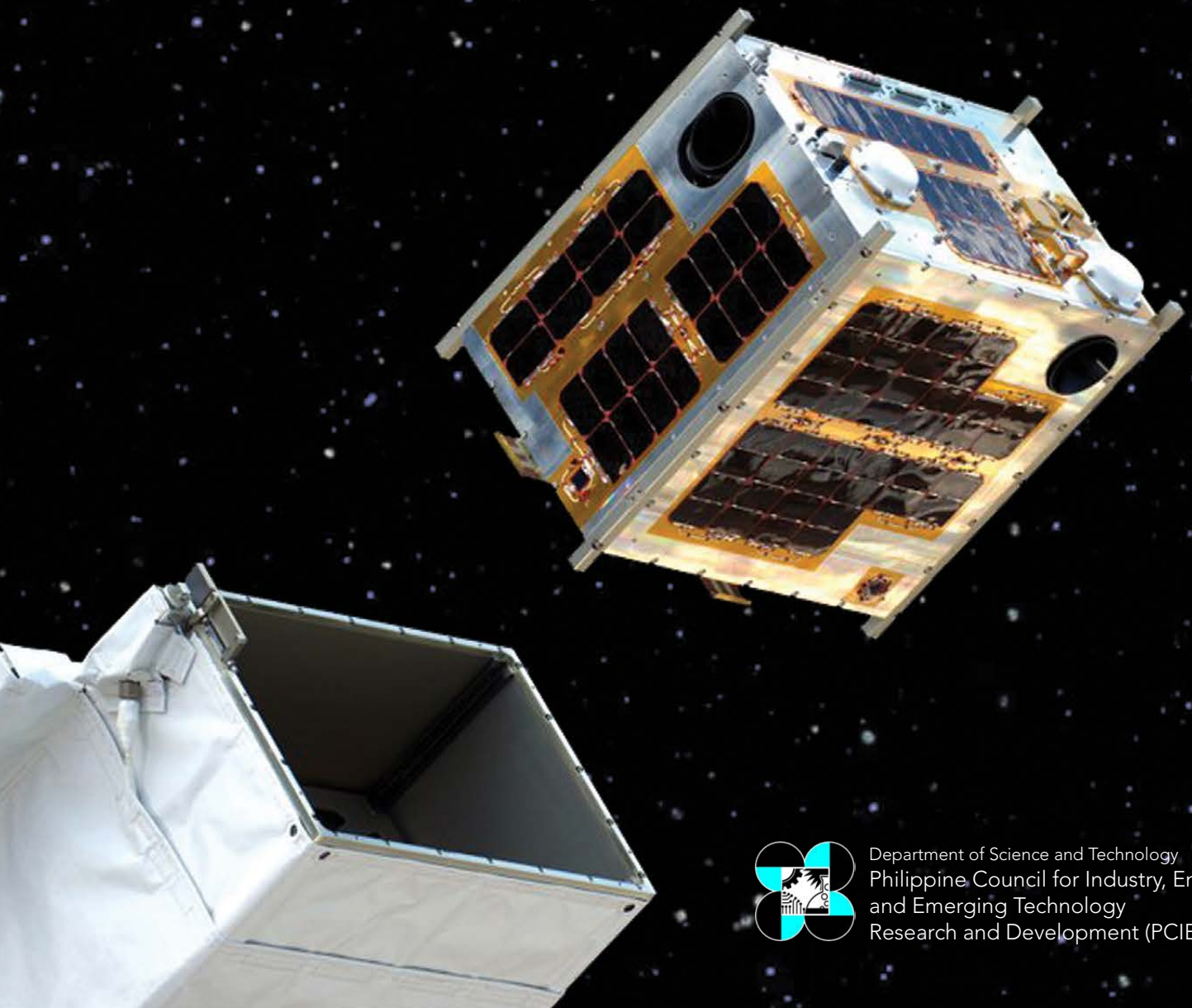
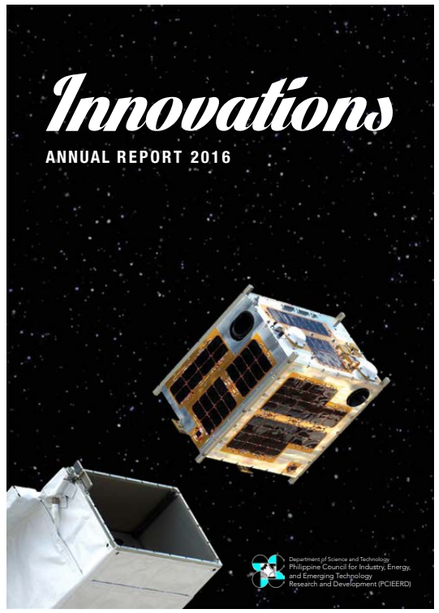
Innovations

ANNUAL REPORT 2016

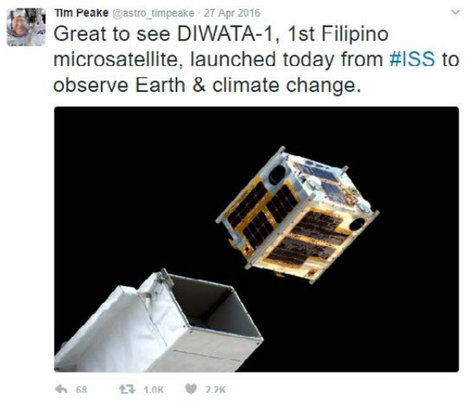


Department of Science and Technology
Philippine Council for Industry, Energy,
and Emerging Technology
Research and Development (PCIEERD)



ABOUT THE COVER

A photo of the first Philippine-made microsatellite, Diwata-1, as it launches into orbit from the International Space Station on April 27, 2016. It precedes the hoped-for development of a National Space Agency. The photo was taken—and tweeted—by British astronaut Tim Peake, who led the deployment.



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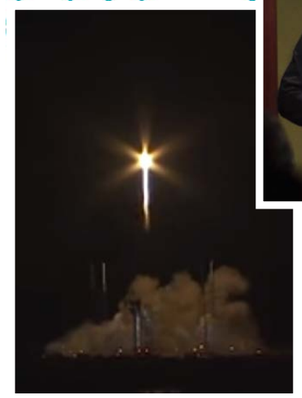

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MESSAGE FROM THE DOST SECRETARY

This year ushered in a new leadership agenda which includes the continuous development and application of S&T in everyday life, aiding in poverty alleviation and socio-economic development in the country. Change, innovation, and development significantly marked the landscape in science and technology (S&T) in 2016.

The Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) has been a great contributor in finding creative solutions to pressing national problems. These include accomplishments and breakthroughs in the areas of climate change and disaster risk reduction, waste reduction and utilization, responsible mining, and food security. All these, together with emerging technologies, nanotechnology, and space technologies are being spearheaded by PCIEERD to effect change in the lives of the Filipino people for the better.

This Annual Report details various projects that have significantly touched the lives of the people. I invite you to discover and immerse in the outputs of PCIEERD's programs and projects, as an evidence to DOST's purpose that *Science is for the People.*

Hon. FORTUNATO T. DE LA PEÑA, JR.
Secretary

MESSAGE FROM THE UNDERSECRETARY FOR R & D

The year 2016 was another banner year for the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) in terms of its approved projects totaling to an all-time high of 114 for the year.

This emanates from the Council's vision of having a well-defined research and development (R&D) thrust from innovative idea to technology development and knowledge generation to technology transfer and utilization.

Pursuing and making S&T solutions and innovations available to help create and sustain competitive industries, attain energy self-sufficiency, and ensure efficient and effective use of emerging technologies for the inclusive growth and development of the country, remain to be the order of the day. PCIEERD has bravely put its stakes in innovations not only in products but also in processes and services. One of the best examples is the establishment of the Food Innovation Centers (FICs) in almost all regions of the country. The FICs promote the development of new food products using locally developed equipment identified as crucial to the competitiveness of industries. OneLab, on the other hand, is considered a revolutionary way of doing things where distance or absence of a laboratory is not an impediment, for instance, for a company in Mindanao to avail of laboratory services only found in Ilocos. OneLab virtually connects laboratories nationwide, all you need is a touch on the keyboard. And this year, with all confidence and aspiration that we could muster, we forayed into space through our very own Diwata-1 microsatellite.

Having been in the Department for almost five years now, I have always directed for the engagement of the private sector at the very start of a project. This is a time-tested strategy to insure the utilization of research outputs. I commend the PCIEERD for making this a policy and also for continually encouraging the state college and universities where most creative project ideas could spring from to get on board in research endeavors.

Lastly, PCIEERD instituted a quantitative metric for project outputs called the 6Ps that stand for Publications, where the research or an aspect of it is published in a scientific journal for peer review; Products, where an invention with a potential for commercialization is the end-result of the study; Patents, where an invention or scientific process becomes proprietary to the inventor for potential future profit; People Services, where technical knowledge and training is cascaded to other people, apart from the grantee; Policies, whereby a science-based policy is crafted and adopted by the government or academe as a result of the study; and Partnerships or linkages forged because of the study.

I congratulate the Council for continually innovating its processes to make research and development benefit the people.

ROWENA CRISTINA L. GUEVARA, PH.D.
Undersecretary for Research and Development
PCIEERD Executive Director (July 1, 2012 to March 4, 2015)

MESSAGE FROM THE UNDERSECRETARY FOR S & T SERVICES

I congratulate the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) for maintaining excellence in its mandated functions, making its presence felt among its various publics being a recipient of the Philippine Quality Award (PQA) Recognition for Commitment to Quality Management in 2016.

By sectoral areas, PCIEERD handles 17 sectors, the most diversified among the councils. Notably, it has continued to contribute in developing all these sectors identified as critical to the country's economic progress, bespeaking of committed and multi-disciplinary personnel.

On top of carefully managing a clearly defined R&D agenda that is anchored on the overall DOST development programs, PCIEERD also gives attention to developing the capabilities of institutions, and ensuring Filipino researchers and scientists are trained well and equipped in their research works. This way, they are continually elevating the quality of R&D in the country, and at the same time, creating that much-needed pool of competent researchers.

PCIEERD also shepherds the Balik Scientist Program (BSP), a brain gain initiative of the DOST that seeks to encourage highly trained overseas Filipino scientists and technologists, experts, and professionals to return to the Philippines and share their expertise for the acceleration of the scientific, agro-industrial and economic development of the country. Eleven BSP grantees came back to the Philippines in 2016 and engaged themselves in various research collaborations in the sectors of PCIEERD.

Science, technology, and innovations are getting into the mainstream, more importantly, in the everyday life of Filipinos, and we can only do this through collaborations and linkages with entities that also advocate S&T. Like other DOST agencies, the PCIEERD has established meaningful and mutually beneficial linkages within both local and international science communities. And we also acknowledge the role of the media and all the platforms in social media in helping us to promote and disseminate S&T information to the public. All these in our bid to touch base with all our stakeholders to pave the way for our ultimate goal of technology utilization and adoption.

I wish PCIEERD all the best as it continues to contribute to nation building in many ways through the formulation of S&T policies and programs, R&D, institution building, information and dissemination, as well as technology transfer.

CAROL M. YOROBE
Undersecretary for S & T Services

PROFILE

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

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

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

The logo of the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) was designed with the key elements of the DOST logo as basic pattern.

The four circles of the DOST logo represent the four guiding principles in our S&T Development: Excellence, Relevance, Cooperation, and Cost-effectiveness. The three-color scheme represents the unknown (black), truth and enlightenment (white), and progress (cyan).

The symbolic icons for industry (mechanical gear), energy (flame), emerging technology (circuit board), and science (flask) were placed in the white space at the center. The design depicts PCIEERD's mandate on strengthening and utilizing research and development in industry, energy, and emerging technology for the country's sustainable socio-economic development.

MISSION

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

VISION

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

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

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

PCIEERD LEVELS UP TO PHILIPPINE QUALITY AWARD

PCIEERD RECEIVES AWARD FOR EXCELLENT PERFORMANCE

Excellence. Innovative and competitive change agents. This is PCIEERD as expressed in one of its core values.

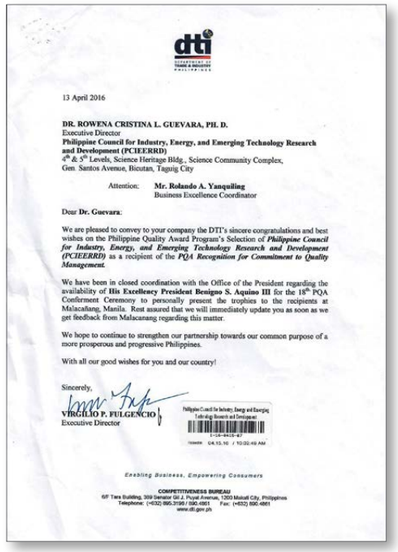
PCIEERD continually embraces the total quality management (TQM) philosophy as exemplified in its certification to internationally accepted performance excellence certification for quality management system, or ISO 9001, since 2010. Consistent to its core values, PCIEERD has taken organization-wide efforts to provide a climate of continuous improvement to deliver high-quality services to its clientele.

In 2016, PCIEERD received the Philippine Quality Award (PQA) Recognition for Commitment to Quality Management. This is the result of the dedication of the men and women of PCIEERD to achieve excellence in its performance.

THE PHILIPPINE QUALITY AWARD

The Philippine Quality Award (PQA) is the highest level of national recognition for organizational performance excellence given to public and private institutions. PQA is a template for competitiveness based on the principles of Total Quality Management. The Award focuses on results, including customer satisfaction. It is not an award for product quality or service quality but for a quality management system which hinges on continuous improvement in the delivery of products and/or services, and provides a way of satisfying and responding to customers' needs and requirements.

The PQA is conferred annually to qualified organizations in the private and public sectors which have demonstrated management excellence by the purposefulness with which it continues to improve and build upon outstanding results and excellent systems, thereby achieving the highest level of performance excellence.



dti

13 April 2016

DR. ROWENA CRISTINA L. GUEVARA, PH. D.
Executive Director
Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERRD)
4th & 5th Levels, Science Heritage Bldg., Science Community Complex,
Gen. Santos Avenue, Bicutan, Taguig City

Attention: Mr. Rolando A. Yanquiling
Business Excellence Coordinator

Dear Dr. Guevara:

We are pleased to convey to your company the DTI's sincere congratulations and best wishes on the Philippine Quality Award Program's Selection of *Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERRD)* as a recipient of the *PQA Recognition for Commitment to Quality Management.*

We have been in closed coordination with the Office of the President regarding the availability of **His Excellency President Benigno S. Aquino III** for the 18th PQA Confirment Ceremony to personally present the trophies to the recipients at Malacañang, Manila. Rest assured that we will immediately update you as soon as we get feedback from Malacanang regarding this matter.

We hope to continue to strengthen our partnership towards our common purpose of a more prosperous and progressive Philippines.

With all our good wishes for you and our country!

Sincerely,

VIRGILIO F. FULGENCIO
Executive Director

Enabling Business, Empowering Consumers

COMPETITIVENESS BUREAU
6F Tiera Building, 358 Senator Gil J. Puyat Avenue, 1200 Makati City, Philippines
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www.dti.gov.ph

PCIEERD received the Philippine Quality Award (PQA) Recognition for Commitment to Quality Management for demonstrating its serious commitment to improvement in order to achieve quality excellence. With its certification to ISO 9001, it has planted the seeds of quality and productivity and is working towards reaping long-term benefits of the efforts.

The requirements of the Criteria for Performance Excellence are embodied in seven Categories, as follows:

- Leadership
- Strategic Planning
- Customer Focus
- Measurement, Analysis, and Knowledge Management
- Workforce Focus
- Operations Focus
- Results

QUALITY MANAGEMENT SYSTEM

Currently, PCIEERD is upgrading its quality management system to meet the new requirements of ISO 9001. The risk-based approach has been embedded in the system particularly on establishing plans and programs. PCIEERD is in its last leg of preparation to certification in March 2017.

INTERVIEW WITH THE EXECUTIVE DIRECTOR

The role of the scientist is to be an innovator and a problem-solver, providing science-based, practical solutions to help meet the country's most pressing needs. The year 2016 marked a transition in the National Government, but it did not change the fundamental mandate of PCIEERD to engage scientists, researchers, and engineers in R&D activities that would push for inclusive growth and development. "We have engaged even more researchers, many in the Visayas and Mindanao doing pioneering work in emerging fields, which is a good thing because we are not reliant on the big universities in Manila anymore," observed Dr. Carlos Primo "CP" C. David, now on his second year as executive director of PCIEERD.

This shift has reinforced the need to deliver localized solutions to current challenges, from looking into underutilized indigenous resources, to improving interlinked data collection systems for more comprehensive coverage and analysis, to exploring microsatellite technology for monitoring and disaster response management. While the Philippines can still improve its gross domestic expenditure on R&D (GERD), using the resources at hand with discretion has led to astonishing discoveries this year. Ingenuity and necessity drive invention and innovation, and Dr. CP will be the first to say that there is always a smarter, more efficient way to achieve one's goal.

Q: What would you highlight as an accomplishment of PCIEERD in 2016?
CP: We changed how we conduct our work. One of the processes that we put in is a quantitative metric for project outputs we call the 6Ps: Publications, Patents, Products, People Services, Policies, and Partnerships. (See article, "The 6Ps of PCIEERD," on page 11). Investing in R&D is no different from investing in infrastructure, education, or the stock market. Resources are provided to generate products and services of even higher value.

Q: What was your most significant project for 2016?
CP: The biggest impact would probably be the microsatellite project Diwata. We were just amazed with how the public received the project and how it sparked Filipino pride. It is still at its very early stages, we have only just started with space technology, but there's a lot of promise there and we have to carefully nurture the research program to give the most benefit to the public.

Q: Is this a prelude for the development of a national space agency?
CP: It would depend on the leadership. We have filed for the creation of a National Space Agency. Right now, we are concentrating on the actual applications of satellite technology in disaster/weather forecasting—Diwata-2 will be useful for disaster risk management. The continuity is very critical because at any point that the program breaks, then everything will be wasted.

Q: What emergent technologies are you focusing on?
CP: Artificial Intelligence (AI) and Data Science are our focus areas for emerging technologies. For AI, we are leveraging on a chip technology developed in the States that is partly owned by a Filipino. We get a crack at developing functions before it reaches the market. For data science, it's all about collating information and coming up with new information when you analyze data, either for predicting information, or looking at archived data and seeing patterns and trends that are available.

Q: You seem to be expanding your linkages.
CP: Regularly, I go around private and state universities and try to convince them to convert their focus of being just an instructional academic institution into an R&D institution. I tell them: 'If you start engaging your faculty in research, he'll be speaking of actual projects that he is currently doing, instead of teaching something from the books.' They start proposing projects, which is better for the R&D environment as a whole, because we can now tap more people to do R&D. If I can't convince them at that level, then I convince them that by doing R&D, you actually generate funds, because the policy of the DOST is that for every R&D grant, 7.5% goes to the institution. It's presenting the university with another stream of income other than tuition fees from students.

Q: Post-ASEAN integration, how is PCIEERD supporting Filipino competitiveness?
CP: We are reorienting our research for 2017 to be industry-driven instead of researcher-driven. Before, researchers would propose a good product, and when it's completed, we try to share it to the market, and many of them would say they don't need it or it's too costly. So this time we go to the market, what products do you think will sell or you would buy, the actual companies, what price point should we have for this product, and then we look for the researchers.

Q: What projects will you attempt with a bigger budget in 2017?
CP: The focus for 2017 is AI, data science, space technology, nanotechnology, electronics, and photonics, a long-standing emerging field. We will realize an increase of about 20% of our budget, which would mean 20% more projects. We have to carefully obligate those funds, not only in trying to find excellent projects, but also in making R&D more cost-effective. It has to be a balancing act.

> One of the processes that we put in is a quantitative metric for project outputs we call the 6Ps: Publications, Patents, Products, People Services, Policies, and Partnerships.

Q: Are you adding a new division, maybe?
CP: We are not adding a new division, but we are trying to form a new unit for climate change and disaster risk mitigation because for the past five years, about 30% of the whole DOST's budget for R&D went into climate change and disaster risk. We're also putting in YSP 2017, Young Scientists' Program, as there's a limitation for us to provide money to researchers that don't have a master's degree. Wala ba silang 'K' to do research? So this YSP will look for talented young researchers, because the idea is you nurture them to do research as early as possible.

Q: What is PCIEERD's current challenge?
CP: R&D for wealth generation—that includes knowledge of basic research that will lead to monetary wealth, and wealth in terms of welfare of people. There are many projects that we do that will not have an ROI with a peso sign, but you know it is helping the general public. R&D is just one tool for helping the country and we are competing against other tools. We have to make a very strong case that R&D is one of the best tools, because you do derive a higher ROI.

THE 6Ps OF PCIEERD

As government resources must be strategically used for the benefit of the majority, it falls on the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) to select, fund, and nurture the R&D projects that could have a significant impact on the country, or even directly address a national concern. For PCIEERD Executive Director Dr. Carlos Primo C. David, this also means providing policymakers with measurable outcomes from the use of taxpayer's money. "It has always been our thinking that R&D, particularly funding research, is an investment, no different from investing in the stock market or buying property, because you do get a return on investment (ROI) after a few years," said David. "Maybe the time horizon for R&D in terms of ROI will be longer, compared to short-term investments like a time deposit or getting a siomai cart, but it's very important that you do get that ROI."

Under David's leadership, PCIEERD developed a quantitative metric for project outputs, which they refer to as the 6Ps: Publications, where the research, or an aspect of it is published in a scientific journal for peer review; Products, where an invention with a potential for commercialization is the end-result of the study; Patents, where an invention or scientific process becomes proprietary to the inventor for potential future profit; People Services, where technical knowledge and training is cascaded to other people, apart from the grantee; Policies, whereby a science-based policy is crafted and adopted by the government or academe as a result of the study; and Partnerships or linkages forged because of the study.

When PCIEERD talks to research proponents, it now asks outright: "What are your 6Ps output in terms of R&D?" The same applies to anyone asking for additional training, or a travel grant to attend a conference and present a paper. If it's basic research, said David, it should be cutting-edge, and therefore the rest of the world should know about it—hence the drive toward publication, one of the 6Ps. "Before, a final report that will be shelved in a library will be your output…Now, other than the usual reporting documents, they have to submit their 6Ps output based on what they promised at the very start," he added.

PUBLICATIONS
PATENTS
PRODUCTS
PEOPLE SERVICES
POLICIES
PARTNERSHIPS

<2M

1. at least 1 ISI-indexed publication and 1 presentation
2. completed patent/prior art search
3. proposal for scaling up the project

2-5M

1. at least 1 Scopus or ISI-indexed publication
2. at least 1 local publication or presentation
3. completed patent/prior art search, proof of patent application
4. the technology has been adopted and continuously being used for productivity improvement by a cooperator
5. at least 1 local MS/PhD graduate

6M–15M

1. at least 2 Scopus or ISI-indexed publications
2. at least 2 local publications or presentations
3. at least 1 patent pending
4. the technology has been adopted with value equal or more than the budget provided; orders requiring mass production
5. at least 2 local MS/PhD graduates

16M – 25M

1. at least 3 Scopus or ISI-indexed publications
2. at least 3 local publications or presentations
3. at least 1 patent to be produced out of the project
4. the technology has been adopted with value equal or more than the budget provided; orders requiring mass production.
5. at least 3 local MS/PhD graduates

>25M

1. at least 1 Scopus or ISI-indexed publication per 5M
2. at least 1 local publication or presentation per 5M
3. at least 1 patent to be produced out of the project per 10M
4. the technology has been adopted with value equal or more than the budget provided; orders requiring mass production.
5. at least 1 local MS/PhD graduate per 5M

**Note: Rough estimate of output values*
1. *International publication (ISI and Scopus-indexed) = P2M*
2. *Local publication = P500,000*
3. *Local MS = P0.50M annually*
4. *Local PhD = P1M annually*
5. *International MS & PhD = P3M annually*

Nature of Grant	Deliverables of the Project
Attendance to Conference*	1. Presentation of a paper 2. Report of completed travel 3. Proof of submission of paper for publication within 6 months after the Conference
Training/Workshop Program	1. Report of completed travel 2. Proof of presentation to sending institution 3. Proof of presentation to another institution for trainings lasting more than 2 weeks 4. Project proposal to be submitted to PCIEERD related to the training program

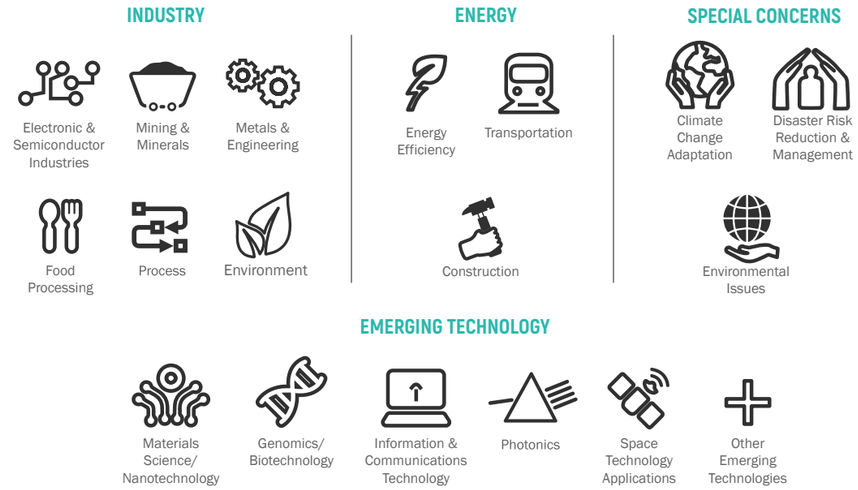
**Note: Projects with conference attendance budgets will have these deliverables, aside from the project deliverables*

Through the 6Ps metric, PCIEERD is able to track how many international and local conferences the researchers attended to present their findings, how many reports got published in which journals, how many graduate/undergraduate students the researchers were able to train and support and which groups did they engage, which inventions are currently being patented, and which ones have already been adopted and are currently in use or in the process of being commercialized.

In a list of randomly selected projects completed in 2014-2015, for example, you'll find that an improved mango fruit bagger and picker developed by the Pangasinan State University is now being utilized by members of the local federation of mango growers and handlers, and that prototypes of a locally designed and low-cost metereological buoy are currently in use by PAGASA. Meanwhile, a project on human computing and multimodal empathic modeling, with a grant funding of roughly 12 million, resulted in two graduate students and 54 undergraduate students being trained, and the researchers attending 10 international and 24 local conferences, with the latter yielding reports in three publications. Apart from a conference appearance and several science-oriented trainees getting support, a different study on 3D gestures on 2D screen for user-interface also resulted in three mobile application games downloaded 100 million times.

"These are measurable research outputs. So it makes sense to go to our congressmen and senators to say, 'With just this amount of money, you have this much impact—what more if we put more money there? The impact is even greater.' Before they release a bigger amount of money, they have to see that. You can't just ask and claim the outcome will be great, you need to show it first," added David.

SECTORAL COVERAGE



COMPLETED PROJECTS IN 2016

SECTOR	DIVISION						
	ITDD	ETDD	EUSTDD	HRIDD	RITTD	PCMD	OED-IG
I. Industry							
Electronics & Semiconductor		3					
Mining & Minerals	5						
Metals & Engineering							
Food Processing	1						
Process							
II. Energy							
III. Transportation			3				
IV. Emerging Technology							
Materials Science/Nanotechnology		9					
Genomics/Biotechnology							
Photonics		3					
Information & Communications Technology (ICT)		2					
Space Technology Applications		8					
V. Environment, Climate Change Adaptation, and Disaster Risk Reduction & Management	3		8				
VI. Others							
Tech Transfer	1				1		
Human Resource Development				6			
R&D Networking				1		1	
Information Dissemination							2
TOTAL	61						

BEST INNOVATIONS FOR 2016

INDUSTRIAL TECHNOLOGY DEVELOPMENT DIVISION (ITDD)

They serve as a catalyst to industry.

ITDD innovates ways to make existing technologies more efficient and cost-effective including new technologies that would improve industrial processes and creates opportunities for business enterprises to adapt to standards that are being considered by regulating authorities.

They ensure that even the farthest regions keep apace—or at the very least, jump a few paces to fill the gaps in technology. Priority areas include R&D programs and projects relating to industrial processes, food technology, textiles, furniture, plastics and chemicals, metals and engineering, mining and minerals, and the environment.

"Projects of ITDD are heavily geared toward the competitiveness of the industries, including demonstration of transfer of technologies and the development of technologies that are appropriate to our country... The projects are rooted to respond to current as well as to emerging needs."

RONALDO Q. DOMINGUEZ
Supervising Science Research Specialist, ITDD

DISTINCTLY FILIPINO DELICACIES
Development of Competence of DOST Food Innovation Centers and Recognition of Most Innovative Products

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HEALTH-SAFE DYE FROM FUNGI

SAND TO TRANSFORM INTO STEEL
Black sand mineral characterization

STEEL JAWS TO CRUSH ROCKS AND STONES

WATER CONSERVATION: RAINWATER COLLECTION SYSTEM
Deployment of a Low-Cost Modular Type Rainwater Collection System Using Locally Available Materials

DISTINCTLY FILIPINO DELICACIES

Development of Competence of DOST Food Innovation Centers and Recognition of Most Innovative Products

Dr. Maria Patricia V. Azanza, Director, Industrial Technology Development Institute (ITDI)

Most Innovative Spray-dried Product: Sea Grapes Powder or Lato

Finalists for Spray-dried Products: Kamias Powder, Sea Grapes Powder, Lemon Grass Powder, Buko Powder, Pomelo Pectin

Finalists for Freeze-dried Products: Blue Pea, Gracilana, Arius Durian Twinks, Roselle

Most Innovative Freeze-dried Product: Gracilaria from Region 2 FIC

One can call it a contest for the most innovative food product, but one can also regard it as a treasure hunt for the best regional delicacies; among them are items that are unfamiliar to those outside their localities. Producers and consumers both benefit from the best technological processes, which the country's Food Innovation Centers (FICs) have to offer—the former because of ease of production, and the latter because of the improved quality of food.

Top marks were given to products that were entirely new to the market and had a unique selling proposition. "These are not commercially available. They used raw materials indigenous to the region," said Fatima Jhoan S. Ibarreta, Project Manager. The initial screening yielded 20 product prototypes out of the 80 from eight participating regions."ITDI went around the regions to discover the best products and gave recommendations on how to improve them. But the region selected what they would enter into the contest," Ibarreta said.

Finalists for Vacuum-fried Products: Instant Sinabawang Isda, Mixede Chips, Mayahini, Sprouted Mongo & Marang

Most Innovative Vacuum-fried Product: Crispy Sprouted Mongo from Region 2 FIC.

Most Innovative product using Water Retort: Tea Tums Lemongrass - Calmansi Blend infused with Turmeric and Ginger

Some of the products showcased modifications on an existing product, to better demonstrate how the regional delicacies can be improved through processing techniques that are safe, sustainable, low-cost, and easily replicable for the micro-, small, and medium enterprises (MSMEs). "We have the FICs to improve existing products, and to have these products adopted by the MSMEs, so that our industries can be competitive at least with our ASEAN neighbors."

Participating teams from the FICs housed in colleges and universities utilized the equipment at the innovation hubs: **Water Retort Technology** to make products shelf-stable even in non-refrigerated conditions through canning, bottling, and packing into pouches; a **Vacuum Fryer** that fries at 80 rather than 100 degrees Celsius, allowing food to retain much of its quality; a **Spray Dryer** to instantly turn liquids, slurry, or puree into powder; and a **Freeze Dryer**, that dehydrates heat-sensitive food at a low enough temperature to preserve its characteristics.

Finalists for products using Water Retort: Sardine Roll, Tea Tums, Mongo Filling, Inasal Sauce, Uved

Most Innovative

Tea Tums
UP Diliman
using Water Retort

Gracilaria
FIC Region 2 - Cagayan State University
using Freeze Dryer

Sea Grapes Powder or Lato
FIC Region 9 - Zamboanga State College of Marine Science and Technology
using Spray Dryer

Crispy Sprouted Monggo
FIC Region 2
using Vaccum Fryer

Second Place

Uved
FIC Region 2
using Water Retort

Arius
FIC Region 2
using Freeze Dryer

Bukolyte
FIC Region 11 - Philippine Women's College
using Spray Dryer

Vacuum-fried Mahayini
FIC Region 8
using Vaccum Fryer

Legend: Industry Choice Award

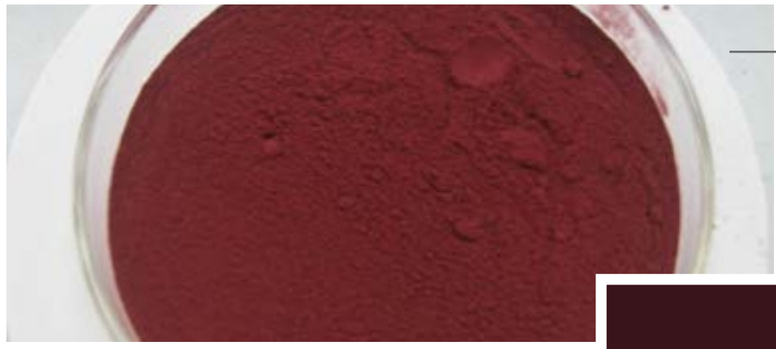
Awarded "Most Innovative" were FIC NCR's Tea Tums from UP Diliman, ready-made health drinks from a blend of lemongrass and *calamansi*, infused with turmeric and ginger, and using water retort technology; Buguey Cagayan's *Gracilaria*, seaweed freeze-dried as flavoring or processed as seaweed chips from FIC Region 2 in Cagayan State University; FIC Region 9- Zamboanga State College of Marine Science and Technology's *Sea Grapes Powder* or *Lato*, which was spray-dried to capture its salty, peppery taste; and FIC Region 2's *Crispy Sprouted Monggo,* vacuum-friedto retain the nutrients of *monggo*.The latter two products also bagged the "Industry Choice Award" for scoring high on novelty, consumer appeal, manufacturing feasibility, and potential for competitive pricing. Commercial rollout for both is scheduled in the first quarter of 2017.

"You wouldn't expect the kind of products that came out of the contest… that we had these kind of raw materials and they could be processed into good products," said Ibarreta, adding that some items, like sea grapes, could also be used for cosmetic purposes. There was no dearth of appealing novelties, among them second-placers FIC Region 2's *uved*, traditional Ivatan food made from banana shoots; *Arius*, berries from a tree that only bears fruit in Batanes; *bukolyte* or powdered coconut water from FIC Region 11 in Philippine Women's College; and vacuum-fried mahayini locally known as *barinday* from FIC Region 8.

The FIC contest drew out the learned skills of the FIC managers and technical personnel who had prior training on product development, food safety regulations, packaging, labeling, costing, and marketing strategies.

The contest also made available product prototypes that are ready-to-market for industry adopters. The MSMEs are encouraged to market-test the distinctly Filipino products, which are targeted to appeal to the health-conscious consumer, via small-volume production at the FICs. Sustainable lifestyle store, ECHOstore, has already expressed interest in carrying some of the products.

"We made it easier because there is available equipment in the FIC," said Ibarreta."The ethnicity of our food—you wouldn't find it elsewhere. It's a new product for them to try, and they can appreciate what's available here in the Philippines."



Monascus purpureus colorant

Simulated color generated from Munsell Pallete Color System Program

HEALTH-SAFE DYE FROM FUNGI

Production, Characterization, and Application of Red Pigment Produced by *Monascus purpureus*

Fides Z. Tambalo, Researcher II, UPLB-BIOTECH

Adding color to food makes it look more appetizing, but the tradeoff is that synthetic dye is used, and it would most likely be dangerous to health. The most widely consumed artificial food colorants—Red No. 40 or Allura Red, and Red No. 3 or Erythrosine Red—have been linked to heath issues such as chromosomal damage, lymphomas, thyroid tumors, and neurochemical and behavioral effects. Consumers are now shifting to organic sources of colorants, leading local researchers to come up with an alternative red pigment from the microorganism *Monascus purpureus.*

Monascus purpureus is a fungi, which researchers processed inside a bioreactor, that yielded an astonishing red pigment never before seen in the Philippines. The result of such liquid fermentation was then spray-dried into powder form. *Monascus purpureus* colorant is similarly being studied in Singapore, but it is already in commercial use in Japan and China—the main difference is that China uses solid substrate fermentation to extract the colorant, rather than liquid fermentation.

"In the Philippine setting, this is a new technology," said Kristina Paula Y. Anacleto, Project Manager. The red pigment produced can be applied to different food systems: cured meat and fish products, bakery products, cheese and yogurt, beverages like soda and lambanog (coconut wine), catsup, and salted eggs. It can also be applied to personal care products such as soaps and lip balm. "Our red eggs use synthetic colors, usually azo dyes used in industrial applications not permitted for human consumption, so we don't know if the dye contaminates the egg itself, once opened," said Anacleto.

Unlike the usual plant and animal sources, *Monascus purpureus* is not subject to seasonality or exposed to the elements. It is available year-round, being cultured in controlled laboratory conditions. It also has none of their disadvantages, such as instability against light, heat, adverse pH, and low water solubility. Numerous tests conducted by the researchers have proven that the dye is safe for ingestion. It is non-mutagenic, heavy metals within acceptable limit, and devoid of the mycotoxin Citrinin. Moreover, it has the metabolite Monacolin K, which is known to decrease blood cholesterol, and an abundance of antioxidants. "Antioxidant properties of *Monascus purpureus* are higher compared to the usual colorant," said Anacleto.

The global market for food coloring reached $1.2 billion in 2015, with natural pigments capturing 31% of the food market, and growing at a rate of 5%. Colorant created from *Monascus purpureus* is the Philippines' point of entry into this sunrise industry. The researchers not only produced the red pigment, but also traces of yellow and orange, which could be further developed for local use and export. Local, large-scale production of microorganism-based organic colorants will be cheaper compared to importing organic or synthetic ones, a boon for the food manufacturing and cosmetics industries.

SAND TO TRANSFORM INTO STEEL

Black sand mineral characterization

Dr. Carlo A. Arcilla, Director, National Institute of Geological Sciences (NIGS), UP-Diliman

Bagamanoc, Catanduanes

Sampling at Sto. Domingo, Albay

Stockpile of black sand at Malinao, Albay

One of the most abundant yet underutilized mineral resources in the Philippines is black sand. It is usually found on beaches where the pyroclastic materials spewed by nearby volcanoes are weathered, eroded, and deposited, through streams and drainage systems, along the coastline. This type of sand is sometimes referred to as “ironsand” because it contains magnetite, one of two types of iron ore commonly used in steelmaking.

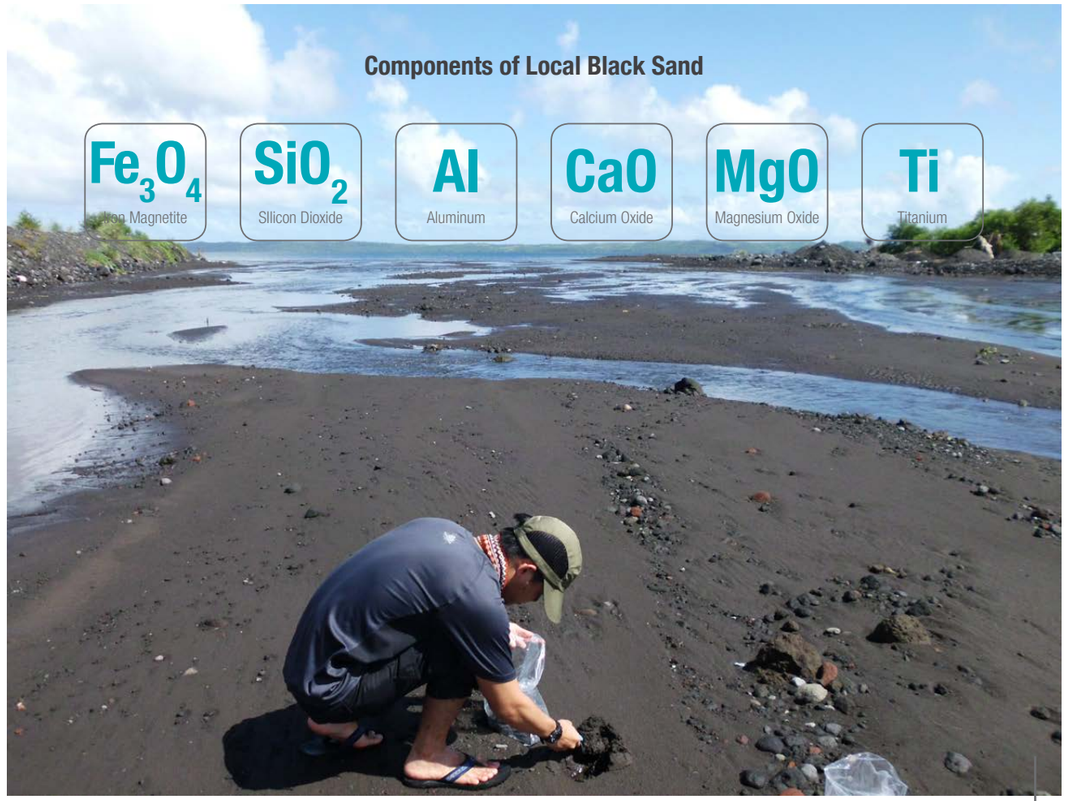
“We have a lot of black sand here. We used to have black sand mines, but operations have been banned. Before, our black sand was brought to other countries and maybe sold back here as steel, at a higher price. That’s perplexing,” said Engr. Katrina B. Landicho, Project Manager.

The challenges in monitoring and mitigating the social and environmental costs of black sand mining in the Philippines led the government to suspend such operations in 2014. However, the high demand for iron magnetite, caused by the unflagging demand for high-quality iron products, has obliged the PCIEERD to take a second look at black sand’s viability as a mineral resource and an economic asset, in line with the plan of the current administration to revitalize the Philippine steel industry.

Sampling at Bagamanoc, Catanduanes

“Our black sand is not characterized, so this project was formulated to determine the composition of black sand,” said Landicho. Since the project’s inception in 2015, researchers have collected black sand from various sampling points in the country, including the Ilocos-La Union-Pangasinan area, Zambales, Bicol, Leyte, Negros Oriental, and Surigao del Sur. They have identified that iron magnetite is the most characteristic component in local black sand, together with trace amounts of silica, aluminum, calcium oxide, magnesium oxide, and titanium.

Sampling at Malinao, Albay



Sampling at Malilipot, Albay

Reforms in the mining sector could very likely lead to the resumption of legal and ethical black sand mining, which will yield ample raw material for processing. In fact, the PCIEERD and DTI are co-funding another projecton the best process to produce steel using black sand.

“We need steel to industrialize. We need to produce our own instead of importing. Right now, we are consuming eight million tons of steel. That will rise as we industrialize further,” said Landicho. “We hope that black sand will fill this gap in the steel industry.”

PCIEERD’s research teams have been conceptualizing other, complementary projects to make use of black sand. One project seeks to facilitate the collection of black sand by developing a machine that will automate the separation of magnetite-rich material from regular sand. The other project aims to study how to remove black sand deposits from targeted sites and how best to recondition the soil for planting. With these projects, black sand is set to become a more prominent resource for local industries.

Steel Jaws

STEEL JAWS TO CRUSH ROCKS AND STONES

Design and Optimization of Austenitic Manganese Steel (AMS) Liners for Philippine Aggregates and Mineral Processing

Engr. Lemuel N. Apusaga, Senior Science Research Specialist, Metals Industry Research and Development Center (MIRDC)

Planning for the designs and materials procurement with Tiger Machines Industrial Corp.

Site visit at electa Tarlac Aggregate Corp. assessing the worn out crushers.

Have you ever been to a stone aggregate crushing plant? Here you will find large machines used to break big hard river rocks into smaller pieces to serve our booming building and construction industry. The heart of these machines are large metal cast steel blocks with opposing ridges or teeth, commonly termed as liners or jaws. These jaws break the stones and rocks into suitable sizes for varying use by industry. But these liners, which do the hardest work, are susceptible to fast wear and tear.

When the liner’s crushing tolerances become wide, they lose their efficiency in breaking and crushing such that they have to be replaced. Often the aggregate plant shuts down, costing companies up to a million pesos per day while waiting for imported replacements. On the average, due to continuous service, they wear out and have to be replaced every month. Locally, manufacturing liners will contribute to the Philippines’ booming industries, in general, and the stone aggregate companies in particular, asfar as reducing operating cost and becoming more efficient in production.

The MIRDC aims to localize the production of the liner jaws by optimizing the metal casting of the manganese steel crusher liners. Engr. Lemuel N. Apusaga, the project leader details the properties of Austenitic Manganese Steel (AMS) as a kind of hard steel, but not brittle.

The liners that will be produced will be at a lower cost and will even prolong the lifespan of the liner a little bit more than the imported ones, minimizing plant shutdowns. Local aggregate companies import manganese steel liners at a very expensive cost of around P250,000 per piece, and almost always a pair is required, as they wear out basically at the same rate.

WATER CONSERVATION: RAINWATER COLLECTION SYSTEM

Deployment of a Low-Cost Modular Type Rainwater Collection System Using Locally Available Materials

Dr. Blessie A. Basilia, Materials Science Division Chief, Industrial Technology Development Institute

When the El Niño phenomenon in September 2015 radically decreased rainfall in the country, it forced water concessionaires, with the agreement of the National Water Resources Board, to reduce water allocations in Metro Manila. In response to this and the national weather bureau's warning that the drought will linger on, the Industrial Technology Development Institute (ITDI), together with plastic products specialist Manly Plastics Inc., devised rainwater collection systems to augment water supply in affected areas.

"The choice was given to the *barangay* whether they would prefer a modular or pillow-type unit for collection and storage," said Dr. Ruby Raterta, Project Manager. Most barangays requested both modular and pillow-type units to be deployed in their area. Both collection systems are made of high-density polyethylene (HDPE), are foldable and thus easily transportable, and can each hold 1,000 liters or one cubic meter of rainwater. This rainwater will be used for flushing toilets, washing clothes, and watering plants. "Eventually, we want it to be used as drinking water, but we're not yet in that phase," said Raterta.

Design-wise, the modular tank takes up less space compared to the pillow-type, which lengthens horizontally. However, they priced differently. "The modular is P15,000; the pillow-type is only P3,000, but they hold the same amount of water. If you live in the city, where space is a premium, you might as well get the modular—it's more expensive, but you save on space," said Jonathan Co, Sales and Marketing Manager of Manly Plastics Inc. "In the provinces, space is not an issue; cost is an issue." Foldability of the units is an advantage since more units fit in the delivery truck, reducing transport costs.

Modular Type Rainwater Collection and Storage System

Pillow Type Rainwater Collection and Storage System

Installation and connection to downspout of a building.

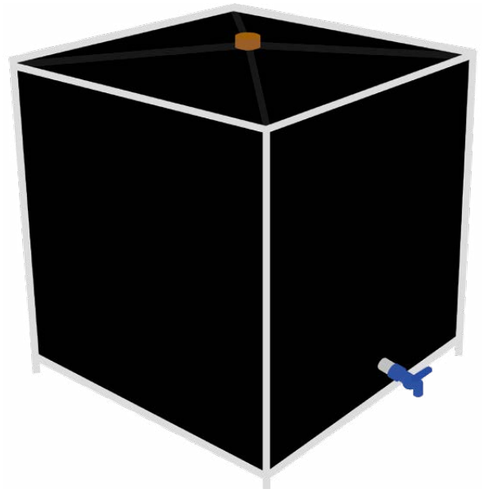
Installation of the upper and lower frame of Rainwater Collection System.

MODULAR-TYPE RAINWATER COLLECTION SYSTEM

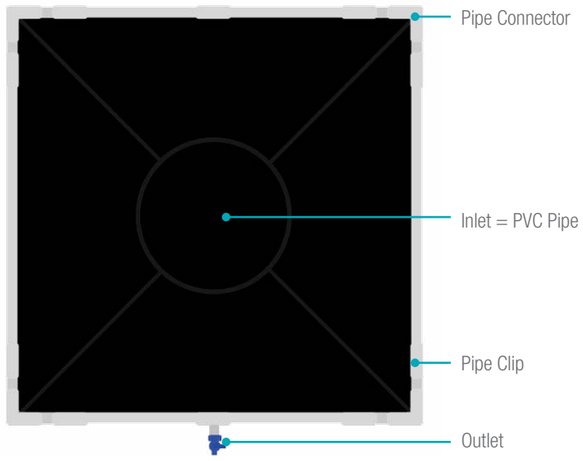
Availability:
can produce 10 units every 2 days (from Manly Plastics)

Cost Estimate:
PHP 15,000.00

50 modular-type & 100 pillow-type units were approved for deployment in December 2015



Top View

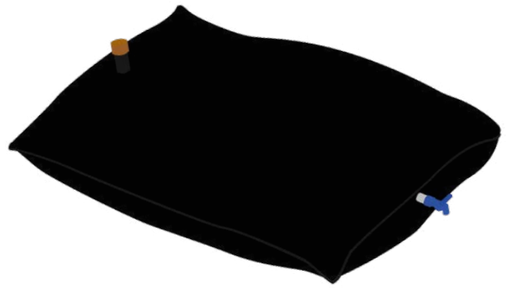


A total of 50 modular and 100 pillow-type units were approved for deployment in December 2015. ITDI has since distributed the rainwater collecting systems to barangays in Manila, Quezon City, and Taguig City. They've also expanded their reach to municipalities in Pampanga, Laguna, Nueva Ecija, Mountain Province, and Misamis Oriental. Local governments assist by contributing a downspout or drainpipe, as well as the platform on which the system rests.

Feedback from recipients allow for improvements on design. Already, they've saved 10 minutes of installation time by eliminating one step during assembly. Water cannot accumulate on top of the units now because of a sloping feature, and there's a mosquito net in between the body and the cover to mitigate risk of dengue. Such features could be further developed into other, more commercial iterations, said Co, depending on need and application. "It's nice to work with scientists and the DOST that can turn their ideas to reality… And I think that's the essence of science. When we develop a technology, it's transferable. The technology we develop no matter how seemingly small can lead to other applications. The things that we learn from this one will affect how we design similar products in the future," he said.

As the project progresses, more design tweaks will be accommodated. Households, for example, favor a tank with half the current capacity, whereas in areas like General Santos, Cagayan de Oro, and Pangasinan, there is a demand for larger-capacity rainwater harvesters to be used in agriculture and cottage industries. Whether the need is to hold water in reserve for the dry spells, or to harvest additional water to use in tandem with potable water supply, it pays to conserve an already limited resource.

PILLOW-TYPE RAINWATER COLLECTION SYSTEM



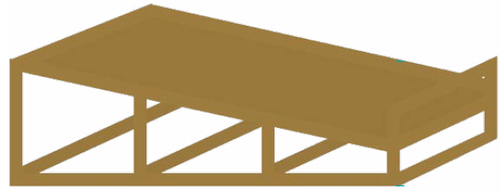
Availability:
can produce 10 units everyday (from Manly Plastics)

Cost Estimate:
PHP 3,000.00

PLATFORM

Height:
This is an inclined platform. The lowest point must be 0.35m from the ground to provide enough space to put a standard pull under the faucet. The highest point must be 0.80m high.

PLATFORM DESIGN



LIST OF RAINWATER COLLECTION RECIPIENTS

Area	No. of pairs (modular & pillow-type)	Locations	Remarks
1. Taguig City	28	All baranggays of Taguig	22 delivered & for installation
2. Manila	1	Brgy. 352, Sta.Cruz, Manila	Installed
3. Quezon City	15	District 5 & 6, Quezon City o Apolonio Samson o Baesa o Balongbato o Culiat o New Era o Pasong Tamo o Sangandaan o Sauyo o Talipapa o Tandang Sora o Unang Sigaw o Bagbag	Not all were installed
4. ITDI-DOST	3	DOST-ITDI Compound, Gen. Santos, Bicutan	installed
Subtotal	46	Metro Manila	
5. Laguna	1	Binan,Laguna	installed
6. Pampanga	1	Mabalacat, Pampanga	installed
7. Mt. Province	3	Bauko, Mt. Province	installed
8. Nueva Ecija	3	Municipality of Talugtug Municipality of Penaranda Municipality of Licab	installed
9. Misamis Oriental	1	Claveria, Misamis Oriental	installed
Subtotal	9	Other areas or regions	
Total	**56**		

ITDD OVERVIEW

2016 ITDD PROJECTS		
ONGOING	COMPLETED	NEW
17	37	7
TOTAL: 61		

SHARE OF SPEND	PROGRAM	AMOUNT	SOURCE OF FUNDING
HGHEST	SCALE Program	PHP 48M	PCIEERD-GIA
LOWEST	Binubudan Lambanog Quality Proposal	PHP 0.6M	PCIEERD-GIA

2016 COMPLETED PROJECTS

TECHNOLOGY TRANSFER

Title	Start Date	End Date	Monitor	Alt. Monitor
Establishment of a Natural Products Business Incubation Facility in West Visayas State University	11/3/2014	11/30/2016	Catherine Miranda	Russel Pili
Enterprise Center for Technopreneurship: Outreach	10/14/2014	10/13/2015	Tarhata Mariano	

ENVIRONMENT

Title	Start Date	End Date	Monitor	Alt. Monitor
Metal Bio-Indicator Plant Species of the Philippines	10/15/2012	10/14/2015	Ruby Raterta	Liz Ahren Peñaflor
Design, Fabrication, and Evaluation of Monitoring and Sampling Devices for Particulate Matter	3/1/2014	2/28/2016	Laarni Piloton	Liz Ahren Peñaflor
Establishment of Production Centers for Ceramic Water Filter in Regions CAR, II, and VIII	2/1/2014	1/31/2015	Laarni Piloton	Liz Ahren Peñaflor

FOOD PROCESSING

Title	Start Date	End Date	Monitor	Alt. Monitor
Establishment of Centralized Facility of Ultra High Temperature/High Temperature Short time Pasteurizer for Milk, Coconut Water and Other Juices	2/1/2013	1/31/2014	Fatima Jhoan Ibarreta	Grace Estillore

MINING & MINERALS

Title	Start Date	End Date	Monitor	Alt. Monitor
Biodiversity Assessment of Terrestrial and Aquatic Ecosystems in Selected Mining Environs in Mindanao-Sub-PRogram 2: Assessment of Terrestrial Ecosystems Biodiversity in Selected Mining Environs in Mindanao- Project 1	9/1/2012	8/31/2014	Katrina Landicho	Jonas Liwanag
Biodiversity Assessment of Terrestrial and Aquatic Ecosystems in Selected Mining Environs in Mindanao-Sub-PRogram 2: Assessment of Aquatic Biodiversity in Selected Mining Environs in Mindanao- Project 2	9/1/2012	8/31/2015	Katrina Landicho	Jonas Liwanag
Biodiversity Assessment of Terrestrial and Aquatic Ecosystems in Selected Mining Environs in Mindanao-Sub-Program 2: Contamination Pathway and Pollution Management of Mining in Mindanao - Project 4	9/1/2012	8/31/2015	Katrina Landicho	Jonas Liwanag
The Gold and Copper Chase: Life Cycle Analysis of Sustainable Small Scale Production System [MinERS Project G]	10/1/2013	9/30/2016	Katrina Landicho	Jonas Liwanag
Black Sand Mineral Characterization	7/9/2015	7/8/2016	Katrina Landicho	Jonas Liwanag

PROCESS

Title	Start Date	End Date	Monitor	Alt. Monitor
Production,Characterization and Application of Red Pigment Produced by *Monascus purpureus* M1018	3/1/2014	2/29/2016	Kristina Paula Anacleto	Mary Grace Buenavides
Revit Project 1. Establishment of Innovation Center for Yarns and Textiles	10/1/2013	9/30/2015	Joni Gonzaga	Mary Grace Buenavides
Revit Project 2. Establishment of Handloom Weaving Livelihood at the DOST Innovation Centers	10/1/2013	9/30/2015	Joni Gonzaga	Mary Grace Buenavides
Rubber Project 2. Optimization and Improvement of Process in the Production of Technically Specified Rubber and Demonstration of Improved Facilities in Zamboanga Peninsula	10/1/2013	9/30/2015	Joni Gonzaga	Mary Grace Buenavides

ENERGY AND UTILITIES SYSTEMS TECHNOLOGY DEVELOPMENT DIVISION (EUSTDD)

They are the team that looks for better technical solutions to current challenges.

The EUSTDD finds the smart ways to fix or circumvent problems related to energy, disaster management, construction, and transportation. Being closely linked to making systems work more efficiently in terms of public utilities and infrastructure, as well as building resilient communities and homes, EUSTDD's work has direct impact on the everyday lives of the Filipino people.

"From nerve-wracking planning sessions to over the top funny moments, EUSTDD is really an exciting place to be. Though we have different ideologies and personalities, unique in our own ways, we manage to enjoy each other's company. More importantly, we share one goal - to serve and move the country forward."

GLADYS MAE C. ALVAREZ
Science Research Specialist II, EUSTDD

SHELTER FROM THE STORM
Build Back Better: The Science and Technology of Designing and Planning Disaster-Resilient Communities, Sites, and Buildings

READING THE WAVES
Marine Weather Forecast Using High Frequency Doppler Radar

MORE POWER TO MSMES
Disaggregated Electricity Consumption Baseline Measurement of Micro-, Small, and Medium Enterprises in the Philippines, and Behavioral Response Analysis to an Intelligent Energy Management Platform Using Real-Time Electricity Monitoring with Integrated Analytics and Recommendations Engine

TOP GEARS
Establishment of a Gear Making and Assembly Facility

THE POWER OF ONE

CHECKING ON SOLID GROUND
Development and Deployment of Early Warning System for Deep-Seated Catastrophic Landslides

SCENARIO MAPPING
Development of a Customized Local Traffic Simulator (LOCALSIM)

PUBFIX: TIME-BOUND BUSES
An Integrated and Optimal Scheduling of a Public Transport System in Metro Manila

SHELTER FROM THE STORM

Build Back Better: The Science and Technology of Designing and Planning Disaster-Resilient Communities, Sites, and Buildings

Architect Mary Ann Espina, UP College of Architecture

The model of the Takbuhan structure of the Build Back Better Program

The models of the KapitBahay structures of the Build Back Better Program

Inventory of various types of traditional vernacular Filipino architecture and their disaster-resilient features

Filipinos face storms frequently, some of them with gale-force winds and torrential rain. On top of these, we are also at risk from landslides and flash floods. In times of calamity, lack of decent shelter and provisions can be crippling. Communities near coastal areas tend to have weaker infrastructure due to lack of resources and technical capacity. Given that their location puts them at the frontline of a storm's path and far away from immediate help, there is a need for sturdier housing that can withstand vicious storms—the foundation of the Build Back Better Program (BBB).

The BBB is a joint research program implemented by the University of the Philippines' (UP) College of Architecture, the School of Urban and Regional Planning (SURP), and the Institute of Civil Engineering (ICE). It aims to provide guidelines and concrete solutions towards building disaster-resilient buildings, sites, and communities. Engr. Carluz Bautista, Project Manager explains the urgency behind BBB: "The project was conceptualized in response to the issues and needs encountered during [Typhoon] Yolanda. Relief efforts were lacking and disorganized. Communities were destroyed, evacuation centers were overcrowded and even school buildings were used as evacuation centers."

The program has three components:

- **Project 1:** Planning Guidelines for Post-Disaster Response and Rehabilitation of Communities and Localities via Supply Chain and Delivery Management, and Risk-Sensitive Environmental Planning

  » The initial phase assisted with the recovery of the community in Tacloban, determined the underlying cause of vulnerability, and from there developed a system that will improve relief efforts, especially in terms of delay. Assessing and identifying the risk were documented, and vulnerability maps were produced. Moreover, existing Humanitarian Logistics Management (HLM) operations and policies (relief efforts) were also assessed, that resulted in the crafting of new HLM framework, i.e. supply chain, strategies, and policy recommendations. Instead of the usual functional approach (mandate and delineation based on specialization), the UP SURP team recommended a business process approach that can be integrated with existing guidelines and complied with the ISO 9000 series, an international standard for management systems.

- **Project 2:** The Architecture of Filipino Resilience: The Adaptation of Traditional Wisdom from Selected Philippine Vernacular Architecture into Modern Building Systems

Cross-referencing of traditional Filipino disaster-resilient architecture with international and local guidelines for disaster resiliency

- **Project 3:** Structural System and Construction Methodologies Resilient to Earthquakes and Strong Winds

  » Projects 2 and 3 go hand in hand. They focus on the analysis of damaged buildings, such as houses, schools, and evacuation centers to come up with an architecturally and structurally sound design. Aside from the designs, the UP ICE and UP ARKI team also produced construction guidelines in constructing cost-effective and disaster-resilient buildings, which detail how to construct a house, the materials to be used, and the levels of intervention needed in reducing impacts of natural hazards.

  » The disaster resilient design outputs of Projects 2 and 3 resemble both modern and traditional Filipino huts using modern materials. Through computer simulation, the improved designs have the ability to resist winds up to 300 kph, and can be constructed from locally sourced materials.

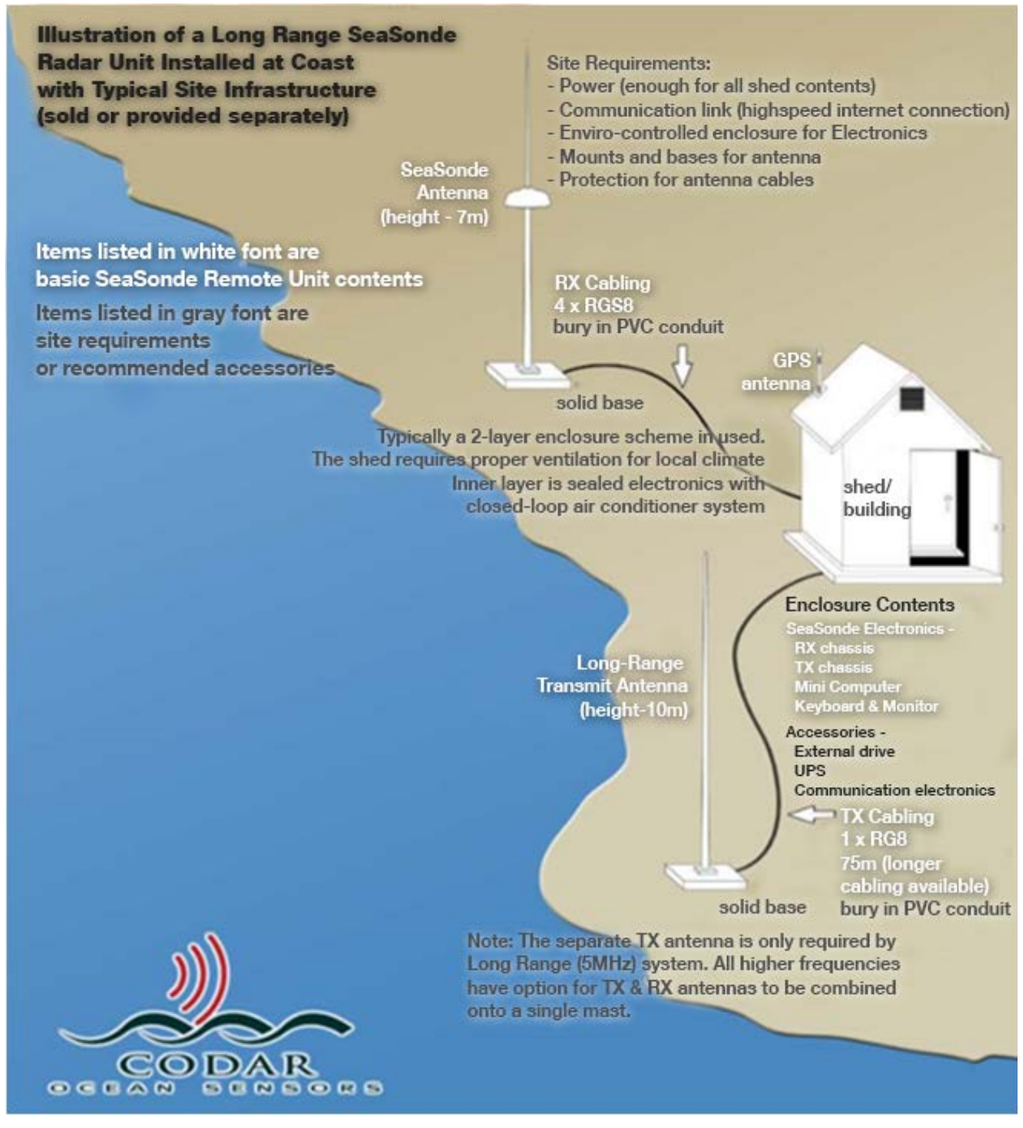
  » The concept design of an evacuation complex (sports facility), which considers both hydro-meteorological and seismological hazards, have disaster-resilient and sustainability features. While for the design of school buildings, the team recommended the Gabaldon-type design with modifications and improvements.

A housing prototype is being built in Baler where the improved design will be tested against the windy landscape. After construction, the design and housing prototype will be presented and showcased to possible adaptors such as NGAs, LGUs, NGOs, CSOs, and the local community.

READING THE WAVES

Marine Weather Forecast Using High Frequency Doppler Radar

Dr. Vicente B. Malano, DOST-PAGASA



Filipinos are, in today's colloquial speech, "storm-born." Due to our geography, we are highly exposed to storms. In fact, an average of 20 typhoons pass through the Philippines in any given year and some make devastating landfall. Though our available forecasting systems are modern, there is still a need to improve them so that the safety of Filipinos is assured. The High Frequency Doppler Radar (HFDR) is one such technology that will bolster weather forecasting by observing marine current and atmosphere interaction.

The HFDR, which is installed in pairs, was initially offered in 2011 to the Armed Forces of the Philippines (AFP) by the United States under the Mutual Defense Treaty but did not materialize. However, in 2014, through the United States and Philippine Science and Technology Joint Committee Program, the HFDR was identified as priority for research collaboration. PCIEERD funded the installation of the HFDR with DOST-PAGASA as the implementing agency. The initial two units were installed back in 2015 at the Naval Education Training Center and at the Masinloc Power Plant in Zambales. Another pair is slated to be installed in 2017 in Berong, Quezon and Punta Bajo, Rizal in Palawan.

The HFDR is a tripartite collaboration project of PCIEERD, DOST-PAGASA and AFP-Philippine Navy (AFP-PN). It was designed for oceanographic monitoring, particularly surface currents, wind speed and direction, and wave height.

The HFDR project is in the construction phase of its shoreline pedestal, installation, commissioning and testing. Through the project, DOST-PAGASA forecasters were trained to utilize and interpret marine oceanographic data to enhance their marine weather forecasting capabilities. "Right now, the only capability of the HFDR is for oceanographic studies. But next year, PCIEERD will fund an R&D project for the development of a low-cost and multi-frequency ship tracking software so we can maximize its full capability for other possible applications such as ship tracking for maritime safety, search and rescue operation, oil spill response and even help fishermen locate good fishing grounds" said Carlos Bautista, Project Manager.

The HFDR has yet to reach its maximum beneficial capacity, but the technology is sound and can be used as basis for local marine surveillance technology in the future, he added.

Field work activities with UP Marinse Scientist and PAGASA personnel

Legend:

Installed HFDR in Palawan and Zambales

Additional HFDR or 2017

Mr. Hardik Parikh, CODAR expert, discussed with the local participants on how the HFDR works

MORE POWER TO MSMEs

Disaggregated Electricity Consumption Baseline Measurement of Micro-, Small, and Medium Enterprises in the Philippines, and Behavioral Response Analysis to an Intelligent Energy Management Platform Using Real-Time Electricity Monitoring with Integrated Analytics and Recommendations Engine

Jan Aaron Augustus Garcia, Energy Technologist and Electrical Engineer, WattSmart Philippines Corp.

WattSmart Philippines Corp. conducting seminar on MSMEs' Electricity consumption baseline measurement

Micro-, small-, and medium-enterprises (MSMEs) make up the bulk of our economy. Proven economic assets, the new generation MSMEs are no longer typical mom-and-pop shops, but instead canny start-ups with novel ideas ranging from reinvented products to convenient technologies. One major hurdle to their growth, however, is their high consumption of electricity despite their comparatively small size.

For MSMEs with fewer financial resources than their big competitors, electricity is a heavy financial burden and business vulnerability that must be managed. An intelligent energy management platform using real-time electricity monitoring becomes a useful tool for these enterprises to track, analyze, and lessen their consumption. "MSME owners are usually blinded when it comes to their power consumption. This was first observed in larger companies, but we came up with this pilot project to help MSMEs," said Luthar James Co, Project Manager.

Based on the statistical size of MSMEs in manufacturing, a representative sample of 150 MSMEs is targeted to pilot test the project. PCIEERD first determines whether MSMES want the service or not. Upon receiving an affirmative response, PCIEERD employs an energy consumption monitoring system dubbed WattSmart (from its proponent, WattSmart Philippines Corp.). The system automatically calculates and provides recommendations to users. This data will later be handed over to the chosen MSMEs, and changes in electricity consumption behavior will be recorded by the same real-time monitoring system.

"The data analysis is done just to give MSMEs an idea of how much they are consuming. We give them a trial period of one month and we make recommendations for the MSMEs based on this. Their energy savings after applying these recommendations will be tracked and recorded for reference. Then, they will decide if they want to avail of the service," Co said.

In January 2017, WattSmart embarked on roadshows in Davao and Cebu to ensure that the project, which has been dubbed the "Smart Energy Program," acquires data on a national scale. Jan Aaron Augustus Garcia, Project Leader at WattSmart, said that more roadshows will be conducted, starting in Bulacan and Laguna in February and March. As of this writing, 13 MSMEs had already availed of the program in Metro Manila and nine in Davao, with 11 more roadshow participants indicating their interest to join the program. The team is also coordinating with the Philippine Chamber of Commerce, Inc. (PCCI) to promote the program in areas within its purview.

WattSmart Philippines Corp. educates MSMEs

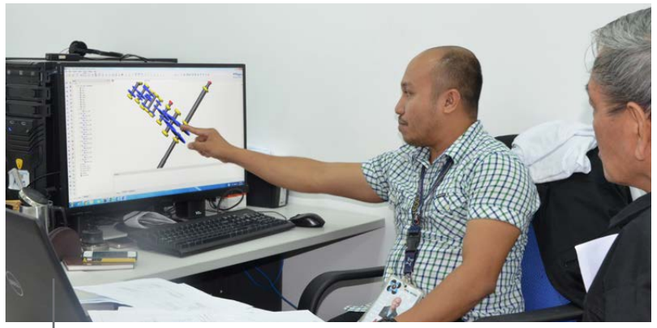
"The DOST-funded project aims to generate an understanding on how SMEs [in particular] use electricity and energy. This includes [getting] baseline data on electricity consumption, alongside major energy consuming processes or equipment, and identifying what the opportunities are in terms of supporting SMEs in line with energy efficiency… Government will have the information it needs when it comes to justifying investments in energy efficiency for SMEs, or defining policy that will impact SME operation," explained Garcia.

Philippine MSMEs are expected to become more competitive through this technology as they save on energy costs and direct their finances toward their core functions, such as product development. Moreover, WattSmart expands its coverage beyond MSMEs, and is also projected to help the academe, industry stakeholders, and policy makers with the data gleaned from the program. Its database will include energy consumption on an appliance level, consumption of the SME as a whole, and other energy consumption trends. It is hoped that insights from the project will encourage better policies on energy consumption in government as well as in the industry groups, apart from enhancing energy demand forecast and demand side management.

TOP GEARS

Establishment of a Gear Making and Assembly Facility

Jonathan Q. Puerto, Metals Industry Research and Development Center (MIRDC)



Discussion with MIAP-TWG concerning the newly acquired gear software (KISSsoft)

Photo taken during the factory acceptance of ST25CNC Gear Shaping Machine and FE30A Gear Shaving Machine in Japan

Project Leader Dr. Dominic S. Guevarra's presentation during the launching of the gear making facility

Metal products are among the top imports of the Philippines, amounting to USD$117.92 million in December 2016 alone. This includes metal parts such as transmission components, the bulk of which are gears and gearings, mostly for the automotive and agricultural industries. While there are a total of 272 parts and components manufacturers in the country, there is still a need to improve their capabilities.

"When you say gears, it's really about precision. We have manufacturers, but they don't really pass the standards of production. If it's locally made, the tendency is that it breaks down faster," said Luthar James Co, Project Manager. Even the smallest of parts has an impact—for the want of a gear, the machine breaks down, and for want of a functional machine, production grinds to a halt. In a competitive globalized economy, delays due to the incapacity to repair or replace equipment is obviously a liability.

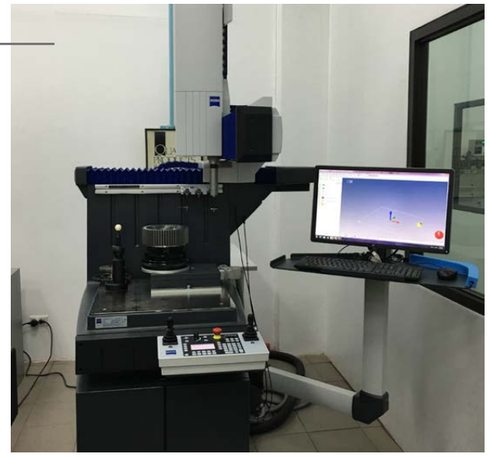
MIRDC Director Robert O. Dizon (center) with MIRDC and Partner Industry Officials during ribbon-cutting ceremony

MWS I Phase 5 (Training and Office Rooms)

The establishment of a gear making facility is meant to increase the productivity and innovativeness of the local manufacturing sector, through a more competitive metalworking industry. Primarily it will serve as a gear design and prototype production facility for the development of different types of gears for transportation, metalworking, and agro-industrial applications. Moreover, it will provide facility-sharing services on the production of gears and transmission systems, and develop a training curriculum for gear design and manufacturing.

"The facility will help the machine shops. In the transport industry, we're looking at those that work on engine transmissions, whether for land, air, or sea vehicles. In the agricultural industry, we're looking at a range of equipment, not just the tractors," said Co. "It's really enhancing our gear manufacturing, and our production lines in general."

PCIEERD had consulted with the Metalworking Industries Association of the Philippines (MIAP) to discover the gaps in the industry, and discovered the need for high-precision equipment. The first order of business then was to acquire gear measuring equipment: a CNC gear hobbing machine, and a 5-axis CNC machine that allows the cutting tool to move with greater flexibility, so the worker is able to approach the workpiece from several directions.They are also eyeing a dynamic balancer, which will check for unwanted vibrations and correct what is unbalanced in the gear, and a carburizing machine



Gear Measuring Equipment

Okuma CNC 5-axis Machine

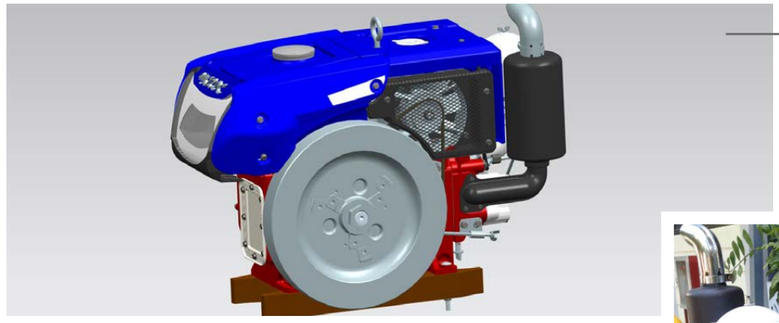
Dynamic Balancer

that will harden the metal surface of the gear so it can withstand abrasions.

A total of 15 machinists and five designers are currently being trained to man the facility, which is housed at the Metals Industry Research and Development Center (MIRDC). “They’re already assembling the equipment, and making sample gears,” said Co. Right now, he added, they’re focused on delivering the MIAP-identified output of specialized gears and gearboxes for the trainset of the locally made hybrid electric road train for the Philippine National Railway, which is targeted to be operational by yearend.

The facility is also expected to create a prototype transmission system for a combined rice harvester for agriculture, and speed reducers for the transport sector, added Co. Some of the gears will have complicated shapes—helical, spiral, and bevel-shaped. The expectation is that the facility’s personnel will not only be able to copy or reconstruct parts that are needed to make repairs, but also to be able to design parts themselves. “There is great market potential for certain parts,” said Co.“It will also serve as good training ground for students, and a testing site for practical applications—it will boost inventions.”

CNC Gear Hobbing Machine



3D model of the 12-hp Single-Cylinder Diesel Engine

One of five prototypes in development

THE POWER OF ONE

Development of 12-hp Single-Cylinder Diesel Engine under the Support Program for the Productivity and Competitiveness of the Metals and Engineering Industry

Jonathan Q. Puerto, Metals Industry Research and Development Center (MIRDC)

Sometimes efficiency means utilizing the most basic of tools. Case in point, the very practical single-cylinder engine, which may be the simplest configuration of an internal combustion engine, yet packs enough power to automate the important tasks. The piston moves to engage combustion within a single chamber or cylinder, and yet it’s enough to operate a small motorbike to move you places (and a customer, for the *habal-habal* driver), a weed-whacker for the gardener, a pump boat for the fisherman, or a tractor for the farmer.

“They have created a 12-horsepower (hp) single-cylinder diesel engine. It can be used for a tractor, or a transplanter, or a milling machine,” said Luthar James Co, Project Manager. “There are five prototypes under development. They’re currently field-testing the first prototype engine in a farm in Nueva Ecija.”

The Agricultural Machinery Testing and Evaluation Center (AMTEC) has approved the testing for the harvest season, from January to June 2017, and evaluation of the performance of the engine from July to December. The engine itself is the same, but the prototype units demonstrate its use in different applications, whether a water pump for irrigation, a rice huller for milling, a transplanter for automated transplanting of seedlings, or a light-duty mobile vehicle such as a tractor, said Co.

Rather than importing such machines from China or Japan (incidentally, the benchmark for the machine is of Japanese make), the Philippines can utilize its own—at a fraction of the cost. Moreover, the 12-hp diesel engine could be the start of creating more complicated and more versatile engines for larger vehicles. “Moving forward, we could make our own engines for small cars, or a standardized engine for the jeepney. We have an existing project to standardize the body of jeepneys, and we will need an engine for that. It will not only be safer, but it will optimize our most common transport vehicle,” said Co.

In the meantime, the small, 12-hp single cylinder engine is enough for a simple man to maintain his livelihood, at very little cost.

CHECKING ON SOLID GROUND

Development and Deployment of Early Warning System for Deep-Seated Catastrophic Landslides

Dr. Joel Joseph Marciano, Jr. of UP EEI (Senslope) and Dr. Arturo S. Daag of Philippine Institute of Volcanology and Seismology (PHIVOLCS) (Dynaslope)

Sensor deployment site: Traces of the right lateral boundary of the moving mass

Involvement of local stakeholders

Given its geography and geology, the Philippines is highly susceptible to landslides, which is one of the most destructive geo-hazards. More than a third of the land area susceptible to landslides are highly populated. Rocks and soil collapse due to the pull of gravity because of several factors—a mountain slope destabilized by groundwater incursions or unchecked deforestation; heavy rainfall leading to flash floods, and earthquakes.

What these areas need is an effective warning system to alert residents if a landslide is imminent, giving them ample time to evacuate to safety. Two PCIEERD-backed projects aim to provide the kind of early warning system that will allow local communities to immediately cope with the onset of landslides: the Development and Deployment of Landslide Sensor and Data Communication System (a.k.a. SENSLOPE) and the Development of Site-specific Threshold for Deep-seated Landslides and Slope Failures (a.k.a. DYNASLOPE).

"Senslope is the development of the sensors that will allow for real-time monitoring of ground movement prior to a landslide, and Dynaslope is the development of the models, the warning system, and the community integration and partnership. One is hardware-oriented, the other is logistics," explained Ryan Christopher P. Viado, Project Manager.

Under Senslope, the researchers were able to develop, test, manufacture, and deploy alternative instrumentation and sensor networks for reliable and cost-effective monitoring of landslide-prone areas—those that have weakened and deformed slopes or those that experience excessive rainfall and water seepage. The monitoring equipment consists of a tilt and moisture sensor column which tracks underground movement, a water pressure sensor column used to measure soil moisture at different depths, and a personal computer with wireless capacity for data storage and processing.

Positive laboratory tests led to field-deployment of the sensors, initially in La Trinidad, Benguet. As of 2016 under Dynaslope, a scaled-up model has been deployed to a total of 53 barangays. PHIVOLCS itself has initiatives to further expand the coverage of the project on its own. Prioritized are the sites where landslides are expected to occur in the immediate future, where there is network signal and available electricity to power the system, and where there are households or critical facilities that are exposed to the risk of a deep-seated landslide.

Members of the nearby community will form a local landslide monitoring committee (LLMC) and become the local partners that would validate the research results, as well as secure and maintain the sensor system. They participate in training workshops conducted for one week, per installation. "Usually, the LLMC is manned by the entire barangay council, and some extensions like the *barangay tanod*, and the lot owner where the sensors are installed. Ideally the more people involved, the better—such that when one is not immediately available, another can step in," said Viado.

Everyday, data is collated onsite, and reports are sent for analysis to PHIVOLCS. "The most important part is the community. There's a standard training module [for community integration] and the equipment is pretty much the same," said Viado. "They will be able to see if the movement is advanced, such that when the occasion calls for it, they can immediately warn the other members of the community to take action."

Apart from a few problems with telemetry—some sites are so far-flung that signal boosters are needed, or better yet, a satellite dedicated specifically to transmit the information—the researchers are hopeful that the entire system can be re-configured and made operational anywhere there's an LLMC that can be trained. Already, other countries, such as Nepal, are interested in the technology.

The same equipment can even be used in an urban setting, with different parameters—monitoring the sway of buildings, for example, to provide data for retrofitting for strong earthquakes. "It should be more useful for disaster risk reduction and management officers and planners, so that they will be able to project what investments they can put up, where to set it up that cannot be affected, and also for business continuity," said Viado.

Viado, who saw the aftermath of the 2006 rock avalanche in Brgy. Guinsaugon in St. Bernard, Leyte, said the communities stand to gain the most from an early warning system at their disposal. With protocols in place, the locals don't need to wait on the national government to issue a public advisory. "I went there to Leyte. You can see that the entire village is covered, the slope of the mountain is eroded, and a lot of people died. It just so happened that there was heavy rainfall, and the earthquake was a magnitude 2.0, which contributed to the landslide. It's a complication of the heavy amount of rainfall and the geology," said Viado. "The benefits really are more than the cost itself."

SCENARIO MAPPING

Development of a Customized Local Traffic Simulator (LOCALSIM)

Dr. Hilario Sean O. Palmiano, Director, National Center for Transportation Studies, University of the Philippines-Diliman (UP-NCTS)

LocalSim group

LocalSim team in Davao CIty

Traffic Observation in Davao City

When people call the Metro Manila traffic gridlock "carmaggedon," it only means that a good portion of the 12.877 million residents (according to the 2015 Population Census) have gotten stuck in their cars or spilled over onto the streets, not to mention the daily influx of day trippers from the nearby provinces. A gridlock not only inconveniences everyone, the economic toll of traffic builds up to PHP 3 billion a day, according to the Traffic and Congestion Act pending in Congress. Given the challenges of policing the massive population, local government officials have their hands full—and need all the help they can get to plot their stratagems in managing traffic.

The LOCALSIM project is just one of several solutions under the Intelligent Transport System (ITS) Program of the DOST. It devised a customized simulation software that evaluates and provides simulation scenarios of proposed traffic countermeasures. For example, if there is a proposed U-turn slot, the software can be used to assess its impact through computer simulation, sans implementation, saving time and cost, and minimizing the risks inherent in trial and error. "It will help the traffic aides in decision-making," said Carminda R. Tandelcarmen, co-Project Manager.

Proponents benchmarked LOCALSIM against existent microscopic simulation software. The advantage is that the LOCALSIM software's developmental cost is around PHP 4.5 million only, whereas a basic one-year license for commercial traffic simulation software costs around £1,095 per computer and has to be renewed annually. Added to which, Filipino driving behavior is incorporated into the microsimulation model. "They have factored in the unique behavior of our road users—the drivers, PUV passengers, and pedestrians," said Tandelcarmen.

Verification was done using empirical data collected through BEAMS technology, which allowed automatic collection of data. Among the collected data from which the travel models were derived are optimal U-turn distances from the intersection, control of pedestrian loading/unloading, and design of traffic light signals in intersections with optimal U-turns. Pilot testing was done in a selected corridor of EDSA. Online live simulation is also a function. "They have already completed integration of algorithms to a single LOCALSIM flowchart," said Tandelcarmen.

The project was completed in September 2016. The software was initially presented to the Metro Manila Development Authority (MMDA), and the cities of Iloilo and Davao. Among these three, Davao has expressed interest to adopt the said software.

However, the software requires further R&D that will include the dynamic route, multi-intersection simulation, and inclusion of other Public Utility Vehicles (PUVs). A phase two of the project is being envisioned, once the Davao LGU has formally submitted their letter of intent to collaborate in the project.

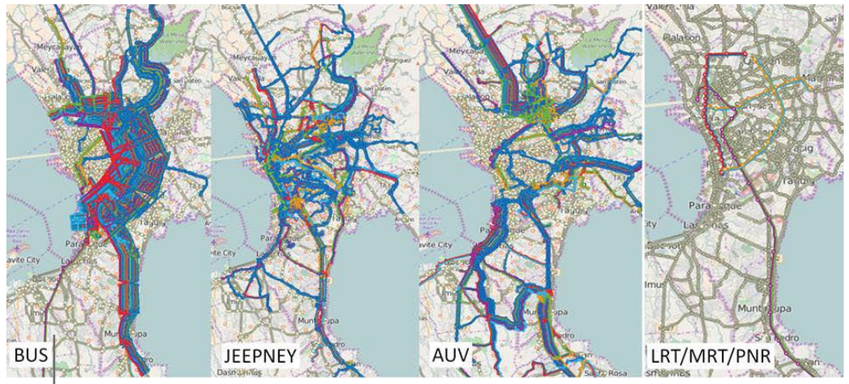
Having the LGUs involved is crucial to the success of the project. "Obviously you will need to do planning, so you model it using LOCALSIM, but after that, the implementation will not only be technological, it will have people involved, the human element," said Dr. Carlos Primo C. David, PCIEERD Executive Director. It is hoped that the partnership will lead to more collaborations for the adoption and real-time use of the technology.

Iloilo presentation with DOST Region 6 Transportation Management and Traffic Regulation Office, and DOST PCIEERD

PUBFIX: TIME-BOUND BUSES

An Integrated and Optimal Scheduling of a Public Transport System in Metro Manila

Dr. Allexis M. Fillone, Civil Engineering Department, De La Salle University-Manila



Public transport routes of buses, jeepneys, AUVs, LRT1/ LRT2/MRT3, and PNR in Metro Manila used in public transport modeling

Perspective view of dynamic traffic assignment (DTA) of Metro Manila vehicular traffic

When it comes to everyday rush hour patterns, the public utility buses (PUBs) have often been blamed for holding up traffic due to their intermittent stops and starts to board or disgorge passengers, with particular rancor toward "overstaying" at certain spots. While blaming traffic solely on the behavior of bus drivers and riders is a debatable topic, there is some merit in finding a more efficient way to manage the flow. PUBFix is an initiative precisely geared toward setting a varying schedule to meet passenger demand based on off-peak and peak hours.

"It is an integrated and optimal scheduling of the public transport system in Metro Manila. They are finding out how many passengers ride or go down at a particular station, what is the capacity of the bus, and how it functions in the overall flow of traffic," said Carminda R. Tandelcarmen, Project Manager.

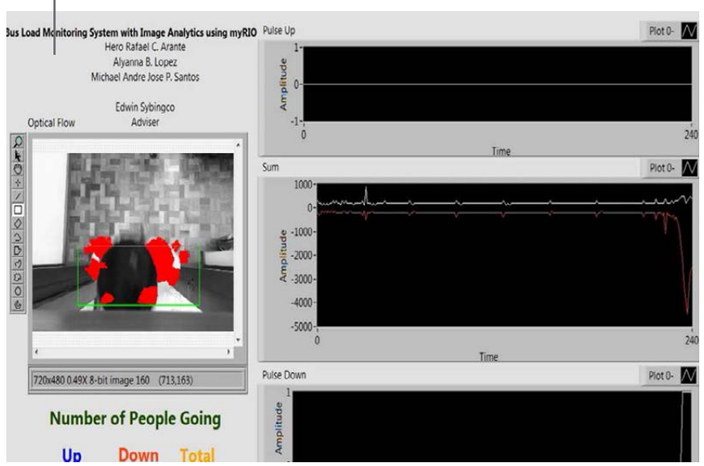
The project, dubbed PUBFix, intends to make an inventory of buses and their routes for optimal scheduling on a daily basis. It will look into whether a fixed schedule for the bus based on the demand or passenger trend will affect estimated revenues, cost of operation, productivity, and impact on the environment.

To this end, they have been collecting data through automatic passenger counting (via BEAMS technology as well as manual count), video-tracking along the routes (for example, one insight is that peak schedules are 7-9 a.m. and 4-6 p.m. along the southbound Kamuning to Cubao, and Ayala Avenue to Buendia routes, with average dwell time being five minutes), congestion pricing modeling for the central business districts, as well as surveys of both drivers and passengers to get a handle on their experiences.

At the end of the project, the proponents will compile a list of public transport systems by route, and their typical service operating characteristics, such as average speed, dwell time at stops, frequency of trips, and load profile or volume, among others. They will also provide a basic computer program on PUB scheduling using MS Excel, with a reference manual in both English and Filipino. Finally, a web-based Public Transport Information System (PTIS) for the existing city bus operations, initially along EDSA, will be developed, which can be accessed by commuters using their computers or hand-held devices.

The proponents are looking at scenario modeling for high-capacity transport systems in Metro Manila within a 10- and 20-year planning horizon. Combined with the integrated bus terminals already being implemented by the government, through the coordination of concerned agencies like the Department of Transport (DOTr), the Metropolitan Manila Development Authority (MMDA), and Land Transportation Office (LTO), it could make a big difference toward decongestion. "If they fix the scheduling, there's a chance that traffic will be solved, especially since they're also looking at walkable areas, and recommending other transport systems," said Tandelcarmen.

Bus passenger counting equipment using image analytics



EUSTDD OVERVIEW

2016 PROJECTS			
PCIEERD-GIA	ONGOING	COMPLETED	NEW
ENERGY	5	0	0
DRRM	4	6	12
TRANSPORT	3	3	5
TOTAL	12	9	17

Products

10
Intelligent Transport Systems (ITS)

16
Disaster Management

2
Energy

Patents

18
Intelligent Transport Systems (ITS)

Publications

31
Intelligent Transport Systems (ITS)

21
Disaster Management

Policies

3
Intelligent Transport Systems (ITS)

7
Disaster Management

S&T TESTING & LABORATORY FACILITIES ESTABLISHED

3
Intelligent Transport Systems (ITS),

2
automotive parts and components related partnerships forged

2 Disaster Management facilities (PSHS, DOST-PAGASA HFDR Station),

33
Disaster Management partnerships

2016 COMPLETED PROJECTS

DISASTER RISK REDUCTION & MANAGEMENT

Title	Start Date	End Date	Monitor	Alt. Monitor
Design and Development of Aerial Mapping and Imaging Systems and Standards	10/1/2012	12/31/2015	Gladys Mae Chavez	Ryan Christoper Viado
Project e-Bayanihan: A Nationwide Web – Mobile Based System for Participatory Disaster Management	2/5/2014	2/4/2016	Ryan Christoper Viado	Gladys Mae Chavez
System to identify, Quantify and Map the Storm Surge Threat to Philippine Coasts	9/1/2013	8/31/2014	Kasfhi Nicole Paticio	Ryan Christoper Viado
Planning Guidelines for Post-Disaster Response and Rehabilitation of Communities and Localities via Supply Chain and Delivery Management, and Risk-Sensitive Environmental Planning. - Project 1	2/16/2015	2/15/2016	Carluz Bautista	Raymundo Habal
Development of Temporary Shelter System for Disaster Stricken Areas	8/15/2014	2/14/2016	Carluz Bautista	Raymundo Habal
Pre-positioning & Allocation of Relief Supplies GIS-Based Support System for Disaster Preparedness & Response	12/1/2014	11/30/2015	Gladys Mae Chavez	Ryan Christoper Viado
Structural System and Construction Methodologies Resilient to Earthquake and Strong Winds - Project 3	2/16/2015	2/15/2016	Carluz Bautista	Raymundo Habal
Regional Disaster Science and Management S&T Capacity Development (Phase II)	9/1/2015	8/31/2016	Ryan Christoper Viado	Carluz Bautista

TRANSPORTATION

ITS 1. Advanced Traffic & Pollution Monitoring and Analysis System Based on GPS Trajectory Data, Air Quality Data and Engine Status Data collected from Taxis in Metro Manila (ATPMS) - Year 1 & 2	11/1/2013	10/31/2015	Rachel Habana	Carminda Tandelcarmen
ITS 2. Development of a Customized Local Traffic Simulator - Year 1 & 2 (LOCALSIM)	4/1/2014	3/31/2016	Rachel Habana	Carminda Tandelcarmen
Project 2. Revitalization of MIRDC's Testing Facility in Support of the Automotive Components and Parts Manufacturing Sector - Year 1 and 2	1/1/2013	12/31/2014	Rachel Habana	Marlon Aguilar

EMERGING TECHNOLOGY DEVELOPMENT DIVISION (ETDD)

They are the prospectors of new science.

The ETDD is always on the lookout for the next big scientific discovery. Its focus is on ensuring that the country is not left behind—that it is, in fact, on par with or even leading in technological advancement. Its core function is to coordinate, evaluate, and monitor R&D programs and projects on emerging technologies, including biotechnology, genomics, material science, electronics, information and communications technology, artificial intelligence, photonics technology, space technology applications, nanotechnology, and data science.

"My most memorable project is the Phil-LIDAR 1 Program implemented by 15 state universities and colleges (SUCs) and higher education institutions (HEIs) to produce flood hazard maps of the 257 river basins in the country... [These] maps can save lives during flood events. Truly a project worth tiring for."

MAY-ROSE B. PARIÑAS
SRS II, ETDD

3D MAPPING OF PHILIPPINE AQUATIC LIFE
Coral Reef Assessment and Visualization Advanced Tools (CRAVAT)

DATA MANAGEMENT MADE EASY
Computing and Archiving Research Environment (CoARE)

BATTLING ARSENIC POISONING
Bench-scale Production of Filters for the Removal of Arsenic from Contaminated Water Using Modified Biopolymer-Silica Nanocomposite Materials

THE PERFECT CATALYST
Development of Functional Nanocarbon-based Catalysts for Biomass Conversion Processes

CONDUCTIVE CARBON INK
Development of Ink Using Carbon from Straight Pyrolysis of Glycerol as Electrodes in Printed Electronics

NEXT-GENERATION BATTERIES
Fabrication of a Solid-State Rechargeable Li-ion Battery using $Li_7La_3Zr_2O_{12}$ as Solid Electrolyte for Energy Storage Applications

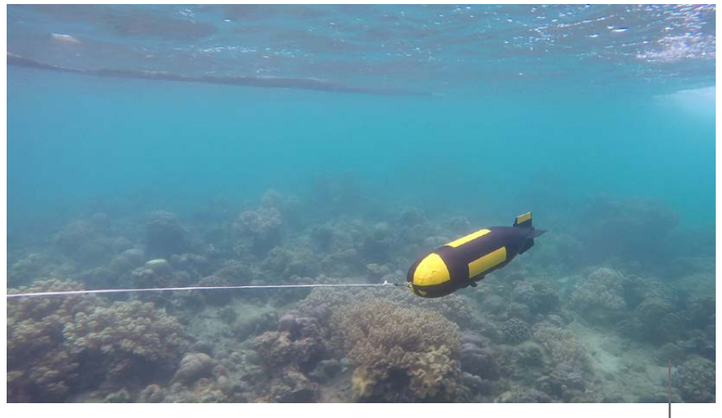
LEARNING BY DOING
Versatile Instrumentation System for Science Education and Research (VISSER)

3D MAPPING OF PHILIPPINE AQUATIC LIFE

Coral Reef Assessment and Visualization Advanced Tools (CRAVAT)

Dr. Maricor N. Soriano, NIP UP Diliman
Dr. Prospero C. Naval, DCS UP Diliman
Engr. Roel John Judilla, MAPUA

Underwater Camera Calibration



Towpedo, the new towable platform which can go up to depths of almost 30m.

The Philippine archipelago consists of 7,641 islands with around 27,000 square kilometers of tropical coral reefs. It is situated squarely in the Coral Triangle and forms the world's center of marine biodiversity, harboring a rich network of coral reef ecosystems. Unfortunately, the United Nations Environment Programme (UNEP) also reports that 97% of these reefs are threatened by destructive fishing methods, boat and anchor damage, and pollution from untreated sewage.

Before any damage is fixed, one has to know what conditions existed to bring about that change. To assist protection efforts, scientists are attempting to map out and provide a baseline inventory of local marine resources. Monitors will then be able to document the overall health of the coral reef systems, track changes that occur, and determine which areas require immediate intervention. Since there is a lot of ocean ground to cover, and minimal manpower and resources to spare for frequent dives, remote monitoring becomes a vital task.

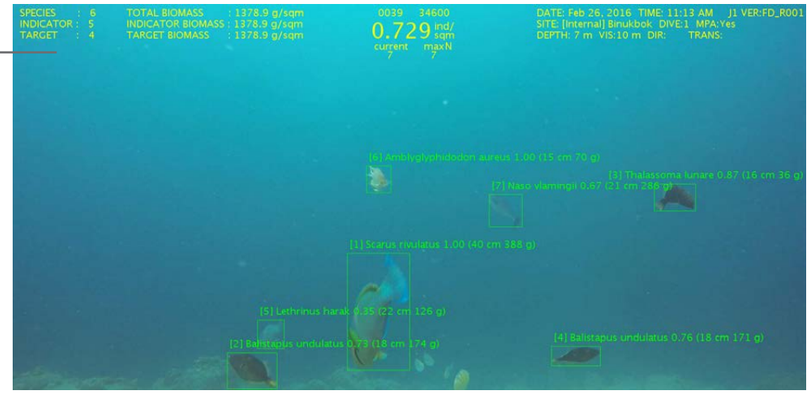
Teardrop Prototype

The DOST-funded CRAVAT program has come up with some of the best and latest tools for coral reef mapping and assessment. Essentially, the second phase of the Automated Rapid Reef Assessment System (ARRAS) program, CRAVAT seeks to further enhance the ARRAS efforts by investigating the relationship of reef bio-architecture, biodiversity, and potential productivity of reef fish. In effect, CRAVAT does away with all the limitations of current reef monitoring practices, and provides permanent visual records of the reef in a rapid manner.

"The scientists produced the technology that they can now hand over to the designated authorities in the area, be it local government units or Bantay Dagat (community-based volunteer organizations that patrol against illegal fishing) who will be the ones monitoring," said Jezzel R. Jao, Project Manager. "It is empowering for the one monitoring."

Adding to the significance of the project, CRAVAT tools were tested in Verde Island Passage (VIP) along Batangas, Marinduque, Occidental Mindoro, Oriental Mindoro, and Romblon. "It is novel; it hasn't been done before," said Jao. Previously, tools had been tested in man-made fish ponds, rather than in a natural strait, much less what is known as "the center of the center of marine shorefish biodiversity."

Screenshot of the FishDrop360 Software for Fish Surve



CRAVAT consists of three successive projects accomplished over two years in collaboration between Mapua Institute of Technology and University of the Philippines Diliman.

Project 1:

FISHDROP360:

Development of Tools for Improved Monitoring of Reef Fish Communities

Project Leader: Dr. Prospero C. Naval, Jr., Department of Computer Science, College of Engineering, UP Diliman

Fishdrop 360 creates 3D maps of coral reefs by incorporating data derived from multi-beam and single-beam cameras. Data-capture includes recognition and estimate of the fish population, species distribution, size, and biomass. Around 182 species of fish were validated in the resulting database. Such mapping allows for the investigation of the reefs' potential productivity and the relationship between bio-architecture and biodiversity.

Project 2:

Teardrop Upgrade

Project Leader: Engr. Roel John Judilla, School of Mechanical Engineering, Mapua Institute of Technology

The prototype Teardrop Video Transecting Tool was upgraded to capture wider swathes and deeper corals (up to a depth of 100 meters) in "natural" lighting. The easier-to-maneuver rig is outfitted with a propulsion mechanism, an array of cameras, underwater lighting, and echo sounders.

Project 3:

Integration of Automated Rapid Reef Assessment System (ARRAS) and CRAVAT tools

Project Leader: Dr. Maricor Soriano, National Institute of Physics, UP Diliman

The integration of ARRAS and CRAVAT tools resulted in faster, deeper, wider, and more detailed 3D mapping, measurement of the surface roughness of coral reefs (rugosity), and measurement of water depth (bathymetry). The inclusion of the "Towpedo," a new banca-towable platform that can go as deep as 30 meters, plus a multi-camera array rig that can be towed across shallow reef flats, further widened scope. A new change detection algorithm can collate a series of images captured at varied times, even years apart, to determine the presence and absence of coral colonies, in specific areas, over time. The result is overlaid, software-stitched, and color-corrected panoramic videos, made richer when viewed through the 3D-capable monitor with 3D glasses.

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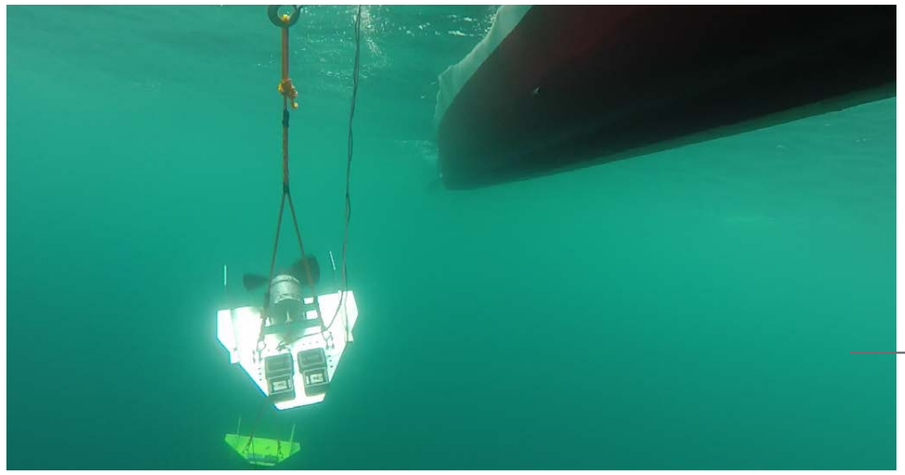


Teardrop prototype

There is an ongoing patent application for ARRAS and CRAVAT technologies. Nevertheless, prior to project completion, the technology was already called in to survey the damage inflicted by a US Navy vessel run aground Tubbataha Reef (damages have since been paid by the US government to be used in reef rehabilitation). CRAVAT has also been presented in conferences and caught the interest of marine scientists, and has gained various other local collaborations.

While commercially available auto-stitching tools would take 780-1,800 seconds to make a composite six-second video clip, CRAVAT cut it down to 32 seconds, inclusive of initialization and parsing. Image quality also improved. "There are more details. Before the visuals were murky, now you can see the real color and actual location," said Jao. "They were able to surpass the objectives they set," she added, noting the combination of algorithms (auto-detection, panoramic auto-stitching, color correction, and change detection), and the immediate conversion of single-camera videos into viewable 3D videos. Thus, CRAVAT is able to create a reef album—a convenient visualization of collections of stitched images of a reef, with a map inset, scale bars, and capture information.

A reef atlas covering more than 1,000 kilometers of coastal coral reefs around the VIP is also being mapped out by the CRAVAT team, in collaboration with the DOST-National Assessment of Coral Reef Environment (NACRE), which shares the goal of surveying reefs nationwide to better understand how to preserve their health. CRAVAT will be disseminating several reef atlases tailor-fit to target audiences—whether reef experts, students, tourists, or government agencies like the National Mapping and Resource Information Authority (NAMRIA). "You have on-hand factual evidence that you can promote to neighboring countries for tourism," said Jao, adding, "Well-presented information for specific audiences would impact them in the long run—it also has a long-term effect in the next generation."

Coral reefs serve as nurseries for fish and a haven for phytoplankton and algae—the sort of rich biodiversity that attracts tourists, and provides an alternative or additional source of income to poor coastal communities. The World Wildlife Fund (WWF) noted that if properly managed, coral reefs could yield around 15 tons of fish and other seafood, per square kilometer, annually.

Another boon for coastal dwellers is that reefs also protect the coastline by breaking the power of waves during typhoons and storm surges. In a disaster-prone country like the Philippines, preserving coral reefs becomes doubly important. "Marine biodiversity is dynamic, but you can monitor whether it has gone or the health of the area is affected, and perhaps you could regulate fishing—and tourism activity—so as not to abuse the area," said Jao.

DATA MANAGEMENT MADE EASY

Computing and Archiving Research Environment (CoARE)

Engr. Rene C. Mendoza, Chief, Knowledge Management Division, Advanced Science and Technology Institute (ASTI)

Today's computing technology allows users to store and process large sets of data. This can then be quickly analyzed or served as input data to scientific models to gain understanding of patterns and correlations. Subsequently, these insights will contribute to scientific knowledge or be used to make strategic decisions in solving problems.

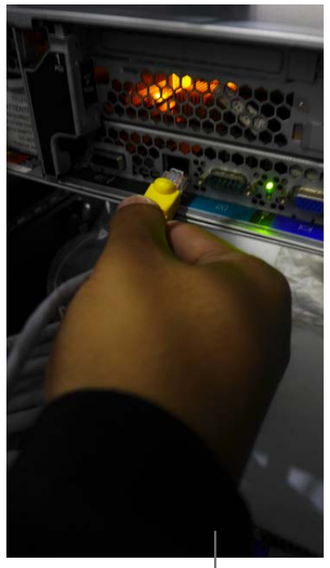
In 2008, DOST-ASTI launched the Philippine e-Science Grid (PSciGrid) Program, which set up the first grid and high performance computing (HPC) facility intended for the science community. In 2014, the CoARE Project was established to upgrade and expand the facility in support of high-impact research like disaster research, bioinformatics, and genomics which use large data sets. Essentially, the CoARE enables multiple data integration from various data sources, and offers HPC, storage and cloud services to provide users a platform for easy storage, analysis and sharing of data gathered from their respective researches. It also supports collaborative projects with other agencies that have high requirements for data storage, HPC and cloud computing.

DOST-ASTI has set up a multiple-site environment to ensure reliability of CoARE services, as well as security of data, by having replica sites. These can also be used as back-up sites intended for disaster recovery and business continuity measures.

ASTI systems administrators installing and configuring servers, and laying out cables

Storage servers and repository facility used by Project NOAH

One of the network switches inside the ASTI HPC facility

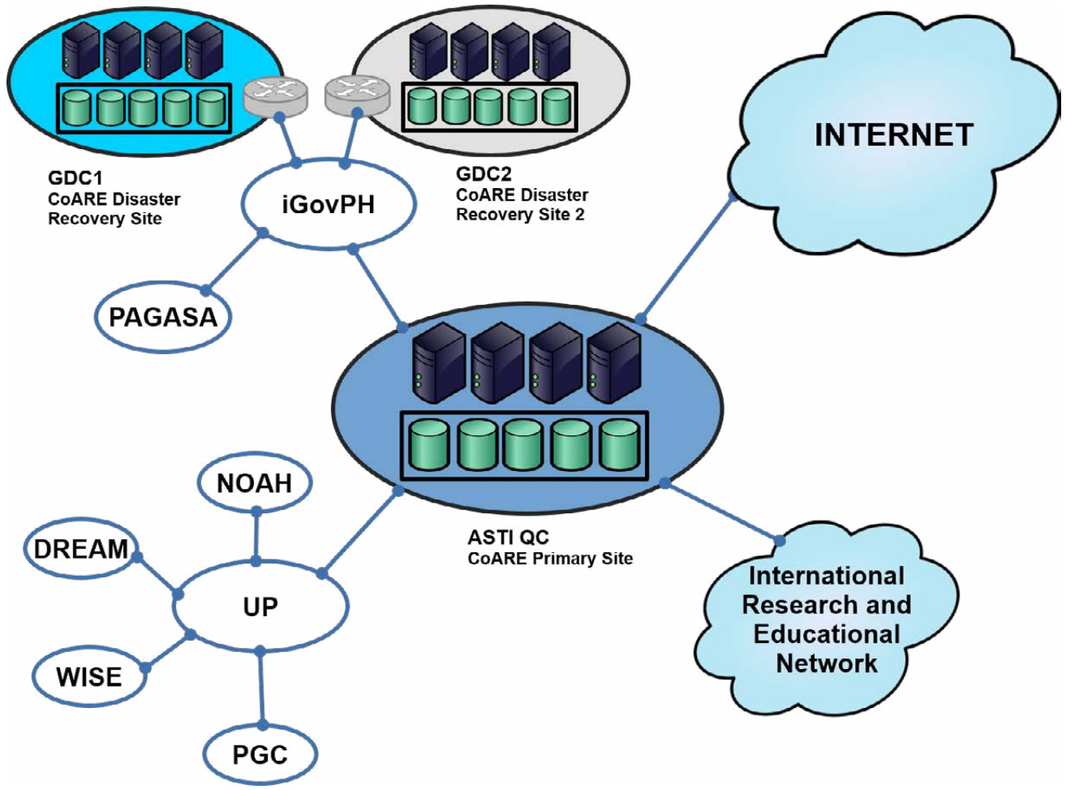


Computing and storage equipment in the CoARE facility procured and setup through DOST-GIA funding

Blade servers at the ASTI HPC facility, used for computing

	SCIENCE CLOUD	iRODS (Integrated Rule-Oriented Data System)	HPC (High-Performance Computing)
Function	Website hosting; file storage and sharing; file backup; cloud computing; cloud database; cloud-based email services; test and development	Repository for large amount of environmental and geospatial data; archiving for HPC and CoARE facility users	Data storage and analysis; data processing using various applications; performing large-scale calculations; simulations; visualization of complex data
No. of users (as of mid-Dec. 2016)	66	8	74
Default allocation per user	2 cores or 4GB	Storage space will depend on the need of the user	240 cores
Areas of Study	Environmental Science, Traffic, Bioinformatics, Weather and Climate Modeling/Disaster Management, Environmental Monitoring (Air Quality) and Education, Genomics, Disease	Environmental Science, Traffic, Bioinformatics, Weather and Climate Modeling/Disaster Management, Environmental Monitoring (Air Quality) and Education, Genomics, Disease	Bioinformatics, Storm Surge Modeling, Computational Biochemistry, Computational Chemistry, Statistics, Protein Structure Prediction, Membrane Computing, Bioinspired Computing, Genomics, Astrophysics, Astrobiology, Molecular Dynamics, Molecular Dynamics Simulation, Weather and Climate Modeling/Disaster Management, Marine Science, Environmental Science, Meteorology

Inside the PMDC (Portable Modular Data Center), which also serves as the CoARE Facility



Network connectivity showing how the CoARE is connected to: (1) research/academic community (focusing on the NOAH Projects and DOST-PAGASA) (2) iGovPhil (where we will setup redundant sites in the two national data centers) (3) international research and education networks (APAN, TEIN, Internet 2) and (4) Commercial Internet

Users of the facility include members of the academe, research institutes, and government agencies. The CoARE facility hosts some significant data sets, resulting in full-blown collaborations with the proponents of these data. One of these is the 3,000 Rice Genome (3KRG) Project of the International Rice Research Institute (IRRI). The CoARE currently hosts 130 terabytes of public rice genomic database, which is a significant resource for understanding natural genetic variation in rice, and for large-scale discovery of new rice genes. It also holds the data gathered from the nearly 1,800 automated weather sensors deployed by the ASTI nationwide. These data are used by the Nationwide Operational Assessment of Hazards (NOAH) project in weather simulation models which they release for the public. The DOST's Philippine Atmospheric, Geophysical and Astronomical Services Administration (DOST-PAGASA) also uses the facility for numerical and weather modeling.

The DOST-ASTI itself is running an Operational Weather Research and Forecasting (WRF) Model on the facility. This is a numerical weather prediction system used for atmospheric research and operational forecasting. Enabling Operational WRF over the CoARE allowed the automation of NOAH-WISE's weather forecast. A set of raw output is produced every six hours and is uploaded on iRODS (a component of storage repository).

The DOST-ASTI, through the CoARE, will continue to support high-impact research applications not only on disaster management, bioinformatics and genomics, but would also expand to various domain areas.

BATTLING ARSENIC POISONING

Bench-scale Production of Filters for the Removal of Arsenic from Contaminated Water Using Modified Biopolymer-Silica Nanocomposite Materials

Dr. Milagros M. Peralta, Institute of Chemistry, College of Arts and Sciences, UPLB

Nanostructured silica beads developed from rice hulls compatible for point-of-entry devices for efficient removal of arsenic from contaminated water.

Arsenic poisoning has been observed in Bangladesh since the early 1990s, as well as in other Asian countries such as Taiwan, China, Vietnam, Cambodia, and Thailand. There are numerous researches on arsenic removal but still, millions of people are afflicted due to exposure to contaminated groundwater. Arsenic is widely distributed in the earth's crust and is leached from rocks and minerals most especially in areas near volcanoes and hot springs. It is considered a global problem.

"Currently there are no definite data on occurrence and prevalence of arsenic poisoning in the Philippines, but there are reported cases in the provinces" said Erika Lorraine C. Gaw, Project Manager. To address this, former President Benigno Simeon Aquino III issued Administrative Order no. 47 s. 2015 creating an inter-agency task force on arsenic risk reduction and management. While arsenic, the twentieth most abundant element in the earth's crust, is already present in its bound form in soil and rocks, exposure can also be from human activities such as mining, metal smelting, fossil fuels conversion, incineration, and even irrigation. Before the awareness of the global problem in arsenic, it has also been used as pesticides, herbicides, and as a component in nutritional supplements for pigs and poultry.

Arsenic commonly occurs as As+5 (arsenate) or As+3 (arsenite). "Both are detrimental to health, especially as it accumulates in the body. One may have been long exposed without knowing and feeling the effects," Gaw said. Acute arsenic poisoning can lead to nausea, vomiting, abdominal pain, and diarrhea. Long-term accumulation of arsenic in the body can eventually lead to skin lesions, neuropathy, cardiovascular and lung diseases, and cancer.

Being odorless and tasteless, arsenic is hard to detect in drinking water. Finding a way to remove arsenic from contaminated water to make it fit for human consumption thus becomes imperative. The UPLB team turned to nanotechnology in their search for solutions and developed a process by which rice hull nanosilica can be transformed into beads that can be used as filter material. "With this, an agricultural waste by-product, rice hulls, is used to produce a higher-value product," said Gaw.

The team collected water samples from different areas: Meycauyan and Marilao in Bulacan; Talisay, Batangas; and Pansol and Los Baños in Laguna. Routine analysis—via differential pulse anodic stripping voltammetry (DPASV), as well as Inductively Coupled Plasma-Optical Emission Spectometry (ICP-AES analysis)—measured the arsenic levels and confirmed the effectiveness of the nanosilica beads as filter materials. Depending on the initial concentration, water treatment in standing mode (versus running water mode) took an average of 4 to 6 hours to achieve 92% to 97% arsenic removal.

"The iron-modified nanosilica absorbs the arsenic. In a water station, you can use this filter material, and insert it along one of the purification steps in the pipe line. With this, you can easily remove arsenic without extensive resource modification," said Gaw. Meanwhile, an easy and accessible option for the consumer would be a pitcher with a modified filtration block. "You turn on the water source and the arsenic is removed as the water flows from the filter material. Or in standing mode, you immerse your filter in water, and after some time, you can already drink the water," she added.

Bench-scale research work has been completed and discussions with the Los Baños Water Purifiers Association are ongoing for the possibility of pilot testing the developed product with a water-refilling station in Laguna. The project offers a cost-efficient and effective means of removing arsenic that ensures the health safety of the drinking public.

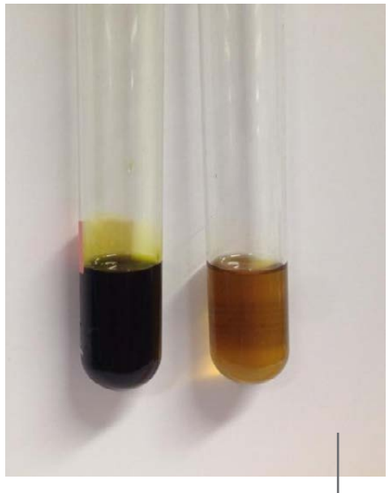
THE PERFECT CATALYST

Development of Functional Nanocarbon-based Catalysts for Biomass Conversion Processes

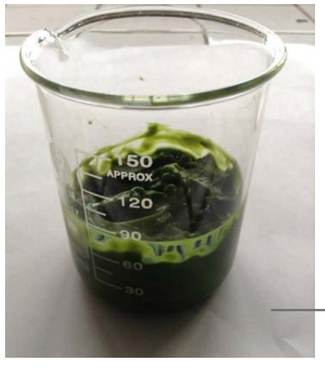
Dr. Joseph L. Auresenia, Chemical Engineering Department, De La Salle University

Transesterification Setup B

Transesterification Setup A



Kakawate oil (left) and Kenaf oil (right)



Microalgae

Science does not exist in a vacuum, it flourishes in an enabling, collaborative environment. Case in point: the Japan-Thailand-Philippines Joint Research Project in the field of functional materials, within the framework of the e-Asia Joint Research Program (e-ASIA JRP).

The objective of the joint project is to develop functionalized carbon-based catalysts for biomass conversion according to each country's expertise—functionalized graphene for the Japan team; functionalized hydrothermal nanocarbons for the Thailand team; and functionalized carbon nanotubes for the Philippine team. "It is collaborative; they share findings to determine the most suitable technologies and methods, but they work independently. They share best practices," explained Diana Jimenez-Leomo, Project Manager.

For the Philippine team, they created catalysts in the form of functional carbon nanotubes (CNTs) via microwave-enhanced chemical vapor deposition. The CNTs were then successfully modified using sulfonate and amide groups. "It is one whole system—that's the beauty of it. The first microwave-assisted pyrolysis extracts the gas that will be your source of carbon, and this flows into the next microwave-assisted process where you create your CNTs," said Jimenez-Leomo.

MAP-MPECVD

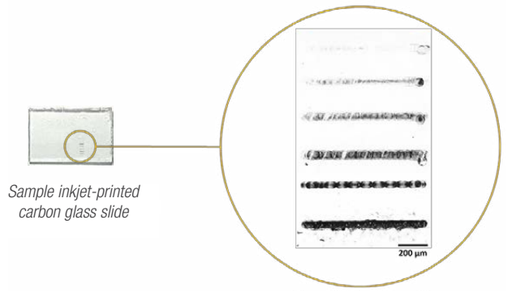
Commercially available CNT can be expensive, but this is a very friendly and safe process that can be easily replicated, noted Marietta M. Valdez, Project Manager. The chemically modified carbon-based functional materials were applied as catalysts to bio-feedstock and used to create biofuel. "It is value-adding to materials that would otherwise be considered as waste. They used microalgae, and non-edible kenaf seeds as well as kakawate seeds, as bio-feedstock, and it resulted in 80% yield," she said. It is very cost-efficient considering that these are rarely used materials that are quite common to the Southeast Asian region. Further, it opens up other possibilities for research and development. "While there's a clamor for biodiesel production, what this joint experiment showed is the potential of the process being developed, which can be used for the extraction of useful proteins, or useful chemicals from medicinal plants. This is about biomass conversion; however, the primary output is the technology, not the specific product; because whoever adopts the technology will be able to dictate what they will produce," explained Jimenez-Leomo. Targeted beneficiaries would be energy and pharmaceuticals companies.

Actual Supercritical Fluid Extractor

CONDUCTIVE CARBON INK

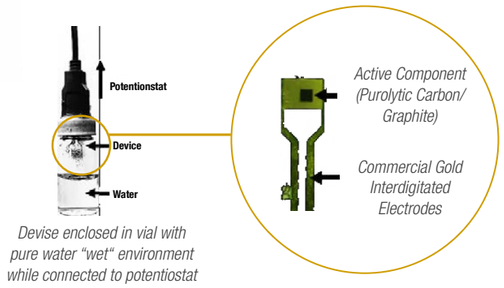
Development of Ink Using Carbon from Straight Pyrolysis of Glycerol as Electrodes in Printed Electronics

Dr. Erwin P. Enriquez, Department of Chemistry, School of Science and Engineering, Ateneo de Manila University



Sample inkjet-printed carbon glass slide

Zoomed micro-image of inkject carbon wires



Devise enclosed in vial with pure water "wet" environment while connected to potentiostat

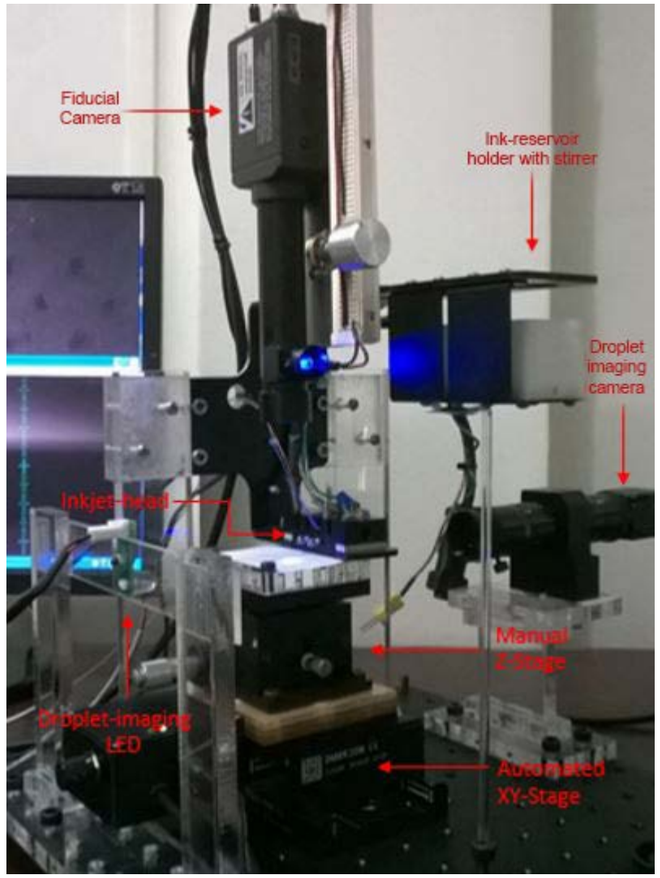
Sample inkjet-printed silver on glass slide

Sample inkjet-printed carbon-based resistor

Zoomed-in microscope image of printed carbon-based resistor

Printed electronics is now responsible for the evolution of gadgetry into affordable and flexible devices. It has also given birth to a lot of creative and flexible functions, where the inks used in the fabrication of the devices transform ordinary objects into touch pads, or sensors, and allow them to interact with their environment. Here, the inks play an important role in applications including printed resistors, circuitry, membrane switches, bioelectronics sensors, and the like. The catch? Presently, metallic inks, for example, even the ones that use a mere fleck of silver, gold, or indium oxide, tend to be still costly especially for large area applications.

This is where carbon-based inks come in, as they become more accessible and can provide highly effective substitutes for precious metals. What is interesting about this PCIEERD-funded project is that it has developed an ink formulation using carbon from pyrolyzed glycerol as a main component. "Glycerol is a low-cost byproduct of the local coco-biodiesel industry, its crude form contains many impurities so the industry has not much use for it. In the Philippines alone, roughly 60 million liters of crude glycerol is produced annually, so with this massive stock the team of Dr. Erwin Enriquez studied the potential of glycerol as source for carbon," said Erika Lorraine C. Gaw, Project Manager. "The target is to develop the locally produced carbon as ink for printed electronics, as alternative for the other expensive ink formulations based on silver, gold or other precious metals such as indium, or other expensive types of carbon such as the carbon nanotubes."



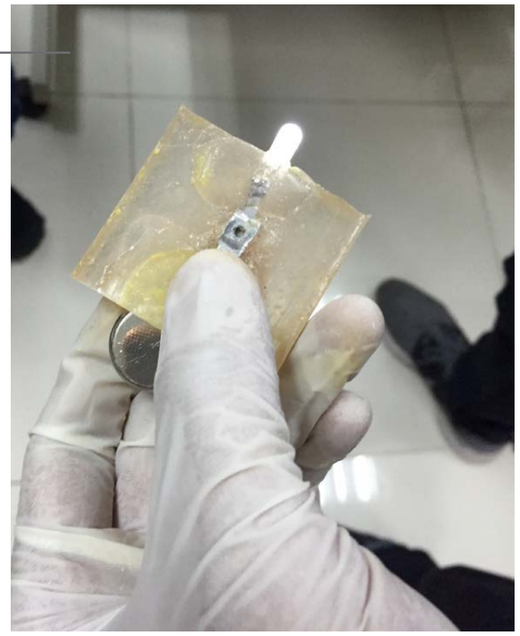
The team has applied for a patent for the process of producing carbon from low molecular weight poly-alcohols such as glycerol, which easily vaporize upon heating and are not readily carbonized by heat. In this novel method, glycerol has been directly converted to high-grade carbon, including activated carbon, with high yields. "Using an inkjet printer, the carbon ink can be printed as thin wires or as patterns for electronic devices. The carbon-based prototype products developed in this project were resistors and electrodes for supercapacitor devices, and a prototype gas sensor using a pyrolyzed carbon-graphene composite was also demonstrated." said Gaw.

One practical application for the innovation is the use of these carbon electrodes as water activity sensor—water activity is a measure of available water in agricultural products and is correlated with a measure of propensity for microbial growth, and hence is an important quality assurance parameter. "The more water available, the more likely that microbes will grow leading to its spoilage" explained Gaw. "There are commercially available water activity meters, but they are expensive. One output of this project addressed the need for an affordable water activity sensor which can be developed further into an affordable tool for the agricultural process industry in the succeeding phases of research" she added.

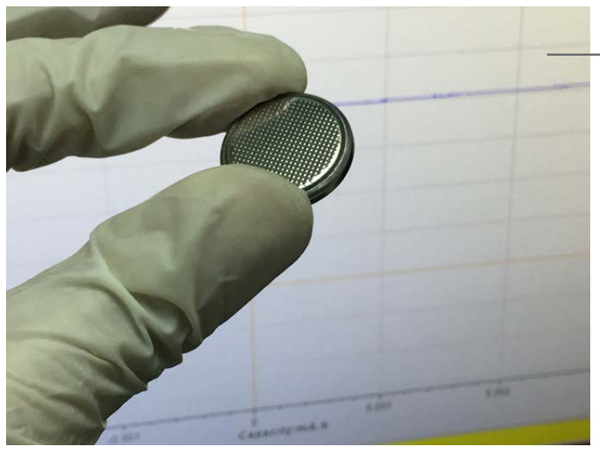
NEXT-GENERATION BATTERIES

Fabrication of a Solid-State Rechargeable Li-ion Battery using $Li_7La_3Zr_2O_{12}$ as Solid Electrolyte for Energy Storage Applications

Dr. Rinlee Butch M. Cervera, Department of Mining, Metallurgical, and Materials Engineering, University of the Philippines Diliman



Light-emitting diode powered by a single coin cell



Coin cell with Ga-doped LLZ solid electrolyte

In a digital world, the hottest commodity is undoubtedly a powerfully efficient rechargeable battery that allows ubiquitous gadgetry, not to mention electric and hybrid vehicles, to run longer. The smaller these batteries are, the better. Scientists are currently at work to find the latest innovation, and they believe they've found it in solid-state rechargeable batteries.

Solid-state batteries are thus named because they use solid electrolytes (SE) to manage the flow of ions, instead of the organic liquid or gel-like electrolytes currently used by present-day lithium ion batteries that are more likely to short-circuit, burn, or at worst, explode due to flammable electrolytes. SE batteries are expected to be safer and able to retain charge for longer periods, while being less bulky.

"Here, they are using lithium lanthanum zirconia synthesized through solid state reaction," said Marietta Valdez, Project Manager. This is done by using LiOH, Li_2CO_3, ZrO_2, and La_2O_3 powders as raw materials, sintering the resulting LLZ powder, and molding it into a pellet. In the two-year project duration, $Li_7La_3Zr_{2O12}$-based SE was successfully synthesized to achieve the target conductivity of >$2x10^{-4}$ S/cm. Using a novel fabrication method for cell assembly, the SE was sandwiched between a cathode and an anode to make a full coin cell battery.

Preparation of demonstration setup by molding the light-emitting diode in polymer resin and providing a slot for the coin cell

The best performance of the coin cell battery revealed a cathode specific capacity of about 140 mAh/g, which was comparable to that of a commercial battery using pure liquid electrolyte. Further, the battery retained its good coloumbic efficiency even after 50 cycles of charge and discharge. "It can power a common white light-emitting diode," said Valdez. If stacked, this battery can produce higher capacities for specific applications such as for portable electronic devices.

While the battery is not yet consumer-ready, and it may be premature to ask companies to switch production from liquid-state to solid-state batteries, the fact that there is proof of concept for the technology and it is already available locally for anyone who cares to use it, is promising. "It's a solution to a problem," pointed out Diana Jimenez-Leomo, Project Manager.

LEARNING BY DOING

Versatile Instrumentation System for Science Education and Research (VISSER)

Dr. Giovanni A. Tapang, National Institute of Physics, University of the Philippines Diliman

High school students perform an environmental science experiment using VISSER handheld device

VISSER different experimental setups for chemistry, biology, physics, environmental science and engineering experiments

First year college students from UP Mindanao analyze results from a physics experiment using the VISSER handheld device and set-up

How do you put modern science laboratories in every school in the Philippines? You can start with a handheld gadget like the VISSER or Versatile Instrumentation System for Science Education and Research. "It's meant to help laboratories of schools in doing science experiments. There are several experiments that the device will cater to in the fields of biology, chemistry, engineering, science, and physics," said Janina Catrina H. Fuentes, Project Manager.

The system is centered on a handheld microcontroller-based universal platform. The handheld device serves as a "brain," and various sensors can be connected to it and controlled to perform various scientific experiments. The hardware and software are supplemented by well-written, highly descriptive, inquiry-based laboratory manuals that facilitate individual learning. Software, which includes control, data storage, and analysis tools, were developed using an open source environment.

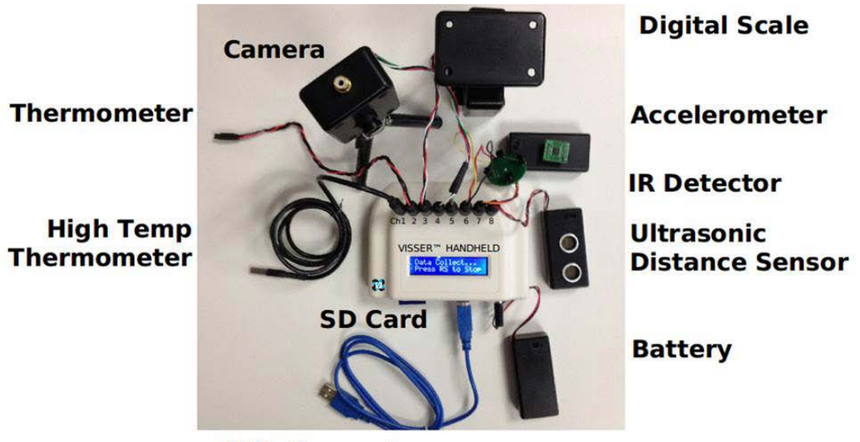
The VISSER is really designed to provide a homegrown alternative to commercially available educational modules, at roughly 1/10th or 1/100th of their asking price. For example, a simple experimental setup to measure the acceleration of gravity using a Spark Learning System by Pasco could cost PHP 44,500 (at current conversion rates), but the same experiment can be performed on the VISSER platform for under PHP 4,500.

Initially, 60 handheld devices were produced and deployed to 10 Philippine Science High Schools nationwide. Pilot testing of the modules was conducted among 200 students from both public and private secondary schools, with a small percentage of tertiary level students. Positive feedback has led to the Department of Education (DepEd) ordering an initial batch of 3,000 units for deployment. Potential partners in the private sector have also been identified.

The advantage is that instead of fully assembled, individualized custom-made modules, VISSER uses generic probes that can be adapted for different applications. For example, the same ultrasonic distance sensor can be used to study several topics: acceleration due to gravity, harmonic motion of spring-mass system, harmonic motion of a pendulum, speed of sound, principles of echolocation, and moment of inertia, among others. The addition of a second distance sensor makes it possible to study the physics of momentum conservation and energy, as well as the interference of acoustic waves. VISSER can actually accept eight different sensors that can collect data at the rate of 56,000 times per second.

Very little supervision is needed, as the students can easily learn on their own. Moreover, the VISSER rejects "canned" experiments in which the students use pre-constructed apparatus and obtain predetermined data. Instead, VISSER trains the students to make the appropriate connections and be involved in the actual experimental design. Given that not all the schools are equipped with the requisite laboratory equipment, with the VISSER, students have a single, powerful tool that enables them to perform most of the same functions—much more independently.

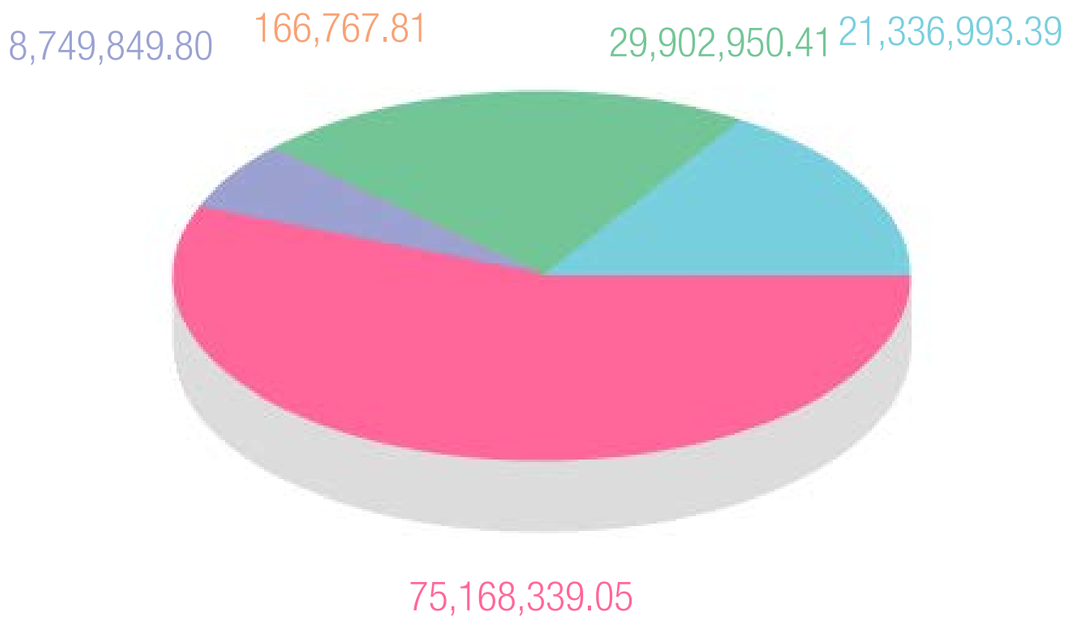
"It is better if the students would have firsthand experience in doing the experiment and getting the information. With this gadget, it would be much easier for them," explained Fuentes, noting that this has made a huge impact on students' learning abilities. "Students who engaged in hands-on activity every day or once a week scored significantly higher on standardized test on science achievements," she noted.



ETDD OVERVIEW

2016 PROJECTS			
FUNDING	COMPLETED	ONGOING	NEW
PCIEERD-GIA	10	55	0
DOST-GIA	15	17	17
Subtotal	25	72	17
TOTAL	114		

PCIEERD GIA
PHP 135,354,900.46



Products (PCIEERD-GIA)

7 Advanced Materials

3 Electronics

9 ICT

14 Nanotechnology

Publications (PCIEERD-GIA)

16 Advanced Materials

10 Electronics

18 ICT

5 Nanotechnology

Patents (PCIEERD-GIA)

3 Advanced Materials

Space Technology Applications (DOST-GIA)

357 Products

65 Patents

29 Scopus or ISI Indexed &

128 non-ISI

666 trained: **514** BS, **174** MS, **65** PhD

18 Partnerships

3 Policies

LEGEND:

16 % Nanotechnology

22 % ICT

0 % Electronics

6 % Optics-Photonics

56 % Advanced Materials

2016 COMPLETED PROJECTS

SPACE TECHNOLOGY APPLICATIONS

Title	Start Date	End Date	Monitor	Alt. Monitor
Nationwide Disaster Risk Exposure Assessment for Mitigation (DREAM) Program	12/28/2011	5/31/2016	Clarinda Reyes	Mary Joy Buitre
DREAM Project 1. LIDAR and SAR Data Acquisition	12/20/2011	12/19/2013	Clarinda Reyes	Mary Joy Buitre
DREAM Project 2. LIDAR and SAR Data Calibration and Validation	12/20/2011	12/19/2013	Clarinda Reyes	Mary Joy Buitre
DREAM Project 3. Extracting Digital Elevation Models and Salient Features for Flood Modelling	12/20/2011	12/19/2013	Clarinda Reyes	Mary Joy Buitre
DREAM Project 4. Integrating High Resolution Digital Elevation Models (DEMs) into GIS-based Flood Modelling	12/20/2011	12/19/2013	Clarinda Reyes	Mary Joy Buitre
DREAM Project 5. Training for LIDAR Data Acquisition and Flood Modeling	12/20/2011	12/19/2013	Clarinda Reyes	Mary Joy Buitre
Drought and Crop Assessment and Forecasting (DCAF)	11/16/2013	11/15/2015	Clarinda Reyes	
Implementing a Satellite-based Monitoring and Assessment of Rehabilitation in Typhoon-effected Regions (SMARTER VISAYAS)	12/13/2013	3/12/2014	Clarinda Reyes	Mary Joy Buitre

ELECTRONICS AND SEMICONDUCTOR INDUSTRIES

Establishment and Operation of Philippine Electronics Product Development Hub	10/1/2012	12/1/2015	Darwin Santos	Janina Catrina Fuentes
Smart Wire Project 4 - Resilient Data Transport	1/1/2014	12/31/2015	Darwin Santos	Janina Catrina Fuentes
Versatile Instrumentation System for Science Education and Research:: Adapting, Testing, and Deployment (VISSER::ATD)	5/11/2015	5/10/2016	Darwin Santos	Janina Catrina H Fuentes

PHOTONICS

CRAVAT Project 2. Teardrop Upgrade	5/15/2014	5/14/2016	Meraida Reyes	Jezzel Jao
CRAVAT Project 3. Integration of ARRAS and CRAVAT Tools	5/15/2014	5/14/2016	Meraida Reyes	Jezzel Jao

MATERIALS SCIENCE/NANOTECHNOLOGY

Title	Start Date	End Date	Monitor	Alt. Monitor
Molecularly Imprinted Polymers (MIPs) for the Targeted Purification of Natural Compound	4/1/2014	3/31/2016	Desiree Vera	Erika Gaw
Development of Ink Using Carbon from Straight Pyrolysis of Glycerol as Electrodes in Printed Electronics	10/1/2014	9/30/2016	Desiree Vera	Erika Gaw
Synthesis of Flexible Nanohybrid Supercapacitor Based on Conducting Polymers and Metal Oxides	1/1/2014	12/31/2015	Desiree Vera	Erika Gaw
UPLB Project 1- Bench-scale production of Filters for the Removal of Arsenic from Contaminated Water Using Modified Biopolymer- Silica Nanocomposite Materials	1/1/2015	12/30/2015	Desiree Vera	Erika Gaw
UPLB Project 2-Bench-scale Production of Nanosensors for the Detection and Analysis of Arsenic in Contaminated Water	1/1/2015	12/30/2015	Desiree Vera	Erika Gaw
UPLB Project 3: Bench-scale Production of Hand-held Nanosensors for Methane Using Zinc Oxide Film	1/1/2015	12/30/2015	Desiree Vera	Erika Gaw
UPLB Project 4: Bench-Scaling of the Production of Cellulosic Nanocrystals from Kawayang-tinik (Bambusa blumeana) and Its Utilization for Renewable Nanomaterials	1/1/2015	12/30/2015	Erika Gaw	Desiree Vera
UPLB Project 5: Production of Nanosilica from Rice Hulls and Rice Hull Ash and Bench Scale Verification of the Production of Biodegradable Packaging Using Cassava Starch-RHA Nanosilica	1/1/2015	12/30/2015	Erika Gaw	Desiree Vera
Fabrication of a Solid-State Rechargeable Li-ion Battery Using Li7La3Zr2012 as Solid Electrolyte for Energy Storage Applications	10/1/2014	9/30/2016	Edna Nacianceno	Diana Marie Jimenez

INFORMATION AND COMMUNICATIONS TECHNOLOGY

Development and Deployment of Adaptive, Interactive, SMS-Based Modules for English	1/8/2015	1/7/2016	Dianne Remae San Pedro	Janina Catrina Fuentes
Stealth Assessment of Student Conscientiousness, Cognitive-affective States, and Learning using and Educational Game for Physics	1/8/2015	1/7/2016	Dianne Remae San Pedro	Janina Catrina Fuentes

HUMAN RESOURCES AND INSTITUTION DEVELOPMENT DIVISION (HRIDD)

They build up Filipino expertise and ensure R&D needs are met.

HRIDD ensures that Filipino researchers and scientists get the tools and equipment, as well as the training, whether here or abroad, that they need. Through HRIDD, these grantees are also able to join relevant discourse and disseminate their research outputs in publications or via local and international conferences, fora, and events.

The HRIDD pushes limits by providing the kind of support required to elevate the quality of Filipino R&D and the viability of the existent technology available. They develop and enhance the Filipino scientists' capabilities through immersive experiences, and by leveraging on linkages with experts in the industry, energy, and emerging technology fields.

"I still remember the feeling I had during the deployment of the Diwata-1 from the International Space Station (ISS) last April 27. The moment was very breath-taking... Seeing the Diwata released into space gives a sense of pride, not just of being one of the project managers of the PHL-Microsat Program, but as a Filipino who is very hopeful of all the good things that the country will be reaping soon."

EIDEL QUINN T. EDA
Science Research Specialist II, HRIDD

GITARA NI JUAN IN CONCERT
Gitara ni Juan: Development of Prototype Design and Standardization of the Guitar-making Process for Quality Classical Guitars Using Select Philippine Woods

SMALL VENTURES INTO SPACE
PHL-Microsat Program

NATIONAL SPACE DEVELOPMENT PROGRAM

THE HUMAN RESOURCE DEVELOPMENT PROGRAM (HRDP)

BALIK SCIENTIST

INSTITUTIONAL DEVELOPMENT PROGRAM

GITARA NI JUAN IN CONCERT

Gitara ni Juan: Development of Prototype Design and Standardization of the Guitar-making Process for Quality Classical Guitars Using Select Philippine Woods

Asst. Professor Nathan Manimtim of the University of the Philippines-Diliman College of Music

Students of UP College of Music used the Guitara ni Juan prototypes in playing Danzas de Panama

Guitarist from UP College of Music performs using Guitara ni Juan prototype

On May 12, 2016 a concert was held at the University of the Philippines College of Music to showcase the prototype guitars developed from the Gitara ni Juan project. Surprisingly, the guitars, made mainly from Philippine wood, did justice to the strains of classics such as Filipino composer Nicanor Abelardo's "Fantasie Impromptu," played by music Professor Lester Demetillo and Assistant Professor Nathan Manimtim. The instruments, dubbed Gitara ni Juan, were the product of 18 months of careful study and experimentation with various guitar-making techniques and wood combinations.

The concert repertoire covered everything from beginner's piece "Gentle Maiden" by Steve Marsh, performed by Erwyn Aenas M. Vibal; to chamber pieces such as "Jongo" by Paulo Bellinati, performed guitar by duo Jose Contreras and Regie Sanggo, "Sonata No. 12" by Nicolo Paganini performed by Fred Saclor on guitar and Bernice Go on violin. The performers also explored genres, from the *kundiman* "Sa Ugoy ng Duyan" by Lucio San Pedro and Levi Celerio, both National Artists of the Philippines, as transcribed by Contreras; to modern folk dance suite "Danzas de Panama" by William Still, as arranged by Demetillo; to pop-rock song "Harana" by Eric Yaptangco, popularized by the band Parokya Ni Edgar. The Gitara ni Juan also blended well in the "*Africaine* from Concerto for Classical Guitar and Jazz Piano" by Claude Bolling, perfomed by DOST Undersecretary Dr. Rowena Cristina L. Guevara together with the jazz band.

Atty. Anne Mariae Celeste Vios Jumadla performs "Still Loving You" with Guitarist Solaiman Jamisolamin

Manimtim said they wanted to test the performance of the guitars by covering the full range of the classical guitar: standard classical guitar pieces, solo and duet; different ensembles (with a jazz band composed of piano, double bass and percussion; and with voice, with violin, up to a full 12-piece guitar ensemble); and different genres from different periods of musical styles. Because they also wanted to stress the significance of the guitar in the Philippine setting, they also had a 'jamming' session or a guitar accompanying singing in tribute to what often happens with *barkadas* during inuman sessions. "We wanted our repertoire to be relevant and relatable to our audience members," explained Manimtim.

Moving forward, Manimtim and company intend to study the guitars as they age, used frequently, and exposed to different weather conditions. "The age of maturation of the wood for classical guitars has not been scientifically documented over time…There are only estimates from the luthiers," said Project Researcher Crisron Lucas. They will start tests a year after the date of construction, and will be using new methodologies such as laser vibrometry (non-contact vibration measurements).

DOST Undersecretary Dr. Rowena Cristina L. Guevara joins the Guitara ni Juan team's performance during the concert

SMALL VENTURES INTO SPACE

PHL-Microsat Program

DIWATA -1 brought to the International Space Station via the Orbital ATK Commercial Resupply Services Flight 6 Rocket Release

Philippine and Japanese officials in JAXA watching the release of Diwata-1 into space

ASTI Ground Receiving Station can now download images using X-band.

When it comes to space technology, to "think big," you need to build small. Miniaturization is an essential tactic in space technology, as small satellites(or "smallsats") are being used for near real-time earth observations, security and communications applications, and testing and verification of new technologies in a space environment. "They have a similar function as the bigger satellites—the capability is the same or improved. But it's smaller," noted Eidel Quinn "Quick" T. Eda, Project Manager of the Philippine Microsatellites (PHL-Microsat) program.

The advantages of small sats include being much faster to build, lighter in weight (microsatellites weigh between 10-100 kilograms, whereas nanosatellites can weigh 1-10 kg, and cube satellites no more than 1.33 kg), highly responsive, and cost-efficient compared to conventional satellites with heftier payloads. For academic researchers and governments with stretched resources, smallsats are especially attractive as they offer affordable access to opportunities in space.

The PHL Microsat Program is particularly keen on effectively utilizing microsatellite technology for multispectral, high-precision real-time documentation of the country's environment, particularly for applications such as land use management (i.e. forest, agriculture/crop), aquatic resource assessment (e.g. algal bloom and mangrove health), monitoring, and disaster risk management.

PHIL-MICROSAT PROGRAM PROJECT COMPONENTS

Project 1:

Microsatellite BUS Development

University of the Philippines Electrical and Electronics Engineering Institute (UP EEEI)

* Focuses on the design, development, and testing of the mechanical, electrical, electronic control, and computing systems of the microsatellites. A team of Filipinos "learn by doing" under the supervision of Japanese experts, building up capabilities in developing space missions, microsatellite architecture, sensor development, and space environment testing.

* Sets up research laboratories and integrates courses on microsatellite technology

Project 2:

Ground Receiving Station

Department of Science and Technology-Advanced Science and Technology Institute (DOST-ASTI)

* Takes charge of the ground receiving station for the Philippine Microsatellite housed in Subic Freeport in Zambales

Project 3:

Development of a Data Processing, Archiving, and Distribution Sub-system

University of the Philippines-Training Center for Applied Geodesy and Photogrammetry (UP-TCAGP)

* Designs and develops data processing, archiving, and distribution sub-systems for multiple sensor remote sensing
* Generates products from satellite data with applications for disaster risk reduction, resource mapping, food security, and defense

Project 4:

Calibration and Validation of Remote Sensing Instruments UP-TCAGP

University of the Philippines-Training Center for Applied Geodesy and Photogrammetry (UP-TCAGP)

* Tackles the development of a calibration method to fine-tune the remote sensing instruments, and establish a signature database on Philippine conditions, ensuring quality, consistency, and authority

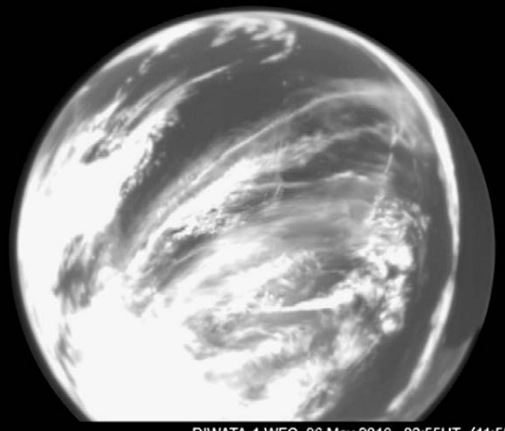
Project 5:

Remote Sensing Product Development

University of the Philippines Institute of Environmental Science and Meteorology (UP IESM)

* Ensures the quality and maximum utilization of microsatellite data, eventually creating high-quality data libraries that can be used to develop products and algorithms

British astronaut Tim Peake, who led the deployment of Diwata-1 into space



DIWATA-1 WFC 06 May 2016, 02:55UT (11:55JST)

Diwata-1 is in its initial testing phase and successfully captured and transmitted images

DIWATA-1 MFC 17 May 2016, 01:15UT (09:15PHT)

THE FIRST FILIPINO SMALLSAT

Diwata-1 successfully launched from the Japanese Experiment Module (JEM) Small Satellite Orbital Deployer (nicknamed “Kibo”) of the International Space Station (ISS) on April 27,2016. It is expected to stay in orbit for 20 months.

The 50-kg Diwata-1 is a Low Earth Orbit (LEO) Satellite, with has an estimated altitude of 400 to 420 kilometers, and a speed of around seven kilometers per second. It is programmed to pass four times a day over the Philippines, spending six minutesto capture 900 images per pass. It can capture up to 3,600 images daily, which it then sends to the ground station at a speed of 2.4 Mbps.The high-resolution images it has been sending home are sharper and more detailed compared to the Landsat 8 Operational Land Imager satellite operated by the National Aeronautics and Space Administration (NASA) of the United States.

AN ENHANCED DIWATA

The second satellite, Diwata-2, is targeted for completion this year and expected to launch in early 2018. “They’re studying the payloads right now—the structure of the microsatellite will depend on the launcher that will be used,” said Eda. “If we could get a higher orbit, or a sun-synchronous orbit, that would be much better. Diwata-1 that has no clearly delineated path, but if Diwata-2 will have its own orbit, it will pass through the same point, there’s a return, which will help in comparative analysis.”

For Diwata-2, they’re also building an engineering and not just a flight model. “They will make a copy of the flight model that the team in Japan will make. The parts will be sourced from Japan, and the local team will assemble. The local version is just for capability-building, it won’t be launched,” explained Eda.

Like its predecessor, Diwata-2 has a high-precision telescope, a space multispectral imager with liquid crystal tunable filter, a middle field camera, and a wide field camera. In addition, Diwata-2 has two new payloads: an enhanced resolution camera (ERC), and an amateur radio. “The ERC is bigger and has a wider scope than the high precision telescope. And while the Diwata-1 has optical payloads only, the Diwata-2 has radio—it can be used for communications during disasters and emergencies, such as when there’s a typhoon and traditional communication lines are cut,” said Eda.

Primarily, Diwata-2 is expected to acquire critical high-resolution images of populated areas stricken by disasters such as, but not limited to, typhoons, earthquakes, volcanic eruptions, fires, and landslides, for evaluation. Thus, it will aid in faster disaster response and appropriate resource allocation. In addition, it will also be used in environmental assessment of forest and aquatic resources and land use management.

PIONEERS OF SPACE TECH

To date, a total of 15 Filipino scholars have been sent to Japan for training, including the first batch of nine scholars assigned to Tohoku University where they developed the baseline technology for Diwata-1, and Hokkaido University where they focused on the payload, thermal design, and bus. Two of these scholars are currently studying cube satellite development at Kyushu Institute of Technology, with the aim of developing two cube satellites. “Later, we will independently create cube satellites, which are smaller than the microsatellite,” said Eda.

Four of the scholars are about to complete their training but will stay on to assist in the building of Diwata-2. There’s also an expectation that they will also create modules and training programs for the UP Diliman Microsatellite Research and Instructional Facility, currently under construction, which will be a training hub for microsatellite technology development and the GRS. These same scholars are encouraged to further develop the country’s fledgling space program, and perhaps, eventually, man the National Space Agency, once it is set up.

NATIONAL SPACE DEVELOPMENT PROGRAM

The National Space Promotion, Awareness, and Capabilities Enhancement (SPACE) Development Program (NSDP), which started in September 2015 through PCIEERD, aims to establish the foundations of Philippine space science and technology activities, prior to the creation of a national space agency.

To date, four bills have been filed in Congress: House Bill (H.B.) 3637 or An Act Establishing the Philippine Space Development and Utilization Policy and Creating the Philippine Space Agency introduced by Cong. Erico Aristotle C. Aumentado and Cong. Seth Frederick P. Jalosjos; H.B. 04275 authored by Cong. John Marvin "Yul Servo" Nieto and Cong. Edward Vera Perez Maceda; H.B. 04367 by Cong. Joey Sarte Salceda and H.B. 04623 by Cong. Maximo B. Rodriguez, Jr.; and two in the Senate: Senate Bill (S.B.) 1211 introduced by Sen. Paolo Benigno "Bam" A. Aquino IV, and S.B. 1259 or the Philippine Space Act authored by Sen. Loren B. Legarda.

"For the Philippines, our eagerness to have our own space agency has gained ground because in the past four years, we saw government's support to our program on space technology applications or STA. This program focuses on addressing the integrity of the environment and climate change adaptation and mitigation, which is one of the five Key Result Areas (KRAs) of the President's Social Contract with the Filipino people," said Dr. Carlos Primo C. David, Executive Director of DOST-PCIEERD, during the plenary session of the 23rd Asia-Pacific Regional Space Agency Forum.

As an interim project, the NSDP was implemented to lay the groundwork for the space agency to ensure that its first few years of operation will be less problematic and more focused on actual implementation. Key development areas are national security and development, hazard management and climate studies, space research and development, space industry capacity building, space education and awareness, and international cooperation.

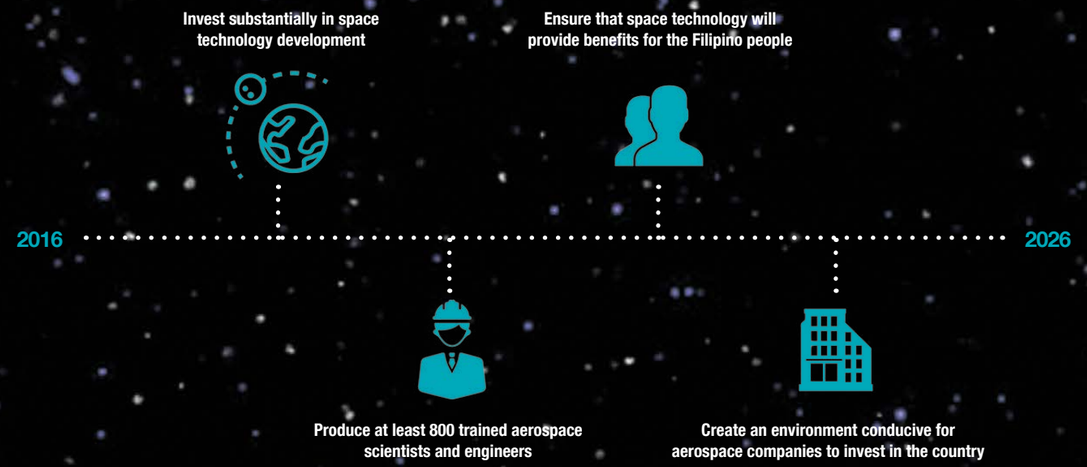
The Philippine Space Agency has a targeted budget of PHP 24 billion. DOST Secretary Fortunato de la Peña said that the national government will be investing PHP 1 billion in 2017 and 2018 toward capacity building and infrastructure development in space science. Subsequently, it plans to allocate PHP 2 billion per year.

PHP 899 million has already been allotted for PHL-Microsat program, which includes the development, testing, and launch of Diwata-1 and -2, and attendant capacity-building for Filipinos through research attachment (RA) or MS and Ph.D. degree programs with partner universities:

PARTICULARS	Tohoku University		Hokkaido University		Kyushu Institute of Technology	Total
	2015	2016	2015	2016	2016	
RA	6	1	3			10*
MS	4**		3	1	1	
Ph.D.		1			1	7

** the same students who undergo MS and Ph.D. in each University*
*** 2 of the scholars discontinued their scholarship at Tohoku University*

Secretary de la Peña mentioned that the long-term goals for the space program are to build up satellite development capability (already off to a rousing start with the PHL-Microsat program) and develop a robust space industry, form strong international linkages and cooperation, and use space technology applications for nation-building (e.g. global navigation systems for industry needs, transportation and health management, and disaster and climate change resiliency).



DOST-PCIEERD HOSTS THE 23RD SESSION OF THE ASIA-PACIFIC REGIONAL SPACE AGENCY FORUM

The DOST-PCIEERD, in partnership with the Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT) and Japan Aerospace Exploration Agency (JAXA), hosted the 23rd Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-23) with the theme "Building a Future through Space Science, Technology and Innovation" on November 15-18, 2016.

APRSAF provides opportunities to discuss regional and international cooperation on space activities, which involves sharing of information on the activities and future plans in the following areas: Space Applications (SA), Space Technology, Space Education (SE), and Space Environment Utilization (SEU).

PCIEERD Executive Director, Carlos Primo C. David delivers his opening remarks during the plenary session of APRSAF-23

Hosting the 23rd Session of APRSAF in Manila allowed the country to showcase its initiatives, and the invaluable contributions of Filipino scientists, engineers, practitioners, and technopreneurs here and abroad.

DOST Secretary Fortunato T. de la Peña, in his keynote speech, gave an update on the country's space development, and itemized satellite requirements for the next 15 years, including a large telecommunications satellite to be completed by 2023.

For his part, Phil-Microsat program leader, Dr. Joel Joseph Marciano, now Acting Director of DOST-Advanced Science and Technology Institute (ASTI), organized a special session on small satellites for innovation featuring

APRSAF-23 posed for a photo opportunity during the plenary session

the country's very own Diwata-1. He was joined by Engr. Raul Sabularse, Deputy Executive Director of DOST-PCIEERD, Prof. Yukihiro Takahashi of Hokkaido University, Dr. Koichi Wakata, Program Manager of JAXA ISS, and Harold Bryan S. Paler, one of the nine engineers of Diwata-1.

Notably, a special session organized by Dr. Enrico C. Paringit, Associate Professor at the Training Center for Applied Geodesy and Photogrammetry of the University of the Philippines Diliman (UP-TCAGP), showcased the space technology applications in mitigating natural disasters. Topics included the Philippine government's disaster risk reduction and management program, space-based agricultural drought management program, Philippines' landslide warning system, the Earth observation (EO) Data-Supply coordination, and the Sentinel Asia 10th Anniversary.

During the weeklong event, various workshops and working group sessions were also held simultaneously. Four APRSAF working group parallel sessions—Space Applications, Space Technology, Space Environment Utilization, and Space Education—were organized to share information about the activities and future plans of each country and region in these respective areas.

Other side initiatives were the Asian Beneficial Collaboration through Kibo (Kibo-ABC) Initiative Workshop, which aims to promote ISS/Kibo utilization and share and build on the outcomes of "Kibo" utilization in the Asia-Pacific region, and the Space Applications for Environment (SAFE) Workshop, which is a voluntary initiative that encourages environmental monitoring in the long term to understand environmental changes. Further, a New Cooperation Session was conducted to explore opportunities for further space-related cooperation through the APRSAF framework.

Water Rocket Event and Can Satellite Competition were also held on November 12-13, co-organized by the DOST-Science Education Institute (SEI) with support from DOST-PCIEERD. The said side events aimed to provide education and training opportunities for young people in space science and technology.

Kibo-ABC Initiative Workshop attendees

SAFE Initiative Workshop attendees

A total of 576 participants from 33 countries and regions, and 10 international organizations in the Asia-Pacific region, attended the largest space-related conference. The delegates mostly came from various space agencies, governmental bodies, international organizations, companies, and research institutes.

In all these, Dr. Rogel Mari Sese, NSDP Project Leader, said that he hopes these types of events will help increase interest in science—especially in space technology and applications in the Philippines—and demonstrate that space is within the reach of the Filipinos, and that the sky is no longer the limit for us. Ultimately, other space developments are looked forward to, especially the creation of the country's own national space agency.

THE PHILIPPINES JOINS ASIAN MICROSATELLITE CONSORTIUM

The Philippines, represented by PCIEERD, has signed the memorandum of understanding forming the Asian Microsatellite Consortium (AMC), which consists of 17 participating institutions, among them space agencies, government institutions, and universities, from nine Asian nations: Bangladesh, Indonesia, Malaysia, Mongolia, Myanmar, Thailand, Vietnam, Japan, and of course, the Philippines.

TThe AMC agreed to standardize satellite bus and sensing technologies, observational data, and data application methodologies. In the future, the consortium is expected to share and utilize data collected by about 50 microsatellites that the participating nations are planning to launch. These microsatellites will form a network that will allow the AMC to monitor any given location on Earth around the clock, therefore making it possible to grasp a variety of situations, including major disasters, should any occur.

The signing ceremony for the consortium was held on November 18 at Hotel Jen in Manila.

PARTICIPATING COUNTRIES AND INSTITUTIONS

BANGLADESH

Bangladesh Space Research & Remote Sensing Organization (SPARRSO)

INDONESIA

Indonesian National Institute of Aeronautics and Space (LAPAN)

Agency for the Assessment and Application of Technology (BPPT)

PHILIPPINES

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

JAPAN

Tohoku University

Hokkaido University

MONGOLIA

National University of Mongolia (NUM)

New Mongol Institute of Technology (NMIT)

German-Mongolian Institute for Resources and Technology (GMIT)

THAILAND

King Mongkut's Institute of Technology Ladkrabang (KMITL)

MALAYSIA

Multimedia University

University of Malaysia Sabah (UMS)

MYANMAR

Myanmar Maritime University

Myanmar Aerospace Engineering University (MAEU)

University of Yangon (UY)

VIETNAM

Vietnam National Satellite Center (VAST-VNSC)

University of Science and Technology of Hanoi (VAST-USTH)

HUMAN RESOURCE DEVELOPMENT PROGRAM (HRDP)

The Filipino's capacity for innovation has to be continuously nurtured, thus PCIEERD set up the Human Resource Development Program in 2010, provide scientists and would-be researchers with the knowledge and skills they will need to conceptualize and undertake scientific projects.

"We focus on the most important resource, the people, because without the right people, there will be no one to do R&D," said Jerica A. Fernes, Program Manager. "When education fails to keep pace with technology, the result is inequality. Without the skills to stay useful as innovations arrive, researchers suffer—and if enough of them fall behind, society starts to fall apart. We need to make sure that our researchers are able to get the proper training to be equipped."

The HRDP is a capability building program which has several components such as: Visiting Expert, Faculty Immersion, Research Attachment, Attendance in Conference/ Seminars/Trainings/Fora/ Workshops and Support for Conduct of Seminars/ Conferences/Trainings. HRDP wants to ensure that the scientists and researchers are able to update what they know and hone their expertise, and at the same time have the opportunity to present their ideas to the scientific community at large.

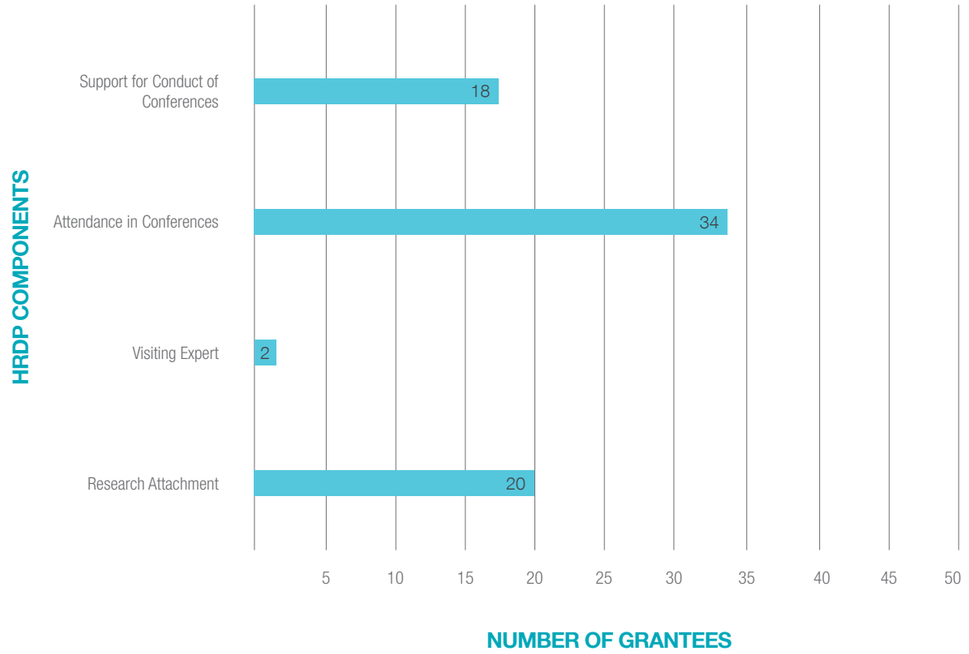
The grants provided by HRDP also make sure that the trainees are able to transfer their knowledge and skills to benefit the society as a whole. "They have a service obligation. They have to be employed here in the Philippines for the duration of the return service. We also want the industry to benefit from their trainings," said Ms. Fernes.

To be approved for a grant, applicants must submit their 6Ps targets. 6Ps stand for: publications, proposals, people trained, patent applied for, proposals to be submitted for funding and presentations made in conferences and other fora. For example, they could commit to publish their paper in a peer-reviewed scientific journal or do a presentation outside their sending institution, within six months to one year upon return.

Fernes stressed that there are measurable gains. "Our researchers, scientists, and engineers have to be fully equipped not only with knowledge in their respective disciplines. They also have to learn skills and the latest developments in the fields they are working on to put the Philippines at par not only with its neighboring countries but also with the rest of the world," said Fernes.

Other measurable outcomes include project proposals stemming from the new competencies; presentation in a conference,product development or patent application; and policies spearheaded. "You can't overlook human resource because it is very important. Training and experience will cost time, effort, and money so we make sure our grants go to the right people, people who can deliver something in return of the investments we have made," said Fernes.

PCIEERD HUMAN RESOURCE DEVELOPMENT PROGRAM (HRDP) GRANTEES



HRDP-SUPPORT FOR CONDUCT OF CONFERENCES

YEAR	RESEARCH ATTACHMENT	VISITING EXPERT	ATTENDANCE IN CONFERENCES	SUPPORT FOR CONDUCT OF CONFERENCE	TOTAL APPROVED	TOTAL RECEIVED
2016	20	2	34	18	74	216

BALIK SCIENTIST

The Department of Science and Technology (DOST) held its second Balik Scientist Program Convention on November 18, 2016 at Hotel Jen, Pasay City. The Balik Scientist Program, established in 1975, invites foreign-based Filipino scientists, researchers, and technologists to return to the country to share their gained expertise and address existing gaps in research and development.

"The program is an initiative of the Philippine government, which encourages Filipino scientists abroad to return to the country to share their expertise, to help accelerate the scientific, agro-industrial, and economic development of the country," said Carol M. Yorobe, DOST Undersecretary for Science and Technology Services.

The three sectoral councils of the DOST, namely the PCIEERD, the Philippine Council for Health Research and Development (PCHRD), and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD), all came together to honor the Balik Scientists, some of whom came all the way from the United States, France, Australia, and Japan.

The expertise of this year's Balik Scientists ranged from emerging technologies, energy, industry, health, agriculture, and aquatic and natural resources. Aside from having conducted lectures, workshops, and seminars, this year's Balik Scientists also published academic papers, assisted in research and development programs, and introduced new technologies.

"We have a growing number of Balik Scientists," said DOST Secretary Fortunato de la Peña, adding that the Balik Scientists can play an important role in promoting rural and value chain development, investing in human capital development, and increasing the country's overall competitiveness.

As of August 2016, a total of 539 Balik Scientists have completed their terms, noted Dr. Reynaldo Ebora, Acting Executive Director of the PCAARRD. Different state and private universities and colleges, non-government and private organizations, and local government units nationwide accommodated the Balik Scientists during their stay in the country.
"Our nation will benefit from the Balik Scientist Program. Thus, we encourage Balik Scientist Program Awardees to spread the word and to promote the program to all foreign-based Filipino scientists. We also encourage the academe to avail the program as host institutions. You may also relay this call to your notable alumni and let us all work together to address the country's long-standing development problems through science, technology, and innovation," concluded Dr. Ebora.

BALIK PUSO. BALIK PILIPINAS. BALIK SCIENTIST.

2016 BALIK SCIENTIST PROGRAM AWARDEES

Sending Institution

Host Institution

DR. GERALD A. GALGANA
Crustal Deformation & Geodetic Engineering

- 14 lectures & seminars conducted
- 1 project implemented on tectonic deformation of SWL and its effect on the horizontal survey controls
- 20 people trained on geodesy in geodynamics
- 2 undergrad & 1 Grad students
- 1 proposal developed to be submitted to PCIEERD for funding
- 4 publications submitted

Sending Institution

Host Institution

DR. MYRNA H. ESTRADA
K-12, Chemistry

- Seminar-Workshop on Pedagogical Approaches to Teaching the Sciences
- Training of STEM Curriculum Material Developers
- Seminar-Workshop on Curriculum Development in STEM Education

Sending Institution

Host Institution

DR. FELIXBURTO A. BUOT
Quantum Physics

- Advanced Research Seminars for M.S and Ph.D. students
- Tutorial Sessions for MS and Ph.D. students
- Computer Program Code Development
- Ph.D. & M.S. Thesis Advising
- Writing and packaging of research proposals on nanodevice transport physics
- Research Manuscripts for Publication

Sending Institution

Host Institution

DR. MYRNA O. NISPEROS
Food Science

- Product development and laboratory experiments & test
  *Standardized edible coating and protocol for each fruit
- Application of hemicellulose-chitosan nanocomposite to mango and banana
- Preparation of papers for application to intellectual property registration
- Preparation of research paper/s for publication in an international refereed journal

2016 BALIK SCIENTIST PROGRAM AWARDEES

Sending Institution

Host Institution

DR. HERNANDO SALAPARE III
Plasma Physics

- Packaged research project proposal/s
- Writing scientific manuscripts for possible submissions to ISI-indexed journals
- Develop a technology roadmap for UP Baguio & Manila that is in line with its thrust to be a center for basic & applied physics (UPB) & Health Physics (UPM) in the Philippines
- Establishment of a plasma physics laboratory for materials processing applications of UP Baguio

Sending Institution

Host Institution

DR. JULIAN F. CACHO
Watershed hydrology, water quality & GIS

- Lectures on agricultural management & low impact development
- Workshop on watershed modeling using the Soil & Water Assessment Tool (SWAT) model
- Packaged proposals on integrated waste managementt for Langihan Wet Market
- Estimating rice water use using surface renewal method
- PCIEERD S&T water environment roadmap, Phil LiDAR 2

Sending Institution

Host Institution

DR. JORGE O. EMMANUEL
Environmental Hazard, Energy Innovation & Chemical Engineering

- 3 sets of solar energy tools
- Complie vulnerability and impact assessment tools and frameworks
- Lectures on solar energy, DRR planning & options
- Consultancy to S&T water environment roadmap

Sending Institution

Host Institution

DR. ABIGAIL P. CID
Chemistry, Environment Oceanography & Limnology

- Lectures on agricultural management & low impact development
- Workshop on watershed modeling using the Soil & Water Assessment Tool (SWAT) model
- packaged proposals on integrated waste managementt for Langihan Wet Market
- Estimating rice water use using surface renewal method
- PCIEERD S&T water environment roadmap, Phil LiDAR 2

2016 BALIK SCIENTIST PROGRAM AWARDEES

Sending Institution

Host Institution

DR. GINNO L. ANDRES
Tribology, ME, Environmental Engineering

- Lectures/seminars in capacitive deionization (cdi) research, tribology, ion adsorption, energy calculation
- Workshop on activated charcoal manufacturing, electrode fabrication
- Write proposal on mechatronic laboratory of ISU

Sending Institution

Host Institution

DR. PHER ERROL B. QUINAY
Computational Earthquake Engineering

- Training on creating virtual city model and input hazard model for analysis using IES-SRA
- Assistance on externally-funded project SeReNe (PHIVOLCS 2016 project)
- Assistance in the preparation of a research grant proposal for improving the damage assessment methodology of PHIVOLCS
- Lectures to undergraduate students and presentations on the current applications of numerical methods to hazard analysis
- Technical assistance on PCIEERD-GIA project "Development of Wireless Sensory Network System for Structural Integrity Monitoring of Bridges

Sending Institution

Host Institution

DR. ROGEMAR S. MAMON
Mathematical Finance and Actuarial Science

- Creation of 3rd/4th level course (Math 190)
- Lecture series and seminar on energy risk management, weather derivatives and climate change adaptation
- Collaborative research with faculty members on disaster risk management and real options approach in technology valuation
- Preparation of research grant
- Mentoring of faculty members

INSTITUTIONAL DEVELOPMENT PROGRAM (IDP)

In line with its mandate of developing and promoting R&D in the country, PCIEERD set up the Institutional Development Program that provides needed equipment and supplies, including HR materials, for the use of researchers, scientists, and academics.

"They want to do R&D, but they can't propose any research just yet because they don't have a laboratory. There is no R&D because there is no equipment. So we provide the IDP grant for them to build that laboratory," explained Dr. Carlos Primo C. David. It usually takes a year for the grantee to build their laboratory or use the seed money for their needs; after which, they start proposing projects to PCIEERD, he added.

David said a dedicated team toured the country in 2016 to look for the best partner-institutions. Part of the criteria, he said, was the "eagerness and willingness" of the university or the agency to engage in research. "There should be an initiative from their end, also. It's much easier for us to say, 'Okay, we're just doubling on the investments already made'."

For 2016, PCIEERD partnered with one government-owned research institute and five academic institutions, most of which are located outside of Metro Manila.

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES (PUP)

PUP College of Engineering Sensors and Mechatronics Laboratory

PHP 4,980,000.00
Twenty four months
06 June 2016 - 05 June 2018

The PUP College of Engineering is one of the premier engineering schools in the Philippines. PUP offers Bachelor of Science in Civil Engineering (BSCE), Computer Engineering (BSCOE), Electronics Engineering (BSECE), Electrical Engineering (BSEE), Industrial Engineering (BSIE), Mechanical Engineering (BSME), and Railway Engineering Management (BSREM). PUP upgraded the standard with the latest revision in the curriculum to match with the industry competency requirements to fulfill the outcomes-based academic development.

Designed to integrate the theories and applications of mechatronics in design and production implementation, the creation the mechanics laboratory laboratory will support the track of CHED towards outcomes-based syllabus. Basic electro-pneumatics and pneumatics training sets, robotics trainers, i-Learning software, a distribution station, and a testing station will be purchased using the grant.
This project will train instructors and students on mechatronics, and the established facility will serve as a training center of PUP branches and campuses, and other state universities and colleges (SUCs). It will greatly benefit the Philippines and serve the best interests of the Filipino people.

SOUTHERN LEYTE STATE UNIVERSITY (SLSU)

Strengthening SLSU's Capability in GIS Technologies in Support of Southern Leyte's Competitiveness and Development

PHP 2,385,000.00
Twenty four months
01 June 2016 – 31 May 2018

The emergence of Geographic Information Systems (GIS) as a versatile tool has recently revolutionized decision-making at all levels of organizations. It cuts across many disciplines and has seen wide applications in education, business, industry, and local government. GIS is a powerful spatial analytical technique that recognizes and leverages the unique location of people, things, and places on Earth.
GIS applications and teaching are especially useful for higher educational institutions (HEIs) such as SLSU. GIS techniques enhance teaching, research, extension, and income generation activities. Furthermore, GIS techniques help in increasing the efficiency of campus management through effective facilities and asset management.

The multifaceted challenges of Southern Leyte is fertile ground for the integration of GIS in many, if not all, of its development initiatives – from project conceptualization and planning to implementation and reporting, and project evaluation. Southern Leyte focuses on three development thrusts: tourism, environment, and agriculture. GIS can evaluate the potentials of a site for tourism (including planningfor developing the tourist site, and even managing the tourism business), classify areas suitable for rubber and abaca growing, manage fish sanctuaries and mariculture, and help develop sustainability programs. GIS is popularly used in broad environment related projects, including hazards management, climate change, and terrestrial and marine biodiversity conservation. Furthermore, GIS has been increasingly used in agriculture, such as site planning, precision farming, irrigation and drainage, and soil mapping.

This project will provide SLSU with appropriate equipment that will be used for the implementation and training of faculty and staff for this innovative technology.

CENTRAL MINDANAO UNIVERSITY (CMU)

Enhancing the Natural Science Research Center Laboratories of CMU

PHP 5,000,000.00
Thirty six months

The proposed infrastructure development of the Natural Science Research Laboratory is part of the plan to strengthen CMU's research capacity. While CMU has laboratories equipped with facilities that can help produce products, further development is necessary to conduct laboratory analysis for food and cosmetics. The abundance of indigenous plants in the area which are possible sources of food, cosmetics, aesthetics, and medicines remain untapped. Some pteridophytes and flowering plants were reported to have different bioactivities including antimicrobial, skin healing, skin smoothening, anti-acne, and protection against aging or UV damage.

The grant will provide appropriate equipment that will enable CMU to achieve the objectives of its research projects on the commercial and health potential of indigenous plants particularly on nutraceuticals and eco-friendly and safe cosmetic products. This could also help CMU researchers in mentoring young researchers and students in natural products to produce quality research outputs.

PHILIPPINE NUCLEAR RESEARCH INSTITUTE (PNRI)

Upgrading the PNRI Neutron Laboratory for Neutron Physics & Dosimetry Research

PHP 11,032,416.00
Twenty four months
01 October 2016 – 30 September 2018

Nuclear technology has invaluable contributions to health care, energy production, and industries worldwide. For our country to fully benefit from it, we must have our own research and development programs to advance our knowledge and expertise in the field. The Philippine Nuclear Research Institute (PNRI) was given the mandate of continuously promoting and advancing nuclear science knowledge and expertise to further develop the many peaceful uses of nuclear technology in the country. In addition, there is a renewed interest of including nuclear power in the energy mix to help address the country's future energy demand.

The PNRI conducts basic training and education in neutron science using radioisotope neutron sources, and some instrumentation are already available. However, the existing laboratory where these activities are performed is small, has inadequate instrumentation, and requires more safety systems. The project will help address these issues by upgrading the laboratory equipment already available and thereby allowing more advanced neutron physics and dosimetry studies.

UNIVERSITY OF SAN JOSE-RECOLETOS (USJ-R)

Establishment of the USJ-R Center for Energy Harvesting Materials Research

PHP 4,778,616.00
Twenty three months
04 January 2016 – 29 December 2017

The USJ-R plans to establish the Center for Materials Research (CMR) to provide extension and research services to the public, industry and academe through materials search, analysis synthesis, prototyping, and the development of the necessary materials processing technologies that would help the academe develop graduates with in-depth understanding of these materials, and also help the industries cut energy cost by utilizing locally designed energy harvesting materials.

This grant will be used to train the capacity of the researchers and develop processes, designs, and applications of energy harvesting materials. It is also geared towards the promotion of materials research and alternative energy technologies.

UNIVERSITY OF THE PHILIPPINES BAGUIO

Establishment of a Plasma Physics Laboratory for Materials Processing Application

PHP 5,000,000.00
Twelve months
01 September 2016 – 31 August 2017

The development and operation of plasma devices in UP Baguio will increase the research output and attract more students to take up the course BS Physics in the future, boosting the current program and promoting the establishment of graduate programs including M.S. and Ph.D. degrees.

Plasma Physics is one of the main fields in Physics that has plenty of applications. One of which is materials science. This project aims to design, build and construct an atmospheric plasma jet system to demonstrate its applicability in materials processing. The equipment that will be acquired will help with the development of plasma physics research and will train several students in plasma characterization and materials science applications.

MATERIAL TRANSFORMATION

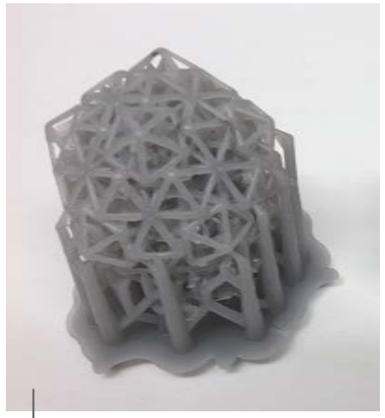
2015 Additive Training Program | Bridging the Human Resource Competency Gaps in Support of the National R&D Agenda Phase 2

Dr. Rigoberto Advincula, Laboratory Head, Advincula Research Group (ARG), Case Western Reserve University-Cleveland, Ohio

Knowledge and skills transfer sometimes involves crossing continents. Three Filipino researchers were sent abroad to train in the field of additive manufacturing or 3D printing under Filipino-American scientist Dr. Rigoberto Advincula, a leading expert in the field of polymers and nanomaterials. Additive manufacturing involves the process of fabricating a part by layer-by-layer assembly of materials with processes such as extrusion, binding, melting, and photopolymerization. It is transforming how we assemble our prototypes and, in the future, how we manufacture our products. “They had the opportunity to train in his lab. Training fees, travel funds, and a living allowance came from PCIEERD,” said Jerica A. Fernes, Project Manager.

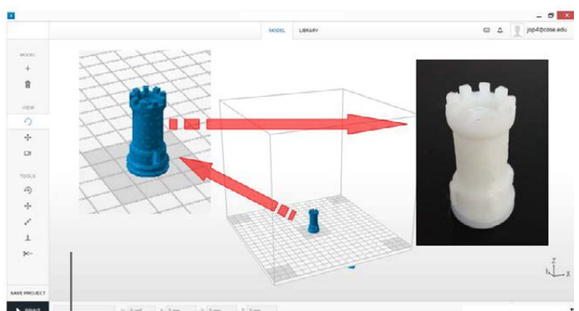
The opportunity was made open to MS/PhD students or degree holders in chemical engineering, materials engineering, mechanical engineering, biomedical engineering, chemistry, and physics. The first batch of successful applicants are Dr. Jerome O. Palaganas of Mapua Institute of Technology (MIT) whose area of study is gadget application aiming to develop a “self-healing polymer”); Napolabel B. Palaganas also of MIT who is focusing on biomedical applications; and Jill Z. Manapat of University of the Philippines Diliman whose interests are on mechanical 3D printing and strengthening 3D-printable parts.

Actual Stereolithography 3D print Specimens



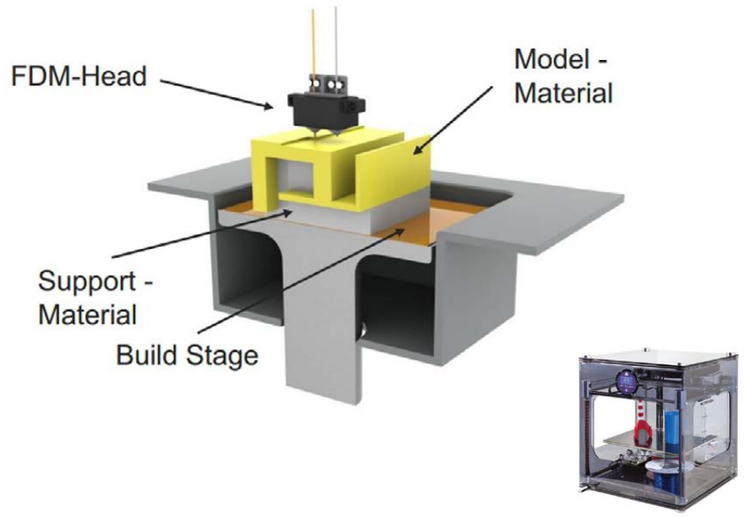
Monolith Polymer

Sample actual Fused Deposition Modeling (FDM)



File conversion to FDM 3D printed specimens.

AM Fused Deposition Modeling (FDM)



“Under the mentorship of Dr. Advincula, they study different techniques of additive manufacturing (or 3D printing), and find alternative materials for creating products that will be used for various applications,” explained Fernes. These alternative materials can sometimes contain a raw ingredient like abaca, which is endemic to the Philippines.

The group has presented their work in five conferences, including the American Chemical Society Conference. They have continuously published information on their findings, most notably a paper titled “High performance polymer nanocomposites for additive manufacturing applications,” which was cited as one of the most downloaded articles in the Functional Polymers Journal.

As explained in the aforementioned report, “additive manufacturing (or 3D printing) involves the process of fabricating a part layer-by-layer assembly of materials with processes such as extrusion, binding, melting, and photopolymerization.”

High performance polymer nanocomposites is one class of material newly introduced to additive manufacturing. High performance polymer, meanwhile, is a group of polymer materials known to retain its desirable mechanical, thermal, and chemical properties when subjected to harsh environments such as high temperature, high pressure, and corrosive chemicals. “When mixed with nanofillers such as carbon nanotube, nanoclay, and graphene, these polymers can have improved mechanical properties and sometimes acquire properties that were not present initially like thermal and electrical conductivity,” according to the report.

The Filipino researchers have been able to produce space-grade plastic parts to replace those used in expensive computer numerical control (CNC) milling processes. “The printed plastic parts perform better technically, weigh less, and provide better electrical insulation.” Some of their production-grade materials are both lightweight and flame-retardant, and can be used as component parts for automotive, aircraft, and spacecraft. Others can be used for energy sensor design, and semiconductor materials and devices. Their experiments also brought to the fore component issues that did not materialize during the initial design stage.

“Although 3D printing is available here, it is mostly output-based and focused on the printing activity itself, rather than on creating the materials that can be used for printing,” said Fernes. “Through this program, our researchers are discovering cheaper, more lightweight, better-insulated alternative materials without compromising tensile strength.”

All three Filipino trainees are professors so it is expected that what they learn during their stint abroad will be cascaded down to their students, apart from the readers of their published work. Manapat is also keen on putting up a university-based 3D printing laboratory when she returns, while the Palaganas couple will be using their learnings to improve manufacturing processes and can provide opportunities for other Filipinos.

The next batch of five students will be hosted by Dr. Advincula, who will pattern their training based on their background—six months’ training for mechanical engineers, and a year’s training for chemists and chemical engineers.

HRIDD OVERVIEW

Bridging the Human Competency Gaps in R&D

160
persons for Food Safety training

10
persons for School of Engineering Equipment (SEE) training

15
researchers trained in entrepreneurship, business, technology transfer and commercialization to the Newton Royal Academy of Engineering Leaders in Innovation Fellowship Program (Batch 2)

Institutional Development Program

10
institutions supported for R&D infrastructure and R&D capability development

HRDP Accomplishments for 2016

23
persons for research attachments

2
visiting experts to develop capabilities of universities

6
group trainings

12
institutions for the conduct of seminars, conferences, workshops

6
group trainings

7
persons for attendance to conference

26
persons for paper presentations

2016 COMPLETED PROJECTS

HUMAN RESOURCE DEVELOPMENT

Title	Start Date	End Date	Monitor	Alt. Monitor
Program for Critical Learning and Problem Solving (CTAPS)	4/15/2014	4/14/2016	Eidel Quinn Eda	Jonathan Muñoz
Program for Improving Service Orientation Skills (SOS)	4/15/2014	4/14/2016	Eidel Quinn Eda	Jonathan Muñoz
Program for Computer Literacy (ComLit)	4/15/2014	4/14/2016	Eidel Quinn Eda	Jonathan Muñoz
Focused Competencies Assessment Program (FCAP)	4/15/2014	4/14/2015	Eidel Quinn Eda	
Gitara ni Juan: Development of Prototype Design and Standardization of the Guitar-making Process for Quality Classical Guitars Using selected Philippine Woods	10/1/2014	5/30/2016	Eidel Quinn Eda	Jonathan Muñoz
Landing Program (Sciene and Technology Entrepreneurship Program) - Phase - 3	7/1/2015	3/31/2016	Eidel Quinn Eda	

R AND D NETWORKING

Title	Start Date	End Date	Monitor	Alt. Monitor
Design and Development of a Passive Solar Meat Dryer for the Production of Pork-Based Ethnic Delicacy in the Highlands - (CIERDEC)	9/1/2014	8/31/2015	Emelita Dimapilis	Glenda Sacbibit
Greening the Resorts: Design and Development of a Low-cost Solar Water Heater - (STIRDC)	12/1/2014	11/30/2015	Joseph Escorial	Ruel Pili

PCIEERD IN THE REGIONS

To accelerate regional development, PCIEERD has encouraged the building of networks in the various regions. Thus, we have the establishment of the PCIEERD Regional Consortia to sustain the holistic development of the regions' resources through enhanced partnerships and institutional collaborations among the member institutions from the academe, government, and the private sectors.

Each Regional Consortium is tasked with drafting an S&T Agenda addressing their regional concerns, through the guidance and template provided by PCIEERD. The regional development initiatives are geared toward the aggressive application of science and technology, with prime considerations on PCIEERD's sectoral concerns and priorities. Researchers, planners, and policy makers from member institutions shall have the opportunity to share their expertise in the development and implementation of programs and projects, aimed at harnessing the effective use of resources in the regions through the pursuit of R&D and other scientific activities.

To date, there are 10 PCIEERD Regional Consortium that were able to craft their respective S&T Agenda, namely:

- Cordillera Industry and Energy Research and Development Consortium (CIERDEC)
- Ilocos Consortium for Industry and Energy Research and Development (ICIERD)
- Cagayan Valley Industry and Energy Research and Development Consortium (CVIERDEC)
- Central Luzon Industry and Energy Research and Development Consortium (CLIERDEC)
- Southern Tagalog Consortium for Industry and Energy Research and Development (STCIERD) Southern Tagalog Islands Research and Development Consortium (STIRDC)
- Bicol Consortium for Industry and Energy Research and Development (BCIERD)
- Western Visayas Consortium for Industry and Energy Research and Development (WVCIERD) Eastern Visayas Consortium for Industry and Energy Research and Development (EVCIERD)
- Eastern Mindanao Industry and Energy Research Alliance for Development (EMIERALD)

Each respective agenda includes programs and project initiatives aimed to address the particular regional consortium's S&T needs, challenges, and development issues.

There are 23 approved projects endorsed by the PCIEERD Regional Consortia in 2016, and 32 project proposals are still under evaluation.

10
PCIEERD Regional Consortium with S&T Agenda

23
Approved projects endorsed by the PCIEERD Regional Consortia in 2016

32
Project proposals are still under evaluation

Region	Consortium	Approved Projects for 2016	Under Evaluation
CAR	CIERDEC	2	15
REGION 1	ICIEERD	2	3
REGION 2	CVIERDEC	2	
REGION 3	CLIERDEC	-	
NCR	MMIERDC-NCR		1
REGION 4A	STCIERD	2	9
REGION 4B	STIRDC	2	3
REGION 5	BCIERD	7	
REGION 6	WVCIEERD	2	
REGION 7	CVCIERD		
REGION 8	EVCIERD		1
REGION 9	to be established		
REGION 10	NORMINCIERD		
REGION 11	SMIEERDC		
REGION 12	CRIERDC		
REGION 13	EMIEERALD/ CARAGA	4	
TOTAL		23	32

RESEARCH AND INFORMATION AND TECHNOLOGY TRANSFER DIVISION (RITTD)

They bring solutions, wrought by scientific study, to market.

RITTD works hard so that the knowledge and technology meant to solve problems will reach those who need it the most. They bridge the gap between the scientist and the enterprises and industry practitioners that need to improve their processes and further develop their capabilities. They push for discoveries to be patented so their value is safeguarded, and also market such inventions so that the inventor's hard work is rewarded. They ensure that good work gets recognized, added to, and ultimately, adopted in the public sphere.

"Technology should not end in research and development. It has to be translated into the market, into actual use for the people. We develop these technologies so citizens can have better alternatives."

NOEL HINGCO
Science Research Specialist I, RITTD

BETTER WAYS TO MARKET INNOVATION
Capability Building Program for Technology Transfer Officers of DOST Network and Technology Business Incubators

A SHOWCASE OF SCIENTIFIC OPPORTUNITIES
Technology Transfer Day

UP SCIENTISTS PITCH THEIR PRODUCTS
Valuing Innovation through Partnership (VIP) Day

BETTER WAYS TO MARKET INNOVATION

Capability Building Program for Technology Transfer Officers of DOST Network and Technology Business Incubators

Russell M. Pili, Chief Science Research Specialist, RITTD, PCIEERD

The University of Texas Tower serves as a beautiful background as the participants of the Austin Immersion Training pose for a group photo at the University of Texas Main Campus with Marie Caruth Wargen from UT- GCG

Dr. Alanis Salvador of the University of Texas Global Commercialization Group (UT-GCG) welcomes the participants of the Two-Week Austin Immersion Training at the University of Texas at Austin.

Dr. Bob Hebner from the Center of Electromechanics (CEM) of the University of Texas tours the participants at their facility at the University of Texas Research Center

Imagine having a groundbreaking and perfectly functional invention that can solve one of the many daily problems of Filipinos. You put it up for sale, but nobody notices it, and so you focus your energies on creating another invention with a better chance at marketability, but even that doesn't get picked up. Science—be it knowledge or product—stagnates on a forgotten shelf, when it could've made a difference in people's lives.

Such is the case for most of our Filipino researchers and developers. "[They] do research but the mindset for commercializing technology has not yet been instilled in them. Their goal is usually to be published, but once their work is published, it becomes public property and its value decreases," said Edward Apigo, Technology Transfer Officer (TTO) of PCIEERD's RITTD.

"The good thing is that since the Technology Transfer Law was passed in 2010, there has been awareness on the need for technology transfer," Apigo said. More and more researchers are taking steps to commercialize their product with the help of TTOs. However, technology transfer is not easy, here and abroad; systems must be in place.

The participants at the culmination of the Phase IV of the Capability Building Program with Usec. Rowena Cristina Guevara, Council Directors and representatives from UT GCG

The participants from the Research and Development Institutes (RDIs) discuss their action plans for their respective technology transfer offices

Thus, a partnership with the University of Texas in Austin (UTA) was nurtured which resulted to a Capability Building Program solely for TTOs.

The program has four phases:

- **Phase 1:** Assessment of local technology commercialization system – Each of DOST's TTOs are assessed on their systems and strategies for technology transfer.
- **Phase 2:** In-country training and Innovation Readiness Course – Recently, PCIEERD conducted a series of trainings based on the identified gaps and problems. This included lectures on effective ways to pitch technologies and practice good business development. The trainings were attended by 40 participants, narrowing down to 18 in the last session.
- **Phase 3:** Austin Immersion Experience – The 18 trainees were sent to UTA for training and immersion for a period of 14 days. Various experts from the university covered a wide range of topics from technology transfer marketing down to confidentiality and licensing agreements. The trainees also went on educational tours and showcases.
- **Phase 4:** Action Plan Generation and Portfolio Audit – The trainees are tasked with creating an action plan or agency based on the training they received. Trainees are free to choose which processes they will adapt from UTA.

It is expected that those who attended the training will implement and share the lessons they learned to ensure that the program is maximized and that technology transfer continues to grow in the Philippines.

A SHOWCASE OF SCIENTIFIC OPPORTUNITIES

Technology Transfer Day

Engr. Edgar I. Garcia, Technology Application and Promotion Institute (TAPI), DOST

Top DOST officials graced the 1st Technology Transfer Day event

DOST-STII's Dr. Aristotle P. Carandang and DOST-PCIEERD's Maria Elena A. Talingdan as Masters of Ceremonies

The Philippines is home to a great number of brilliant and scientific minds that have come up with ingenious inventions like water-fuelled cars and fluorescent water bottles. However, despite the Filipinos' capacity for innovation, many of their creations still do not find their way into the relevant industry due to lack of exposure and networking opportunities. PCIEERD determines products and technologies that are ready for transfer through a score card. Criteria for readiness include cultural acceptability, comprehensibility, timeliness, and marketability. Those that passed the grading were presented during the Technology Transfer Day, where the researchers interfaced with investors.

Technology Transfer Day was born out of the need "to bridge the gap to bring technology from universities and research development institutes to the market." The Technology Application and Promotion Institute (TAPI) spearheads the project. According to Noel T. Hingco, Technology Transfer Officer of PCIEERD's RITTD, "the end goal is to determine if there are possible deals and inquiries about technologies. This should provide more opportunities to talk more about these technologies."

PCIEERD determines products and technologies that are ready for transfer through a score card. Criteria for readiness include cultural acceptability, comprehensibility, timeliness, and marketability. Those that passed the grading were presented during the Technology Transfer Day, where the researchers interfaced with investors.

Technology Transfer Day is to be held thrice a year: one day each for Luzon, Visayas, and Mindanao. The very first Technology Transfer Day was held on April 27, 2016 at Sofitel in Manila. Investors lauded the event, and many expressed their interest over particular technologies. Some of these include the Gitara ni Juan, several guitars made from locally sourced wood, and Versatile Instrumentation System for Science Education and Research (VISSER), a multi-purpose laboratory tool that manages data gathered from sensors.

From the 19 technologies and 11 FIC products supported by PCIEERD, 23 companies expressed interest in licensing—particularly the technologies for stabilized brown rice, biofertilizer MykoPlus, Rapid Electric Vehicle Charging system called Charging in Minutes (CharM). At least 25 companies requested product samples for trial marketing, including CTC Far East Philippines Inc. for UPLB Biotech's enzymes, and Philippine Airlines for FIC food products. Also, 68 companies requested collaboration with exhibitors in order to test their technologies for technical and market validation.

Researchers and invited guests discussed the possibilities in adapting the DOST technologies in the market.

Inaugural Tech Transfer Day

19 technologies,
11 FIC products showcased

23 companies interested in licensing

25 companies requested product samples

68 companies requested collaboration for field testing and market validation

Other technologies showcased would suit a range of applications from transportation to agriculture to energy. There was also a food-tasting activity that showcased various food products, among them organic juices and vacuum-fried indigenous delicacies, which were developed in DOST's Food Innovation Hubs.

Following the success of the first Technology Transfer Day, the 2nd and 3rd legs of the event were subsequently held in the Visayas and Mindanao on September 14 and December 13, respectively. In so doing, regional scientists were given equal opportunity to promote their scientific creations.

At the end of the day, technology has to be made useful. "Technology should not end in research and development. It has to be translated into the market, into actual use for the people. We develop these technologies so citizens can have better alternatives," said Noel Hingco, Project Manager.

PCIEERD believes that successfully commercializing Filipino technology will help the country become more competitive in the global market. Hopefully, it will also inspire other researchers and scientists in the Philippines to further develop the country's innovativeness.

UP SCIENTISTS PITCH THEIR PRODUCTS

Valuing Innovation through Partnership (VIP) Day

Dr. Luis Sison, Director of UP, Technology Transfer and Business Development Office (UP-TTBDO)

Prof. Glenn N. Baticados, the Director of the Center of Technology Transfer and Entrepreneurship of UPLB hosted the pitching session at the VIP Day

Dr. Veronica Sabularse of the University of the Philippines-Los Baños explains her technology "FruiTect" (nanocoating for fruits) to an interested guest at the VIP Day

Soledad Garabay of the University of the Philippines Visayas pitches their technology "Algar Concentrator" during the VIP Day

Technology Transfer is a hurdle encountered by every scientist, and that particular challenge found its answer in the Technology Transfer Day. However, certain groups display a remarkable drive in researching and developing new technologies, and deserve the opportunity to showcase not just a few but a plethora of meritorious work. Thus, VIP Day, where VIP is an acronym of Valuing Innovation through Partnership, came to fruition.

Where Technology Transfer Day showcased all products and technologies from all divisions of DOST, VIP Day focused on technologies proposed by the University of the Philippines (UP) System. Majority of the research and development (R&D) projects are from UP, comprising about 90% of the total project count. Thus, there was an initiative to fund their promotional efforts.

VIP Day is the culmination of a project to bring R&D technologies to the market. "The objective of VIP Day is to showcase some of the technologies of the UP System and to establish a partnership or linkage between researchers and businesses," says Engr. Edward Paul H. Apigo, Technology Transfer Officer.

VIP Day was held on October 26, 2016 at UP Bonifacio Global City (BGC). People from various sectors of business, agriculture, academe, and media attended the event. Guests were properly acquainted with the 18 projects featured during the event through a pitching session where each proponent was given five minutes to present their product. The pitched technologies spanned agriculture, aquaculture, information communications technology, electricity, and power consumption. There was also a breakout session where guests got to know more of either the start-ups or those technologies still waiting for transfer.

Of all the products and technologies presented, the ones that garnered the most attention from private entities were the products in agriculture, aquaculture, and food. These include the multifunctional biofertilizer Mykoplus, the natural and edible fruit coating Fruitect, the fish-feed-producing Algal Concentrator, and the tasty and organic oyster powder.

89 Completed Projects of UP Diliman

Copyright	32
Patent	24
Utility Model	11
Algorithm*	2
Not Applicable	15
For Clarification	4
Trade Secret	1

Note: Some projects have multiple IPs
* Treated as separate category from software

Both private businesses and government bodies were also intrigued by the featured marine research technologies, namely: the Automated Rapid Reef Assessment System (ARRAS), a visual recording system of coral reefs; Fish Size, Population Density, and Biomass Estimation Device (FISHDROP), a fish census technology tool; and the water-purifying ceramic water filter, which Cavite's Provincial Government-Environment and Natural Resources Office (PG-ENRO) plans to use on select communities in the municipality.

At the end of VIP Day, 10 companies had expressed their interest to follow-up.

"UP cannot really commercialize all these technologies on their own, which is why we are giving them marketing support," said Apigo, adding that the RITTD is currently assessing VIP Day to ascertain if it fulfilled its goal. "We'll assess the outcome of VIP Day first. If it turns out well, if we have solid leads and we can do follow-ups, then hopefully, we can have a VIP Day Phase 2."

Dr. Luis Sison of UP Enterprise with Dr. Alvin Marcelo of UP Manila and Rodel Anunciado of Good Earth Inc. during the panel discussion on Licensing of Technologgies at the VIP Day

RITTD OVERVIEW

ONGOING	ONGOING (TBI)	NEW	NEW (TBI)	PROPOSALS	COMPLETED 2016	TOTAL
8	4	10	3	10	2	**38**

ONGOING

Nipa

CharM

Ecosep

NanoPGR

Nanocoating for fruit project 1 and 2

VISSER

Aquasense

TAPI 500

NEW (TBI)

AIM,

MUST,

Animo Lab

ONGOING (TBI)

MSU-ITT

BatState U

Innovation Hub Ideaspace

Innovation UP Diliman

NEW

Smart Surface,

Tekton Micro-seismic

Tekton Accelograph

ARRAS

Intelisense

Nanozeolite

Jolt

Nanoensors Quicklook, UP IP Management

UCC Project

PROPOSALS

UP FabLab,

MNERK,

Bamboo Flattening,

R-Tap,

FIC DOST TBI,

Mosquito Repellent,

IFR/IPR,

Charcoal Briquette,

Redopac,

Fishdrop

COMPLETED 2016

WVSU,

Bringing DOST R&D to the Market

7
Technologies for Translational R&D

5
Technologies for Spinoff

7
Technologies under negotiation for licensing

POLICY COORDINATION AND MONITORING DIVISION (PCMD)

They are the data monitors and overseers.

The Policy Coordination and Monitoring Division (PCMD) assesses and coordinates the sectoral plans, and monitors the implementation for consistency with the overall policy of the Council. They're very much focused on aligning the mandate and stated priorities of PCIEERD with its current activities.

"The thing I enjoy the most in my division is the camaraderie between the employees. The relationship between our Chief and us is a pleasant and progressive one. He motivates us to do things outside of our comfort zone, and believes in our abilities. He also never forgets to have fun and enjoy with us during activities. Among us staff, I feel the genuine friendship and bond that I always hear and feel the happiness around even when work gets stressful and tough."

EVANGELINE ROSE MENDOZA
SRA, PCMD

In 2016, there were three callouts for R&D proposals from PCIEERD, which markedly improved the volume and quality of proposals that it received. This 2017, PCIEERD will again employ the same strategy, with a view toward greater efficiency.

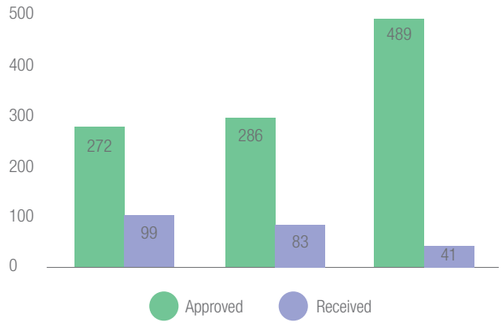
RECEIVED PROPOSALS FROM 2014-2016

PROGRAM	YEAR		
	2014	2015	2016
DOST-GIA	91	94	198
PCIEERD-GIA	153	184	277
TECHNICOM	3	1	8
OTHERS	25	7	6
TOTAL	272	286	489

PROPOSALS ACTED UPON WITHIN 72 DAYS

Nature of Grant	Deliverables of the Project
2014	60%
2015	59%
2016	94%

RECEIVED VIS-À-VIS APPROVED PROPOSALS FROM 2014-2016



Call for proposals 2017

543
received proposals

72
approved proposals (Approved by EXECOM/GC/ Executive Director)

123
assisted & monitored projects from PCIEERD funding

176
monitored projects from DOST funding

PHP 613,280,000
PCIEERD-funded projects

COMPLETED PROJECT

Greening the Resorts: Design and Development of a Low-cost Solar Water Heater - (STIRDC)

Project Monitor: Joseph Escorial

Start date-End date: 12/1/2014-1/30/2015

PEOPLE

The continued success of the PCIEERD rests on the quality and dedication of its people, and PCIEERD Executive Director Dr. Carlos Primo C. David maintains that the council employs only the finest individuals.

"I can safely say that we have one of the most competent personnel in the whole of DOST," he said, with no small amount of pride, he adds PCIEERD will be refining an internal evaluation system in 2017, where best performing divisions will be rewarded with a larger share of the budget, and highly productive personnel are promoted, and the rest are nurtured to enhance their performance. "I've realized that it's not all about numbers and statistics but also the social aspect. Morale—it's not about giving more money. Obviously if you have numbers like 90% and 93%, okay that's very useful, but beyond that, [we're looking at quantifying] the human side of doing the work," said David.

Asked whether he has a "favorite" among the divisions, he gave a good-natured demurral: "Of course I have favorite projects in each division but I don't have a favorite division per se. I like the food processing projects of ITDD, the [upcoming] electronics for agriculture, and Artificial Intelligence, from ETDD. And from EUSTDD, the energy and utilities, particularly the renewable energies. I also like our Tech Transfer, because this is a clear indication of R&D: this is the money that you put in, this is the wealth that came out of it."

At PCIEERD, you could say that the people, especially the ones selecting and monitoring the R&D projects—and ensuring that every cent of the taxpayers' money ultimately benefits the country—are a wealth unto themselves.

"The challenging yet positive working environment is what I enjoy the most in our division. Despite our differences in our fields, our views, and our age, we have managed to work well with and around each other. Being the newest in this group, I have observed and I admire how each member is aimed at doing their best and how this group has formed a family that supports, encourages, and challenges each other for the best."

MARIA CHELSEA CLARISSE F. UGAY
Science Research Specialist I, ITDD

GOVERNING COUNCIL

They make the important decisions.

As the policy-making body of PCIEERD, the GC is responsible for policy and broad management decisions in setting the national development goals, plans, and priorities for research in the priority areas of PCIEERD. Headed by the DOST Secretary, it counts among its members other Cabinet Secretaries or designated representatives from pertinent departments, the Executive Director of PCIEERD, and representatives from the private sector who represent the industry, energy, and emerging technology sectors.

Hon. Fortunato T. de la Peña

Dr. Carlos Primo C. David

Dr. Minella C. Alarcon

Ms. Remedios V. Baclig

Dr. Antonio B. Villaflor

Dr. Judy F. Sese

Engr. Ramon N. Santos

Dr. Ameurfina D. Santos

"It has always been my desire to collaborate with government institutions on R&D programs and projects focused on the utilization of native/indigenous plant and aquatic materials for food ingredients and food products—with the aim of innovation. That means building a creative, science-based expertise in food science and technology with the creative edge or genius that is truly Filipino in origin and design, and able to stand abreast with the food technology giants in the global arena.

My participation as a private sector representative to the Governing Council of PCIEERD has provided me with the, space, tools, challenges and insights to pursue this advocacy."

REMEDIOS V. BACLIG
Governing Council Member

NOT PHOTOGRAPHED:
Atty. Gerald Reyes
Dr. Maria Corazon H. Dichosa
Dir. Jesus T. Tamang

PCIEERD MANAGEMENT TEAM (PMT)

"PMT meetings usually involve discussions on administrative matters, project status, and proposal evaluation. Discussions can be a roller coaster ride, but what is important is that agreements are made in the end.

By end-2017, I envision an Innovation Council with a strong corporate culture that is passionately pursuing its mission, with talents that are inspired and satisfied, and rewarded with very satisfied stakeholders. I also see PCIEERD continuously improving its 6Ps. "

ENGR. NIÑALIZA ESCORIAL
Chief, ITDD

01
ENGR. ERMIE M. BACARRA
Chief, Human Resource and Institution Development Division (HRIDD)

02
ENGR. NIÑALIZA H. ESCORIAL
Chief, Industrial Technology Development Division (ITDD)

03
ENGR. RAUL C. SABULARSE
Deputy Executive Director

04
RUSSELL M. PILI
Chief, Research Information and Technology Transfer Division (RITTD)

05
ENGR. NONILO A. PEÑA
Chief, Energy and Utilities Systems Technology Development Division (EUSTDD)

06
DR. CARLOS PRIMO C. DAVID
Executive Director

07
ENGR. ALBERT G. MARIÑO
Chief, Policy Coordination and Monitoring Division (PCMD)

08
ENGR. NELSON P. BENIABON
Chief, Emerging Technology Development Division (ETDD)

09
CARLOTA P. SANCHO
Senior SRS
PMT Secretariat

10
SONIA P. CABANGON
Chief Administrative Officer, Finance and Administrative Division (FAD)

01 MARY ANN P. MAGNAYE
02 MARK DENIEL D. FORBES
03 RAQUEL O. ATUN
04 JACHIN JANE O. ABERILLA
05 ROLLY H. PACTORES
06 MARIA ELENA A. TALINGDAN
07 RAISSA JEAN A. ANCHETA
08 ROLANDO A. YANQUILING
09 DIANE L. TATING
10 CARMELLA P. DUMALI

(Not in photo: DR. CARLOS PRIMO C. DAVID, ENGR. RAUL C. SABULARSE)

Showroom of the Philippine Textile Research Institute (PTRI)

OFFICE OF THE EXECUTIVE DIRECTOR, OFFICE OF THE DEPUTY EXECUTIVE DIRECTOR, & INFORMATION GROUP (OED, ODED, & IG)

"The Information Group (IG), being the unit that leads the information dissemination of the Council, gets in the forefront of the latest Filipino inventions and researches in the country. We witness the projects unfold and eventually the society. My favorite innovations so far are the ceramic water filter and the rainwater collection system because in our country where not everyone gets clean potable water, these inventions are fundamental."

RAISSA JEAN ANCHETA
Science Research Specialist I, IG

POLICY COORDINATION AND MONITORING DIVISION (PCMD)

"My most memorable project was the development of e-Proposals. It helped our project managers by lifting the burden of encoding the proposal metadata. The use of e-Proposals also signals the era of open source technologies in PCIEERD."

GEORGE D. MONROYO
Senior Science Research Specialist, PCMD

01 CARLOTA P. SANCHO
02 GEORGE D. MONROYO
03 MARK ANTHONY C. BATHAN
04 EVANGELINE ROSE Q. MENDOZA
05 JOHN KEISHNER C. ROMERO
06 MARY JANE S. DABELA
07 LIONEL F. TATARO
08 RUEL A. PILI
09 ALBERT G. MARIÑO
10 CYDSYL ANN P. PESTRADO
11 JOHN ERNIE S. EVALLE
12 MARK ANTHONY A. ZOSA

(Not in photo: TONY ROSE C. TUMANENG ULYSSES M. PALMONES)

PTRI Innovation Center for Yarns and Textiles

01 RUTH A. GONZALES
02 EDNA C. NACIANCENO
03 NELSON P. BENIABON
04 ARIANE G. JARAPLASAN
05 JOANNA ROSE G. CRUZ
06 CLARINDA G. REYES
07 MARIETA M. VALDEZ
08 ERIKA LORRAINE C. GAW
09 MERAIDA D. REYES
10 DIANNE REMAE C. SAN PEDRO
11 JANINA CATRINA H. FUENTES
12 DANILO C. PATEÑO JR.
13 MAY-ROSE B. PARIÑAS
14 JEZZEL R. JAO
15 ALBEN A. MATANGUIHAN

(Not in photo: JENNY LEIGH A. DAQUIOAG, DIANA MARIE J. LEOMO, DARWIN V. SANTOS, DESIREE D. VERA, MARY JOY C. BUITRE, ROVEN D. TUMANENG)

Electronics Product Development Center

EMERGING TECHNOLOGY DEVELOPMENT DIVISION (ETDD)

"The first time that I had the chance to talk with people from ETDD, I already noticed their positive energy and vibe. I felt that they are very welcoming. They're the type of people with charming amounts of energy every single day. Also, they are very humorous. I appreciate the quality time that we have every time there are small gatherings like birthday celebrations or even over lunch. I also enjoy the nature of my work because we have the chance to go out and meet different people who are part of the projects that our division handles."

ALBEN MATANGUIHAN
Science Research Specialist I, ETDD

INDUSTRIAL TECHNOLOGY DEVELOPMENT DIVISION (ITDD)

"The accomplishment that I am most proud of relates to the PCIEERD-Monitored DOST-GIA Project, titled "Strengthening of DOST Regional Metrology Laboratory Services." Aside from our division administratively managing it, we were able to impart valuable inputs and influence in achieving DOST's goal of providing accurate metrology services to private companies, government laboratories, and local government units, which closely and/or directly extend benefits to the general public in the entire country."

RONALDO Q. DOMINGUEZ
Supervising Science Research Specialist, ITDD

01 KRISTINA PAULA Y. ANACLETO
02 KATRINA B. LANDICHO
03 MA. CHELSEA CLARISSE F. UGAY
04 STEPHANIE ANN M. BLANCO
05 MYRNA M. BLAH
06 NIÑALIZA H. ESCORIAL
07 LAARNI T. PILOTON
08 FATIMA JHOAN S. IBARRETA
09 RONALDO Q. DOMINGUEZ
10 MARK JOHN N. RATIO
11 ALEAH P. ORENDAIN
12 BIANCA C. IGNACIO
13 GRACE F. ESTILLORE
14 TARHATA M. MARIANO
15 RUBY RATERTA
16 LIZ AHREN C. PEÑAFLOR
17 JONI MAE D. GONZAGA
18 JONAS KARL C. LIWANAG

PTRI Innovation Center for Yarns and Textiles

01 SHEILA MARIE M. MEDINA
02 CARLUZ R. BAUTISTA
03 NONILO A. PEÑA
04 AGERICO P. BAUTISTA
05 GLADYS MAE C. ALVAREZ
06 GLORY JEAN B. BALANSAG
07 RYAN CHRISTOPHER P. VIADO
08 KASFHI NICOLE PATRICIO
09 LUTHAR JAMES S. CO
10 JULIUS L. MAYORGA
11 CARMINDA R. TANDEL CARMEN
12 RACHEL R. HABANA
13 MARLON C. AGUILAR

(Not in photo: EMELITA A.S. DIMAPILIS, RAYMUNDO H. HABAL)

ENERGY AND UTILITIES SYSTEMS TECHNOLOGY DEVELOPMENT DIVISION (EUSTDD)

"On the most basic level, I enjoy the sincere appreciation I receive from not only my boss, but also the people I work with. A heartfelt thanks goes a long way to improve one's attitude and productivity."-

GLORY JEAN BALANSAG
Science Research Specialist I, EUSTDD

RESEARCH INFORMATION AND TECHNOLOGY TRANSFER DIVISION (RITTD)

"In the short time I have been working at the RITTD, all I can say is that it is a great working environment because you are valued and appreciated. I am surrounded by amazingly talented professionals with diverse expertise, who remain friendly and help me strive for excellence. I feel proud to be a part of this amazing family, which I believe will give me great opportunities for growth and success. I love this division!"

ASELA LINGLINGAY R. VILLANUEVA
Senior Science Research Specialist, RITTD

01 LEIZL D. SUENO
02 JENNIFER D. ANTONIO
03 RUSSELL M. PILI
04 ASELA LINGLINGAY R. VILLANUEVA
05 CATHERINE F. MIRANDA
06 JULIUS CARLO T. GUINTO
07 EARVIN JAY L. ENRIQUEZ
08 EDWARD PAUL H. APIGO
09 NOEL T. HINGCO
10 JOHN MARK J. BATANG
11 JEJOMAR S. CARLOS

01 ANNALIZA R. MONTEREY
02 ROXANNE E. DELOS REYES
03 MARY JOY A. ZABALA
04 EDERLYN L. ROGELIO
05 ERMIE M. BACARRA
06 GLENDA DORCAS T. SACBIBIT
07 MARY JOY B. FERNANDO
08 EIDEL QUINN T. EDA
09 JULIE ANNE C. ATIENZA

(Not in photo: JONATHAN G. MUÑOZ, MARIE CHRISTIE B. SANTOS)

Advanced Device and Materials Testing Laboratory

HUMAN RESOURCE AND INSTITUTION DEVELOPMENT DIVISION (HRIDD)

"The most memorable project for me is no other than the hosting of the 23rd Session of the Asia-Pacific Regional Space Agency Forum or APRSAF-23, which was held on November 14-18, 2016. I was just hired last June and APRSAF-23 became my major task. Through this event, I was able to meet a real-life astronaut, make friends with international space community, and build an effective working relationship with the Japan Aerospace Exploration Agency (JAXA) and PCIEERD colleagues. Overall, it was an auspicious and pleasant experience for me."

JULIE ANN ATIENZA
Science Research Specialist II, HRIDD

FINANCE AND ADMINISTRATIVE DIVISION (FAD)

"As a division, we have to work as a team, keep each other motivated, and be proactive in finding more efficient ways of working through the use of new tools or procedures. I am proud of what we've accomplished in providing financial and administrative support. "

ANNA MARGARITA B. ISIDRO
Accounting Analyst, FAD

From left
1st Row: JOSELITO B. VELASQUEZ
ENA R. CONDE
ELAINE ANNETTE C. SALMA
SONIA P. CABANGON
SONIA S. DE LEON
MARY ANN P. BANGUNAN
EDA T. YSULAN
DONDON D. SANTIANO
2nd Row: MILDRED F. CABRADILLA
QUEENIE ANN A. GACAYAN
ALLEN Z. MANIBOG
CHINGKY N. SILVEDERIO
RACHEL C. NATCHER
3rd Row: AILEEN L. VENTURA
JOHN PAUL S. CANILLAS
ALVIN Z. SABANAL
MA. CRISTINE A. BASIAO
DIVINA B. ALMAZAR
GRACE I. SABLAN
4th Row: ANNA MARGARITA B. ISIDRO
DAYANARA B. HERRAS
MARISSA G. DALAY
CHARLEMAIGNE P. VALDEZ
EMMERICK C. QUEMA
PANCHO A. CERTEZA
5th Row: VILMA ROSA C. BORJA
ISIDRO V. QUERUBIN JR.
LESLIE JOHN A. NUYDA
ROLAND S. RENDON
EMMANUELLE M. MARCELINO
6th Row: ANTHONY D. DELA CRUZ
BENJIE B. VILLANUEVA
NOMER T. EVANGELISTA
RICARDO G. PALAD JR.
JAYSON RYAN G. SALUNSON

(Not in photo: RODOLFO A. VELOSO, JR., ALEX R. GESMUNDO, JULIETA H. LACSA ANTONIO L. REDUTA)

SEMINARS/ TRANINGS/ SCHOLARSHIP PROGRAMS 2016

LOCAL

January

Name	Training / Seminar Attended	Date	Venue
GAW, Erika Lorraine	Genome Assembly, Annotation and Variant Calling	January 18-19, 2016	UP Diliman, Quezon City
VALDEZ, Marietta	Unlocking the Mysteries of Test & Measurement in the Academe 2016	January 27, 2016	Great Eastern Hotel, Quezon City
LEOMO, Diana Marie			
PATEÑO, Danilo			
ABERILLA, Jachin Jane	GRAPHIKA Manila 2016: Conference on Creativity	January 30-31, 2016	SMX MOA, Pasay City
DUMALI, Carmela			

February

Name	Training / Seminar Attended	Date	Venue
VILLAR, Norly	Training Seminar on ISO 9001-2015 Transition Requirements	February 10, 2016	PCAARD, Los Baños Laguna
SANTOS, Marie Christie			
ESTILLORE, Grace			
DABELA, Mary Jane S.			
PRESTADO, Cydsyl			
PEÑAFLOR, Liz Ahren	1st Philippine Environmental Summit	February 9-11, 2016	SMX MOA, Pasay City
PILOTON, Laarni	77th PICHE National Convention	February 17-20, 2016	Boracay Ecovillage Resort, Malay, Aklan
MARIANO, Tarhata			
APIGO, Edward Paul			
ORENDAIN, Aleah			
GONZAGA, Joni Mae			
CONDE, Ena R.	Management Basics for New Managers and Supervisors	February 18, 2016	Heritage Hotel Manila, Pasay City
BORJA, Vilma Rosa			
APIGO, Edward Paul	34th Strategic Marketing Course	February 27 - April 2, 2016 (6 Saturdays)	UP Diliman, Quezon City
SUENO, Leizl			

March

Name	Training / Seminar Attended	Date	Venue
REYES, Clarinda	“Symposium on Predatory Journals and Conferences”	March 28, 2016	Hotel Jen Manila, Pasay City
FERNES, Jerica			
FERNANDO, Mary Joy			
JAO, Jezzel R.			
VALDEZ, Marietta			
PATEÑO, Danilo			
ATUN, Raquel	"Effective Business Writing"	March 31, 2016	Richbelt Tower, Greenhills San Juan City

April

Name	Training / Seminar Attended	Date	Venue
NACIANCENO, Edna	"31st Philippine Chemistry Congress"	April 13-15, 2016	Iloilo City
JAO, Jezzel R.			
GAW, Erika Lorraine			
IGNACIO, Bianca			

Name	Training / Seminar Attended	Date	Venue
SUENO, Leizl	3rd FINEST Financial Management for Entrpreneurship and Investment	April 16, May 28, 2016 (6 Saturdays)	UP Diliman, Quezon City
MANIBOG, Allen Z	Employee Relations Program	April 20-22, 2016	CSC, Quezon City
BANGUNAN, Mary Ann	"38th GACPA Annual National Convention"	April 27-30, 2016	Ibalong Center, Legazpi City
MONTEREY, Annaliza			
SILVEDERIO, Chingky			
QUEMA, Emmeric			

May

Name	Training / Seminar Attended	Date	Venue
QUERUBIN, Isidro V.	Government Accounting Manual	May 16-20, 2016	Executive Lounge, DOST Compound
DALAY, Marissa G.			
SANTIANO, DonDon			
GESMUNDO, Alex	PhilGEPS Buyers Training	May 19-20, 2016	AM Zone Internet Café, Ortigas, Pasig City
CANILLAS, John Paul			
NUYDA, Leslie John			
ALMAZAR, Divina	"2016 Public Sector HR Symposium"	May 23-25, 2016	Cebu City
CONDE, Ena R.			

June

Name	Training / Seminar Attended	Date	Venue
NACIANCENO, Edna	13th Philippine Semiconductor and Electronics Convention and Exhibition (PSECE 2016)	June 15-17, 2016	SMX MOA, Pasay City
PATEÑO, Danilo			
SAN PEDRO, Dianne Remae			
DUMALI, Carmela	"Social Media Management"	June 21-24, 2016	Richville, EDSA, Mandaluyong City
ABERILLA, Jachin Jane			

Name	Training / Seminar Attended	Date	Venue
SANTIANO, DonDon	"Effective Audit Report Writing"	June 22-24, 2016	Malate, Manila
CABANGON, Sonia P.	Consultative Assembly of DOST Financial and Administrative Officers for FY 2016	June 22-24, 2016	Azalea Hotel and Residences, Baguio City
DALAY, Marissa G.			
QUERUBIN, Isidro V.			

July

Name	Training / Seminar Attended	Date	Venue
NACIANCENO, Edna	“Vaccuum 101: Fundamental of Vacuum Technology for Industrial Applications”	July 15, 2016	Acacia Hotel, Alabang, Muntinlupa City
SACBIBIT, Glenda Dorcas			
IBARRETA, Fatima Jhoan			
MONROYO, George	"Basic GIS Training using ArcGIS"	July 18-22, 2016	Geomatics Training Center, Taguig City
DABELA, Mary Jane S.			
ESTILLORE, Grace	"55th PAFT (Philippine Association of Food Technologists) Annual Convention"	July 27-29, 2016	SMX MOA, Pasay City
IBARRETA, Fatima Jhoan			
UGAY, Maria Chelsea Clarisse			

August

Name	Training / Seminar Attended	Date	Venue
TANDELCARMEN, Carminda	"23rd Annual Conference of the Transportation Science Society of the PHilippines (TSSP)"	August 8, 2016	UP Diliman, Quezon City
CO, Luthar James			
NACIANCENO, Edna	"34th SPP Physics Conference"	August 18-21, 2016	"UP Visayas Campus, Ilo-ilo City"
LEOMO, Diana Marie			
VALDEZ, Marietta			
LANDICHO, Katrina	"Mining Philippines Exhibition and Conference 2016"	August 23-25, 2016	Marriot Hotel, Manila
LIWANAG, Jonas Karl			
CABRADILLA, Mildred F.	"Onboarding: Strengthen the Core of your Business"	August 30, 2016	Ortigas, Pasig City
GACAYAN, Queenie Ann A.			

September

Name	Training / Seminar Attended	Date	Venue
CABRADILLA, Mildred F.	Training Series on Competency Based HRDP under the DOST-HRDP	September 7-9, 2016 October 5-7, 2016 October 26-28, 2016 November 22-23, 2016	MIRDC Auditorium, DOST Compound
DE LEON, Sonia	"RM201 ISO Compliant Records Management Processes and Control"	September 13-15, 2016	Cagayan De Oro, Misamis Oriental
BASIAO, Ma. Cristine			
MENDOZA, Evangeline Rose			
ANACLETO, Kristina Paula	Asia-Pacific Cocoa Conference	September 15-17, 2016	Davao City
GONZAGA, Joni Mae			
NACIANCENO, Edna	"1st International Bio-sensing Technology Workshop & Conference"	September 19-21, 2016	De La Salle University, Manila
REYES, Meraida			
DELOS REYES, Roxanne			
JAO, Jezzel R.			
GAW, Erika Lorraine			
CONDE, Ena R.	"Records Counter Disaster Preparedness and Business Continuity"	September 27-29, 2016	Metrocentre Hotel, Tagbilaran City, Bohol
MANIBOG, Allen Z			
CRUZ, Joanna Rose			
ANTONIO, Jennifer			
ZABALA, Mary Joy			
MAGNAYE, Mary Ann			
CABANGON, Sonia P.	What you Must Know About Procurement Law and its Revised IRR	September 29-30, 2016	EDSA Shangri-La Hotel, Mandaluyong City
RATERTA, Ruby			
SACBIBIT, Glenda Dorcas			
REYES, Clarinda			
GESMUNDO, Alex			
QUERUBIN, Isidro V.			
CANILLAS, John Paul			

October

Name	Training / Seminar Attended	Date	Venue
CABRADILLA, Mildred F.	Training Series on Competency Based HRDP under the DOST-HRDP	September 7-9, 2016 October 5-7, 2016 October 26-28, 2016 November 22-23, 2016	MIRDC Auditorium, DOST Compound
HABANA, Rachel	"Revitalizing the Philippines Shipbuilding Industry - Outlook for the Future"	October 13, 2016	AIM Conference Center, Makati City
BALANSAG, Glory Jean			
CO, Luthar James	"64th National Convention of the Philippine Society of Mechanical Engineers (PSME)	October 19-22, 2016	SMX Convention Center, Pasay City
AGUILAR, Marlon			
MAYORGA, Julius			
CABANGON, Sonia P.	"AGAP Annual Technical Seminar and Convention"	October 19-22, 2016	Tagbilaran City, Bohol
DALAY, Marissa G.			
NACIANCENO, Edna	"National ElectroChemical Energy Storage Workshop"	October 20-22, 2016	NIP-UP Diliman, Quezon City
LEOMO, Diana Marie			
VALDEZ, Marietta			
GAW, Erika Lorraine			
JAO, Jezzel R.			
PILI, Ruel,	"Statistical Analysis Using the R"	October 24-28, 2016	Philippine Science High School, Quezon City
NACIANCENO, Edna	"The 2nd IMEP Conference	October 27-28, 2016	Microtel by Wyndham, UP Technohub, Quezon City
VALDEZ, Marietta			
LEOMO, Diana Marie			
PATEÑO, Danilo	"66th Annual IECEP General Membership Meeting and Convention"	October 27-29, 2016	PTTC, Pasay City
EVALLE, John Ernie	"ITSM 2016-04 Managing ICT Services In government - IT Infrastructure Library"	October 26-28, 2016	DICT-CP Garcia Diliman, Quezon City
BATHAN, Mark Anthony			

November

Name	Training / Seminar Attended	Date	Venue
CABRADILLA, Mildred F.	Training Series on Competency Based HRDP under the DOST-HRDP	September 7-9, 2016 October 5-7, 2016 October 26-28, 2016 November 22-23, 2016	MIRDC Auditorium, DOST Compound

Name	Training / Seminar Attended	Date	Venue
NATCHER, Rachel C.	"The Philippine Budgeting System"	November 9-11, 2016	Hotel Kimberly, Malate, Manila
QUERUBIN, Isidro V.	"3rd PAGBA Annual Seminar and Meeting"	November 16-19, 2016	Grand Menseng Hotel, Davao City
VENTURA, Aileen			
SALMA, Elaine Annette			
DABELA, Mary Jane S.	"Information Systems Strategic Planning"	November 23-25, 2016	DICT - CP Garcia, Quezon City
EVANGELISTA, Nomer	"Establishment of a Records Section"	November 22-24, 2016	Davao City
GONZALES, Ruth			
MEDINA, Sheila Marie			
DOMINGUEZ, Ronaldo	MRSP Convention Center 2016	November 28-29, 2016	MIRDC, DOST Compound
RATIO, Mark John			
BLANCO, Stephanie			
PATEÑO, Danilo			
FUENTES, Janina Catrina			
SAN PEDRO, Dianne Remae			
ROMERO, John Keishner	"Structure System Analysis and Design"	November 21-25, 2016	Phoenix One, Legazpi Village, Makati City

December

Name	Training / Seminar Attended	Date	Venue
ABERILLA, Jachin Jane	"Social Media Teams, Structure and Protocols for the DOST System Training"	December 7-9, 2016	Davao City
TALINGDAN, Maria Elena			
TATARO, Lionel	"Mobile Programming with Android"	December 12-16, 2016	Phoenix One, Legazpi Village, Makati City
DABELA, Mary Jane S.	"Comprehensive Training on Virtualization VMware vSphere Install, Configure and Manage v6"	December 12-16, 2016	Bonifacio, Global City

INTERNATIONAL

February

Name	Training / Seminar Attended	Date	Venue	Registration Fee
CABANGON, Sonia P.	Training on Leadership and Innovation: Executive Leadership Program for the DOST	February 13-26, 2016	Brisbane, Australia	DOST Funded
MARIÑO, Albert				
DIMAPILIS, Emelita Asuncion S.	Capacity building on Climate Change Greenhouse Gases Emission	February 22-28, 2016	Japan	ICETT

March

Name	Training / Seminar Attended	Date	Venue	Registration Fee
REYES, Clarinda G.	UN Costa Rica Workshop on Human Space Technology	March 7-11, 2016	Costa Rica	-

April

Name	Training / Seminar Attended	Date	Venue	Registration Fee
HABANA, Rachel	"APEC Public Bike Sharing System"	April 20-22, 2016	Da Nang, Vietnam	APEC Secretariat

May

Name	Training / Seminar Attended	Date	Venue	Registration Fee
MARIANO, Tarhata	“Capacity Building Program for Technology Transfer Officer of DOST Network and TBI’s - Austin Immersion Program”	May 14-28, 2016	Texas, USA	BCDA Funded
APIGO, Edward Paul				
PILI, Russell	"ASEAN-EU STI Days"	May 10-12, 2016	Hanoi, Vietnam	PCIEERD Funds

June

Name	Training / Seminar Attended	Date	Venue	Registration Fee
DIMAPILIS, Emelita A. S.	"Regional Workshop on Overcoming Critical Bottlenecks to Accelerate Renewable Energy Deployment for ASEAN 6+ Countries"	June 13-16, 2016	Bangkok, Thailand	Travel Expenses charged to ASEAN, local incidental charged to PCIEERD Funds
ESTILLORE, Grace F.	"Training Program on Strengthening National Food Control System (Level 2)	June 20 - July 1, 2016	Nanyang Polytechnic, Singapore	PCIEERD HRDP

July

Name	Training / Seminar Attended	Date	Venue	Registration Fee
PILI, Russell	"Newton-UK SEA Innovation Leadership"	July 6-7, 2016	Bangkok, Thailand	Royal Academy of Engineering

September

Name	Training / Seminar Attended	Date	Venue	Registration Fee
IBARRETA, Fatima Jhoan	"Training Program on Strengthening National Food Control System (Level 2)	September 26 - October 7, 2016	Nanyang Polytechnic, Singapore	BCDA Funded

October

Name	Training / Seminar Attended	Date	Venue	Registration Fee
ANACLETO, Kristina Paula Y.	"Training Program on Strengthening National Food Control System (Level 3)	October 10 - 28, 2016	Nanyang Polytechnic, Singapore	BCDA Funded
PARIÑAS, May Rose	ACRS 2016: The 37th Asian Conference on Remote Sensing"	October 17-21, 2016	Colombo, Sri Lanka	PCIEERD Funds
SUENO, Leizl	"WIPO-SIPO-CIPTC Beijing-Training Course for ASPAC Region on Management and Commercialization of IP Assets"	October 24-28, 2016	Beijing, China	Funded by WIPO
MAYORGA, Julius	"International Training Programme on Bioenergy Development"	October 26 - November 1, 2016	Yogyakarta, Indonesia	Funded by NAM-SCCTC

November & December

Name	Training / Seminar Attended	Date	Venue	Registration Fee
ESCORIAL, Niñaliza H.	"The First Seminar on Promoting Services Trade Professional services trade & R&D Services trade"	November 29-December 2, 2016	Tokyo, Japan	Partially funded by Japan and PCIEERD

STRATEGIC PLANNING WORKSHOP

November 21-22, 2016
Waya Function Room, ACACIA Hotel Manila, Alabang, Muntinlupa City

PARTICIPANTS	POSITION	DEPARTMENT/ DIVISION
DR. CARLOS PRIMO C. DAVID	Executive Director	OED
ENGR. RAUL C. SABULARSE	Deputy Exec. Director	ODED
ROLANDO A. YANQUILING	Admin. Assistant II	ODED
MARIA ELENA A. TALINGDAN	Supervising SRS	OED-IG
NIÑALIZA H. ESCORIAL	Chief SRS	ITDD
RONALDO Q. DOMINGUEZ	Supervising SRS	ITDD
GRACE F. ESTILLORE	Senior SRS	ITDD
KATRINA B. LANDICHO	Senior SRS	ITDD
RUBY RATERTA	Senior SRS	ITDD
TARHATA M. MARIANO	Senior SRS	ITDD
NELSON P. BENIABON	Chief SRS	ETDD
EDNA C. NACIANCENO	Senior SRS	ETDD
MERAIDA D. REYES	Senior SRS	ETDD
CLARINDA G. REYES	Sr. SRS	ETDD
MAY-ROSE B. PARIÑAS	SRS II	ETDD
NONILO A. PEÑA	Chief SRS	EUSTDD
RYAN CHRISTOPHER P. VIADO	Senior SRS	EUSTDD
AGERICO P. BAUTISTA	Senior SRS	EUSTDD
RACHEL R. HABANA	Senior SRS	EUSTDD
CARMINDA R.TANDELCARMEN	SRS II	EUSTDD
ERMIE M. BACARRA	Chief SRS	HRIDD
GLENDA DORAS T. SACBIBIT	Senior SRS	HRIDD
MARIE CHRISTIE B. SANTOS	Senior SRS	HRIDD
ROXANNE E. DELOS REYES	SRS II	HRIDD
EDWARD PAUL H. APIGO	SRS II	RITTD
LEIZL D. SUENO	SRS II	RITTD
ASELA LINGLINGAY R. VILLANUEVA	Senior SRS	RITTD
ALBERT G. MARIÑO	Chief SRS	PCMD
CARLOTA P. SANCHO	Senior SRS	PCMD
GEORGE D. MONROYO	Senior SRS	PCMD
MARY JANE S. DABELA	SRS II	PCMD
SONIA P. CABANGON	Chief Administrative Officer	FAD
MARISSA G. DALAY	Accountant III	FAD
ALEX R. GESMUNDO	Admin. Officer V - Supply	FAD
VILMA ROSA C. BORJA	Admin. Officer V - Cashier	FAD
ENA R. CONDE	Admin. Officer V - Records	FAD
ISIDRO V. QUERUBIN JR.	Admin. Officer V - Budget	FAD
MILDRED F. CABRADILLA	Admin. Officer V - Personnel	FAD
ALLEN Z. MANIBOG	Admin Aide III	SECRETARIAT
QUEENIE ANN A. GACAYAN	Admin Officer II	SECRETARIAT
EMMANUELLE M. MARCELINO	Admin Officer II	SECRETARIAT
TOTAL: 41		

FUNCTIONAL COMPETENCY FRAMEWORK DEVELOPMENT WORKSHOP

November 24-25, 2016
ACACIA Hotel Manila, Alabang, Muntinlupa City

PARTICIPANTS	POSITION
DR. CARLOS PRIMO C. DAVID	Executive Director
ENGR. RAUL C. SABULARSE	Deputy Executive Director
ROLANDO A. YANQUILING	Admin. Assistant II
MARIA ELENA A. TALINGDAN	Supervising SRS
NIÑALIZA H. ESCORIAL	Chief SRS
RONALDO Q. DOMINGUEZ	Supervising SRS
RUBY RATERTA	Senior SRS
GRACE F. ESTILLORE	Senior SRS
KATRINA B. LANDICHO	Senior SRS
FATIMA JHOAN IBARRETA	SRS II
LAARNI T. PILOTON	SRS II
KRISTINA PAULA Y. ANACLETO	SRS I
NELSON P. BENIABON	Chief SRS

PARTICIPANTS	POSITION
CLARINDA G. REYES	Senior SRS
MERAIDA D. REYES	Senior SRS
EDNA C. NACIANCENO	Senior SRS
MAY-ROSE B. PARIÑAS	SRS II
NONILO A. PEÑA	Chief SRS
RYAN CHRISTOPHER P. VIADO	Senior SRS
AGERICO P. BAUTISTA	Senior SRS
RACHEL R. HABANA	Senior SRS
CARMINDA R. TANDELCARMEN	SRS II
ERMIE M. BACARRA	Chief SRS
GLENDA DORAS T. SACBIBIT	Senior SRS
ROXANNE DELOS E. REYES	SRS II
QUINN EIDEL T. EDA	SRS II
EDWARD PAUL H. APIGO	SRS II
LEIZL D. SUENO	SRS II
ALBERT G. MARIÑO	Chief SRS
CARLOTA P. SANCHO	Senior SRS
GEORGE D. MONROYO	Senior SRS
MARY JANE S. DABELA	SRS II
SONIA P. CABANGON	Chief Administrative Officer
MARISSA G. DALAY	Accountant III
ALEX R. GESMUNDO	Admin. Officer V - Supply
VILMA ROSA C. BORJA	Admin. Officer V - Cashier
ENA R. CONDE	Admin. Officer V - Records
ISIDRO V. QUERUBIN JR.	Admin. Officer V - Budget
MILDRED F. CABRADILLA	Admin. Officer V - Personnel
ALLEN Z. MANIBOG	Admin Aide III
DIVINA B. ALMAZAR	SRS I
EMMANUELLE M. MARCELINO	Admin Officer II
PANCHO CERTEZA	Admin Aide VI
ANTHONY DELA CRUZ	Admin Aide VI
BENJIE VILLANUEVA	Admin Aide VI
TOTAL: 45	

2016 PCIEERD SCHOLARS

ROLANDO A. YANQUILING
Master in Info Systems
On-going

DARWIN V. SANTOS
Master in Information Systems
On-going

DESIREE D. VERA
MS in Food Science
On-going

MARY JOY C. BUITRE
MS in Environmental Science
On-going

MARIE CHRISTIE B. SANTOS
MS in Info Systems
On-going

ULYSSES M. PALMONES
MA in Development Studies
On-going

MARY GRACE G. BUENAVIDES
MS in Materials Science
On-going

JOSEPH H. ESCORIAL
Ph.D. in Management
On-going

EMELITA ASUNCION S. DIMAPILIS
MS in Chemical Engineering
On-going

RUSSELL M. PILI
Master of Laws (LLM)Intellectual Property
On-going

ENGAGING THE PUBLIC AND THE MEDIA IN SCIENCE INFORMATION

The past years saw the dramatic transformation of science information accessibility, flow and connectivity. There was a surge of science communication and information exchange among different publics especially among the younger population.

This was the landscape in PCIEERD in 2016. The Information Group (IG) aggressively utilized and bravely transformed the way of making science and technology information sexier, more interesting, and most of all, fun-filled. It focused on using social media—Facebook, Twitter, Instagram—realizing that this is where everyone is, anywhere in the world, at any time of the day. This resulted in a remarkable engagement and perception of the public and the media on science information. Added to which, PCIEERD also maintained the more traditional means of information dissemination using broadsheets, press conferences, and RTV interviews. Indeed, the medium is the message.

"We started with engaging media just to put out the products that DOST has been doing. We had a very good year, particularly our Information Group, and I think we had around 500 media engagements anywhere from published articles to interviews…. So there's a focus on public perception. At the same time, other than media engagements, we had events like trade fairs—we were always there," said Dr. Carlos Primo David, PCIEERD's Executive Director. "The public has to see the effect of R&D."

IG not only manages and implements the Council's information dissemination and promotion via media (press conferences, press releases, trade fairs and exhibits, tours, etc.) and social media, it also funds and monitors promotion-related projects such as the DOSTv and the Strategic Communication to Boost PTRI Promotions.

> Disseminating science information will always be a challenge due to its nature. But there is no longer a hindrance for science information getting into the mainstream, fast and easy. All platforms of social media are at our disposal. However, we must be clever enough in coming up with science-related posts/stories that are engaging, to make audiences relate and positively affect their everyday grind. Pinoy Science and DOST PCIEERD FB pages have become a meeting place and source of such information."
>
> MARIA ELENA A. TALINGDAN
> Supervising Science Research Specialist,
> Information Group,
> Office of the Executive Directorr

SOCIAL MEDIA CAMPAIGNS

Pinoy Science Facebook: Making science popular and engaging

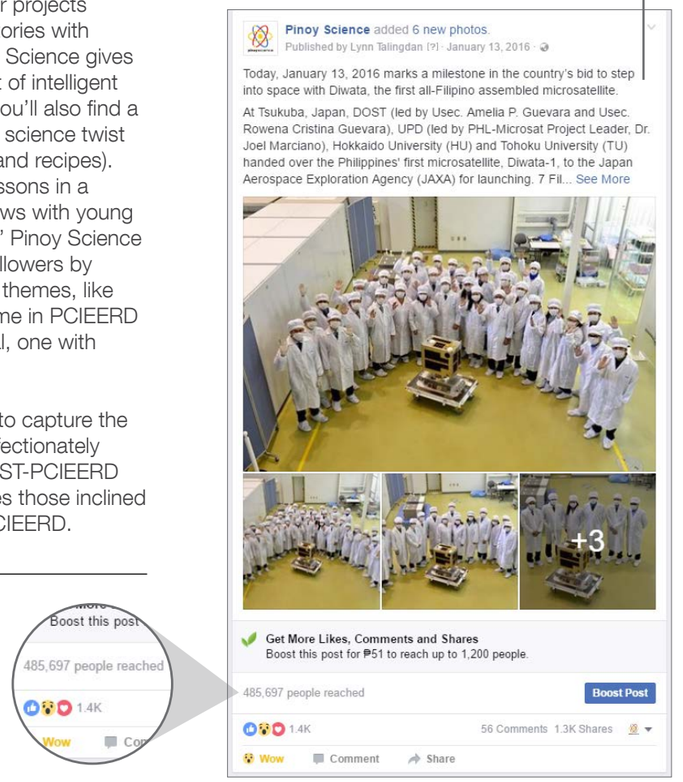
Pinoy Science (www.facebook.com/pinoyscience), the social media campaign of DOST-PCIEERD, gained momentum this year in promoting science to the general public. Regular posts with well-conceptualized copy and visuals attracted more participatory visitors to the site, resulting in an organic gain of over 13,000 likes by yearend, and 14,297 likes by February 2017.

Aside from the featured technologies or projects of PCIEERD in carefully written short stories with accompanying visuals or videos, Pinoy Science gives a daily dose of science trivia with a hint of intelligent humor (#SciencePuns). Occasionally, you'll also find a post related to a specific hobby, with a science twist (e.g. #LutongAgham food technology and recipes). The site presents science news and lessons in a relatable way, helped in part by interviews with young scientists dubbed "Pinoy Science Idol." Pinoy Science also encourages the engagement of followers by involving them in games using popular themes, like ScienceHugots. In 2016, for the first time in PCIEERD history, science related-posts went viral, one with about 400K reach!

In such manner, Pinoy Science is able to capture the imagination of the Filipino audience, affectionately dubbed "Juanderers." By featuring DOST-PCIEERD supported technologies, it also engages those inclined toward science to learn more about PCIEERD.

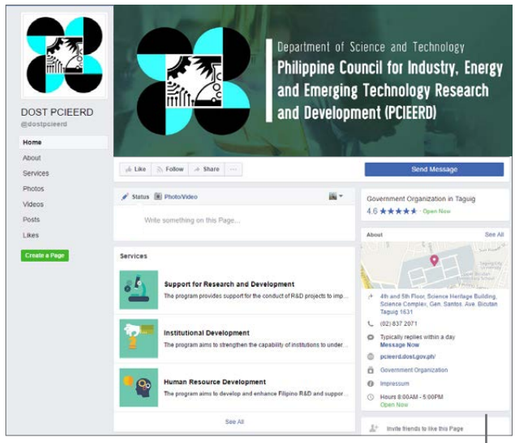
Pinoy Science Facebook homepage

Viiral Pinoy Science Facebook post about Philippines' first microsatellite, Diwata-1

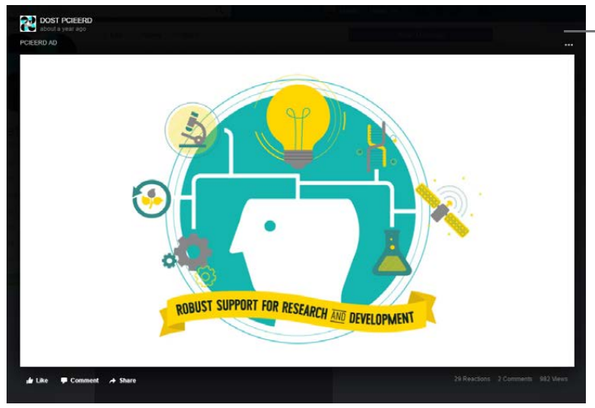


DOST PCIEERD Facebook

PCIEERD maintains its official or institutional FB page (www.facebook.com/dostpcieerd) that features the activities of the Council and of the DOST. This is also where the Council announces its Call for Proposals, and other announcements.

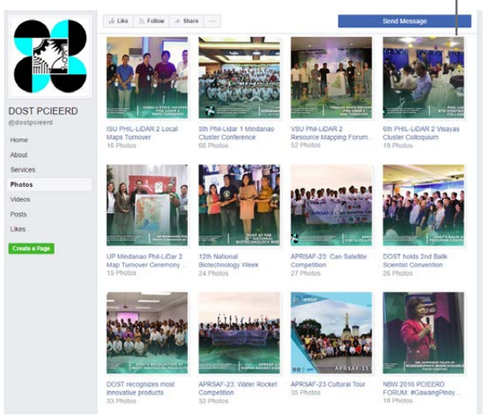


DOST PCIEERD Facebook page



Announcement of Call for Proposals

DOST PCIEERD events and activities coverage



TRI-MEDIA ENGAGEMENTS

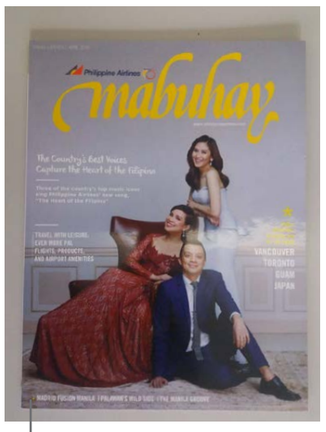
PCIEERD in Major Broadsheets, Magazines, Major TV Networks and Radio

In its resolve to reach as many readers as possible, PCIEERD also ventured in establishing connections with Philippine Airlines (PAL), knowing that the carrier has a captive audience. Mabuhay Magazine, the in-flight magazine of PAL, published two stories submitted by PCIEERD.

Stories also landed in the front pages of major broadsheets as well as in TV and Radio Networks. Over 500 published articles were recorded and about 20 interviews featured in 2016

Article on Diwata's first images made it to Philippine Daily Inquirer's front page

Diwata-1 featured on the cover of Philippine Panorama magazine



DOST Food Innovation Products featured in Mabuhay, Philippine Airlines' in-flight magazine

IG EVENTS, EXHIBITS, & TOURS

National Biotechnology Week (NBW 2016)

The 12th National Biotechnology Week (NBW) was held on November 21-25, at the Bureau of Soils and Water Management (BSWM), Visayas Avenue, Quezon City, with the theme, "*Bioteknolohiya: Kaagapay sa Pangkalahatang Kaunlaran"* and tagline: "Yakapin ang Pagbabago, Biotek na tayo!"

The Department of Agriculture was elected as this year's chairman of the inter-agency committee composed of the Departments of: Science and Technology, Education, Environment and Natural Resources, Interior and Local Government, and Trade and Industry.

The celebration was composed of lectures, workshops and seminars, competitions, and technology and trade exhibits. These activities highlighted the importance of Biotechnology and its application to food and agriculture, health and wellness, environment and resource management, and the industry.

"We can be proud to say that we have achieved significant strides in the promotion of a science-based culture, as we see more and more Filipinos embracing the benefits of this technology," said Department of Science and Technology (DOST) Secretary Fortunato de la Peña.

At the NBW 2016, PCIEERD showcased two biotechnology-related projects, namely: Cacao Fermentation, a project using microbial and chemical analyses to produce better quality cocoa, and the use of *Monascus purpureus* as an alternative colorant.

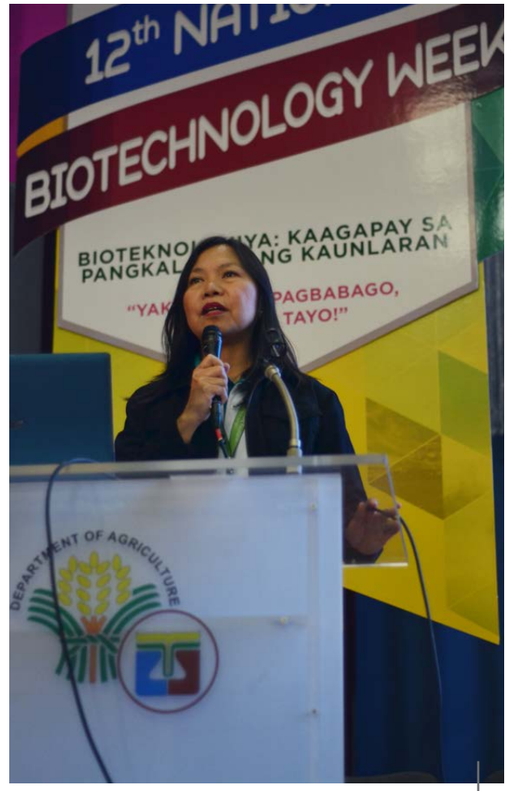
NBW is celebrated annually in accordance with the Presidential Proclamation No. 1414, s. 2007 to recognize the importance of Biotechnology and its impact to society. Biotechnology increases crop yields with improved value and quality of crops, and farm productivity; contributes in the development of vaccines, antibiotics, and other drugs which makes healthcare accessible to many; delivers benefits to the environment such as in the production of renewable energy, conservation of topsoil and protection of water quality; aids in meeting the increasing and sustained demands for improved food production system and health and wellness through the emergence of new industries. Also, forensic DNA Analysis and similar DNA technologies have hugely contributed in today's administration of justice.

"The Department of Science and Technology will remain supportive of the endeavors that will help in furthering initiatives to sustain modern biotechnology. Likewise, we shall be at the forefront of ensuring that the best and available science is utilized and applied in the crafting of policies, guidelines, and decisions regarding modern biotechnology," DOST Secretary de la Peña added in his message.

Dr. Myrna Nisperos giving her talk during the 2016 NBW

Pinoy Science at the National Biotechnology Week

Students participating in the NBW



Ms. Maria Elena Talingdan giving her Opening Remarks during the 2016 NSTW forum

Participants from the Philippine Science High School

NSTW 2016: JUANderWALK

True to the overarching theme, “Juan Science. One Nation,” the National Science and Technology Week this year was celebrated simultaneously nationwide, at all DOST regional offices, apart from the four major science hubs in Bicutan, Taguig; Quezon City; Manila; and Los Baños, Laguna.

PCIEERD led the Bicutan Science Community in kicking off NSTW 2016, which was held from July 25 to 29. During the week, all agencies within the DOST Complex, including their laboratories, opened their doors to the public. Students and professionals alike viewed and participated in exhibits, fora, film shows, tech demos, product launches (notable was the presentation of the ‘Tryk ni Juan’ abaca fiber-reinforced composite tricycle roof), entrepreneurial and livelihood activities, food tasting, contests, games, photo booths, and other activities.

PCIEERD tied up with the National Academy of Science and Technology (NAST) and the Science Education Institute (SEI) for an interactive educational exhibit dubbed “JUANderWALK: An Adventure Walk in S&T,” which featured the PCIEERD-funded technologies, and “Future Flavors,” which offered tasty treats of the best that the food hubs have produced.

Set up at the Science Heritage Building of the DOST Complex in Bicutan, JUANderWALK provided visitors a glimpse into the capabilities of the local science community, while offering several ways to have fun while learning.

Students try on Virtual Reality Experience game, a project of UP EEEI

Students get to play interactive games like IGPAW, an augmented reality game of Ateneo De Manila University

Researcher from UP demonstrates how nanowires, a conductive ink, works in LED lights.

Students get a chance to play a Guitara ni Juan prototype

FUTURE FLAVORS

Food security is part of what science aims to achieve, and that means innovations that would ensure we have enough to eat, no matter the circumstances. Ten years ago, who could have imagined an arroz caldo that could be eaten without water? PCIEERD, through an exhibit called “Future Flavors,” says it’s not only possible, but ready for rollout.

“Future Flavors” is a recurring exhibit that showcases particularly noteworthy food products and food technology innovations produced by the Food Innovation Centers (FICs) of the Department of Science and Technology (DOST). In 2016, no less than four such exhibits and one media guesting were held: during PCIEERD’s inaugural Technology Transfer Day on April 27 at the Sofitel Philippine Plaza, Pasay City; the Gitara ni Juan launch on May 12 at the UP College of Music in UP Diliman, Quezon City; the National Science and Technology Week on July 25-29 at the DOST Complex in Bicutan, Taguig; the Sikat Pinoy National Arts and Craft Fair on October 26-30 at Megatrade Halls 1-3 in SM Megamall, Mandaluyong City; and during a special episode of the morning show Unang Hirit aired on GMA Network on Dec 7.

One of the food innovations showcased is the ready-to-eat arroz caldo, originally developed as a relief food for disaster victims in 2014, and included among the R&D 100 Awards Finalists by R&D Magazine in 2016. It can withstand aerial distribution of about 800 to 1,000 feet, for flooded areas or disaster zones which can’t be reached by land. The ready-to-eat arroz caldo is lightweight, handy, has a shelf life of one year, and can be eaten without water. This ensures that a filling, nutritious meal can be served even in dire circumstances when potable water becomes either scarce or unavailable.

Other food innovations featured include a thermally-processed instant laing (gabi leaves cooked in coconut milk and seasoned with ginger and chili), iron-fortified rice, stabilized brown rice, ready-to-fry gluten-free cassava cookies and chips, and a nipa sweetener with low glycemic index. As with all “Future Flavors” endeavors, these products are deemed ready for adoption as business opportunities.

Visitors to “Future Flavors” exhibits can look forward to more innovations, as PCIEERD’s FICs continue to look for ways to promote greater food consistency, longer shelf life, the removal of toxins, reduction of food-borne diseases, and cheaper production processes.

PCIEEERD Executive Director Dr. Carlos Primo David leads the food tasting event at the Technology Transfer Day 2016

Food Innovation Products display for GMA 7’s Unang Hirit feature

Guests of TID Updates event get to taste the food innovation products at Future Flavors

Future Flavors display at Gitara ni Juan Concert

15th Trade and Industry Development Updates featuring DOST's innovation hubs and centers

By Charmaine Baisa, Jahn Patrice Rington and Ira Dominique Guerrero

The Department of Science and Technology (DOST), led by PCIEERD, together with the Department of Trade and Industry (DTI) and Board of Investments (BOI), hosted the 15th Trade and Industry Development Updates (TID Updates) on June 17, 2016, focusing on DOST's innovation hubs and centers.

TID Updates is a series of fora which is done to inform the public and the other stakeholders on the recent developments of the DTI-BOI's Industry Development Program. It started last August 2013, when they focused on the chemical, mining, and manufacturing industries. For the 15th installment of the fora series, they featured the DOST's Innovation hubs and centers.

DOST Undersecretary for Scientific and Technological Services, Dr. Rowena Cristina L. Guevara, started the forum by discussing the importance and contribution of these innovation hubs to the different industries when it comes to employment and increasing the quality of the products. "These state-of-the-art facilities will enable industries to develop technologies and business models that will contribute to global competitiveness of industries and improve the country's productivity," she said.

Along similar lines, DTI Secretary Adrian S. Cristobal Jr. emphasized that the industries are producing more jobs for Filipinos, whereas then-DOST Secretary Mario G. Montejo spoke of the DOST's vision to create innovations in an environment that attracts investors. Mr. Montejo also compared Philippines to other neighboring countries like Taiwan and China in terms of workers' salary and cost of equipment in the industry. According to him, Philippines has the lowest salary among the three countries while spending a lot of money for the equipment.

DOST-PCIEERD Executive Director, Dr. Carlos Primo C. David, on the other hand, talked about the visioned impact of research and development in the country.

He believed that R&D can help increase the country's number of job opportunities. He also cited studies abroad noting that there will be an increase in market value when investing to R&D. Aside from this, he also introduced the innovations that are being developed in DOST. These technologies are of great help in improving the quality of the products of the different industries here in the Philippines, particularly in food, textile, and electronics.

For her part, Regional Director Brenda L. Nazareth-Manzano informed the delegates on the status of OneLab, which is a One Stop Shop Laboratory Services for Global Competitiveness. OneLab is a project of DOST which aims to create a network for laboratories to avoid transporting samples, and thus, minimizing attendant risks.

After the talks, the delegates were able to explore the DOST centers and facilities through a tour. They visited the ITDI's NanoLab, Advanced Device and Materials Testing Laboratory (ADMATEL), Food Innovation Center, and Packaging Center, MIRDC's Die and Mold Solution Center, PTRI's Innovation Center for Yarns and Textiles, and the Electronics Product Development Center (EPDC).

DOST-PCIEERD also set up a "Future Flavors" booth during the event "Future Flavors" is a collection products of the technologies developed and funded by DOST; usually on display are a variety of food products produced by the DOST Food Innovation Centers (FICs) from the different regions in the Philippines using DOST-developed food processing equipment – vacuum packaging machine, water retort, vacuum fryer, spray dryer, and freeze dryer. Noted advantages of food processing include greater food consistency, longer shelf life, removal of toxins, reduction of food borne diseases and cheaper food. The event ended with an open forum where questions from participants were answered by the facility managers.

PCIEERD Facility tours

To reinforce partnerships and promote collaboration, PCIEERD conducts facility tours for industry, media, and its stakeholders. The aim is to familiarize and educate them on the available technology, encourage participation in scientific endeavors, and transparently show what was made possible through government funding.

The usual destinations for facility tours in the Bicutan complex are the Philippine Textile Research Institute (PTRI), Electronics Product Development Center (EPDC), Advanced Device and Materials Testing Laboratory, and ITDI's Food Processing Division. For the Quezon Community, tours were conducted at the DNA Core Sequencing Facility at the Philippine Genome Center (PGC); for the Mineral Extraction with Responsibility for Sustainability (MinERS) program and National R&D Rubber Program, both at UP DMMME; and Robust and Rapidly Deployable GSM Base Stations and Backhaul for Emergency Response (ROGER) at UP EEEI. There was also a demo of Versatile Instrumentation System for Science Education and Research (VISSSER) at UP NIP.

On some occasions, no less than PCIEERD Executive Director Dr. Carlos Primo C. David would guide a tour, as was the case in the 2016 media tour of the service facilities, and the walkabout with Governing Council members to view PCIEERD-funded facilities in UP Diliman.

Engineer from ITDI's Packaging Division shows how packaging boxes are made.

Engr. Rico Delmoro, EPDC Manager, tours the guests inside EPDC's EMC Chamber

Former DOST Secretary Mario G. Montejo at the Gear Making Facility of DOST-MIRDC

Facility tour attendees inside the PTRI's Innovation Center for Yarns and Textiles

IG-MONITORED PROJECTS

DOST live on web, TV

Project Leader: Richard P. Burgos, DOST - Science and Technology Information Institute (DOST-STII)

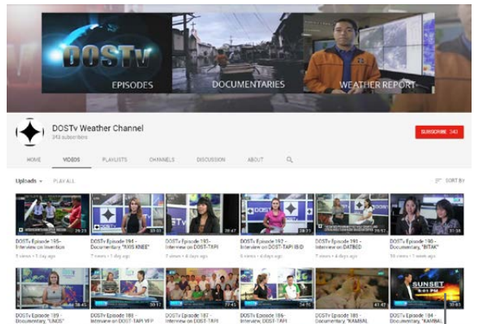
In the recent spate of calamities and disasters, DOST has to be more vigilant in reaching out to people and make them not only knowledgeable, but well-prepared for any critical situation. DOSTv was thus conceptualized as a multi-platform information program simulcast over the web to serve as a reference center for science and technology news, and to provide the public with a daily/hourly source of science-based and reliable information.

Through DOSTv, the DOST is now using television and the internet—both considered influential, powerful and far-reaching mediums of communication—to deliver needed information that will directly affect people's lives. Programming contents include weather, flood, and water level updates from DOST-PAGASA and PHIVOLCS; one-on-one live talk interviews with science and technology experts, DOST officials, and employees; documentaries; DOST flash report; public service announcements; trivia; bulletins such as "What's the Weather With You"; and the "Finding Joona" special feature.

DOSTv was launched on May 30, 2016, airing online at the DOST website (www.dostv.ph.), official YouTube channel (www.dostv.ph/youtube), and in Facebook channels. Since then, the expanded program has incorporated other segments on topics that deal with livelihood, technology trends, and outstanding individuals (young and old) in the field of science and technology. This makes the program more versatile, gain greater viewership, and at the same time promote better public appreciation for science.

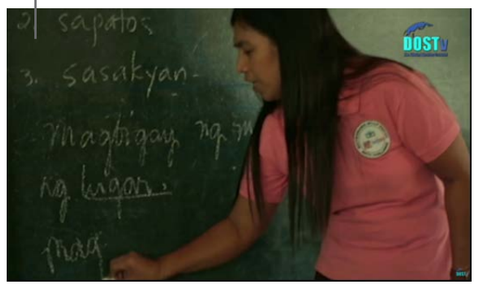
As of this writing, DOSTv has completed over 170 episodes, and continues to air live from 11 a.m. to 12 noon, Mondays to Fridays. Plans are also underway for DOSTv to be aired on free TV.

DOST-Science and Technology Information Institute (STII) Director Richard P. Burgos said they ventured to online broadcasting owing to the accessibility of TV and the internet. "It is the easiest way to broadcast because it is economically viable. We want to reach out to a bigger audience and these are just baby steps to a bigger dream."



DOSTv's Youtube Channel

Screen-captured from one of DOSTv's documentary films



Screen-captured from DOSTv's weather update report

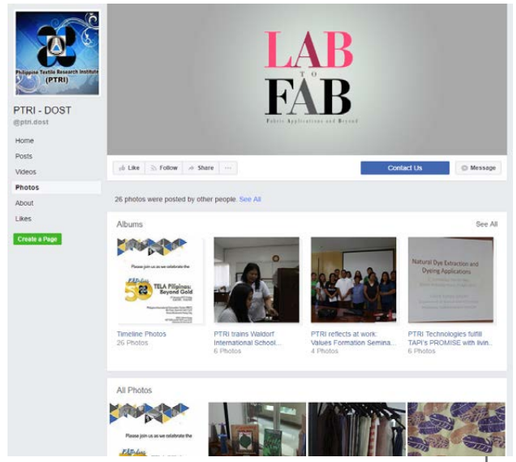
Strategic Communication to Boost PTRI Promotions

Project Leader: Mr. Norly B. Villar, DOST - Philippine Textile Research Institute (DOST-PTRI)

It's a good time for Pinoy Fashion. Filipino designers have been making waves in the international fashion arena, which has sparked interest in Filipino designs using unique fabrics and the traditional craft of weaving. However, it has also created a need to undertake an aggressive promotion and awareness, not just on fashion products, but on fashion-forward research and development (R&D).

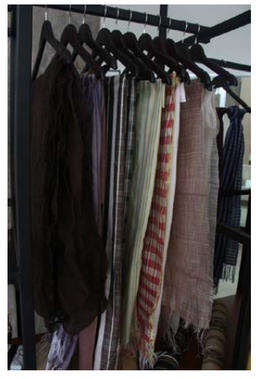
The DOST's Philippine Textile Research Institute (PTRI), which is mandated to assist the textile, garment, and allied industries, has been working hard to serve technologies that intend to boost the local garments sector in becoming more globally competitive. As the lead government agency and brand in textile research, the Institute is not only hands-on in advancing technology interventions through strong R&D but also offers training courses to equip the workforce of the textile industry. This includes fabric and fiber testing and evaluation, extraction and application of natural dyes, development of new natural textile blends, and spinning, knitting, weaving and finishing technologies. The PTRI has also been mapping regional handloom weaving communities in line with the growing international interest in Filipino fashion, and connect them to the actual market.

PTRI's efforts to reach out to potential adaptors and end-users of PTRI-developed textile-related technologies led to the creation of the "Lab to Fab" promotions via the PTRI's Facebook site (*www.facebook.com/ptri.dost*). As of March 2017, the FB page has garnered 1,315 likes from 1,310 followers. This web campaign is combined with brochures/ printed collaterals, radio interviews, and facility tours. In developing a more strategic communications plan for PTRI, the convergence of science, culture/art, and the social impact of PTRI and DOST interventions, is the main theme alongside with preserving Filipino practice and culture of traditional fiber and fabric production. All these with the goal of encouraging the textile industry to engage and collaborate with PTRI through the adoption of over 30 developed technologies and improved awareness of PTRI as the textile research and development institute/brand in the country.



DOST-PTRI's Facebook Page

Scarves and apparel showcased in PTRI Showroom



EVENTS

ANIMBERSAYA

The PCIEERD celebrated its sixth year as an organization in 2016. The main celebration, which followed the outreach program, was held on June 29, 2016 at the Widus Hotel, Clarkfield, Pampanga with the theme, “Hatid ng Agham at Teknolohiya, Kaunlaran ng Bawat Isa.” Aside from being a celebration, the event also introduced PCIEERD-funded technologies and innovations to students, researchers, local government officials, potential investors, technology adopters, and other beneficiaries. Interested parties were then invited to attend business-matching technology clinics.

Animbersarya (a portmanteau of the Filipino words for “sixth,” “anniversary,” and “joy”) also featured a series of talks about turning technologies into business, the challenges of running a technology-based business, competition in the industry, and protecting one’s intellectual property. During the breaks, the Manila Guitar Quartet entertained the audience with a musical performance using guitar prototypes from Gitara ni Juan, a PCIEERD-funded project.

Attendees were also treated to a free ride on the DOST Hybrid Road Train, which runs on either diesel fuel or electric batteries through a hybrid engine. It is one of the proposed solutions to the worsening traffic and mass transportation issues currently plaguing the country.PCIEERD Executive Director Dr. Carlos Primo C. David capped off the event by revealing that the technologies featured were only but a handful from among over two hundred innovations turned over from PCIEERD-funded projects.

The PCIEERD family celebrating 6th Anniversary

PCIEERD Executive Director delivers his message to PCIEERD employees

Trophies for the PCIEERD Loyalty Awardees

AWARDEES

Awarded by Dir. Carlos Primo David and Deputy Executive Director Raul C. Sabularse, Mr. Carluz Bautista received the award as 2015 Best Technical Contractual Personnel

Ms. Elaine Anette C. Salma received the award for the Best Support Contractual Personnel.

Ms. Allen C. Manibog and Mr. Caluz Bautista won as Gandang Lalake and Gandang Babae during 6th Anniversary.

Ms. Clarinda Reyes & Ms. Grace F. Estillore (not in photo) as Best Senior Project Managers.

Aileen Ventura awarded as Best Junior Support Personnel.

Kristina Paula Y. Anacleto Best Junior Project Manager

WAVE TEAM-BUILDING

To promote harmonious synergy of personal motivations and company values, and ensure that its personnel continue to perform their work with excellence and heart, PCIEERD held its Work Attitude and Values Enhancement (WAVE) Program on June 2 to 3, 2016 at the Caliraya Resort Club, Laguna. The WAVE team-building activity aimed to discover PCIEERD employees' personal vision, mission, and values and harness them in accordance with the organization's core values and leadership competencies. At the end of the program, the participants were expected to discover their own work value system in relation to the core values and competencies of the organization through the different WAVE models.

PCIEERD personnel dressed up for Hawaiian themed Team Building after Party

PCIEERD personnel actively participates at WAVE activities

PCIEERD family at WAVE 2016

Ceramic Water Filters to be distributed to the communities

OUTREACH PROGRAM

To give back to the Filipino community, the PCIEERD held its annual outreach program on June 28, 2016 in Sitio Cuadra, Mabalacat, Pampanga. Here, the PCIEERD deployed a low-cost rainwater collection system, and ceramic water filters, and taught the Aeta community how to use these technologies. The rainwater collection system was developed by the Industrial Technology Development Institute (DOST-ITDI) in partnership with Manly Plastics, with funding from PCIEERD. Besides which, school supplies, clothes, and iron-fortified rice developed by the Food and Nutrition Research Institute (DOST-FNRI) were also distributed to the beneficiary Aeta community.

Community members check out the newly installed Rainwater Collection System given to them

PCIEERD personnel with the beneficiaries of the Rainwater Collection System

LINKAGES:

LOCAL AND INTERNATIONAL NETWORK

True to its mandate, PCIEERD fosters technical cooperation and collaboration, here and abroad. For 2016, it strengthened its links with the following institutions:

MATERIALS SCIENCE

e-Asia Joint Research Program

Manila Economic and Cultural Office - Taipei Economic Cultural Office (MECO-TECO)

ASEAN Sub-Committee on Materials Science and Technology (SCMST)

BIOTECHNOLOGY

Philippine Sugar Research Institute Foundation, Inc.

Sugar Regulatory Administration

DISASTER MANAGEMENT

e-Asia Joint Research Program

National Irrigation Administration

National Water Resources Board

Manila Economic and Cultural Office - Taipei Economic Cultural Office (MECO-TECO)

JICA Technical Cooperation Program

PH-US Joint Science and Technology Cooperation
JICA-JST SATREPS (PHIVOLCS & PAGASA Projects)

ELECTRONICS AND INFORMATION & COMMUNICATIONS TECHNOLOGY

Department of Trade and Industry - Board of Investments

Electronics Industries Association of the Philippines, Inc.

Semiconductor & Electronics Industries in the Philippines, (SEIPI)

ENERGY

Manila Economic and Cultural Office - Taipei Economic Cultural Office (MECO-TECO)

Philippine-California Advanced Research Institute

Auto-LPG Technical Working Group

National Biofuels Board

ASEAN Sub-committee on Sustainable Energy Research (SCSER)

ENVIRONMENT

Biodiversity Conservation Society of the Philippines

British Council

Caraga State University

Carmen Copper Corporation

Lepanto Consolidated Mining Company

Manila Mining Corporation

National Sun Yat-Sen University

Philex Mining Coporation

Research Councils UK

Royal Botanic Garden Edinburgh

University of Nottingham

University of Surrey

Xavier University

Ferrochrome Processing Plant

Municipal Solid Waste Sub-Committee

Global Environment Facility Writeshop/Workshop on re: International Waters Biodiversity, POPs and Climate Change

Japan-Philippines Dialogue on Waste Management (DFA, DENR)

Joint Crediting Mechanism with Japan Development Mechanisms

Benguet Federation of Small scale miners

Silangan Mining Corp.

Benguet Federation of Small-Scale Miners, Inc.

Brgy. Tumpagon, Cagayan de Oro

Brgy. San Simon, Cagayan de Oro

Kalinga: Kalinga Agricultural State College

Marinduque: Mogpog Municipal Environment and Natural Resources Officer

(MENRO) and Kabayan Action Group

Rapu-rapu Island: Non-Government Organization (SISKI)

Cebu: Carmen Copper Corporation, University of Saint La Salle Andres Soriano Memorial College

Negros: University of Saint La Salle

Compostela Valley: Maragusan Municipal Environment and Natural Resources Officer (MENRO)

Taganito Mining Corporation (TMC)

Zambales Diversified Metals Corporation (ZDMC)

Magarwak, Puerto Prinsesa and Urduja, Narra in Palawan LGUs

FOOD PROCESSING

Central Mindanao University

Department of Agriculture

Department of Health

Nanyang Polytechnic

National Commission on Muslim Fllipinos

Sultan Kudarat State University

Temasek Foundation International

University of Southern Mindanao

Department of Trade and Industry

Stanford Alumni

LGUs (2,3,4B,7,8,9,10,13)

HUMAN RESOURCES DEVELOPMENT

Engineering Research and Development for Technology

Sung Kyun Kwan University

METALS & ENGINEERING

Adventist University of the Philippines

Aerospace Industries Association of the Philippines

Electronics Industries Association of the Philippines, Inc.

Metalworking Industries Association of the Philippines

Metal Industries Research & Development Centre Taiwan

Mechatronics and Robotics Society of the Philippines

Philippine Welding Society

Philippine Metalcasting Association Insitute (PMAI)

Philippine Die and Mold Association, Inc. (PDMA)

Original Equipment Manufacturer's Association of the Philippines (OEMAP)

National Apiculture Research, Training and Development Institute

Coco Coir National Technical Working Group

MINING & MINERALS

Minerals and Energy for Development Alliance

Stratbase ADR

Presidential Mineral Industry Environmental Award (PMIEA)

Mining Industry Coordinating Council

PROCESS

Asia Pacific Metrology Programme

Philippine Rubber Technical Working Group

Philippine Council for Agriculture and Fisheries Sub-Committee on Rubber

Philippine Council for Agriculture and Fisheries Sub-Committee on Cacao

Philippine Council for Agriculture and Fisheries Sub-Committee on Coffee

ASEAN Consultative Committee for Standards and Quality-Rubber-based Product Working Group

Textile Mills Association of the Philippines, Inc. (TMAP)

Garment Business Association of the Philippines (GBAP)

Foreign Buyers Association of the Philippines (FOBAP)

Non-Timber Forest Products-Exchange Programme-Philippines

SPACE TECHNOLOGY APPLICATIONS

Asian Association on Remote Sensing

Clyde Space Ltd.

Hokkaido University

Japan Aerospace Exploration Agency (JAXA)

King Mongkut's Institute of Technology Ladkrabang (KMITL-Thailand)

Kyushu Institute of Technology

Indonesian National Institute of Aeronautics and Space (LAPAN)

Myanmar Aerospace Engineering University

Ministry of Education, Culture, Sports, Science and Technology (MEXT - Japan)

Multimedia University (Malaysia)

Myanmar Maritime University

National University of Mongolia

Bangladesh Space Research and Remote Sensing Organization (SPARRSO)

Tohoku University

UK Space Agency

University of Surrey

University of Yangon

Universiti of Malaysia Sabah

Vietnam France University

Vietnam Academy of Science and Technology - Vietnam National Satellite Center (VAST - VNSC)

TECHNOLOGY TRANSFER AND TBI

Asian Institute of Management

De La Salle University

Electronics Industries Association of the Philippines, Inc.

Maibarara Geothermal Inc.

Research Councils UK

Royal Academy of Engineering

University of Texas

Vista Group of Companies

British Council - PCIEERD (Newton Fund)

University of Science and Technology of Hanoi (VAST-USTH)

ASEAN Subcommittee on Space Technology and Application

JICA-JST SATREPS (PHIVOLCS & PAGASA Projects)
APRSAF

China-ASEAN Science and Technology Innovation Policy Research Center (CASTIP)

1000 Angels

UP - Office of the Vice Chancellor for Research and Development

Hybridigm Consulting

IdeaSpace Foundation

Tekton Geometrix Inc.

TRANSPORTATION

Department of Transportation

Marina

Joint Crediting Mechanism with Japan Development Mechanisms (JCM)

Science, Technology, Research and Innovation for Development

FINANCE AND ADMINISTRATIVE DIVISION (FAD)

They've got their eye on the budget.

The FAD handles personnel administration, supply, cash and property management, communications and records management, budgeting, and accounting. Their good service ensures that the government's funds and assets go where they are meant to go—not a peso wasted.

PCIEERD 2016 FINANCIAL PERFORMANCE REPORT

The 2016 General Appropriations Act no. 10717 includes the PCIEERD Budget amounting to P 690,086,000.00. This is 11% higher than the council's 2015 approved budget (P 616,581,000.00). The breakdown are as follows: Personnel Services with P 49,080,000.00, Maintenance and Other Operating Expenses with P 636,892,000.00 and Capital Outlay with P 4,114,000.00. The largest portion of PCIEERD's budget was allotted for the Grants-In-Aid (GIA) Funds. PCIEERD was able to utilize funds forvarious projects with a total of P 613,280,000.00 under the Council's thrusts and programs. Under the PCIEERD's major programs, the breakdown of fund releases are as follows: Competitive industries; P 447,082,000.00 Sustainable Energy; P 10,532,000.00 Sustainable Mass Transport; P 28,329,000.00 and Environment, Climate Change Adaptation and Disaster Risk reduction; P 127,337,000.00

PCIEERD has also gathered a total of P 270,225 million project funds from external sources. This fund is for the implementation of various projects from DOST, DTI and for the monitoring and evaluation of DOST-funded projects.

Breakdown of Allotment and Obligations:

A. By Programs/Activity

Program	Allotment	Obligations	Balances
General Administration Services	30,770,000.00	25,842,789.40	4,927,210.60
MFO 1: R&D Policy and Planning Services	99,932,000.00	98,105,014.03	1,826,985.97
MFO 2: R&D Management Services	559,384,000.00	556,910,182.51	2,473,817.49
TOTAL	690,086,000.00	680,857,985.94	9,228,014.06

Breakdown of Allotment and Obligations:

A. By Expense Class

Program	Allotment	Obligations	Balances
Personnel Services	49,080,000.00	44,232,538.32	4,847,461.68
Maintenance and Other Operating Expenses	636,892,000.00	632,943,369.70	3,948,630.30
Capital Outlay	4,114,000.00	3,682,077.92	431,922.08
TOTAL	690,086,000.00	680,857,985.94	9,228,014.06

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

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