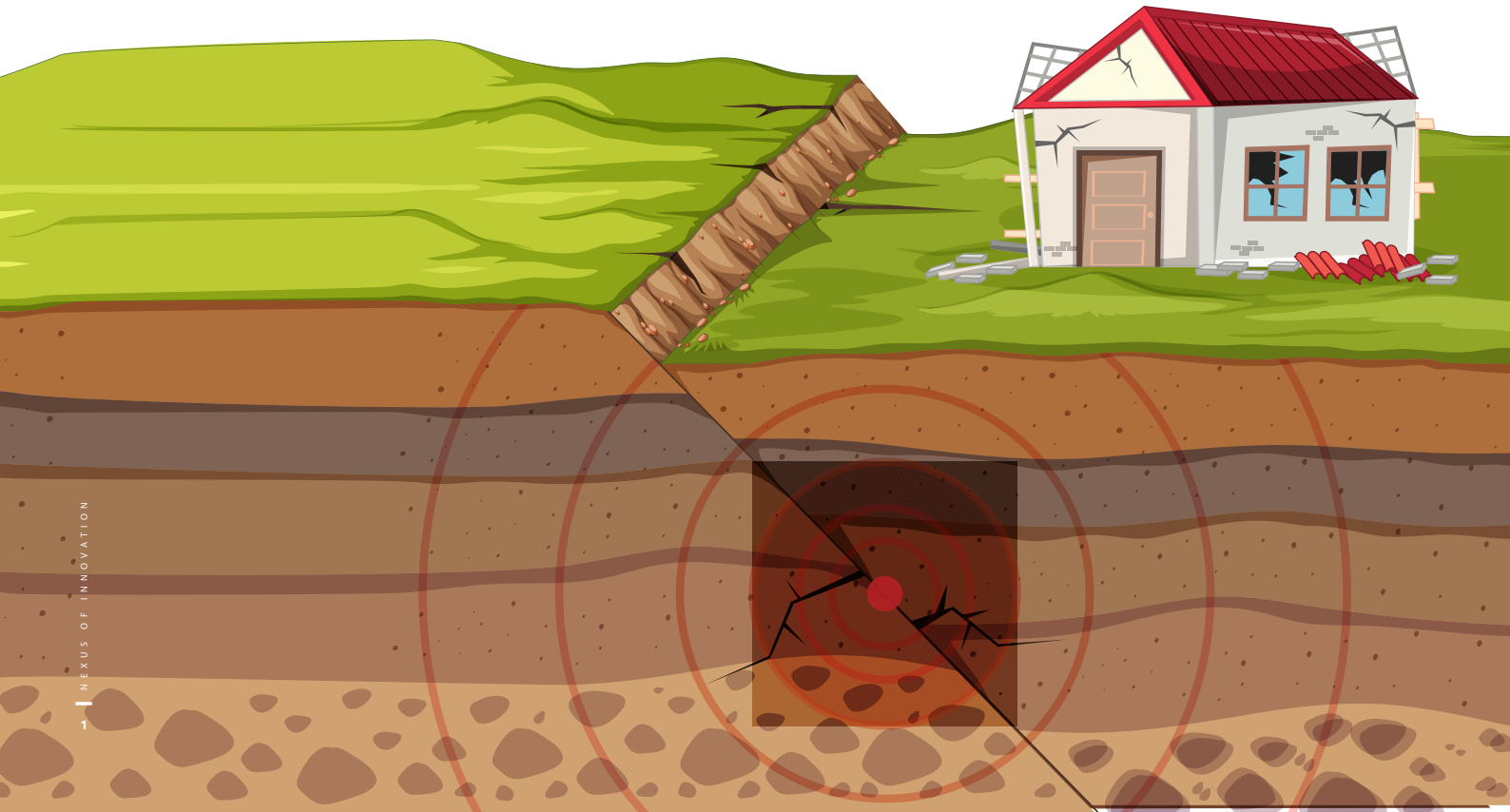
2022 ANNUAL REPORT

Support to Research & Development

Non-Invasive Geophysical Techniques for Liquefaction Hazard Assessment: Towards Resilient Schools in GMMA

Liquefaction Hazard Assessment for Resilient Schools in GMMA: A Liquefaction Probabilistic Model using Non-Invasive Geophysical Techniques and Limited Probe Hole

Project Leader: Arturo S. Daag, Ph.D.
Implementing Agency: DOST-PHIVOLCS



Liquefaction is a destructive phenomenon that occurs due to earthquake-induced ground shaking in areas located in geomorphic environments with thick, loose, and unconsolidated sediments saturated by shallow water tables. In the Philippines, liquefaction can cause significant damage to buildings and other structures, highlighting the need for proper soil investigation and mitigation measures. However, techniques used now include boring holes in the ground which are time-consuming, manpower- dependent and expensive.

Dr. Arturo S. Daag, through the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and in cooperation with the Department of Education (DepEd) engineers, conducted a project using non-invasive geophysical techniques to establish state of the art techniques in liquefaction assessment and using outputs that are produced, recommend mitigation measures to reduce the impact of liquefaction to make public schools resilient to this type of hazard.

The project successfully established a non-invasive liquefaction assessment technique using Ground Penetrating Radar (GPR), Refraction Microtremor (ReMi), Three-component Microtremor (3CMT), and a limited probe hole Screw Driving Sounding (SDS) for the geophysical survey. The methodology assessed site-specific liquefaction potential quickly and cost-effectively and correlated subsurface geology with geophysical data. The project also developed seismic response analysis and recommended mitigation measures to sixty-three (63) DepEd schools in Valenzuela, Navotas, Malabon, Manila, Paranaque, Pasay, Las Pinas, Quezon City, Bulacan, and Cavite as pilot sites and primary beneficiaries. Lastly, the project trained DepEd geotechnical and structural engineers on the new technique for rapid assessment of the liquefaction hazard.

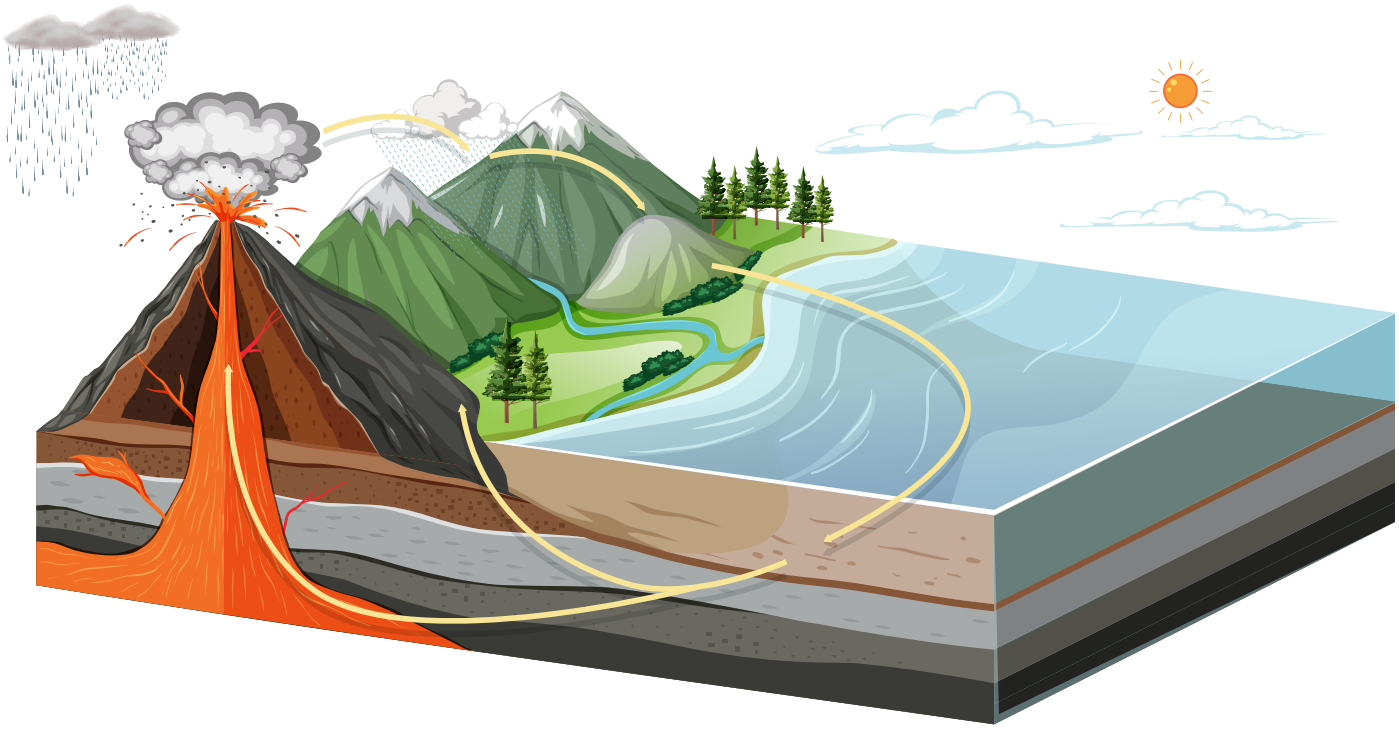
The project's impact goes beyond the successful establishment of a new rapid, cost-effective, and accessible liquefaction hazard assessment technique. With the resulting assessment from the processed geophysical and geotechnical data, geotechnical and structural engineers can evaluate the degree of acceptability of new building designs as well as suggest mitigation efforts to existing ones if there is high liquefaction risk. Said information will also be usable in determining more stable areas to build new schools. This information could help prevent damage to buildings and other critical infrastructures during earthquakes, especially in areas with a high potential for liquefaction, such as GMMA. By building critical infrastructures that are resilient to liquefaction hazards, the project contributes to nation-building efforts and supports sustainable development.

(Top) Research personnel conducting Screw Driving Sounding and (below) retraction microtremor

Mitigating Lahar Hazards through Quantitative Assessment and Modeling

Quantitative Lahar Impact and Loss Assessment under Changing Land Use and Climate Scenarios

Project Leader: Perla Delos Reyes, Ph.D.
Implementing Agency: DOST-Philippine Institute of Volcanology and Seismology



In the Philippines, lahar events pose a significant risk to communities living near volcanic river channels. Unlike most hazards associated with volcanic eruptions, lahars may manifest long after an eruption which continuously expose communities to the danger of extreme flooding and destruction of homes, infrastructure, and agricultural land. Due to its size and complexity, lahar inundation research is needed to better understand its behavior and produce accurate data for successful disaster mitigation strategies.

Dr. Perla Delos Reyes, through the Philippine Institute of Volcanology and Seismology (PHIVOLCS), in collaboration with the University of Bristol and co-funded by DOST-PCIEERD with the UK NERC, under the Newton-Agham Program titled "Understanding of the Impacts of Hydrometeorological Hazards in the Philippines" conducted a project titled "Quantitative Lahar Impact and Loss Assessment under Changing Land Use and Climate Scenarios" that developed predictive lahar model implementation at a building scale which linked land use and erodibility for lahar modeling, characterized rainfall on a catchment scale for lahar initiation under current and future climates, and provided lahar risk assessment test cases for the Mt. Pinatubo and Mt. Mayon volcanoes.

During the project implementation period, the team was able to generate loss estimation models, inundation maps and land cover maps. They also identified lahar initiation sites for the Masarawag-Maninlla and Pasig-Potrero river channels, and built exposure databases for pilot barangays in Mt. Pinatubo and Mt. Mayon, among others.

The project also provided detailed Report of Investigations (QRT-RI), to stakeholders of Albay (e.g. Provincial Public Safety and Emergency Management Office or PSEMO and the Guinobatan LGU) for land cover and DRR planning. They also generated Final Quality Procedures and Work Instructions (WI) on LaharFlow Model and Python Processing for use in PHIVOLCS operations and future projects, as well as eight (8) Work Instruction manuals following ISO-standard formats for related processing and analysis procedures.

The scenario-based simulation results of this project can be employed to make estimations regarding the losses and damage resulting from lahar events, as well as evaluate the lahar risk in specific geographical areas. One of the project's recommendations is to apply the calibrated LaharFlow model adapted to Philippines settings and its associated techniques to other significant lahar-prone volcanoes in the Philippines to further validate the performance of the model. Furthermore, the combination of this methodology with sustainable and innovative engineering practices holds promise for reducing the probability of damage and losses caused by lahars. Thus, the project has made a noteworthy contribution to the research endeavors aimed at enhancing our understanding of lahars. The achievements of this project serve as a testament to the significance of collaborative efforts involving multiple agencies, aimed at generating precise data on hazards and formulating effective disaster mitigation strategies for vulnerable communities.

Project SINAG: Revolutionizing Solar PV Assessment and Installation in the Philippines

Solar PV Resource and Installation Assessment Using Geospatial Technologies (SINAG)

Project Leader: Dr. Jeark Principe
Implementing Agency: University of the Philippines National Engineering Center

The Philippines, like many other countries, is facing the challenge of balancing energy security with environmental sustainability. The Solar PV Resource and Installation Assessment Using Geospatial Technologies, also known as Project SINAG, was started to address this. This two-year research project, led by Dr. Jeark Principe and implemented by the University of the Philippines National Engineering Center (UP-NEC), aims to evaluate the potential of solar PV energy in the country.

Project SINAG is composed of two components: SolarPot and OutSolar. The SolarPot component creates solar resource maps utilizing high temporal remotely sensed data and modern processing techniques, while the OutSolar component creates a forecasting model that can anticipate the output power of solar PV systems in the Philippines. WebGIS serves as a platform for sharing the results, allowing interested parties and key stakeholders to access the results as online maps.

So far, Project SINAG has achieved significant accomplishments, including completing the workflow for solar PV power resource estimation and generating maps showing shortwave radiation hotspots and the location of Solar PV plants. They have also updated the Overall SARIMAX forecasting model, which included data gaps filling and selection criteria for the best model. The WebGIS has been developed, and the project can be accessed via ***sinag.nec.up.edu.ph.***

The project team visiting a small scale solar PV installation in ISAT U Lapaz Campus

The results of this study can contribute to the long-term aim of Department of Energy's Renewable Energy Management Bureau (DOE-REMB) to triple the nation's renewable energy capacity by 2030. By providing a reliable map of the nation's solar PV resource availability, Project SINAG can help guide the investment decisions of private individuals and companies on whether to invest in solar PV installations like solar rooftops.

Project SINAG is a breakthrough in renewable energy development in the country as it showcases the importance of utilizing geospatial technologies in assessing solar PV energy potential. With the ongoing development of this project, the future looks bright for the Philippines in terms of sustainable energy.

Harnessing the Power of Machine Learning for Reliable and Cost-Effective Solar Home Energy Storage System

Integration of Machine Learning Inference on Home Energy Storage System (HESS) to Deliver Long-term Optimized Self-Consumption with Low Probability of Power Loss

Program Title: Accelerated R&D Program for Capacity Building of Research and Development Institution and Industrial Competitiveness: Collaborative Research and Development to Leverage Philippine Economy (CRADLE)
Project Leader: Engr. Adel Socorro Parungao
Implementing Agency: Holy Angel University

The world is moving towards a sustainable future, and one of the key components of this transition is the adoption of renewable energy sources such as solar energy. However, despite the potential benefits, residential solar PV energy systems still face numerous challenges, including low bankability, weak purchasing power, and lacking regulatory and financial support. In this context, Techno Philippines Innovation Corporation, Edge-Systems Engineering Services, and Holy Angel University collaborated to develop a bankable Home Energy Storage System (HESS) that integrates machine learning inference for long-term optimized self-consumption.

The HESS uses a clever Energy Management System (EMS) with machine learning inference to achieve cost-effectiveness, profitability, and lower levelized cost of electricity (LCOE) for grid-independence and market adoption. The process involves probabilistic estimation of solar irradiation values and dynamic consumption behavior, which machine learning explores to make cost-saving inferences. A Data Mining web server is included for automated data collection, tracking, and monitoring of energy produced by the deployed units. By embedding machine learning capabilities in HESS, it can achieve these goals at a fraction of the product cost.

Machine learning algorithms play a key role in realizing the objectives of the project. With machine learning inference, the system was able to provide a probabilistic approach to managing and optimizing energy consumption. This simply implies that the machine learning algorithm enables the HESS.

Meanwhile, the Edge Systems Engineering Services played a vital role in the project. As a business focused on designing and installing HESS, they helped in determining the target beneficiaries of the project and conceptualizing it. The company also contributed by identifying key points to improve the conventional HESS, specifically in optimizing energy consumption and maximizing energy exported from solar panels.

By integrating machine learning, Edge Systems Engineering Services reduced the possibility of power loss, thus making the system more efficient. They also opened an avenue for users to be more involved in their energy consumption, enabling them to monitor and control their energy use. Overall, their contribution played a significant role in the successful realization of the project.

IP beneficiaries of HESS unit in Camias, Porac, Pampanga

On the other hand, the project has made significant progress in developing the techno-economic model of HESS, building testable prototypes, conducting testing and design iterations, and developed mathematical model and probability estimation for loss of power through machine learning algorithm.

Towards the future, the project's development of a bankable and cost-effective HESS with machine learning inference capability can contribute significantly to the country's energy security and sustainability goals. It can promote the adoption of renewable energy sources, reduce dependence on fossil fuels, and create new job opportunities in the renewable energy and artificial intelligence sectors.

Bayan Ko-Ops: An Innovative Solution to Address Retail Store Stock Shortages

Bayan Ko-Ops

Project leader: Dr. Eugene Rex Jalao
Implementing Agency: University of the Philippines Diliman

The COVID-19 pandemic has caused panic buying and stock shortages in many retail stores, leaving consumers frustrated and without access to essential goods. To address this issue, the Bayan Ko-Ops project was developed as a collaborative effort between the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) and Dr. Eugene Rex Jalao of the University of the Philippines Diliman.

The Bayan Ko-Ops project aims to develop a unified system that integrates available inventory data from all participating retail service providers. This system will provide pertinent government agencies with real-time information on the on-shelf and stock items currently distributed in the market. The online, integrated digital inventory will provide a complementary solution to the identified problem of stock shortages.

This R&D initiative has achieved a significant milestone in providing a complementary solution to the identified problem of low stocks in retail stores. The online integrated digital inventory provides real-time information on the availability of products in various retail stores, allowing consumers to make informed decisions when making purchases. This has helped to mitigate the effects of panic buying and has also allowed retailers to better manage their stock levels.

Moreover, the crowdsourcing effort has helped gather data from various physical stores, providing a more comprehensive inventory database. This has contributed to a more accurate and up-to-date picture of the market situation, which is essential for government agencies to make informed decisions and adjust regulatory measures.

The project has contributed to making certain that the public has easy access to necessary commodities and supplies by addressing the issue of low stocks and unmet demand in retail stores. This has helped to alleviate the burden on consumers, especially those who are most vulnerable.

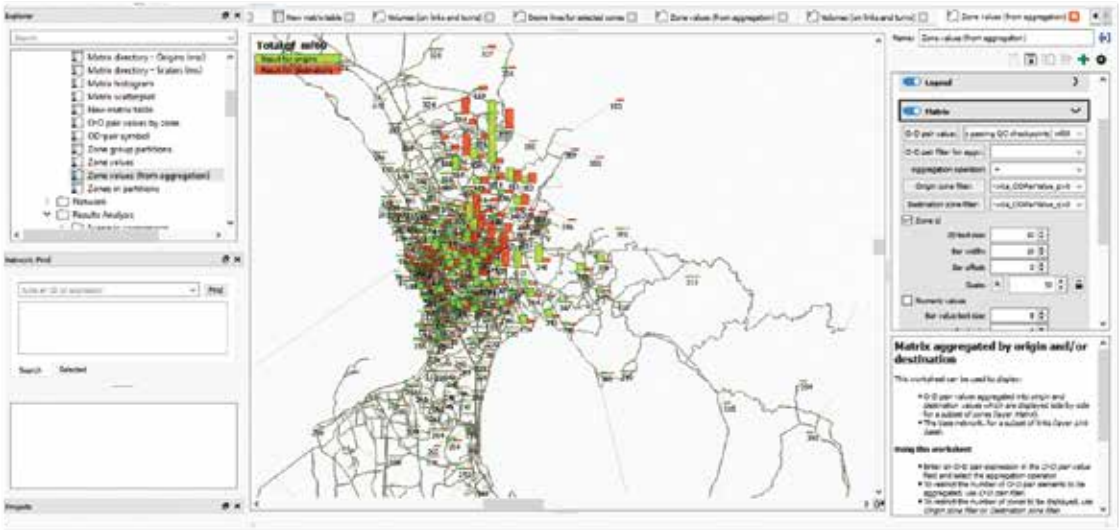
Furthermore, the project has provided valuable data to government agencies, which can help them make informed decisions and adjust regulatory measures. This can lead to more effective policies and better outcomes for the Philippines.

The project's success is a testament to the power of collaboration between government agencies, academia, and the public in addressing the nation's most pressing challenges.

Although, this project was initiated under the Covid situation, the online integrated goods inventory and price commodity information system can be an excellent decision support system for isolated island communities with commercial goods inventory and price manipulation concerns.

Enhancing Pandemic Response through Checkpoint Analysis and Social Distancing Detection in Metro Manila

Optimal Locations and Allocation of Personnel (OLAP) at Checkpoints during the Coronavirus Lockdown in Metro Manila and other Regions



Project Leader: Dr. Alexis M. Fillone
Implementing Agency: De La Salle University

The coronavirus pandemic has affected the daily lives of people in the Philippines, especially in Metro Manila, the country's most populous region. With the implementation of lockdowns and community quarantines to curb the spread of the virus, travel restrictions and reduced mobility have been observed.

To mitigate the negative impacts of the pandemic, Dr. Alexis M. Fillone of the De La Salle University conducted a comprehensive study to provide research support and guidance to the government in terms of analyzing the checkpoints, travel behavior, and public transport systems. The project also included the development of software for social distancing detection which can aid in following health protocols for public transportation and open spaces.

The study has made significant progress towards its objectives, with the classification of checkpoints based on the volume of vehicles using the road at peak and off-peak hours. This was done to provide an estimate of the proportionate number of personnel that needed to be stationed at the checkpoints. The team also documented the analysis and results of determining the extent each checkpoint serves areas and important facilities. The project has characterized existing checkpoints and determined vehicle behavior.

Every drop counts

CRADLE 2020: IoT (Internet of Tubig): Development of smart water meter wireless network

Project leader: Dr. Jhoanna Rhodette Pedrasa
Implementing Agency: UP Diliman - Electrical and Electronics Engineering Institute
Funding/Cooperating Agency: Department of Science and Technology through the Grants-in-Aid program

Water is one of the resources often ignored when wasted. People used to think that potable water running through their faucets is infinite when in fact, it is not. With the recent water crises in Metro Manila and lack of access to clean water in rural areas in the country, it is high time to monitor and be conscious of one's consumption.

The Internet of Tubig is a reliable and cost-effective smart water meter wireless network that enables the exchange of information and control signals between water meters/valves and a central control unit through the Internet of Things – enabling an effective management of water in buildings.

The project was implemented under the private-academe scheme between Jhaymarts Industries Incorporated, a water systems supplier company, and UP Diliman Electrical and Electronics Engineering Institute under the DOST Collaborative Research and Development to Leverage Philippine Economy (CRADLE) of the Science for Change Program.

Project team, predeploying the smart water meter prototype & testing its efficiency at Davao City

To enable and promote efficient management and utilization of water resources, the project team was able to design and implement prototypes of a smart water meter and a cloud gateway infrastructure for the wireless smart water meter.

This is initially targeted for the use of the residents and administrators of condominiums that are part of the partner company's client base. The gateway was deployed in two sites – one in Sonsoles Suites and another in GPC Building in Talamo, Davao City. The IoTubig team conducted an orientation to the partner industry as well as provided user manuals for both tenants and admins for their reference.

And as the technology transfer continues to commence, Jhaymart Industries Inc. would soon initiate the commercialization of the product.

Through this advanced metering infrastructure technology, users, administrators, and consumers would be able to manage water meters and monitor consumption remotely, detect the leaks, and collect the necessary data in real-time.

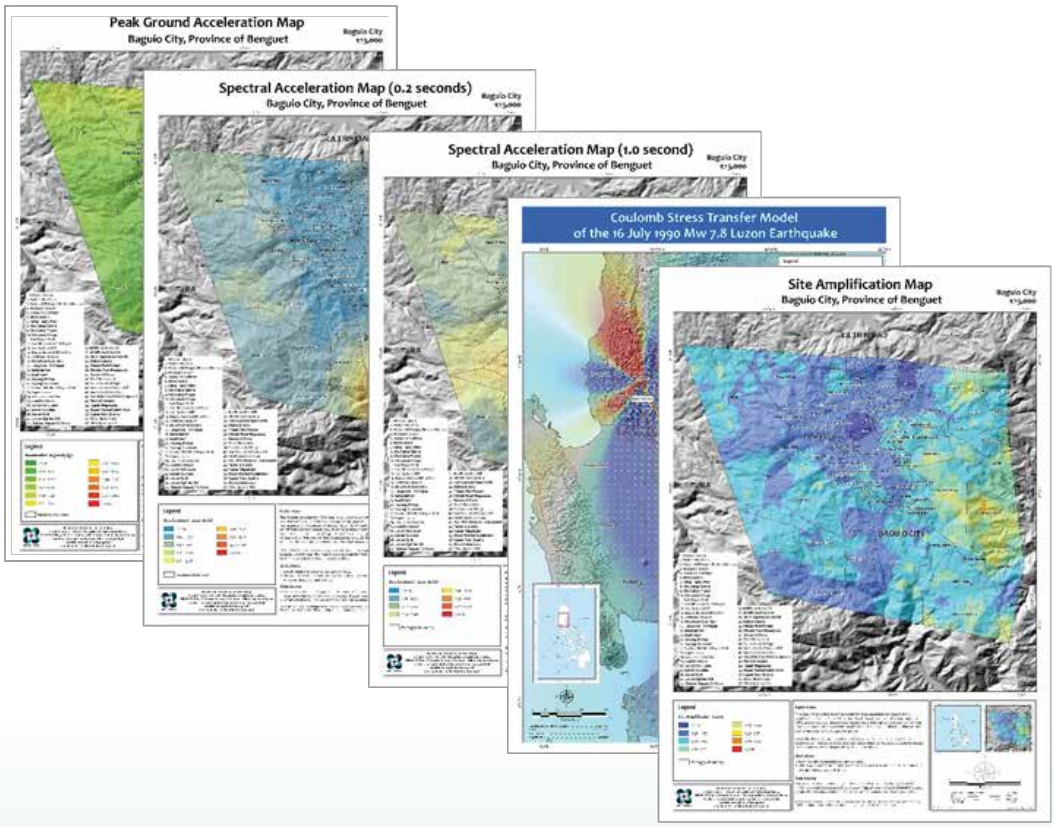
Final assembly up to the installation of the smart water meter at Sonsoles Suites

Passive Seismic Stratigraphy of Irregular Topography (PSSIT) Applicable to Mountainous Areas of Baguio City

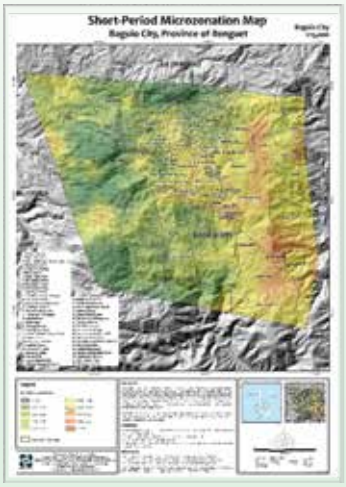
Project Leader: Dr. Rhommel N. Grutas
Implementing Agency: PHIVOLCS-DOST
Collaborating Agency: DPWH BRS & BOD, DOST-CAR, LGU Bagio City, LGU La Trinidad

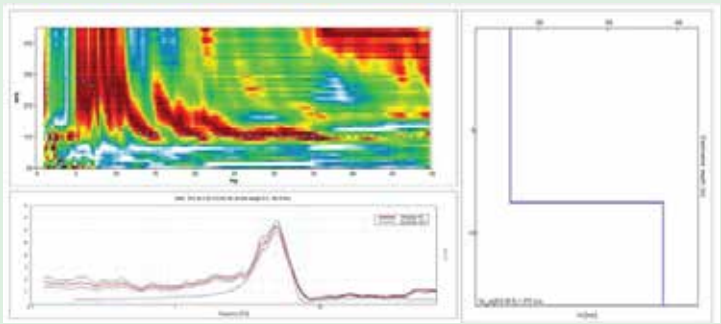
Baguio City, known as the Summer Capital of the Philippines, is situated in an area prone to earthquake hazards, making it important to establish a reliable seismic micro zoning map for the city ensuring earthquake resiliency of structures. The Passive Seismic Stratigraphy of Irregular Topography (PSSIT) project led by Dr. Rhommel N. Grutas and implemented by PHIVOLCS-DOST aims to address this issue.

The project's objective is to provide a seismic micro zoning map specific for long-period and short-period waves that will improve seismic design of future structures and appropriate retrofitting for existing mid-rise to high-rise buildings in Baguio City, and extended in regional government center & buildings in La Trinidad. This map will help local administrators in land-use planning and implementation of seismic design of structures.



The project's actual accomplishments are significant, including the completion of training manuals on survey procedures and data processing and analysis. The team surveyed seven hundred ninety-two sites across Baguio City and in La Trinidad using the Tromino tromograph, a geophysical surveying equipment, resulting in the generation of the **Baguio City and La Trinidad Ground Shaking Hazard Maps (BCGSHM)** that provides science-based information in designing and constructing structures that can withstand seismic activities in the city:





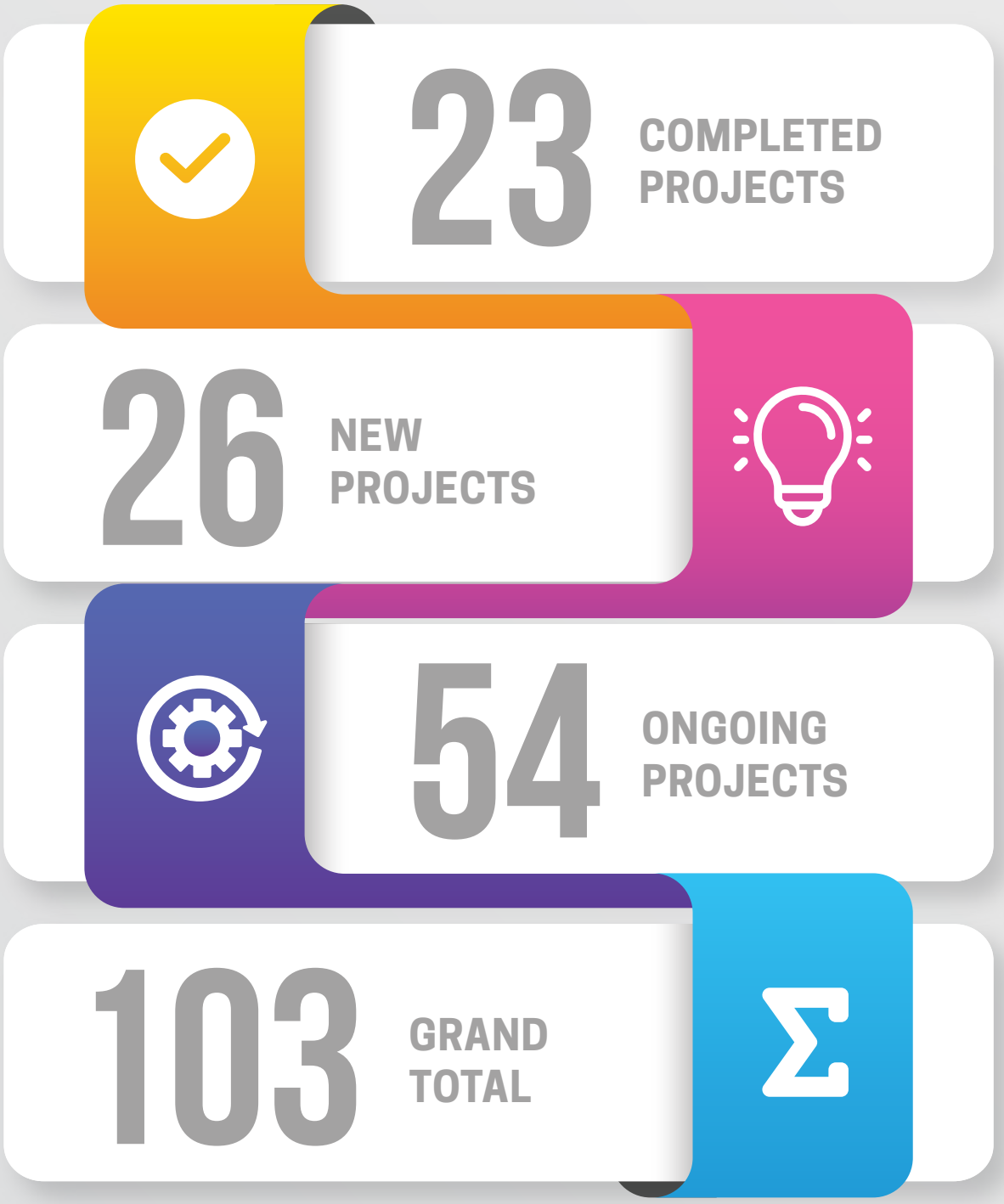
- Short-Period Microzonation Map
- VS30 Model Map
- Peak Ground Acceleration Map
- Spectral Acceleration Map (0.2s)
- Spectral Acceleration Map (1s)
- Site Amplification Map
- Stress Transfer Model Map with Horizontal Displacement

DOST-PHIVOLCS also conducted two-separate training workshop last September and November 2022 at Fortune Hotel and Venus Parkview Hotel respectively, with launching and the turnover of the generated maps, series of lectures with discussion on how to utilize these generated maps in the updating of comprehensive land use planning, contingency plan, disaster risk plan, and its importance, and how engineers and contractors will use the data for seismic design analysis were part of the workshop. The said workshop was attended by officials from LGU Baguio City & La Trinidad, regional government offices, constituent barangays, and engineers, architects and environmental planners.

These accomplishments will provide researchers, civil/structural engineers, earthquake disaster planners, and local administrators of Baguio City and La Trinidad an essential tool for enhancing seismic risk assessment to prevent further loss of life and damage to property.

Energy and Utilities Systems Technology Development Division

in 2022 by the Numbers



Program Title	Project Title	Agency Name	Project Leader
	CRADLE 2020: IoT (Internet of Tubig) : Development of smart water meter wireless network	University of the Philippines Diliman – Electrical and Electronics Engineering Institute	Dr. Jhoanna Rhodette Pedrasa
	CRADLE: Enhanced Forecasting Model for Complex Water Supply Systems of the East Service Area of Metro Manila	Asian Institute of Management	Christopher Monterola
	Deployment of Energy Monitoring Application and Network at DOST (DEMAND) as Demonstration Sites	DOST-Industrial Technology Development Institute	Apollo Victor Bawagan
	DRIVER.PH Drivers Roadworthiness Improvement Verification Education & Readiness for the Philippine logistics industry	Technological Institute of the Philippines Quezon City	Felizardo Reyes
	Investigation and numerical modelling of Philippine tsunamis based on historical, geomorphological and geological evidence of past earthquakes		Noelynna Ramos
	Liquefaction Potential for Resilient Schools in GMMA: A Liquefaction Probabilistic Model Using Non-Invasive Geophysical Techniques and Limited Probe Hole	PHIVOLCS	Arturo Daag
	Optimization of the Operational Capabilities of Hydromet Sensors in Line with International Standards (WMO Standards) for Effective Weather, Flood Warning (CBFEWS) and Application to Research	Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)	Roy Badilla
	Recycling and Recyclability Index of Public Utility Vehicles (PUVs)	University of Asia and the Pacific	Noemi Torre
	Unmanned Aerial System (UAS) with Passively Rotating Spherical Shell for Close-proximity Inspection of Infrastructure	Mindanao State University – Iligan Institute of Technology	Carl John Salaan
	Weather and Climate Science for Service Partnership for South East Asia: Building Safer Community to Weather and Climate Variability through Science and Innovation (WCSSP)	Department of Science and Technology – Philippine Atmospheric, Geophysical and Astronomical Services Administration	Esperanza Cayanan
BATTERY: Broadening Accumulator Tenable Time Extends Rechargeability Years	Sonic Oscillations Unleashing Nonconductive Deposits on Electrode Reactors SOUNDER: Sonic Oscillations Unleashing Nonconductive Deposits on Electrode Reactors (SOUNDER)	Other Agency	Dandreb Earl Juanico
BATTERY: Broadening Accumulator Tenable Time Extends Rechargeability Years	TUNER: Transmissometry Using Nonlinear Electrode Response	Other Agency	Dandreb Earl Juanico
Establishment of the ELECTROMOBILITY Research and Development Center	Viability Study of Conversion of Conventional Tricycle to e-Trike	Cagayan State University – Tuguegarao (Carig)	Orpilla Michael
RC-UK PROGRAM	Philippine Groundwater Outlook (PhiGO)	Ateneo de Manila Universdity (ADMU)	Maria Aileen Leah Guzman
RC-UK PROGRAM	Philippines – Quantitative Lahar Impact and Loss Assessment Under Changing Land Use and Climate Scenarios		Perla Delos Reyes
RC-UK PROGRAM	SCARP: Simulating Cascading Rainfall-triggered Landslides Hazards in the Philippines		Fibor Tan
	Activity-Based Modeling for Transport Last Mile Mobility and Decision Support System for COVID-19 Pandemic (ACTS)	University of the Philippines – Los Baños, Department of Civil Engineering	Ma. Bernadeth Lim
	Enhancement of Transportation Management Software (E-TraMS)	University of the Philippines Diliman	Hilario Sean Palmiano
	Integration of Machine Learning Inference on Home Energy Storage System (HESS) to deliver long-term optimized self-consumption with low probability of power loss	Other Agency	Adel Parungao
	Maritime Energy Demand Information and Analysis Software (MEDIAnS)	University of the Philippines Diliman – Department of Computer Science	John Justine Villar
	Passive Seismic Stratigraphy of Irregular Topography (PSSIT) Applicable to Mountainous Areas of Baguio City	DOST-Philippine Institute of Volcanology and Seismology	Rhommel Grutas
	Philippine Comprehensive Nationwide Construction Resources Technical Evaluation (Philippine CoNCReTE)	Philippine Nuclear Research Institute (PNRI)	CARLO ARCILLA
	Sustainable Technology – Assisted Route Planning for Region VI (STARPLAN VI)	De La Salle University – Manila	Alexis Fillone

Philippine Sky Artificial Intelligence Program (SkAI-Pinas)

Project 1 &2: Automated Labeling Machine – Large Scale Initiative (ALaM-LSI)
Project Leaders: Dr. Jose Ildefonso U. Rubrico and Dr. Franz A. De Leon

One way to democratize the adoption of AI in the country is through the utilization of government-owned computing facilities, such as the DOST-ASTI Computing and Archiving Research Environment (COARE), in providing ready-to-use mathematical models that can easily be integrated into software applications as remotely accessed services over the Internet.

This will introduce reusability of models and economies of scale that will benefit the software development community in the Philippines in the same way that common software libraries have benefited the same for a long time now. AI will truly reach its potential in the Philippines once it has faded into the background as a common software engineering component that can easily be used even by personnel with no background in machine learning or deep learning.

Under the Philippine Sky Artificial Intelligence Program (SkAI-Pinas), the project titled Automated Labeling Machine-Large-Scale Initiative (ALaM-LSI) is an AI-based framework structured around the vision of an autonomous labeling machine and would be the first big step ("Stage 1") towards that long-term goal. It comprises an AI knowledge base (experts, protocols) and an AI repository (models, labeled images) whose function and organization are rooted in expediting the workflows of remote sensing applications, including addressing sustainability gaps in past and present remote sensing projects as well as facilitating flexibility and ease of incorporating AI or AI-derived components in existing and future applications.

ALaM-LSI builds upon the knowledge, expertise, and grassroots experience gained, as well as lessons learned from the main proponent's previous Balik-Scientist research projects, namely, the ASTI Labeling Machine Phases 1 and 2, which were proofs-of-concept in applying deep learning methods for classifying and detecting features of interest in satellite imagery. The task of training models for feature labeling is significantly scaled up in ALaM-LSI compared to the earlier prototypes in terms of the sheer volume of data to be used and the amount of time expended in training the deep learning models.

Furthermore, aside from satellite imagery, processing of LiDAR data is also included, which is yet another difficult but exciting challenge in this research since, unlike optical imagery, the application of deep learning to complex data derived from return-of-flight inputs like LiDAR has not been addressed as much and is still relatively open to the discovery of novel approaches. Note that this does not mean that there is nothing new to discover or develop regarding the deep learning models for satellite imagery. For one, existing architectures will likely have to be tweaked and new ones explored so that their performance is optimized for remote sensing. Cutting-edge unsupervised learning methodologies aside from the usual ones in supervised learning could also be explored in order to try to speed up training with possibly fewer data points.

ALaM-LSI maximizes the utilization of the country's remote sensing data, taking advantage of the huge volume of "archival" data already available in both raw and processed form from past projects to serve as base sets of training data that could be augmented further to train more accurate deep learning models.

The first project was able to establish the first AI-enhanced force multiplier framework for remote sensing, leveraging the country's big data. It also set the direction towards a viable sustainability strategy for past and present remote sensing projects and initiatives and was able to facilitate large-scale data processing in the country based on AI or AI-delivered components, starting with remote sensing.

Specifically, the project was able to achieve the ALam-LSI Knowledge Base, where a core team was created for the AI and deep learning experts and practitioners who serve as the primary technical and mentoring staff of the research initiative. They were also able to establish a repository where a base library of neutral network inference models for remote sensing was developed, as well as a library of feature-labeled images for remote sending. There are also ALam-LSI interactions where an interface is established with past and present remote sensing projects, initiatives, and application developers to ensure that the proposed research follows a "needs-driven" developmental approach.

The second project, the ASTI-ALaM project, is the result of collaboration between DOST-ASTI and the Balik Scientist Program awardee, Dr. Jose Ildefonso U. Rubrico. The collaborative effort ran for two phases, which resulted in (1) the capacity-building of DOST-ASTI researchers and engineers, particularly in AI-based solution development using DOST-ASTI COARE, and (2) the development of deep learning models using convolutional neural network (CNN) architectures such as VGG16, ResNet, and InceptionV3.

The objectives of the collaboration include (1) the segmentation of satellite-captured RGB images into several classifications of natural and man-made features (agricultural land, water, buildings, etc.) and (2) the estimation of the structural strength of buildings in satellite-captured images. Through the currently proposed project, an optimized workflow for developing machine learning and artificial neural network-based models for different application domains will be established. The optimized model development workflow will be supported by dedicated AI technology development hardware to be hosted and managed by DOST-ASTI and will be best utilized by different stakeholders, especially by major collaborative partners like the University of the Philippines-Mindanao's ALaM-Large Scale Initiative (ALaM-LSI) and the DATOS Project.

Onto a Quantum-Enabled Economy: The Quantum Innovation Laboratory in the Philippines

Establishment of Quantum Innovation Laboratory: Optimizing a Decision Diagram-based Free and Open-Source Quantum Circuit Simulator for Benchmarking in an HPC Environment using Entanglement, Random Circuits, and Quantum Algorithms Benchmark Datasets [QCS Project]

Project Leader: Jeffrey A. Aborot
Implementing Agency: Department of Science and Technology Advanced Science and Technology Institute (DOST-ASTI)
Funding/Cooperating Agency: Department of Science and Technology Philippine Council for Industry, Energy and Emerging Technology Research and Development

In the age of digital transformation, technology has become an integral part of every economy. As industries adapt to emerging technologies, quantum computing has emerged as a game-changer for businesses and governments around the world. However, access to this technology remains limited, especially for developing countries like the Philippines.

To address this gap in computing and knowledge resources, DOST-ASTI's Jeffrey A. Aborot led a team in the establishment of the Quantum Innovation Laboratory in the Philippines. The laboratory conducts simulations on quantum physical systems, providing a platform for researchers and students to explore and experiment with quantum computing technologies.

Project team of the Quantum Innovation Laboratory project

The project aims to inspire more Filipino graduate students and research practitioners from different domains to take an interest in quantum computing research or apply the results to their own fields of study.

The laboratory also provides a unique opportunity for students and researchers to gain hands-on experience in quantum computing technologies, thereby increasing their interest and potential contribution to the field. The laboratory provides researchers with access to locally hosted classical quantum circuit simulators, which will benefit them in stimulating quantum processes and validating quantum algorithms in their respective domains of research.

The Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) recognizes the potential of quantum computing in driving economic growth. By 2030, the council aims to establish a quantum-enabled economy, developing its own quantum computer, network, simulator, and metrology. The council believes that the Quantum Innovation Laboratory will play a crucial role in achieving this goal.

Quantum computing is a complex and rapidly evolving field that can revolutionize industries worldwide. As countries invest in quantum technologies, they are setting the foundation for future economic growth and development. The Quantum Innovation Laboratory in the Philippines is a step towards building a quantum-enabled economy and ensuring that Filipinos have access to cutting-edge technologies that will shape the future of industries and economies worldwide.

COARE Facility at DOST-ASTI

Inside of the COARE Facility

Additive Manufacturing Program

MATDEV: Developing Local Materials for Additive Manufacturing

Project 1: Development of Multiple Materials Platform for Additive Manufacturing (MATDEV)

Program Title: Advanced Additive Manufacturing R&D Program (AMCen)
Project Leader: Dr. Marianito Margarito
Implementing Agency: DOST-Industrial Technology Development Institute (ITDI)

Additive manufacturing has revolutionized the manufacturing industry with its ability to produce complex shapes and parts quickly and efficiently. However, the cost of raw materials for additive manufacturing can be a significant challenge.

The Development of Multiple Materials Platform for Additive Manufacturing (MATDEV) project aims to address this challenge by developing various materials from local sources that are optimized for single and multi-material additive manufacturing.

MATDEV is one of the component projects of the program on the establishment of the Advanced Additive Manufacturing R&D Program (AMCen). The AMCen program has established facilities at MIRDC and ITDI for design, materials development, and testing for additive manufacturing prototyping. Through one of its facilities in ITDI, the project has enhanced its capability on design, materials development from local sources, and testing for additive manufacturing application in accordance with standards.

The project has also qualified, characterized, and developed local materials for single and multiple materials additive manufacturing. The team has optimized the performance and material utilization in additive manufacturing and developed, characterized, tested, and prototyped using the materials developed for additive manufacturing.

In addition, the project team has participated in the International Technical Committee on Additive Manufacturing (ISO/TC261) and has received training on operation, maintenance, and troubleshooting of equipment and various aspects of additive manufacturing.

The manager's training on additive manufacturing at the University of Tennessee, Knoxville has also been completed. Locally, the project team is also part of the Bureau of Philippine Standards Technical Committee on Additive Manufacturing (TC 88).

The accomplishments of MATDEV will provide more options for materials for various stakeholders, further reduce the cost of raw materials for additive manufacturing and contribute to nation-building. Moreover, the project's development and adoption of applicable standards, particularly for critical applications of the technology, will ensure the quality and safety of the products produced using additive manufacturing in the country.

TECHNOLOGIES

FDM (Open Chamber/
Filament Material)

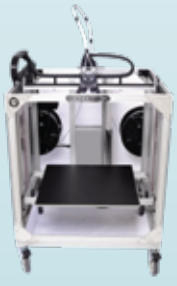
3D Printer for Polymer
Fiber Composites

Fused Deposition Modeling
(FDM) Desktop 3D Printer

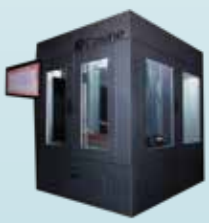
Selective Laser Sintering
(SLS) 3D Printer

SLA Printer (Multi Material)

Tower Type FDM Printer



FDM Printer Open Chamber
Pellet Material

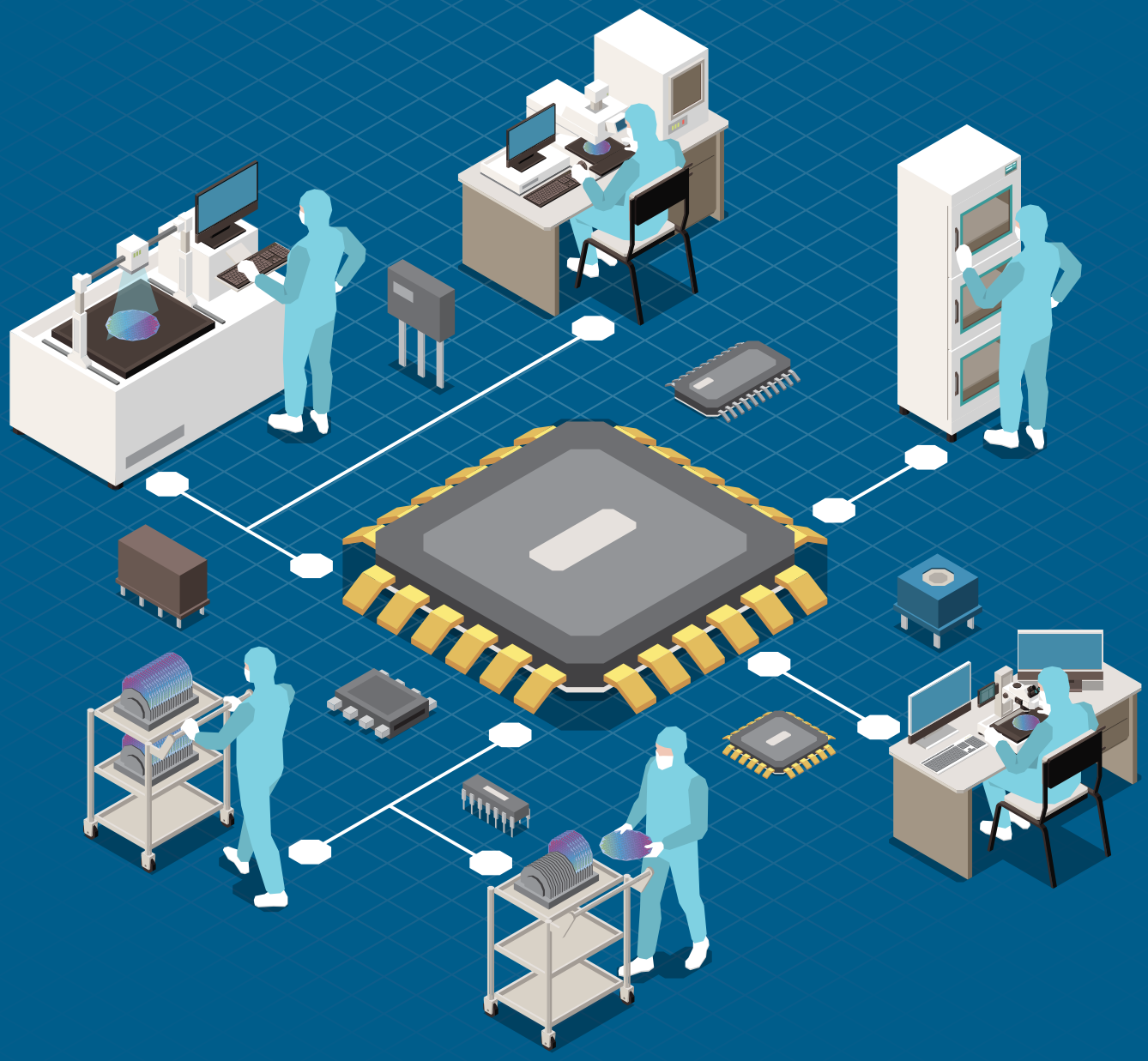


FDM Printer Heated Chamber
Pellet Material

Tabletop Blue Light
3D Scanner

RAPPID-ADMATEC: Advancing Additive Manufacturing for National Development

Project 2: Research on Advanced Prototyping for Product Innovation and Development using Additive Manufacturing Technologies (RAPPID-ADMATEC)



Program Title: Advanced Additive Manufacturing R&D Program (AMCen)
Project Leader: Engr. Fred P. Liza
Implementing agency: DOST-Metals Industry Research and Development Center (MIRDC)

In the world of product innovation and development, the speed and accuracy of prototyping can mean the difference between success and failure. The Research on Advanced Prototyping for Product Innovation and Development using Additive Manufacturing Technologies (RAPPID-ADMATEC) project, spearheaded by the Engr. Fred P. Liza of DOST-Metals Industry Research and Development Center (MIRDC), aims to establish a technological hub for additive manufacturing in the Philippines.

The project has accomplished several significant milestones, including the construction and renovation of the Additive Manufacturing Center (AMCen) and the development of a training program for additive manufacturing design and manufacturing.

RAPPID-ADMATEC has also acquired the following additive manufacturing technologies, among others, enabling product innovation, 3D printing, and rapid prototyping:

- Tabletop Blue Light 3D Scanner
- FDM Printer Open Chamber Pellet Material
- 3D Printer for Polymer Fiber Composites
- FDM (Open Chamber/Filament Material)
- Tower Type FDM Printer
- Fused Deposition Modeling (FDM) Desktop 3D Printer
- SLA Printer (Multi Material)
- FDM Printer Heated Chamber Pellet Material
- Selective Laser Sintering (SLS) 3D Printer

Moreover, this initiative has successfully supported seven R&D-published two R&D studies on additive manufacturing participated in the initiatives during the pandemic which included production of face shield holders and components.

Through its accomplishments, the RAPPID-ADMATEC project has addressed various issues and objectives, including the need for a technological hub for additive manufacturing in the country, the enhancement of product innovation and development, and the development of a training program for additive manufacturing design and manufacturing. It has also forged partnerships with academe and industries for the operation and sustainability of the AMCen facility.

Truly, the RAPPID-ADMATEC project has made impressive strides towards advancing additive manufacturing in the Philippines. Its accomplishments in R&D, training, and partnerships are key to its contribution to national development, helping to sustain the country's global competitiveness in product innovation and development.

Tech PartnerShape
Equipment

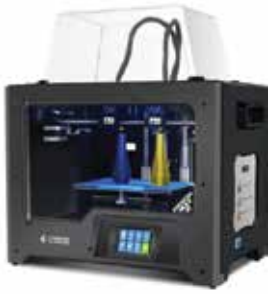
AMCen Tech PartnerShape
Advancing Manufacturing Technology

PUZZLEBOX 3D
3D PRINTING SOLUTIONS

Ultimaker S5

Formlabs Form 3

Intamsys FunMat HT Enhanced



Ultimaker S5

Desktop Metal Studio System 2

Phrozen Sonic XL 4k 2022

Phrozen Sonic Mini 8k

EnvisionTEC D4K

OmniFab
3D Technologies

Markforged Metal X

Markforged Mark Two

ZMorph Fab

MODIX 120X

Tech PartnerShape
Equipment

MAKERLAB ELECTRONICS

Ender 3 S1

CR 10 Smart

Ender 7

Sermoon D1

CR 6 Max

Ender 6

Ender 2 Pro

Sermoon V1 Pro

NORDE

Raise3D Pro 2 Plus

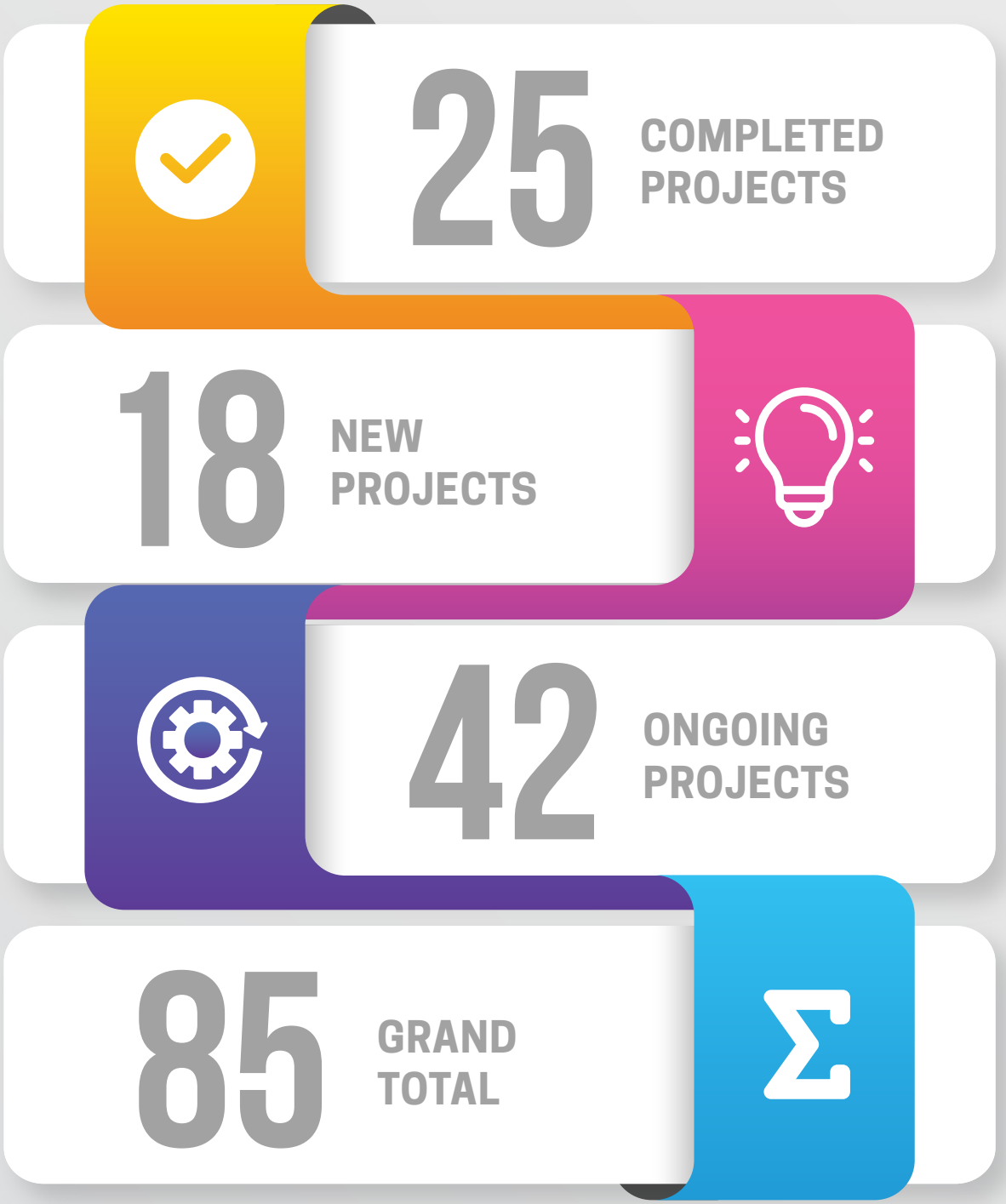
Lulzbot Taz 6

ULS VLS 3.50

Stratasys
Objet 500 Connex 3

Emerging Technology Development Division

in 2022 by the Numbers



Program Title	Project Title	Agency Name	Project Leader
	A Game-based Mobile Learning Platform for Social Studies	Mariano Marcos State University - Main	Saturnina Nisperos
	ADMATEL Expansion Towards Long Term Competitiveness and Sustainability – Phase 2 : ADMATEL Geared for PHL Industry 4.0 (ADEX2)	DOST-Industrial Technology Development Institute	Araceli Monsada
	BRAVE: Bomb Removal Automated Vehicle	Philippine Council for Industry, Energy and Emerging Technology Research and Development	Elmer Dadios
	CRADLE: Development of a Design Guideline Using Finite Element Analysis for Semiconductor and Electronics Packaging Systems for Automotive Applications (FEA2)	De La Salle University - Laguna	Aristotle Ubando
	Design of Highly Active Kapok Fiber Electrodes for Energy Applications	University of the Philippines - Diliman, Department of Mining, Metallurgical, and Materials Engineering	Mary Donnabelle Balela
	Development of Plasma Coating Processes for the Furniture Industry	University of the Philippines- Diliman	Magdaleno Vasquez Jr.
	E-ASIA JRP: Fundamental study of the physical properties of metal-oxide single nanowires and nanoparticles for bio-nano-sensing	De La Salle University - Manila	Gil Nonato Santos
	Handum: The Design, Implementation, and Analysis of a Digital/Mobile Game-based Learning Tool for Primary and Secondary Education	Philippine Council for Industry, Energy and Emerging Technology Research and Development	Susan Festin

	Haynayan AR: An Augmented Reality-Based Lesson for the Improvement of Learning Achievement in Cell Biology for the STEM Curriculum	**DOST-Philippine Science High School**	**Joel Bautista**
	Resilient Education Information Infrastructure for the New Normal	DOST-Advanced Science and Technology Institute	Peter Antonio Banzon
	Stunt Science: A Physics Simulator Mobile Game	Western Institute of Technology	Ryan Subong
Space Technology & Applications Mastery, Innovation and Advancement (STAMINA4Space)	Project 1. Optical Payload Technology In-depth Knowledge Acquisition and Localization (OPTIKAL)	University of the Philippines - National Institute of Physics (NIP)	Maricor Soriano
Space Technology & Applications Mastery, Innovation and Advancement (STAMINA4Space)	Project 4: Ground Receiving, Archiving Science Product Development and Distribution (GRASPED) for the STAMINA4Space Program	University of the Philippines (UP)	Alvin Retamar
	CRADLE 2020: baTID: RFID-band for personalized body temperature monitoring	Ateneo de Manila University	Erwin Enriquez
	CRADLE: Smart Parcel Locker	Technological Institute of the Philippines Manila - Arlegui Campus	Jennalyn Mindoro
	CYANanobot: Miniaturized Boat-assisted Data Acquisition for Automated Cyanide Monitoring in Wastewater using Optical Nano-sensor	Caraga State University - Main	Alexander Demetillo
	Development of biodegradable nanofiber filters as an active material for medical-grade facemasks	University of San Carlos - Talamban Campus	Evelyn Taboada
	Development of Framework and Materials for Distance and Remote Learning via Datacasting	De La Salle University - Manila	Raymund Sison

	Development of Multiple Materials Platform for Additive Manufacturing (MATDEV)	**Industrial and Technology Development Institute (ITDI)**	**Blessie Basilia**
	DOST-JSPS: Preparation of Crown Ethers and Alpha-aminophosphonates Decorated Natural Fibers-based Hybrids Metal Ion Adsorbents by Fusing Multicomponent-reaction and Radiation-grafting of Polymers	DOST-Philippine Nuclear Research Institute	Jordan Madrid
	Kapok fibers absorbent with customizable hydrophobicity/hydrophilicity for oily water and wastewater treatment	University of the Philippines - Diliman, Department of Mining, Metallurgical, and Materials Engineering	Mary Donnabelle Balela
	Project 2: Building PHL-50: Localizing the Diwata-1 and Diwata-2 Bus System as the Country's Space Heritage 50kg Microsatellite Bus (PHL-50)	University of the Philippines - Diliman, Electrical and Electronics Engineering Institute	Marc Caesar Talampas
	Research on Advanced Prototyping for Product Innovation and Development using Additive Manufacturing Technologies (RAPPID-ADMATEC)		Fred Liza
	Secured Command and Control Communication Link System (Unclassified Title)	Holy Angel University	Richard Figueroa
	Study on the Suitability of Acrylonitrile Styrene Acrylate (ASA) as Material for a 3D-Printed Statue	Metals Industry Research and Development Center (MIRDC)	Robert Dizon

IM4ManilaBay Program

IM4ManilaBay: Project 1 - IWASTO

(Integrated Waste Analysis, Survey, and Technological Options)

Project leader: Dr. Maria Antonia N. Tanchuling, Ph.D.
Implementing Agency: University of the Philippines Diliman – Institute of Civil Engineering
Funding/Cooperating Agency: Department of Science and Technology

Manila Bay and Laguna Lake are essential bodies of water in providing environmental goods and services to surrounding communities. Strategically situated adjacent to the center of urban activity in Metro Manila, the Bay/Lake system is the focal point of national development efforts for its vast potential for multi-purpose use. Both ecosystems provide an abundance of biological resources and an array of biodiversity, thus, the optimal and sustainable use of the Bay-River-Lake system requires a proper understanding of the physical and environmental processes that govern the system. A combination of field data monitoring, physical laboratory experiments, and mathematical modeling is needed to fully comprehend these processes.

population growth in Metro Manila and its neighboring communities, the degradation of the environmental quality of the Bay-River-Lake system has been a concern. The Bay-River-Lake system has virtually become a sink of urban waste and pollution, putting the various industries present in jeopardy.

Dr. Maria Antonia N. Tanchuling of the University of the Philippines - Institute of Civil Engineering (UP-ICE) led the IWASTO project. IWASTO was able to describe and assess the solid waste management (SWM) activities in several cities that are part of the Manila Bay watershed, and to develop integrated solid waste information and technology management system that considers both the present situation and potential futures.

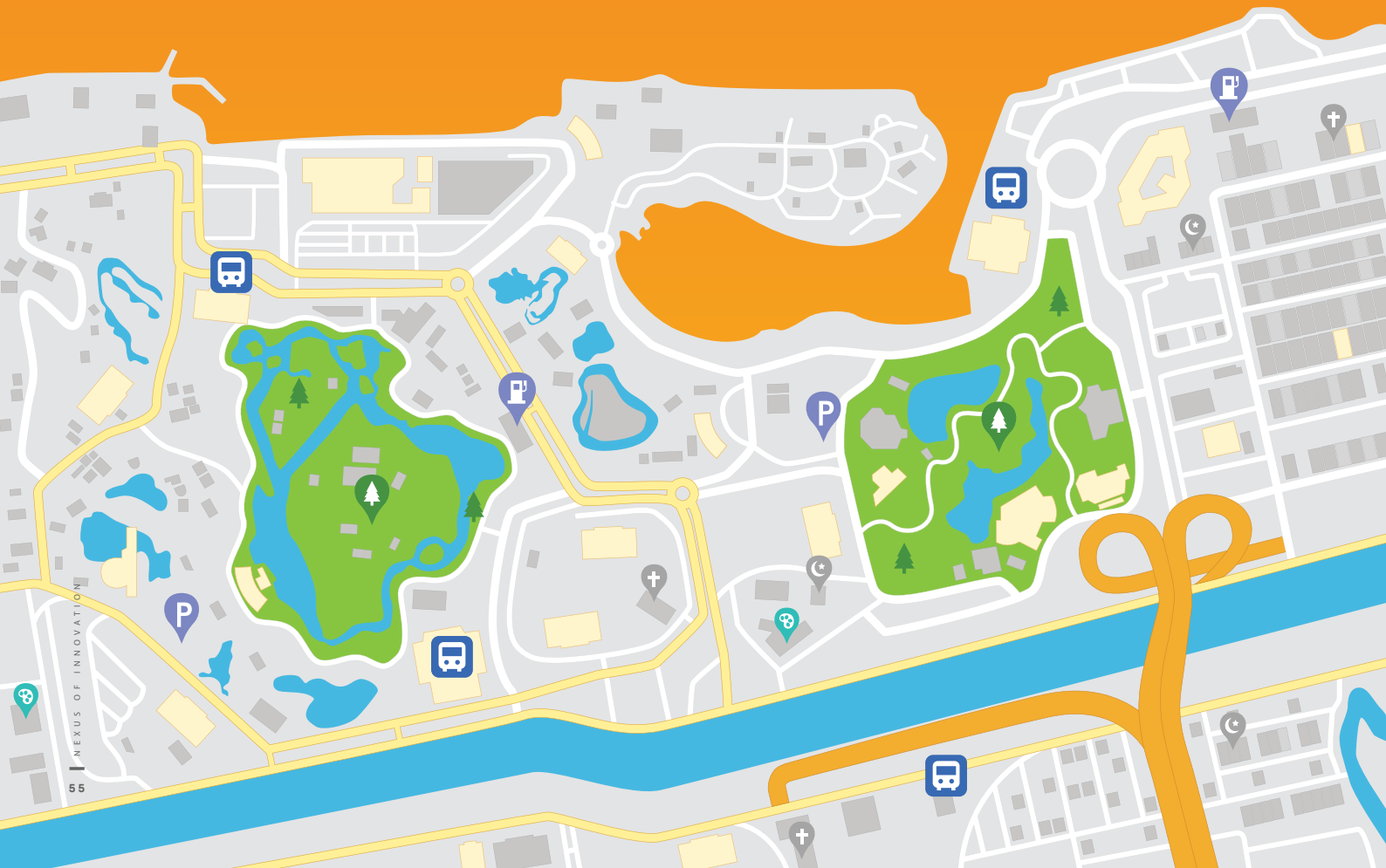
The IWASTO project also systematizes and makes available information on SWM to process biodegradable and plastic wastes, particularly for its target beneficiaries such as Brgy. 412 in Manila, Brgy. San Agustin in Malabon City, Brgy. Tanza 1 in Navotas City, Metro Manila, DOST-NCR, and DILG-NCR. Several training courses were done to capacitate barangay personnel of these beneficiaries with relevant knowledge on SWM.

Project initiatives like IWASTO provide forecasted trends on SWM for the use of the general public. Moreover, the project is necessary to provide data and a scientific foundation for creating integrated coastal management plans, policies, and strategies, as well as for assessing the results and effects of enforced actions and interventions on the bay, which would be of great support for building a nation with environmental consciousness.

IM4ManilaBay: Project 2 - MapABLE

(Development of an Integrated Mapping, Monitoring and Analytical Network System for Manila Bay and Linked Environments)

Project leader: Dr. Ariel C. Blanco
Implementing Agency: UP Training Center for Applied Geodesy and Photogrammetry
Funding/Cooperating Agency: Department of Science and Technology



The Manila Bay region is a primary economic hub in the Philippines, encompassing manufacturing, trade, shipping, fishing, aquaculture, and tourism industries. It is a crucial part of our country's economy and society, yet several major environmental issues have been found in Manila Bay: declining water quality, coastline erosion and siltation, overfishing, habitat degradation, and biodiversity loss. Due to the significant loss of ecosystems and biodiversity, these challenges affect all living species along the bay's demands.

Dr. Ariel C. Blanco from the University of the Philippines - Institute of Civil Engineering (UP-ICE) is the driving force behind MapABLE project, an initiativeintended to create and implement an integrated system for mapping and monitoring the water quality of Manila Bay and linked systems. This includes major tributary rivers using geospatial technologies and citizen science in response to the serious environmental problems that are becoming threats to Manila Bay.

MapABLE was able to produce oil spill detection chlorophyll-a, turbidity/TSM, and mangrove maps which are available via the web portal. The project also developed a water quality trend analysis tool for environmental monitoring agencies. Social media was utilized as a venue for the produced IEC materials.

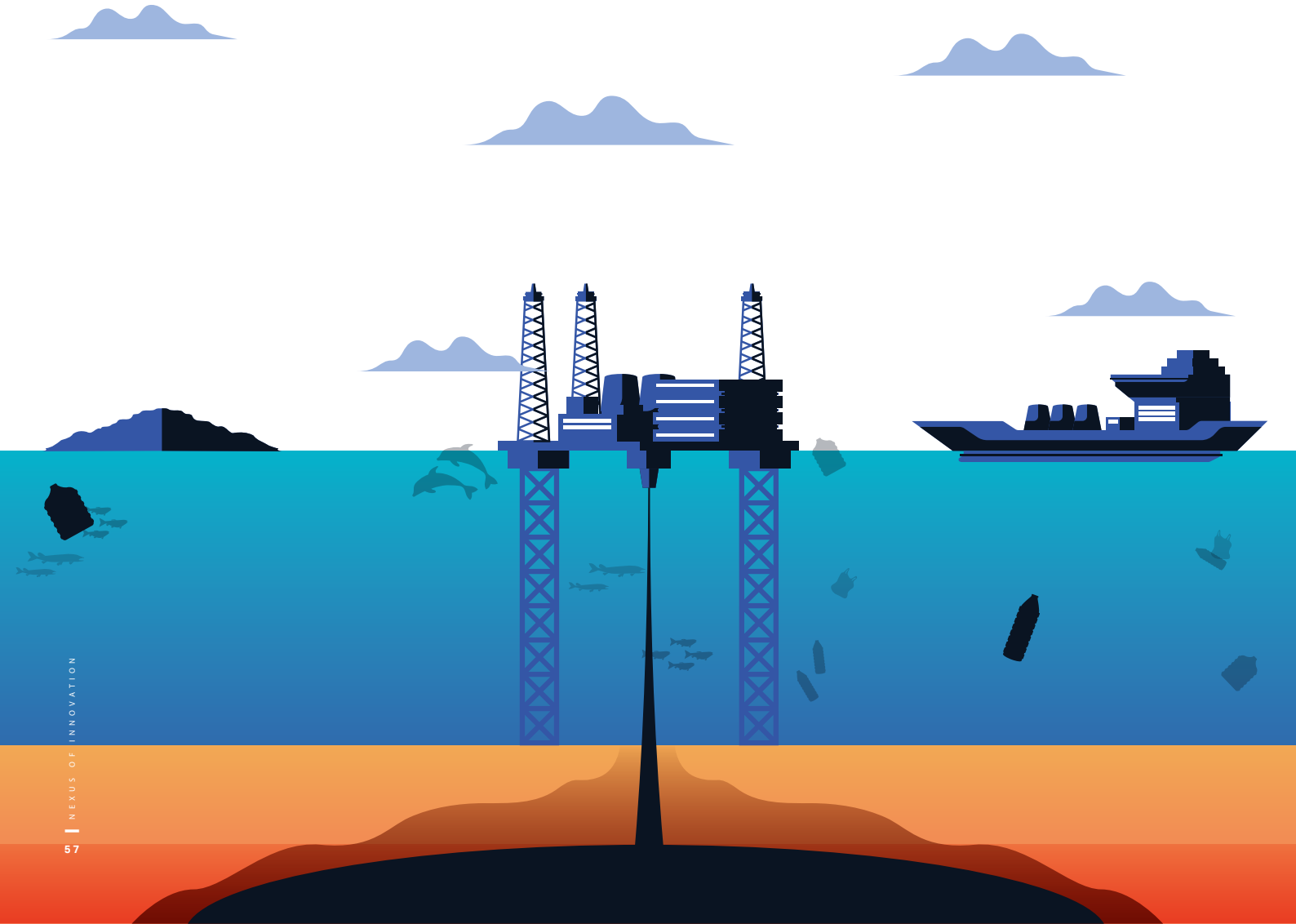
The project collaborates with various agencies/institutions and LGUs on the coastal towns of Bataan, Pampanga, Bulacan, Metro Manila, and Cavite which comprises the 17 principal river systems of Manila Bay, in addition to capacity building activities with the stakeholders and 12 partner HEIs.

Apart from these activities and interventions, the project also aims to encourage and prompt policymakers to develop local and national policies and implement sustainable and environmentally friendly initiatives to aid in the management and rehabilitation of Manila Bay and strengthen participation o local communities on monitoring the Manila Bay environment.

IM4ManilaBay:
Project 3 - CharTed DreaM

(Management of Dredged Material: Characterization, Treatment and Disposal)

Project leader: Dr. Reynaldo L. Esguerra
Implementing Agency: DOST Industrial Technology Development Institute (ITDI)
Funding/Cooperating Agency: Department of Science and Technology



In the Philippines, the Tullahan-Tinajeros (Tu-Ti) River System is one of the polluted waterways in Metro Manila and considered as a major tributary of Manila Bay. The Tu-Ti River System spans 27 kilometers from La Mesa Water Reservoir in Quezon City, all the way to the mouth of Manila Bay in Navotas City. It was once an abundant source of food for the residents nearby because of its relatively better environmental state – with wider, deeper, and good quality water. Since then, overpopulation and uncontrolled development, among others, caused a significant degradation of the ecosystem and biodiversity of the area. This alarming problem resulted in various rehabilitation programs for water tributaries feeding the Manila Bay.

The Management of Dredged Material: Characterization, Treatment and Disposal or the CharTed DreaM project led by Dr. Reynaldo L. Esguerra aims to provide technology for the management and utilization of dredged materials collected from Tullahan-Tinajeros River System.

Dredge material is composed of soil or sediment that may contain inorganic or organic pollutants that made the river system shallower and narrower than before. This has caused floods to worsen, affecting families in the communities along the area.

The project was able to conduct site assessment and sampling of dredge and leachate to six (6) sampling points along the Tu-Ti river system and characterized the samples physically and chemically to identify its heavy metal and organic and inorganic compounds. In this way, they would know if the dredge was suitable as an additional material and/or partial substitute to sand in producing construction materials and embankments such as mortar and cement. It was found that the concrete and mortar mixture resulted below standard limit set for the Toxicity Characterization Leaching Procedure (TCLP). Nevertheless, the manual operation done in producing cement and mortar would be the guide of the technology adapter to obtain the optimum and best design of the mixture in the future.

IM4ManilaBay: Project 4 - e-SMART

(Ecosystem Modeling and Material Transport Analysis for the Rehabilitation of Manila Bay)

Project leader: Dr. Eugene C. Herrera
Implementing Agency: UP Institute of Civil Engineering - National Hydraulic Research Center
Funding/Cooperating Agency: DOST-GIA

In the Philippines, two of the most significant bodies of water in terms of both economic and environmental significance are Manila Bay and Laguna Lake. Manila Bay is considered one of the finest harbors in the world which facilitates the nation's international trade and commerce and provides millions of people with a variety of employment options. On the other hand, Laguna Lake is a multi-utility water source used for aquaculture, irrigation, flood control, residential water supply, navigation, power generation, and industrial cooling. Additionally, Pasig River, which serves as Laguna Lake's sole exit, connects Manila Bay and Laguna Lake.

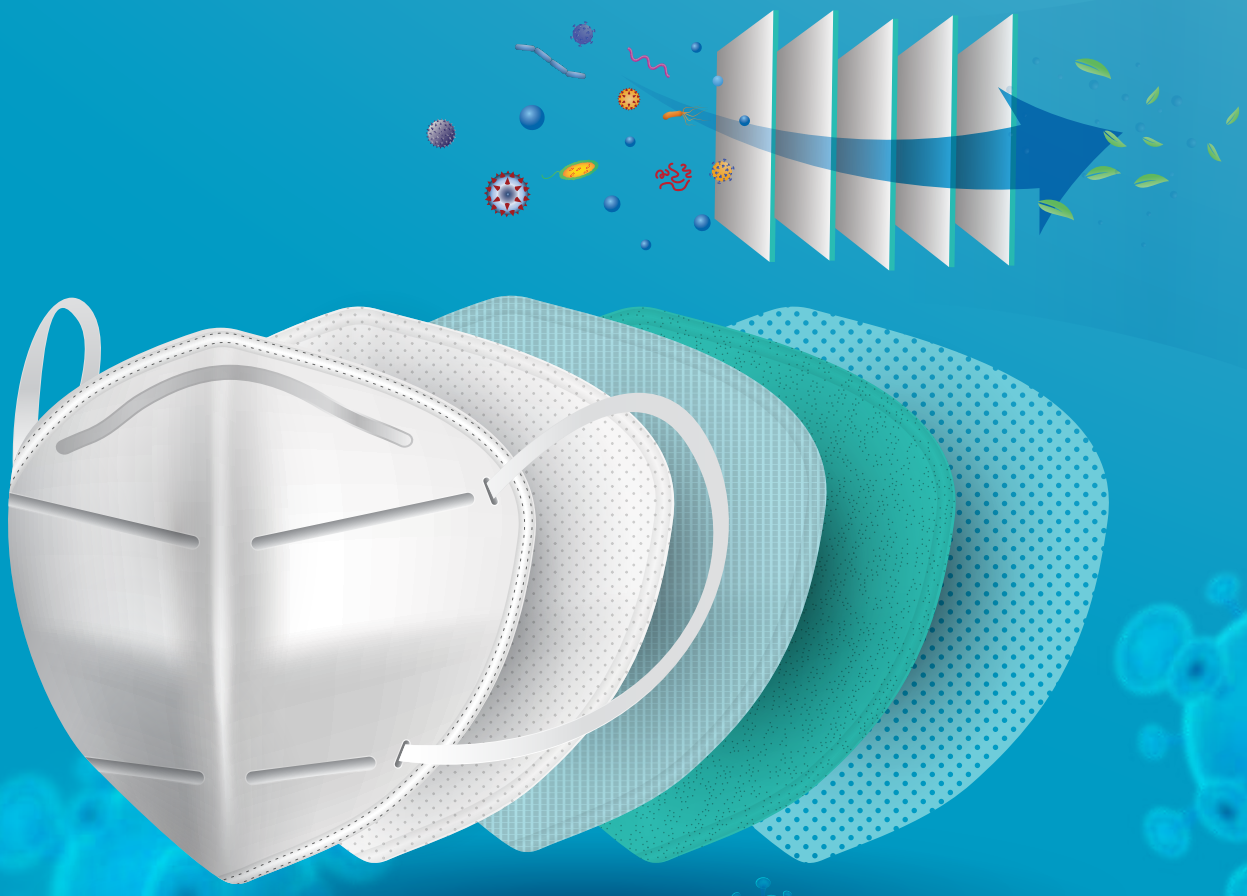
During the dry season, the lake elevation occasionally drops below mean sea level, leading to Manila Bay's dirty seawater intrusion into the lake, making it a necessity for thorough evaluation of the integrated Manila Bay-Ecosystem management and in Laguna Lake. With that, the implementation of SMART Ecosystem-based solutions information and the scientific foundation is needed for creating integrated coastal management planning policies and plans, as well as to evaluate the results and effects of actions and interventions imposed on the bay.

Led by Dr. Eugene C. Herrera of the UP College of Engineering, the Ecosystem Modeling and Material Transport Analysis for the Rehabilitation of Manila Bay or the e-SMART project was initiated aiming to streamline solution interventions for the rehabilitation of Manila Bay through hydrodynamic and material transport analysis of the integrated Manila Bay-Pasig River-Laguna Lake and surrounding watershed system using numerical modeling.

The project was able to develop and disseminate graphs, summary of water balances, preliminary hydrologic Manila Bay circulation patterns; Storm Surge model; Hydrodynamic and Water Quality model; Data management and archiving of model results, maps, time-series plots, including historical datasets and other documentations. An e-SMART Academy with various modules, through Google Classroom, was also developed for the training of partner institutions and stakeholders who are part of the established Memorandum of Agreement, alongside with other trainings and workshops for staff development. Moreover, social media campaigns were also done to amplify the call of the project.

PMTTC: Improving Access to Quality Medical Textile Testing in the Philippines

Establishment of the DOST-PTRI Medical Textile Testing Center (PMTTC)



Project leader: Donna A. Uldo, MSc, RCh
Implementing Agency: DOST-Philippine Textile Research Institute (PTRI)

The world's demand for medical textiles has risen exponentially, and the Philippines is no exception. Early in the pandemic, a massive global shortage of personal protective equipment challenged the country, and the effects of the fallout of the nation's textile industry made it even more difficult. This has led many Filipinos to use alternative face coverings instead.

In line with the government's efforts in expanding access to quality-tested textile materials for use in the healthcare sector and in the development of innovative textile solutions to cater to the needs of the industry, the Philippine Textile Research Institute (PTRI) of the Department of Science and Technology (DOST) established the PTRI Medical Textile Testing Center (PMTTC) to achieve self-reliance in medical textile testing. The facility was officially launched on June 24, 2022.

Before PMTTC, locally developed and produced medical textiles such as face masks and medical gowns needed to be sent out to foreign laboratories to be evaluated to an international standard based on a complete battery of tests and analyses. The usual turnaround time for these tests' ranges from four to six weeks and costs hundreds of thousands. Meanwhile, the PMTTC offers an average turnaround time of two to three weeks with an average of 60% lower fees.

Along with the establishment of the PTRI Medical Textile Testing Center, led by Donna A. Uldo, 55 units of equipment were acquired, enabling the Institute to offer 23 new testing capabilities. In addition to the existing Chemical and Physical Testing Laboratories, PTRI also established its new Microbiological Testing Laboratory as a component laboratory of PMTTC.

The PMTTC offers the following testing capabilities for face masks and respirators:

1. Differential Pressure Test (Breathability for Face Masks)
2. Synthetic Blood Penetration Resistance Test for Face Masks
3. Particle Filtration Efficiency Test
    a. Latex Spheres
    b. Sodium Chloride
4. Flammability
5. Bacterial Filtration Efficiency
6. Microbial Cleanliness/Bioburden
7. Breathing Resistance Test for Respirators
8. Quantitative Respirator Fit Test

For protective clothing, critical barrier tests and other performance tests are available:

1. Liquid Penetration, Water Resistance: Hydrostatic Pressure Test
2. Synthetic Blood Penetration Resistance Test for Protective Clothing
3. Tensile Strength (Wet and Dry) Test
4. Bursting Strength (Wet and Dry) Test
5. Microbial Penetration (Wet and Dry) Test
6. Thermal and Water Vapor Resistance Test
7. Puncture Resistance Test

Flex Tester

8. Lint Generation Test
9. Microbial Cleanliness/Bioburden
10. Flammability
11. Fiber Identification Test (Using FourierTransform Infrared Spectroscopy-Attenuated Total Reflectance)

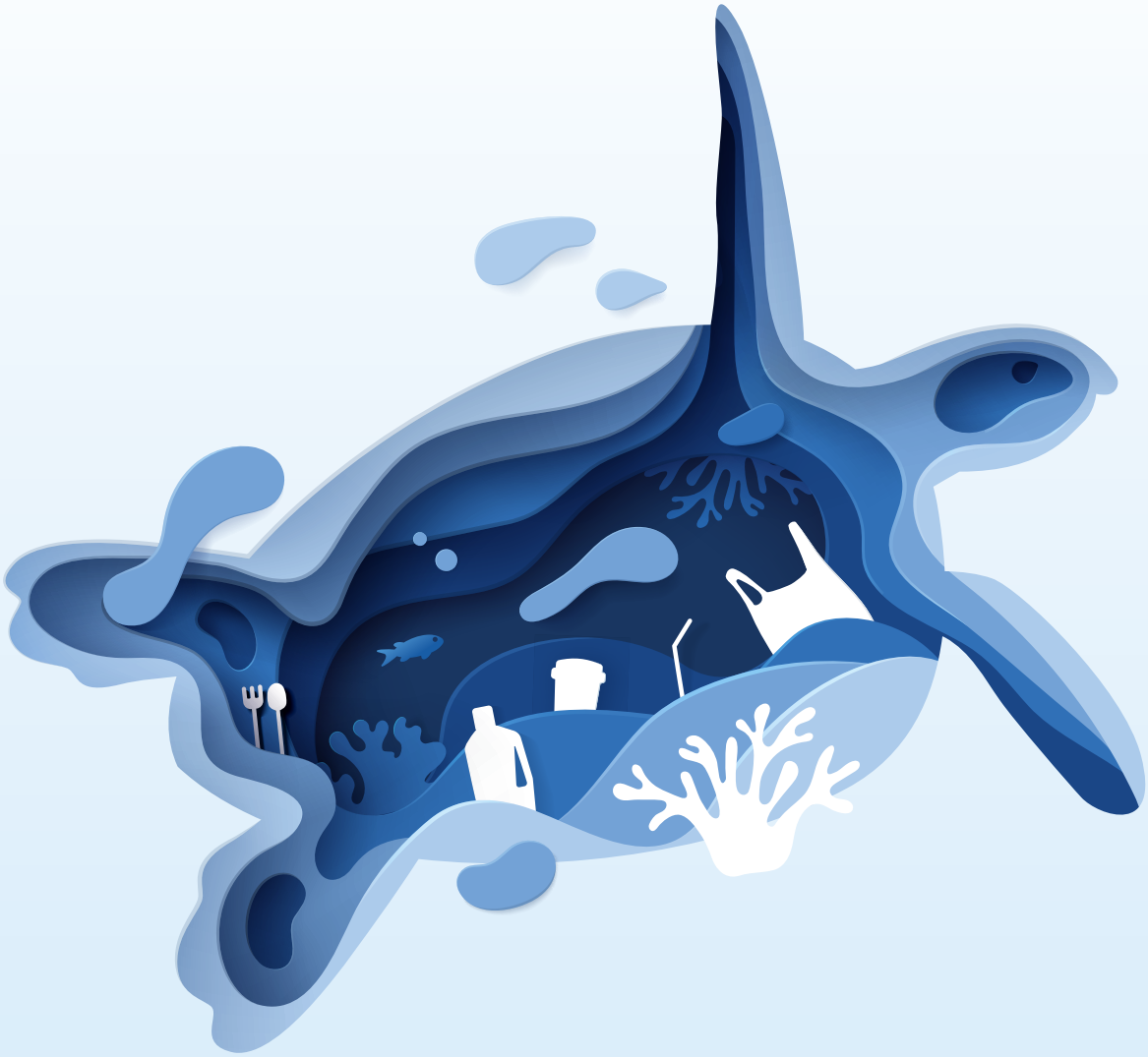
Furthermore, the staff has undergone relevant training to complement the upgraded facilities, which is one of the main requirements of the application for accreditation of the testing laboratories with relevant accreditation body for ISO 17025:2017.

It is expected that the synergy of an equipped laboratory and proficient staff would enable the PMTTC to support the Philippine government's initiatives in the development, assessment, and certification of materials fit for medical protection.

Bacterial Filtration

Counting Plastics

PlastiCount Pilipinas: Counting and Visualizing Marine Plastics Pollution in the Philippines



Project leader: Dr. Deo Florence Onda
Implementing Agency: University of the Philippines Diliman
Funding/Cooperating Agency: Department of Science and Technology through the Grants-in-Aid program and the Philippine Council for Industry, Energy, Emerging Technology Research and Development (PCIEERD)

Plastic pollution is a severe problem worldwide, and Philippines being one of the top ten countries in the world for mismanaged plastic waste and the 3rd most contributor to marine plastics, is in no exception. The coastal areas of Manila Bay alone produce as much as 0.75 million tons per year of plastic which enters the ocean.

This already negative implication caused by the country's high waste generation is being amplified because of being an archipelago with massive inlets of plastic from neighboring countries.

In order to provide tangible solutions, efforts to increase the local capacity for monitoring plastics pollution in the coastal and marine environments is being done by the Marine Science Institute at the University of the Philippines Diliman through PlastiCount Pilipinas.

PlastiCount Research Assistant, Mr. Ramgen Luzadas demonstrates water samplying for microplastics with a plankton net to training personnel from the Department of Environment and Natural Resources (DENR) and Philippine Coast Guard (PCG)

The project adopted, optimized, fine-tuned, and rolled out high throughput monitoring technologies for macroplastics and microplastics. Written protocols have been developed and converted into a manual and uploaded to the PlastiCount Pilipinas portal. A hybrid protocol was developed to increase efficiency to a 98-100% recovery rate.

Access to these resources would enable policymakers to craft sound management and mitigation approaches in making policies relevant to mitigating this environmental hazard. Likewise, it could also contribute to the regional understanding of the problem in Southeast Asian waters.

To date, PlasticCount Pilipinas was able to establish a comprehensive database by incorporating integration and visualization of the different datasets coming from various survey initiatives in providing a more holistic view on the extent of plastics pollution in the country which can be accessed through *plasticount.ph.*

Furthermore, series of training for NGAs has been completed and they are now training their own coworkers in macroplastics quantification. Technologies have been adopted in their own line of work as well. The project was also featured in different media coverages within and outside the country. Moreover, two (2) facilities have already been established: the Microplastics

Washed and dried macro-plastics collected from the coast for input into the artificial intelligence model

Sediments collection for microplastics quantification & classification in Alaminos, Pangasinan

Personnel from the DENR are trained in laboratory methods for microplastics quantification

Quantification, Identification, and Biodegradation Facility (MicroQuIB) in Bolinao, Pangasinan, and the Quantification, Identification, Classification, and Mapping of Plastics Pollution Facility (QuICMaPP) in Baguio City. A Plastics Research Network (PlaRenet) for local networking has also been established.

PlatiCount Pilipinas is in collaboration with Kyushu University in Japan, the University of East Anglia in the United Kingdom, and Swinburne University of Technology, Sarawak Campus in Malaysia and being funded the Department of Science and Technology through the Grants-in-Aid (DOST-GIA) and Technology through the Grants-in-Aid (DOST-GIA) program and the Philippine Council for Industry, Energy, Emerging Technology Research and Development (PCIEERD).

Revolutionizing Surface Mines through SMART Mines Automation and Telematics Platform

Systematized Mining Operations Using Automation and Real-Time Telematics Platform towards a Paradigm Shift in Surface Mines of Caraga Region (SMART-Mines)

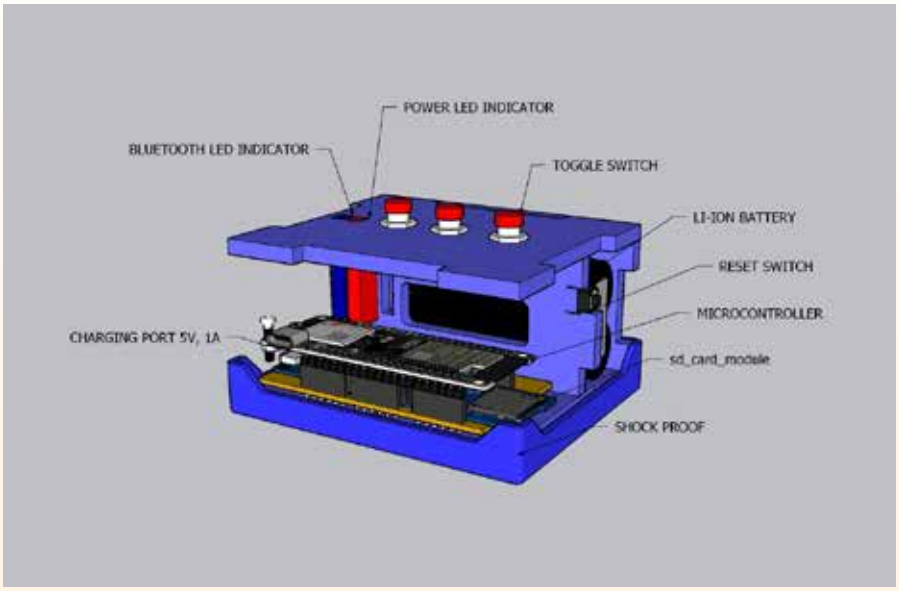
Project Leader: Dr. Alexander T. Demetillo,
Implementing Agency: Caraga State University

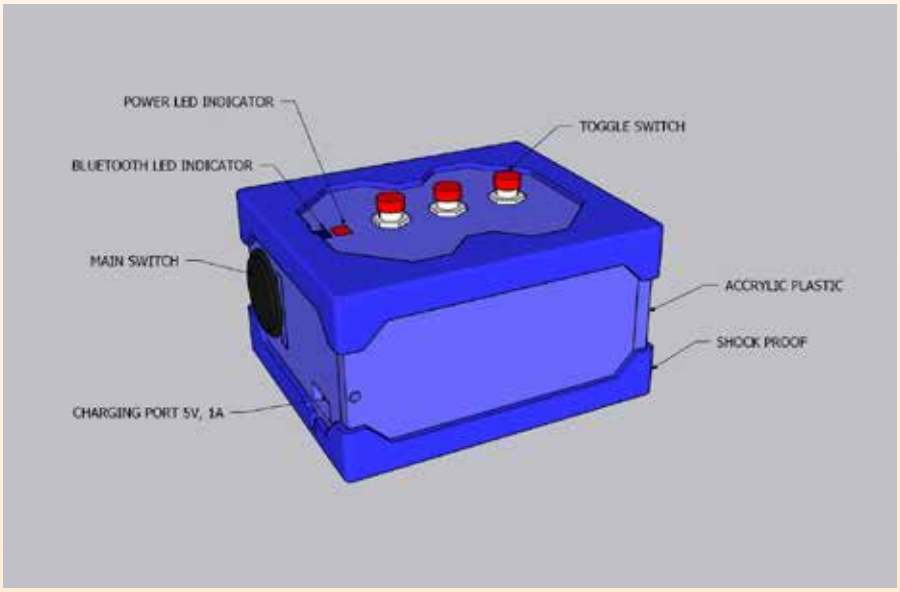
The SMART Mines project is a scientific and technological innovation aimed at improving the efficiency, safety, and sustainability of surface mining operations in the Caraga Region. The project team developed and deployed automation and telematics platforms that monitor and analyze the surface mines' operations. The partner company, Cagdianao Mining Corporation (CMC), expressed its full support and commitment to the project, providing feedback on its usefulness and effectiveness.

The project team modified the technologies based on the feedback and conducted training and workshops for CMC's end-users. The SMART Mines system automates several key areas of CMC's operations, including material delivery receipt generation, data inputs in Material Delivery Receipts (MDRs), material inventory, and DT activity logs. The web-based application of SMART Mines provides real-time graphical information, reporting, and analytics based on the acquired data from the developed technologies.

The feedback from CMC shows that the SMART Mines project has a significant impact on the operational efficiency and optimization of the mines. The technology uses sensors to determine location, velocity, distance travelled, and fuel level without the need for human intervention, ensuring accuracy and minimizing errors. The system also uses RFID tags to determine the movement of ore and waste, eliminating the need for MDRs and reducing errors and delays. The system replaces the Driver Equipment Utilization Record (DEUR), and drivers fill it out in their android devices, recording activities more precisely.

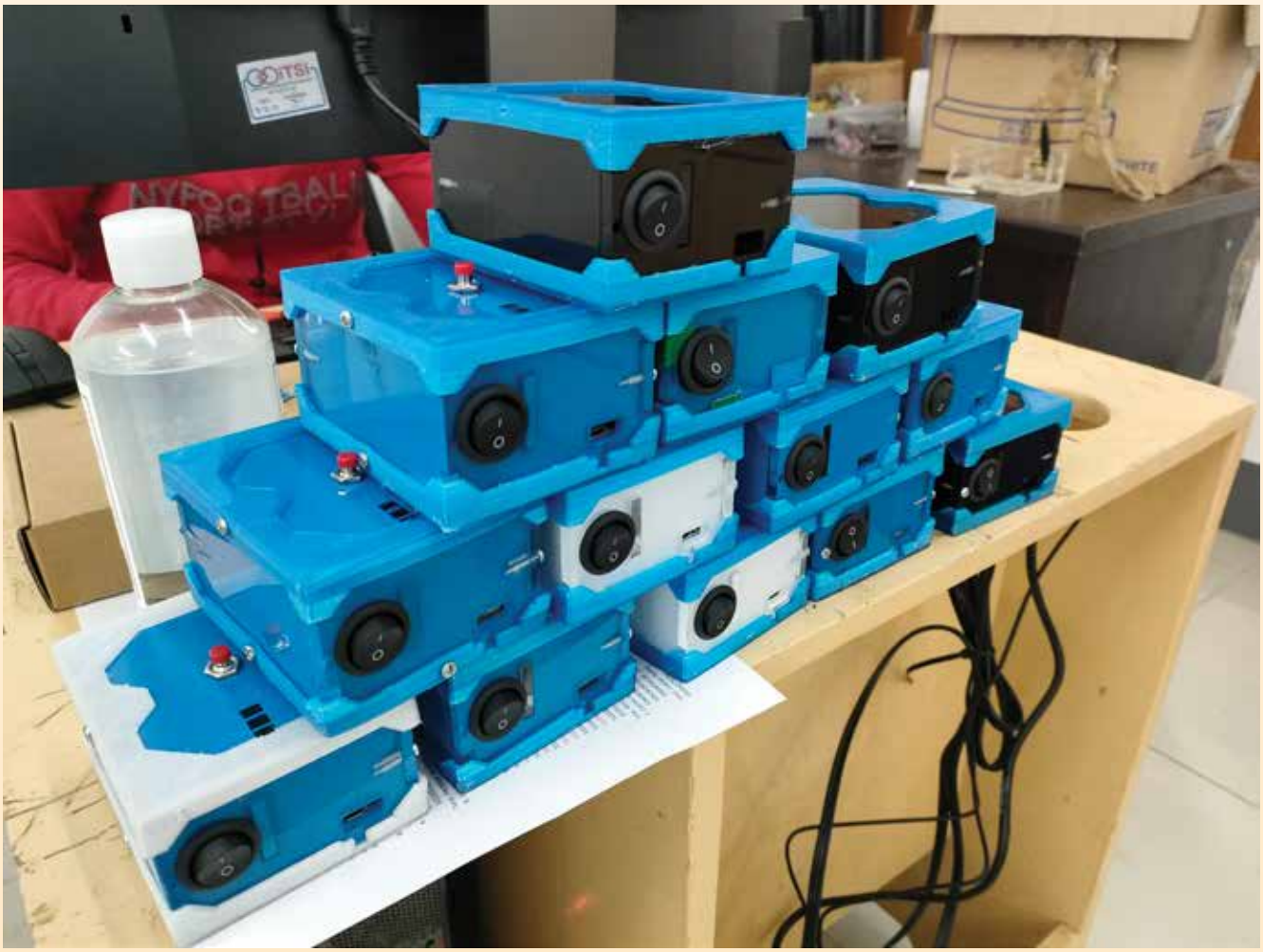
The system does not require constant internet connection and stores data locally in android devices and sends it to the cloud when internet connection is available. The web-based application summarizes all the data gathered to help analyze and visualize important metrics.

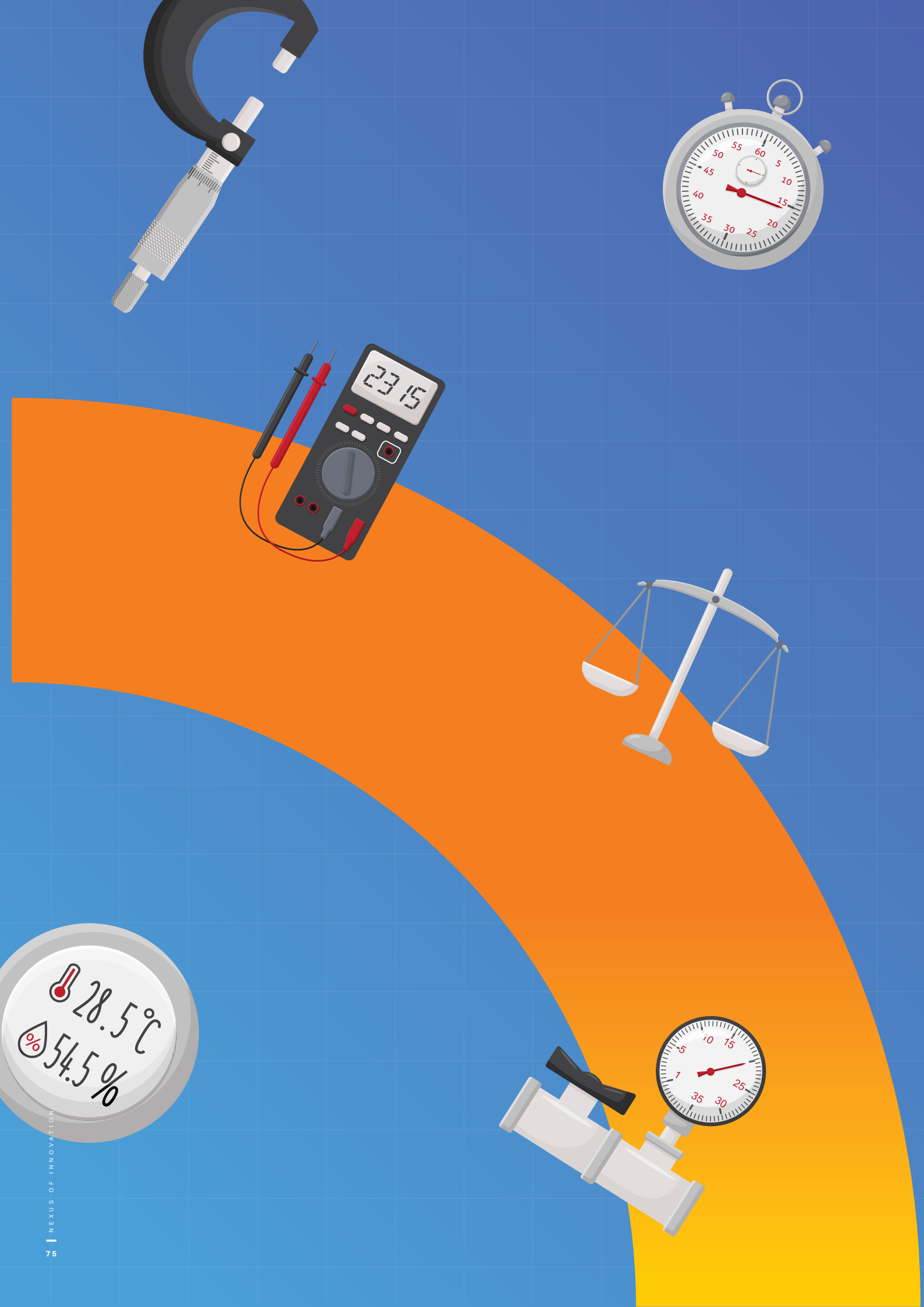




The project team visited CMC for the third Mine Visit and Fieldwork to deploy and pilot test the modified technologies based on the findings from the previous visit. The team accomplished 100% of the activity components, including presenting the developed technologies to CMC, and three-day actual testing and deployment of the tracker system. There were no hardware or software issues encountered with the new version of all revisions in the checker, DT tracker, receiver, and weighbridge device. The project team also conducted a training and workshop on technology utilization and operationalization, which was participated in by 11 employees.

The SMART Mines project is a significant contribution to the modernization and digitization of the mining industry, leading to more efficient and sustainable mining practices. Although the MoA between CSU and CMC-NAC is still pending for further deliberation, the project's success shows the potential of technology and scientific approaches to improve the mining industry's overall performance and profitability. The project's expenditures are limited, yet the possible savings are huge, making the project an excellent investment for the mining industry.




2315
28.5°C
%54.5%

Metrology Program

Boosting Food Safety: Enhancing the National Metrology Laboratory's Dissemination of Traceability in the Analysis of Organic Contaminants in Food

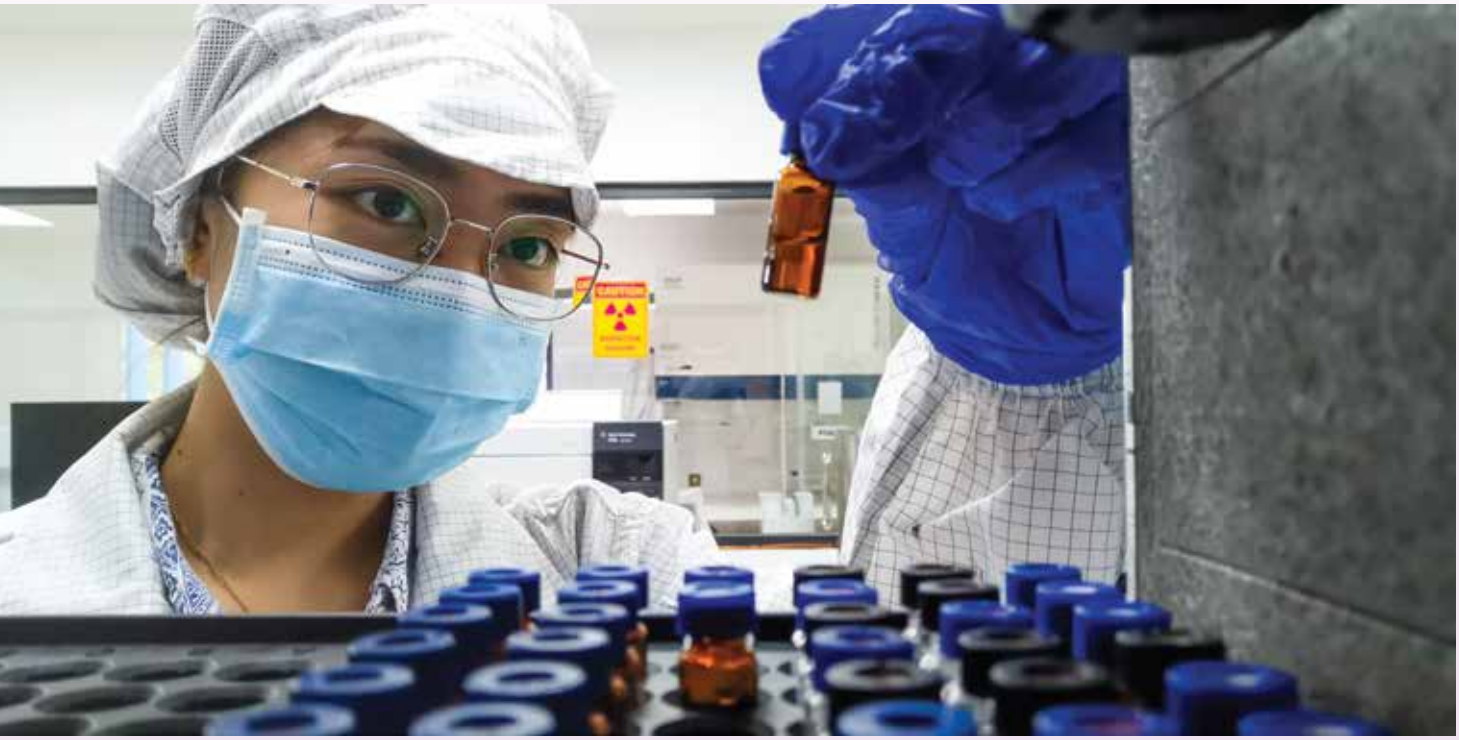
Metrology Project 1: Chemical Metrology for Organic Contaminants in Foods and Water

Program Title: Enhancement of the Competence and Capability of the National Metrology Laboratory of the Philippines
Project Leader: Mr. Aaron C. Dacuya
Implementing Agency: National Metrology Laboratory, Industrial Technology Development Institute (NML-ITDI)

The Enhancement of the Competence and Capability of the National Metrology Laboratory (NML) of the Philippines program aims to establish traceability for reference materials and proficiency testing schemes for food preservatives and contaminants.

Specifically, Project 1: Chemical Metrology for Organic Contaminants in Foods and Water seeks to develop national standards for chemical measurements and establish traceability for reference materials and proficiency testing schemes.

With the Philippines being a significant exporter and consumer of processed fruits, beverages, and fish, it's crucial to ensure the safety of these food products. This project addresses the need for accurate and reliable measurements of organic contaminants, such as veterinary drug residues and pesticides, in various matrices.



Analysis of preservatives, contaminants and veterinary drug residues

The project aims to develop methods for detecting target analytes, produce reference materials and conduct proficiency testing schemes in line with ISO standards. It also seeks to establish traceability for reference materials and proficiency testing schemes for food preservatives and contaminants.

By developing methods, producing reference materials, conducting proficiency testing schemes, and eventually applying for Calibration and Measurement Capabilities (CMCs), the project ensures the accuracy and reliability of chemical measurements in food analysis, which is crucial for trade, commerce, and public health.

To date, the team has developed and validated 21 out of the targeted 28 analytical methods, 12 out of the targeted 15 reference materials that need homogeneity and short- and long-term stability assessment, and 6 out of the targeted 15 PT testing schemes with 3 ongoing schemes.

Through the implementation of cutting-edge techniques and technologies, production of reference materials aligned with ISO 17034 and PT schemes aligned with ISO 17043 standards, the NML demonstrates its commitment to innovation and continuous improvement, further solidifying its role as a hub for scientific and technological excellence in the country.

Ethoxyquin in chicken analysis using LCMSMS(1)

Analysis of Reference materials using HPLC(1)

Improving Water Quality and Food Safety through Chemical Metrology

Metrology Project 2: Chemical Metrology for Inorganic Toxic Elements in Food and Water

Program Title: Enhancement of the Competence and Capability of the National Metrology Laboratory of the Philippines
Project Leader: Dr. Benilda S. Ebarvia/ Ms. Alleni T. Junsay
Implementing Agency: National Metrology Laboratory, Industrial Technology Development Institute (NML-ITDI)

Ensuring the safety of the food and water supply is a critical concern for any country. In the Philippines, the establishment of limits for heavy metals in food by the Philippine National Standard and for heavy metals in water by the World Health Organization (WHO) has heightened the need for capable and competent laboratories that use validated methods in analyzing trace amounts of elements in the said matrices.

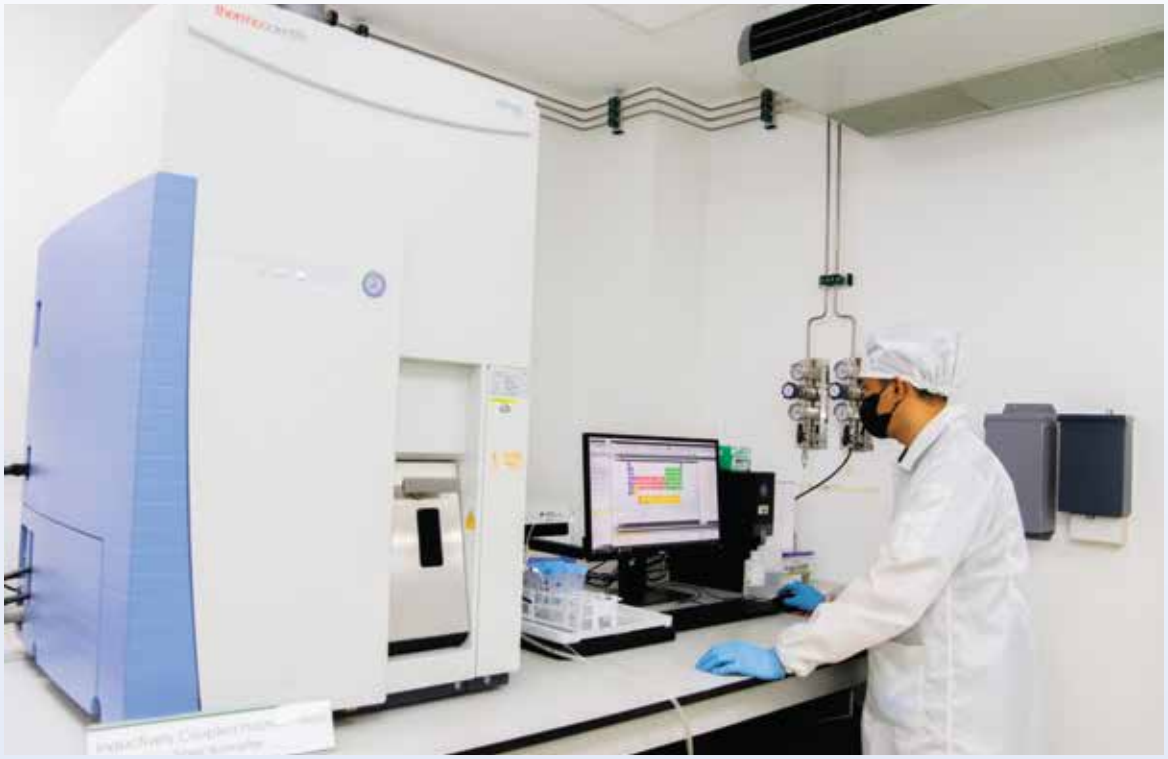
The National Metrology Laboratory of the Philippines, through its Metrology in Chemistry (MiC) project, aims to address this need by enhancing its competence and capability to produce Certified Reference Materials (CRMs) and provide accuracy-based Proficiency Testing (PT) Schemes for local testing laboratories that can help establish traceability to International System (SI) of units and achieve accuracy in measuring inorganic toxic elements in food and water.

The team has also assessed the homogeneity and stability of candidate RMs for water, and characterized and assigned reference values to produced Reference Materials (RMs) like PRM-0401: Pb, Cd, Cu, Fe in drinking water, PRM-0501: Sulfite in dried mango, PMR-0901: Ca, Mg, and Zn in drinking water, PRM-1001: Co, Mn, Ni in drinking water, PRM-0301: As and Hg in drinking water, PRM-0502: Sulfite in desiccated coconut, PRM-3001: Total hardness in water and calibration solutions for Ca, Cd, Co, Mg, Pb, Zn, Cu, Fe, Mn, and Ni. These developed RMs are important to local laboratories for their method validation and use as quality control samples for their routine analytical measurements.

The organized accuracy based-proficiency testing (PT) schemes carried out by DOST-ITDI using these developed RMs had provided local laboratories in the country with appropriate materials in achieving accuracy and establishing traceability of measurements to the SI units that are required for international recognition of chemical measurement in the country.

Likewise, the active participation of MiC in international interlaboratory comparisons among other National Metrology Institutes has contributed to the country's claim for Calibration and Measurement Capability (CMC) for heavy metals in food and water matrices.

Indeed, the NML's Project 2 has made significant progress in developing advanced chemical metrology for heavy metal analysis in food and water matrices. The project's accomplishments in validating primary methods, characterizing RMs, conducting PT schemes, and establishing CMCs significantly affect the safety and health of the Filipino people. These achievements had contributed to enhancing the competency and capability development of local laboratories in analyzing elements in trace amounts, thereby ensuring food and water safety in the country. This, in turn, will boost the public's confidence in the safety and quality of food and water products, contributing to the country's nation-building efforts



Awards obtained during the implementation of the Project:

1. National Finalist representing the Philippines in the Senior Scientist Category for the Search for Underwriters Laboratories-ASEAN-U.S. Science Prize for Women 2021
   Dr. Benilda Ebarvia

2. 2019 Asia Pacific Metrology Program (APMP) Award for Developing Economy National Metrology Institute (DEN) 2019
   Dr. Benilda Ebarvia

3. 3rd PLACE BEST POSTER AWARD

   2019 UST-CYCU Joint Symposium on Chemical Sciences

   Poster Title: External Standard vs Standard Addition Method in the Determination of Calcium in Drinking Water by ICP-OES for Proficiency Testing Studies

4. BEST ORAL PRESENTATION

   3rd Philippine Solid and Hazardous Waste Management Conference 2018

   Presentation Title: Assessment of Lead and Cadmium Waste Mixture as an In-House Reference Material for Testing Laboratories

Building National Capacity for Biological Metrology in the Philippines: Advancing Food Safety through Proficiency Testing

Metrology Project 3. Biological Metrology for Microorganisms in Food

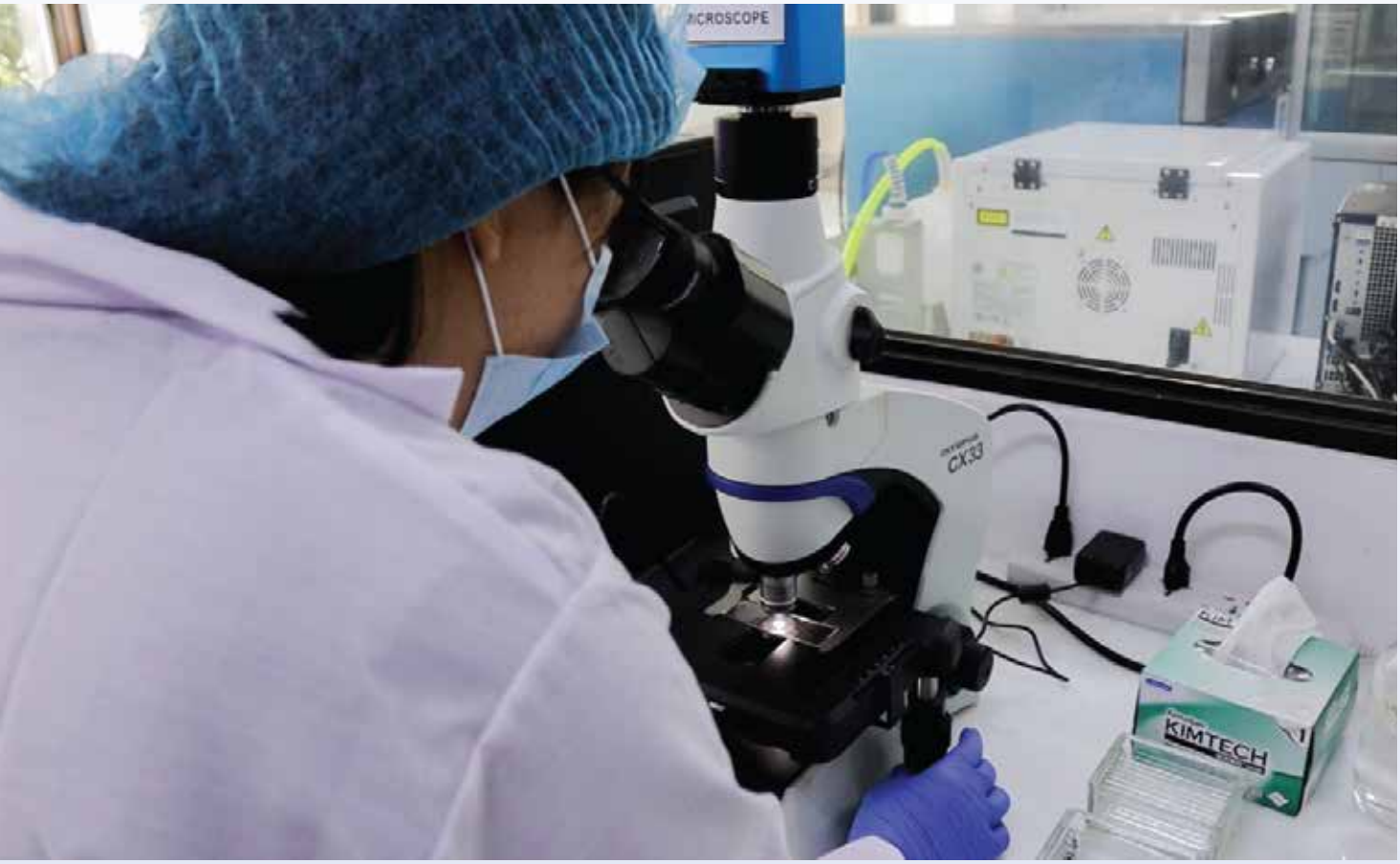
Program Title: Enhancement of the Competence and Capability of the National Metrology Laboratory of the Philippines
Project Leader: Mr. Marlon SA. Aguinaldo
Implementing Agency: National Metrology Laboratory, Industrial Technology Development Institute (NML-ITDI)

Biological measurement is a critical component in ensuring the safety of food products. As food safety is a public good, the National Metrology Laboratory (NML) of the Philippines, of the Industrial Technology Development Institute (ITDI), has undertaken Project 3: Biological Metrology for Microorganisms in Food. This project is an initiative of the Department of Science and Technology (DOST) which aims to capacitate the country in developing local microbiological PT materials and organizing PT schemes for local microbiological laboratories. The absence of local PT providers is an identified gap in food microbiological testing.

Through this initiative, we will be able to support the laboratory requirements for *ISO/ IEC 17025: 2017* in ensuring validity of test results as part of their quality assurance (QA), thus, benefitting the 43 microbiological laboratories accredited to the Philippine Accreditation Bureau (PAB). These laboratories currently subscribe to PT schemes organized abroad, which can be expensive due to freight, import and participation costs. Participation to international PT schemes costs around P17,000, while, the NML can offer the service for P5,500. This would translate to 67% savings. More importantly, by providing local laboratories with access to PT schemes, we support food safety and the global competitiveness of local food products, through accurate measurements.

The project team, led by Mr. Marlon Aguinaldo, was able to develop six (6) PT materials and conducted four PT schemes. Most of the developed PT materials were for seafood products as this is a major export industry and the incidences of foodborne disease outbreak in the country were also considered. The developed PT materials included Aerobic Plate Count (APC) in milkfish, *Salmonella sp*. Detection in milkfish, APC in octopus powder, *Salmonella sp*. Detection in octopus powder and Total Coliform and E. coli in octopus powder. The production process involved microbial cell immobilization and freeze drying of food matrices. The batch produced were characterized for homogeneity and stability to meet the requirements of ISO Guide 35: 2017.

For the duration of the project, four (4) PT schemes were conducted which had a total of eighty - nine (89) participants. This represents forty – one (41) local microbiological laboratories. Evaluation of laboratory performance was based on ISO 13528: 2015. By participating, laboratories were able to gauge their competence in specific measurements and implement corrective actions when necessary. In addition to PT services, a quantitative reference culture for *Salmonella enterica* was also developed. The material is intended to be used by laboratories in their quality control procedures.



Metrology in Biology researcher performing morphological characterization of microbial cells

In terms of human resource development and information dissemination, thirteen (13) Metrology in Biology (MiB) staff received various technical training on food analysis, microbial cell preservation, equipment operation, and quality management systems. Ten (10) stakeholder engagements, in the forms of seminars, webinars, PT orientation and focus group discussion (FGD), were attended by approximately four hundred (400) participants from testing laboratories, the academe, and regulatory agencies. And five (5) scientific papers were presented in both local and international conferences through oral and poster presentations.

The participation of 41 laboratories in the PT schemes that were organized is a testament to the program's success by providing a tool for participating laboratories to monitor and improve their competencies. However, several areas for improvement were identified. These include improvement of the process to scale up the batch production, to ensure that more laboratories could participate in a PT scheme. Improving the storage condition of *E. coli* to refrigerated conditions to cater to laboratories from far areas. Though no problem was encountered during the transport of the PT materials, improvement of the packaging material is to be further studied to ensure maximum protection.

Stability study of the PT material, Aerobic Plate Count in octopus powder

With Project 3, the Philippines will have a laboratory that has expertise in developing and providing PT schemes for microbiological measurements that is integrated to NML, Philippines. The establishment of procedures for PT material production is a foundation for developing PT materials for other types of food matrices, and other consumer products – water, cosmetics and pharmaceuticals covered by Philippine standards. By providing these services, we strengthen consumer protection through accurate measurements.

Strengthening the National Metrology Laboratory: Advancing Accurate Measurements and Calibration Services in the Philippines

Metrology Project 4: Strengthening the Physical Metrology Capabilities of the National Metrology Laboratory

Project Leader: Mr. Kiveen P. Suycano
Implementing Agency: Industrial Technology Development Institute (ITDI)-National Metrology Laboratory (NML)

The National Metrology Laboratory of the Philippines (NML) is the country's primary facility for measurement science, standards, and calibration services. However, over the years, the laboratory's capabilities have become outdated and insufficient to meet the demands of modern industries and regulatory bodies. To address this issue, Project 4, led by Mr. Kiveen P. Suycano and implemented by the Industrial Technology Development Institute (ITDI), was launched to enhance the competence and capability of the NML.

Under the project, 221 standards and equipment were acquired. The 14 calibration rooms for temperature, pressure, length, mass, humidity, density, volume, hardness, force, flow, electricity, frequency, torque, and photometry were renovated and 64 services were offered and enhanced through these facilities. Moreover, the staff of NML was sent to various technical training courses in the fields of mass, length, volume, density, temperature, humidity, flow, pressure, force, torque, and hardness.

These improvements ensure that NML is equipped with state-of-the-art facilities and highly skilled personnel to provide accurate and reliable measurements for industry, government, and research institutions. This will help to promote innovation, trade, and consumer protection in various sectors of the economy.

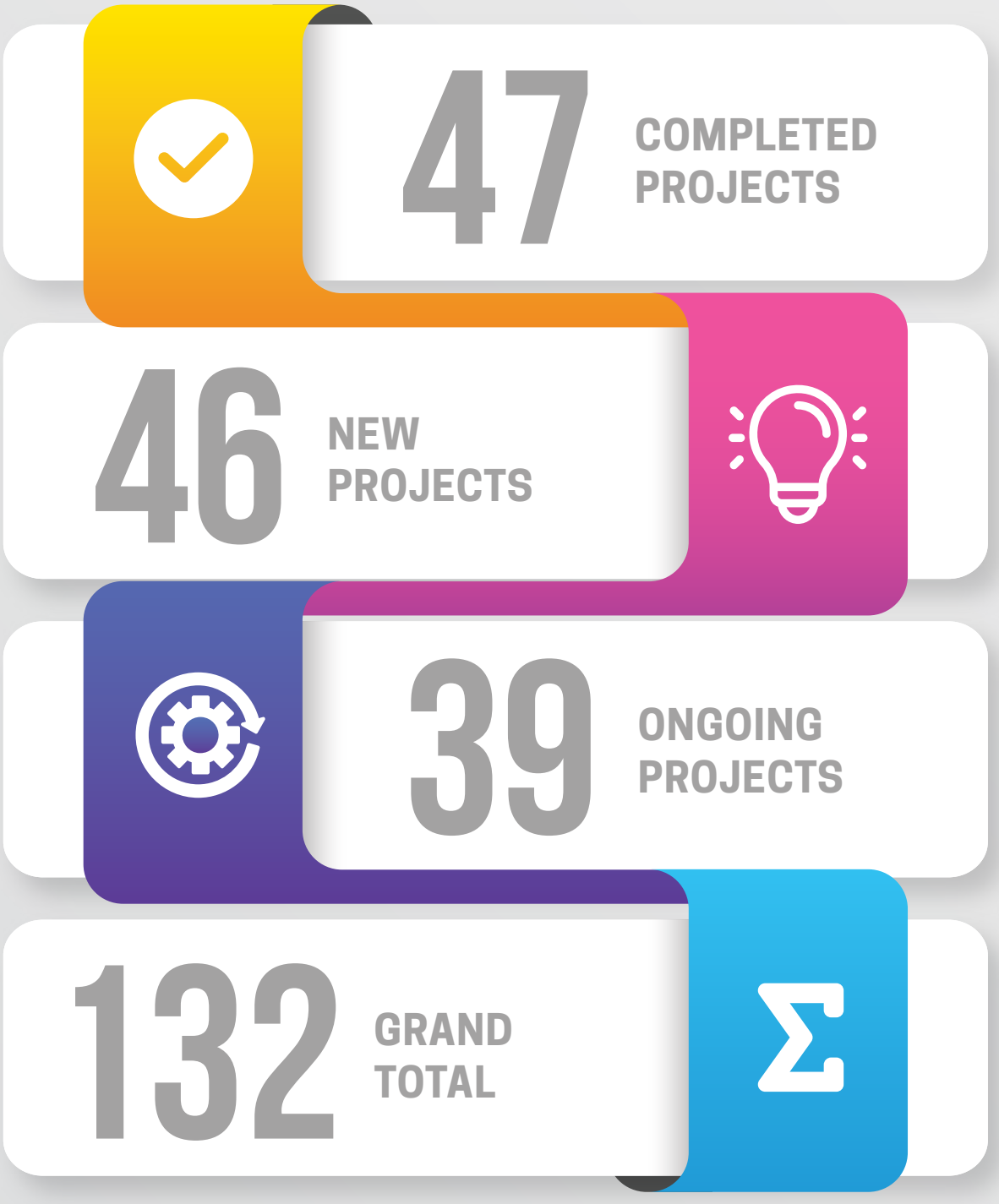
Through Project 4, the NML's calibration and measurement services have become internationally recognized, with four areas accredited by the German Assessors-DakKS. The project's accomplishments have benefited calibration laboratories, R&D laboratories, academe, manufacturers and producers, regulatory bodies, and the public, who can now rely on nationally delivered, internationally recognized measurement and calibration services within a reasonable time and cost. It is also an authentication of Philippine Metrological capabilities vounched by the BIPM, the world's highest body in metrology.

The successful implementation of Project 4 marks a significant milestone in the NML's pursuit of excellence in the field of metrology. The project's accomplishment's, particularly in upgrading the laboratory's physical capabilities and developing qualified and competent metrologists is a testament to the agency's commitment to strengthening the country's science and technology capabilities, promoting innovation, and contributing to the nation's overall development.


Microsemi
BATTERY CONTAINER

Industrial Technology Development Division

in 2022 by the Numbers



Program Title	Project Title	Agency Name	Project Leader
	CRADLE 2019: Design and Prototyping of Salt Harvesting Machine	Industrial and Technology Development Institute (ITDI)	Annabelle Briones
	CRADLE 2019: Development of Quality Soysage Using Okara	University of Santo Tomas	Elizabeth Arenas
	CRADLE 2020: SMART MINE: Development of Sediment Monitoring and Analysis for Rehabilitation Tool in a surface MINE area	Central Mindanao University	Einstine Opiso
	CRADLE 2020: Valorization of Carabao's Milk Produced in Western Visayas for the 'New Normal'	University of the Philippines in Visayas (UPV)	Jihan Santanina Alumbro
	Design Improvement and Sea Testing of a Remote-Controlled Weapons System (RCWS)		Jonathan Puerto
	Determination of Appropriate Expansion Process of Perlite to Conform to Standards of Light Weight Aggregates for Use in Construction	Other Agency	Rosabelle Louise Caram
	Development of Draft Standards and Recommended Code of Practice for Processing of Peanut Butter	DOST-Industrial Technology Development Institute	Maria Clarissa Manabat
	Development of FIC Competency in Moving New Products from Concept to Market Launch	DOST-Industrial Technology Development Institute	Zorayda Ang
	Development of Food Reference Materials for Nutrition Labeling for Use of Local Testing Laboratories (Phase 3) Implementation of ISO 17034:2016 Quality Management System in the Development of Rice Flour Reference Materials	Food and Nutrition Research Institute	Leah Dajay
	Development of Low Heat and Low Humidity (LH)2 Drying System for DOST Malnutrition Reduction Program (DOST-MRP) Facilities	Food and Nutrition Research Institute	Charlie Adona
	Economic and Life Cycle Analysis (LCA) of Single-use Plastic (SUP) in the Philippines	DOST-Industrial Technology Development Institute	Reynaldo Esguerra
	Eco-System Modeling and Material Transport Analysis for the Rehabilitation of Manila Bay (eSMART)	University of the Philippines-Diliman	Eugene Herrera
	Establishment of DOST Food Safety Web Application	Other Agency	Francisco III Barquilla
	MR. Tour Guide: A Cultural Adaptive Mapping Platform using Mixed Reality	Batangas State University - Main	Albertson Amante
	Operationalization of Halal Verification Laboratories (HVLs) of DOST Regions CALABARZON, 11, 12, and ARMM in Support to Halal Assurance Systems		Dr. Alexander Madrigal
	Parallel Testing of the Traditional Gold Extraction Process versus CLINN-GEM Technology of UP-DOST Characterization of Tailings and Monitoring of the Gold-Copper Pilot Plant in Jose Panganiban, Camarines Norte	Department of Science and Technology - Region 5 (DOST 5)	Rommel Serrano

	Project 1 : Documentation of Philippine Indigenous Bamboo Musical Instruments		
	Project 3 : Processing Facility for Bamboo musical Instruments and Other Lignocellulosic Materials		
	Scale-up Production, Stability and Other Applications of Natural Colorants for Cosmetics	DOST-Industrial Technology Development Institute	Ma Rachel Parcon
	SUGPo: Sustainable mine waste management Using modified hydrothermal carbon from prawn shells, and Geochemical modelling of Pathways of contaminants from mine tailings	Mindanao State University - Iligan Institute of Technology	Maria Cristina Vegafria
	Systematized Mining Operations using Automation and Real-Time Telematics Platform towards a Paradigm Shift in Surface Mines of Caraga Region (SMART Mines)	Caraga State University - Main	Alexander Demetillo
	Towards Leveling- up OneLab for Research, Development and Innovation	DOST IX	Rosemarie Salazar
	Valorization of Mature Coconut Water through Beverage Development (CRADLE)	University of the Philippines-Diliman	Myrna Benita Luna
	Valorization of Mining Wastes by Green Nano-hydrometallurgy: Application of Green-mediated Leaching Process and Innovative Magnetic Nano-separations for the Recovery of (Precious)Metals	Caraga State University (CSU)	Temmy Vales
Integrated Food Safety Program	Risk Profiling of Hazards in Philippine Food to Support National Risk Management	University of the Philippines Diliman	Abigail Rustia
Integrated Mapping, Monitoring, Modeling, and Management System for Manila Bay and Linked Systems (IM4ManilaBay)	Development of an Integrated Mapping, Monitoring, and Analytical Network System for Manila Bay and Linked Environments (MApABLE)	University of the Philippines Diliman	Ariel Blanco
Integrated Mapping, Monitoring, Modeling, and Management System for Manila Bay and Linked Systems (IM4ManilaBay)	Integrated Waste Analysis, Survey and Technological Options (IWASTO)	University of the Philippines Diliman - Institute of Civil Engineering	Maria Antonia Tanchuling
	"Waste to Wealth": Value-Adding Approaches to Transform Cacao (Theobroma cacao L.) Pod Husk Towards Economic Development	Isabela State University - Main	Perlita Raymundo
	CRADLE 2019: Reworking of Processed Meat Using a Combined Acidification-Heat Treatment Process	Eastern Visayas State University - Tacloban City Main Campus	Jennilou Cortes
	CRADLE 2020: Community-level Functionalization of Handwoven Cordillera and Mindoro Textiles for Creative Protective Clothing	DOST-Philippine Textile Research Institute	Zailla Payag

	CRADLE 2020: Drive Air ni Juan – Aluminosilicate Technology for Compact Air Purification	University of the Philippines – Diliman, Department of Chemical Engineering	Bryan Alamani
	CRADLE 2020: Technology Intervention to Provide an Alternative Market for Sampaguita (Jasminum sambac) as Raw Material for Jasmine Oil Production	Mapua Institute of Technology – Manila	Lemmuel Tayo
	CRADLE 2020: Upgrading the Philippine Lateritic Bauxite Through Potential Ore Beneficiation Processes	University of the Philippines – Diliman, Department of Mining, Metallurgical, and Materials Engineering	Hanna Czarise Regidor
	Development of a Liner-Enhanced Curing Vessel for Salted Egg Production for Eggciting Traditions(CRADLE)	ASEAN Foundation	Engr. Allan De Villa
	Development of Column-Packed Adsorbent for Chrome Recovery from Tanning Wastewater	DOST-Philippine Nuclear Research Institute	Jordan Madrid
	Development of Food Safety Guidelines for the Food Service Sectors	Food and Nutrition Research Institute	Trinidad Arcangel
	Development of Halal Compliant Dehydrated Food Products from Selected Food Materials (Fruits, Vegetables and Rootcrops)	DOST Central Office	Maria Elsa Falco
	DOST-CITEM Innovative Food Products under the Value Food Innovation Program for IFEX 2021	Industrial and Technology Development Institute (ITDI)	Daisy Tanafranca
	Establishment of Halal Assurance System for Selected Food Ingredients (Dried and Powdered Onion, Garlic, Black Pepper and Chili)	DOST Central Office	Maria Elsa Falco
	Integrated Community-scale Textile Fiber Innovation Hubs in Northern Luzon	DOST-Philippine Textile Research Institute	Jenneli Caya
	Metrology Project 1. Chemical Metrology for Organic Contaminants in Foods and Water		Aaron Dacuya
	Metrology Project 2. Chemical Metrology for Inorganic Toxic Elements in Food and Water		Alleni Junsay
	Metrology Project 3. Biological Metrology for Microorganisms in Food		Marlon Aguinaldo
	Plant Protein Products from Local Sources	Industrial and Technology Development Institute (ITDI)	Annabelle Flores
	PlastiCount Pilipinas: counting and visualizing marine plastics pollution in the Philippines	University of the Philippines Diliman	Deo Florence Onda
	Recovery of Nickel, Cobalt, Iron and Rare Earth Elements from Low Grade Philippine Laterite Ores using Atmospheric Leaching with Reduction Pretreatment	Mines and Geosciences Bureau (MGB)	Edith Daruca
	Valorization of agri-food waste: ultrasound-assisted extraction of oil and polyphenols from cherry rejects of Cordillera grown arabica coffee	University of the Philippines – Baguio, College of Science	Roland Hipol

Technology Transfer & Commercialization

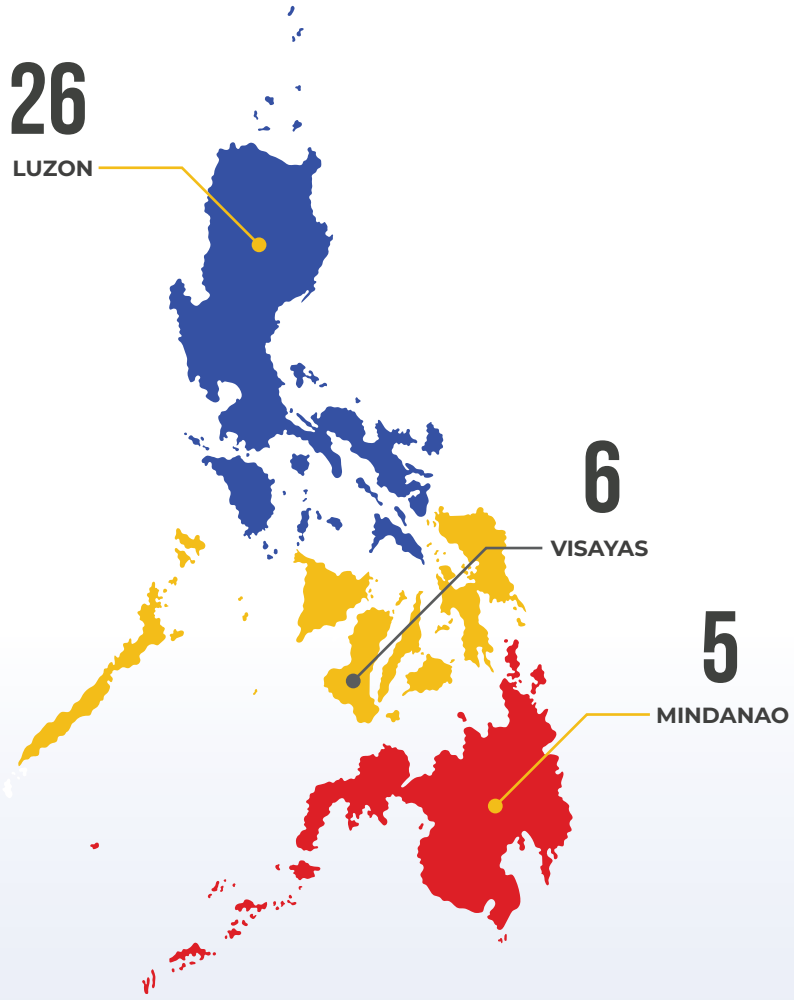
PCIEERD STARTUP GRANT FUND PROGRAM

The Startup Grant Fund (SGF) Program was established to help startups overcome R&D roadblocks, strengthen intellectual property, establish initial market traction, and refine their business model. Aside from the research grant, these startups also received support and assistance from the DOST-funded Technology Business Incubators (TBIs) through their services and programs.

In 2018, even before the Innovative Startup Act (ISA) was signed into law, the PCIEERD has already funded fifteen (15) startups for its first ever run of the SGF Program. The SGF Program was re-launched after the signing of the ISA and during its first call for applications in 2021, the PCIEERD received a total of sixty-five (65) startup applicants from various disciplines/sectors but only thirteen (13) out of the 65 applicants qualified and received the funding after a series of evaluation and assessment.

Cumulative Accomplishments of the first 15 funded startups from 2017-2022 are as follows:

REGIONAL DISTRIBUTION



37 APPROVED STARTUPS

Since its re-launching in 2021, the SGF Program has funded 37 startup proposals, with a total funding of P127.9 million, of which 26 proposals are from Luzon, 6 from Visayas, and 5 from Mindanao. While there has been a higher number of startups in Luzon, it is important to continue efforts to support and grow the startup community in Visayas and Mindanao to benefit the local communities and create job opportunities for the people. This helps to ensure a more balanced and equitable distribution of resources and support for startups across the country.

The target for 2023 is to fund 20 startups, which is less than the usual target of 30 per year because the Council plans to tie up with the DOST regional offices for a pre-SGF grant. This will be a feeder for the SGF in 2024, along with the Regional Startup Enablers for Ecosystem Development (ReSEED) Program, in which the Council plans to partner the ReSEED consortia with accelerators for them to handhold and train startups to be fundable for the SGF. The goal for 2024 is to approve 40 SGF-ready startups.

For its two Call Cycles in 2022, DOST-PCIEERD, under SGF Program, has approved a total of 16 startup R&D proposals for funding which are as follows:

Project Title: Enhancement and Market Validation of Brooky, A Sales Process Automation Platform to Increase Sales And Generate Insights for Real Estate Developers
Startup Company: Kingstate Ventures Corp.
Project Leader: Stefanie Uy
Priority Area: Industry Data-Driven Solution

Description: Brooky is a cloud-based sales process automation platform designed for real-estate companies to speed up sales processing and generate insights through data-driven system

Project Title: Enhancement of Prototype of the Blockchain-powered Document Management System, Electronic Signature Software-as-a-service Platform and Self-Sovereign Digital ID.
Startup Company: Twala (Ohelio Inc.)
Project Leader: Jeffrey Reyes
Priority Area: Industry Data-Driven Solution

Description: Twala is a digital signature platform secured by blockchain technology. It enables legally certified digital signatures for individuals, businesses, and organizations in the Philippines.

Project Title: Enhancement and Validation of Cerebro (An Integrated School Management and Content Library System for K-12 Schools)
Startup Company: LMS Solutions Philippines, OPC
Project Leader: Jonald Justine Itugot / CEO
Priority Area: Education/Learning

Description: Cerebro is a cloud-based system that features ready-made teaching materials for K-12 levels based on DepEd's curriculum. It contains 2,870 digital teaching materials for 102 subjects covering 94% of DepEd's learning competencies, in addition to its automated enrollment and payment system.

Project Title: Enhancement of a Wireless Sensor Based Educational Service Delivery (A Mobile App Development for Content Distribution System)
Startup Company: Creatorbox Products And Solution
Project Leader: Jon Alvin Macariola
Priority Area: Education/Learning

Description: EduBox, one of the products of CreatorBox Products and Solutions, is a content distribution network compose of low-powered wireless sensors for sending and receiving learning packets when internet connection is not available in the area.

Project Title: Enhancement and Market Validation of Olivia (An AI-enabled Expense Management App that recognizes Philippine Receipts and Invoices) for Philippine Companies and their Employees
Startup Company: Olivia Technology Group, Inc.
Project Leader: Ma. Jocelyn B. Pantastico
Priority Area: Remote Work Productivity Tools

Description: Olivia is an AI-enabled expense management app built for Philippine receipts and invoices using a patent-pending language and image processing technology

Project Title: Enhancement and Market Validation of Mathayog, an Adaptive, AI-driven Math Learning Platform
Startup Company: Eduk.Ai Software Corporation
Project Leader: Joanne Sison
Priority Area: Learning and Education

Description: Mathayog is an adaptive K-12 Math learning platform which provides immediate feedback and assists students in solving problems interactively to reach their ideal level of competencies and their full potential in Mathematics.

Project Title: Development of Hubware 4.0 and Market Validation of the Construction-focused online marketplace Platform
Startup Company: Hubware Corporation
Project Leader: Marika Laciste
Priority Area: Industry Data-Driven Solution

Description: Hubware is a platform designed as essential to the growing needs of the construction industry and supply chain management.

Project Title: Rover Reading Literacy Program: Reading Level Assessment of Public Elementary Students using Workbooks with Progress Tracking in Digital Platform
Startup Company: PCI Innovations Tech Center Inc.
Project Leader: Engr. Sergio Ramos III
Priority Area: Learning and Education

Description: Rover is a web-based reading program that follows the Chall's Reading development Stage and aims to track the progress of students as well as provide prescriptive analytics in giving enrichment activities

Project Title: Development Of Shelf-Stable Plant-Based Product Line Using Microalgae Proteins For Food Service Industries
Startup Company: WTH Plant Based Corporation
Project Leader: Stephen Co
Priority Area: Sustainable Industries

Description: Shelf stable plant-based alternatives that uses local and sustainable ingredients (microalgae protein, soy, wheat, coconut oil) for food service outlets, restaurants and other catering facilities.

Project Title: Enhancement and Improvement of Recommender System and Risk Assessment Report Features of AIMHI, a Construction Project Management System for Construction Companies
Startup Company: Seckka Empire Builders Inc.
Project Leader: Mas. Cherryanne Lee Angoy
Priority Area: Remote Work Productivity Tools

Description: AIMHI (Artificial Intelligence Meet Human Intelligence) - a construction project management software that ensures profit increase through Data & AI-driven profit optimization platform that uses real time and historical data to learn project inefficiencies, manpower productivity footprint, and overall cost behavior.

Project Title: Improvement and Market Validation of Workbean, an HR tech platform that helps companies discover their culture, attract better talent, and retain their employees
Startup Company: Workbean Philippines, Corp.
Project Leader: Kassandra Beatrice Monzon
Priority Area: Remote Work Productivity Tools

Description: Workbean Culture Pages- is a values and culture platform that matches the values of the employee with the culture of the company

Project Title: Improvement and Market Validation of Cassava Bioplastic
Startup Company: Sustainable And Compostable Horizons Industry (SACHI) Group Inc.
Project Leader: Engr. Prince Darhyl Anthony, Ryan Ang
Priority Area: Sustainable Industries

Description: Cassava Bioplastics- Locally-made bioplastic made from cassava starch, which is 100% compostable and biodegradable.

Project Title: Development and Market Validation of PAYDAY TODAY – a mobile App that allows employers to enable their employees to access REALTIME wages they have earned MID-PAY PERIOD
Startup Company: GoodApps, Inc.
Project Leader: Caesar T. Michelena
Priority Area: Remote Work Productivity Tools

Description: Payday Today is a mobile platform that allows employees to choose when they want to get paid of their accrued wages before the end of the pay cycle.

Project Title: Research of Local Supply Chain and Pilot Testing of MuraMart Optimization System
Startup Company: MuraMart Holdings Inc.
Project Leader: Mr. Bryden Elizan
Priority Area: Industry Data Driven Solutions

Description: MuraMart - is an e-commerce platform that provides a multi-vendor marketplace with delivery service and connects local farmers to local demand through data and technology

Project Title: Enhancement and Market Validation of KargaX, an Empty Miles Optimization Mapping Solution for the Freight Transport Industry
Startup Company: Karga Express Intelligence System, Inc.
Project Leader: Kristoffer Dan Montebon
Priority Area: Industry Data Driven Solutions

Description: Karga X - a web and mobile application that optimizes empty miles of truckers to increase their productivity and income while making transportation of goods cost-effective for shippers

Project Title: Enhancement and Market Validation of LYON: The All-in-One Platform for Creators to Monetize, Engage, and Retain Their Audiences
Startup Company: LYON Software Technologies Inc.
Project Leader: Mr. Jason Deniega
Priority Area: Content and Talent Development

Description: LYON - A one-stop shop where creators can create and monetize their content, engage with their audiences, and grow online their communities Also provides insights and analytics that helps creators grow their respective communities

Twala:
Transforming Document Management with Blockchain Innovation

Enhancement of Prototype of the Twala Blockchain-powered Document Management System, Electronic Signature Software-as-a-service Platform and Self-Sovereign Digital ID

Startup: Ohelio Inc.
Project Leader: Engr. Jeffrey V. Reyes

Twala, a groundbreaking blockchain-powered document management system and electronic signature software-as-a-service platform, is revolutionizing the way organizations handle contracts and documents. This project focuses on enhancing Twala's existing prototype, improving security, and developing new features. By addressing the inefficiencies and security risks of paper-based workflows, Twala aims to provide a secure, efficient, and eco-friendly solution for businesses across industries.

Traditional paper-based agreement workflows are known to be costly, inefficient, and prone to tampering and fraud. Twala's objective is to eliminate the need for paper documents and manual processing, saving trees and reducing carbon footprints. By introducing a verifiable and secure platform, Twala enhances the ease of doing business in the country, improves document authenticity, and mitigates the risks associated with paper-based processes.

As of December 2022, the project team has successfully completed the back-end integration of the Twala ID Ecosystem, including mobile apps for iOS and Android, as well as the Twala Claim Issuer/Verifier Portals.

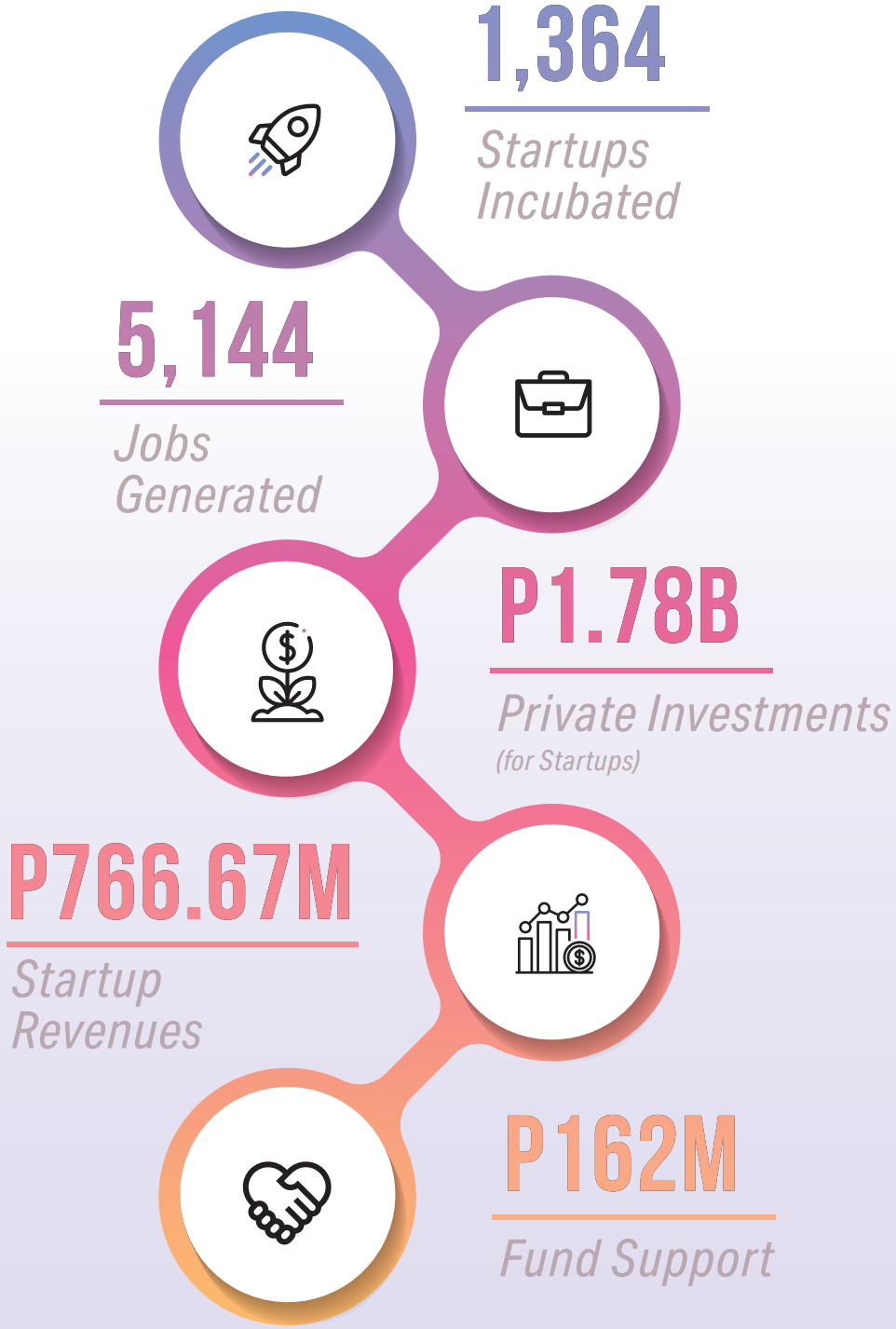
Vulnerability and Assessment Penetration Testing were conducted to ensure the security of the Twala Ecosystem. Additionally, the team enhanced the user interface and user experience of the Twala Sign app, introducing features like multiple documents signing, ordered signing and workflow, and API-embedded signing.

Twala's project highlights the transformative potential of blockchain technology in document management and electronic signatures. By enhancing security, improving user experience, and promoting sustainability, Twala addresses the inefficiencies and risks associated with paper-based workflows. The project's accomplishments, along with its contribution to the Philippine startup ecosystem, demonstrate the power of innovation to drive positive change in the country's digital landscape. As Twala continues to develop and integrate new features, it sets a promising precedent for the future of document management in the Philippines.

Technology Business Incubation

DOST-PCIEERD has established the Technology Business Incubation (TBI) Program to help the Philippine startup ecosystem. Since 2009, the Council has fostered the establishment of thirty-two (32) industry-based TBIs strategically situated in various areas across the country. TBIs assist aspiring technopreneurs and existing startups by, among other things, providing them with office and co-working spaces, mentoring and training programs, marketing assistance and networking, IP Strategy and IP Protection, and access to the university's network of alumni, innovation facilities, and business connections.

As of December 2022, the **32** PCIEERD TBIs has incubated a total **1,364** startups since 2018, with the following accomplishments:



TBI Program Accomplishments as of December 2022

DOST TBI NETWORK

54

Technology Business Incubator Facilities Across the Country

The revenues to date of the startups in the TBIs amounting to P767 million already surpassed the PCIEERD investment of P162 million to the TBIs.

The DOST TBI Network, including TBIs from DOST-PCAARRD (22 TBIs focused on agriculture and aquaculture), is presently comprised of 54 TBIs located in various HEIs and SUCs across the nation.

Recognizing the influence of TBIs on the startup community, additional technology business incubators must be established. However, creating a TBI requires extensive planning.

Through the Higher Education Institutions Readiness for Innovation and Technopreneurship (HEIRIT) Program, the DOST-PCIEERD provided universities with a structured preparatory program to guide and equip them to plan, implement, build, and start embracing the emerging startup community on their own universities.

Twenty-seven (27) HEIs and SUCs are currently being assisted under the HEIRIT Preparatory Program wherein fifteen (15) universities were already approved for funding assistance for the establishment of their own TBIs.

HEIRIT:Fueling Higher Education Institutions for Sustainable Innovation and Technopreneurship

Higher Education Institution Readiness for Innovation and Technopreneurship (HEIRIT) Preparatory Program for Starting TBIs

Project Title: HEIRIT: Handholding Starting Incubators from HEIs for Readiness towards Innovation and Technopreneurship Preparatory and Skills Acceleration for TBI Managers Optimizing Regional Startup Ecosystem (HIHEIRIT PA MORE!)

Project Leader: Miguel Carlo S. Guillermo

In the quest to foster innovation and entrepreneurship, the Higher Education Institution Readiness for Innovation and Technopreneurship (HEIRIT) Preparatory Program for Starting TBIs emerges as a transformative force. Led by the University of the Philippines Mindanao Growing and Developing Enterprises (UPGRADE), HEIRIT aims to address the challenges faced by Technology Business Incubators (TBIs) in the Philippines. By equipping HEIs with the necessary skills and knowledge, this program plays a pivotal role in empowering startups and early-stage entrepreneurs, ultimately contributing to the advancement of the technology business incubation system in the country.

The project's accomplishments include the successful delivery of the TBI Primer Course, which featured various lectures and workshops. These sessions covered topics such as community and network management, gender-smart business incubation, regional startup community establishment, establishing a startup culture within universities, and customer discovery.

These initiatives were designed to provide participants with a deeper understanding of the startup ecosystem, foster inclusivity, share experiences among funded HEI incubators, and facilitate stakeholder validation.

By equipping future TBI managers with the necessary skills and knowledge, the project ensures that TBIs operate effectively, supporting startups and MSMEs throughout their incubation journey. The establishment of operational and sustainable TBIs creates a conducive environment for innovation, fostering collaboration between the government, private sector, investors, and HEIs.

This collaborative effort strengthens the technology business incubation ecosystem, attracting talented individuals, innovators, and entrepreneurs. Moreover, the project's emphasis on strategic business planning and models enables TBIs to become self-sufficient and sustainable in the long run, contributing to the growth of the overall entrepreneurial landscape in the Philippines.

The HEIRIT Preparatory Program for Starting TBIs has been instrumental in enhancing the technology business incubation system in the Philippines. Through its comprehensive capacity-building initiatives, the project has trained future TBI managers, assisted HEIs in establishing TBIs, and fostered an entrepreneurial culture within universities.

By achieving these objectives, the project has paved the way for the growth of operational and sustainable TBIs, the commercialization of R&D, investment generation, and job creation. The project serves as a catalyst for innovation and technopreneurship, fueling the country's economic development and positioning it as a hub for startups and entrepreneurial endeavors.

Women Helping Women:
Innovating Social Enterprises

Women-Helping-W
Innovating Social
(WHWise) Progra

In 2021, the Council launched the Call for Proposals for the Women-Helping-Women: Innovating Social Enterprises (WHWise) Program, which aims to support women-led social enterprises who have a need to access technology, early-stage funding, and customized gender-focused support.

Women:
Enterprises
m

The program aims to provide funding support projects that fall within the following categories:

Requires specific technical assistance in refining their product – This includes programs/projects that provide specific technical expertise in redesigning the minimum viable product for the social enterprise. The output of this assistance is an improved product or service ready for validation.

Entails research & development assistance in improving their prototype into a market-ready product – This includes programs/projects that provide research & development support on developing the minimum viable product for social enterprises. The output of this assistance is marketable and validated products or services. Enterprises with early-stage prototypes that require assistance in product improvement, market testing, data gathering, market validation, business modelling, IP protection, and product certification were also supported.

In need for a specific technology – This shall include programs/projects that guide, capacitate, and provide support to the social enterprise and its community.

Unlike the Startup Grant Fund Program, all qualified women-led enterprises were provided with the following activities:

- Incubation
- Mentoring
- Business support program
- Capacity building
- Fabrication support
- Marketing and market validation

Under this program, the social enterprises should have a community to assist, and they should be able to train or capacitate the said community with the learnings they gathered during the incubation phase.

The support also included optimization of processes, acquisition of production capacities, business model validation, research on manufacturability of products/ optimization of value chains, mentoring, advisory, legal, and expert support, and use of facilities, among others.

For its 2022 Call Cycle, the WHWise Program has approved six (6) women-led social enterprises for funding, which are as follows:

1. RLGV Fruit Wine Industry - Commercialization of Sustainable Fruit Wine Enterprise Through Improve Processing Technology and State of the Art Facility in Cagayan Valley

2. Dulce Chocolates Inc. - Project SWEET PH-C: Standardization of Ways in Enhancing and Establishing Techniques in Processing Highland Cacao

3. Panublix Innovations Inc. - Panublix Weaving Enterprise Digital Enabler (PWEDE) - Developing A Web Platform to Onboard Rural Weaving Enterprises on the Digital Economy in Western Visayas and Cagayan Valley

4. Likhang Maragondon Native Products Trading - Quality and Product Enhancement of Community-produced Woven Bamboo Panels for the Housing Industry

5. Waste4Good Research Experimental - Improvement, Market Validation & Mass Production of W4G CAS (Compost Activator Solution) for biodegradable waste utilization of rural & urban communities

6. HeySuccess Virtual Assistant Services - Development, Implementation, and Validation of Mobile Learning Toolkit in Baguio City - La Trinidad - Itogon - Sablan - Tuba - Tublay (BLISTT)

REGIONAL DISTRIBUTION

15 APPROVED SOCIAL ENTERPRISES

Empowering Women Entrepreneurs: WHWise Program Sparks Innovation and Inclusion for a Thriving Nation

WHWise: Innovation thru Building and Leveraging Entrepreneurship Development, Networking and Inclusive Community Engagement for WomEntrepreneurs (iBLEnDNICE 4WomEn)

Project Leader: Dr. Jinky B. Bornales

Women-led enterprises have a crucial role in the socioeconomic development of the country. However, they still encounter barriers in a business landscape dominated by men. Additionally, juggling multiple responsibilities, such as household duties, further impedes women's ability to establish successful businesses.

Recognizing these challenges, the Women-Helping-Women: Innovating Social Enterprises or the WHWise program was designed to provide the necessary training and support to women-led enterprises, empowering them with entrepreneurial skills, a gender lens perspective, and local and international point of view to scale up their businesses.

It addresses the small number of women-led enterprises making significant contributions to the socioeconomic landscape. By implementing inclusive entrepreneurial activities and providing gendered lens strategies and technical assistance, the program aims to promote a culture of social innovation among women entrepreneurs. It also seeks to capacitate and empower women-led social enterprises from diverse backgrounds, including Indigenous Peoples, to navigate the business landscape in the post-pandemic era.

Furthermore, the program aims to provide a platform for national and international networking, fostering collaboration and knowledge sharing among women-led social enterprises.

The program has achieved significant milestones towards its objectives. The first cohort of women-led social enterprises was assigned to implementing universities for mentoring and monitoring. Learning labs were conducted to enhance the awareness and understanding of social enterprises on various concepts and frameworks. Additionally, strategic partnerships were forged with organizations such as Villgro Philippines, Social Enterprise Academy, and AyalaLand, providing access to funding, mentoring, and networking opportunities for the participating enterprises. The program's monitoring and evaluation tool facilitated needs-based interventions, ensuring targeted support for social enterprises.

Through community engagements and partnerships, the program promotes social entrepreneurship and showcases the ventures and advocacies of women-led social enterprises, increasing awareness and traction from both the online and offline communities.

WHWise stands as a beacon of empowerment for women entrepreneurs in the Philippines. By addressing gender biases, providing training and support, and fostering inclusive community engagement, the program is propelling the growth of women-led social enterprises. Its achievements in promoting social innovation, establishing strategic partnerships, and facilitating national and international networking highlight its significant contribution to nation-building. WHWise is transforming the socioeconomic landscape, creating opportunities, and inspiring a new generation of successful women entrepreneurs who are shaping a brighter future for the country.

Empowering Women through EdukSine: Transforming Independent Films in the Philippines

Project title: EdukSine App and Streaming Website

Program Title: Women-Helping-Women: Innovating Social Enterprise (WHWise) Program
Project Leader: Ms. Karen Jane Salutan

The Women-Helping-Women: Innovating Social Enterprise (WHWise) Program presents the EdukSine App and Streaming Website, a groundbreaking project led by Ms. Karen Jane Salutan. This initiative aims to address the limited exposure of socially relevant Filipino independent films and empower women-led social enterprises in the country. By creating a digital platform for these films, the project seeks to expand their reach and contribute to the local film industry's growth while championing women's entrepreneurship.

This project aims to bridge these gaps by providing a platform exclusively dedicated to independent Filipino films. Its objectives include developing the EdukSine app and website, expanding the client directory for schools and government offices, registering the platform with the Intellectual Property Office of the Philippines (IPOPHL), and establishing partnerships with at least ten independent film producers.

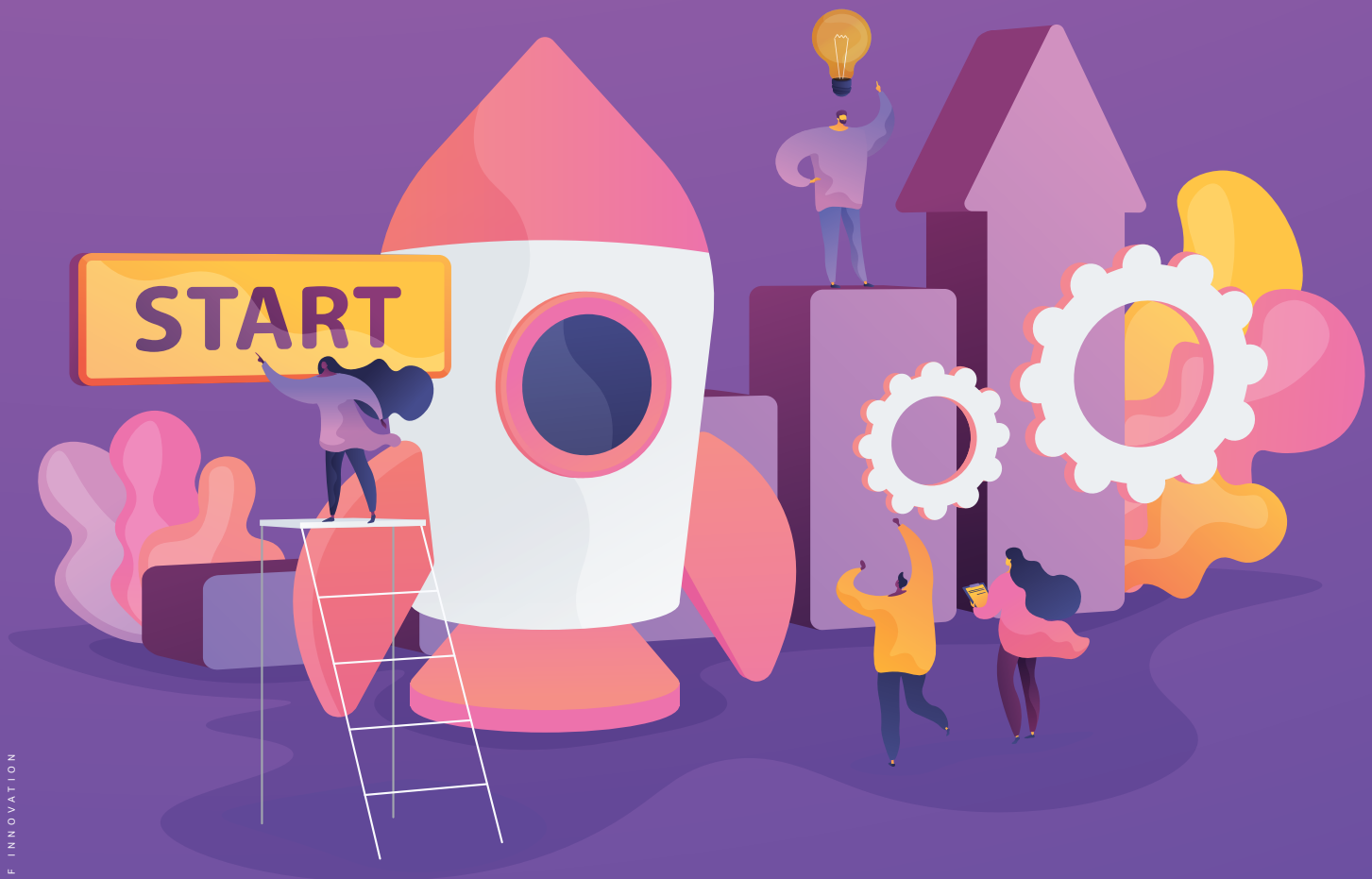
Notably, Ms. Salutan and her team, successfully launched the full website and streaming platform of EdukSine, making forty full-length films available to the audience. Additionally, they conducted sixty-six block screenings in schools and government offices between August and December 2022.

Through their efforts, they secured more than forty sponsorship contracts and signed over fifty Memorandum of Agreements with filmmakers and producers, showcasing the project's viability and support from various stakeholders.

The EdukSine project is a testament to the immense contribution of women-led social enterprises to the Philippine landscape. By empowering women like Ms. Salutan, it promotes gender equality in entrepreneurship and highlights the potential of women to lead innovative initiatives.

The project's focus on showcasing independent films with social relevance also amplifies the voices of marginalized communities and addresses important societal issues. By bringing these films to schools, government offices, and remote areas through block screenings and the EdukSine platform, the project fosters cultural enrichment and creates opportunities for dialogue and awareness. Furthermore, the project's revenue-sharing model supports filmmakers, actors, and directors, providing them with sustainable income and promoting the growth of the local film industry.

Homegrown Heroes Unite: Philippine Startup Week 2022 Sparks Innovation and Collaboration



The Philippine Startup Week 2022 (PHSW22) ignited a spark of inspiration and collaboration as it gathered the country's brightest minds, emerging startups, and global stakeholders in a celebration of innovation. With the resounding theme of "Homegrown Heroes: Cultivating Future Tech Giants," PHSW22 showcased the remarkable growth of the Philippine startup ecosystem and highlighted the importance of collaboration and community involvement.

PHSW22 delivered an array of captivating events, both online and offline, that captivated attendees throughout the week. The electrifying Opening Ceremony at the prestigious Blue Leaf Events Pavilion in Taguig City set the stage for an unforgettable experience, simulcasted live at the PHSW22 Virtual Hub in Accelevents. The Main Summits hosted by the Department of Science and Technology (DOST), the Department of Information and Communications Technology (DICT), and the Department of Trade and Industry (DTI) provided valuable insights into the future of the Philippine startup ecosystem.

In addition to the main summits, Community Events organized by accelerators, tech companies, schools, investors, and other organizations added depth and diversity to the program. Covering various topics and sectors, these events engaged participants and highlighted the remarkable progress of the PH startup ecosystem. To further enhance the networking and celebration, community partners hosted vibrant "Night Fest" gatherings, bringing together like-minded individuals to forge connections and revel in shared enthusiasm for startups.

In addition to the main summits, Community Events organized by accelerators, tech companies, schools, investors, and other organizations added depth and diversity to the program. Covering various topics and sectors, these events engaged participants and highlighted the remarkable progress of the PH startup ecosystem. To further enhance the networking and celebration, community partners hosted vibrant "Night Fest" gatherings, bringing together like-minded individuals to forge connections and revel in shared enthusiasm for startups.

The impact of innovation extends beyond startups and technology enthusiasts—it reaches the very heart of communities. PHSW22 recognized the importance of bringing innovation to the community, as it can address pressing societal challenges, improve lives, and drive local empowerment. By showcasing Filipino startups and their groundbreaking innovations, the event sparked inspiration among the public and encouraged future entrepreneurs. Fostering a culture of entrepreneurship and innovation at the grassroots level leads to job creation, economic resilience, and a thriving community that embraces change and progress.

The resounding success of the Philippine Startup Week 2022 showcased the remarkable growth and potential of the local startup ecosystem. With its emphasis on collaboration, innovation, and community involvement, PHSW22 served as a catalyst for the advancement of startups in the Philippines. By fostering partnerships, providing support systems, and showcasing local talent, the event laid the foundation for a thriving ecosystem that will continue to cultivate homegrown heroes and inspire the next wave of tech giants.

6th National Technology Business Incubator (TBI) Summit

The Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) in collaboration with UPGrADE TBI and Ideaspace QBO hosted the 6th National Technology Business Incubator (TBI) Summit on November 16 2022, which brought together key players in the startup ecosystem for a dynamic event. The summit, themed "Homegrown Heroes: Incubating Future Tech Giants," aimed to foster collaboration, highlight success stories, and investigate emerging challenges in the technology business incubation ecosystem.

The TBI Summit commenced with inspiring welcome remarks from DOST Secretary Dr. Renato U. Solidum, Jr., reaffirming the government's commitment to supporting the Philippine startup ecosystem. Dr. Enrico C. Paringit, the Executive Director of DOST-PCIEERD, provided updates on the Startup Development Program and highlighted the accomplishments of various programs aimed at nurturing startups.

The event featured two keynote speeches by industry leaders, Mr. Prim Paypon, Executive Director of AIM-DBI, shared valuable insights into supporting startups during challenging times and emphasized the core values essential for successful TBIs. Mr. Alfred Gersava, Co-Founder of Virtualahan, a Davao-based social enterprise, inspired future technopreneurs with his own startup journey and showcased the transformative power of innovation.

A panel discussion titled "The Unsung Homegrown Heroes: Their Inspiring Journey" provided a platform for startup founders from the Visayas region to share their challenges, successes, and the crucial role played by TBIs in shaping their growth. The panel discussion highlighted the significance of government support in their entrepreneurial journeys.

The event also marked the launch of the 2022 HEIRIT Program, which aims to foster innovation and technopreneurship in higher education institutions. Ms. Russell Pili, the Chief of PCIEERD Research Information and Technology Transfer Division, delivered a talk on the role of TBIs in the startup and innovation ecosystem, emphasizing the importance of capital, connections, and competency in incubation. Partnerships between TBIs and higher education institutions were also emphasized. Universities serve as ideal launchpads for startups, providing access to research facilities, mentorship, and a diverse talent pool. The HEIRIT Program further strengthens the collaboration between TBIs and higher education institutions, enabling them to jointly foster innovation, entrepreneurship, and technological advancement.

The 6th National TBI Summit successfully brought together stakeholders in the startup ecosystem to foster collaboration, showcase success stories, and launch initiatives aimed at incubating homegrown heroes. The event highlighted the importance of collaboration and partnership in driving innovation and nurturing the growth of startups, ultimately contributing to the development of a robust technology business incubation ecosystem in the country.

TEXCHANGE: Technology Exchange Summit 2022

On June 14-15, the TEXCHANGE: Technology Exchange Summit 2022, organized by the Department of Science and Technology-Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) and the Electronics and Telecommunications Research Institute (ETRI), served as a platform for collaboration, knowledge exchange, and technology transfer between Filipino researchers and companies and their counterparts from ETRI. The event aimed to foster synergy and catalyze innovation in the field of electronics and telecommunications.

The event brought together 187 participants from academe, industry, and government, who attended plenary sessions and breakout discussions. During the summit, participants engaged in a series of plenary sessions and breakout discussions.

Esteemed speakers from Korea and the Philippines shared their expertise and insights on diverse topics, such as connecting innovation ecosystems, renewable energy ICT convergence, human-care robot technology, and wireless communication. These sessions provided a platform for knowledge dissemination, showcasing ongoing research efforts, and promoting collaborative opportunities between the two organizations.

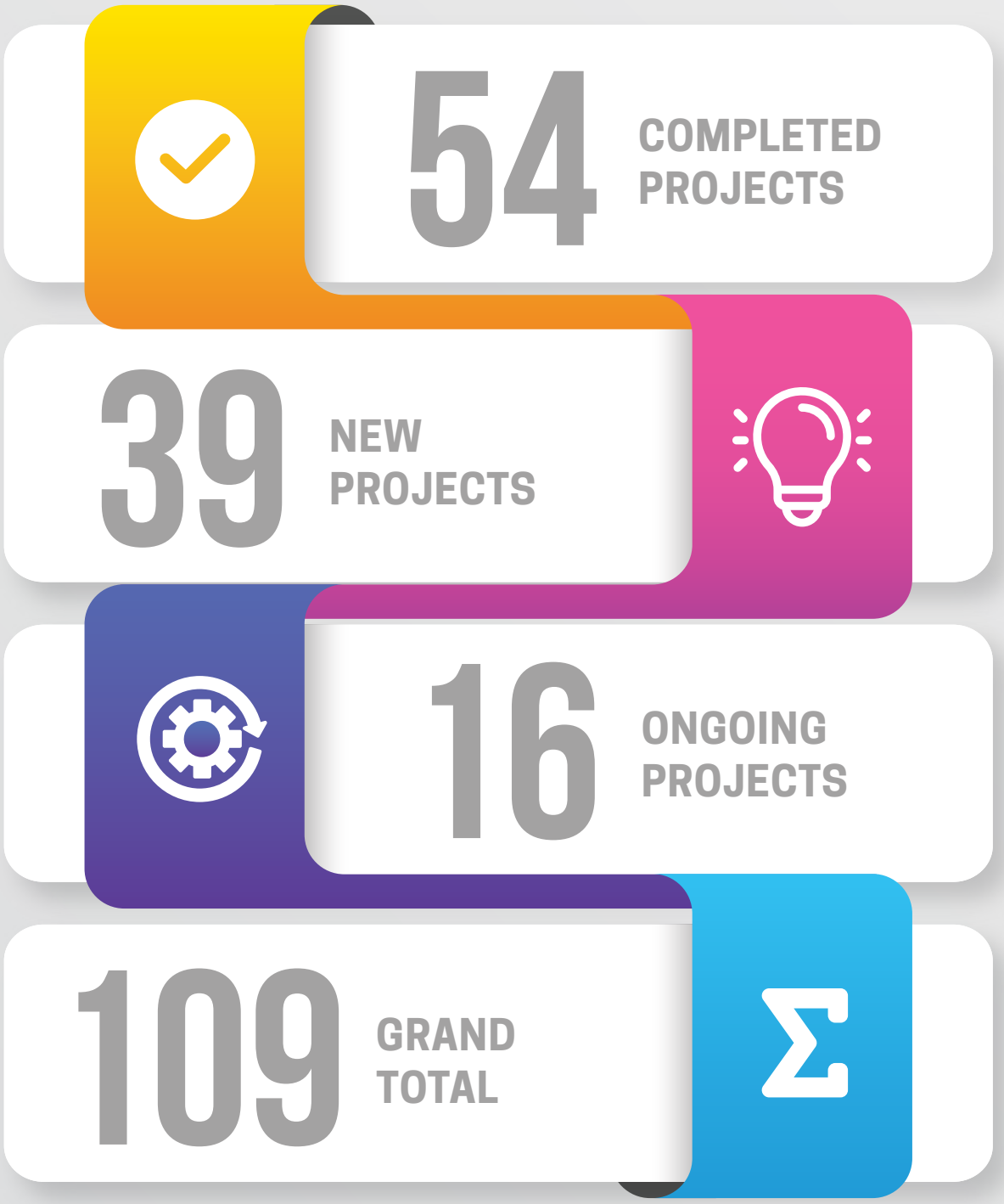
TEXCHANGE played a pivotal role in fostering collaboration between DOST-PCIEERD and ETRI. By bringing together experts and stakeholders from academia, industry, and government, the event created an environment conducive to collaborative research and technological advancement. Through shared experiences, discussions, and breakout sessions, participants explored potential areas of collaboration, identified mutual research interests, and laid the groundwork for future partnerships.

The visit of Dr. Jong Heung Park, ETRI Fellow and former Vice President of the SMEs and Commercialization Division of ETRI, added further significance to the event. Dr. Park's visit to DOST facilities provided an opportunity to assess the research and commercialization landscape in the Philippines. Additionally, discussions between Dr. Park and DOST officials, including Dr. Enrico Paringit and Dr. Leah Buendia, opened avenues for potential collaborations and knowledge exchange between the Philippines and Korea.

The event served as a catalyst for future innovations in electronics and telecommunications by connecting innovative ecosystems, exploring emerging technologies, and paving the way for fruitful collaborations. TEXCHANGE marked a significant milestone in the collaboration between DOST-PCIEERD and ETRI, setting the stage for a bright future of technological advancements and synergistic partnerships.

Research Information and Technology Transfer Division

in 2022 by the Numbers



Program Title	Project Title	Agency Name	Project Leader
	Enhancement and Validation of Zippee Logistics: A Franchise B2B Logistic Platform for Truck Owners and Franchisees	Other Agency	Alejandro James Chiongbian
	Enhancement of Local Disaster Reporting and Response System	Other Agency	Arnel Arreglado
	FILIPINNOVATION ENTREPRENEURSHIP CORPS 3 (FEC 3): COHORT 3 AND TRAIN-THE-TRAINER (TTT) MODULE – ENABLING RESEARCHERS TO ASSESS COMMERCIAL AND SOCIETAL VALUE OF THEIR RESEARCH	De La Salle University - Manila	Emilina Sarreal
	IMPACT: Establishment of Knowledge and Technology Transfer Processes for University of the Cordilleras	University of the Cordilleras	Thelma Palaoag
	IMPACT: The Enhancement of USTPs Intellectual Property Management and Establishment of Technology Commercialization Systems and Standards	University of the Philippines - Mindanao	Bronson Mabulay
	Market Segment Validation and Targeting for CodeChum, An Online Programming Class Platform	Other Agency	Jemar Jude Maranga
Fastrac Program	FASTRAC: Alama Project: Technology Development, Commercialization and Promotion of Gitara ni Juan		Crisron Rudolf Lucas
HeiRIT Development Program	HEIRIT Establishment of the DOST technology Business Incubation in UP Mindanao		Miguel Carlo Guillermo
HeiRIT Development Program	HEIRIT: Establishment of the DOST-TOMASInno Center TBI	University of Sto. Tomas (UST)	Raymond Marquez
HeiRIT Development Program	HEIRIT: ESTABLISHMENT OF THE SABATAN: THE NUEVA VIZCAYA STATE UNIVERSITY TECHNOPRENEURS HUB	NUEVA VIZCAYA STATE UNIVERSITY	Cristina Salvosa
HeiRIT Development Program	IMPACT: Fostering Innovation to Galvanize HEI:s Tech Transfer (FIGHTT) - Saint Louis University	Saint Louis University	Engr. Cynthia Posadas
IP Management Program for Academic Institutions Commercializing Technologies (IMPACT)	IMPACT: Establishment of Technology Transfer and Utilization Processes and Services in Bulacan State University	Bulacan State University - Main	Dennis Dela Cruz
IP Management Program for Academic Institutions Commercializing Technologies (IMPACT)	IMPACT: SPRINGBOARD - Supporting Potential and Relevant IP as Next Generation Business Opportunities towards Acceleration of Research and Development	Batangas State University - Main	Albertson Amante
	Agrabah: An Agriculture Technology Platform for Automated Logistics Booking for Farmers and Fisherfolks	Other Agency	Joselito Ocol
	Assistance to the Upgrading of Technology of LunchBox Project Superfoods Community Partners in Bulacan, Philippines.		Deborah Gay Estacio
	Augmentation Using Generative Adversarial Network for Violence Detection Videos		Eric John Emberda
	BAbae Livelihood AcceleratiNG Kasaba OpportunitY (BALANGKOY)	Department of Science and Technology - Region 2 (DOST 2)	Wilma Alvester
	Development and Market Validation of Empath, a Mental Health Mobile App for Youth in High-Stress Situations		Stephanie Angelica Naval

	Enhancement and Market Validation of Infinit LMS – a Learning Management System with Outcomes-Based Education Analytics	**Other Agency**	**Somerset Elcid Siang**
	Enhancement and Market Validation of Nutricoach (A work-from-home productivity tool for nutrition professionals)		Sharafiyah Amina Batua
	Enhancement and Market Validation of ROBIN (A reverse vendo machine for collecting PET bottles and aluminum cans)	Robin Machine Manufacturing	Bernadine Bobis
	Enhancement and Validation of the Advanced Robust Cooperative System (ARCS), an integrated Software-as-a-Service (SAAS) solution for cooperative management and regulatory compliance	Other Agency	Kevin Philip Gayao
	Enhancement of BizKit (The First Local Centralized Business Suite) to better facilitate cross-functional and holistic business operations in the new normal	BizKit Technologies Inc.	Jin Beryle Dela Cruz
	Enhancement of Material Property of Lesstics Roofing Tile (Bio-based Insulation Polymer/Waste Single-Used Plastic Composite)	Lestics Inc	Kenno Michael Uy
	Enhancement of the Prototype and Market Validation of Traceability Access for Consumer and Export powered by Artificial Intelligence (TrACE.AI) Software System	Other Agency	Cherry Cubacub
	Enhancing the MSME Supply Chain Experience by Integrating Cold Chain Solutions in DeliverE 2.0	Other Agency	Arvi Miguel
	Establishment of the Innovation and Development Accelerators Consortium for Startups in Davao Region (IDEAS-Davao Region)		Miguel Carlo Guillermo
	ExperTISE Project: Ameliorating the non-net metering grid-tie solar PV systems		Clark Darwin Gozon
	Exporter Incubation and Predictive Intelligence for Exporters – Improving the Capabilities of eCExport, an AI-powered export incubation platform for Filipino MSMEs	Enderun College	Ghian Carlo Marucot
	FASTRAC: Enhancement and Market Validation of TITAN Vision based Traffic Information and Analysis	La Salle University	Joel Ilao
	FASTRAC: Establishment of a Spin-off Facility and Pilot Plant for Fruitect Coatings for Shelf-Life Extension of Fresh Fruit Produce		Rhea Mallari
	HEIRIT ReSEED: Development and Acceleration Support for Innovation Growth in Central Visayas (DASIG Central Visayas)	Silliman University	Janice Antoniette Forster
	HEIRIT ReSEED: Unified Movement in Western Visayas to Accelerate Startup and SpinOff Development (UMWAD Western Visayas)		Carmelo Ambut
	IMPACT Operationalizing Technology Transfer in T.I.P.: A Reference for T.I.P. Initiatives to Strengthen the Innovation Ecosystem	Technological Institute of the Philippines Manila - Arlegui Campus	Jennifer Enriquez
	IMPACT: Establishment of the Technology Transfer and Commercialization Management System at Cagayan State University	Cagayan State University	Jose Guzman

	IMPACT: Enhancing the Technology Transfer Processes of the TUPV Intellectual Property and Technology Transfer Office (TIPTTO)	Technological University of the Philippines – Visayas	Engr. Gregorio Crisostomo
	IMPACT: Establishment of Adamson University Technology Transfer Processes	Adamson University	Engr. Raymond Raguindin
	IMPACT: Establishment of Technology Management System at Samar State University	Samar State University	Vivian Moya
	IMPACT: Establishment of Technology Management System at UP Mindanao	University of the Philippines (UP)	Lynda Buenaobra
	IMPACT: Establishment of the Knowledge, Innovation and Technology Transfer Processes of the Holy Angel University	Holy Angel University	Gina Tumang
	IMPACT: Establishment of the SU-KTTO at Silliman University, Dumaguete City, Negros Oriental	Silliman University	Klint Ian Austero
	IMPACT: Establishment of University of Mindanao Technology Transfer and Intellectual Property Management Office (UM-TTIPMO)	University of Mindanao - Bolton	Chosel Lawagon
	IMPACT: Reinforcing the Capability of the Technology Transfer Program of the DOST-Forest Products Research and Development Institute	University of the Philippines - Open University	Maria Reyes
	IMPACT: Strategic Enhancement of Technology Transfer and Business Development Operations and Programs of the Philippine Nuclear Research Institute	DOST-Philippine Nuclear Research Institute	Gregory Ciocson
	IMPACT: Teknoy InACT - Teknoy Innovation Advancement through Commercialization and Technology Transfer	Cebu Institute of Technology University	Junaline Sapariya
	Implementation of the Innovations for Filipinos Working Distantly from the Philippines (iFWD PH) Program	DOST NCR	Jose Patalinjug III
	Rapid Appraisal of the Status and Prospects of Rabbit Meat Industry in the Philippines	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development	Meliza Abeleda
	Support for DOST Technology Business Incubators (TBIs) through Launchgarage Innovation Hub Acceleration Program	DLSU Animo Labs Foundation, Inc.	Federico Gonzalez
	Support to the Issuance of Fairness Opinion Report for Technology Transfer Activities of the DOST-Generated Technologies thru the DOST Regional Offices (ROs) as Receiving Offices and FOB Secretariat	DOST NCR	Jose Patalinjug III
	Support to the Operation of the Central Luzon Industry and Energy Research and Development Consortium (CLIERDEC) for 2022	Other Agency	Marilene Hipolito
	Technology Innovation for Commercialization (TECHNiCOM 2.0) Program		Caezar Angelito Arceo
	TRANSFORMING R&D OUTPUTS INTO INNOVATIONS THROUGH TECHNOPRENEURSHIP AND CUSTOMER VALIDATION (TransDI)	DOST IV-B	Ma. Josefina Abilay
	TRUE IMPACT: Technology and Research of USeP Enhanced through IMPACT	University of Southeastern Philippines - Main	Philip Despares
	VISSER::REFRESH (Redesigning for Remote Education, in School and at Home)	University of the Philippines-Diliman	Giovanni Tapang

Human Resources Development

Human Resource Development Program (HRDP)

It is no secret that the Philippines has a wealth of talented researchers and scientists, but it is equally important to nurture their knowledge and skills to conceptualize and undertake scientific projects. This is where the Human Resource Development Program (HRDP) by DOST-PCIEERD comes into play.

The HRDP is an excellent initiative that aims to develop and enhance the research and development capabilities of Filipinos in industry, energy, and emerging technology sectors. The program provides various components such as Visiting Experts, Research Attachment, DOST Facilities and Laboratory Access Grant (FLAG), Presentation of results in Conferences, Publication in S&T Journals, Support for Conferences/Seminars/Workshops, Presentation of Scientific Outputs in Conferences, Symposia, Fora and Seminars, Researchers on Industry, Energy, Emerging Technologies – Opening Opportunities for Learning (RIEETOOL), Providing Resources, Opportunities and Support for the Project-Based Personnel and Researchers (PROSPPER), Balik Saliksik, Good Governance through Data Science and Decision Support System (GODDESS) Program, Regional Research Institution (RRI), and Expert Intervention for Scientific Engagement (ExpertISE).

These components aim to support Filipino researchers and scientists by providing them with the necessary tools and resources to excel in their fields. By nurturing the capacity of Filipinos to undertake and conceptualize scientific projects, the HRDP is helping to create a brighter future for the Philippines in the industry, energy, and emerging technology sectors.

From 2021 to date, the HRDP program was harmonized with existing systems of DOST and DOST-PCIEERD by submitting the proposals under the DOST Project Management Information System (DPMIS) and the call for proposals were also scheduled. The procedures and guidelines were revised/updated to respond to the existing needs and requirement of the program and complement the human resources needs of IEET.

Photo during the conduct of the 4th Philippine Silk Summit

Photo during the conduct of the Federation of Engineering Institutions of Asia and the Pacific (FEIAP) 30th General Assembly and 6th International Convention

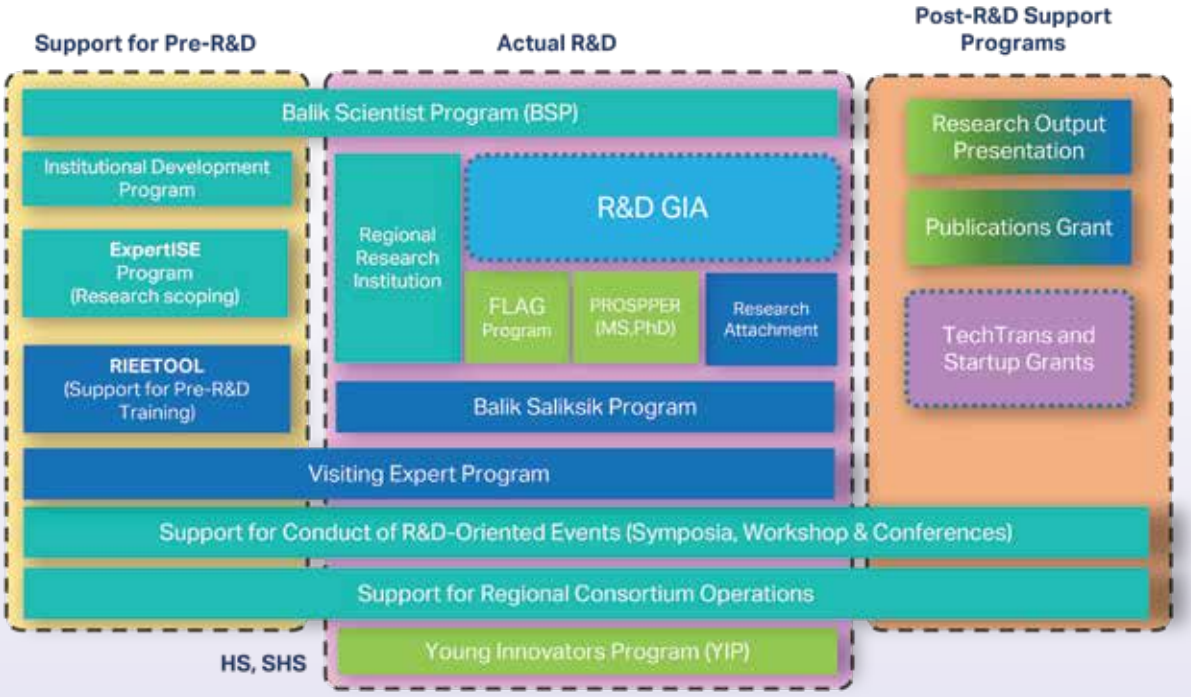
Photo during the conduct of the 1st Caraga Food Safety Summit

A photo from the 1st Philippine Textile Congress

A glimpse of the workshop for LGUs during the Visions of a Smart METRO A Smart City Seminar and Workshop Series

A shot during the Conduct of Workshop on Radiological Environmental Impact Assessment for Nuclear Installations

Pre-, con- and post-R&D HRI Support Programs



- Undergraduate
- Graduate
- Postgraduate
- University &
- RDI-based Researches

Key actors:

- Students
- Researchers/Academics
- Institutions (HEIs and RDIs)
- Enterprises/Startups

Beyond PCIEERD-HRIDD

Visiting Expert Program

The program is open to institutions needing faculty members or experts from another institution who possesses the required expertise not available in the requesting institution. The program may also be extended to foreign visiting experts under meritorious cases where the expertise is not available locally.
The program can be conducted for a maximum of one (1) year.

Support for the Conduct of Seminars, Conferences, and Trainings

The program provides assistance to academic institutions as well as scientific and professional organizations in the conduct of seminars, conferences, workshops, fora, and trainings which aim to contribute to the development and enhancement of R&D capabilities in the industry, energy, and emerging technology sectors.

Presentation of Scientific Outputs in Conferences, Symposia, Fora and Seminars

This component encourages Filipino researchers to be more productive by providing support for dissemination of research outputs in the sectors in local and international conferences, fora, and similar events and for recognition of Filipino researchers in the international science community.

Researchers on Industry, Energy, Emerging Technologies – Opening Opportunities for Learning (RIEETOOL)

The program aims to develop capabilities of Filipino researchers, scientists, and engineers (RSEs) to complement the human resources and skills requirements of the industry, energy and emerging technology (IEET) sectors, specifically to provide support to: (1) attendance to highly specialized trainings; and (2) conduct of group trainings to acquire specialized skills and new knowledge in the IEET sectors.

Providing Resources, Opportunities and Support for the Project-Based Personnel and Researchers (PROSPPER)

This program covers assistance for graduate scholarship of project personnel for PCIEERD-funded and other monitored projects (DOST-GIA funds) for the conduct and completion of their graduate degrees while gaining research experience in the said project/s.

Regional Research Institution (RRI)

This program aims to develop the research capabilities of the PCIEERD Regional Consortium member institutions and eventually increase the available Researchers, Scientists, and Engineers (RSEs) in the region. This funding opportunity encourages new researchers and/or new institutions from Higher Education Institutes (HEIs), government Research and Development Institutes (RDIs), non-profit S&T networks and organizations, the private sector, and other proponents seeking funding for their R&D initiatives.

Research Attachment

This is open to MS and PhD students, degree holders, and project staff of a DOST-PCIEERD or DOST-funded project, in the science and engineering sectors, who need to conduct their research in a host institution, including foreign universities and research institutions to avail of the host institution's facilities and research expertise. The foreign host institution may be identified by DOST-PCIEERD or the grantee, and in the latter case, should be acceptable to DOST-PCIEERD. The duration of the research attachment or fellowship must be for a maximum of 1 year.

DOST-Facilities and Laboratory Access Grant (FLAG)

This is open to undergraduate (BS) and graduate (MS/PHD) students who will conduct research projects directed towards developing emerging technologies and exploring innovations in the PCIEERD sectoral priority areas such as, but not limited to, materials research, electronics, and applied physics. The grant is an outright research subsidy which will finance expenses for testing and analysis fees specifically in the use of any of the equipment in the identified DOST- and DOST-funded facilities, centers, and laboratories, e.g., ADMATEL, EPDC, etc.

Balik Saliksik

This is open to all new Filipino Ph.D. graduates who have obtained their Ph.D. locally and abroad for the conduct of research projects upon their return to the respective institutions/universities.

Publication of Scientific or Research Papers in Scientific or Technical Journals

This program aims to support researchers, faculty, and other S&T personnel of academic and research institutions for the publication of research results in refereed scientific/technical journals and related publications.

Good Governance through Data Science and Decision Support System (GODDESS) Program

This program aims to provide assistance for the development of appropriate systems and technologies to address the specific needs of the National Government Agencies (NGA), Local Government Units (LGU), academic or research institutions and Micro, Small and Medium Enterprises (MSMEs) and enable them to adapt data driven governance and evidence-based management.

Expert Intervention for Scientific Engagement (ExpertISE) for Regional Consortia

This is open to researchers of the PCIEERD Regional Consortia. The grant is intended for an engagement with an industry partner in their regions for the identification of potential niche or project scoping, industry gaps and challenges, and the development of a project that addresses the identified gaps and challenges that can be submitted to PCIEERD or DOST for funding. All institution members of the PCIEERD Regional networks can submit proposals.

PCIEERD Human Resource Development Program (HRDP 2022 Approved Projects)

Visiting Experts			
Project Title	**Implementing Agency**	**Project Leader**	**Visiting Expert**
DOST HRDP Visiting Expert Program	DOST-Philippine Nuclear Research Institute (PNRI)	Dr. Cheri Ann Dingle	Dr. Roberto Bedogni Expertise: Nuclear science and technology Institution: Laboratori Nazionali di Frascati Roma
Enhancement of the Food Innovation Capabilities of the Faculty and Researchers of the Negros Oriental State University (NORSU)	Negros Oriental State University (NORSU)	Dr. Edwin F. Romano	Dr. Denis Marvin Santiago Expertise: Institution: University of the Philippines Los Baños
Integrated Human Resource Development of Food Innovation Center's in Caraga through the Visiting Expert Program	DOST-Caraga Region	Engr. Noel M. Ajoc	Expert: Dr. Rona Camille M. Lizardo Expertise: Food Science Institution: University of the Philippines Los Baños

Facilities and Laboratory Access Grant (FLAG)			
Project Title	**Implementing Agency**	**Project Leader**	**Undergraduate Students**
Production of Bio-Briquettes from Nanosized *Durio zibethinus* (Durian) Peels and Seed Starch Adhesive	University of Mindanao	Mr. Jay Carlos S. Aguilar	1. Alondra M. Balaba 2. Lady Mae S. Galupa 3. Danica Gementiza
Funko Bats (Fungal Quinone Batteries: A Sustainable Energy Storage from Fungal Quinone Extraction	Polytechnic University of the Philippines	Ms. Lourdes V. Alvarez	1. Bamuya, Glenn Christian G. 2. Lucas, Paolo Nicko M. 3. Lazo, Keith Mariz P.
Catalytic Zeolite PH: Hydrothermal Transformation of Pangasinan Clinoptilolite and Kaolin to ZSM-5 and its Potential Application to the Thermocatalytic Depolymerization of Polyethylene	Polytechnic University of the Philippines	Mr. Chester C. Deocaris	1. Milambiling, Dave Ahsaelle M. 2. Galang, Jhune Dominique. 3. Arce, Mary Rose L.
BIO-INSULATION: Low-cost Aerogel with Heat and Sound Insulation Properties From Spent Mushroom Substrate and Coir Fiber	Polytechnic University of the Philippines	Dr. Lourdes V. Alvarez	1. Fermin, Jhoana A. 2. Gabriel, Sony Jayag M. 3. Roque Bonita P.
Design of a 3D Printed Polymer-Based Adsorbent Containing In-Situ Grown Waste PET Plastics-Derived Metal Organic Framework for Effective Removal of Textile Dye from Polluted Water	Batangas State University	Mr. Lawrence V. Portillo	
Characterization of Non-metallic Mineral Deposit Found in General Santos City and Sarangani Province	Mindanao State University – Gen San	Dr. Ryan G. Banal	1. Godfrey Saloria
Nitrogen-doped Carbon Aerogel Derived from Lignin and Cellulose Nanofibers Extract of Dried Mango (Mangifera indica) Leaves as Electrode for Supercapacitors	Batangas State University	Mr. Ace Albert Angeles	
Green synthesis of silver nanowires using A. scholaris leaf and bark extracts for flexible electrode application	UP Visayas	Ms. Kimberley Sucias	

Good Governance through Data Science and Decision Support System (GODDESS)		
Project Title	**Implementing Agency**	**Project Leader**
Predicting Malnutrition among Children Under-Five Years Old with the Use of Classification Techniques in Data Mining	DOST FNRI	Ms. Mae Ann Javier
Development of a Data-Driven Student Support System using Admission to Graduation Data	Mariano Marcos State University	Mr. James Patrick Acang
Development of QP Data Analytics and Recommender System for Effective Monitoring and Management (QP-DAREM)	Camarines Norte State College	Mr. Edgar Bryan B. Nicart
Development of an integrated Barangay Civil Registration and Information System (BCRIS) optimizing Data Analytics for a smarter e-governance of the City of Tayabas	Colegio de la Ciudad de Tayabas	Dr. Raymond Bermudez
Predictive Modeling on Student Metrics for School Effectiveness	Liceo de Cagayan University	Dr. Maria Felicitas M. Mamauag
Data-Driven Decision Support System for Groundwater Level Monitoring in Los Baños, Laguna: The Application of Time-Series Analysis and Machine Learning Techniques	University of the Philippines Los Baños - School of Environmental Science and Management - Interdisciplinary Studies Center for Water	Mr. Allan Tejada
eScholar: a Mobile Responsive Web App for Educational Benefit System Unit (EBSU) with Prescriptive Analytic	University of Mindanao - Bolton	Mr. Reban Cliff Fajardo
ProWESS (Provincial Workforce Enabling System thru Scholarships): A scholarship registry, monitoring dashboard and job matching prediction system for the Province of Davao del Sur	UM Digos College	Dr. John Vianne Murcia
Business Intelligence Data Driven Assistant (BIDDA) for DOST SETUP Adoptors Business Performance	Isabela State University	Dr. Arnel C. Fajardo

Providing Resources, Opportunities and Support for the Project-Based Personnel and Researchers (PROSPPER)		
Project Title	**Implementing Agency**	**Project Leader**
Method Validation for the Simultaneous Determination of Cation and Anion in Lake Water using Dual Channel Chromatography in correlation with Ion Selective Electrode for Ammonia (PROSPPER)	UP Los Baños	Mr. Alvin Manuel M. Traje

Research Attachments		
Project Title	**Implementing Agency**	**Project Leader**
ROS-Compatible Autonomous Indoor Navigation Robot using a 2D Lidar Sensor	University of Santo Tomas-Research Center for Natural and Applied Sciences	Dr. Sherwin John Dignadice
Solvothermal Carbonization of Carbon-Based Industrial Waste into Carbon DotPhosphors for WLEDapplication	Western Mindanao State University	Mr. Najeeb Sadjari Abdulla

Presentation of Scientific Outputs in Conferences, Symposia, Fora and Seminars		
Project Title	**Implementing Agency**	**Project Leader**
Synthesis of forward osmosis membrane from Ananas comosus-silica composites for desalination application	UPLB	Dr. Liza B. Patacsil
Effect of silica/MBNT/BNT ternary filler on the curing properties of natural rubber vulcanizates 2022 9th International Conference on Mechanics, Materials Manufacturing Publication in Key Engineering Materials	UPLB	Ms. Clare L. Garing
Presentation of poster entitled "Effect of heating temperature on the perception of aroma and flavor attributes of selected Philippine Virgin Coconut Oil (VCO)"	UP Diliman	Ms. Alrisse Rae Basinang
Grafting of poly (glycidyl methacrylate) onto abaca woven fabric as interface compatibilization for composite reinforcement – Presentation in the Second International Conference on Applications of Radiation Science and Technology (ICARST-2022)	DOST-PNRI	Ms. Bin Jeremiah D. Barba
Electron beam-induced synthesis of amine and carboxylic type adsorbents from abaca-polyester fabric via pre-iraradiation technique for Pb (II), N(II), and Cd(II) ion adsoption – Poster Presentation in the Second International Conference on Applications of Radiation Science and Technology (ICARST-2022)	DOST-PNRI	Mr. Patrick Jay Cabalar

Researchers on Industry, Energy, Emerging Technologies – Opening Opportunities for Learning (RIEETOOL)		
Project Title	**Implementing Agency**	**Project Leader**
Basic Training Course on the Theory and Applications on Finite Element Analysis using MSC Software	FEATI University	Engr. John Gabriel Decena
Attendance to the 2022 CIMPA Summer School on Mathematical Methods in Data Analysis	University of the Philippines Los Baños	Dr. Neil Jerome Egarguin
Attendance to Training in Nanophotonics Technology Center (NTC) at Universitat Politècnica de València	Department of Physics, Ateneo de Manila University	Mr. Kent Emmanuel Cobarde Soria
Digital Twin Skills Training Using ODeSSEE Towards Open Data Platform of Cagayan Valley Smart City Belt	Isabela State University Cauayan Campus	Dr. Betchie E. Aguinaldo
Visions of a Smart METRO: Modern Geospatial Technologies to support Smart City Development	University of the Philippines Training Center for Applied Geodesy and Photogrammetry (UP TCAGP)	Dr. Czar Jakiri Sarmiento
Attendance to the 2022 CIMPA Summer School on Mathematical Methods in Data Analysis	University of the Philippines Los Baños	Ms. Destiny Lutero
Fundamentals of Deep Learning Workshop	Engr. John Anthony Jose	De La Salle University Manila

Researchers on Industry, Energy, Emerging Technologies – Opening Opportunities for Learning (RIEETOOL) Training on Additive Manufacturing with Machine Learning and Artificial Intelligence at The University of Tennessee, Knoxville		
Project Title	**Implementing Agency**	**Project Leader**
Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	ITDI	Dr. Persia Ada N. De Yro
Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	ITDI	Dr. Marianito T. Margarito
Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	ITDI	Engr. Alvin Kim M. Collera
Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	MIRDC	Engr. Leif Oliver B. Coronado
Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	MIRDC	Ms. Laureen Ida M. Ballesteros
Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	ASTI	Mr. Elmer C. Peramo

Publication of Scientific or Research Papers in Scientific or Technical Journals		
Project Title	**Implementing Agency**	**Project Leader**
Full factorial design analysis of the facile synthesis of organo-conjugated carbon quantum dots from glycerol	DOST-ITDI	Engr. Roland Andrew Cruz
Agent-based Modelling of COVID-19 Transmission in Philippine Classroom	UP Los Baños	Mr. Jcob C. Malaguit
Optimization of *Durio zibethinus* (Durian) Fiber-reinforced composite as automotive skin material	University of Mindanao-Bolton	Engr. Jay Carlo S. Aguilar

Balik Saliksik		
Project Title	**Implementing Agency**	**Project Leader**
A Real-time Flying Insect Recognizer and Locator Tool utilizing Binaural Signals for Portable and Constrained Devices	University of the Philippines Visayas (UPV) - Tacloban College	Dr. John Paul Tan Yusiong
Development of operational seasonal prediction system for tropical cyclone passages in the Philippines	DOST-PAGASA	Dr. Joseph Basconcillo
Microbial Biobank for Lactic Acid Bacteria (LAB) from Traditional Fermented Shrimp *(Acetes sp.)* and Anchovies *(Encrasicholina sp.)* in Western Visayas	ISATU	Dr. Francis Legario

Support for the Conduct of Seminars, Conferences, and Trainings		
Project Title	**Implementing Agency**	**Project Leader**
1st Philippine Textile Congress	DOST- Philippine Textile Research Institute	Mrs. Zaila Flores Payag
1st Philippine Handloom Weaving Conference: Weaving a Sustainable and Inclusive Future	DOST- Philippine Textile Research Institute	Ms. Jenneli Espolita Caya
4th Philippine Silk Summit	DOST- Philippine Textile Research Institute	Ms. Cheryl Gulay Lopez
Integration of RTK-GPS module for Autonomous Outdoor Navigation of Mobile Land and Aerial Robots	University of Santo Tomas	Dr. Anthony James Constante Bautista
Visions of a Smart METRO: A Smart City Seminar and Workshop Series	University of the Philippines Training Center for Applied Geodesy and Photogrammetry	Dr. Czar Jakiri S. Sarmiento
CIMPA SCHOOL PHILIPPINES 2022 Mathematical Modeling of Ecosystems	Caraga State University	Dr. Jayrold Provendido Arcede
Caraga Food Safety Summit	DOST Caraga	Engr. Noel Mozo Ajoc
Conduct of Workshop on Radiological Environmental Impact Assessment for Nuclear Installations	DOST- Philippine Nuclear Research Institute (PNRI)	Dr. Jessie Ollet Samaniego
The Federation of Engineering Institutions of Asia and the Pacific (FEIAP) 30th General Assembly and 6th International Convention	Philippine Technological Council	Dr. Lydia Gonzalez Tansinsin

Photo of the visiting scholars together with Dr. Rigoberto C. Advincula and graduate students of University of Tennessee, Knoxville

Dr. Banal and Engr. Saloria conducting experimental analysis at the Advanced Device and Materials Testing Laboratory (ADMATEL)

PNRI and PCIEERD Delegates together with Visiting Expert, Dr. Roberto Bedogni from the Laboratori Nazionali di Frastica Roma

Photo of the visiting scholars as they successfuly concluded their training at the UTK under the guidance of Dr. Advincula and Dr. Espera.

Blockchain Technology Training Program: Building Capacity for Sustainable Development in the Philippines

Blockchain technology is a digital ledger that records transactions and data in a secure and transparent manner, without the need for intermediaries. In the Philippines, blockchain is gradually gaining momentum in various sectors, including finance, arts, gaming, and education. However, the full potential of this technology has yet to be realized.

Recognizing the potential of blockchain for sustainable development, the Department of Science and Technology – Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) embarked on a program to capacitate the country's science, technology, and innovation (STI) professionals to explore blockchain technology and its practical applications in the Philippines.

The training program, launched in May 2022, aimed to develop specialists who could help build non-crypto applications that can be used by DOST in terms of processes, finance, security, networking, among others. Conducted in four batches from May to August 2022, around 84 participants completed the hands-on training in the fundamental and practical applications of blockchain technology.

The goal of the program was to support how government agencies could also use blockchain not just for conducting financial transactions and collecting taxes but also for identifying recipients of healthcare, financial assistance such as the Pantawid Pamilyang Pilipino Program (4Ps) conditional cash transfers, and emergency aid. There may also be other possible applications of blockchain technology in issuing passports and visas, registering patents and trademarks, recording marriage, birth, and death certificates, as well as maintaining the integrity of government records.

Top 5 Capstone Proposals

PCAARRD, TAPI, and CAR | Batch 1
Decentralized Intellectual Property Transactions Data and Analytics Platform

PHIVOLCS | Batch 1
Blockchain Enabled Hazard Assessment Service

PSHS | Batch 2
Blockchain for Portable Digital Credentials for PSHS

NCR | Batch 3
Unified Customer Profile Management Portal (Digital Customer ID), Redefining Digital Governance Simplifying S&T Services

CARAGA | Batch 4
Decentralization of the Modernized Philippine Government Electronic Procurement System Thru Blockchain Technology

33 Capstone Proposals developed

1. PCAARRD, TAPI, and CAR -Decentralized Intellectual Property Transactions Data and Analytics Platform
2. STII -Publications integration to Blockchain
3. PCHRD -Issuance of Certificates
4. DOST CO -Science Foundation Certificates Issuance & List of Due and Demandable Accounts
5. PHIVOLCS -Blockchain Enabled Hazard Assessment Service.
6. FPRDI -Blockchain Based Test Results
7. MIRDC -Documents and Records Management System
8. PCIEERD -Integration of Blockchain in Project Monitoring System
9. PTRI -NFT Certificates
10. PSHS -Blockchain for Portable Digital Credentials for PSHS
11. PCIEERD HRDP Proposal Evaluation Process (from application to approval)
12. FNRI. NNS Data Access System
13. MIRDC. PHILMET
14. STII and ITDI. Blockchain to increase patronage and awareness through Rewards Points and Creation of Service Currency (Dosthereum)
15. DOST ASTI. Blockchain in Philippine Government Procurement
16. PHIVOLCS. Blockchain-based Web Portal for DOST-PHIVOLCS Earthquake Data Requests
17. Region VII. Blockchain Technology: Food Supply Chain
18. STII, PCIEERD, Region XI. Website Content Management System: Securing Contents Using Blockchain
19. Region IX. Block-9 Academic Records Contract - EduChain
20. Region XII. eCertificate using Blockchain
21. NRCP. eRecruitment
22. Regional Office VI. Equipment Management System
23. Regional Office I. Acceptance of the test and/or calibration jobs payment scheme of onelab (RSTL) through blockchain technology
24. NCR. Unified Customer Profile Management Portal (Digital Customer ID), Redefining digital governance Simplifying S&T services
25. Region II. FOODx Bood blockchain with IOT for traceability of a finished product back to its origin. IoT to track the entire food supply chain almost instantaneously (in seconds)
26. PCIEERD. Improving the validation of proposal evaluation and project monitoring thru deep learning and blockchain
27. Region IV-A -CALABARZON. Traceability System for Coffee Industry using Blockchain Technology
28. SEI. Scholarship Administration Blockchain Application
29. Region V. Blockchain Technology CreditScore
30. PCIEERD. (DCSS) DOST – Document Centralized Sharing system through blockchain
31. MIMAROPA. Just an Online System for Hashing (JOSH)
32. CARAGA. Decentralization of the Modernized Philippine Government Electronic Procurement System thru Blockchain Technology
33. ITDI. Establishment of DOxSTChain to validate and authenticate government issued documents

BATCH 1 - 17

BATCH 3 -23

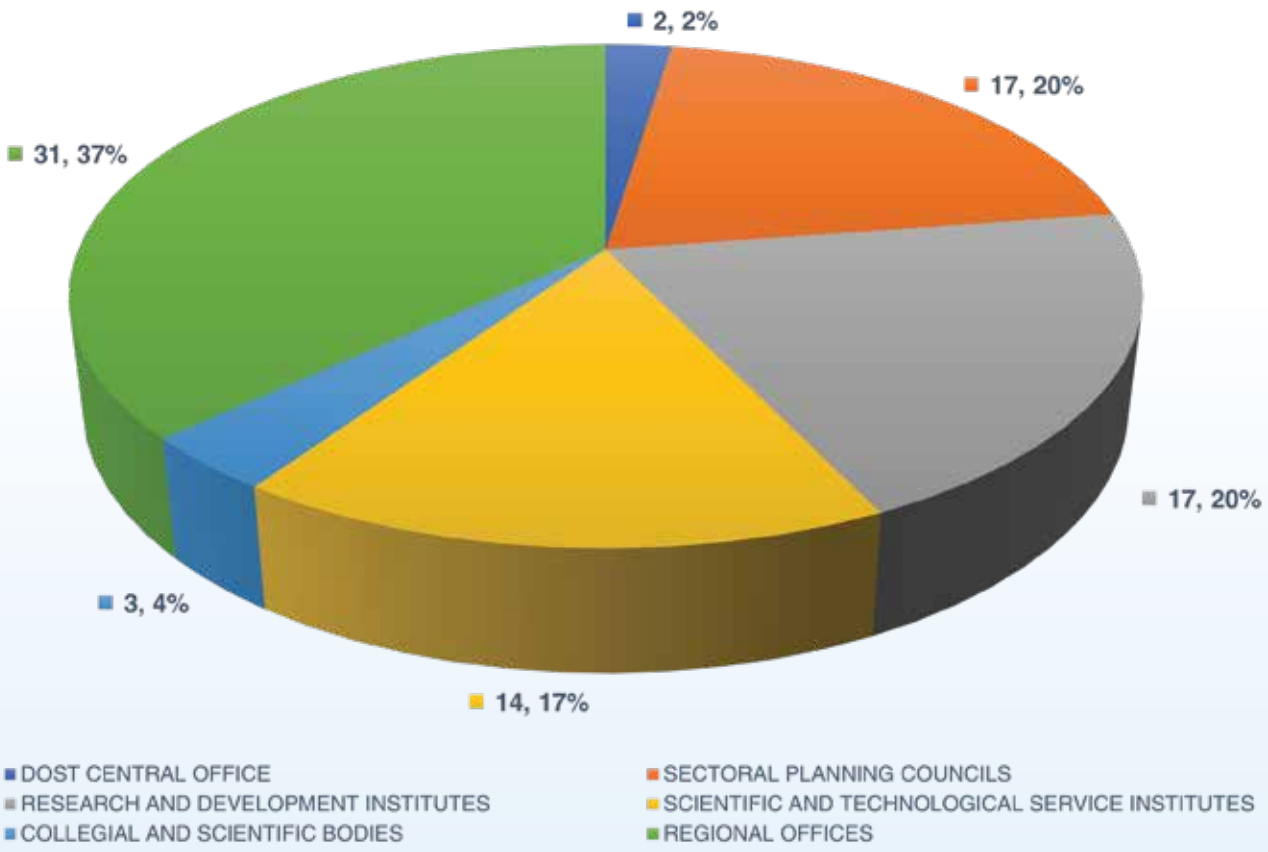
BATCH 2 - 20

BATCH 4 - 24

The result of the workshop will be used as input in formulating the Blockchain Technology Roadmap to be created by PCIEERD. The roadmap will consider the inputs from various stakeholders from the workshop and survey, as well as the learnings from the test network setup. With the prototypes and a clear roadmap in place, the deployment of the production network will initially be DOST-wide, with provisions to expand coverage to other agencies and the private sector.

Blockchain Technology Training Program is a significant step towards building capacity for sustainable development in the Philippines. The program not only enables STI professionals to explore blockchain technology and its practical applications but also contributes to the government's efforts to harness technology for the benefit of the Filipino people.

SUMMARY OF COMPLETERS PER INSTITUTION



2022 Balik Scientist Program (BSP) Awardees

DR. SAMUEL B. DULAY

EXPERTISE
Biosensor Technology

HOST INSTITUTION
Quirino State University

DURATION OF ENGAGEMENT

Phase I: 01 Mar 2022 - 03 Jun 2022 (95 days)
Phase III: 26 Jul 2022 - 19 Aug 2022 (25 days)

STATUS: Completed

ROLES/SUMMARY OF ACCOMPLISHMENTS

1. Updated syllabus that includes current edge technology like analytical chemistry and its application to various field. The field of expertise, i.e Nanoscience and Nanotechnology, Biosensor technology and Analytical Chemistry, greatly helped faculties that are teaching science field where topics on biosensor applications were included in the syllabus for each science courses offerings such as BS Criminology (forensic Chemistry) and Bachelor of Nutrition and Dietetics (Chemistry subjects).

2. Provided expert advice and technical expertise/consultations for the following:
   a. Development of sensing technology for routine monitoring and protection of crop
   b. Development of a reagentless needle proble sensor for soil and water: Environmental Monitoring
   c. Food packed (food for emergencies) using indigenous fruit and vegetables and other crop products guided by optimized good product practice intended for technology transfer and commercial launching
   d. Drinking water quality assessment (Physico-chemical and microbial
   e. Precision Agriculture
3. Mentored four (4) graduate students
4. Conducted various seminars and lectures on Biosensor Technology
5. Drafted manuscript titled, "Development of an electrochecmical oxygen microsensor for the measurement of dissolved oxygen in natural waters", which won first prize in Technology category in the 3rd Campus In-House Review of Ongoing and Completed Researchers at Quirino State University
6. Drafted an Institution Development Program (IDP) proposal titled, "ElectroChemical microsensor for Multiuse Application for Research Technology for the Proposed Quirino State University Interdisciplinary Watershed Research Laboratory" (Project: ECsensMART)

DR. NOEL PETER B. TAN

EXPERTISE
Nanoscience and Nanotechnology

HOST INSTITUTION
University of San Agustin

DURATION OF ENGAGEMENT

Phase I: 01 Jun 2022 - 03 Nov 2022 (156 days)
Phase II: 05 Nov 2022 - 15 Dec 2022 (41 days)
Phase III: 15 Jan 2023 - 06 Apr 2023 (82 days)
Phase IV: 15 May 2023 - 08 Aug 2023 (86 days)

STATUS: Ongoing

ROLES/SUMMARY OF ACCOMPLISHMENTS

Dr. Tan is expected to elevate the USA Department of Chemical Engineering into a globally competitive R&D active academic program. He will likewise aid in the establishment of the Center for Advanced New Materials, Engineering, and Emerging Technologies (CANMEET) that will significantly contribute to the R&D needs of the University. Moreover, his engagement will also be beneficial in encouraging more USA faculty and researchers thru the possible collaborations with local and international institutions.

DR. DJ DONN C. MATIENZO

EXPERTISE

Process/Chemical Engineering
Material Science
Technoprenuership

HOST INSTITUTION

1. UP Department of Chemical Engineering
2. Technological Institute of the Philippines

ROLES/SUMMARY OF ACCOMPLISHMENTS

Dr. Matienzo is expected to enhance the knowledge and skills of researchers and students in the field of electrocatalysis, hydrogen, and energy storage systems that are relevant to the ongoing projects being undertaken by the host institutions. He will also actively participates in writing the country's first textbook on renewal energy systems.

During his engagement, he will not only get involved in the implementation of the project titled, "CIPHER: Clean and Vertically-Integrated Pure/Applied Hydrogen Energy Research for Next Generation Power Systems" funded by the Commission on Higher Education (CHED) through the Philippine-California Advanced Recent Institutes (CHED-PCARI), but he will also develop several proposals, including the local development of cost-competitive hydrogen production, which is one of the priority areas under Sustainable Energy.

Being a researcher – entrepreneur, he will likewise provide technical assistance / expertise on various techno-entrepreneurship activities of UPD DChE and TIP that are significant in strengthening both the R&D and startup ecosystem.

DURATION OF ENGAGEMENT

01 Mar 2022 - 28 Feb 2024
(24 months / 2 years)

STATUS: Ongoing

DR. NEIL CONCIBIDO

EXPERTISE

Chemistry, Chemical Engineering, Bioprocess Technology, and Process Safety Management (PMS)

HOST INSTITUTION

UPLB Department of Chemical Engineering (UPLB DChE)

DURATION OF ENGAGEMENT

Mar 2022 to Aug 2023 (120 days)

STATUS: Ongoing

ROLES/SUMMARY OF ACCOMPLISHMENTS

Dr. Concibido's engagement is expected to improve the curriculum of Chemical Engineering in UPLB and enhance the knowledge and capabilities of students and faculty on the PSM. It will likewise be beneficial for UPLB DChE in developing their research capabilities related to process safety management

DR. ERNESTO J. GUADES

EXPERTISE
Structural and Earthquake Engineering

HOST INSTITUTION
Cebu Technological University

ROLES/SUMMARY OF ACCOMPLISHMENTS

1. Developed a proposal for the Establishment of Center for Earthquake Engineering which will serve as research hub making the Philippines more earthquake-resilient.
2. Established collaborations with HEIs, private and government agencies
3. Trained engineering faculty and researchers from Cebu Technological University on project proposal writing and journal publication
4. Drafted an IDP-proposal titled, "Establishment of the Hydraulics and Water Resources (HWR) Laboratory of CTU"

DURATION OF ENGAGEMENT

06 Jun 2022 - 03 Jul 2022 (28 days)

STATUS: Completed

DR. RODRIGO S. JAMISOLA, JR.

EXPERTISE

Robotics and Artificial Intelligence

HOST INSTITUTION

University of Science and Technology of Southern Philippines
Holy Name University

DURATION OF ENGAGEMENT

01 Jul 2022 - 04 Aug 2022 (35 days)

STATUS: Completed

ROLES/SUMMARY OF ACCOMPLISHMENTS

For USTP, he was able to:

1. developed three (3) proposals, as follows:
   a. Equipment Acquisition for Coir-based Building and Packaging Materials
   b. Power Optimization for Fruits and Vegetable Transportable Storage Box
   c. Development and Implementation of an Automated Mechanical Ventilator using Ambu-bag with IOT Monitoring
2. plan activities for the Hemodialysis Machine Project
3. conducted field visits at the USTP-Claveria campus and hemodialysis clinic for possible collaboration
4. created utilize plan for USTP's Center for Artificial Intelligence

For HNU, he was able to:

1. developed five (5) proposals,as follows:
   a. Development of a Mobile Application to Assess Dance Movements in the Creation of Dance Literature of Unpublished Four Bol-anon Dances
   b. Development of a Realtime ST-Elevation Detection Device on a 3-Lead ECG Using Machine Learning
   c. A Study on the Larvicidal Properties of Coffee Beans, Garlic, and Papaya Against Dengue-Carrying Mosquitoes
   d. Development of a Physical Attraction Mobile Application Recorded from a 30-Second Video Using Machine Learning from Human Kinesics
   e. Machine Learning Model to Predict Graduates' Employment
2. mentored at least 40 faculty and graduate students

During this engagement, he was also tapped by the Bulacan State University for the review of various proposals and projects related to mechatronics, pyrotechnique manufacturing, and drones.

DR. FIORELLO B. ABENES

EXPERTISE
Biofuels and Bioenergy

HOST INSTITUTION
Mariano Marcos State University

ROLES/SUMMARY OF ACCOMPLISHMENTS

1. Organized and capacitated three (3) cooperatives in Ilocos Norte and Cagayan on bioethanol collection, processing, and development.
2. Developed a novel and practical Methanol assay
3. Prototyped an ethanol-fueled cooking stove
4. Mentored junior researchers at the National Bioenergy Research and Innovation Center (NBERIC)
4. Assisted in analyzing, interpreting, and validating data from lambanog testing and cookstove
5. Provided advice and technical consultations on NBERIC proposals, including the Establishment of Flex-fuel Gasoline Station

DURATION OF ENGAGEMENT

10 Sep 2022 - 08 Dec 2022 (90 days)

STATUS: Completed

DR. SYRUS B. GOMARI

EXPERTISE
Urban Mobility Planning, Data Science, and Software Development

HOST INSTITUTION
City Government of Pasig and Taguig

DURATION OF ENGAGEMENT

Phase I: 01 Aug 2022 - 15 Dec 2022 (137 days)
Phase II: 04 Jan 2023 - 19 Aug 2023 (228 days)

STATUS: Ongoing

ROLES/SUMMARY OF ACCOMPLISHMENTS

Dr. Gomari is expected to conduct R&D activities as part of the pilot use case implementation with the two (2) LGUs to identify the best data-driven approaches to generalize their respective urban mobility contexts. His engagement will be beneficial in the government and academe collaboration as he will involve universities in Pasig and Taguig, such as, but not limited to the Pamantasan ng Lungsod ng Pasig (PLP) and Taguig City University (TCU), for the conduct of R&D-related activities. He is also expected to mentor and/or advise students, particularly in the fields of urban mobility, urban planning, data science, and computer vision.

DR. AARON RAYMOND A. SEE

EXPERTISE

Electrical Engineering, Assistive Device and Biomedical Engineering, Image Processing, Artificial Intelligence

HOST INSTITUTION

Cebu Institute of Technology – University

ROLES/SUMMARY OF ACCOMPLISHMENTS

1. Established linkage between STUST and CIT-U, where the student exchange MOA was formally signed last 15 Sep 2022
2. Mentored five (5) group of students (total of 13 students) that produced one (1) international journal paper and two (2) research papers:
   - 2.a. Aaron Raymond See, Monching Desierto, John Jefferson Sison, Chris Jordan Aliac (2022, Jul). Obstacle Detection and Monocular Distance Estimation on a Mobile Phone for the Visually Impaired and Blind. International Journal of Computer, Consumer and Control (IJ3C), 11(1),1.
   - 2.b. Aaron Raymond See, Mark Kenith Simbajon, Ray Anthony Solis, Joshua Carl Manigos, Chris Jordan Aliac. Indoor Navigation using Pedestrian Dead Reckoning (PDR) and Feature Extraction (ORB) with obstacle detection technology for the visually impaired
   - 2.c. Aaron Raymond See, Monching Desierto, John Jefferson Sison. MobileScan: A 3D Modeling Solution to Accessible Devices
3. Conducted seminar on Design Concepts of Assistive Device Technology which was attended by at least 150 faculty and students.
4. Drafted one (1) concept proposal with CIT-U, for further development

DURATION OF ENGAGEMENT

25 Jul 2022 - 22 Sep 2022 (60 days)

STATUS: Completed

DR. KHINO J. PAROHINOG

EXPERTISE

Energy Science and Technology, Nanotechnology for Energy and Environmental Applications

HOST INSTITUTION

University of Mindanao
University of St. La Salle

DURATION OF ENGAGEMENT

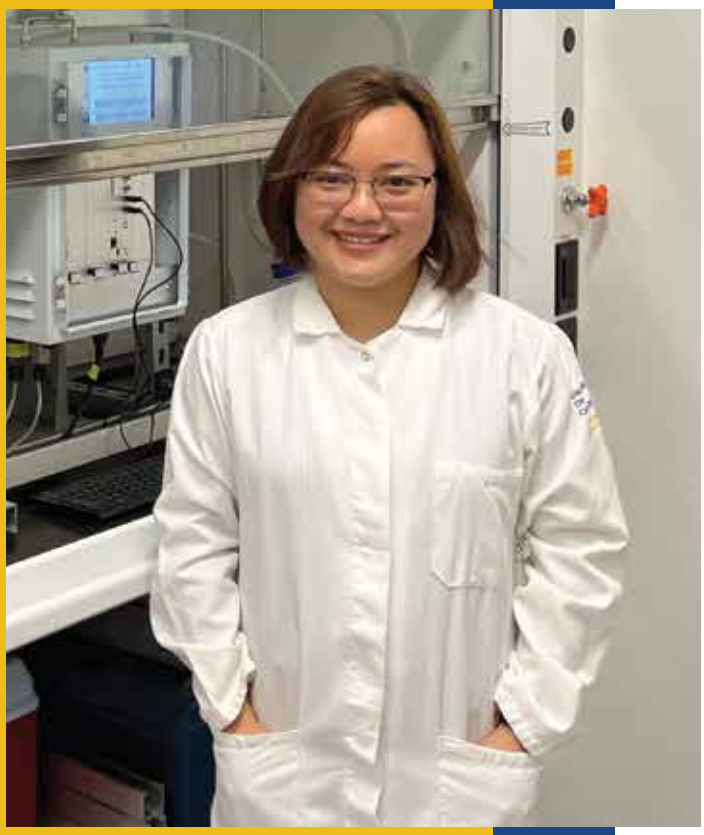
06 Mar 2023 - 01 Sep 2023 (180 days)

STATUS: Ongoing

ROLES/SUMMARY OF ACCOMPLISHMENTS

Dr. Parohinog's engagement is expected to enhance the research capabilities of the faculty and students of UM and USLS' Chemical Engineering Department. For UM, he is expected to contribute to several DOST-funded projects and provide consultancy services and mentor graduate students to develop their thesis topics and institutional research. For USLS, he will likewise provide technical assistance in formulating the research plan for the synthesis of nano-adsorbent materials for contaminant removal and resource recovery, as well as in creating the laboratory development plan to support the university's research objectives.

DR. MARIFE B. ANUNCIADO



EXPERTISE

Environmental Science and Pollution Control and Mitigation

HOST INSTITUTION

Department of Environment and Natural Resources – Environmental Management Bureau XI

ROLES/SUMMARY OF ACCOMPLISHMENTS

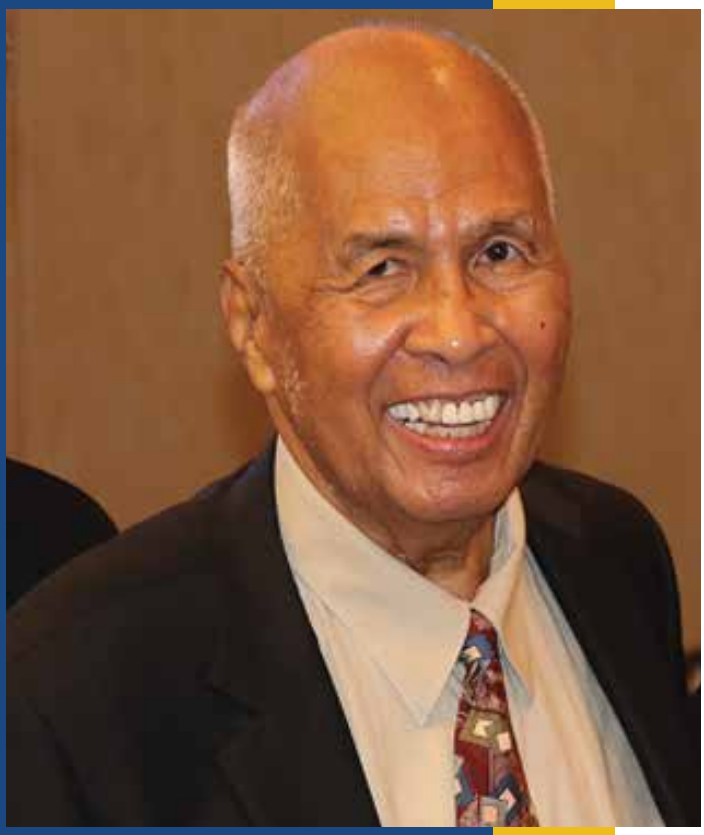
Dr. Anunciado's engagement is expected to enhance the air quality assessment and mapping capabilities of DENR – EMB XI personnel through various lectures and workshops. Aside from these, Dr. Anunciado will also contribute to the implementation of their project on mapping air pollutant concentration and distribution in the Davao City airshed, as well as lead the development of paper related to air quality mapping.

DURATION OF ENGAGEMENT

Phase I: 01 Dec 2022 - 16 Dec 2022 (16 days)
Phase II: 04 Jan 2023 - 30 Apr 2023 (117 days)

STATUS: Ongoing

ENGR. VICENTE E. DYREYES



EXPERTISE

Aerospace Engineering, Space Technology, and Finitie Element Analysis

HOST INSTITUTION

DOST – Industrial Technology Development Institute

DURATION OF ENGAGEMENT

04 Jan 2023 - 02 Jul 2023 (180 days)

STATUS: Ongoing

ROLES/SUMMARY OF ACCOMPLISHMENTS

Engr. DyReyes is expected to (1) conduct trainings and seminars to ITDI personnel, industry professionals and students; (2) provide technical advice on various ITDI projects; and (3) establish collaboration with an academe or industry. His engagement, through his extensive experience and expertise, will greatly contribute to the materials informatics and materials development initiatives of ITDI under the additive manufacturing program. It was agreed that Engr. DyReyes will likewise assist the ADMATEL group in enhancing their services with the infusion of FEA methods.

Empowering the Next Generation of Innovators in the Country

Young Innovators Program (YIP)

Young researchers are the future builders of the nation. In the Philippines, young minds are driving innovation and making significant contributions to nation-building. The Young Innovators Program (YIP) is a groundbreaking initiative of the DOST-PCIEERD that recognizes the vital role of youth in the innovation ecosystem.

YIP aims to encourage students to engage in research by providing funding for their innovative ideas and turning those ideas into reality. The program also seeks to usher young innovators to pursue independent research to accelerate the production of scientific works and encourage new and innovative research areas.

By empowering young minds and providing them with the resources and support they need, YIP is creating a dynamic ecosystem that fosters the growth and development of the next generation of scientific breakthroughs in the country.

DOST-PCIEERD has provided **P25.9** million to YIP since its inception in 2017 and has received an overwhelming response with **433** proposals from all regions of the country. **47** of these have been approved, ushering in a new era of scientific discovery and innovation in the Philippines.


YOUNG
innovators
PROGRAM

2017-2022 Grantees

REGION	2017	2018	2019	2020	2021	2022	TOTAL
NCR	3	3	2	4	2	1	15
1	1						1
2							0
3	1	1	4	2	2	4	14
4A			1	1	1	3	6
4B							0
5	1					1	2
6							0
7	1	1					2
8							0
9							0
10					1	1	2
11				2	2		4
12		1					1
13							0
CAR							0
BARMM							0
TOTAL	7	6	7	9	8	10	47

YIP Grantee from 2017-2022

54 TEAMS

YIP Proposals Received from 2017-2022

443 PROPOSALS

2023 YIP Proposals Received

70 PROPOSALS

Target for 2023

15 PROJECTS

2022

YIP APPROVED PROJECTS

Project Title:

Development and Fabrication of Nanoparticle-infused Intelligent/Smart Food Packaging from Agricultural By-products

Team Name:
CLSU – USHS Environmental Research Team (CERT)

Region:
Region III

School:
Central Luzon State University-University Science High School

MENTOR
Lexter R. Natividad

TEAM MEMBERS
Blessie Louise C. Monserate
Jenn Elise T. De Jesus
Curt Daniel D. Marquez

Duration: 12 months

In recent years, the world has seen a growing demand for sustainable solutions that address the environmental impact of plastic packaging waste. In response to this challenge, a team of researchers from the CLSU-USHS Environmental Research Team (CERT), based in Nueva Ecija, has developed an innovative and sustainable food packaging material made from agricultural by-products that incorporates nanotechnology.

The use of synthetic polymers as primary food packaging materials has long been the norm due to their excellent mechanical properties, low permeability values and low cost. However, these polymers are mainly derived from non-renewable fossil sources and pose significant environmental disposal problems. To address these concerns, this project aims to utilize renewable, biodegradable materials made from agricultural by-products and waste, such as polysaccharides, proteins, and lipids.

The team aims to develop innovative and sustainable packaging by incorporating nanoparticles into materials made from agricultural by-products. These nanoparticles will give the packaging antibacterial properties and the ability to detect early spoilage through odor. The project's objectives include producing prototypes of these packaging materials, evaluating them through sensory evaluation, microbial assay, and degradation testing. The ultimate goal is to address issues such as early spoilage detection, microbial growth, and the environmental impact associated with synthetic polymers in food packaging.

CERT hopes that the development and fabrication of nanoparticle-infused intelligent food packaging from agricultural by-products will significantly impact the food packaging industry in terms of sustainability and food safety. As the world continues to grapple with the environmental impact of plastic waste and the need for sustainable solutions, this project provides a promising solution that can revolutionize the food packaging industry. The team also hopes to scale up the production of this innovative packaging material and explore new applications for this technology.

Project Title:

Chitosan and Phosphorylated Chitin from Mussel Shells (Perna viridis) as Flame Retardant Bilayer Coating for Linen Fabrics

Team Name:
Team SILAB

Region:
Region III

School:
Angeles University Foundation, Integrated School

MENTOR
Analiza J. Molina

CO MENTOR
Camela B. De Leon

TEAM MEMBERS
Dayne Krissabelle A. Cudal
Maria Jenina M. Dimla
Jhermaine Margarett S. Larroza
Eeman M. Petrasanta
Kimbra Rae S. Sanchez

Duration: 12 months

The textile industry is constantly searching for sustainable and eco-friendly alternatives to traditional synthetic materials. In this project, Team SILAB from Angeles City proposes to use chitosan, a natural biomaterial derived from green mussel shells, as a flame-retardant additive for linen fabrics. This study aims to address the issue of disaster risk reduction caused by fire hazards while also utilizing abundant shell wastes to create a sustainable solution for the textile industry.

The proposed project has significant potential in providing a sustainable and eco-friendly solution for fire-resistant textiles. If proven effective, the use of chitosan and phosphorylated chitin from green mussel shells can pave the way to produce specialized gear for first responders and protective clothing for individuals at risk of fire hazards. Moreover, the utilization of shell wastes in creating a valuable biomaterial will also contribute to the sustainable management of aquaculture by-products. This project can also lead to further studies on the applications of chitosan and other natural biomaterials in the textile industry, promoting sustainable and environmentally friendly practices in the field.

Project Title:

Development of Tubular Triboelectric Exhaust Filter for Philippine Jeepneys

Team Name:
Team Turbo SHSI

Region:
Region IV-A

School:
South Hill School, Inc.

MENTOR
Amando Perfecto dC. Molin

TEAM MEMBERS
Wyztan Ulrich B. Amante
Jihun Lee

Duration: 7 months

In the Philippines, jeepneys are a common mode of transportation, but they also contribute to air pollution that poses a significant threat to public health. The emissions from these vehicles contain carcinogens and other hazardous air pollutants that can cause cancer and other respiratory diseases. To address this issue, Team Turbo SHSI of South Hill School Inc., proposed the development of a tubular triboelectric exhaust filter for Philippine jeepneys.

The filter will be created using polytetrafluoroethylene (PTFE) pellets that are less expensive to produce and do not release toxins during the manufacturing process. The triboelectric filter will capture and remove harmful particles from jeepney exhaust, thus improving air quality and reducing the risk of lung cancer and other respiratory illnesses.

By repurposing the old jeepney models with the use of triboelectric filters, the project provides a sustainable and affordable solution to address air pollution in the transportation sector. The team's goal is to promote clean air and reduce the health risks caused by diesel exhaust particles. The success of this project may lead to future opportunities for the development of similar technology that can be applied to other types of vehicles, ultimately contributing to the improvement of the country's overall air quality.

Project Title:

Solar-powered Enzymatic Composting Bin with Arduino-based pH, Moisture level, and Temperature Monitoring System

Team Name:
Team E-Composters SHSI

Region:
Region IV-A

School:
South Hill School, Inc.

MENTOR
Amando Perfecto dC. Molin

TEAM MEMBERS
Kyla V. Banaag
Nina Ricci D. Dimabuyu

Duration: 8 months

Team E-Composters from South Hill School, Inc. in Los Banos, Region IV-A, has developed a novel solution for sustainable waste management. Their project involves the creation of four prototypes of composting bins with different features, all of which utilize enzymatic composting and solar power. These prototypes include a solar-heated composting pit with enzymatic sprinkler, a solar-powered composting bin with Arduino-based sensors, a solar-powered enzymatic composting bin with Arduino sensors, and a household-based enzymatic composting bin.

The composting bins developed by Team E-Composters aim to provide efficient solutions for composting. They address issues such as odor, animal attraction, and the acceleration of the composting process while minimizing the carbon footprint through the use of enzymes. The Arduino-based sensors provide real-time monitoring of pH levels, moisture levels, and temperature, ensuring optimal composting conditions.

This project promotes sustainable waste management practices and provides an easy-to-use solution for households and communities alike. With further research and development, these composting bins have the potential to revolutionize waste management practices and contribute to a cleaner and greener environment.

Project Title:

AmoGOOs: Adhesive Effectiveness of Recycled Styrofoam Waste as an Alternative to Conventional Wood Glue

Team Name:
Team StickyStyrene

Region:
Region III

School:
Morong National High School – Senior High School

MENTOR
Juan Kristopier D. Angeles

CO MENTOR
Ms. Diarina Jane Cariaso

TEAM MEMBERS
Gerard Alexander C. Bernados
Francis Edward V. Duran
Jull Andrei B. Florendo
Ferica S. Caramat

Duration: 12 months

Styrofoam waste is one of the major contributors to pollution, and finding a sustainable way to repurpose it is a pressing concern.T eam StickyStyrene from Morong National High School – Senior High School presents their project, ***"AmoGOOs: Adhesive Effectiveness of Recycled Styrofoam Waste as an Alternative to Conventional Wood Glue"***, which explores the potential of a hydro-distilled oil found in citrus rinds called D. Limonene as a solvent to recycle Styrofoam waste.

This project aims to address the problem of Styrofoam waste and pollution by repurposing it into a sustainable adhesive alternative to conventional wood glue. Through the use of non-volatile solvents, this project also aims to reduce the number of carcinogenic gases emitted by the usual process of melting Styrofoam.

The development of amoGOOs has the potential to significantly reduce the environmental impact of Styrofoam waste by providing a sustainable and eco-friendly alternative to conventional wood glue. This project could pave the way for further research on the use of Limonene as a solvent for other types of waste materials, promoting a circular economy and sustainable waste management practices.

Project Title:

Utilization of Crab (Brachyura) Shells in Bioplastic Nursery Pot Production

Team Name:
Team CSBNpot

Region:
Region V

School:
Daraga National High School

MENTOR
Mercy O. Retuerma

TEAM MEMBERS
Alfredo D. Nieva III
Neil Andrei G. Macinas

Duration: 12 months

Plastic pollution is a serious environmental issue affecting marine and terrestrial ecosystems, and human health. With the increasing demand for plastic, it is imperative to find alternative materials that are sustainable and biodegradable. The utilization of crab shells in bioplastic and biodegradable nursery pot production is a potential solution to reduce plastic waste while promoting sustainable development.

The abundance of crab shell waste in the Bicol region presents a unique opportunity to utilize this material in the development of bioplastic nursery pots. The study aims to determine the feasibility of utilizing crab shells in producing bioplastic and biodegradable nursery pots that are environmentally friendly and non-toxic. The objective is to develop a sustainable and cost-effective method of producing bioplastic nursery pots that can replace petroleum-based plastics.

The development of bioplastic and biodegradable nursery pots from crab shells can provide an eco-friendly alternative to conventional plastics. This study can serve as a foundation for future research on bioplastics and biodegradable materials. The use of crab shells as a raw material for bioplastic production can also provide a new market for crab shell waste, promoting a circular economy. The research team is optimistic that their findings can help promote sustainable development, reduce plastic waste, and contribute to a cleaner environment.

Project Title:

BioHoshi: Developing an Environmentally Sustainable Alternative to Conventional Food Service Ware Disposables

Team Name:
TEAM TIP ENSIO

Region:
NCR

School:
Technological Institute of the Philippines Manila - P. Casal Campus

MENTOR
Ellaysa V. Esplago and Dr. Glorielyn L. Camerino

TEAM MEMBERS
Rayvhen Dominique D. Rada
Mary Nicole B. Alejandrino
Paulo Luis E. Bautista
Will Andrew M. Mercado

Duration: 10 months

Disposable food service ware is a major contributor to the world's plastic waste problem, and it is critical that we find alternative solutions to this growing concern. The BioHoshi project is a promising answer to this challenge, using mycelium to bind wood waste and create a sustainable, biodegradable alternative to conventional disposable cutlery and utensils.

The innovative process offers a unique solution to a pressing environmental problem, and the potential applications for this technology are vast. The BioHoshi project is a step in the right direction towards creating a more ecological future.

Project Title:

Electric Field Generating Portable Device Against Arthropod Vectors

Team Name:
CIS-SHS RESEARCH GROUP

Region:
Region X

School:
Can-ayan Integrated School

MENTOR
Lonell A. Saboco

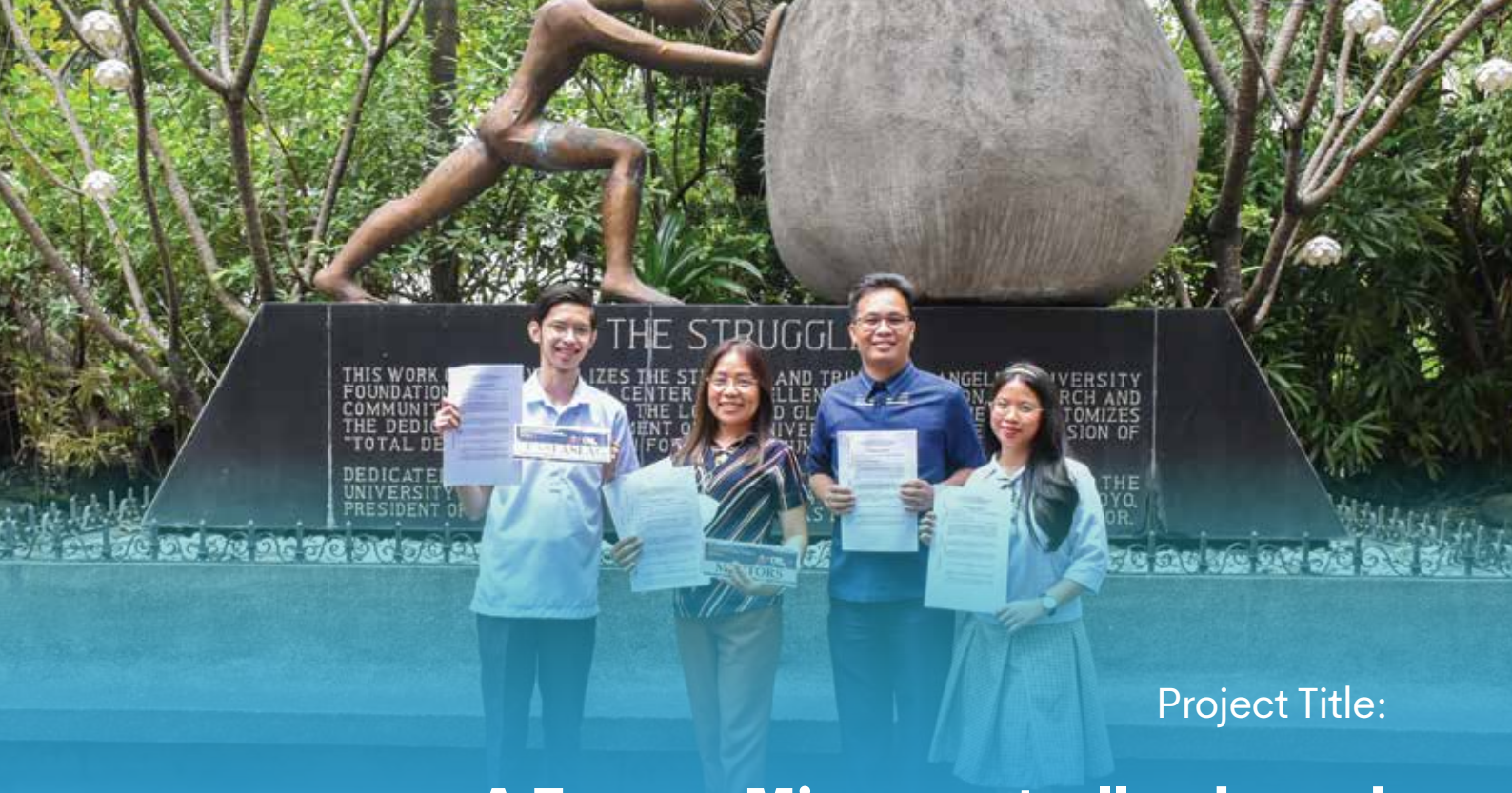
TEAM MEMBERS
Cassandra F. Caresia
Keycee Claire H. Iroc
Jemaica C. Casinabe

Duration: 12 months

Mosquitoes and other arthropod vectors are responsible for transmitting numerous diseases that pose a threat to human health, such as dengue fever, Zika virus, and malaria. Traditional methods of controlling these pests, such as insecticides and repellents, have proven to be insufficient in many cases. In response, the CIS-SHS Research Group developed a portable device that utilizes electric fields to keep these disease-carrying insects away.

The primary objective of the project is to develop an efficient and cost-effective method of controlling arthropod vectors. The device's portability makes it ideal for use in outdoor areas and can potentially reduce the need for insecticides and other harmful chemicals. Additionally, the research aims to contribute to the body of knowledge on the use of electric fields in pest control.

The research group plans to conduct further studies on the effectiveness of the device and refine its design to make it more user-friendly and accessible to the public. The team also hopes to collaborate with local health organizations and government agencies to implement the use of the device in areas where arthropod-borne diseases are prevalent. Ultimately, the goal is to improve public health and reduce the incidence of these diseases in affected communities.



Project Title:

A Teensy Microcontroller-based Photobioreactor for Microalgae Cultivation

Team Name:
Team ASLAG

Region:
Region III

School:
Angeles University Foundation, Integrated School

MENTOR
Analiza Molina and Mark Francis A. Mallari

TEAM MEMBERS
Joe Vincent Q. Teodoro
Annesa Gayle O. Ingal

Duration: 12 months

Project ASLAG's innovative use of a Teensy microcontroller based Photobioreactor to cultivate microalgae is a timely response to the world's growing concern for environmental health. With the rise of global warming due to CO2 emissions from fossil fuels, microalgae are being seen as a promising solution for renewable energy.

However, current methods of cultivating microalgae are either weather-dependent or too costly. By using a closed-system Photobioreactor with a Teensy microcontroller, Project ASLAG is hoping to provide a feasible solution for the cultivation of microalgae.

Their research aims to determine the effectiveness of the prototype in cultivating a specific species of microalgae and to offer opportunities for Filipino farmers and fisherfolk amidst agricultural challenges.

Project Title:

Converting Single-Use Plastic Wastes into Base Ten Blocks for Mathematics

Team Name:
Team PlasMath

Region:
Region IV-A

School:
South Hill School, Inc.

MENTOR
Amando Perfecto dC. Molin

TEAM MEMBERS
Sophia Margarette L. Benavidez
Althea Angela S. Pablo

Duration: 8 months

Plastic pollution has been a major issue in the Philippines, ranking third globally in plastic leakage to the ocean due to unmanaged plastic waste. On the other hand, the Philippines ranked low in math proficiency among 58 other countries based on international studies. Thus, addressing both issues can create a positive impact in the environment and educational system.

The project will address the issue of plastic pollution by providing a solution for the disposal of single-use plastic wastes. At the same time, it aims to create a stronger foundation in mathematics for students by providing effective learning materials, such as math manipulatives. By utilizing waste materials and turning them into educational tools, the project can create a positive impact on both the environment and education system.

The conversion of single-use plastic wastes into math manipulatives can be a sustainable solution for the disposal of plastic wastes, while also contributing to the improvement of math education in the Philippines. The project can also inspire other schools and institutions to adopt similar practices in addressing environmental and educational issues. Furthermore, it can open opportunities for further research and development on the use of waste materials in education.

Enhancing Regional Development through Collaborative Partnerships

Regional Consortia

Establishing partnerships and regional consortia are critical in accelerating regional development. The PCIEERD Regional Consortia recognizes the importance of these collaborations and has been established to promote the holistic development of the regions' resources through enhanced partnerships and institutional collaborations among member institutions from the academe, government, and private sectors.

The Regional Consortia, under the guidance and template provided by DOST-PCIEERD, are responsible for reviewing and providing their respective S&T Agenda that addresses their region's concerns. By identifying key areas for scientific and technological research and development, the program aims to create solutions to address regional challenges and improve the quality of life for local communities.

To date, there are sixteen (16) PCIEERD Regional Consortium that were able to submit their respective S&T Agenda. 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-CIERD)
2	Region II	Cagayan Valley Industry and Energy Research and Development Consortium (CVIERDEC)
3	CAR	Cordillera Industry and Energy Research and Development Consortium (CIERDC)
4	Region III	Central Luzon Consortium for Industry and Energy Research and Development (CLIERDEC) (Region 3)
5	NCR	Metro Manila Industry and Energy Research and Development Consortium
6	Region IV-A	Southern Tagalog Consortium for Industry and Energy R&D (STCIERD) (Region 4)
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 Consortium (BCIEERD)
9	Region VI	Western Visayas Consortium for Industry and Energy Research and Development (WVCIERD)
10	Region VII	Industry and Energy R&D Consortium-Central Visayas (IERDC-CV) (Region 7)
11	Region VIII	Eastern Visayas Consortium for Industry and Energy R&D (EVCIERD) (Region 8)
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 Consortium (NORMINCIERD)
14	Region XI	Southern Mindanao Industry, Energy and Engineering Research and Development Consortium (SMIEERDC) (Region 11)
15	Region XII	SOCCSKSARGEN (SOX) Industry, Energy, Emerging Technology Research and Development Consortium (SOXIEERDC)
16	Caraga	Eastern Mindanao Industry, Energy and Emerging Technology Research Alliance for Development (EMIEERALD)

Through networking and collaborations among member institutions from academe, government, and the private sector, these consortia have sustained the holistic development of the regions' resources. As a result, the membership of regional consortia operations in 2022 increased from 282 in 2019.

PCIEERD REGIONAL CONSORTIA OPERATIONS
Monitoring Report as of December 2022

Regions	Consortium Name	Regional Consortia Institution Members			Total
		HEIs	Government Agencies	Other Agencies	
NCR	MMIEERDC	29	4	4	37
CAR	CIEERDEC	10	11	5	27
Region I	ICIEERD	11	10	-	21
Region II	CVIERDEC	14	5	4	23
Region III	CLIERDEC	7	8	-	15
Region IV-A	STCIERD	13	6	-	19
Region IV-B	STIRDC	8	6	-	14
Region V	BCIEERD	17	8	3	28
Region VI	WVCIEERD	22	3	-	25
Region VII	CVCIERD	15	2	-	17
Region VIII	EVCIERD	10	2	-	12
Region IX	ZIEERDC	8	1	-	9
Region X	NORMINCIERD	15	6	4	25
Region XI	DRIEERDC	17	9	2	28
Region XII	SOXIEERDC	8	5	-	13
Caraga	EMIEERALD	6	4	3	13
TOTAL		**210**	**90**	**26**	**325**

List of New Institution Members

Regions	Consortia	New Institution Members
NCR	MMIEERDC (6)	Ateneo de Manila University (AdMU)
		Quezon City University (QCU)
		Far Eastern University (FEU)
		City of Malabon University (CMU)
		Philippine State College of Aeronautics PSCA)
		Air Link International Aviation College (ALIAC)
Region 2	CVIEERDEC (5)	Saint Mary's University (SMU)
		Batanes State College (BSC)
		University of La Salette (ULS)
		Agricomp Machineries and Construction Corp. (AMCC)
		Act Machinery and Metal Craft Corp. (ACT)
Region 6	WVCIEERD (3)	Philippine Normal University-Visayas (PNU-V)
		Western Institute of Technology (WIT)
		John B. Lacson Foundation Maritime University (JBLFMU)

2022 TARGETS & ACCOMPLISHMENTS

Region	Activities Conducted			Proposals			New Institution Members		
	Meetings	Trainings/ Workshop	Others	Evaluated	Endorsed	Approved	HEIs	Govt.	Industry /Private
CAR	3	9	2	30	26	2	0	1	0
Region 1	13	6	6	23	19	3	0	0	0
Region 2	3	4	7	18	21	7	3	0	2
Region 3	2	0	0	0	0	0	0	0	0
NCR	2	6	2	6	6	2	6	0	0
Region 4A	2	5	0	15	1	1	0	0	0
Region 4B	8	6	2	3	3		0	0	0
Region 5	11	1	4	18	14	1	0	0	0
Region 6	11	8	8	41	27	7	3	0	0
Region 7	1	0	0	0	0	0	0	0	0
Region 8	8	1		12	12	1	1	1	1
Region 9	1	4	1	0	0	0	0	0	0
Region 10	9	6	3	7	7	4	1	0	1
Region 11	7	2	25	5	5	2	0	0	0
Region 12	13	5	3	15	15	5	0	0	0
Region 13	2	1		10	10	3	0	0	0

Consortia Components

Support for Operation

REGION I

ILOCOS CONSORTIUM FOR INDUSTRY, ENERGY & EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT

The Ilocos Consortium for Industry, Energy, and Emerging Technology Research and Development (ICIEERD) was established on August 3, 2000, aiming to contribute to economic growth during trade globalization. Through the years, ICIEERD has lived up to its mission to provide and nurture synergy and promote strong and committed partnerships among the various industry and energy sector stakeholders toward contributing to increased productivity in the Ilocos. ICIEERD continuously develops strategies and mechanisms to catalyze and integrate research and development in the industry and energy sectors responsive to the needs of the industries in Region 1, particularly the SMEs.With the numerous registered SMEs in Region 1 beset with problems like inefficient production processes and outdated facilities, ICIEERD as a member of the science community, in close coordination with the SME stakeholders, joined together to address the technical problems of the local industry. ICIEERD assists in improving the SMEs' productivity and competitiveness, which contributes to the attainment of its vision.

Through the support of ICIEERD, efficient, effective, and sustainable technology in the industry, energy, and emerging technology sectors could maximize a technology-propelled and progressive community such as Region 1 in harnessing its bountiful resources and capable people.

In 2022, ICIEERD evaluated and endorsed 18 proposals to DOST-PCIEERD, and 7 proposals was approved for funding.

19 proposals were evaluated and endorsed to PCIEERD

Project Title	Implementing Agency	Program
1. Development of Portable Power Wall for Calamity Stricken Areas	Universidad de Dagupan (formerly Colegio de Dagupan)	RRI
2. Development of Data-Driven Student Support System using Admission to Graduation Data	Mariano Marcos State University (MMSU)	GODDESS
3. Development of Student Performance Monitoring System	Mariano Marcos State University (MMSU)	GODDESS
4. Development of Human Resource Analytics System	Mariano Marcos State University (MMSU)	GODDESS
5. Establishment of an Extended Reality (XR) Laboratory	Mariano Marcos State University (MMSU)	IDP
6. Production and Utilization of Powdered Glass Waste	Don Mariano Marcos Memorial State University (DMMMSU)	RRI
7. Development of Smart Energy Meter for Furniture Industry in Ilocos Norte	Mariano Marcos State University (MMSU)	RRI
8. Upgrading of the National Bioenergy Research and Innovation Center Facility for Biomass Characterization, Utilization and Product Development	Mariano Marcos State University (MMSU)	IDP
9. Digital Archiving and Preservation: Design and Development of Cultural Heritage Repository with AR Technology for Urdaneta City	Urdaneta City University	GODDESS
10. Water Quality Assessment: Information System with Data Analytics	North Luzon Philippine State College	GODDESS
11. Portable Oyster Shell Powderizing Machine	DMMMSU	
12. Development of an Emergency Response System in Dagupan City based on Incident Reporting	Universidad De Dagupan PSU	GODDESS
13. GIS Technology and Spatial Analysis of Coastal Areas for Salt Production In Region 1	DMMMSU	
14. GSM-Based Distribution Transformer Failure Monitoring Device	DMMMSU	GODDESS
15. Establishment and Operationalization of Ilocos Sur Polytechnic State College (ISPSC) Microbiology Testing Laboratory	ISPSC	IDP
16. Establishment of Food Safety and Quality Food Products Microbiology R&D Laboratory		
17. Development of Portable Glass Waste Powdering Machine and Utilization of Powdered Glass as Waste Water Filter Medium	Don Mariano Marcos Memorial State University (DMMMSU)	RRI
18. Motorized Silk Cotton (Ceiba pentandra). Seed Remover	Don Mariano Marcos Memorial State University (DMMMSU)	RRI
19. Production of Sea Salt in Ponds lined with High-Density Polyethylene (HDPE) Platform and Different Filtration System	Don Mariano Marcos Memorial State University (DMMMSU)	CRADLE

3 proposals approved

Project Title	Implementing Agency	Program
1. Development of a Data-Driven Student Support System using Admission to Graduation Data	Mariano Marcos State University (MMSU)	GODDESS
2. Establishment and Operationalization of Ilocos Sur Polytechnic State College Microbiology Testing Laboratory	Ilocos Sur Polytechnic State College (ISPSC)	IDP
3. Production of Sea Salt in Ponds lined with High-Density Polyethylene (HDPE) Platform and Different Filtration System	Don Mariano Marcos Memorial State University (DMMMSU)	CRADLE

REGION II

CAGAYAN VALLEY INDUSTRY AND ENERGY RESEARCH AND DEVELOPMENT CONSORTIUM (CVIEERDEC)

The Cagayan Valley Industry, Energy, and Emerging Technology Research and Development Consortium (CVIEERDEC) is one of the Regional R&D Consortia established under DOST-PCIEERD. Its formation is in line with their mission to provide policy guidance and enhance coordination for research and development efforts. The consortium serves as a platform through which DOST-PCIEERD promotes meaningful research by allocating research funds within the region.

CVIEERDEC brings together regional government agencies, public institutions, and private universities and colleges in region 2 that possess research and development capabilities. Their collective aim is to catalyze, coordinate, and integrate R&D activities in the fields of industry and energy, addressing the specific needs of local businesses and emerging industries.

The primary objective of the consortium is to establish and maintain a conducive environment for research in industry, energy, and emerging technologies. The research conducted aims to provide effective and responsive solutions to various challenges faced in Region 2, including industry development, energy concerns, disaster risk reduction, climate change adaptation and mitigation, and related issues.

In 2022, CVIEERDEC evaluated and recommended 18 proposals to DOST-PCIEERD, resulting in the approval of funding for 7 proposals.

18 proposals were evaluated and endorsed to PCIEERD

Name of Consortia	Project Title	Institution	Program
CVIEERDEC	21st Century Equipment for Engineering, Architecture, Technology, and Computing Sciences	Cagayan State University	IDP
CVIEERDEC	Design and Development of Multi-Purpose Food Processing Equipment	Cagayan State University	IDP
CVIEERDEC	FAB LAB Establishment of a Rapid Prototyping Research Fabrication Laboratory for Electronic Projects, Electrical Equipment, and Embedded Systems	University of Saint Louis - Tuguegarao	IDP
CVIEERDEC	Infrastructure Development of the Ethanol-Organic Fertilizer Production Facility	Nueva Vizcaya State University	IDP
CVIEERDEC	Upgrading of the Fabrication of the Nueva Vizcaya State University	Nueva Vizcaya State University	IDP

CVIEERDEC	Waste to Compost R&D Program in Region 02	Isabela State University	RRI
CVIEERDEC	Design and Optimization of Combined Biomass Gasification and Water Electrolytic System for Production of Biomethane	Cagayan State University	RRI
CVIEERDEC	Sustaining Yield of Wells in Hilly and Upland Pedo-Ecological Zones through Artificial Groundwater Recharge Structures	Isabela State University	RRI
CVIEERDEC	Upgrading/Establishment of Fisheries Data Science Analytics Research Center for Sustainable Fisheries Management	Cagayan State University	GODDESS
CVIEERDEC	DapunE: Development and Implementation of Online Marketplace for Aparri Fishery Products (Driving Aparri's Fisheries Products unto Network Environment)	Cagayan State University	RRI
CVIEERDEC	Upgrading of ICT laboratory for Data-Science, Image Processing, and Natural Language Processing	Cagayan State University	IDP
CVIEERDEC	Methane Production as Animal Waste Management Strategy and Bottling of Biomethane for Cooking in Rural Households	Isabela State University	RRI
CVIEERDEC	Development of Azuela	Cagayan State University	RRI
CVIEERDEC	Development of Gummy Ginger Candy with Metal Candy Molder	Cagayan State University	RRI
CVIEERDEC	Innovative and Sustainable Hybrid Information Systems (ISHIS) in Nueva Vizcaya: An ICT-based Community Project toward e-Governance	Nueva Vizcaya State University	GODDESS
CVIEERDEC	NVSU Online Student Management System	Nueva Vizcaya State University	GODDESS
CVIEERDEC	Design and Development of an Application for Freshwater Resources Management using Data Mining Techniques	Cagayan State University	RRI
CVIEERDEC	GIS-Based Agriculture Profiling for Smarter DRRM	Quirino State University	RRI

7 proposals approved

Name of Consortia	Project Title	Amount	Duration	Institution	Program
CVIEERDEC	Establishment of Electronics for Process Automation of the Cagayan Lodging Industry	₱ 6,370,784	August 22, 2022 to August 22, 2024	University of Saint Louis-Tuguegarao	IDP
CVIEERDEC	Upgrading and Repair of the Cagayan State University Food Quality and Safety Laboratory	₱ 5,000,000	Feb 2, 2023 - Feb 2, 2025	Cagayan State University	IDP
CVIEERDEC	HEIRIT: ReSEED: Synergistic, Innovative, and Agile Cagayan Valley (SINAG Cagayan Valley)	₱ 1,500,000	January 2, 2022 to January 2, 2023	Cagayan State University	HEIRIT
CVIEERDEC	Establishment of Smart City Technology Business Incubator (Smart City TBI) for the Cagayan Valley Region	₱ 14,122,088	January 02, 2023 to December 31, 2024	Isabela State University	HEIRIT
CVIEERDEC	Business Intelligence Data Driven Assistant (BIDDA) for DOST SETUP Adoptors Business Performance	₱ 1,000,000	December 01, 2022 to November 01, 2023	Isabela State University	GODDESS
CVIEERDEC	WHWise: RLGV Fruit Wine Industry	-	-	Isabela State University	RRI
CVIEERDEC	Automatic Fire Incidence (AFI) Monitoring and Response System	₱ 927,792.80	October 2022 - October 2023	Cagayan State University	RRI (Funded by DOST Region 02)

REGION III

CENTRAL LUZON CONSORTIUM FOR INDUSTRY AND ENERGY RESEARCH AND DEVELOPMENT (CLIERDEC)

The Central Luzon Industry and Energy Research and Development Consortium (CLIERDEC), presently named as Central Luzon Industry, Energy, and Emerging Technology Research and Development Consortium (CLIEERDEC) is the first regional industry and energy consortium that was organized in the country. The CLIERDEC mandate is in the enhancement and orchestration of the R & D initiatives and capabilities to address the needs of the industry. energy and related sectors in the Region.

In recent years, the Consortium's activities have been very limited, due to insufficient funds, to support its operation. With its 19 member institutions, 10 of which are R&D implementing agencies, while the other 9 institutions are coordinating agencies majority of which are regional offices of national government agencies, the potential of the consortium to stimulate economic development through R8D is enormous.

REGION IV-A

SOUTHERN TAGALOG CONSORTIUM FOR INDUSTRY AND ENERGY R&D (STCIERD)

The overall goal of STCIERD is to strengthen the formulation and implementation of industrial and energy research and development programs in Region IV-A.

To achieve this, it has specific objectives:

1. organize and put into operation a research and development consortium for industry and energy in Region IV-A.
2. strengthen public and private participation in R&D and Science and Technology related activities.
3. provide assistance in the formulation of policies, strategies, programs and projects for industry and energy.
4. provide support in the establishment and operation of R&D programs and projects.

4 proposals were evaluated and endorsed to PCIEERD

Project Title	Amount	Duration	Institution	Program
Quality and Product Enhancement of Community-produced Woven Bamboo Panels for the Housing Industry	Php 3,800,504.00	12 months	Likhang Maragondon	WH-WISE Program
Establishment of the CALABARZON Research Center for Distilled Spirits and Tropical Wines (CRC-DSTW)			Southern Luzon State University	NICER
Advanced Research and Innovations in Smart Energy (ARISE) Center			Batangas State University	NICER
Establishment of Regional Center for Sustainable Development			University of the Philippines Los Baños	NICER

1 proposal approved

Project Title	Amount	Duration	Institution	Program
Quality and Product Enhancement of Community-produced Woven Bamboo Panels for the Housing Industry	Php 3,800,504.00	12 months	Likhang Maragondon	WH-WISE Program

REGION IV-B

SOUTHERN TAGALOG ISLANDS RESEARCH AND DEVELOPMENT CONSORTIUM (STIRDC)

The Southern Tagalog Islands Research and Development Consortium is a funding project of DOST-PCIEERD. With all the member-agencies working in collaboration, the STIRDC shall coordinate the planning, implementing, monitoring and evaluating of integrated regional research and development and extension programs and related activities in the various scientific and technological fields.

It shall develop strategies and implement a dynamic system of research and development and extension management attuned to the development needs of the MIMAROPA Region, with the view of promoting and utilizing research results and information to support regional, as well as national development goals.

REGION V

BICOL CONSORTIUM FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT CONSORTIUM (BCIEERD)

The BCIEERD is focused on collaborating and integrating research initiatives by offering organizational, technical, and other appropriate resources in the region's priority thrusts in industry, energy, and emerging technology. BCIEERD as globally recognized dynamo of collaboration and integration of researches of high ethical standards for the uplift of the lives of Bicolanos towards national development.

In addition, the Consortium currently has 28 member-agencies that are committed to providing better solutions and addressing regional development challenges in areas such as Product Development and Packaging; Post-harvest Equipment and Machinery Development; Resiliency and Sustainability Initiatives and Development of ICT Software/Program.

11 proposals were evaluated and endorsed to PCIEERD

Project Title	Amount	Duration	Institution	Program
Development of Vegan Leather from Banana (Musa acuminata × balbisiana var. Cardaba) Peels Reinforced with Snake Plant (Sansevieria trifasciata) Fibers	Php 1,000,000.00	July 1,2022-June 30, 2023	Partido State University	Regional Research Institution (RRI)
Development and quality evaluation of Baloko (Pinna bicolor) sauce and Baloko powder	Php 628,659.00	June 1, 2022-May 31, 2023	Sorsogon State University	Regional Research Institution (RRI)
DTECH Research and Innovation Management System (DRIMS)	PhP 700,000.00	April 01, 2022-May 2023	Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology	Good Governance through Data Science and Decision Support Systems (GODDESS)
Development of QP Data Analytics and Recommender System for Effective Monitoring and Management (QP-DAREM)	Php7,249,747.00	Not indicated	Department of Agriculture RFO-5	Good Governance through Data Science and Decision Support Systems (GODDESS)
Establishment of a remote network security laboratory using service orchestration and network device emulation	Php4,980,000.00	August 01, 2023-July 2023	Ateneo de Naga University	Institution Development Program (IDP)
Disaster Risk Assessment using Support Vector Machine Algorithm and Risk Indicators	Php935,384.00	June 2022-May 2023	Sorsogon State University	Good Governance through Data Science and Decision Support Systems (GODDESS)
Developing Pili Pulp Oil Production Protocol and Quality Control Parameters	Not indicated	Not indicated	Central Bicol State University of Agriculture	Regional Research Institution (RRI)
Evaluation and Characterization of Starch from Corms of Different Taro Cultivars in the Bicol Region for Utilization and Technology Generation	Not indicated	Not indicated	Central Bicol State University of Agriculture	Regional Research Institution (RRI)
Regional Research Institution (RRI)	Not indicated	Not indicated	Mariners' Polytechnic Colleges Foundation-Legazpi City (MPCF-LC)	Institution Development Program (IDP)
Production and Sensory Acceptability of Nami (Dioscorea hispida) Chips	Not indicated	Not indicated	Dr. Emilio B. Espinosa, Sr. Memorial State College of Agriculture and Technology	Regional Research Institution (RRI)
Development of Automated Packager for Carabao Camelado	Not indicated	Not indicated	Memorial State College of Agriculture and Technology	Regional Research Institution (RRI)

1 proposal approved

Project Title	Amount	Duration	Institution	Program
Development of Vegan Leather from Banana (Musa acuminata × balbisiana var. Cardaba) Peels Reinforced with Snake Plant (Sansevieria trifasciata) Fibers	Php 1,000,000.00	July 1, 2022-June 30, 2023	Partido State University	Regional Research Institution (RRI)

REGION VI

WESTERN VISAYAS CONSORTIUM FOR INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT (WVCIEERD)

The Western Visayas Consortium for Industry, Energy, and Emerging Technology Research and Development (WVCIEERD) is and association of different agencies, private higher education institutions (PHEIs) and state universities and colleges (SUCs) involved in research and development, and extension that aims to provide solutions to the needs of the industry and energy sectors in Western Visayas. The vision of the consortium is to be the leading dynamic consortium of highly competent and committed institutions responsive to the industry, energy and emerging technology needs of Western Visayas. While its mission is to generate leading-edge, viable, sustainable, and environment-friendly technologies relevant to the needs of the industry and energy sectors in Western Visayas.

WVCIEERD plays a vital role in fostering a dynamic R&D environment that will support the industrial development of the region, in the industry, energy, and emerging technology sectors.

26 proposals were evaluated and endorsed to PCIEERD

Project Title	Duration	Institution	Program
Enhancement of Functional and Antioxidant Properties of Seaweed Crackers Through Incorporation of Spent Turmeric Pulp and Salted Egg Powder	12 months	Iloilo Science and Technology University-Dumangas Campus	RRI
Extraction and Optimization of Maltodextrin from Ipomoea batatas for Pharmaceutical Applications	12 months	Technological University of the Philippines-Visayas	RRI
Gray Water Technology Utilizing Plant-Based Chemicals for Vermicomposting and Brackishwater Use	12 months	Iloilo State College of Fisheries	RRI
Development of Protein Hydrolysates from Catfish Consumption Wastes	12 months	University of the Philippines-Visayas	RRI
Establishment of Engineering Laboratory Facility as Testing Center of Agricultural Machineries and Equipment	24 months	Central Philippines State University	IDP
Development of Mangrove-Based Food Products for Food Security and Sustainability	12 months	Capiz State University	RRI
"Lakwatsa Panay": Augmented Reality/Virtual Reality Serious Game of Panay Island History	12 months1	Iloilo Science and Technology University	RRI
Development of Pandan-Flavored Yoghurt from Coconut Milk and Cocowater	12 months	Capiz State University	RRI
Design Development of Bamboo Processing Machine with Automated Cutting and Splitting functions for Manufacturing Bamboo Products	12 months	University of Antique	RRI
Establishment of ISAT University Molecular Microbiology Laboratory	24 months	Iloilo Science and Technology University	IDP
Upgrading and Improvement of Food Research and Development Laboratory of Iloilo Science and Technology University (ISATU)	24 months	Iloilo Science and Technology University	IDP
Economic and Technology Modeling for Renewable Energy Systems		University of the Philippines-Visayas	Support for Conduct of Training
Emergency Response System Using Best-Shortest Path Algorithm	12 months	University of Antique	RRI
Establishment of a Hub for Sustainable Smart Nanomaterials in the Philippine countryside	24 months	University of San Agustin	IDP
Design and Development of a Low-Cost and Localized PV System Design and Simulation Software	12 months	John B. Lacson Foundation Maritime University-Molo	RRI
Design and Development of Towing Tank with Data Acquisition System for Efficient Designing of Local and Merchant Vessels	12 months	John B. Lacson Foundation Maritime University-Molo	RRI
Design and Development of a Photovoltaic System with Sea Water as Energy Storage	12 months	John B. Lacson Foundation Maritime University-Molo	RRI
Design and Development of Fresh Water Generator Powered by Solar Energy	12 months	John B. Lacson Foundation Maritime University-Molo	RRI
Design and Development of Automated Marine Sewage Treatment Plant (MSTP) Using Ultraviolet Lights with Holding Tank and Shore Connection to Discharge Pipe for Domestic Vessels	12 months	John B. Lacson Foundation Maritime University-Molo	RRI
Design and Development of a hybrid natural fiber and textile grading, quality assessment and standardization applied system of Aklan pina	12 months	Aklan State University	RRI
Nano-enabled bioplastic from regenerated cellulose	12 months	University of San Agustin	RRI
Seawater desalination using a passive solar-driven membrane system: nanoimprovement of the membrane layers	12 months	University of San Agustin	RRI
Innovations Laboratory for Process Machinery and Related Technology Development (i-PROMATECH)	24 months	Capiz State University-Burias Campus	IDP
Establishment of "Marine Engineering Lab: Water Craft Design, Testing, and Development Laboratory"	24 months	John B. Lacson Foundation Maritime University-Molo	IDP
Building Laboratory Capability for Food, Product Development, Water and Wastewater Technologies	24 months	Technological University of the Philippines-Visayas	IDP
QualiSafe Lab: Food Quality and Safety Laboratory for Seafoods and other Innovative Food Products	24 months	Capiz State University-Mambusao Campus	IDP

7 proposals approved

Project Title	Amount	Duration	Institution	Program
Development of Protein Hydrolysates from Catfish Consumption Wastes	1,000,000.00	12 months	University of the Philippines-Visayas	RRI
Establishment of a Hub for Sustainable Smart Nanomaterials in the Philippine countryside	4,999,488.00	24 months	University of San Agustin	IDP
Design and Development of Automated Marine Sewage Treatment Plant (MSTP) Using Ultraviolet Lights with Holding Tank and Shore Connection to Discharge Pipe for Domestic Vessels	1,000,000.00	12 months	John B. Lacson Foundation Maritime University-Molo	RRI
Nano-enabled bioplastic from regenerated cellulose	998,787.00	12 months	University of San Agustin	RRI
Seawater desalination using a passive solar-driven membrane system: nano improvement of the membrane layers	998,787.00	12 months	University of San Agustin	RRI
Innovations Laboratory for Process Machinery and Related Technology Development (i-PROMATECH)	5,000,000.00	24 months	Capiz State University-Burias Campus	IDP
QualiSafe Lab: Food Quality and Safety Laboratory for Seafoods and other Innovative Food Products	4,999,999.00	24 months	Capiz State University-Mambusao Campus	IDP

REGION VIII

EASTERN VISAYAS CONSORTIUM FOR INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT (EVCIEERD)

The EVCIEERD aims to strengthen the efforts in research and development through capability building activities, technology capacity commercialization, and to build linkages and partnerships among the member institutions.

EVCIEERD would like to help the universities in the region to uplift the socio-economic status of the region through industry partnership, technology transfer initiatives, and conduct of research that will translate into the alleviation of poverty incidence in the region.

9 proposals were evaluated and endorsed to PCIEERD

Project Title	Amount	Duration	Institution	Program
A Real-time Flying Insect Recognizer and Locator Tool Utilizing Binaural Signals for Portable and Constrained Devices	1,161,346.50	December 1, 2022- November 2023	University of the Philippines Visayas Tacloban College	Balik Saliksik Program
Coconut Value Chain Analysis: What is missing towards Coconut Farmers' inclusive and sustainable development in Eastern Visayas?	3,253,288.40	2022-2024	Visayas State University	Regional Research Institution **(RRI)**
Process mechanization of VSU-selected coconut food product	4,064,951.84	July 01, 2022- June 30, 2024	Visayas State University	Regional Research Institution **(RRI)**
Suitability Assessment of Recommended Coconut Varieties in VSU and Region 8 for High-Value Food Products	6,736,236.84	July 01, 2022- June 30, 2024	Visayas State University	Regional Research Institution **(RRI)**
POLYMER BIOCOMPOSITES FILMS FROM Nypa fruticans (NIPA) PALM SPECIES	4,999,145.60	2022-2024	University of Eastern Philippines	Regional Research Institution **(RRI)**
Establishment of Samar Island Water Testing Laboratory for Real-time Water Quality Monitoring and Assessment	45,540,931.80	January 2023- January 2025	Samar State University	Infrastructure Development Program **(IDP)**
Development and Evaluation of a Wireless Electrical Parameters Monitoring and Data Logging System			Southern Leyte State University	Regional Research Institution **(RRI)**
WebGIS-based Spatial Decision Support System for Disaster-Resilient Community Evacuation Centers	3,938,056.00	2022-2024	Southern Leyte State University	Regional Research Institution **(RRI)**
Development and Evaluation of Hybrid Solar-Wind and Piezoelectric Generation System	305,496.00	2022-2023	Southern Leyte State University	Regional Research Institution **(RRI)**

1 proposal approved

Project Title	Amount	Duration	Institution	Program
1. A Real-time Flying Insect Recognizer and Locator Tool Utilizing Binaural Signals for Portable and Constrained Devices	1,161,346.50	December 1, 2022- November 2023	University of the Philippines Visayas Tacloban College	Balik Saliksik Program

REGION IX

ZAMBOANGA INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT CONSORTIUM (ZIEERDEC)

The general function of ZIEERDEC is to harmonize and synchronize R&D activities for speedy, economic, and broad-based impact to the local industries. The specific functions include:

1. Sourcing, sharing and managing resources to support all the activities of the consortium.
2. Sharing and disseminating information and package of technologies
3. Institutionalizing efficient and effective complementation of GOs, NGOs, LGUs, private sector, donors, and financial institutions to effectively move information and technologies vital to the goals of the RDC; and
4. Intensifying cost-effective decision making in the implementation of regional development programs and projects through the use of comprehensive research results.

REGION X

NORTHERN MINDANAO CONSORTIUM FOR INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT (NORMINCIEERD)

The Department of Science and Technology Region 10 has established NorMinCIEERD with its primary objective to strengthen the collaboration among the industry, government, and academe in the region and to enhance the capability of R&D human resources engaged in industry, energy, and emerging technology research.

4 proposals were endorsed and approved

Project Title	Implementing Agency	Program
Predictive Modeling on Student Metrics for School Effectiveness	Liceo de Cagayan University	Good Governance through Data Science and Decision Support System
Steady-State Hydraulic Numerical Analysis for Optimized Water Distribution Network Modelling: An Application of Selected Hydraulic Solver	Central Mindanao University	Regional Research Institution
Bamboo Expert Immersion Program	Xavier University – Ateneo de Cagayan	Experts Intervention for Scientific Engagement (ExpertISE) for Regional Consortia
LSU - MOELCI-II Research Collaboration Project	La Salle University - Ozamis	Experts Intervention for Scientific Engagement (ExpertISE) for Regional Consortia

REGION XI

DAVAO REGION INDUSTRY, ENERGY AND EMERGING TECHNOLOGIES RESEARCH AND DEVELOPMENT CONSORTIUM (DRIEERDC)

The Davao Region Industry, Energy and Emerging Technologies Research and Development Consortium (DRIEERDC) concept is anchored on the realization that no single research organization can cope with all the demands on itself from within and outside. Research is more efficient if the resources such as manpower, equipment, facilities, information, and funds are shared by a group of institutions in a given region sharing at least one common area of focus or interest.

A consortium is arranged whereby R&D institutions and the stakeholders jointly plan and administer programs aligned toward a centralized regional development plan. It also provides a mechanism for sharing resources within the region for implementing cost-effective plans and programs.

5 proposals were evaluated and endorsed to PCIEERD

Project Title	Amount	Duration	Institution	Program
Establishment of Ateneo de Davao Ventures (AdDVentures) Technology Business Incubator (TBI)	Php 14,998,104.00	24 months	Ateneo de Davao University	HEIRIT TBI
Establishment of Philippine Women's College of Davao Creative Hubs for Industry 4.0 (PWC CHI+)	Php 14,661,296.00	24 months	Philippine Women's College of Davao	HEIRIT TBI
Establishment of Mobilizing Advanced Research and Innovations to Advocate Nation-building (MARIAN) TBI	Php 11,357,032.00	24 months	University of the Immaculate Conception	HEIRIT TBI
Augmentation Using Generative Adversarial Network for Violence Detection	Php 959,924.00	12 months	University of the Immaculate Conception	RRI
Establishment of the Ateneo de Davao Aerospace Training and Research Advancement (AD ASTRA) Wind Tunnel	Php 4,999,782.40	24 months	Ateneo de Davao University	IDP

3 projects approved

Project Title	Amount	Duration	Institution	Program
Establishment of Philippine Women's College of Davao Creative Hubs for Industry 4.0 (PWC CHI+)	Php 14,661,296.00	24 months	Philippine Women's College of Davao	HEIRIT TBI
Establishment of Mobilizing Advanced Research and Innovations to Advocate Nation-building (MARIAN) TBI	Php 11,357,032.00	24 months	University of the Immaculate Conception	HEIRIT TBI
Augmentation Using Generative Adversarial Network for Violence Detection	Php 959,924.00	12 months	University of the Immaculate Conception	RRI

REGION XII

SOCCSKSARGEN INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY, RESEARCH AND DEVELOPMENT CONSORTIUM (SOXIEERDC)

SOCCSKSARGEN Industry, Energy, and Emerging Technology, Research and Development Consortium (SOXIEERDC) has 12 member-institutions coming from different universities and regional line agencies. For the past years, the consortium was able to increase awareness on DOST-PCIEERD's programs and projects and encourage SUCs and other relevant agencies to submit proposals for funding consideration.

12 proposals were evaluated and endorsed to PCIEERD

Project Title	Amount	Duration	Institution	Program
Optimization of Irrigation Flow through Conduit Microhydropower to generate electricity for off-grid Barangay of Kabacan, Cotabato.	P996,776.00	May 1, 2022 – May 1, 2023	University of Southern Mindanao	Regional Research Institution – PCIEERD Startup Grant Fund Program
Steady-State Hydraulic Numerical Analysis for Optimized Water Distribution Network Modelling: An Application of Selected Hydraulic Solver	P921,600.00	January 1, 2023 – December 30, 2023	University of Southern Mindanao	Regional Research Institution – PCIEERD Startup Grant Fund Program
Establishment of Sultan Kudarat State University – Forensic Molecular Biology Center (SKSU-FMBC)	P4,960,000.00	July 2022 to June 2024	Sultan Kudarat State University	Institution Development Program – PCIEERD Startup Grant Fund Program
Impact of Climate Change and Green Infrastructure in a Drinking Watershed: An Integrated Hydro-Economic Modelling Framework for Water Supply Regulation	P1,839,566.40	March 25, 2022 to March 26, 2023	Cotabato State University	Others
Agricultural Waste as Silica source for the production of ZnO: SiO2/TiO2/polymer composite as metal coating of mild steel	P5,132,052.00	January 1, 2024 – July 1, 2025	University of Southern Mindanao	Others
Utilization of Plasma Technology in the Production of Fresh-cut Indigenous Fruits	P1,008,344.00		University of Southern Mindanao	Regional Research Institution – PCIEERD Startup Grant Fund Program
Flood Information and Decision Support System (FIDSS) for Kabacan River using Simulation Software and Machine Learning	P1,000,000.00	January 2, 2023 – December 29, 2023	University of Southern Mindanao	Good Governance through Data Science and Decision Support System – PCIEERD Startup Grant Fund Program
Development of an Internet of Things (IOT)-based Water Quality Monitoring Application System for Arakan Valley	P1,500,000.00	August 1, 2022 – July 31, 2024	Cotabato Foundation College of Science and Technology	Regional Research Institution – Capability Development Program 2022/2023 Funding
Development of Online Public Assistance System (OPAS) for Arakan, North Cotabato	P1,000,000.00	August 1, 2022 – July 31, 2023	Cotabato Foundation College of Science and Technology	Good Governance through Data Science and Decision Support System – Capability Development Program 2022/2023 Funding
LeArch: An Innovative Application for Tree Identification Using Leaf Architecture	P3,361,666.00		University of Southern Mindanao	Others
SMART Governance	P5,813,960,00	January 1, 2023 – December 31, 2024	Sultan Kudarat State University	Good Governance through Data Science and Decision Support System – Capability Development Program 2022/2023 Funding
Developing a Fleet Management System Web Application for the Public Transport Cooperatives of General Santos City	P1,000,000.00	February 15, 2023 – February 14, 2024	Mindanao State University – General Santos City	Regional Research Institution – Capability Development Program 2022/2023 Funding

3 projects approved

Project Title	Amount	Duration	Institution	Program
Optimization of Irrigation Flow through Conduit Microhydropower to generate electricity for off-grid Barangay of Kabacan, Cotabato.	P996,776.00	May 1, 2022 – May 1, 2023	University of Southern Mindanao	Regional Research Institution – PCIEERD Startup Grant Fund Program
Steady-State Hydraulic Numerical Analysis for Optimized Water Distribution Network Modelling: An Application of Selected Hydraulic Solver	P921,600.00	January 1, 2023 – December 30, 2023	University of Southern Mindanao	Regional Research Institution – PCIEERD Startup Grant Fund Program
Establishment of Sultan Kudarat State University – Forensic Molecular Biology Center (SKSU-FMBC)	P4,960,000.00	July 2022 to June 2024	Sultan Kudarat State University	Institution Development Program – PCIEERD Startup Grant Fund Program

REGION XIII-CARAGA

EASTERN MINDANAO INDUSTRY, ENERGY AND EMERGING TECHNOLOGY RESEARCH ALLIANCE FOR DEVELOPMENT (EMIEERALD)

The Eastern Mindanao Industry, Energy and Emerging Technology Research Alliance for Development (EMIEERALD) is the regional consortium for the IEET sector in Caraga. Its current composition includes four (4) National Government Agencies, five (5) Higher Education Institutions and three (3) private sector representations. As one of the three (3) regional consortia in Caraga, EMIEERALD aims to strengthen collaboration among the academe, NGAs, the private sector and other key stakeholders that will benefit from the R&D outputs of consortium member institutions.

EMIEERALD is also tasked to determine regional R&D priorities in the Industry, Energy and Emerging Technologies that will support the region's development goals and improve the competitiveness of industries in the region through the infusion of new technologies obtained from the R&D initiatives of the academe in partnership with the private sector. EMIEERALD also serves as the regional arm of DOST-PCIEERD that will ensure that all PCIEERD programs and projects will be disseminated to the consortium member institutions.

NATIONAL CAPITAL REGION

METROPOLITAN MANILA INDUSTRY AND ENERGY RESEARCH & DEVELOPMENT CONSORTIUM (MMIEERDC)

The Metropolitan Manila Industry and Energy Research & Development Consortium (MMIEERDC) is an R&D Consortium established by the Department of Science and Technology-National Capital Region (DOST-NCR) and the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD). Its primary objective is to foster collaborative and synergistic research and development efforts as drivers of social and economic growth. The consortium aims to create industry-specific solutions rooted in science, technology, and innovation by promoting a robust and dynamic research culture that involves active collaboration among the government, academe, and industry.

The overarching vision of MMIEERDC is to serve as a network of science and technology (S&T) experts, advisers, and practitioners specializing in energy, environment, food, and information and communications technology (ICT). Through research and development initiatives and innovative approaches, MMIEERDC aims to make significant contributions in offering S&T-based solutions and services to address pressing technical challenges faced by the National Capital Region. In 2022, MMIEERDC conducted a thorough evaluation of various research proposals and subsequently endorsed six proposals to DOST-PCIEERD for consideration. Following the evaluation process, three out of the six proposals were approved and granted funding.

7 projects endorsed & approved

Title	Proponent	Program	Remarks
Procurement of Test Bench for Electrical Machines for the Newly Established Colegio De Muntinlupa's Equipment Design and Prototyping Facility (CDM-EDPF)	Colegio De Muntinlupa	IDP	Endorsed, not approved
Establishment of Footwear Innovation and Technology (FIT) Research Laboratory - Marikina Polytechnic College	Marikina Polytechnic College	IDP	Endorsed, Approved
Accelerating the Growth of the Ateneo Blue Nest Incubation Program	ADMU - Ateneo Intellectual Property Office	HEIRIT	Endorsed, Approved
Establishment of DOST-Benilde HIFI BTS TBI	De La Salle-College of Saint Benilde, Benilde HIFI	HEIRIT	Endorsed, Approved
Establishment of Marikina Polytechnic College-SHOE (Start-up Hub for Opportunity-seeking Entrepreneurs) TBI Center	Marikina Polytechnic College	HEIRIT	Endorsed, not approved
Accelerating the Growth of the Ateneo Blue Nest Incubation Program	ADMU - Ateneo Intellectual Property Office	HEIRIT	Endorsed, Approved
Strengthening the Research and Development Capabilities of the Faculty and Researchers of the City of Malabon University (CMU)	City of Malabon University	RDLead	Endorsed, Approved
Strengthening the Research and Development Capabilities of the Faculty and Researchers of the Navotas Polytechnic College (NPC)	Navotas Polytechnic College	RDLead	Endorsed, Approved
Strengthening the Research and Development Capabilities of the Faculty and Researchers of the Pamantasan ng Lungsod ng Marikina (PLMar)	Pamantasan ng Lungsod ng Marikina	RDLead	Endorsed, Approved

CORDILLERA ADMINISTRATIVE REGION

CORDILLERA INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT CONSORTIUM (CIEERDEC)

The Cordillera Industry, Energy, and Emerging Technology Research and Development Consortium (CIEERDEC) is a collaborative organization comprising academia, government agencies, and business sectors. Its primary objective is to conduct research and development in relevant fields to foster progress in the Cordillera Region.

CIEERDEC provides ongoing institutional support to enhance research, development, and innovation in the industry, energy, and emerging technology sectors within the Cordillera region. In 2022, CIEERDEC evaluated and recommended 26 proposals to the DOST-PCIEERD. Among these proposals, 4 were approved for funding.

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

ExperTISE

Expert Intervention for Scientific Engagement

Expert Intervention for Scientific Engagement (ExpertISE) for Regional Consortia

Expert Intervention for Scientific Engagement (ExpertISE) for Regional Consortia		
Proposal Title	**Implementing Agency**	**Project Leader**
Bamboo Expert Immersion Program	Xavier University-Ateneo de Cagayan	Mary Ann Mercurio
LSU-MOELCI-II Research Collab	La Salle University-Ozamis	Lady Vi Tagailo

Regional Research Institution (RRI)

Regional Research Institution (RRI)		
Project Title	**Implementing Agency**	**Project Leader**
Development of Vegan Leather from Banana (Musa acuminata × balbisiana var. Cardaba) Peels Reinforced with Snake Plant (Sansevieria trifasciata) Fibers	University of the Philippines Visayas (UPV) – Tacloban College	Engr. Kier Perdon Gasga
Development of Protein Hydrolysates from Catfish Consumption Wastes as a Food Ingredient	UP Visayas	Dr. Mercy Barte Quilantang
Optimization of Irrigation Flow through Conduit Microhydropower to Generate Electricity for Off-Grid Barangay of Kabacan, Cotabato	University of Southern Mindanao	Dr. Marilyn Santiago Painagan
Augmentation Using Generative Adversarial Network for Violence Detection Videos	University of the Immaculate Concepcion	Mr. Eric John Emberda
Design and Development of Automated Causing Ultraviolet Lights with Holding Tank and Shore Connection to Discharge Pipe for Domestic Vessels	John B. Lacson Foundation Maritime University – Molo And Iloilo Science and Technology University	Engr. Ernie Jay Teves
Nano-enabled bioplastic from regenerated cellulose	University of San Agustin	Dr. Noel Peter Tan
Steady-State Hydraulic Numerical Analysis for Optimized Water Distribution Network Modelling: An Application of Selected Hydraulic Solver	University of Southern Mindanao – Main	Dr. Ma Dely Panelo Esberto
Application of Machine Learning in Energy Production Forecasting for Small Hydro Power Project	Central Mindanao University	Engr. Tristan Magallones

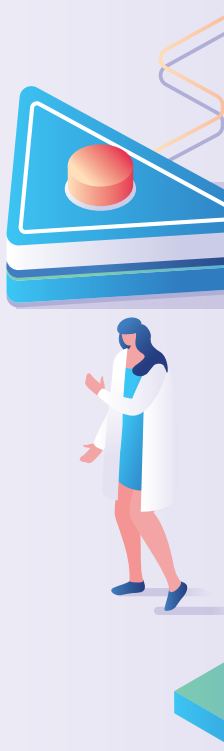
Institution Development Program

In a world driven by technological advancements, the Institution Development Program (IDP) emerges as a catalyst for progress, aiming to address critical issues and objectives in research laboratories and facilities. IDP has revolutionized academic and research institutions within the PCIEERD sectoral priority areas, paving the way for a new era of scientific exploration and discovery.

Over the past eight years, from 2015 to 2022, IDP has made remarkable strides in transforming the research landscape of the Philippines. With a total investment of 234 million pesos, the program has facilitated the establishment of 49 laboratories across public and private academic institutions and research development institutes.

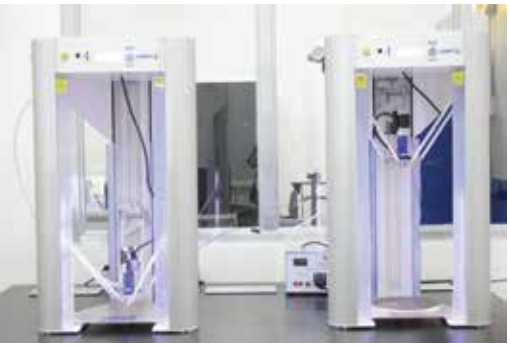
These laboratories have become epicenters of innovation, producing tangible outputs in the form of publications, patents/intellectual property, products, people services, places, partnerships, and policies. The IDP's impact on academic advancement and knowledge dissemination is truly commendable.

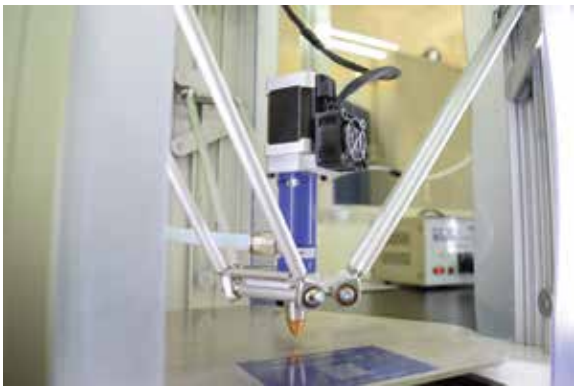
As we celebrate IDP's achievements, we envision a future where enhanced research capabilities become the norm, inspiring generations of researchers to push the boundaries of knowledge and transform our world.



For 2022, 12 institutions received grants under the program:

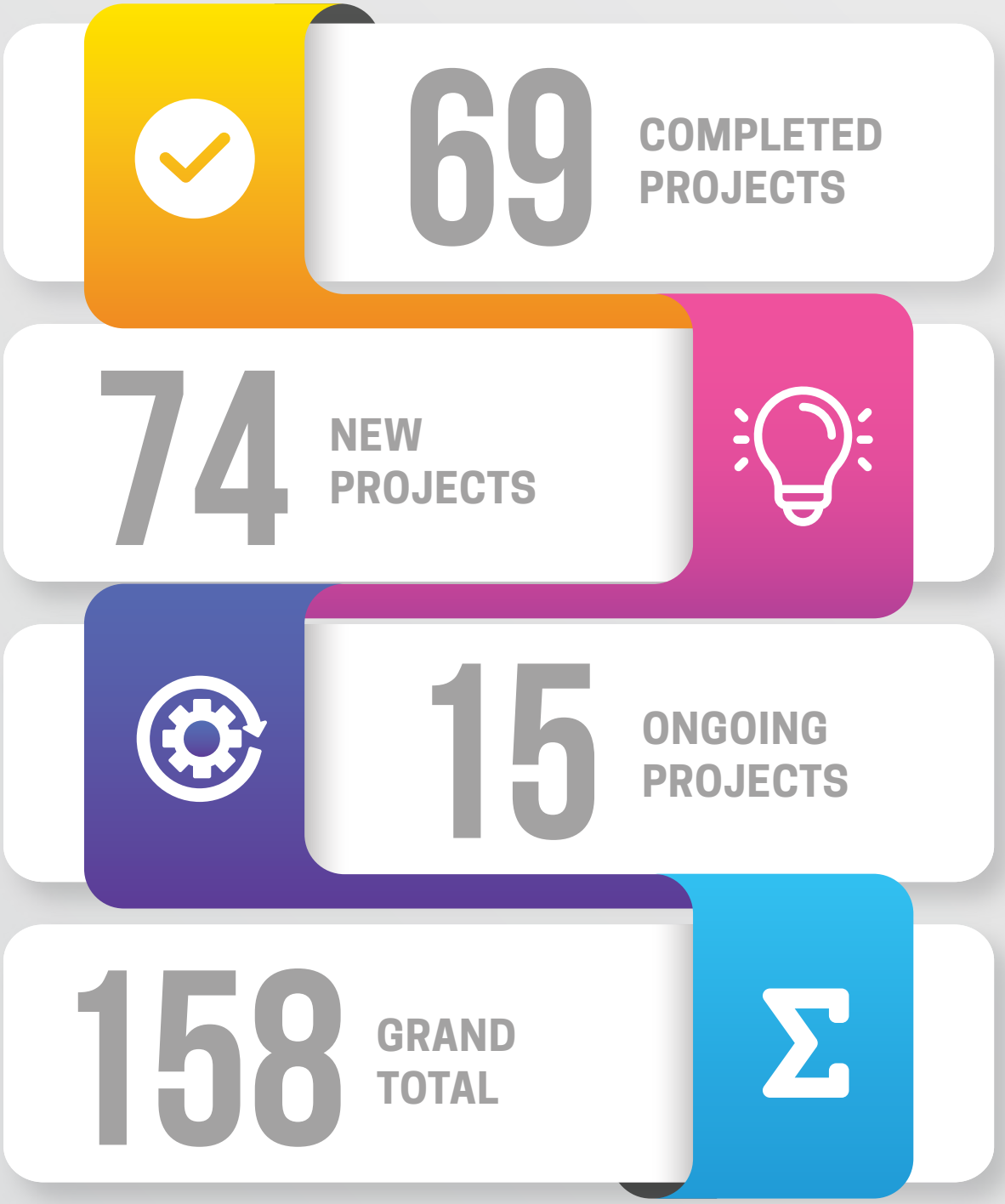
Project Title	Area	Project Leader	Institution
Establishment of PnC DANGAL for Smart Warehouse Inventory Management System	IoT	Engr. Mary Grace Beano	Pamantasan ng Cabuyao
Establishment of nanoCORE Lab: Computational Nanotechnology Laboratory	Nanotechnology	Dr. Rey Y. Capangpangan	Mindanao State University – Naawan
Establishment of Footwear Innovation and Technology (FIT) Research Laboratory at Marikina Polytechnic College	Creative Industries	Engr. Nelson Arguelles	Marikina Polytechnic College
Establishment of Electronics Projects Laboratory for Process Automation of the Cagayan Lodging Industry	Electronics	Mr. Ertie C. Abana	University of St. Louis – Tuguegarao
Establishment of Sultan Kudarat State University – Forensic Molecular Biology Center (SKSU-FMBC)	Forensics	Dr. Vincent Louie D. Cabelin	Sultan Kudarat State University
Innovations Laboratory for Process Machinery and Related Technology Development (i-Lab ProMaTech)	Fabrication	Engr. Monalyn L. Oloroso	Capiz State University
Establishment of Central Luzon Internet of Things Research and Innovation Laboratory for Smart Cities (IoTRILS)	IoT	Engr. Alberto C. Cruz	Bulacan State University – Main
Establishment of a "Hub for Sustainable Smart Nanomaterials" in the Philippine countryside	Packaging Technology	Dr. Noel Peter B. Tan	University of San Agustin
Establishment and Operationalization of Ilocos Sur Polytechnic State College (ISPSC) Microbiology Laboratory	Food	Dr. Juvy D. Naungayan	Ilocos Sur Polytechnic College
QualiSafe Lab: Food Quality and Safety Laboratory for Seafoods	Food	Dr. Marife Hilapad	Capiz State University





Human Resources and Institution Development Division

in 2022 by the Numbers



Program Title	Project Title	Agency Name	Project Leader
	3D Printed Waste Battery Rod Derived Exfoliated Graphite-Polymer Composites for Electronic Sensor Applications	Batangas State University	Jefferson Macalalad
	Attendance to the 2022 CIMPA Summer School on Mathematical Methods in Data Analysis (PCIEERD-HRDP-RIEETOOL)		Neil Jerome Egarguin
	Basic Training Course on the Theory and Applications on Finite Element Analysis using MSC Software		John Gabriel Decena
	Development of biocomposite materials from various agricultural wastes and fabrication of optimized small-scale production machine	Bataan Peninsula State University - Main Campus	Dan William Martinez
	Digital Twin Training Course for Civic Innovation Twin Technology (CITTE) Platform	Isabela State University - Cauayan	Betchie Aguinaldo
	Fungal chitosan- based Microbeads: A Heavy Metal Soil-based biobsorbent	Polytechnic University of the Philippines	Lourdes Alvarez
	HUNDRED ISLANDS NATIONAL PARK MANAGEMENT SYSTEM: IMPLEMENTATION OF SMART TOURISM - resubmitted	Pangasinan State University - Urdaneta City	Paul Andrew Roa
	Liveable City: Transitioning to Low Impact Development strategy to mitigate the impact of climate change-induced urban floods in the City of Balanga, Bataan	Bataan Peninsula State University - Main Campus	Gil Cruz
	Participation in the CIMPA School on Mathematical Methods in Data Analysis		Destiny Lutero
	Prescriptive Navigation through Vision-based Traffic Monitoring for City of San Fernando, La Union	Don Mariano Marcos Memorial State University - Mid La Union Campus	Sheena Sapuay
	Shock Electrodialysis Apparatus (S.E.A.)	DOST-Philippine Science High School	Boon Kristoffer Lauw
	Upskilling the Pool of S&T Experts through Capability Building to Advance the Local 3D Printing Ecosystem (UPSCAL3D Ecosystem) - Pilot Implementation of AMCen Trainings	Other Agency	Joseph Alfred Garcia
Institution Development Program	Establishment of the Additive Manufacturing Center for Industrial Ceramics (AMCeram)	Adamson University	Valino Arnaldo
	1st Philippine Textile Congress	DOST-Philippine Textile Research Institute	Zailla Payag
	4th Philippine Silk Summit	NULL	Cheryl Lopez
	Addressing the Needs, Gaps, and Challenges of PILMICO Foods Inc. through Science and Technology Research and Development: an ExperTISE Project of MSU-IIT	Mindanao State University - Iligan Institute of Technology	Rodel Guerrero

	Agent -Based Modeling of COVID -19 Transmission in Philippine Classrooms		Jcob Malaguit
	Cagayan Valley Industry, Energy, and Emerging Technology Research and Development Consortium (CVIEERDEC)	Cagayan Valley Industry and Energy Research and Development (CVIERDC)	Junel Guzman
	Capacity development needs of the 1.4 MW Maramag Mini Hydropower Project towards a sustainable renewable energy source	Central Mindanao University	Einstine Opiso
	Center for Green Nanotechnology Innovations for Environmental Solutions (CGNIES)	University of Mindanao - Bolton	Chosel Lawagon
	CIMPA SCHOOL PHILIPPINES 2022Mathematical Modeling of Ecosystems		Jayrold Arcede
	Conduct of Workshop on Radiological Environmental Impact Assessment for Nuclear Installations	DOST-Philippine Nuclear Research Institute	Jessie Samaniego
	CuxO-Deposited Activated Carbon Cloth Electrode for Flexible Supercapacitors		Genes Maylem
	Design and Development of a Vision-based Passenger Counter with GPS Tracking for Public Utility Buses using Edge Computing (PROSPPER)	Other Agency	Immanuel Jose Valencia
	Development of Data Analytics and Information System: Support on Social Welfare Services for Senior Citizens of Butuan City	Father Saturnino Urios University	Eltimar Castro
	Development of Data Analytics System for Visualization and Exploratory Analysis of Philippine Rice Genetic Resources	Other Agency	Nehemiah Caballong
	Development of Halal Compliant Restructured Goat Meat Products	Sultan Kudarat State University-Tacurong Campus	Cyril John Domingo
	Development of Optimized Pineapple Fiber Scraping Machine (WVCIEERD PROPOSAL)	Capiz State University - Burias Campus	Monalyn Oloroso
	DOST-HRDP Visiting Expert Program	DOST-Philippine Nuclear Research Institute	Cheri Anne Dingle
	Effect of In2O3 in Granularity and Superconducting Properties of Bi2Sr2CaCu2O8+d bulks and films		Francesca Isabel de Vera
	Effect of silica/MBNT/BNT ternary filler on the curing properties of natural rubber vulcanizates2022 9th International Conference on Mechanics, Materials and ManufacturingPublication in Key Engineering Materials		Clare Garing
	Effects of heterojunction position and cocatalyst loading in CuBi2O4/CuO nanocomposite on carbon dioxide photoelectrochemical reduction		Ian Lorenzo Gonzaga

	Electron beam -induced synthesis of amine and carboxylic type adsorbents from abaca -polyester fabric via pre –irradiation tec hnique for Pb(II), Ni(II), and Cd(II) ion adsorption – Poster Presentation in the Second International Conference on Applications of Radiation Science and Technology (ICARST -2022)		Patrick Jay Cabalar
	Enhancing Technological Innovation of Coconut Products of Segatic Daku Small Coconut Farmers Cooperative through Expert Intervention for Scientific Engagement (ExperTISE) Program		Wilson Nabua
	Establishment of Advanced Mechatronics, Robotics, and Industrial Automation Laboratory (AMERIAL) in Support of the Metals and Engineering Industry	Metals Industry Research and Development Center (MIRDC)	Robert Dizon
	Experts Engagements of USTP Jasaan Researchers to PICMW for the Ideation of Research Proposal		Maricel Mandawe
	Financial Assistance to Bicol Consortium for Industry, Energy and Emerging Technology Research and Development (BCIEERD)		Nino Jeffrey Luzon
	Full Factorial Design Analysis of the Facile Synthesis of Organo-conjugated Carbon Quantum Dots from Glycerol		Roland Andrew Cruz
	Fundamentals of Deep Learning Workshop	De La Salle University - Manila	John Anthony Jose
	GCAP: Evaluation of Mechanical and Ballistic Properties of Glazed Ceramic Armor Plates	Mindanao State University - Iligan Institute of Technology (MSU - IIT)	Ivyleen Arugay
	Grafting of poly(glycidyl methacrylate) onto abaca woven fabric as interface compatibilization for composite reinforcement - Presentation in the Second International Conference on Applications of Radiation Science and Technology (ICARST-2022)		Bin Jeremiah Barba
	Graph Query Language (GQL) – Based Geospatial Intelligence: A Novel Approach to Public Transport Data Modelling for Route Recommendation (PROSPPER)	Other Agency	Marielet Guillermo
	Hydrothermally grown Zinc oxide on activated Carbon fiber cloth as an enhanced electrode for supercapacitor application		Marjorie Valenzona
	Institutional Support for Cotabato Region Industry, Energy, Emerging Technology Research and Development Consortium (CRIEERDC) for CY 2022		Tamano Sacar

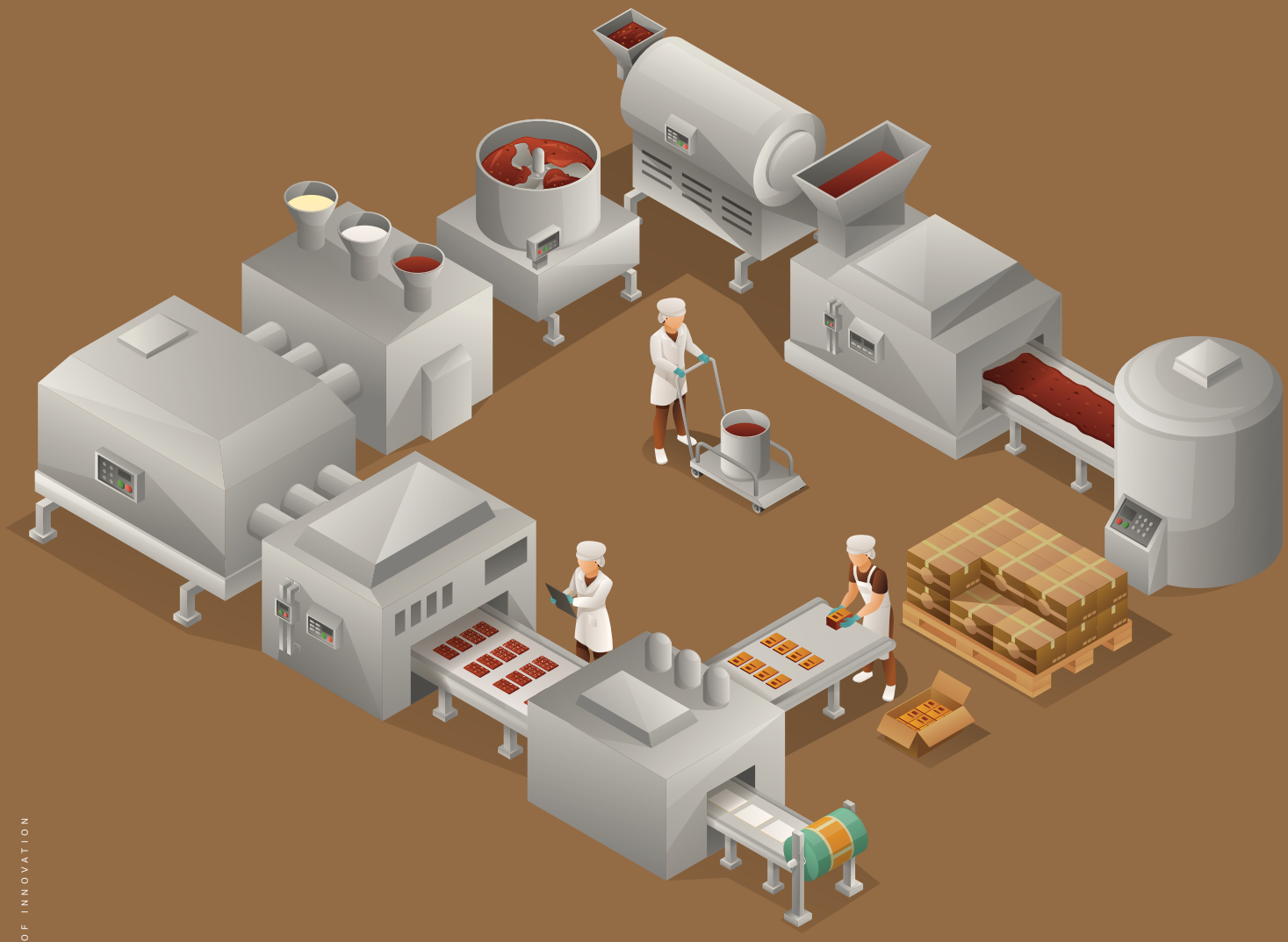
	Integration of RTK -GPS module for Autonomous Outdoor Navigation of Mobile Land and Aerial Robots applied in Agriculture	University of Santo Tomas	Anthony James Bautista
	Operationalization of the Metropolitan Manila Industry, Energy, And Emerging Technology Research and Development Consortium (MMIEERDC)	DOST NCR	Romelen Tresvalles
	PhilRice Data Analytics Initiative – RiceLytics	Other Agency	Nehemiah Caballong
	Potential biodegradable scaffold from Chanos chanos (milkfish) scales and fishbone	Angeles University Foundation	Analiza Molina
	Presentation of poster entitled "Effect of heating temperature on the perception of aroma and flavor attributes of selected Philippine virgin coconut oil (VCO)" at the 21st World Congress of Food Science and Technology		Airisse Rae Basinang
	Research Attachment to Nanophotonics Technology Center (NTC) at Universitat Politècnica de València		Kent Emmanuel Soria
	Research Presentation at the International Conference on Learning Design and Educational Technologyof Project Haynayan AR: Augmented Reality–based Tool for Teaching Cell Biology and Basic Microscopy		Joel Bautista
	Smarter Philippines through Data Analytics R&D, Training and Adoption (SPARTA)	Development Academy of the Philippines	Alan Cajes
	Southern Tagalog Islands Research and Development Consortium (STIRDC)		Jun Cayron
	Support for Ilocos Consortium for Industry, Energy and Emerging Technology Research and Development	Other Agency	Ismael Gurtiza
	Support for the Operation of the Davao Region Industry, Energy and Emerging Technologies R&D Consortium (DRIEERDC) for CY 2022	DOST XI	Anthony Sales
	Support for the Operation of the Eastern Visayas Consortium for Industry, Energy and Emerging Technology Research and Development (EVCIEERD)for the Year 2022	Eastern Visayas Consortium for Industry and Energy Research and Development (EVCIERD)	Benedicto Militante
	Support for the Operation of the Northern Mindanao Consortium for Industry, Energy and Emerging Technology Research and Development (NorMinCIEERD) for Region 10 for CY 2022	Department of Science and Technology – Region 10 (DOST 10)	Bonnie Mangalimotan

	Support for the Operation of the Southern Tagalog Consortium for Industry and Energy Research and Development (STCIERD) for CY 2022	Adventist University of the Philippines	Lorcelie Taclan
	Support for the Operation of the Zamboanga Industry, Energy, and Emerging Technology Research and Development Consortium for CY 2021		Teresita Montano
	Support for the Operation of Western Visayas Consortium for Industry, Energy, and Emerging Technology Research and Development (WVCIEERD) for the Year 2022		Carmelo Ambut
	Support for the Operations of the Central Visayas Consortium for Industry, Energy and Emerging Technology (CVCIEERD) for the year 2022		Merivic Catada
	Support of Operations for the Cordillera Industry, Energy, and Emerging Technology Research and Development Consortium (CIEERDEC)		Pepita Picpican
	Synthesis of forward osmosis membrane from Ananas comosus cellulose-silica composites for desalination application		Liza Patacsil
	Synthesis of Self-Healing Geopolymers Through the Application of BiocharImmobilized Spores of Bacterial Cultures for Enhanced Biomineralization		Jadin Zam Doctolero
	The Federation of Engineering Institutions of Asia and the Pacific (FEIAP)30th General Assembly and 6th International Convention		Lydia Tansinsin
	Training on Additive Manufacturing with Machine Learning and Artificial Intelligence	DOST-Industrial Technology Development Institute	Marianito Margarito
	Transitioning Adlaw farm into a smart cacao and chocolate production company: a capacity needs assessment		Rex Yadao
	Visions of a Smart METRO: A Smart City Seminar and Workshop Series	University of the Philippines Diliman	Czar Jakiri Sarmiento
	WVCIEERD Small R&D Project - Application of Blockchain Technology to the Guimaras Mango Supply Chain	Western Visayas College of Science and Technology - Main	Maureen Nettie Linan

Policy Development & Advocacy


Contract
Legal
egal
dvice

Boosting the Food Processing Industry Through Sustainable Food Innovation Centers



Food processing is a dominant industry in the Philippines. Processing food can be segmented according to source: fruits and vegetables; fish and marine products; meat and poultry products; or according to target products: flour and bakery products; beverage and confectionery; dairy foods; food condiments and seasonings; food supplements; bottled water; snack foods; and fats and oils (Trade Chakra, n.d.).

The gross value-added production of the Philippine food and beverage processing sector climbed by 7% to $32.5 billion in 2018 and by 31% during the preceding five years (2014–2018) (Singian, 2019). In addition, it accounts for nearly half of the total output of the country's manufacturing sector, which contributed around 23-24% of the GDP in 2019 (IFEX Philippines, n.d.).

Despite this milestone, the food processing industry is encountering hurdles, especially in innovating its technological capacity to develop nutritional yet profitable products that can compete with imported goods. A report from the World Integrated Trade Solution shows the disparity in the food products exported and imported by the Philippines in 2019, with the former amounting to USD 2.4 million and the latter to USD 6.1 million.

Further, there is an urgent need to improve the status of malnutrition and micronutrient deficiency among Filipinos, as studies by the Food and Agriculture Organization of the United Nations (UN-FAO) illustrate the continued prevalence of protein-energy malnutrition and micronutrient deficiencies across all ages. As a matter of fact, four (4) million (31.8%) of the preschool population are underweight for age, and three (3) million (19.8%) adolescents and five (5) million (13.2%) adults, including older persons, are found to be underweight and chronically energy deficient, respectively. Likewise bothersome are micronutrient malnutrition, with the vitamin A status of the country classified as severe subclinical deficiency impacting children aged 6 months to 5 years and pregnant women, and overweight and obesity affecting children, adolescents, and adults (UN FAO, n.d.).

Thus, the government must initiate effective policies and sustainable programs to capacitate local food processors with food processing equipment and services.

Food Innovation Centers

The Food Innovation Centers (FIC) were established through the High Impact Technology Solutions (HITS) program of the Department of Science and Technology in 2015. It serves as a hub for innovations, research and development, and technical support services for the value-adding of fresh produce and the development of processed foods in different regions of the country.

Food Innovation Centers provide an opportunity for local food manufacturers to improve and develop products using the four (4) locally designed and fabricated pieces of equipment: (a) a spray dryer, (b) a freeze dryer, (c) a water retort, and (d) a vacuum dryer. The spray dryer transforms liquids into powder instantly, while the freeze dryer produces dried materials but prolongs shelf life and enables a more convenient way of transporting these materials.

There are currently eighteen (18) FICs established in the regions through the rollout of locally designed and fabricated food processing equipment, which was completed in three (3) batches. From 2017–2020, the FICs have developed 9,893 product concepts, 1,413 product prototypes from the product concepts, 312 packages of technologies (POTs) from the prototypes, 282 IP applications filed as of 2020, 36 licensing agreements signed, and at least 5,464 clients served (FIC Task Group Report, 2020).

Technical and Operational Recommendations

1. Operation and maintenance

a. Administer extended regular training on operating equipment.

b. FIC to produce a harmonized operations manual.

c. Develop technology development roadmap to eradicate, if not minimize, duplication of products.

d. The FIC to identify priority commodities essential for research and product development.

e. Maintenance protocols/procedures must be thorough and properly documented.

f. Implement stricter policies on quality assurance and testing of fabricated equipment.

2. Design and workmanship

• Spearhead collaboration with LGUs. The collaboration will involve product development for nutrition programs of LGUs which may be legally supported through issuance of ordinances and other regulations.

• Expand partnerships with other government agencies. The FICs may partner with the Department of Education in a nationwide program which will develop and administer nutritional food to malnourished children in all public schools. Similarly, it may also partner with the Department of Health in promoting healthy diet among Filipinos through delivering ready-to-use therapeutic food for malnourished children and adults. Further, FICs may collaborate with the Department of Trade and Industry on programs and activities to expand its reach to more potential and existing MSMEs. Through these partnerships, stakeholders will be able to fully utilize the services of FICs while keeping it sustainable.

• The PCIEERD may lobby a bill that will highlight the need to maintain Food Innovation Centers as it is instrumental in advancing public interest, particularly public health.

Powering Missionary Areas with Solar Energy

Based on global data on energy consumption, fossil fuels remain the top source of energy in the world (Ritchie and Roser, 2017). Renewable energies account for only 36.39% of total energy consumption worldwide. Of this, 2.65% is from solar energy. Thus, there remains a huge discrepancy between fossil fuels and solar energy. However, solar photovoltaic (PV) installations continue to increase worldwide. Solar PV capacity increased from 15 to 505 gigawatts (GW) from 2008 to 2018, indicating a continuous interest in the development and utilization of solar energy around the world, with China, the U.S., Japan, Germany, and India as the leading countries (REN21, 2019).

The Philippines keeps up with this trend.

In 2017, the Philippines ranked first in Asia and fifth in the world in terms of operational solar PV projects. The country was also noted to have seven active solar power projects ranked in the top 50.

Fossil Fuels and Solar Power

Solar energy is a very promising energy source. Making use of renewable energy resources, such as solar energy, for power generation could improve fuel security in the country. Despite moving forward with policies on REs, the Philippines remains heavily reliant on fossil fuels. Coal accounts for 52% of gross power generation as of December 2018.

Fossil fuels, the primary source of greenhouse gas emissions, are harmful to the environment from acquisition to utilization (Denchak, 2018). Aside from environmental impact, air pollution from fossil fuel consumption is attributed to causing 27,000 premature deaths in the country per year (Greenpeace Philippines, 2020). Economically, the import-reliant nature of fossil fuels in the country leaves the economy vulnerable to price shocks and drastic increases in the prices of commodities should there be fluctuations in scarcity and demand.

Powering the Philippines

In 2018, PCIEERD, DOST Region XI, the Ateneo de Davao University, and local government units collaborated to bring electricity to the community of Barangay Manurigao in New Bataan, Compostela Valley, as part of the field testing for the viability of an off-grid solar PV system in the electrification of missionary areas in the country, which is under the MREC. The result of the project aims to be the benchmark for the offshoot development of solar PV systems in the country, especially in providing electricity in remote areas of the Philippines.

The project team installed a micro-grid hybrid solar PV power system to supply electricity to the community. The 50-kW off-grid solar power system, which supplies electricity to around 100 households in the area, produces at least 112 kWh of energy per day. The system has batteries that enable energy to be stored for future use. The system also has a generator, which helps ensure a continuous supply of electricity.

Despite successful installation, the microgrid faces issues regarding the sustainability of the project. One issue is the high cost of generating electricity from the installed solar PV system through the project. According to Project Leader Dr. Randell Espina, the community cannot sustain the P40.00 per kilowatt-hour (kWh) energy cost. The high cost covers the maintenance of the batteries and fuel for the generator, essential components of the system, and manpower for system operations. A survey conducted by the implementers revealed that the community could only afford to pay P20.00 per kWh.

To address the concern about sustainability, several interventions are being introduced. First is the provision of a milling machine for the post-processing of crops to increase the value of the community's products. Through this, income will increase, the solar PV system can be sustained, and at the same time, the surplus energy generated will be utilized by the machine. The second is the establishment of a local cooperative.

Challenges

Solar energy is a promising source of electricity, especially in the off-grid areas in the Philippines. The self-sustaining and relatively low maintenance technology can be maximized in the electrification of remote areas as mandated by Section 70 of RA 9136 and Section 12 of RA 9513. However, it is important to note that there are issues and challenges particularly sustainability issues as demonstrated by the Manurigao project.

Here are the following challenges:

a. Socio-economic feasibility of adoption of solar PV for remote communities
b. Lack of knowledge and skills in operating the technology
c. Lack of incentive for off-grid PV systems in the law
d. Lack of ex ante situational analysis.
e. Bureaucratic processes in developing RE facilities.

Policy Recommendations

The following are policy recommendations from DOSTPCIEERD for the planning of future rural electrification projects by NGAs, and the implementation of these projects by concerned LGUs

1. Socio-economic feasibility of adoption of solar PV for remote communities

a. Incorporate socio-economic plans in projects or programs to assist the beneficiaries of power systems in sustaining the technology.

b. Offer employment opportunities and include training programs for community members who will manage the operations.

c. Install solar capacity as quickly and as much as possible. Mass installation of solar technology could be able to drive down costs per kWh, as seen in the U.S. Department of Energy's SunShot 2020 Program, which could eliminate a major hurdle to adoption in low-income missionary communities.

d. Reevaluate the prevailing focal point of rural electrification.

e. Use livelihood electrification as the cornerstone of future projects. This means primarily directing the usage of rural solar PV projects towards electrification that can drive income for communities, as opposed to the model currently being used, which directs usage of rural solar PV towards household electrification.

f. Assess the current economic model used. Remote rural areas are often the poorest and most conflict affected. The current market-oriented scheme has fueled debate about whether electrification is a public concern and, if so, should public funds be used until the communities can economically develop and pay for electrification services (Mesina, 2016).

2. Incentive for off-grid PV systems in the law and growing knowledge and skills in operating the technology

a. Develop parameters and models to include and incentivize lower-income households and farms in net metering, which will raise awareness and increase community participation in RE.

b. Pivot Universal Charge usage into RE facilities for microgrids in remote areas. Majority of fund usage by the NPC SPUG has been focused on fuel-based energy plant development in remote areas. A shift towards RE plant development would be a long-term benefit for the communities

3. Conduction of ex ante situational analysis

a. Conduct feasibility studies/situational analyses by creating programs consisting of phases, through which these are conducted in the first phase. These will determine the overall situation of the community which will in turn determine other interventions that will be incorporated to support the sustainability of the technology.

4. Streamlining bureaucratic processes in developing RE facilities

a. Establish a full-service institution for the streamlining of RE development applications. Offering services to streamline bureaucratic processes would help alleviate red tape for potential RE projects.

Water Pollution: Health and Economic Hazard

Water pollution continues to be a major challenge in the Philippines. Rapid population growth and urban-rural migration led to unequal concentrations of people and, subsequently, increased pressure to use resources, resulting in poor water quality and sanitation practices and systems. The amount of biological oxygen demand (BOD) indicates a falling level of dissolved oxygen and is an indicator of sustainability for biodiversity. In essence, the greater the BOD, the greater the degree of organic pollution (NEDA, 2021). The amount of BOD being discharged into bodies of water annually in Metro Manila alone is estimated to be 430,000 tons per year (ARCOWA SA, n.d.). Adverse impacts of water pollution cost the Philippines an estimated Php 67 billion annually through effluent discharge and environmental damage that hamper livelihoods (Water Environment Partnership in Asia, 2003).

Industrial Waste

Coupled with the increase in industrial activities in the country, contamination through improper industrial wastewater treatment and disposal continues to pose a significant threat. Notices of Violations were served to 5,228 out of 10,168 industries around Manila Bay alone (Manila Bay Coordinating Office, 2018, as cited in ARCOWA SA, n.d.). The Department of Environment and Natural Resources' Environmental Management Bureau (EMB) estimates that 15% of organic material pollution in bodies of water is from industrial sources.

The EMB also reported "unsatisfactory ratings" for rivers in regions where most Philippine manufacturing industries are located (Ibid.). Heavy metals released into bodies of water through improper industrial wastewater management may also affect communities further than those in their immediate vicinity via the food chain, wherein flora and fauna ingest and absorb toxic wastewater (Ahmed et al., 2021).

Disparity in Sanitation: The Social Impact

Only 7 million people in the Philippines have access to piped sewerage systems (Magtibay, 2017). This statistic is reinforced by the National Economic Development Authority's (NEDA) report on open defecation, which states that about 4 million people resort to open defecation and an additional 2 million resort to unprotected pit latrines or buckets.

In Metro Manila alone, approximately 2,000 cubic meters of solvent waste, 22,000 tons of heavy metals, infectious wastes, biological sludge, lubricants, and intractable wastes, as well as 25 million cubic meters of acid and alkaline liquid wastes, are improperly disposed of annually, and only five percent of the population is connected to sewerage networks and treatment facilities, equivalent to only around 440,000 households being serviced.

Vigormin Impacts

1. Increased income.

In specific, septic tanks, a decentralized system, are the most widely used in the country (United States Agency for International Development and Philippine Department of Health, 2008). These store wastewater temporarily and treat it through leach fields - trenches of water where water is further treated before release into nearby soil. However, most septic tanks in low-income countries were observed to have no leach field (Baltazar et al., 2021). As such, these require removal through desludging and treatment in facilities upon reaching full capacity. For reference, In the United Kingdom, the cost to install a septic tank can range from USD 7,500 to 15,000 (PHP 431,103.75 to 862,207.50 as of 16 November 2022) and maintenance from USD 200 to 1,520 (PHP 11496.10 to 87370.36 as of 16 November 2022) every 5 to 10 years (Express Wastewater Solutions, n.d.). In the Philippines, the annual cost of maintenance for household septic tanks is PHP 3,000 (Viray, 2014). This shows the steep difference from the cost of Vigormin Technology at PHP 120 per month or PHP 1,440 per year (with the average household using 1 kilogram per month).

2. Improved Quality of Life
3. Improved Human Heath
4. Reduced Energy Consumption
5. Sustainability
6. Contribution to Goal Achievement

Policy Recommendations

1. Empowering individuals, businesses, and communities through dispersion of technology through DOST-SETUP or government subsidization, research for more sustainable cost-effective water treatment technology, and more effective information dissemination and maintenance.

For future micro, small, and medium enterprise (MSME) adopters or manufacturers concerned with wastewater treatment services, application to DOST's Small Enterprise Technology Upgrading Program (SETUP) for Vigormin Technology is highly recommended. SETUP is a strategic program that assists MSMEs on the adoption of technological innovations to improve products, services, and operations, and increase their effectiveness. Through the program, MSMEs are given the opportunity to get free technical advice from DOST consultants, avail themselves of technical training courses for workers and employees, acquire new equipment, and improve productivity through venture funds.

The original Vigormin program used the tourism industry as its target market. However, the potential impact of Vigormin in low-income communities, where improved water resources and sanitation are scarce, should not be understated. As mentioned in the Impact Assessment conducted on the technology, responders ere be more receptive to usage of Vigormin if some form of government subsidization was involved rather than having to spend it out of their pockets. Offering the technology at full subsidization or partially subsidized costs for households that lack financial capability ties in as well with the constitutional provision of the state adopting an "integrated and comprehensive approach to health development which shall endeavor to make essential goods, health, and other social services available to all the people at affordable cost" (Article XII Sec. 11). This could also potentially offset the dwindling adoption observed in other target areas.

2. Target strategic locations and communities for deployment before expanding service delivery.

For further research of cost-effective products related to water sanitation, the methodology of field deployment of the Vigormin program is recommended. In cooperation with LGUs and DOST regional offices, strategic locations should be targeted. Results may then be used to showcase the effectiveness of the technology. This gives the public, specifically those outside the scientific field, tangible results to measure how successful the product is.

3. Transfer Implementation from LGUs to Other Implementing Agencies

A noted concern for the project's long-term viability is change in political leadership, especially for LGU administrations. Continuation of projects regardless of administration changes may be better assured if project implementation is shifted from LGUs to other implementing agencies with specific mandates related to the project. For instance, wastewater sanitation project implementation may be directed towards the Department of Public Works and Highways (DPWH), pursuant to its mandate of provision of water supply and sewerage facilities in RA 9275 and the agency with primary responsibility for the act. Notwithstanding, the potential of streamlining projects through partnership with the LGUs must not be overlooked. It is thus also recommended that the LGU remains active in supportive, facilitative, and informative functions for projects being implemented within its authority.

Robust Optical Aerosol Monitor as a Requirement for the Issuance of Environmental Compliance Certificate

Aerosol is a suspension of solid or liquid particles in the air. In the context of air pollution, aerosol or particulate matter is a mixture of solid particles and liquid droplets found in the air that is classified according to its size.

As of 2014, the Philippines has nineteen (19) coal districts (Global Methane Initiative, 2015), fifty-four (54) coal operating contracts, and eighty-five (85) small-scale coal mining operator (DOE, 2022). The combustions from the mechanical processes of these coal mines directly result to increased concentration of particulate matter (PM) in the surrounding areas.

The increasing concentration of particulate matter in the atmosphere is a growing concern to inhabitants of areas situated near coal mines. In terms of health, scientific studies link particulate matter to significant health issues, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, and difficulty breathing (US-EPA, 2022.

In 2018, the World Health Organization identified that 43.5 of 100,000 Filipinos die due to air pollution-related illnesses (RAPPLER, 2021). Moreover, the Philippine Health Statistics reported that 65,887 (4%) out of 1,647,178 cases of acute respiratory infection, 327,684 (42%) out of 780,199 cases of acute respiratory tract infection and pneumonia, 218,325 (42%) out of 519,821 cases of bronchitis, and 5,207 (16%) out of 32,541 cases of heart diseases were attributed to air pollution-related causes (DENR-EMB, 2012).

Robust Optical Aerosol Monitor

In 2014, a group of researchers from the University of the Philippines Diliman, in partnership with the Department of Science and Technology – Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD), spearheaded the development of the first Filipino-made air quality monitoring device called the Robust Optical Aerosol Monitor (ROAM). The ROAM measures particulate matter concentration in the air. It uses laser illumination and camera to obtain images of size-selected particles. The images are then digitally processed to yield the mass concentration estimate. Aside from determining the concentration of particulate matter up to the size of PM2.5, it is also capable of temperature and humidity reading in an interval as little as only five (5) minutes.

Other than being locally developed, another advantage of ROAM over other foreign aerosol monitors is its significantly lower cost of production and maintenance. The ROAM costs around one hundred fifty thousand pesos (Php 150,000) to produce and would be sold at three hundred eighty thousand pesos (Php 380,000.00) compared to other foreign aerosol monitors whose production could cost between five hundred thousand pesos (Php 500,000.00) to three million pesos (Php 3,000,000.00). This cost discrepancy is due to non-requirement of parts for funneling samples of air into a small illumination volume considering that the illumination chamber of ROAM is large enough for the deposition of stray particles. Nonetheless, ROAM is of same quality and efficiency with other foreign aerosol monitors, as verified by the Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB). In fact, during collocations of ROAM with its foreign counterparts (TSI Dus Trak and Grim Aerosol Monitor) in different locations in Manila, statistical analyses (Regression Analysis and Pearson Correlation) showed low Root Mean Squared Error (RMSE) values and high correlation coefficients indicating closeness and significance of the PM data from both ROAM and its foreign counterparts. As of date, the ROAM project of DOST-PCIEERD was able to locally fabricate 10 units of ROAM (consist of 3 station-collocated reference units and 7 units collocated with 3 reference units).

On July 12, 2021, the DOST-PCIEERD deployed ROAM in the municipalities of Agoncillo and Alfonso, Batangas, following the eruption of the Taal Volcano. This was to help the residents know the concentration particulate matter pollution in the air is detrimental to their health. This also served as an opportunity to further test the capability of ROAM in a challenging environment considering its upcoming commercialization.

Challenges of ROAM:

1. Unavailability of materials.
2. Lack of local and international certification.
3. Lack of mechanisms compelling the use of air quality monitors.

Policy Recommendations

1. Capacitate local industries to produce necessary materials.

a. Capacitate relevant local industries to make auto-mechanic materials typical of common optomechanical assemblies and applications necessary to produce Air Quality Management Districts (AQMDs) by conducting technical trainings and seminars and providing financial support for upgrading of their technical capacities.

2. Pursue local and international certifications

a. Re-evaluate and recalibrate the technical specifications of ROAM to achieve the standards set by the US Environmental Protection Agency in order to obtain its certification that is crucial for the regulatory use of ROAM. Better yet, the DENR-EMB may facilitate a coordination with the DOST Industrial Technology Development Institute (ITDI) for the evaluation and local certification of aerosol monitors. With this, the regulatory use of ROAM will not be dependent on the certification of the US-EPA.

3. Standardize and compel the adoption of legal mechanisms on the use of air quality monitors.

a. Incorporate the use of ROAM in the work and safety protocols of businesses that primarily contribute to high concentration of particulate matter. Regular reports as to the result of such deployment should be submitted to relevant government agency/s in order for the business to adjust its operations or practices accordingly.

b. Standardize the use of AQMDs, especially ROAM, in industries that primarily contribute to high concentration of particulate matter by adding it as a pre-requisite before obtaining an ECC from the DENR. In addition, the DENR may issue regulatory policies on the proper use, manufacture, fabrication, sale, importation, and exportation of aerosol monitors. Strategies to prevent counterfeit aerosol monitors from penetrating the Philippine market should also be strengthened.

c. Promote continuous deployment of ROAM to assist the drafting and/or modification of existing air and environmental quality standards. In addition, local government units (LGUs) may utilize these assessments to provide solutions in minimizing particulate matter concentration, which will upgrade the capacities of these LGUs in sustainable air and environment management.

4. Other policy recommendations for promotion and commercialization of the ROAM

a. Create a spin-off company through DOST-PCIEERD's Funding Assistance for Spinoff and Translation of Research in Advancing Commercialization or FASTRAC program to help advance the commercialization of their technology and bring this citizen science project to the community.

b. Encourage the Department of Education (DepEd), Department of Health (DOH), DENR, local government units (LGUs), and other relevant government agencies to undertake comprehensive information/education campaign on the health implications of high particulate matter concentration. This will drive the public to demand regular deployment of air quality monitoring devices, especially in areas susceptible to high concentration of particulate matter i.e. coal mines and similar industries. Eventually, this will translate to high commercial demand for ROAM.

Policy Forum for Local Government Units in Visayas and in Davao

PCIEERD Goes Local: Legislative Opportunities for Collaboration to Advance LGUs

A full contingent of local representatives from the Visayas—about 77 in total—were present during the "PCIEERD Goes Local: Legislative Opportunities for Collaboration to Advance LGUs" policy discussion for local government units (LGUS) in the Visayas at the Waterfront Cebu City Hotel & Casino in Lahug, Cebu City, on November 22, 2023.

This forum's objective is to spread awareness of DOST-PCIEERD and the S&T-based policy suggestions emerging from the projects it supports. Additionally, it seeks feedback on additional potential PCEERD solutions while identifying LGUs that may apply these rules. Additionally, the project aims to forge connections with municipal, state, and federal administrations.

Key personnel from the LGU, DOST, DILG, NEDA, and universities from Regions VI, VII, and VIII participated in the event. Among the participating provinces were Cebu, Bohol, Samar, Leyte, and Iloilo.

The forum was spearheaded by the Policy Group of the Policy Coordination and Monitoring Division, or PCMD, and was hosted by Mr. Jeiel Angelo Gabriel Rodriguez. Science Research Specialist I.

The Executive Director of PCIEERD, Dr. Enrico Paringit, presented the rationale of the forum. Dr. Paringit began with the introduction of PCIEERD, along with its mandates and sectoral coverage. He also shared some of the technologies developed and supported by the DOST.

Following this introduction, Dr. Paringit focused on the importance of spreading awareness about the new technologies available and how policy development can help in their adoption. Dr. Paringit also quoted a part of President Ferdinand Marcos Jr.'s speech during the recently concluded National Science and Technology Week (NSTW):

> And as long as that problem is overcome, then I think that it is absolutely necessary that you invite all the LGUs or a representative thereof to come and see some of the available technologies because many of these are immediately applicable to the local government — the local communities around the country. And this will provide new opportunities."

Dr. Paringit also briefly shared the process of technology development where the industries determine what needs to be developed and the government being prompted to provide funding and plans for action. He also mentioned the role of the academe as key drivers of technology transfer. Dr. Paringit also discussed the cycle of policy development from the recommendations of researchers from S&T projects to government agencies and LGUs.

During the forum, selected policy recommendations from completed S&T projects of PCIEERD were presented by Mr. Ulysses Palmones of PCMD. These are samples of relevant policies that may be adopted by the LGUs through their ordinances and/or resolutions.

The policies were enumerated and categorized based on sectoral concerns, namely: health care services/equipment, environmental solutions, renewable energy, electronics technology/human security/food security, and data science/good governance. Mr. Palmones highlighted the following items: goods and services for the healthcare industry, environmental solutions, non-traditional energy sources, electronics, human and food security, data science, and good governance.

Mr. Palmones closed his presentation with a call to action, urging local and other government agencies to improve their partnerships with R&D organizations, participate in stakeholder meetings, and forge stronger connections between corporate and government organizations and R&D institutions.

Testimonial on Municipal e-Governance Systems through ICT Project

Dr. Challiz Omorog, Dean of the College of Computer Studies at CSPC, gave an overview of the processes of adopting electronic governance systems and shared her experiences during their implementation.

The discussion was mainly about the project titled "eGov2.0: Interoperable eGovernance Systems for LGUs", led by Dr. Omorog. She began with the introduction of e-Gov 2.0 as an "umbrella software solution" for electronic document administration, management, and analytics solely for LGUs.

The eGov 2.0 is composed of six (6) interrelated programs, namely, the Electronic Building Permit and Licensing System (eBPLS), the Real Property and Tax Assessment System (RPATS), the Electronic Business Permit System (eBPS), the Legislative Management and Tracking System (LemTrac), the Interoperable Local ID System (LIDS), and the Point of Payment System (POPS). Dr. Omorog also added that eGov2.0 is a web-based system that can be opened on any device with a browser; it is open-source software that anyone can use, inspect, modify, and enhance; and lastly, it is an interoperable framework where information from the six (6) programs mentioned can be accessed through a centralized database.

Dr. Omorog also shared the advantages of eGov2.0 compared with other systems, claiming that it has six (6) programs that can also be purchased individually, is the least expensive, and offers data analytics where officials can easily see a summarized version of information within the system. She also mentioned that only their system allows users to have a centralized payment system and document tracker. The current beneficiaries and adopters of eGov2.0 include the LGUs of Nabua, Bula, and Pasacao, Camarines Sur.

Lastly, Dr. Omorog discussed the processes involved in the adoption of eGov2.0. These include: 1) evaluation of IC infrastructure status and the eGo process viz. actual LGU operations; 2) crafting of LGU ordinances regarding the e-governance project implementation; and
3) procurement of equipment and other ICT supplies before project implementation. She also mentioned the expected outputs from the LGUs before implementation and the personnel involved in such preparations.

Consultation / Discussion on Possible Legislation from Policy Outputs of Projects

With the presentation on the available technologies and policy recommendations from PCIEERD, the testimonies, and the clarifications given, participants were then consulted regarding the possibility of policy adoption in their respective LGUs.
The participants were grouped by region (Regions VI, VII, and VIII) and were accompanied by two (2) PCIEERD secretaries each to facilitate the discussion.

The summary of the responses is presented in the following table:

Region	Awareness	Technology Adoption	Legislation and Policy	Challenges/ Constraints	Remarks
Region VI	Not aware; No committees for Science and Technology in Iloilo	1. Ventilation and eGov project 2. Solid Waste Management	1. Introduce in NDC meeting to discuss plans and projects 2. Presentation of plans through proposals to local chief executive to confirm prioritization of DOST projects 3. MOA between DOST and LGUs	1. No continuity of plans especially during changes in administration 2. Budget/Funding	1. Designing projects to fit in 3-year terms may increase chances of adoption but may have no continuity for the long run. 2. Most effective way to have knowledge of the technologies presented is to repackage technologies into forms usable and beneficial to the LGU. 3. Strengthen presence of PCIEERD in SUCs and HEIs especially for research (funding and functionality)
Region VII	Not aware; Familiar with eGov	1. eGov project 2. e-Trike 3. LiDAR 4. Titan (for Cebu city)	1. Link DOST directly to LGU 2. Include in the executive agenda	1. Lack of knowledge on PCIEERD initiatives and technologies; Gap between DOST and LGUs (having to course through DILG first before LGU) 2. Connection issues between communities 3. Support from the LGU Executive level 4. Budget	1. Can eGov2.0 work with other eGov systems? 2. Projects focused on DRRM and middlemen elimination on services available in DOST 3. DOST to link LGUs with private institutions may also be helpful
Region VIII	No answer	1. Salt Processing Equipment 2. e-Gov project 3. Solar PV 4. Waste-to-Energy technology	1. Include in the legislative priority agenda 2. Include as a requirement in the Seal of Good Governance of the DILG 3. For the E-gov project one option to reduce cost is subscription	1. Funding/Budget allocation 2. Waste sufficiency (for WTE requirements) 3. Political will	1. Plans to subscribe to eGov instead of buying the system at once; clarification on maintenance of the system (c/o Dr. Omorog)

PCIEERD Goes Local: Legislative Opportunities for collaboration to advance LGUs

PCIEERD conducted its Policy Forum with the theme *PCIEERD Goes Local:Legislative Opportunities for Collaboration to Advance LGUs* last October 18 at the SMX Convention Center, Davao City. The event was attended by 111 participants from 24 LGUs coming from the Regions of Mindanao and hosted by Mr. Ivan Roblas, Supervising Science Research Specialist of DOST PCIEERD Information Group.

The objectives of this policy forum are as follows:

- To create awareness of PCIEERD and its programs and projects with the LGUs.
- To establish linkages with the LGUs.
- To encourage the LGUs to adopt policy recommendations from PCIEERD-supported projects

The event was opened with a message from Davao City Mayor Sebastian Duterte delivered by Hon. Bonz Andre Militar, City Councilor and Chairperson of the Committee on Information Technology. In his speech, he emphasized that digital transformation is imperative and that it is high time to upgrade the government's processes to par with international standards to cater to the needs of and provide timely services to the citizens.

According to him, Davao City approved the Davao City Invention and Innovation Center (DCIIC) during its 14th regular session in 2021, which gave an opportunity for Davao City inventors, innovators, and startups to access goods, services, and capital so that inventions and innovations can be fully developed and promoted.

Hon. Militar added that Davao City will be the pilot implementor of the "one-stop portal" of ARTA, and if this is successful, it will be introduced to the other cities in Mindanao so that the processes from the application to certification will go digital for easy and fast transactions.

Dr. Enrico Paringit, Executive Director of PCIEERD, gave the rationale for the event. He started his presentation by sharing the mandates and sectoral coverage of PCIEERD. He emphasized that one of the council's mandates is to develop and advocate policies for innovation. Moreover, Dr. Paringit added that the industry plays a vital role in determining what PCIEERD should prioritize and the interconnection among industry, R&D (researchers), and government. Good linkage among these three actors will ensure that the technology being developed will suit the needs of the country.

Dr. Paringit shared that supporting innovation, especially for young researchers, is important to foster development and innovation in the technologies that we use, and that policies should be placed so that the proposed measures will thrive and improve the citizens' lives.

Dr. Paringit ended his speech by giving three call-to-action points:

- Urge local and other government agencies to strengthen partnerships with R&D agencies.
- Participate in stakeholder meetings.
- Forge stronger ties between industry and government agencies and R&D institutions.

Testimonial on Municipal e-Governance Systems through the ICT Project: Dr. Challiz D. Omorog, Dean, College of Computer Studies, Camarines Sur Polytechnic Colleges (CSPC)

Dr. Omorog divided her presentation into three sections governing the overview of eGov2.0, its beneficiaries, and its inception through deployment and adoption PPAs. eGov2.0 has six (6) interrelated systems: the Electronic Building Permit and Licensing System (EBLS), the Real Property and Tax Assessment System (RPATS), the Electronic Business Permit System (EBPS), the Legislative

Management and Tracking System (LemTrac), the Interoperable Local ID System (LIDS), and the Point of Payment System (PPS).

In addition, Dr. Omorog also shared a competitor analysis matrix of the system in terms of the number of modules, service offering, price, data analysis, and the like.

Lastly, Dr. Omorog shared what the LGUs need to know before the adoption of the eGov2.0 system, such as:

- PPA 1: Evaluation of IC infrastructure status and eGo

process, viz. actual LGU operations
• PPA 2: Crafting of LGU ordinances regarding the e-governance project implementation
• PPA 3: Procurement of equipment and other ICT supplies before project implementation

Q&A/Open Forum

Ms. Cabonita of DOST CARAGA asked questions related to projects Zeoskin and Vigormin. On Zeoskin, she asked if PCIEERD has a cost comparative analysis of the technology versus the commercial or traditionally
available technology in the market. Mr. Palmones responded that a cost comparison was provided by the proponents during the submission of the proposal. What we can do is check whether the costs are still up to date with the existing options on the market. On the Vigormin project, Ms. Carbonita shared that DOST CARAGA is one of the implementors of the project.

However, the proponent increased the price of the product (an IPR concern), and the availability of the product is also a concern. Considering the increased cost of the product, it is no longer practical to use. Dr. Paringit mentioned that costs are really a factor. It is important that economic viability be present for the product. This product was initially tested in 2014 in the Pasig River. There is a need to balance the viability, cost, and sustainability of the product. (Balance cost with the need for environmental sustainability.)

Board Representative Hon. Erwin Dano of Agusan del Norte asked about the solar energy technologies of the Council, particularly the cost and availability of the battery and whether this is created by DOST. Dr. Paringit responded that the technology presented is a small microgrid or off-grid solar type to cater to the unserved or underserved. All parts of this technology are composed of off-the-shelf materials, and it is not really a new discovery but more focused on developing a viable design and specifications. The reason for the Council's support for this project is the sector's direction and advocacy towards off-grid renewable energy sources. Dr. Paringit added that Ateneo de Davao University, as the implementing agency, came up with the configuration and cost of the technology. It is also noted that for this kind of project, the battery usually takes the brunt of the cost since it needs to be replaced approximately every two years.

Dr. Paringit also discussed another project in the region, which is the Pisolar Project. This project operates a layaway scheme (as you use the power, you pay for the system). This technology can power one house. Dr. Paringit conveyed that PCIEERD will provide the participants with a longer brief to give further details of the projects.

Councilor Edgar Corvera of Bislig City, Surigao Del Sur, also raised his concern about a possible solution to their problem related to mycotoxin (bukbok) in harvested bananas. Dr. Paringit mentioned looking at the arsenal of projects related to this. One project he remembered related to bananas was the use of nanotechnology for banana preservation. This concern will be referred to PCAARRD.

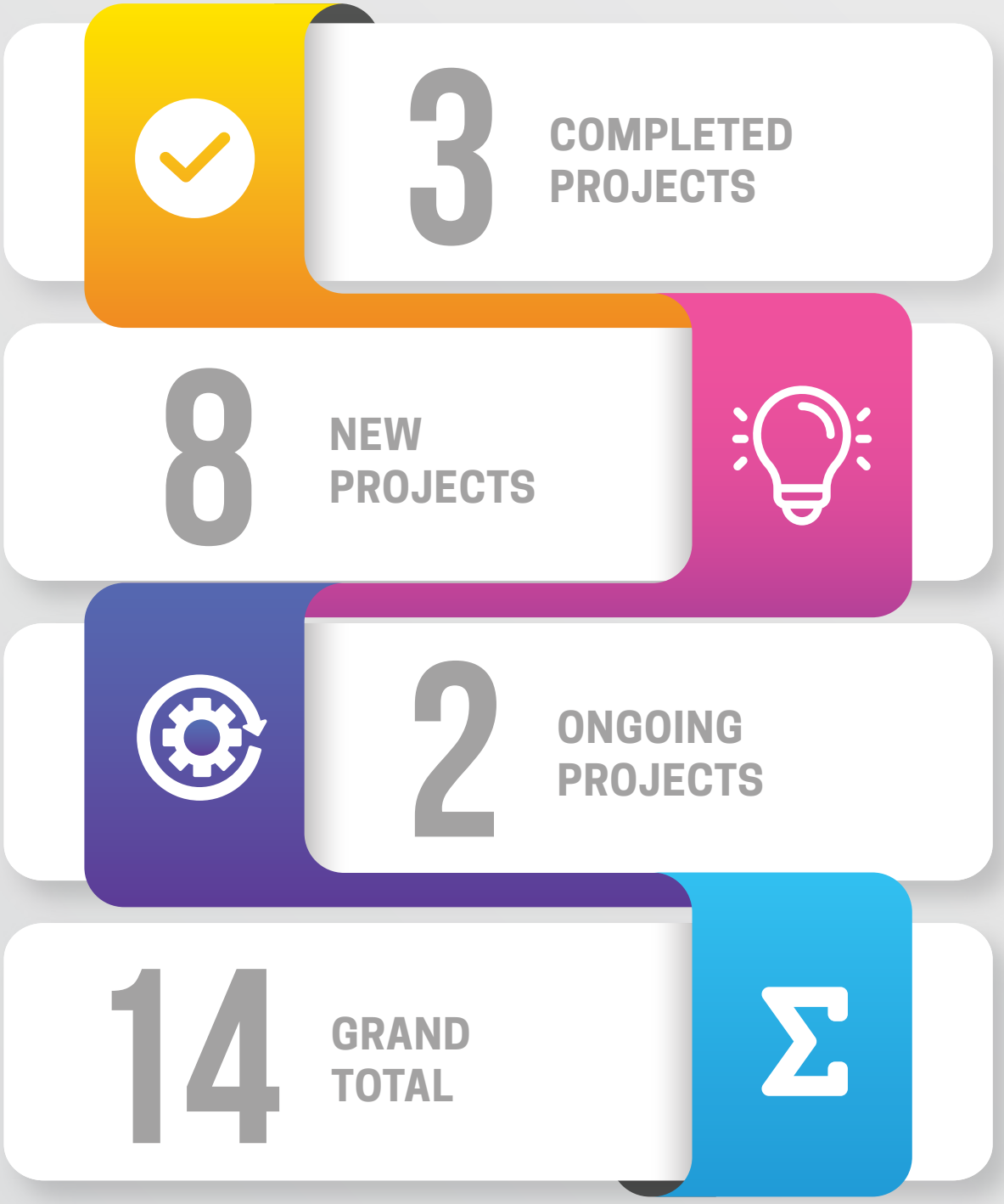
Another question related to myctoxin was raised by SB Member Leonilo Gorecho from Kapatagan, Lanao Del Norte. He asked if there are technologies or innovations readily available that could be shared with the farmers to control the problems of mycotoxin in their crops. Mr. Palmones responded that PCIEERD can assist in connecting the LGU with the implementing agency for possible adoption of the available technology. He added that further details of the said project would be provided.

Councilor Eva Impuerto of Davao Oriental raised a follow-up question regarding the problems encountered by the region on the banana plantations. She pointed out the concern related to fusarium and asked if there were sample policies and measures that the LGU could easily adopt. Another concern shared was the far-flung areas that are not reached by electricity. She asked, in case the LGU partners with DOST, if there will be monitoring and evaluation of the project to ensure its sustainability. This is usually lacking with commercial providers that usually come and go.

Dr. Paringit emphasized that during the course of the proposal evaluation, DOST looks for these critical questions of sustainability, reliability, and economically viable products. In the off-grid microsolar project, there is an established agreement between the municipality and Ateneo de Davao to implement the project, indicating the roles of both sides. On the concern related to Fusarium, Dr. Paringit recalled that PCAARRD has developed technology related to this matter, which is on how to contain Fusarium and its surveillance. This concern will be referred to PCAARRD to get the best possible scientific solution to address the problem.

Policy Coordination and Monitoring Division

in 2022 by the Numbers



List of Completed Projects

Project Title	Agency Name	Project Leader
IMPACT ASSESSMENT OF THE TECHNOLOGY INNOVATION FOR COMMERCIALIZATION (TECHNICOM) PROGRAM	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development	Annette Tobias
Customer Focused DARIUS II	Other Agency	Francisco III Barquilla
Test Project_ DOST CENTRAL	DOST Central Office	DOST CENTRAL

Information Dissemination

Bridging Science and Society: Celebrating the Success of the Science Communication Fellowship Program

Science Communication Fellowship Program

In a world driven by scientific advancements, effective science communication plays a crucial role in bridging the gap between researchers and the public. Recognizing this need, DOST-PCIEERD, in collaboration with the College of Development Communication's Department of Science Communication of the University of the Philippines Los Baños, initiated the Science Communication Fellowship Program.

This program aimed to equip researchers with the necessary skills to communicate their scientific findings in a clear, accessible, and engaging manner. The culmination of this program marked a significant milestone in promoting science communication in the Philippines.

The Fellowship Program was developed in response to the low level of science and technology awareness among the general population, as revealed by the 2019 SWS survey. The program aimed to address this issue by providing researchers with training and mentorship in science communication. By enhancing their competencies, the program sought to enable fellows to effectively communicate complex scientific concepts and research outcomes to non-specialists. The objectives included fostering a thriving science community, promoting inclusive and equitable growth, and advancing science and technology in the country.

The Fellowship Program achieved remarkable accomplishments during its duration. The program admitted 38 fellows from 19 DOST-PCIEERD projects, engaging them in an 18-week mentorship program. Through a comprehensive curriculum consisting of synchronous and asynchronous sessions, the fellows gained expertise in various aspects of science communication. They developed essential skills in crafting science communication plans, creating engaging content for different platforms, utilizing visualization techniques, and fostering public engagement. The program's rigorous evaluation ensured the production of high-quality outputs, including media plans, social media calendars, opinion pieces, technical materials, infographic cards, and elevator pitches.

The program fostered a culture of science communication and emphasized the importance of science in society. Furthermore, the program served as a catalyst for the development of science communicators, bridging the gap between scientists and non-scientists and engaging a wider audience in scientific discourse. The program's achievements set a strong foundation for future science communication initiatives in the country.

Special Citations

1. Best Rundown Script

This fellow's rundown script was coherently written providing creative spiels that stirred interest on the science topic related to Geology.

Jethro Capino of the DOST-funded Project 'PhilKARST Project 1 – Influence of surface and subsurface processes in karst degradation and its impacts on sustainable tourism'.

2. Best Opinion Piece

Her article entitled "Language of Change" was a good read that intelligibly mentioned technical concepts on language-based applications and technologies for relatable understanding among non-specialists.

Erinne Ong of the DOST-funded Project 'Diachronic
Representation and Linguistic Study of Filipino Word Senses Across Social and Digital Media Contexts'.

3. Best Technical Material

The prototype technical material they produced succinctly encapsulated the gist of their project and the benefits of implementing smart cities in the country.

Keith Ann Cabello and Gwyneth Anjelika Rufino of the DOST-funded Project 'LUNGSOD : A Link-Up of Geomatics and Social Science Research for the Development of Smart Cities'.

The prototype material they produced provided concise and simplified information to promote the value of safer building structures and communities.

Ynna Patricia Aquino and Melissa Tamayo of the DOST-funded Project '3D Earth Risk".

4. Best Editorial Calendar

Their editorial calendar adhered to the principles in crafting a clear and detailed plan for social media reach in promoting ITDI's different technologies.

Bernadette Garcia and Margarita Atienza of the DOST-funded Project 'Pilot Implementation of ITDI's Pre-commercialization Tools/Strategies'.

5. Best infographic Cards

The produced infocards showcased impressive visualization and popularization techniques that simplified concepts for better appreciation of language technologies.

Erinne Ong and Briane Paul Samson of the DOST-funded Project 'Diachronic Representation and Linguistic Study of Filipino Word Senses Across Social and Digital Media Contexts'.

6. Best Elevator Pitch

The elevator pitch was creatively structured that provided straight-to-the-point and compelling messages to support the project on Halal compliance.

Monica Manalo of the DOST-funded Project 'Development of Halal Compliant Dehydrated Food Products from Selected Food Materials (Dried Fruits, Dried Vegetables and Dried Root Crops)'.

List of Completers:

These are the 28 out of the 38 fellows completed the mentorship program:

Name	Project Title
Emmanuel Aldea	GeoRiskPH Philippines Initiative: IT Developments and Training Services
Angela Aquino	Project IWASTO (Integrated Waste Analysis,Survey and Technological Options)
Ynna Patricia Aquino	3D Earth Risk
Jose PocholoArazas	Development of a CNN and RNN Topology forImpedance Spectroscopy Analysis
Margarita Atienza	Pilot Implementation of ITDI's Pre-commercialization Tools/Strategies
Nwynn VrenelyFaith Bulusan	Business Incubation Zone for Novel andSustainable Technology Enterprises
Keith Ann Cabello	LUNGSOD : A Link-Up of Geomatics and SocialScience Research for the Development of Smart Cities
Jethro Capino	PhilKARST Project 1 – Influence of surface andsubsurface processes in karst degradation and its impacts on sustainable tourism
Melvin RaymundDangin	Project e-SMART
John OmarEsguerra	Business Incubation Zone for Novel andSustainable Technology Enterprises
Aquila Kristian Esmeralda	PhilKARST 2 – Integrated Characterization,Quantitative Assessment, and Statistical Modelling for Geologic Hazards in Karst Landscapes in the Philippines: Input to Management Plans for Sustainable Tourism
Pete Maverick Nicole Estudillo	Development of Halal Compliant Dehydrated Food Products from Selected Food Materials (Dried Fruits, Dried Vegetables and Dried RootCrops)
Conrado Alfonso Favis	GeoRiskPH Philippines Initiative: IT Developments and Training Services
Bernadette Garcia	Pilot Implementation of ITDI's Pre-commercialization Tools/Strategies
Monica Manalo	Development of Halal Compliant Dehydrated Food Products from Selected Food Materials (Dried Fruits, Dried Vegetables and Dried RootCrops)
Amihan Manuel	Project MAPABLE
Nicole Jean Mercado	PhilKARST Project 1 – Influence of surface and subsurface processes in karst degradation andits impacts on sustainable tourism
Erinne Ong	Diachronic Representation and Linguistic Studyof Filipino Word Senses Across Social and Digital Media Contexts
Rhoda Lyn Ramos	Project IWASTO (Integrated Waste Analysis, Survey and Technological Options)

2022 SIBOL

Science and Innovation Budding Opportunities for Leverage

The Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) launched its second run of the Science and Innovation Budding Opportunities for Leverage or SIBOL 2022 in support of the Council's innovative ways to communicate science to the public. 101 Filipino innovators and scientists showcased and presented their innovations in the industry, energy, and emerging technology sectors from the supported 238 new projects, programs, and technologies in 2021.

SIBOL 2022 received a satisfactory rating from over two-thousand and four hundred participants who attended the seven (7) SIBOL webinars and one (1) hybrid set up activity during the event.

The Council supported a total funding of Php 1.7 billion on Emerging Technology, Food Security, Governance, Infrastructure, Disaster Risk Reduction, Manufacturing, Mining, Transport and Space, and Energy and Environment sectors.

"We at DOST-PCIEERD are confident that the projects that we put under the spotlight today can aid us in our journey towards a better and safer future... a sneak peek as to what the new and better normal will be for us with the help of our Filipino scientists, engineers, and researchers who have been working on emerging technologies for the benefit of fellow Filipinos." by Dr. Enrico C. Paringit, PCIEERD Executive Director.

In total, 2,446 attended the SIBOL 2022 Webinar Series through the Zoom platform and reached over 37,606 Facebook users through Facebook Live and total engagements of 5,635.


Innovate Pinas
The 2022 Philippine Development,
Research, and Innovation Conference

Innovate Pinas! The 2022 Philippine Research, Development, Innovation Conference was spearheaded by the Department of Science and Technology - Philippine Council for Industry, Energy, Emerging Technology Research and Development (DOST-PCIEERD) to create public awareness of all the completed project and its impact to society.

This year's Innovate Pinas! series drew a total of 16,833 participants from Zoom and Facebook Live in the emerging technology, energy and utility systems, and human development sectors.

The industry sector presented their projects through a hybrid set up in line with the 12th anniversary of DOST-PCIEERD. The whole series highlighted 93 completed projects and was attended by researchers, scientists, industry leaders, entrepreneurs, government officials, media, and academic representatives.

Excellence in Project Implementation and Completion (EPIC) Awards were given to the top completed projects. Awards were based on the project's completion rate, budget utilization, and project accomplishments with no extension.

EPIC Awardees:

1. Project - Zeoskin: A Green Indoor Air Filter

a. Project Leader: Ms. Melissa May Boada
b. Institution: Saint Louis University

2. Project - BAYAN KO-OPS

a. Project Leader: Dr. Eugene Rex Jalao
b. Institution: UP-National Engineering Center (NEC)

3. Project - Optimal Locations and Allocation of Personnel (OLAP) at Checkpoints during the Coronavirus Lockdown in Metro Manila and other Regions

a. Project Leader: Alexis Fillone
b. Institution: De La Salle University (DLSU)

4. Project - Port Capacity Analysis and Route Optimization for Local Maritime Administration (PAROLA)

a. Project Leader: Dr. John Justine S. Villar
b. Institution: National Center for Transportation Studies - UP Diliman

The event series also provided an opportunity for researchers and industry leaders to network and collaborate, paving the way for future innovation in the country. Overall, the Innovate Pinas! event provided a platform for the Filipino scientific community to highlight their achievements and inspiring others to pursue innovation and excellence. It demonstrated the significant role that research, and innovation can play in driving economic growth and improving the lives of people in the Philippines.

pinoyscience STAR

pinoyscience STAR

(SCIENCE AND TECHNOLOGY ADVOCATES FOR RESEARCH) CAMP 2022

The Rising STARs (Science and Technology Advocates for Research): Mainstreaming S&T Innovations Through TikTok

Human attention span has dropped to eight seconds, making it more challenging for science advocates to engage with their target audience. However, the engagement in short-form videos is deemed effective in online campaigns. With the proliferation of short videos from platforms like TikTok becoming a continuous trend , the Department of Science and Technology—Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) pivoted to the said platform to engage its audiences and share information that are relevant to them.

In its partnership with TikTok, DOST-PCIEERD produced various innovative public engagements to bring science communication to the platform. In 2022, one of the partnership's highlights was a nationwide search for promising TikTok educational content creators – the Pinoy Science and Technology Advocates for Research (STAR) Camp.

The Pinoy Science STAR Camp aimed to discover talents that would join the Council's pool of Science and Technology (S&T) content creators. Throughout the three-month-long search from August to November 2022, aspiring content creators were challenged to promote the Council's supported projects. They were engaged in various training and knowledge-sharing activities which includes social media establishment, introduction to TikTok, effective content creation and storytelling, social media engagement and content curation, research and disinformation, science communication, and social media empowerment.

From the 103 entries received nationwide, the aspiring content creators went through various stages – from the preliminaries to the semifinals – until ten (10) entries were determined to join the three-day face-to-face finale in Pasay City, Metro Manila.

After a careful deliberation with the invited digital and social media content experts, six winners from various categories were named:

- Romieleth Espillardo of the Rizal Technological University, who featured A Game-Based Mobile Learning Platform for Social Studies, was hailed as one of the three Pinoy Science STARs;
- Jess Gabriel Belleza of the DOST-Advanced Device and Materials Testing Laboratory, who featured Lactic Acid technology, was also hailed as a Pinoy Science STAR;
- Lloyd Baliado of Cavite State University, who featured the Design and Development of a PLC-based High-Capacity Tissue Culture Growth chamber, is among the recipients of the Pinoy Science STAR award;
- Mark Angelou Siega of the Center of Green Nanotechnology Innovations for Environmental Solution (CGNIES), who featured Gitara ni Juan, earned the DOST-PCIEERD Choice Award.
- Maricon Clyde Liwan of the University of the Cordilleras, who featured Project Marayum, a Community-built, Mobile Phone-based, Online Web Dictionary for Philippine languages, was hailed as the TikTok Choice Award;
- Meanwhile, the University of the Cordilleras earned the distinction of Star Institution Award.

Aside from being the main content creators of the Pinoy Science social media channels, the winners were entitled to TikTok perks amounting 2000 USD, certificates, as well as TikTok and Pinoy Science exclusive merchandise. The Pinoy Science STAR Camp campaign increased its engagement in the platform by forty-five (45) percent. The participants gave a high satisfactory in their entire experience, noting that the activity was beneficial in their respective fields, especially in addressing fake news and creating engaging content.

pinoyscience

STAR

(SCIENCE AND TECHNOLOGY ADVOCATES FOR RESEARCH)

MEET THE WINNERS


MEET THE
WINNERS
ROMIELETH ESPILLARDO
PINOY SCIENCE STAR
TikTok username: ahmibeth
Rizal Technological University


MEET THE
WINNERS
JESS GABRIEL BELLEZA
PINOY SCIENCE STAR
TikTok username: jesstheweyuare
Advanced Device and Materials Testing Laboratory


MEET THE
WINNERS
LLOYD BALINADO
PINOY SCIENCE STAR
TikTok username: sir.lloyd
Cavite State University


MEET THE
WINNERS
MARK ANGELOU SIEGA
DOST-PCIEERD CHOICE AWARD
TikTok username: monsygeyou
Center of Green Nanotechnology Innovations for
Environmental Solution (CGNES), University of Mindanao


MEET THE
WINNERS
MARICON CLYDE LIWAN
TIKTOK CHOICE AWARD
TikTok username: mariconliwan
University of the Cordilleras


MEET THE
WINNERS
UNIVERSITY OF THE CORDILLERAS
STAR INSTITUTION AWARD


MEET THE
RUNNERS-UP
ALIYA VERONICA BAYA
TikTok username: aliyabaya985
Batangas State University -
The National Engineering University
Alangilan Campus
DALLAS MOJICAN CAMUYOT
TikTok username: tiktokforhomework
University of the Cordilleras
MADANIA PANGANDAMUN
TikTok username: iamdaniaph
University of the Cordilleras
KRISCHA MHAY ANDRADA
TikTok username: https_www.xd.com
Bayambang National High School
RICA MAE CASABUENA
TikTok username: aintrica
Analog Devices /
De Lasalle University Dasmarinas

SPACE TECHNOLOGY APPLICATION:

THE COUNTRY'S FIRST MOBILE EXHIBIT ON THE PHL MICROSAT PROGRAM

With the country's undertakings and accomplishments in the field of space science and technology, the Philippine Foundation for Science and Technology (PFST) puts up exhibits of DOST projects on space science, such as the first Filipino-made microsatellites and LiDAR technology.

The exhibits are:

1) Model of DIWATA-1;
2) Main Infographics Panel Board;
3) ARU payload;
4) 2-way radio communication;
5) Model of DIWATA-2;
6) HPT and WFC Simulation;
7) Multispectral Imaging;
8) Image Browser;
9) DIWATA-1 and DIWATA-2 orbits;
10) Altitude Control;
11) Satellite Tracking
12) Virtual Reality Model of DIWATA-2
13) Maya-1 Cube Satellite; and
14) GPS satellite

Consistently sparking students' interests in space science is the goal of these exhibits. Additionally, much as the scientists and engineers who developed the nation's satellites did, the practical and intellectual experience may inspire students to think about careers in space science and technology. These exhibits went on a mall tour that took place from October 4–10 at the Venice Grand Canal Mall in Taguig City, from November 3–8 at the Newport Mall in Pasay City, from November 9–14 in Binondo, Manila, and from December 9–13 at the Eastwood Mall in Quezon City.

At the opening ceremony in the Venice Grand Canal Mall, DOST PCIEERD's Executive Director, Dr. Paringit, emphasized the significance of STA exhibits and how, with Megaworld's assistance, we offer these life-size displays to consumers in various malls. He also highlighted PFST's creativity in creating these kinds of exhibits and using them as a vehicle for science communication.

The executive director of PFST, Ms. May Pagsinohin, extended a warm welcome to everyone who had come to see the opening of the Space Technology Application Exhibit. In her remarks, she discussed how the department has been helpful with these programs and how the foundation wants to keep educating the public about science, particularly now that it coincides with World Space Week.

The project was completed in 2020, but the Information Group wasn't ready to unveil it until this year to coincide with the World Space Week-related event.

The DOST Secretary, Rene Solidum, PFST Executive Director May Pagsinohin, DOST Executive Director Eric Paringit, and Deputy Executive Director Engr. Ninaliza Escorial oversaw the ribbon-cutting ceremony that followed the formal event. They were joined by DG Mariano and Megaworld representatives.

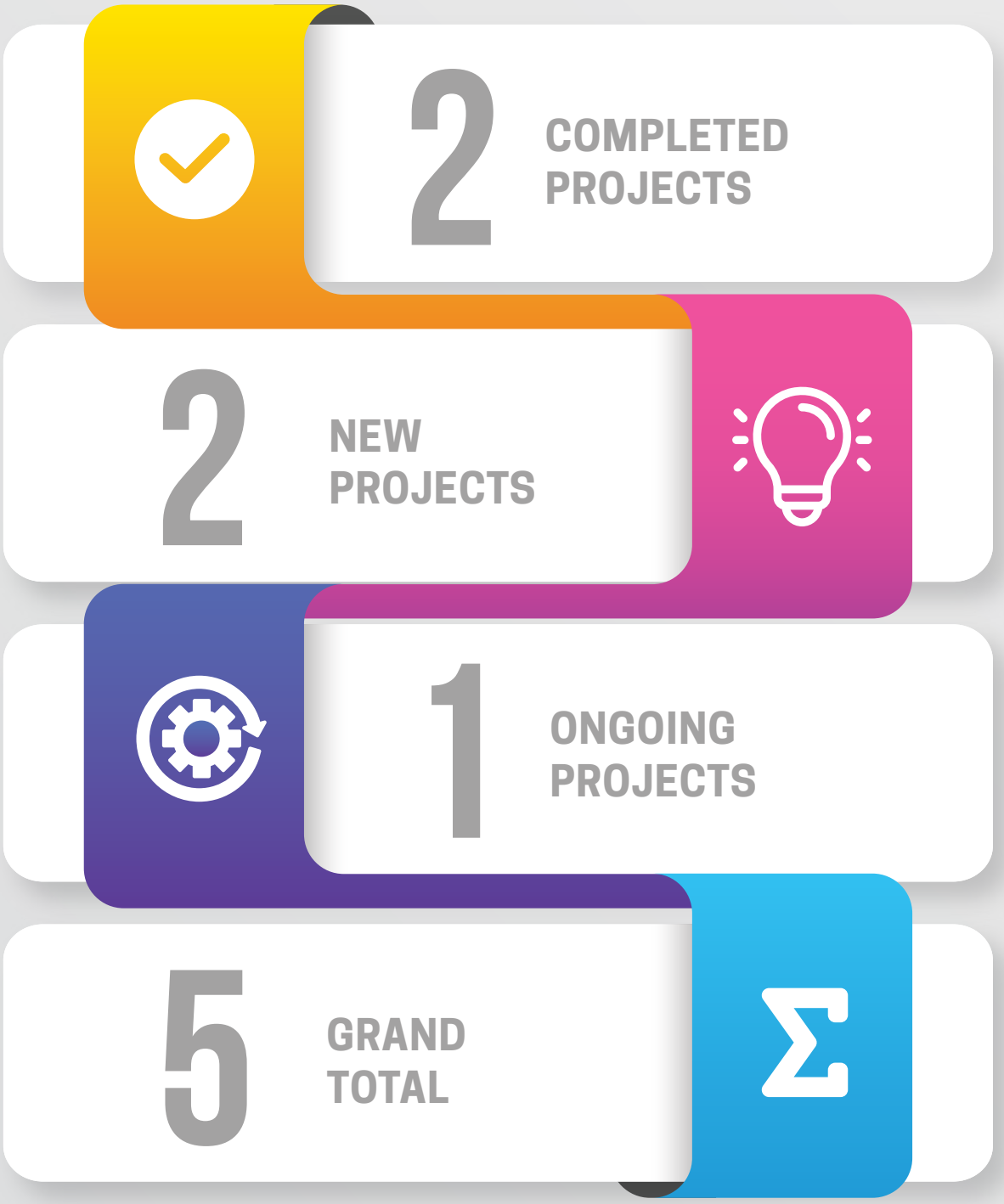
After the ribbon-cutting ceremony, Secretary Rene Solidum delivered an encouraging address, which was followed by speeches of support from DG Mariano of the Philippine Space Agency and Mayor Lani Cayetano.

The Space Exhibit Tour, Meet the Scientist, and a Career Talk by the Philippine Space Agency are among the main activities of the program's second day. The students from Taguig National High School who were invited to the spectacle had a chance to look around, ask questions, take pictures, and observe the exhibit.

Following the visit, more than 25 scientific students were given games and refreshments. They were accompanied by engineering students from Pamantasan ng Lungsod ng Maynila and astrophysicists from Rizal Technological University.

Information Group

in 2022 by the Numbers

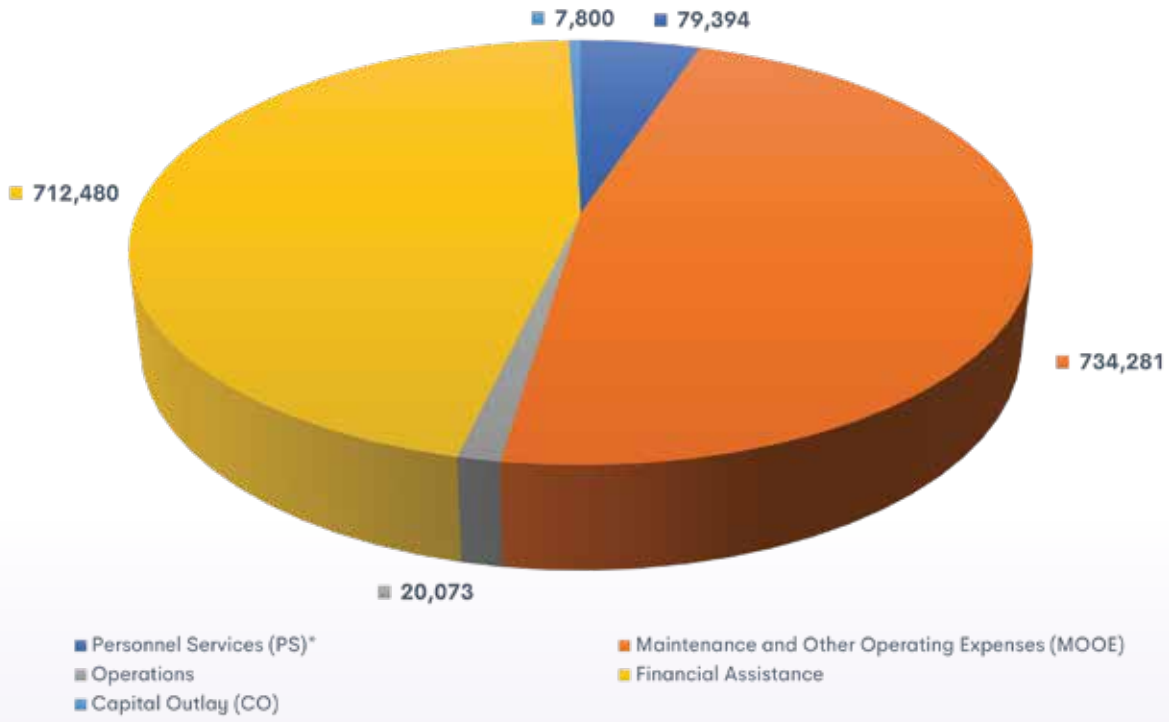


List of Completed Projects		
Project Title	**Agency Name**	**Project Leader**
Commemoration of the 125th Anniversary of the Martyrdom of Jose Rizal	DOST-NRCP	Marieta Sumagaysay
Rizal, the Filipino Scientist Promotional Campaign	DOST-STII	Norly Villar

Financial Report

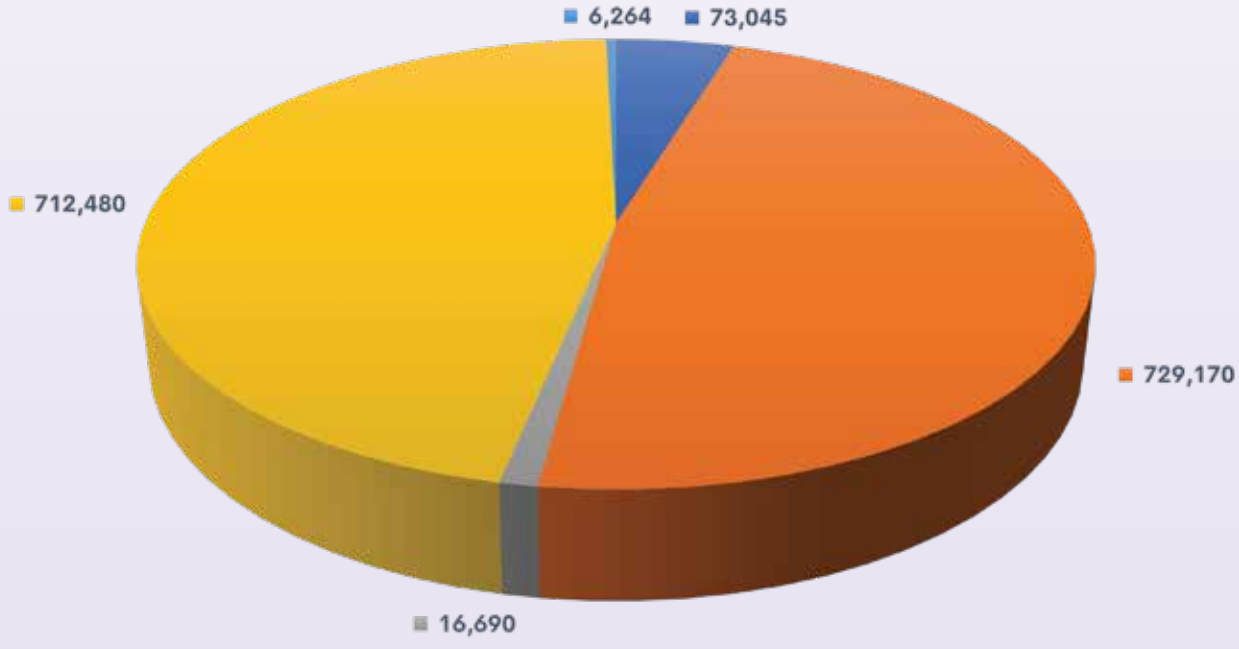
ALLOTMENT

TOTAL: P820,287



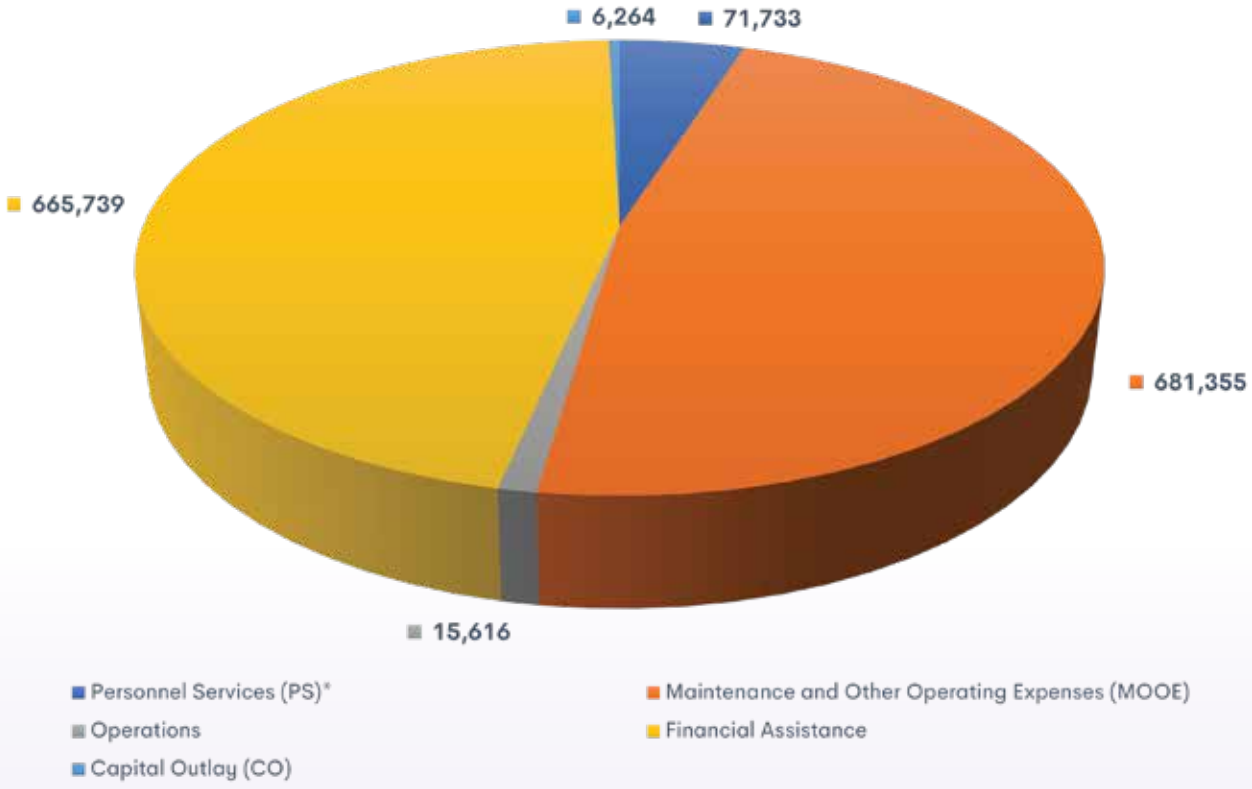
ACTUAL OBLIGATIONS

TOTAL: P808,479



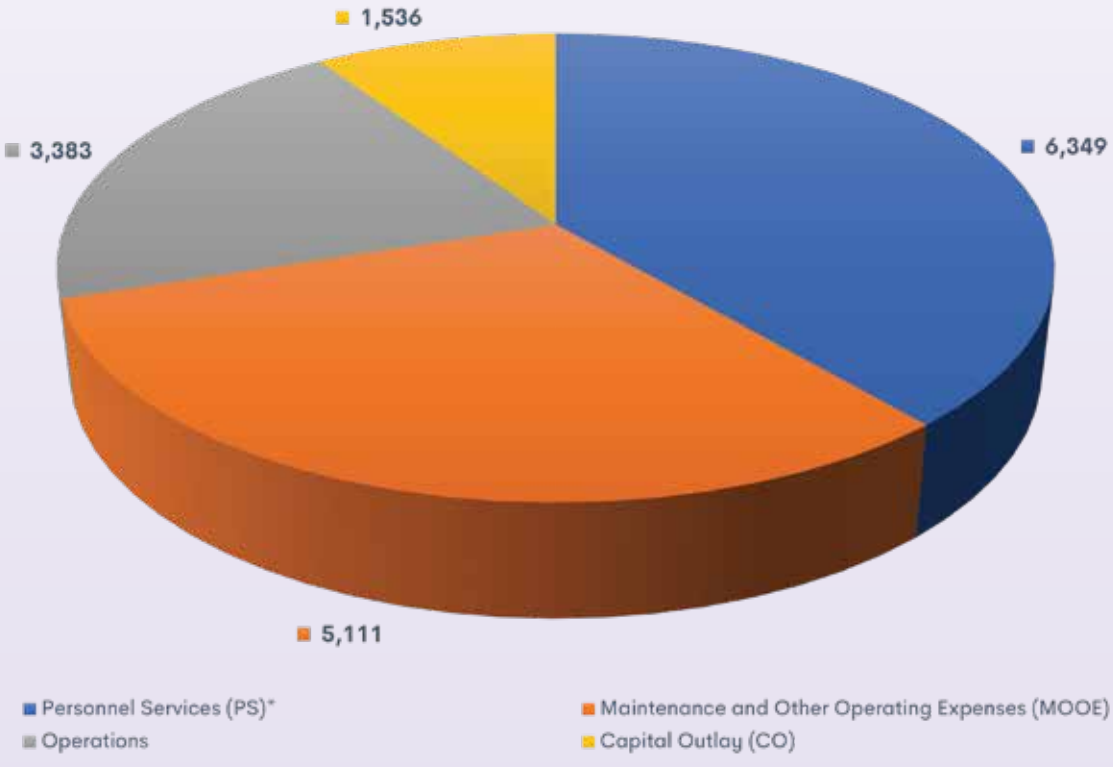
ACTUAL DISBURSEMENT

TOTAL: P808,479



UNOBLIGATED ALLOTMENT

TOTAL: P16,379



Expanding S&T landscape one scholar at a time

*A professional once said, "**As you move outside of your comfort zone, what was once unknown, and frightening becomes your new normal."***

This is accurate, and it is what our PCIEERD scholars have learned as they work for their degrees and eventually pass them with flying colors in 2022.

The scholarship program has continued to produce proud PCIEERD products who have grown to be authorities in their fields despite the challenges brought on by the pandemic.

Continue reading to learn more about Fatima and Tony's memorable journey.

Chevening scholar Fatima Joy with UK Ambassador Laure Beaufils

Full Name: Fatima Jhoan S. Ibarreta
Years in PCIEERD: 8
Course Completed: MSc Sustainable Food Systems
School: University of Leeds

Question: What are your most treasured memories from your advanced studies supported by PCIEERD?

Answers: The whole experience was memorable for me as it entailed leaving my comfort zone for a while (amidst a global pandemic) and jumping back into student life in a foreign country. I am glad to have made it through a strong support system, not only from my family and friends here but also from all the friends I gained from my flatmates, classmates, and fellow scholars.

My most treasured memories from class are the different modes of learning activities, to name a few:

• We had sessions with experts from a range of disciplines for food systems studies under the Sustainability Research Institute (agriculture, food, biological, and environmental sciences, business, law, transport studies, psychology), and sectors of society (academe, industry, government, NGOs, activist groups).

• We attended a seminar workshop delivered by the Interdisciplinary Food Systems Teaching and Learning Group from the University of Oxford that shared with us some tools for analyzing and planning for food system transformations.

• Field activities:
  o Collection of different crops and spices from the Kirkgate Market, one of the largest indoor markets in Europe, for our topic on food culture and identity and the global supply chain.

o Visit the university's farm, which includes the National Pig Center, a Center for Innovation Excellence in Livestock, and one of the UK's Centers for Agricultural Innovation. The farm houses both outdoor and indoor livestock raising facilities to support various research projects on sustainable agriculture.

o Community fieldwork in Bridlington, a coastal town in East Yorkshire and the largest supplier of lobsters in Europe, Lobster is a highly valued commodity, and yet the town remains one of the poorest in the country. We talked to different stakeholders in the area to further understand the challenges of ensuring a sustainable supply while considering the social and environmental aspects of global trade.

Aside from the actual schoolwork, I also took advantage of the university's excellent student support services. Their aim is for students to be their best selves for optimum academic performance. These are meant to provide a more conducive learning environment, especially for international students:

- a personal tutor or faculty adviser who can guide you if you need any help.
- library seminars and consultation with Royal Literary Fellows to improve academic writing
- wide access to software, journals, books, and other references
- Mental health and well-being activities like walking trips to the countryside, museum visits, and pet therapy

Question: What challenges do you encounter after completing advanced studies, and why is it so important to utilize your knowledge while taking advantage of study breaks?

Answer: Some time away from work can help generate ideas on how things can be improved, but putting them into action upon return is a bigger challenge. Here are some of the challenges I encountered as I adjusted again to the busy workplace environment:

• Familiarizing yourself with the updated guidelines and processes

• Juggling the deadlines of the workday, which sometimes require your input on an issue or topic within a very tight schedule (that is, not having the luxury of reading to your heart's content in a quiet library),

• Figuring out how to apply everything you've learned

It is important to reflect and assess yourself when deciding to study. My knowledge and experience from working at PCIEERD have already helped me understand the food sector outside of my food technology background since managing projects is a lot different from toiling a day in the lab or on the production floor. However, with the evolving needs in R&D and innovation, I know there are more aspects of the sector that I would like to learn about. This led me to look for a program that suited my learning objectives.

Question: How would your degree, in your opinion, affect your capacity to advance innovation, science, and technology in support of PCIEERD and DOST's goals for promoting national development?

Answer: Through my degree, I was able to learn and practice a systems-thinking approach to sustainability in the food sector. The concept of sustainability in our project management is more oriented towards the economic aspect for continuity of operations, but the larger concepts of environmental and social impacts, I believe, are not yet thoroughly studied. This strengthens our role in setting the direction for R&D, as science, technology, and innovation are key drivers in achieving a more sustainable future to continuously feed and nurture our growing population.

4. What advice would you give PCIEERD employees who are unsure about taking study breaks, and why is it essential to draw on the knowledge of experts in the sector, in your opinion?

Answers: Pursuing advanced studies is a way to enrich our knowledge in our respective fields and beyond. It enables us to see things in a different manner and maybe find solutions that we will never come across if we limit ourselves and choose to stay as we are. A study leave is a chance to take a step back, make better sense of the work we do within the larger innovation ecosystem of the country, and further appreciate how we contribute to national development. Do it for yourself and for others too.

Studying enlightens us but also humbles us enough to recognize that there is a lot more to learn and discover and that we can't do great things on our own. Thus, we do a lot of coordinating to seek the help of experts in proposal evaluation activities, program development, and overall sectoral planning.

Name: Tony Rose C. Tumaneng
Years in PCIEERD: CoS: 4 years; Permanent: 5 years and 10 months
Course Completed: Masters in Strategic Planning and Public Policy
School: Graduate School of UP Los Baños

Question: What are your most treasured memories from your advanced studies supported by PCIEERD?

Answer: My most treasured memories from my advanced studies supported by PCIEERD are the lunch break kwentuhans with my classmates and the unexpected online classes during the last month of my first semester due to the COVID-19 outbreak. Nevertheless, it was great that I have explored various online meeting platforms and open access publishers for research purposes.

Question: How would your degree, in your opinion, affect your capacity to advance innovation, science, and technology in support of PCIEERD and DOST's goals for promoting national development?

Answer: In my opinion, my degree could affect my capacity to advance innovation, science, and technology in support of PCIEERD and DOST's goals for promoting national development by applying the strategic planning concepts that I have gained at the university as well as proactively participating in inter- and intra-office discussions regarding improvements on plans both physical and financial for the Council and/or the department.

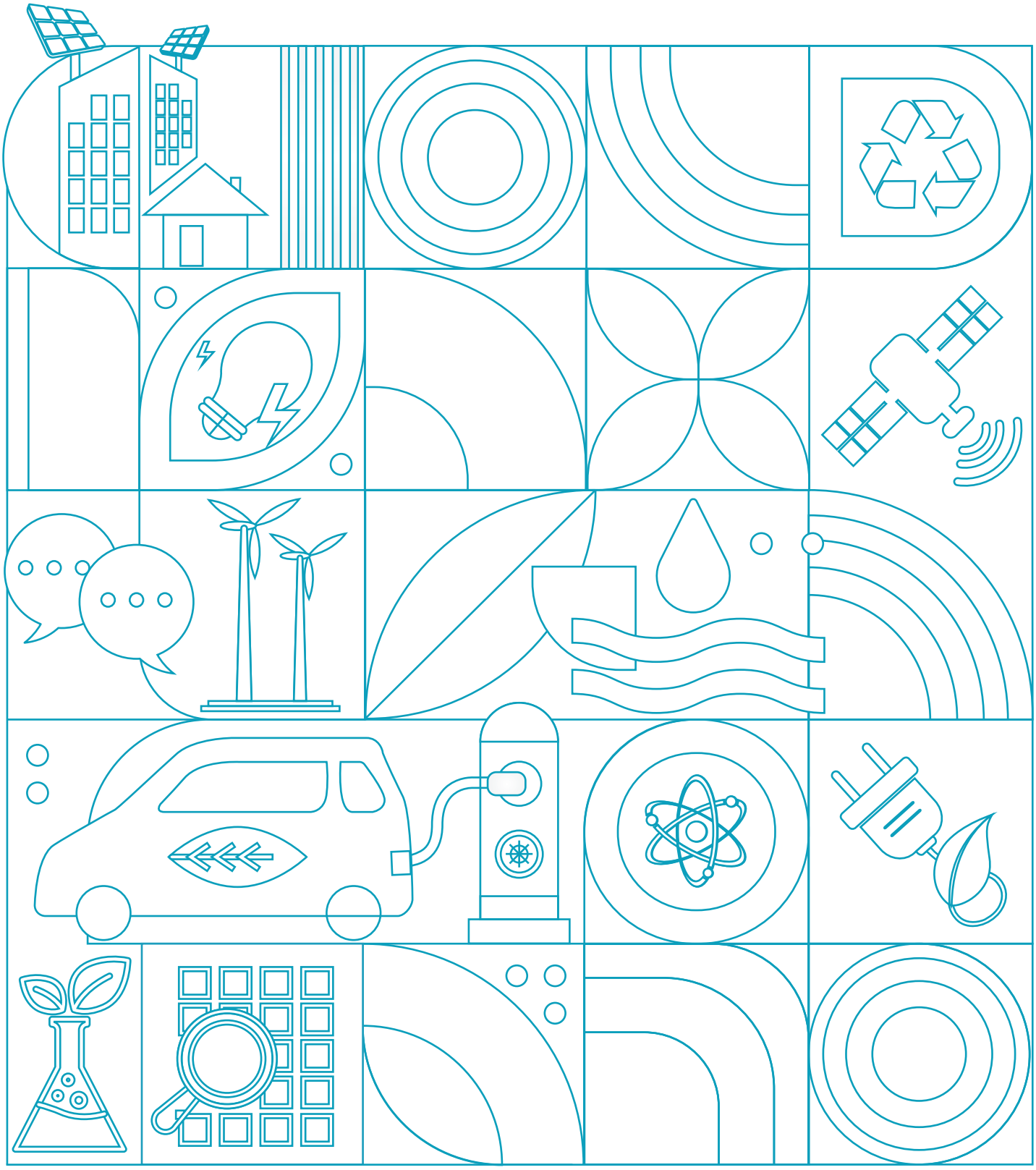
Question: What advice would you give PCIEERD employees who are unsure about taking study breaks, and why is it essential to draw on the knowledge of experts in the sector, in your opinion?

Answer: For PCIEERD personnel who are unsure about taking study breaks, which I am before, do not hesitate to grab the opportunity to learn with the experts as well as with the people that you will meet. Their experiences and knowledge are beneficial in realizing what you still must do and/or improve in the workplace. Best practices are free to be adopted.

Contributors:

Mark Ivan C. Roblas
Mike A. Vertudazo
Allane M. Orendez
Lemuel San Gabriel
Mirzi Angela Encelan
Lemuel Basierto
Audrey Jane L. Cabay

Layout Artist:
Camille D. Santos



Innovation thrives with NEXUS