OUTCOME 6

#HealthPH
Improved Quality Healthcare and Quality of Life through Science, Technology and Innovation

Deparment of Science and Technology

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OUTCOME 6- **#HEALTHPH** | IMPROVED QUALITY HEALTHCARE AND QUALITY OF LIFE THROUGH SCIENCE, TECHNOLOGY AND INNOVATION

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FOREWORD

Science Nation. The phrase is not an apt description for our country of 7,107 islands. Not yet.

The key to make the Philippines a real "Science Nation" is information. With information, programs and technologies developed or funded by the Department of Science and Technology (DOST) – as well as other locally crafted technologies which help solve the country's multi-sectoral problems - become known among Filipinos in all corners of the archipelago, thus pushing them to avail or to take advantage of these science-based innovations to uplift their lives.

When such information is cascaded to the Filipino everyman – every Juan and Maria, including those in the so-called "laylayan ng lipunan" - a lot of things are on cue to take place:

Farmers will become more productive and earn more, small enterprises will grow, thrive and be more competitive, industries will be revitalized, technopreneurship will be more prevalent and employment will increase via the Business Process Management (BPM) sector, government services will become more responsive, healthcare services will improve and become more accessible to more Filipinos, opportunities for S&T education especially among the underprivileged will become more available, and the citizenry will be armed with more effective strategies for disaster preparedness and strategies.

What I had just mentioned are the DOST 8 Outcomes – eight specific targets that the Department aims to achieve in the long run via the following sectors: Agriculture (Outcome 1), Enterprise (Outcome 2), Industry (Outcome 3), IT-BPM (Outcome 4), E-governance (Outcome 5), Health (Outcome 6), Education (Outcome 7), and Disaster Preparedness (Outcome 8).

This compendium of seven publications is a tool for delivering such vital information. It presents to you how DOST and its 8 Outcomes address the current problems in each of these sectors, and thus help contribute to the Philippines' economic resurgence. Six of these seven publications tackle one DOST Outcome each, while the seventh publication focuses on both Outcomes 4 and 5.

In short, this collection is a veritable showcase of the Department's various initiatives across these eight sectors, with stories of ordinary Filipinos whose lives have been touched by the possibilities that S&T has to offer. These stories – encapsulated in news and feature articles – were written by information officers from the different DOST agencies. The articles capture in a nutshell

the pivotal role of S&T in a nation's journey to progress and prosperity and why, therefore, S&T should not be taken lightly by any nation, much less a developing country such as the Philippines. S&T, on the contrary, should be at the forefront of government efforts to drive the country forward and sustain this horizontal trajectory. S&T therefore, should not take the backseat.

This particular publication – titled **#HealthPH Improved Quality Healthcare and Quality of Life through Science, Technology and Innovation** focuses on DOST Outcome 6 which is Health. For this Outcome, DOST envisions an improved quality healthcare and quality of life for Filipinos. It will try to achieve this through three strategies: provision of affordable and effective technologies to help address public health problems, development of technologies that broaden the access and delivery of appropriate medical care to underserved communities, and provision of technologies to help address the basic health needs of Filipinos.

Indeed, information is one of the starting blocks for the country's successful run toward being the definitive Science Nation that it should be. For it is only through complete, accurate, comprehensible, and timely information that mass or public awareness is generated. If the public is aware of scientific and technological developments, they now know how to improve their lives, and thus take action to make this a reality. If there is action, S&T then gets the chance to show off its full capability: rolling its veil of magic across the sectors, over the entire nation, to wrap the entire Philippine population with the bountiful fruits of harnessing its S&T resources. All these, for the welfare and the future of the Filipino.

I humbly invite you to read the stories in this publication and in all of the other six publications as well. In reading these, not only will you get a sense of S&T's importance to a nation, you will also learn how S&T can actually touch your life and that of your family, how it can help you fulfill your dreams, keep you safe and healthy, and allow you to touch other people's lives as well.

Reading these stories will make you realize that S&T has always been a part of our lives and will always be. All we have to do is acknowledge it, use it, and maximize it.

When we do, we're well on our way to becoming a real "Science Nation."

DR. ARISTOTLE P. CARANDANG
Chief, Communication Resources and Production Division
Department of Science and Technology-Science and Technology Information Institute (DOST-STII)

MESSAGE

The saying “health is wealth” is espoused by the Department of Science and Technology (DOST) and the many headways in the field of health research and healthcare prove DOST’s desire to provide each Filipino with affordable and quality healthcare services.

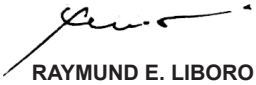
As included in the DOST 8 Outcomes, health research is aggressively being pursued by the Philippine Council for Health Research and Development (PCHRD), the same with the Food and Nutrition Research Institute (FNRI) that has been developing innovative products and services in food science and technology, and the National Academy of Science and Technology (NAST)

This book contains stories of different programs of PCHRD and FNRI geared at improving delivery of public healthcare services and coming up with creative solutions to malnutrition and healthy eating.

The stories include interesting topics like the e-Health program of PCHRD using technology as a medium to improve delivery of healthcare services to the remotest areas in the country; our vigilant advocacy in support of the Rare Disease Bill in the legislature; the Ovicidal-Larvicidal Trap to arrest the spread of dengue mosquitoes; and the Pinggang Pinoy of FNRI, the Filipino’s guide to healthy eating.

These stories indeed mirror DOST’s resolve to empower each and every Filipino through science, technology, and innovation with the end in view of transforming lives for the better.

Read through the pages and be informed of the value of science and technology in offering better ways to improve the delivery of healthcare services to patients across the archipelago.



RAYMUND E. LIBORO
Assistant Secretary

MESSAGE

The Department of Science and Technology's (DOST) information arm – the Science and Technology Information Institute (STII) – is proud to present "#HealthPH Improved Quality Healthcare and Quality of Life through Science, Technology and Innovation" for Health, a collection of informative articles about DOST-developed technologies and its various initiatives poised to elevate the Filipino's standard of living in ways that only an all-encompassing game changer can do. That game changer is of course, S&T.

"#HealthPH Improved Quality Healthcare and Quality of Life through Science, Technology and Innovation" for Health is part of a compendium chronicling the DOST 8 Outcomes – or eight thrusts for the Philippines as it fulfills its mandate to "provide central direction, leadership and coordination of scientific and technological efforts and ensure that the results therefrom are geared and utilized in areas of maximum economic and social benefits for the people."

This particular publication is all about Outcome 6 which is geared toward Health. DOST envisions improved delivery and quality of affordable healthcare products and services to more Filipinos, including those in remote and underserved areas.

Some of its efforts are detailed here, giving the readers a bird's eye view of how DOST is navigating its roadmap for Philippine healthcare, with S&T resources as its well-oiled wheels.

Yet, Health is just one of its 8 Outcomes. The others are: **Agriculture** (Outcome 1), **Enterprise** (Outcome 2), **Industry** (Outcome 3), **IT-BPM** (Outcome 4), **E-governance** (Outcome 5), **Education** (Outcome 7), and **Disaster Preparedness** (Outcome 8).

Together, DOST's projects across these 8 Outcomes will help keep the country on course, and keep its desired results on target.

For this end, STII will keep on churning timely, accurate, and easy-to-understand information to help make the DOST mission complete. After all, it is through information via publications such as this that scientific and technological advancements – key ingredients for national development – are made known to policy makers, leaders, and the general public who are ultimately the beneficiaries of well-utilized S&T resources.

May the reader find this publication useful – for his daily life, his education, his work and livelihood, his family, for the present, and most of all, for his future.

RICHARD P. BURGOS
Director, STII

Outcome 6: Improved quality healthcare and quality of life

Malnutrition, lack of access to safe water, disease outbreaks--these are just some of the top health concerns confronting our country which the Department of Science and Technology (DOST) tries to address as it embarks on various projects towards achieving improved quality healthcare and quality of life through science, technology and innovation.

OL trap: simple tool to combat dengue carrying-mosquitoes

Dengue fever, a viral infection spread by mosquitoes particularly the *Aegis aegypti*, is one of the leading causes of illness in the country. There is no specific medicine to treat dengue infection, but with proper management which includes keeping the patients hydrated, the disease usually resolves on its own. However, it can progress into a more serious, life-threatening dengue – making it one of the most feared diseases in the country.

As there is no cure, and no vaccine effective against it as of the moment, the World Health Organization recommends that the best way to combat dengue is to fight mosquitoes that carry and transmit the virus.

With this in mind, researchers at the Industrial Technology Development Institute (ITDI) of the DOST set out to develop a simple, easy to use, and affordable product aimed to reduce mosquito population--the Ovicidal Larvicidal (OL) Trap.

The OL trap kit consists of a black container, a *lawanit* paddle where mosquitoes lay their eggs, and a pack of pellets used to make a solution that attracts and kills the eggs and larvae of mosquitoes, thus reducing the population of the next generation mosquitoes.

These traps are now being used in public schools nationwide following the distribution efforts of DOST in coordination with the Department of Education, Department of Health, and Department of Interior and Local Government. They are likewise commercially available in Mercury Drug outlets.

Mosquito surveillance website

Aside from keeping mosquito population at bay, the OL traps in public schools are also being used to effectively monitor mosquito population as part of another DOST project—the dengue vector surveillance website which enables public health practitioners and local authorities to check out high-risk areas for dengue outbreaks.

The website features a map marked with red and white balloons which show the schools where OL traps are located. Red balloons indicate high index of dengue-carrying mosquitoes, while white balloons mean low index of mosquitoe and too sparse to cause any dengue incident.

This will help public health workers and local officials to be on top of the situation when it comes to dengue prevention because they will know where to intensify mosquito population control measures.

The school-based monitors check on the OL traps weekly and report to DOST the number of traps that contain mosquito eggs and larvae via text messaging which are then automatically encoded in the website (http://oltrap.pchrd.dost.gov.ph).

Fast, reliable dengue test kit made affordable

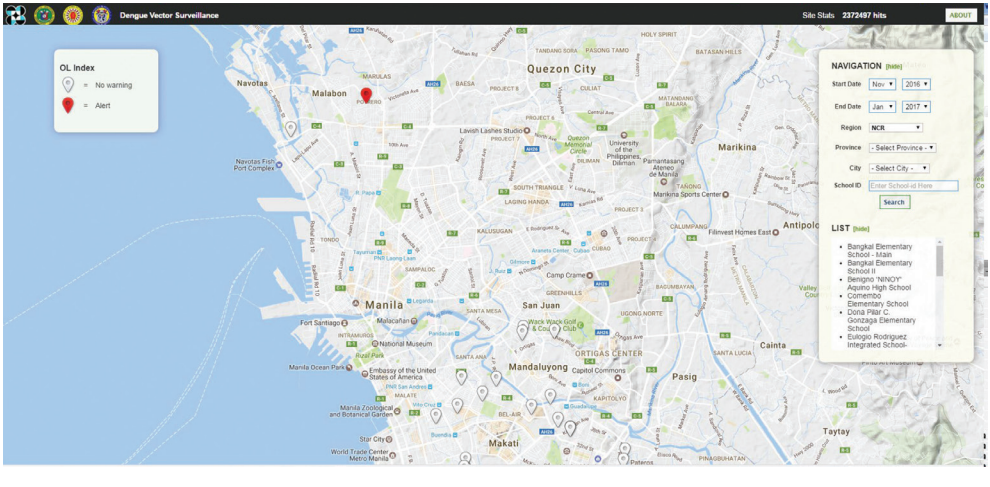
Another DOST initiative in dengue research is the development of Biotek-M, an affordable dengue diagnostic kit that allows detection of the virus at the onset or the first five days of fever.

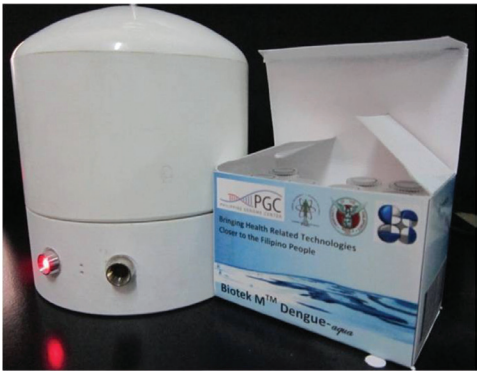
Developed by the Institute of Molecular Biology and Biotechnology-National Institutes of Health, University of the Philippines Manila (BIOTECH-Manila) through funding by the DOST agency Philippine Council for Health Research and Development, Biotek-M is expected to have great impact on public healthcare in terms of dengue management.

Dr. Raul V. Destura, director of BIOTECH Manila and project leader, says that with Biotek-M, doctors can confirm or rule out the presence of dengue at the early stage of illness, saving patients and their families from unnecessary worries and expenses. Also, unwarranted hospital admissions because of dengue suspicion would be avoided, thus more hospital resources and attention can be given to those who need them most.

Dr. Destura describes Biotek-M as a complex technology in a simple platform.

It involves the use of isothermal





Polymerase Chain Reaction (PCR) which can detect nucleic acid of the virus.

Testing for dengue using the kit entails extracting the nucleic acid from the blood of a suspected dengue patient. The nucleic acid will be then added to a mixture. After an hour, the mixture will change its color: green means the patient is positive for dengue and orange indicates a negative result.

Biotek-M has been field tested in three sentinel sites and is currently being rolled out in 100 hospitals nationwide. The market price of the kit is projected to be 75 per cent lower than other dengue diagnostic kits available in the market right now.

The DOST and its research partners are also looking into possible application of isothermal PCR technology in developing diagnostic kits for other diseases.

e-TABLET: for smarter health decisions

Another thrust of DOST-PCHRD is the development of user-friendly information and communication technology solutions for policy making and delivery of quality healthcare services.

One of the projects under this program is the e-TABLET (eHealth Technology Assisted Boards for LGU Efficiency and Transparency) which intends to accelerate the gathering and processing of health-related information and make them available not only to public health workers but also to local authorities.

Developed by Ateneo Java Wireless Competency Center with funding from DOST-PCHRD, the technology will use a tablet with an application wherein local health workers can input data such as dengue cases in their locality. The same type of device will be provided to the Mayor so he can gain immediate access to the information. The same information will be automatically sent to the Department of Health (DOH) system.

Making health information readily accessible to local government officials is important since public health hospitals and health centers are devolved to Local Government Units (LGU). Armed with right information, mayors can make decisions such as allocating resources and manpower to respond to a certain medical situation in their locality.

At the same time, e-TABLET would make it easier for the DOH to gather health data which are important in the formulation of correct health policies and programs.

Currently, the prototype tablets are being field tested in selected municipalities in the Philippines.

Safe water via simple technology

Water is a basic need: yet, 20 percent of our population have no access to potable water according to National Statistics Office figures. It is not surprising that diarrhea and other water-borne diseases rank among the leading causes of illness and death in the country.

With still more than 400 municipalities having less than 50 percent service coverage, the DOST through the ITDI came up with a simple yet innovative solution to make potable water accessible to more people.

DOST-ITDI developed a portable, affordable, and easy to install ceramic-based

water filter made from red clay with nano (very, very small or minute) antimicrobial agent that can eliminate water-borne microorganisms.

The ceramic filter is lodged in a plastic container with a faucet at the bottom for collection of the filtered water. It can purify tap water, deep well water, and raw water from ponds and springs. Three models were developed: two pot-type ceramic water filters of 6.5 and 1.5 L capacity, and the latest edition – the candle type water filter.

The filtered water passed the Philippine National Standard or PNS for drinking water in both tests/counts for Coliform and Escherichia coli, the most common water-borne disease-causing microorganisms. Moreover, the ceramic water filters have also undergone field testing at National Housing Authority households in Muntinlupa City and Cagayan de Oro City.

To speed up the rollout of the technology, ITDI produced 10,000 pieces of candle-type ceramic water filters. "We sought the cooperation of the LGUs, NGOs, and pottery owners who are now our partners in implementing this project," ITDI Director Nuna Almanzor said.

The water filters developed by ITDI are also very useful in times of calamities, when water supply lines are sometimes compromised or cut.

Fighting Malnutrition

In the Philippines, two in every 10 Filipino children aged 5 and below are underweight according to the Food and Nutrition Research Institute (FNRI) of the DOST. The 7th National Nutrition Survey showed that eight in every 10 Filipino children aged 6 months to 5 years old were not meeting the recommended energy intake while five of 10 children fall short of their protein requirement.

To improve their nutritional status, FNRI developed complementary and snack foods for children which include rice-mongo instant blend, rice-mongo curls, and rice-mongo-sesame ready-to-cook blend.

The thrust now is to commercialise the developed products and share the technology to all regions in the country, particularly in areas where malnutrition is high.

Technology within reach

In all of the above mentioned initiatives, DOST and its partner research institutions have ensured that resulting technologies are kept simple, easy to use, and affordable while continuing to create technological solutions that will lead to better, healthier lives for Filipinos.


RxBox

Health on the Go

DOST XI makes room for traveling science exhibits

By JOY M. LAZCANO, *DOST-STII*

Tugbok, Davao City- Janelle wakes up early for her class at Values School in Matina, Davao City. But today is different from her usual day as she and her classmates are on their way to visit the Health On The Go, a traveling exhibit sponsored by the Department of Science and Technology (DOST), together with the Philippine Foundation for Science and Technology (PFST), and United Laboratory.

The exhibit features interactive health and nutrition learning displays to elementary students, and Janelle could not contain her excitement early in the day as the grade six student rushed inside the exhibit hall. They were greeted by various contraptions and digital displays mimicking science phenomena and practical learning materials that she can easily relate to.

Held in partnership with the DOST Regional Office-XI, the exhibit educates children on the importance of having a healthy mind and body and how to keep away from various diseases that may affect their well being and performance in school.

The exhibit is housed at DOST-XI's Mindanao Science Centrum facility in Bago Shero, Davao City. DOST welcomes students who want to learn and view several interactive displays that make learning science fun and easy.

Among the interactive displays in the Health On The Go are the digital display mapping the various disease outbreaks in the world such as the avian flu or better known as the H5N1, which was first reported in Hongkong, China; the Severe Acute Respiratory Syndrome or SARS, which made its presence in Guandong, China; the Middle East Respiratory Syndrome in Saudi Arabia and in some countries in the middle eastern part of Asia; and finally, the dreaded Ebola virus in Congo, Africa.

Further, there are displays on various disease-carrying insects and animals, and corresponding diseases. Displays on how to avoid being sick are more explicitly detailed, as well as displays that encourage children to exercise and keep their bodies moving. In addition to these, Health On The Go incorporated usual displays such as the Plasma Sphere, Bernoulli Effect, Anti-Gravity Mirror, Head on the Platter, and Laser Harp among others.

As for Janelle, her fascination for science and technology was made stronger by the science exhibits. "They are really cool. It (exhibits) made my understanding on science concepts easier than what we are usually reading. I hope there will be more of this in Davao City," chuckles Janelle.

The Health On The Go was launched last September 23 and will ran until October 23, 2015.

DOST, DOH to scale up eHealth innovations for inclusive health

By MA. LUISA S. LUMIOAN, *DOST-STII*

The Department of Science and Technology (DOST), through its Philippine Council for Health Research and Development (PCHRD) in partnership with DOH and other institutions will deploy at least 100 more RxBox devices by the end of 2016.

This was revealed in the second eHealth Summit held during the recent National Science and Technology Week celebration at the SMX Convention Center in Pasay City.

RxBox is a device with built-in medical sensors capable of storing data in an electronic medical record, transmitting health information via the Internet upon the consent of the patient, and facilitating tele-consultations.

The deployment of the devices aims to help promote inclusive health or equitable access to quality healthcare by all Filipinos regardless of socio-economic status. The move is part of DOST's efforts to expand ICT-based innovations in health or eHealth, in a bid to broaden and improve access to healthcare services and real-time health information for better decision-making.

"I am convinced that eHealth can address our challenges in accessing healthcare services and accessing real-time information for decision making. In my travel especially in island provinces, I saw how RxBox can help both patients and health workers. The benefits are enormous and beyond healthcare," DOST Secretary Mario G. Montejo attested in his message for the Summit which was delivered by PCHRD Executive Director Dr. Jaime C. Montoya.

Currently, RxBox devices are deployed in 115 health centers all over the country.

Another eHealth innovation supported by DOST, the Philippine Health Information Exchange (PHIE) is also set for full implementation by 2016.

PHIE aims to harmonize data records from hospitals to ensure accurate and timely health information is available to both health practitioners at point of service and decision makers for more effective and efficient administration of health services.

PHIE will also help avoid duplication of treatments and eliminate redundant and unnecessary tests for patients seeking treatment from different hospitals.

"The PHIE is envisioned to become an integral component of healthcare delivery system as a platform where health facilities and healthcare providers can communicate and interoperate to provide better and real-time healthcare services to our citizens," said DOH Secretary Janette P. Loreto-Garin in her message read by Undersecretary Dr. Vicente Belizario Jr.

Such eHealth innovations change the way information is collected, processed, and accessed to plan, manage, deliver and monitor health services, according to Dr. Garin. From the traditional practice of paper form transactions and manual reporting, the country is moving towards automated yet integrated processing and aggregation of data and information in electronic databases, thereby allowing the information to be searchable, accessible, usable, and actionable.

As of press time, 85 hospitals are already inputting their data into the PHIE registries.

The PCHRD and Ateneo de Manila University have also started rolling out eHATID LGUs or eHealth Tablet for Informed Decision Making of Local Government Units, an android application in a tablet that provides health information and decision-making support to LGUs through an electronic medical record that generates particular health reports for the DOH and Philippine Health Insurance Corporation. For 2014-2015, the project will deploy the eHATID to 450 cities and municipalities nationwide.

DOST Secretary Mario G. Montejo hands over the eHealth TABLET to Gov. Eduardo C. Firmalo, chairman of the Regional Development Council. With them are Dr. Ma. Josefina P. Abilay, DOST IV-B director and Gov. Carmencita O. Reyes of the province of Marinduque.

DOST's health info in a tablet docks in MIMAROPA

By MA. LUISA S. LUMIOAN, *DOST-STII*

A health information support system in a tablet has arrived in the islands of MIMAROPA (Mindoro, Marinduque, Romblon, Palawan) to help local government officials make informed decisions about health-related concerns in their localities.

The ceremonial turn-over of the tablets dubbed as eHATID (eHealth TABLET for Informed Decision-making) was one of the highlights of the recent Science Nation Tour: Agham na Ramdam MIMAROPA leg, a

roadshow of the Department of Science and Technology which coincided with the 51st Regional Development Council Meeting held in Bellaroca Island Resort, Marinduque.

The project, called eHATID LGU, is funded by the DOST's Philippine Council for Health Research and Development (PCHRD) in partnership with Ateneo de Manila University. It aims to support LGUs with the use of an Electronic Medical Record mobile application that generates reports for the Philippine Health Insurance Corporation and Department of Health. Furthermore, the said tablet ensures a more efficient patient record system that will save time and effort for both health workers and patients.

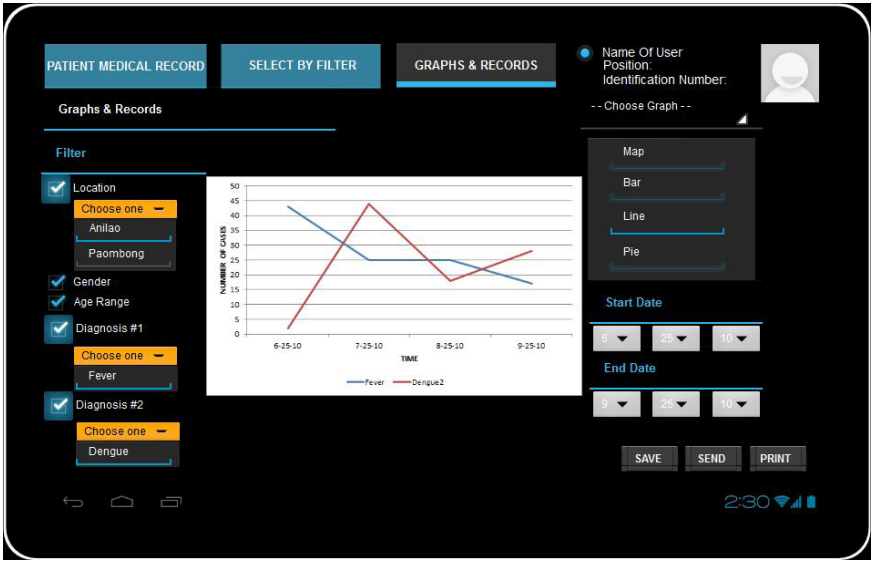
According to project leader Dr. Dennis Batangan of Ateneo de Manila University, eHATID LGU features a dashboard for real-time visualization through charts and graphs of the aggregated patient information in the locality for the decision making of LGUs. It also features a mayor-doctor communication system as a channel for decision-making and sharing of health information.

Dr. Batangan added that in the case of unavailable or intermittent internet connection, a health worker can use the tablet offline to input patient records and then synch the encoded information later to a government cloud facility.

The island-province of Marinduque was the first in the region to fully adopt the eHATID LGU project which targets to deploy the tablet to 450 municipal and city LGUs by the end of 2015.

The project is a spin-off from the eHealth Tablet which was piloted in ten sites two years ago. The current eHATID integrates the PhilHealth's outpatient benefit package and claims system in the software.

The eHATID LGU project is part of PCHRD's eHealth initiatives.



Commission for prevention, control of lifestyle diseases proposed by DOST

By **ESPIE ANGELICA A. DE LEON,** *DOST-STII*

The National Academy of Science and Technology of the Philippines (NAST PHL), an advisory body of the Department of Science and Technology (DOST) proposes the formation of a National Commission for the Prevention and Control of Non-Communicable Diseases under the Office of the President.

The NAST proposal was announced by Academician Antonio Miguel L. Dans, UP Manila College of Medicine Professor and member of NAST's Health Sciences Division, during the presentation of NAST's 37th Annual Scientific Meeting Resolutions last July 9, 2015 at Manila Hotel.

Non-communicable diseases (NCDs) or lifestyle related diseases are the number one cause of death in the whole world today. Among these are heart disease, cancer, stroke, chronic lung disease, and diabetes.

"NCDs threaten progress and their rapid rise is likely to impede our efforts on inclusive growth, particularly poverty alleviation. They have a huge social and economic impact which affects the poor more often than the rich," said DOST Secretary Mario G. Montejo in a statement read by DOST Usec. Dr. Amelia P. Guevara.

The proposed Commission will analyze current laws, policies, and programs which may negatively impact the health of the public, create a research agenda for the development and continuous assessment of strategies which will promote a healthy lifestyle, and recommend new policies if necessary.

These will include policies on price reduction of healthy foods, provision of healthy foods in food establishments, food labeling, and those involving the provision of adequate open spaces to encourage greater physical activity and infrastructure for non-motorized transportation.

"This battle will be fought in three fronts - the school, workplace, and the community," Dans stated earlier in his talk on the burden of NCDs. For schools, he suggested the allocation of more hours for P.E. classes and for workplaces, he proposed the provision for gym facilities and stand desks as well as daily exercises and sports competitions among employees and workers. Meanwhile, for the community, the NAST Academician said that more parks, sidewalks, and bike lanes are better than fun runs.

Occasional fun run activities are good, he explained, but once the fun run is finished, that leaves no other opportunity for people to jog or run for the rest of the year.

The Commission will also address policies on increased sin taxes for tobacco, prohibition of smoking in public places, tobacco ad bans, pollution and environmental protection.

"Public education and awareness campaigns should still be pursued aggressively, utilizing both traditional and new forms of media such as social media. Complementary to these efforts are other S&T and policy interventions," Montejo emphasized in his statement.

"Solutions that bear upon this epidemic must involve how communities are built, how businesses are run and regulated, and how laws are crafted and implemented," stated the NAST Resolution read by Dans during the scientific meeting.

BACKING UP THE BILL | Doctors, health professionals, scientists, government workers and advocates pledge their support to the Rare Diseases Bill which seeks to advance the welfare of people with rare diseases. (S&T Media Service)

DOST, advocates push for passage of rare diseases bill

By **MA. LUISA S. LUMIOAN,** *DOST-STII*

Academician Carmencita D. Padilla renewed her call for the passage of the rare diseases bill during the Science Legislative Forum organized by Department of Science and Technology-National Academy of Science and Technology (DOST-NAST) held recently at the Philippine International Convention Center.

Rare diseases are debilitating or life-threatening disorders that affect only a small segment of the population. An estimated 6,000 to 10,000 people in the Philippines are afflicted with a rare disease, most of them children.

"Even if we are just talking about one, ten, 20, 30, or a hundred versus a hundred million, they still deserve a right to life," Dr. Padilla said.

Dr. Padilla, who was instrumental for the passage of the Newborn Screening Act which institutionalizes newborn screening in healthcare facilities for the early detection of some genetic diseases, expressed her hope that the bill will be passed before the 16th Congress ends.

The Rare Diseases Bill seeks to ensure that patients with rare diseases will have access to adequate medical healthcare, information, and products to treat their conditions. This will be done primarily through the establishment of a comprehensive and sustainable health system for identification, referral, and management of patients with rare diseases—integrated within the current public health system; and the inclusion of rare disease benefit package in PhilHealth.

As well, the bill stipulates giving regulatory and fiscal incentives to support research and development activities on rare diseases and manufacturing of affordable drugs or products. Likewise, the bill provides for the design and maintenance of a rare disease registry containing data on cases, patients, drugs and products for rare diseases. Data from the registry will be used in policy formulation.

The said provisions in the bill are set to address the current challenges being faced by patients afflicted with rare diseases, their families and caregivers, and their healthcare providers.

Foremost of these challenges are the high cost of treatment, the accessibility of an existing treatment, or the lack of existing drugs itself. Dr. Mary Ann R. Abacan of the Institute of Human Genetics, National Institute of Health in the University of the Philippines Manila noted that most pharmaceutical companies do not engage in research and development of drugs or treatment for rare diseases because it is not lucrative, thus the shortage of effective drugs for such.

Another challenge, according to Dr. Abacan, is the missed or delayed diagnosis of a rare disease which often results in irreversible damages to the physical and/or mental functions of a patient. This problem also occurs in developed countries like the United States and United Kingdom, more so in our country where there are only nine geneticists for the entire population.

She stressed that early detection and early treatment for some rare diseases can improve the quality of life of the patients and help them become productive members of society.

Dickoy Magdaraog:

Rare Breed

By **ESPIE ANGELICA A. DE LEON,** *DOST-STII*

Pompe Disease patient Juan Benedicto "Dickoy" Magdaraog and mother Cynthia, president of the Philipppine Society for Orphan Disorders.

Juan Benedicto "Dickoy" Magdaraog is a regular guy. Armed with a degree in Industrial Design from De La Salle – College of St. Benilde, he is a work-from-home urbanite who sells gadgets on the side and invests in the stock market. On his free time, he goes around Greenhills, watches movies, and drinks with friends. He's got Twitter, Instagram, and Facebook (FB) accounts. He does online banking, shops and meets people online. And, he likes burgers, pizza, and ramen. Not to mention that he does have a girlfriend, and a great sense of humor.

He seems to be a regular guy indeed. Only he's not.

Dickoy moves around in his motorized wheelchair. He suffers from Pompe Disease - a rare inherited neuromuscular disorder causing progressive muscle weakness. "The only thing he can move on his own is his wrist," shared mom Cynthia, president of the Philippine Society for Orphan Disorders.

In the Philippines, rare diseases affect one in 20,000 individuals. Most cases are due to inborn errors of metabolism where there is lack of a specific enzyme in the body. There are only a few specialists who can immediately suspect or diagnose this condition correctly. According to Mrs. Magdaraog, there is a lack of available medication and treatment in the market and help from society at large. Rare diseases are often neglected by doctors who pay more attention to other more common illnesses. In which case there is hardly no available health support and health delivery system established in the country. For these reasons, rare diseases are also called orphan disorders.

Her son, now 37 years old, has two or three caregivers who feed him and accompany him wherever he goes. He is also totally dependent on his ventilator. Since Pompe Disease affects the muscles, the heart and lungs weaken eventually, and without early treatment, this may lead to cardiac arrest or pulmonary complications.

Truly, Dickoy Magdaraog is more than the regular guy. He's actually a rare breed. His resilience and resolve to be useful and productive is what makes him a rarity among victims of rare diseases and other debilitating conditions.

"I have Pompe Disease but it does not define me," he announced during a roundtable discussion of rare diseases organized by the Department of Science and Technology's National Academy of Science and Technology (DOST-NAST) in October 2014. "It's part of me but it's not who I am. Who I am is so much more."

Dickoy's story

Born in November 1977, Dickoy was a normal boy growing up – running, jumping, swimming and playing *patintero* with other kids. He loved cars and had crushes.

Then he reached the age of 10. His parents noticed he was having difficulty climbing the stairs, running and keeping up with the other kids. His hips would also waddle whenever he walked, causing other children to call him "*bakla* (gay)" and "*lampa* (clumsy)."

By the time he was in high school, he could not pull out the heavy books. Upon advice, the Magdaraogs transferred their son to another school since Ateneo was not built or equipped for handicapped students. At his new school, classmates would piggyback him through the stairs of their four-storey school building. One of them was his best friend, Dino with whom he has kept in touch. Aside from carrying him on his back, Dino would also walk slowly with him in school.

At home, Dickoy was also ably supported by his family including brother Stevie who is four years younger. There was a time when they shared a room and Stevie would wake up early in the morning to turn his brother on his side or carry him to the bathroom.

"We let him be. We let him adjust to his disorder and we treated him as if there was nothing wrong with him," related Cynthia.

One of the doctors said he would not live past the age of 30. While the family acknowledged the possibility of their eldest being snatched from life at an early age, their hopes were kept alive by another doctor in the U.S. "Who knows, science and technology might catch up. Let's keep him well and healthy," the doctor advised the couple.

Dickoy finally discovered what afflicted him when this doctor told his family he was suffering from Pompe Disease. By this time, he was already 16 years old. By the age of 17, he was on a wheelchair.

In December 2005, at age 27, he was given his first enzyme replacement therapy. In previous years, clinical trials for the treatment were still being held. By this time however, human trials were already being conducted. Dickoy learned about these trials and applied for a slot among the participants. His application was approved. "That was the best Christmas we ever had," recalled Cynthia. "For us, it was a scientific miracle and a scientific blessing."

Previously, Dickoy was so thin and thinking that he had muscular dystrophy, the doctors were making him eat and do things that were otherwise not acceptable for Pompe Disease. Related Cynthia, "We were giving him sugar, thinking that it would boost his energy. It turned out his body could not process sugar. Then he was given exercises in the physical therapy clinic. The exercises turned out to be only wasting his muscles. So when we went to the US, the nutritionist gave him a different diet – high fat, high protein, low carbohydrate, and he had to take ¼ cup of peanut butter every meal."

Thus, the progression of his disease was halted. He has not weakened ever since.

At present, Dickoy continues to go to the doctor for his IV infusions once every two weeks.

"Of course it's never going to be a miracle drug that's going to make me walk all of a sudden. It's keeping me alive and hopefully as science and technology progresses, there would be better treatments, better options," he told S&T Post.

Tapping technology for work, friendships, and advocacy

For the meantime, he makes productive use of his time by working online. Taking advantage of modern technology, he taught himself web design and started designing websites on a freelance basis. Now, he works for a BPO for a US-based firm. He maintains two scholarship sites for the firm, and does front-end coding for them and other support work like troubleshooting and updating.

"I'm very grateful for this industry, the outsourcing industry," he stated. "And the Internet is a great invention."

He saves money for the things he needs to buy, such as his motorized wheelchair and his van which is equipped with a lift.

Dickoy revealed how some people have wondered how come he's not angry or depressed. He tells them he just takes it one day at a time. "If it's a bad day, the consolation is that I get to sleep and tomorrow I start all over. Be thankful for the things that are there, like I have a good family. I've never experienced being hungry in

my life. I never experienced sleeping in the streets, not having clothes. Some people don't have a place to stay. So why will I complain?" he elaborated.

"He always believes that success is not how much money you have or the prestige that you earn. It's how you handle the barriers and become productive," Cynthia added. "He was also blessed that the Lord balances it off. Because physically, it is so hard to have friends. But he has a lot of friends because of the Internet – even people from other parts of the world."

Among this wide circle of friends are other Pompe Disease patients in the Philippines and abroad, specifically his co-members at the US-based International Pompe Association. They get in touch with one another via the organization's FB page.

In fact, Dickoy logs on to FB every day, "not because I want to waste my time." For him, FB is a valuable tool which provides him with a channel to get ideas, meet people and just know what's going on in the world. He forgets about his disability while he is working or interacting with friends on the Internet, he claimed.

It is also through the Internet – social media in particular – that Dickoy shares his experiences to others to fulfill his advocacy for rare disease patients like him. At the same time, he gives talks during public fora on health such as round table discussions organized by DOST-NAST.

In fact, he promotes technology as a whole, as a way to lead a productive life. "The best way to promote it is to share my life and get them to see that, 'Look I'm a person with disability and I can't merely move my hand, yet I'm productive because of technology, computers, Internet and I can do most of the stuff that I need to do like I communicate online through smartphones, I get to chat and meet several people,'" he explained.

He may have accepted his situation and his hopes have not been dashed. "Hopefully, as the Philippines strengthens its science and technology sector, we hope we'll be able to develop a treatment or a cure not just for people with rare diseases, but diseases in general."

FNRI, partners unveil Pinggang Pinoy

By DIVORAH V. AGUILA, *DOST-FNRI*

The tremendous increase in the number of cases of diet- and lifestyle-related diseases worldwide has become so evident and alarming.

The nonstop global and technological advances of the modern world have helped make this possible. Yet, this trade-off in modern living exists not just in technologically-advanced countries but in developing nations like the Philippines as well.

Thus, more and more Filipinos, young and old, have become physically inactive, hypertensive, and overweight.

In response, the DOST-Food and Nutrition Research Institute has committed to Outcome 6, which focuses on health. To help solve the problem and create a more health conscious citizenry, FNRI aims to provide Filipino consumers with easy to use visual tools to help them adopt healthy eating habits.

After fruitful collaboration with the World Health Organization, Department of Health, and the National Nutrition Council, FNRI unveiled one of these visual tools for healthy eating last July 4, 2014 during the Seminar Series on Food and Nutrition Researches and Science and Technology Activities at the DOST Compound in Bicutan, Taguig City.

Dubbed as "Pinggang Pinoy," the new tool serves as our blueprint for planning a healthy balanced meal. It is a quick and easy guide on how much to eat per mealtime.

However, "Pinggang Pinoy" should not be mixed up with the existing Daily Nutritional Guide (DNG) Pyramid for Filipinos.

The Pyramid was also developed by FNRI and shows at a glance the whole day food intake recommendation for Filipinos. It is a simple, trustworthy guide for choosing a healthy diet, founded on the concept that daily exercise and water strongly influence our chances of staying healthy.

The Pyramid builds from the base, indicating that we should eat more vegetables and whole grains which take up the bottom part of the pyramid, and less red meat, sugar, fats, and oils which take up the topmost portion. So based on the Pyramid, Filipinos are advised to eat more of the foods pictured at the lowest parts of the pyramid and consume less of the foods featured at the higher levels of the pyramid.

Combine this simple guide with the fact that most of us eat on a plate and you have this unmistakable partnership between the DNG Pyramid for Filipinos and "Pinggang Pinoy."

It is also important to note that both "Pinggang Pinoy" and the DNG Pyramid for Filipinos are based on the latest scientific findings about how our food, drink, and activity choices affect our health.

Hence, it is appropriate to use "Pinggang Pinoy" not just as a guide for a typical balanced meal, but also as a complementary tool to the DNG Pyramid.

For more information on food and nutrition, contact: Dr. Mario V. Capanzana, Director, Food and Nutrition Research Institute, Department of Science and Technology, General Santos Avenue, Bicutan, Taguig City; Telephone/Fax Nos.: 837-2934 or 837-3164; Direct Line: 839-1839; DOST Trunk Line: 837-2071 to 82 local 2296 or 2284; e-mail: mvc@fnri.dost.gov.ph or at mar_v_c@yahoo.com; FNRI-DOST website http://www.fnri.dost.gov.ph.

DOST pushes eHealth technologies for smarter healthcare

By **MA. LUISA S. LUMIOAN,** *DOST-STII*

DOST Secretary Mario G. Montejo (center) listens to Dr. Kristine Magtubo (left) of the University of the Philippines National Telehealth Center as she explains the features of RxBox during the First Philippine eHealth Summit held last February 4 at the Sofitel Philippine Plaza. RxBox is a biomedical device that measures and stores vital patient health information which can be transmitted to remote medical specialists. With them are Congressman Victor Yu, chairman of the Congressional Committee on Science and Technology and 1st District representative of Zamboanga Del Sur; and Oriental Mindoro Governor Alfonso Umali, president of the Union of Local Authorities of the Philippines. (Photo by Henry A. de Leon, S&T Media Service, DOST-STII)

The Department of Science and Technology's (DOST) trailblazing projects for the health sector took the spotlight at the First Philippine eHealth Summit held last February 4 at the Sofitel Philippine Plaza, to pave the way for smarter healthcare by maximizing information and communications technology (ICT).

These projects included the RxBox, eHealth Technology Assisted Boards for LGU Efficiency and Transparency (e-TABLET), and the Philippine Health Information Exchange (PHIE).

Using ICT for health, also known as eHealth, "is envisioned to transcend the constraints brought about by the country's archipelagic setup and limited budget," DOST Secretary Mario G. Montejo said during the event.

Developed by University of the Philippines Manila-National Telehealth Center and DOST, the RxBox is a medical device which enables health workers in remote communities to consult with medical experts in urban areas, thus providing better access to life-saving healthcare services in isolated and disadvantaged communities nationwide.

It has built-in medical sensors for monitoring blood pressure and blood oxygen levels, assessing the strength of contraction of the mother's uterus, as well as electrocardiogram and fetal heart monitor. The data acquired by the sensors are stored in the device and may be transmitted to a specialist as the need arises and upon patient's consent. The RxBox is currently deployed in 21 sites in the Philippines.

The e-TABLET, on the other hand, is a tablet-based electronic medical record system developed by Ateneo de Manila's Institute of Philippine Culture and Ateneo Java Wireless and Competency Center.

Apart from being a platform for health workers to input and manage patient records, e-TABLET is also a decision-making tool for local government units which are given access to summarize simple medical data in the tablet. Armed with real-time information, LGUs can make decisions such as allocating resources and manpower to respond to a certain medical situation in their locality. e-TABLET also features a messaging system between the mayor and the municipal/city health officer. The tablet is currently deployed in 10 sites, namely San Jose Buenavista, Antique; Alcoy, Cebu; Sta. Rita, Pampanga; Isulan, Sultan Kudarat; Paombong, Bulacan; Anilao, Iloilo; Lal-lo, Cagayan; Dumalinao, Zamboanga del Sur; Guimba, Nueva Ecija; and Dinalupihan, Bataan.

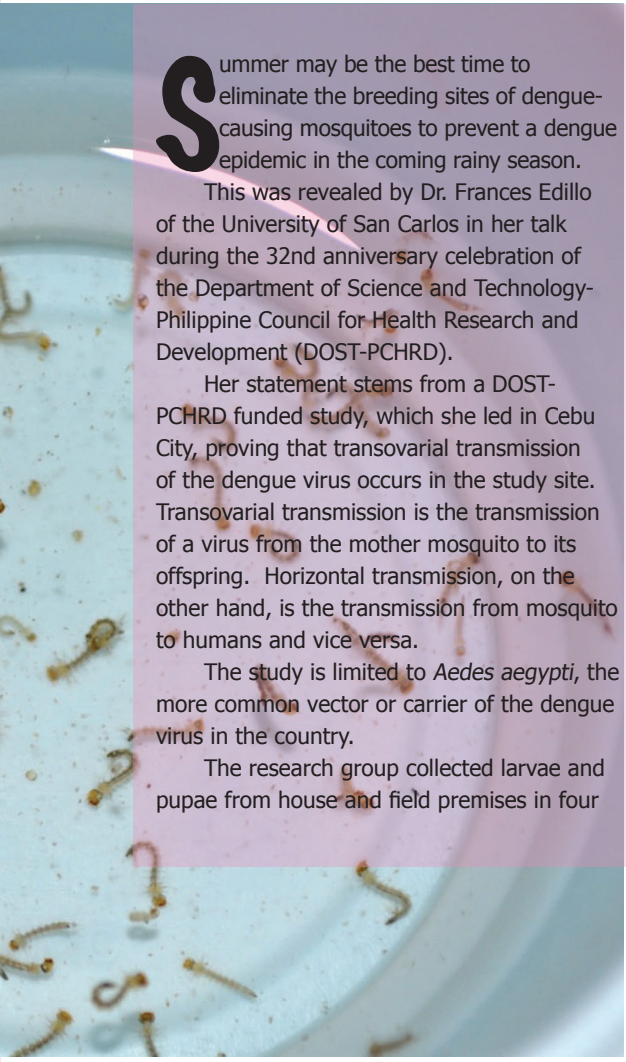
To further enhance the country's healthcare delivery system, DOST and the Department of Health is also setting up the PHIE system by the end of 2014. PHIE will provide centralized database of health and medical records nationwide, allowing a patient to retrieve his medical records from anywhere in the country. With this system, patients can save time and effort, and avoid expenses from unnecessary or duplicate examinations.

To ensure that the full benefits of eHealth can be realized, the DOST through its Information and Communications Technology Office (ICTO) is working to expand internet connectivity in far-flung areas. In particular, ICTO is tapping into the potential of TV White Spaces (TVWS) , or unused frequencies between broadcast TV channels, to provide an extremely cost effective means for internet connectivity and data delivery in areas underserved by telecommunications companies.

Aside from eHealth, ICTO also aims to maximize TVWS technology for applications in environmental sensor networks, educational content delivery, and government information systems.

Summer is the best time to fight dengue mosquitoes–DOST study

By **MA. LUISA S. LUMIOAN,** *DOST-STII*



Summer may be the best time to eliminate the breeding sites of dengue-causing mosquitoes to prevent a dengue epidemic in the coming rainy season.

This was revealed by Dr. Frances Edillo of the University of San Carlos in her talk during the 32nd anniversary celebration of the Department of Science and Technology-Philippine Council for Health Research and Development (DOST-PCHRD).

Her statement stems from a DOST-PCHRD funded study, which she led in Cebu City, proving that transovarial transmission of the dengue virus occurs in the study site. Transovarial transmission is the transmission of a virus from the mother mosquito to its offspring. Horizontal transmission, on the other hand, is the transmission from mosquito to humans and vice versa.

The study is limited to *Aedes aegypti*, the more common vector or carrier of the dengue virus in the country.

The research group collected larvae and pupae from house and field premises in four randomly selected sites in Cebu City, every month from November 2011 to July 2012.

Using Polymerase Chain Reaction (PCR), a technique for making multiple copies of a gene from a sample DNA, the researchers were able to determine the presence of three of the four dengue serotypes or variations from the collected samples. These identified serotypes are DENV-1, DENV-3, and DENV-4.

The research also revealed that the month of April registered the highest minimum infection rate in the mosquito samples.

Edillo explained that if the larvae and pupae infected with dengue virus survive to become mosquitoes in the following rainy season, these mosquitoes could set off an epidemic among humans via horizontal transmission.

In addition, she noted that Cebu City exhibits a pattern wherein a dry season with a low number of dengue cases is followed by a rainy season with a high number of dengue cases.

FNRI's Pinggang Pinoy to guide Filipinos on how much to eat per meal

By **MA. LUISA S. LUMIOAN,** *DOST-STII*

The "Pinggang Pinoy," a healthy food plate for Filipino adults was presented and explained by Ma. Jovina A. Sandoval, science research specialist II of the Department of Science and Technology's Food and Nutrition Research Institute (DOST-FNRI), during the 2014 National Science and Technology Week last July 26, 2014 at the SMX Convention Center, Mall of Asia Complex.

Pinggang Pinoy, which was developed by FNRI in collaboration with the World Health Organization, Department of Health, and the National Nutrition Council, provides consumers with recommendations of the appropriate proportion of various food groups for a truly healthy and balanced meal.

It uses a science-based approach with the best available scientific evidence, backed by formative research, technical consultations, and pre-testing.

"Pinggang Pinoy complements and supplements the Food Guide Pyramid. It is a reminder on how to fill-up their plate, with the right amount and quality of food," Sandoval explained.

The Daily Nutritional Guide Pyramid for Filipinos, or simply the Food Guide Pyramid, was also developed by FNRI and shows at a glance the whole day food intake recommendation for Filipinos. It builds from the base, indicating that we should eat more vegetables and whole grains which take up the bottom part of the pyramid, and less red meat, sugar, fats, and oils which take up the topmost portion. So based on the Pyramid, Filipinos are advised to eat more of the foods pictured at the lowest parts of the pyramid and consume less of the foods featured at the higher levels of the pyramid.

Both Pinggang Pinoy and the Pyramid are based on the latest scientific findings about how our food, drink, and activity choices affect our health.

According to the 2013 National Nutrition Survey, one out of 10 adults is chronically energy-deficient and three out of 10 are overweight and obese. Meanwhile, the World Health Organization estimated in 2008 that 300,000 people die every year from non-communicable diseases. This figure translates to 800 deaths every day, comprising 60 percent of all deaths in the country.

Sandoval said that the new food plate aims "to support our advocacy to prevent the non-communicable diseases and the double burden of malnutrition."

"Our target users are Filipino adults, 19 years old and above, without special medical attention. But for people with ill health, they need special attention or advice from dieticians or medical doctors or any health providers," she stressed.

Bill on eHealth should be patient centered, expert advises in DOST Summit

By **ESPIE ANGELICA A. DE LEON,** *DOST-STII*

The proposed eHealth Bill for the 17th Congress should be patient centered and should contain patient safety guidelines instead of concentrating on health institutions, according to UP Manila College of Medicine Professor and former Department of Health (DOH) Undersecretary Dr. Teodoro J. Herbosa during the 5th eHealth Summit last June 3, 2016 at the Philippine International Convention Center.

Herbosa, a trauma surgeon who engages in research collaborations with PGH and WHO among others, was speaking at the Parallel Session on the Draft eHealth Bill held during the said summit co-hosted by the Department of Science and Technology (DOST) and DOH.

The proposed Bill is "An Act Establishing Philippine eHealth Systems and Services in the Delivery of Health Services Using Information and Communications Technologies and Appropriate Funds." eHealth refers to the use of information and communications technology (ICT) for health and medical care.

"It concentrates on the institutions of government rather than on the people that are supposed to be served by the tool that we're trying to do which is ICT," said Herbosa as he began his reaction to the discussion paper on the eHealth Bill earlier delivered by Crispinita A. Valdez of the DOH's knowledge management and information technology services.

Herbosa suggested that those who are crafting the legislation should instead focus on particular areas of eHealth which need a law in the first place, like teleconsultation or consultation between patients and doctors through networks or video links.

Explaining that the bill should first and foremost be patient centered, he said, "Are we providing ICT tools to somebody in a remote area with poor access, no doctor? I want to provide him with the best specialist from UP. How do I do that?"

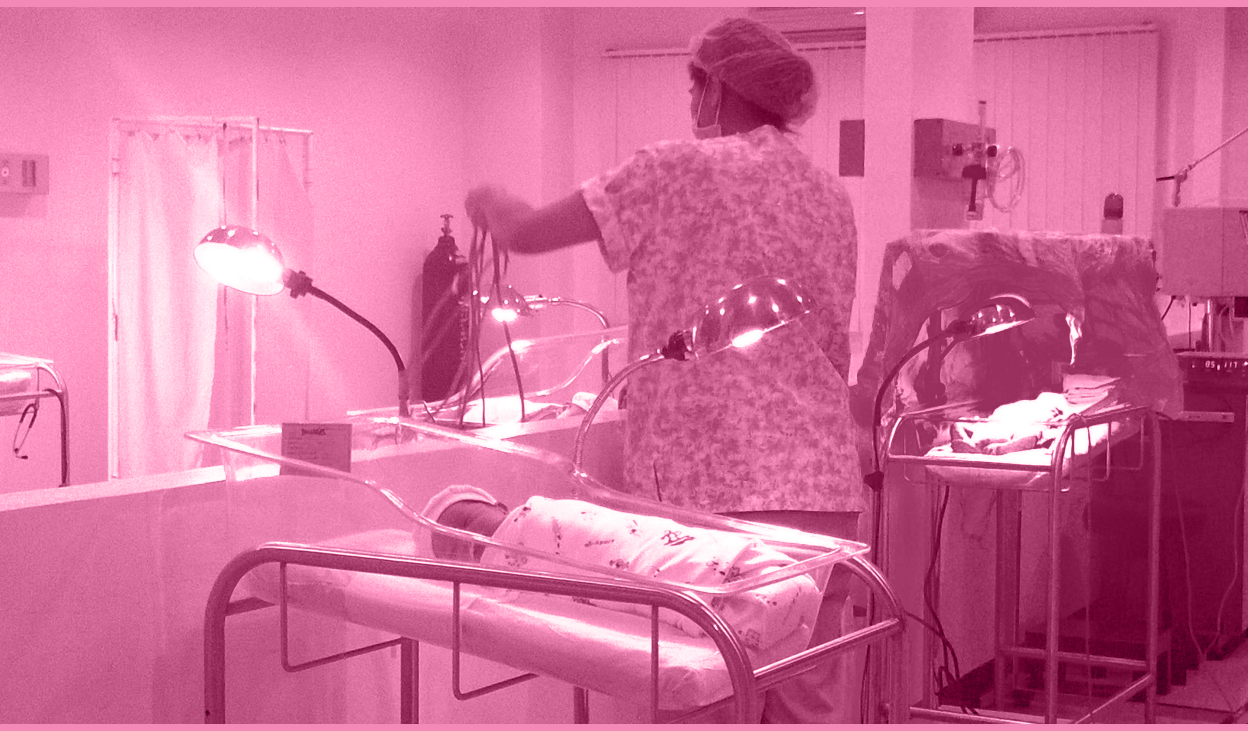
The bill should also be patient safety to make sure that the processes and ICT tools would have patient safety guidelines.

Aside from these, he said that the way health information exchanges and personalized healthcare are implemented should also be regulated. Herbosa claimed that he has heard from the medical community that hospitals and doctors may someday be nonexistent because computers will by then be more accurate in diagnosing illnesses. Smartphones may also eliminate the need for these health facilities. "There are problems here," he said, "like, can you license a machine which diagnoses you based on your human genome count? We need to look at these at a broader picture."

By favoring both the government and private sector while putting the patient at the core of the eHealth Bill, said Herbosa, everything and everyone will be involved – from the pharmaceuticals to the drugstores, to the gyms and wellness centers. "But these should be covered by many laws that create the general framework of eHealth. That way it will be easier to pass," he said.

According to Herbosa, the bigger the law, the harder it is to pass, "dragging on forever like a big elephant in the room which nobody wants to touch."

The 5th eHealth Summit served as a platform for dissemination of information including updates on eHealth developments in the country among stakeholders. Aside from the eHealth Bill, other topics discussed were Health Data Analytics and Data Privacy, as well as the eHealth Research Agenda for 2017-2022.



DOST updates public on newborn screening, nutrigenomics in Biotech Week

By ESPIE ANGELICA A. DE LEON, *DOST-STII*

Basic information and updates on the Expanded Newborn Screening (NBS) and Nutrigenomics programs of the government were presented to biotech-affiliated professionals and students at the Health Forum of the 2015 National Biotechnology Week (NBW) on November 23, 2015.

Led by the Department of Science and Technology's Philippine Council for Health Research and Development (DOST-PCHRD) and the Food and Nutrition Research Institute (DOST-FNRI), the forum shed light on the progress of implementing the Expanded NBS Program, the trial for which is being conducted in selected hospitals in Metro Manila.

Newborn screening is a procedure for the early identification of infants affected by certain genetic, metabolic, or infectious conditions that may lead to mental retardation or morbidity if left untreated, thus saving more lives and reducing unnecessary negative health outcomes in Filipino newborns.

Speaking at the said forum, Dr. Maria Melanie Liberty Alcausin, Newborn Screening Reference Center director, referred to the current coverage of newborn screening in the Philippines as including only congenital hypothyroidism, congenital adrenal hyperplasia, phenylketonuria, glucose-6-phosphate dehydrogenase deficiency, galactosemia, and maple syrup urine disease.

However, Dr. Alcausin reported that the expanded screening includes 22 more disorders like hemoglobinopathies and additional metabolic disorders, namely, organic acid, fatty acid oxidation, and amino acid disorders.

The latter are included in the standard care globally, while the expanded NBS will be optional to parents in all participating facilities, the DOH declared.

The DOH added that the first option is the screening of six disorders at ₱550, which is included in the newborn care package for Philhealth members, while the second option is the full complement of disorders at ₱1,500.

At present, the DOH is negotiating with Philhealth to increase subsidy for the Expanded NBS.

The expansion of the coverage of the NBS program was prompted by the results of the study on enhancing case detection of selected inherited disorders through expanded newborn screening in the Philippines by Dr. Carmencita Padilla and Dr. Tomas Aguirre of the University of the Philippines Manila.

The data on Filipino newborns screened through the California newborn screening program from 2005 to 2009 revealed that serious disorders were detected which are not included in the Philippines' existing program.

Meanwhile, Jacus S. Nacis, science research specialist I of FNRI's Nutrigenomics Unit, introduced the audience to the concept of nutrigenomics, the area of nutrition that uses molecular tools to search, access and understand the several responses obtained through a certain diet applied between individuals or population groups.

According to Nacis, individuals or groups of people with genetic predisposition to nutrition-related or lifestyle-related non-communicable diseases like hypertension, diabetes, heart diseases, overweight and obesity and cancer, among others, now have a fighting chance to live healthy, normal lives instead of surrendering one's future to heredity.

On the other hand, Nacis' colleague Vanessa Joy A. Timiteo, spoke on the topic "Personalizing the Diet of Juan and Juana: Does eating brown rice benefit Juan and Juana's Genes?"

Timoteo stated that eating brown rice regularly can lower blood glucose levels, weight, body mass index, and blood pressure of Filipinos carrying the normal or wild-type allele. An allele is an alternative form of the same gene. The dietary fiber, B-vitamins and minerals in brown rice help prevent many diseases whether caused by our genes, unhealthy diet, or lack of physical activity.

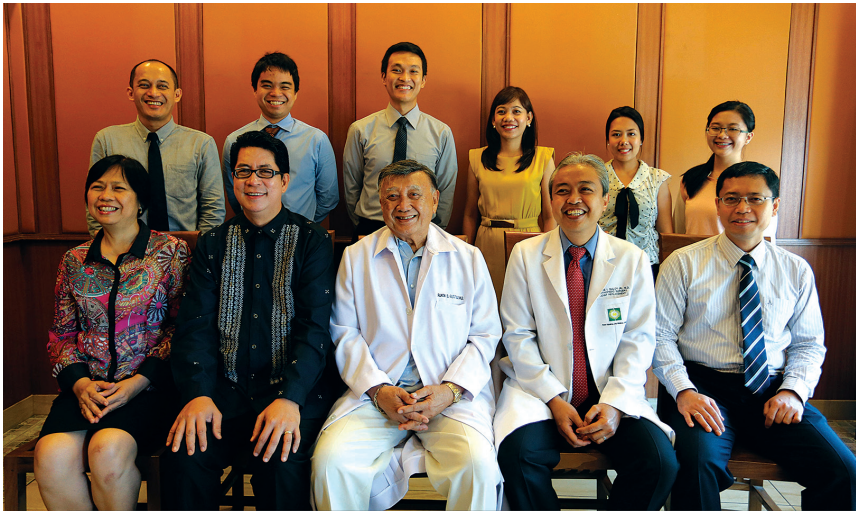
For more information on the DOST-FNRI's Nutrigenomics program or any food and nutrition concern, contact Dr. Mario V. Capanzana, FNRI Director, at the FNRI Building, DOST Compound, General Santos Avenue, Bicutan, Taguig City, or at 837-2934, mvc@fnri.dost.gov.ph, mar_v_c@yahoo.com, and visit the FNRI website at http://www.fnri.dost.gov.ph. (SR Serrano, DOST-FNRI S&T Media Service, srs@fnri.dost.gov.ph, sarose122568@gmail.com, 0905-710-2586, 0921-569-9083, 837-2071 local 2287, 837-8113 loc 232)

Locally developed knee surgical technique puts patient back to LIFE mode

By ESPIE ANGELICA A. DE LEON, *DOST-STII*

Dr. Ramon Gustilo, chairman of OII who spearheaded the development of the Axis Knee Replacement System. *(Photo by Henry A. de Leon, S&T Media Service, DOST-STII)*

The knee implant's three components
(Photo by Henry A. de Leon, S&T Media Service, DOST-STII)



(Seated, from left) PCHRD Division Chief Merlita Opeña, PCHRD Executive Director Dr. Jaime C. Montoya, OII Chairman Dr. Ramon Gustilo, OII Consultant Dr. Ilustre Guloy Jr., OII President Engr. Jude Sasing. (Standing, from left) OII Engrs. Jesus Muñoz, Rainier Natividad, Kevin Bancud, PCHRD Supervising Science Research Specialist Roselle Martonito, OII Documentation Specialist Precious Page, and OII Engr. Joanne Marie Sapiter. *(Photo courtesy of DOST-PCHRD)*

Editha de Guzman had, for about seven years, struggled with knee arthritis which limited her mobility and caused her excruciating pain in the last year. When she was in Canada where one of her daughters lives, she wouldn't go out with her friends and instead, just stayed home watching TV. Mornings were especially trying as she struggled to get up from bed with difficulty. In the middle of the night, she would wake up to answer nature's call but had to crawl all the way to the bathroom, as she didn't want to wake up any of her children.

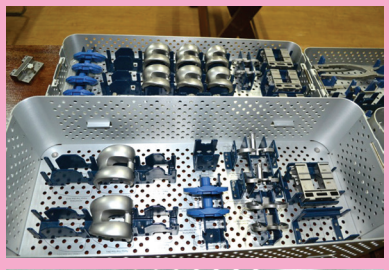
But a trip back to the Philippines to have her knees checked changed everything. She learned she had to undergo knee replacement operation for both her knees. The cost, however, was too expensive.

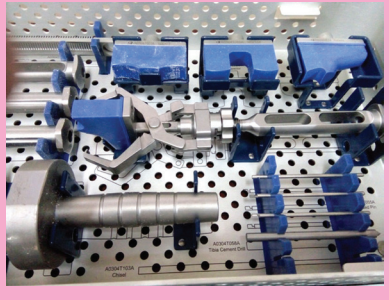
World-class technology developed by Filipinos

Until she learned of another option: the Axis Knee Replacement System, the only one of its kind in Southeast Asia, and which has been in the Philippine market since July 2015.

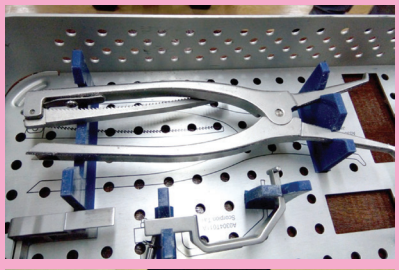
With funding from the Department of Science and Technology-Philippine Council on Health Research and Development (DOST-PCHRD), the Axis Knee Replacement System was developed by a team spearheaded by internationally renowned surgeon Dr. Ramon B. Gustilo from Negros Occidental. The team is composed of Filipino, American, Japanese, and Chinese specialists.

A knee implant basically has three components: the femoral (thigh) component made of a highly polished metal alloy, the

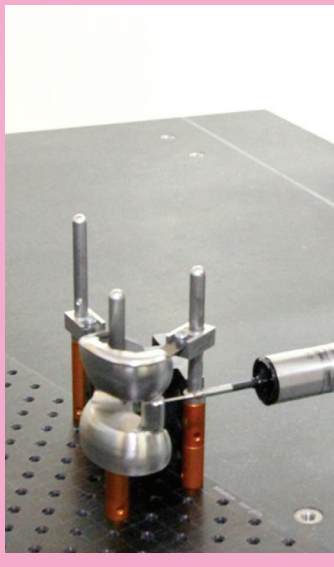




One tray of instrumentations is composed of a removable upper portion (above) and lower portion (foreground). *(Photos by Allan Mauro V. Marfal, S&T Media Service, DOST-STII)*



Some of the instruments used. *(Photos by Espie Angelica A. de Leon, S&T Media Service, DOST-STII)*



tibial (shin) component made of polymer sometimes held in a metal tray, and the patellar (knee cap) component which is also made of polymer. A well-designed knee implant can last up to 20 years.

During surgery, the surgeon cuts off damaged cartilage and bone from the weight-bearing surfaces of the knee and replaces them with these artificial parts. They should be well aligned with the mechanical axis of the leg.

"Axis means that the system achieves correct positioning of the implant components in relation to the mechanical axis which is the line from the center of the hip joint to the center of the knee to the center of the ankle," explained Dr. Gustilo.

The Axis Knee Replacement System is made of similar materials as other knee systems sold in different countries around the world. Yet, it has many features that make it unique from existing systems, which Dr. Gustilo and his team believe will give better patient satisfaction and outcome.

Among these is the instrumentation. "These refer to a set of instruments used to guide the surgeon to make the proper cuts in the bone, so that the knee implant components would fit over these cut surfaces of the bone and at the same time, they would be properly aligned with respect to the mechanical axis," said Engr. Jude L. Sasing, a member of Dr. Gustilo's team.

The system consists of three trays of instruments – more than 50 instruments all in all – in contrast to imported knee systems which consist of six to nine trays of instruments. "They're like hand tools – one of

One of the knee implant components undergoes testing with the Coordinate Measuring Machine inside the OII facility. *(Photo by Henry A. de Leon, S&T Media Service, DOST-STII)*

them looks like a hammer, another looks like a pair of pliers, while another looks like a cutting block with slots where you insert the saw blade used for cutting the bone," said Engr. Sasing as he described the Axis Knee System instrumentation.

Among these instruments is the Mechanical Axis Finder, a portable, cost-efficient, and reusable device which locates this imaginary line called the mechanical axis. In many hospitals around the world, a computerized navigation technology is used to locate the mechanical axis. Only a few hospitals in the Philippines have this equipment. Computerized navigation systems also cost more than P20M and add at least P20,000 to the total cost of surgery.

Another feature of the Axis Knee System is a novel surgical technique called "Soft Tissue First Technique" that takes full advantage of the unique instruments. This new technique involves ligament balancing before cutting bone. The instruments and technique guide the surgeon to achieve optimal implant alignment for each patient.

Meanwhile, knee implants imported from the United States and Europe cost between P100,000 to P120,000. While the materials are the same, their local counterpart costs about P60,000 in government hospitals and P70,000 in private hospitals.

"The salaries of our engineers is one reason [for the cost efficiency]," explained Dr. Gustilo. "In the States, aside from the fact that you can manufacture knee implants, the cost in hospitals is too expensive."

The product is manufactured by Gustilo's Orthopaedic International, Inc. (OII) with Engr. Sasing himself as its president. Based in Cabuyao, Laguna, OII is an ISO 13485-certified facility which has been designing, developing, and manufacturing orthopedic products including trauma, spine and joint replacement systems, for the past 20 years. ISO 13485 represents the requirements for a comprehensive quality management system for the design and manufacture of medical devices.

"The market right now is global," stressed Dr. Ilustre I. Guloy, Jr., chairman of Asian Hospital and Medical Center's Department of Orthopedic Surgery. "So it doesn't matter whether it is made in the Philippines or in Vietnam or in China because manufacturing is really made globally. What's important is

The Mechanical Axis Finder (above). OII Engrs. Joanna Marie Sapiter and Jesus Muñoz demonstrate the surgical technique using the Mechanical Axis Finder, other instruments, and a bone model. *(Photo by Allan Mauro V. Marfal, S&T Media Service, DOST-STII).*

whether you comply with standards and are ISO certified." Dr. Guloy is also a member of Dr. Gustilo's team of surgeons and engineers who conceptualized and developed the knee system.

"We are proud to say that the conceptualization is all Filipino engineers, doctors, with consultants from US, China, and Japan," added Dr. Guloy, "but this is a Filipino venture."

Successful operation

Thus last February 17, 2016, de Guzman, 68, underwent operation for both knees performed by Dr. Guloy.

"Pag gising ko, walang sakit (When I woke up, there was no pain)," she recalled. It stayed painless the next morning. After one week, she was already climbing the stairs at the hospital and shortly after, she went malling with her daughters the whole day.

She can now do the things she used to do like cooking, doing the laundry, and going to the market, among other things. She can even go to the beach now.

"Hindi mo maramdaman na may bakal sa loob. Parang normal lang. (It doesn't feel that there's something inside. I just feel normal)."

The only problem is she still finds it a little difficult to stand up by herself which, Dr.

Guloy said, is natural. He assured her that with therapy, the problem will go away in due time. She receives therapy three times a week, aside from the medications for the first two weeks after the operation.

Leap of faith for de Guzman family

As of April 2016, there have been 61 cases of Axis Knee Replacement surgeries in the Philippines.

Editha de Guzman is one of Dr. Guloy's latest patients. Initially, she and her children Tess, Jojo, Mavic, Cesar Jr., and Cecil had misgivings about it, considering that it is a new surgical technique and is a lot more cost-efficient than imported knee implants.

"Nangayayat ako sa kakaisip. Minsan nga hindi ako nakakatulog. Sabi ko, 'Bilhan niyo nalang ako ng wheelchair kasi natatakot ako. O kaya pa-injection-an niyo na lang ako (I thought about it a lot, I grew thin. Sometimes, I couldn't even sleep. I said, 'Just buy me a wheelchair because I'm scared. Or let me have the injection),'" she told her children who started researching about the Axis Knee System on the Internet.

Their initial apprehension then turned into approval upon learning that the Axis Knee System uses the same materials as knee implants made abroad and the people who developed it are from UP and are acclaimed doctors. As a last push of encouragement, Cecil told her mom, "Sige na Nanay. Yung pera napapalitan. Yung Nanay, hindi. (C'mon mom, money can be replaced, but not you.)"

Members of OII's sales staff during a workshop. *(Photo by Allan Mauro V. Marfal, S&T Media Service, DOST-STII)*

Thus, they turned to Dr. Guloy for the knee replacement procedure. It was "a leap of faith," as Cecil termed it.

Achieving goals

Editha de Guzman's goal and that of her children and seven grandchildren has been achieved. "Napakalaking ginhawa itong pagkaka-opera sa akin talaga (The knee operation has given me such a huge relief really)," de Guzman said.

She plans to go back to Canada this June and be ready to go out with her friends in Winnipeg once again. She's also planning a trip to the Holy Land before the end of the year.

"This is really life changing. What we were trying to avoid is when her mobility becomes very limited and then she will get depressed," Cecil revealed. "So now she's no longer irritable. The old Nanay is back.

Int'l expert vouches for automatic smarter homes for better elderly healthcare

By **ESPIE ANGELICA A. DE LEON,** *DOST-STII*

Elderly patients need not leave their homes to go to a hospital for healthcare services. Instead, healthcare may be brought right into the comfort of their homes.

According to Dr. Mohamed Jamal Deen, president of the Academy of Science, Royal Society of Canada, this will be achieved via ICT mechanisms which will make "Automatic Smart Homes" possible. Dr. Deen is a leading expert in modeling, design and applications of modern advanced semiconductor devices and circuits.

Deen delivered a lecture on "Smarter Homes, Better Healthcare" recently during an event organized by the Department of Science and Technology-National Academy of Science and Technology (DOST-NAST) held at the Manila Hotel.

According to him, the improvement of

public healthcare, medicine, and nutrition has caused an increase in the elderly population worldwide which has spawned the need for better quality healthcare services.

Deen stressed that whenever elderly people have to go to the hospital or clinic, "they will have to walk, climb stairs, stand inside the elevator, wait for their turn at the doctor's clinic."

An Automatic Smart Home is a solution to this problem. The Smart Home is equipped with ICTs such as wireless communications, low-power electronics, web-based technologies, sensors, and intelligent computing which pick up health information about the patient that help diagnose an illness. Among others, "the sensors will detect when the elderly is going to get up from bed at night time, such as when he wants to go to the bathroom," Deen cited as an example.

Aside from eliminating patients' exposure to viruses in a hospital setting, Automatic Smart Homes will also allow early detection of symptoms while making quality healthcare more cost effective and convenient for the elderly.

The microelectronics and nanoelectronics expert also mentioned the inclusion of lit pathways as well as non-intrusive wearables such as vests, which acquire information on the health condition of the person wearing it.

These ICT mechanisms are low cost, non invasive and user friendly, allowing doctors and other medical personnel to remotely monitor their patients' physiological signs in real time.

"There will be engineers, scientists, arts people and social scientists who will be involved in the development of smart homes," Deen stated. "They will make sure that their ideas will be turned into good, interesting products that will make people want to buy them and use them."

The concept of Automatic Smart Homes is the core of an Ubiquitous-Healthcare or U-Healthcare project currently being undertaken by Deen and his team of researchers.

U-Healthcare is a new area in the field of technology which makes use of sensors and motor devices to monitor and improve body conditions among patients.

In his reaction to Dr. Deen's presentation, Dr. Alvin B. Marcelo of UP Manila mentioned the gaps in the Philippine medical community in the context of Automatic Smart Homes. "It would be great if we train our caregivers, nurses, and others to be telemedicine ready," opined Marcelo, "then their role in the smart home concept will improve the ecosystem."

He also mentioned the need to invest on research, expand the number of researchers, include eHealth in the school curriculum, and increase the Philippines' technology transfer capabilities in order to cascade ideas and the benefits of technologies down to the average Filipino.

"Dr. Deen's research on patient monitoring can empower both on-site and remote caregivers allowing them to collaborate and deliver the best possible care to their clients," said Marcelo.

Parts of DLSU's TALA Emphatic Space

InteliSENSE: Making sense of autism using high technology

By **ESPIE ANGELICA A. DE LEON,** *DOST-STII*

Sasha, seven, attends a special school for autistic children. While she is in school, her parents who are at home, and her therapist who is in his clinic, can watch Sasha at school – in real time.

Better yet, they can watch Sasha in school yesterday, or the week before, even a month before – thus allowing them to closely monitor her progress or the lack of it.

If her therapist senses that something is wrong with Sasha's behavior, he can then provide her with another intervention that he thinks will better serve the purpose, based on what he saw and heard.

What makes this possible is InteliSENSE, a project by experts from the De La Salle University (DLSU) in Manila and supported by the Department of Science and Technology's Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD).

InteliSENSE: A no-nonsense approach

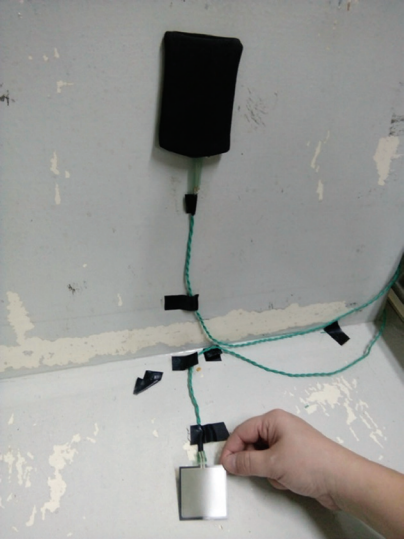
InteliSENSE is a web portal that acts as a progress monitoring tool for children with special needs, or autism in particular.

The child's parents, teachers, school authorities and his therapist can log into this portal and through the live feed, they can watch and see the child's behavior, performance, and progress in school. As such, InteliSENSE helps to answer the questions, "Is the treatment working?" and "Is the treatment a good match for the patient?"

Through this technology, they can view not just video recordings of the child. InteliSENSE likewise generates reports so that they may also access all the patient's health and school records. These records indicate the results of all the child's activities, therapies, and protocols and their effects. These may be summarized and visualized on a weekly or monthly basis, and may be accessed 24/7. Meanwhile, the videos may also be accessed on demand, with permission from the therapist and the school.

Aside from benefiting the therapist, it also becomes useful for the school officials as they can see for themselves if their programs and activities are appropriate and effective for their students and if their teachers are performing well.

At the same time, the parents themselves are updated on their child's progress. If for example, the child needs to improve his reading skills, the parent can see through the portal how the reading session is done in school and how they need to reinforce it at home.



A sensor secretly installed in one of the chairs in TALA

By making the parents, teachers, and therapist aware of how the child is making progress, InteliSENSE thus becomes a vehicle collaboration between them.

It also solves the problem involved in backtracking through the patient's "paper

."

According to Jocelynn W. Cu, chairperson of the Computer Technology Department DLSU's College of Computer Studies and one

he technical people behind the project, the usual scenario is that when parents meet with their child's therapist, they bring with them pieces of paper documenting the patient's condition. The therapist, meanwhile, has a notebook in hand. "The problem begins when certain situations require a change of therapist," Cu explained. "So now it becomes hard for the new therapist to refer back to the child's past behaviors, treatments and results."

As such, the patient's achievements and progress are hard to track over time, data cannot be visualized, and it is difficult to evaluate therapies and protocols.

The project comes into fruition

Cu narrated that InteliSENSE stemmed from a PhD class conducted by Dr. Merlin Teodosia Suarez who is the Project Team Leader. In that class, they explored image audio processing which is Cu's area of expertise. Eventually, Cu, her husband Gregory who is into hardware infrastructure, and Suarez who is fondly called "Doc Yamie" by her students and colleagues in DLSU, hatched the idea of developing a technology that will better serve those involved in the treatment of kids with special needs, ultimately benefitting the patients themselves of course.

At about this time too, they invited DOST Balik Scientist Dr. Roberto Legaspi to conduct a class on empathic computing, or affective computing as it is called in other countries. "The big idea is, when you step inside a room for example, when you feel hot, the airconditioning system will automatically be turned on. Or, when it's time to turn on the lights, they will automatically be turned on. Or, when it's time for you to have

your cup of coffee, then the coffee maker will automatically start to work," Cu explained. "It's all based on your pattern of behavior. This is the big picture now. This is empathic computing."

Influenced by the idea, Doc Yamie shifted gears and identified the target market for their fledgling project – autism patients. Right away, the trio buckled down to work and packaged the technology as such. After all, Doc Yamie is not called "the fearless leader" by her DLSU co-workers for nothing. That was between 2008-2009 and now, InteliSENSE is ready for commercialization.

"It took us several years to develop the technology, [to conduct the] experiments, work with the students, at the same time work on our course requirements," said Cu. "Until we submitted the project to DOST and DOST supported it for three years." "DOST preferred projects with commercial value to those which simply entail a lot of research and nothing more", Cu added.

Now that InteliSENSE is available in the market, the group has been receiving inquiries from interested schools.

For an installation fee, they will place cameras pointed in different directions inside the school room. The purpose is for the cameras to capture images of the child wherever he is inside the room.

They will also install sensors in the chairs but hidden from view. Through these sensors, they would know if the child is sitting or lying down, or if he is leaning against the back rest. They can also determine if there is something else on top of the chair, like the kid's bag.

They will also place speakers, also hidden from view, and other devices namely location sensors and temperature sensors. Location sensors determine where the child is exactly inside the room, while temperature sensors automatically adjust the room's temperature.

All of these devices are connected to the control center in DLSU which will process all the image and audio data.

The group will provide training for the teachers as well upon installation. Thereafter, the school will have to pay monthly subscription fees.

A testing room cum showroom for InteliSENSE

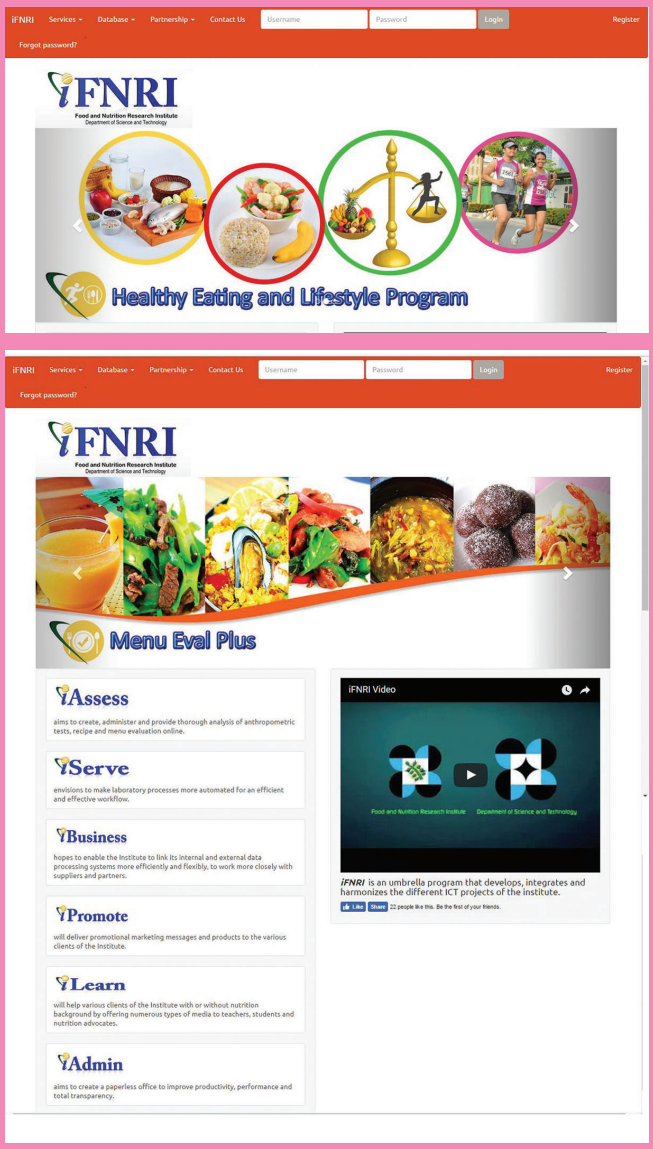
Serving as both a showroom and testing room for InteliSENSE is a facility in DLSU which Doc Yamie's group calls TALA Empathic Space.

It looks like a regular office, with desks lined up in rows and computers on top of each desk. But as one walks further inside, one will notice a small enclosed area containing colourful kiddie stuff. Immediately outside this enclosed area is the control center which consists of a server and network connections.

True enough, this is TALA. Called the "empathic space" by Doc Yamie's team, it is a child's play area, equipped with the devices involved in InteliSENSE, including cameras donated by Japanese professors. By using these cameras, Cu and her teammates can separate the person's head from the body so they can easily do further processing.

In 2014, Autism Speaks Foundation President Erlinda Borromeo said that the number of people with autism spectrum disorder in the Philippines, and other countries as well, had almost doubled in the previous six years. And the number continues to rise, she said.

Meanwhile, InteliSENSE has just been introduced to the market but already, the team behind the project are already taking several steps forward to upgrade the technology and up the ante of autism treatment in the country. Given the statistics of autism globally, InteliSENSE really makes a lot of sense.



Screenshots of DOST-FNRI's new interactive website, iFNRI at i.fnri.dost.gov.ph.

New DOST website gives hefty servings of food, health, and nutri info

By **ESPIE ANGELICA A. DE LEON** , *DOST-STII*

The Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI) has now made available to the public a website that allows users to know their health risks, calculate their daily energy and nutrient requirements, track their food intake and physical activity, get the estimated energy and nutrient content of meals and recipes, upload their own recipes, and make an appointment for professional nutrition counselling all at the same time.

Last February 23, 2016, FNRI officially launched its iFNRI website (i.fnri.dost.gov.ph) at the Crowne Plaza Manila Galleria in Pasig City, ushering the harmonization of the Institute's various projects in one dynamic site.

With its user-friendly layout, easy to understand content, interactive features and software capabilities that allow data management and automatic data capture among others, the website is expected to make Filipinos better informed about health, nutrition, and wellness issues. At the same time, the website helps speed up the delivery of FNRI's programs and services to the public. Overall, it aims to help effect better health outcomes among the population, particularly in terms of solving malnutrition in the country.

"Digital health is one such phenomenon that is gaining momentum and continues to accelerate. iFNRI is a digital health alternative that provides us with a timely option to keep up with the rapidly changing times," said DOST Secretary Mario G. Montejo in his message at the launching which was read by DOST Assistant Secretary and Program Manager for Countryside Development Urduja Tejada.

iFNRI also enables users to know the quantity and type of food they can eat and the kind of physical activity they can do, calculate the costs of certain foods, get the nutritive value of more than 1,500 common food items in the Philippines, and find healthy recipes developed by FNRI such as Creamy Fern Soup.

They may access and download health infographics, survey results and statistics on food consumption involving different food groupings and different population groups. In addition, users, particularly those involved in research, may also process their own data online.

Meanwhile, FNRI clients may use the site for easier tracking of the status of laboratory services which they availed. Those wanting to avail of FNRI's laboratory services may also look it up to get information including the prices of nutritional analysis of food samples.

In addition, the website offers data on FNRI technologies and products transferred both locally and internationally for commercialization. Among these are complementary food products, stabilized brown rice which has longer shelf life, low-fat and low-sugar ice cream, and noodle products.

Also available are data on the delivery of DOST PINOY (Package for the Improvement of Nutrition of Young Children) throughout the archipelago. DOST PINOY, which is included in the national priority plans for 2016, is a package of nutrition interventions for children throughout the archipelago to decrease the number of underweight kids.

"Almost everyone uses the internet and owns a smartphone. The use of mobile devices is growing at a rate of 115 percent each year and the use of health and fitness mobile apps grew by 62 percent in the first half of 2014. This number was even bigger in 2015," said FNRI Director Mario V. Capanzana in his opening remark. "This is not a trend. This has become an inevitable way of life," he added.

Capping the launching ceremony was a hands-on demonstration of iFNRI and a Question and Answer portion where audience members were tested on their knowledge of the website and how to use it.

Mandatory legislation for folic acid fortified foods discussed in DOST forum

By ESPIE ANGELICA A. DE LEON, *DOST-STII*

Foods and ingredients fortified with folic acid such as rice and flour will easily find their way in stores and supermarket shelves once legislation is in place. This will provide more Filipina consumers with more amounts of a nutrient proven to help prevent the incidence of neural tube defects (NTDs) in their future children.

At a recent Roundtable Discussion on Folic Acid organized by the Department of Science and Technology-National Academy of Science and Technology (DOST-NAST), Food Fortification Initiative's Executive Officer for Asia Dr. Karen Codling stressed the necessity of mandatory legislation to create an impact on public health.

"Eighty-one countries currently have mandatory legislation for the fortification of wheat flour," Codling revealed. "All but five of these require fortification with

folic acid. The Philippines is one of the five countries with mandatory fortification of wheat flour that does not include folic acid."

In the same discussion, NAST Academician and UP Manila Chancellor Carmencita D. Padilla shared that the Institute of Human Genetics of the National Institutes of Health is proposing a legislation to establish a comprehensive policy on achieving adequate folic acid intake via food fortification and supplementation. This proposed bill, said Padilla, will hopefully be submitted to the Senate and the House of Representatives by August 2015.

"We want to ensure that there is adequate supply of folic acid-fortified food and food products and folic acid tablets at an affordable price," Padilla stated.

Naturally found in legumes, liver, fruits, and green, leafy vegetables, folic acid helps prevent NTDs which are birth defects of the brain, spine, or spinal cord. The neural tube is that part of an unborn baby which eventually develops into its brain and spinal cord. The onset of NTD occurs on the first month of pregnancy, when most women are still unaware that they are pregnant. Spina bifida in which the fetal spinal column doesn't close completely, and anencephaly in which much of the brain and skull do not develop, are the most common forms of NTDs which entail high cost of treatment.

However, women cannot get enough amounts of folate or folic acid naturally found in food, from these specific food items. First of all, Filipino women of reproductive age have been found to have a low one-day intake of legumes, fruits, and vegetables, according to data by the 2008 National Nutrition Survey.

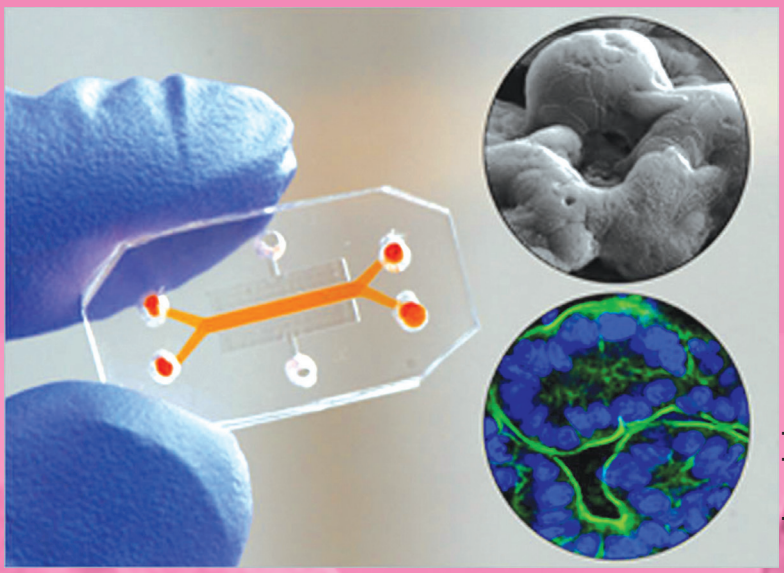
Fortification of other foods with folic acid is one way of solving the problem.

Wheat flour as well as maize flour fortification have specifically been recommended by WHO as effective interventions against NTDs.

According to Codling, a review of 17 studies in 2012 comparing NTD prevalence before and after flour fortification indicated reductions in NTD incidence of 15.5 percent to 58%. Much of the evidence pointing to the efficacy of folic acid fortification was based on the use of wheat and maize flour. Wheat flour fortification, in particular, has been found to prevent 75 percent of folic acid-preventable NTDs at current levels of consumption.

National Nutrition Council's Chief of Nutrition Policy and Planning Ma. Lourdes A. Vega disclosed during the NAST discussion that the local flour industry has expressed openness to the idea of mandatory folic acid fortification, which was recommended during the 2012 review of mandatory food fortification.

"We will request academe to resolve concerns on negative effects of mandatory folic acid fortification," Vega added. Among these are safety concerns. However, Codling assured that there is no clear evidence pointing to folic acid as a cause of cancer, asthma, or cognitive impairment.



wyss.harvard.edu

Dr. Danilo Tagle, associate director for special initiatives of the National Center for Advancing Translational Sciences, is one of the brains behind the "organs-on-chips" that may one day replace animals in pre-clinical trials to accelerate drug development. *(Photo by Gerardo Palad, S&T Media Service, DOST-STII)*

Organs-on-chips to revolutionize drug development

By MA. LUISA S. LUMIOAN, *DOST-STII*

A "breathing", "beating" chip the size of a small USB stick, may one day replace animals in testing the safety and efficacy of potential drugs and save at least a third of the time and half of the cost in drug development.

These "organs-on-chips" are currently being developed by USA's National Center for Advancing Translational Sciences-National Institutes of Health (NCAT-NIH) in partnership with Food and Drug Administration and Defense Advanced Research Agency. This was revealed by Dr. Danilo A. Tagle, NCAT's associate director for special initiatives in a recent scientific symposium organized by the Philippine Genome Center (PGC).

Organs-on-chips are designed to mimic the mechanical and chemical function of organ systems (respiratory, circulatory, etc). In a lung-on-chip, for instance, human lung and blood vessel cells line each side of a flexible porous membrane that stretch and relax upon application of cyclic suction to mimic the breathing action of human lungs.

Dr. Tagle noted that the whole process of developing these chips involves many disciplines such as engineering, biology, microfabrication, and toxicology among others.

These organs-on-chips would address the inadequacy of animal models in pre-clinical trial stage. "Animal models are not really representatives or predictives of human condition," Dr. Tagle pointed out.

NCAT scientists hope that through organs-on-chips, drug developers may be able to predict adverse events earlier to allow their prevention and mitigation, and be able to identify the population who will earlier respond to a new drug, thus accelerating drug development.

Currently, drug development process takes around 15 years or more. Pharmaceutical Research and Manufacturers of America 2005 data indicate that out of 10,000 potential compounds screened for drug development, only 11 compounds reach the clinical trial stage and only one gets approved for human use.

The project targets to build 10 chips for each organ system and link them together to simulate a whole body system.

The scientific forum is part of the launch of the PGC's Bioinformatics Core Facility. PGC is a flagship project of the University of the Philippines and the Department of Science and Technology that aims to advance our capacity in genomic research.

New MD-PhD molecular medicine scholars sign MOA with DOST

By LADYLOVE MAY B. BAURILE, *DOST-PCHRD*

A new batch of scholars under the Department of Science and Technology's (DOST) MD-PhD in Molecular Medicine Program are now well on their way to an eight-year educational journey that will seal their fates as future physician-scientists dedicated to the advancement of health through biomedical research.

Last September 21, 2016 at AmaRonn Restaurant, the 7th batch of scholars signed a Memorandum of Agreement (MOA) with DOST's Philippine Council for Health Research and Development (PCHRD).

The first degree program in the country offering dual MD-PhD course, the MD-PhD Molecular Medicine Program is a joint initiative of DOST through PCHRD, and UP Manila, through the College of Medicine. In particular, the program prepares scholars to assume key leadership roles within the academic community and mentor physician-scientists in training.

Among the new scholars are Patrick Josemaria Altavas from University of the Philippines (UP) Diliman, Allan John Barcena from UP Manila, Christian Jirard Custodio from UP Los Baños, Bryan Paul De Galicia from UP Manila, Vivien Joyce Josol from UP Manila, Rafael Vincent Manalo from UP Diliman, Aurora Nakpil from UP Diliman, Genmar Cyrus Pasion from UP Manila, Paul Benedic Salvador from UP Diliman, and Fatima Ericka Vista from UP Manila.

"As they bring new ideas and possess energy to add to the existing pool of knowledge, the youth are often considered as representatives of the future," said DOST Secretary Fortunato T. dela Peña in his inspirational speech. "They have the capability of bringing enthusiasm and vitality which leads to beneficial discoveries and developments."

PCHRD Executive Director Jaime C. Montoya added, "With the emerging health concerns and rapidly evolving health sector, the DOST and PCHRD understand the importance of investing on the talents and skills of our young people."

Aside from the MOA signing, DOST also renewed its partnership with UP Manila through the signing of another MOA for the MD-PhD Molecular Medicine Program. Eight program mentors were also recognized.

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