The Human Engineer

7th ERDT Congress

July 13, 2018

Pasay City

ROWENA CRISTINA L. GUEVARA, Ph.D.

Undersecretary for Research and Development

Department of Science and Technology

Outline

- ERDT – Historical Perspective
- Impact of ERDT after 11 years
- R&D in Humanities and Social Sciences that involves Engineers
- Technologies for Humans

April 3, 2007 at Malacañang Palace

Dr Rey Vea, Commissioner William Medrano, PGMA, Gev, Mr Dado Banatao, Mr Art Tan

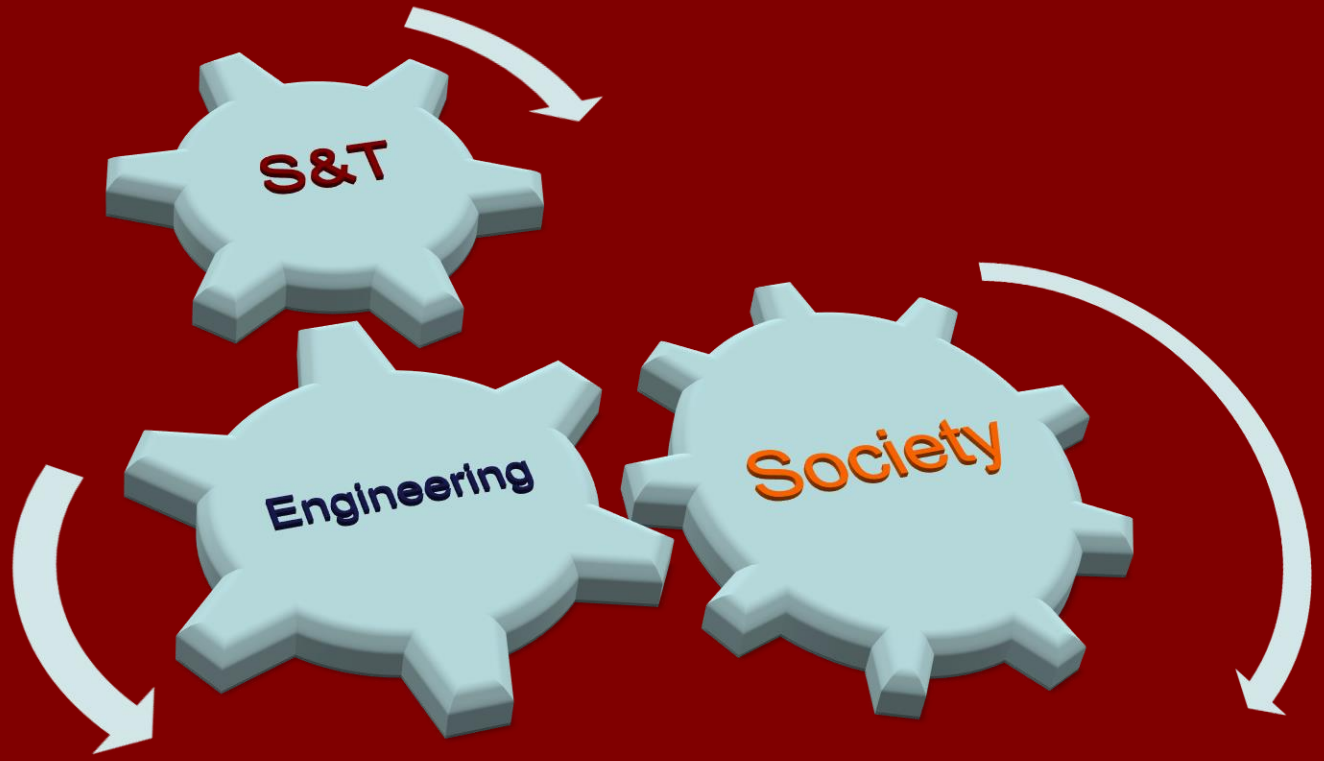
Definition of Terms

Science uncovers new things about the physical world

Technology applies science to meet a need

Engineering is the formal use of both scientific and technological principles to achieve a planned result based upon empirical experience

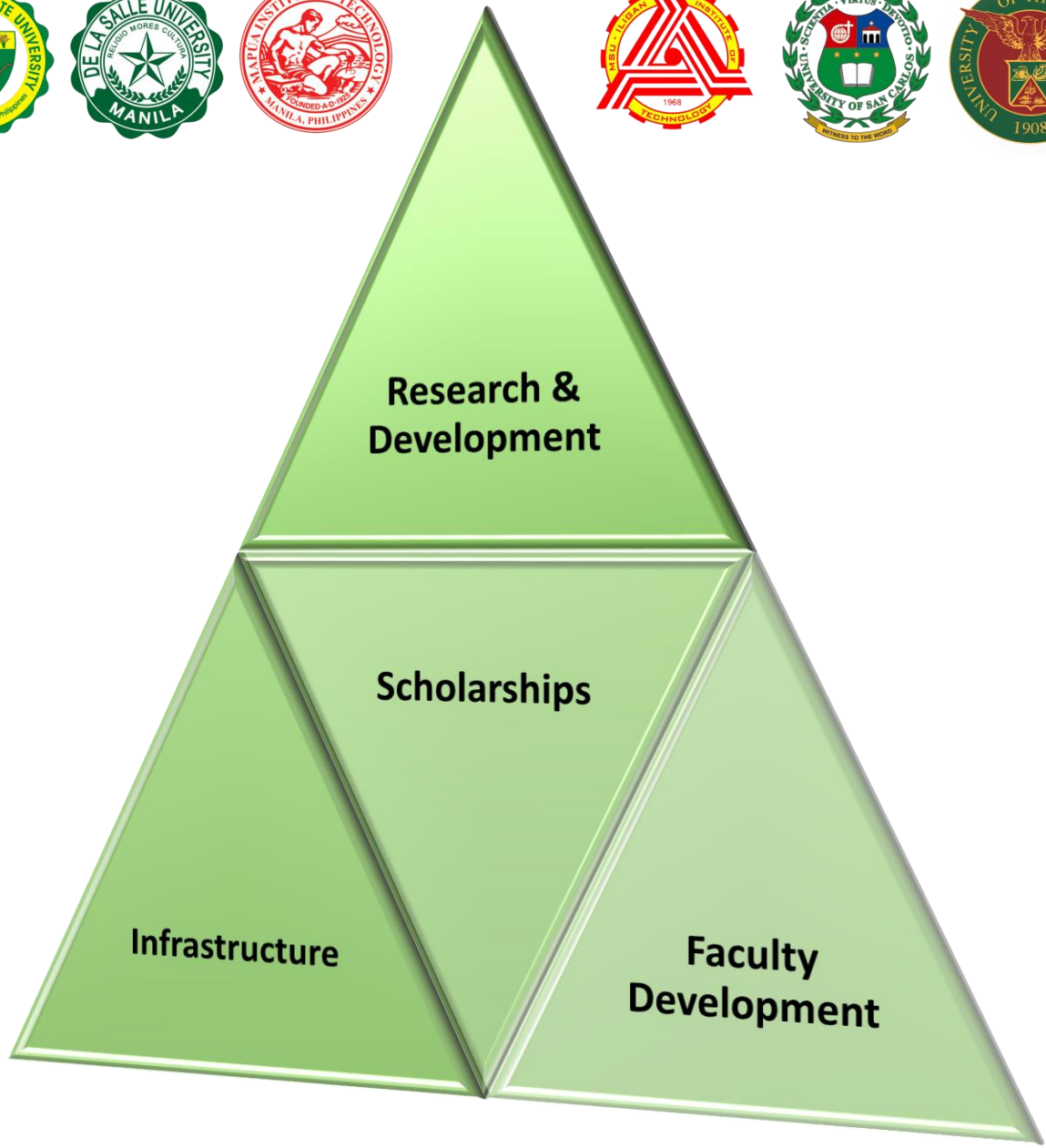
Synergy of S&T and Engineering



Engineering R&D for Technology (ERDT)

We need engineers with advanced degrees to make S&T work for Filipinos: from disaster mitigation to poverty alleviation, from agriculture to semiconductor industries; ensure a sustainable environment and affordable energy for the future; produce indigenous technologies to better our lives

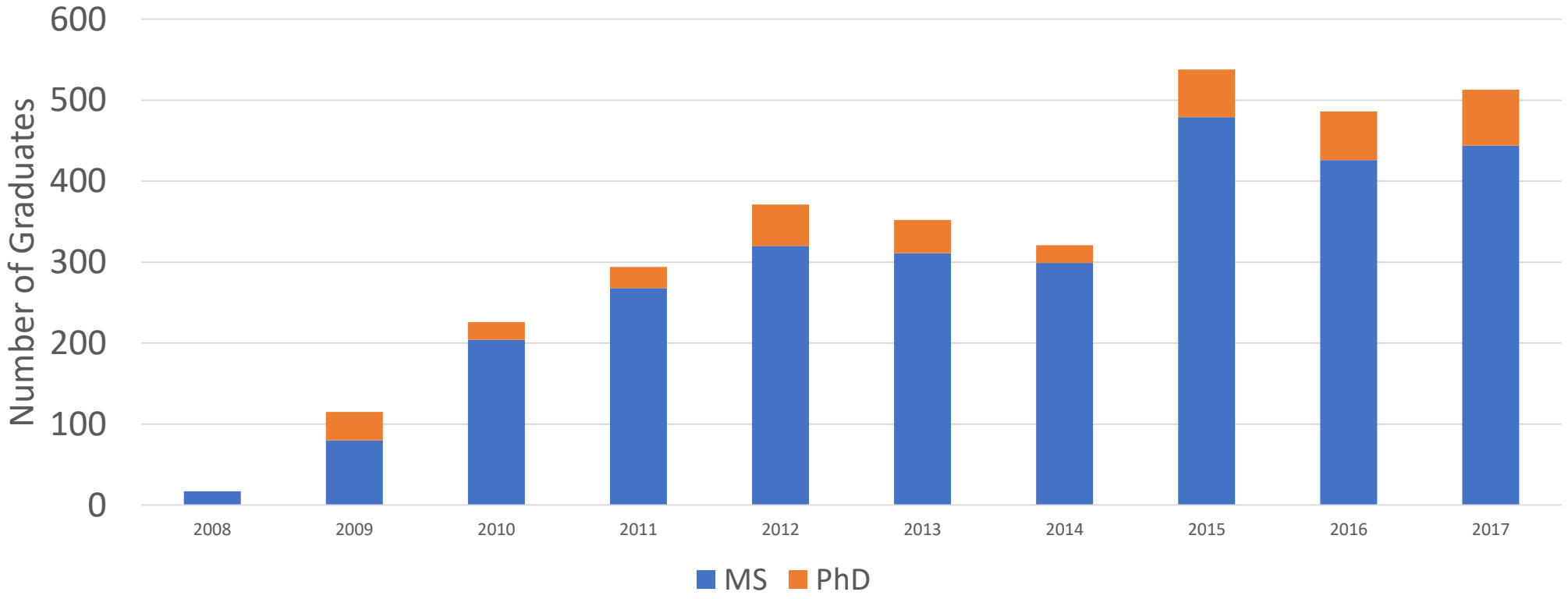
The ERDT is an INVESTMENT FOR GLOBAL COMPETITIVENESS



ERDT Steering Committee, June 8, 2007

CLSU, MSU-IIT, ADMU, DLSU, UPD, USC, MIT

ASTHRDP and ERDT 2008-2017



105 Disciplines

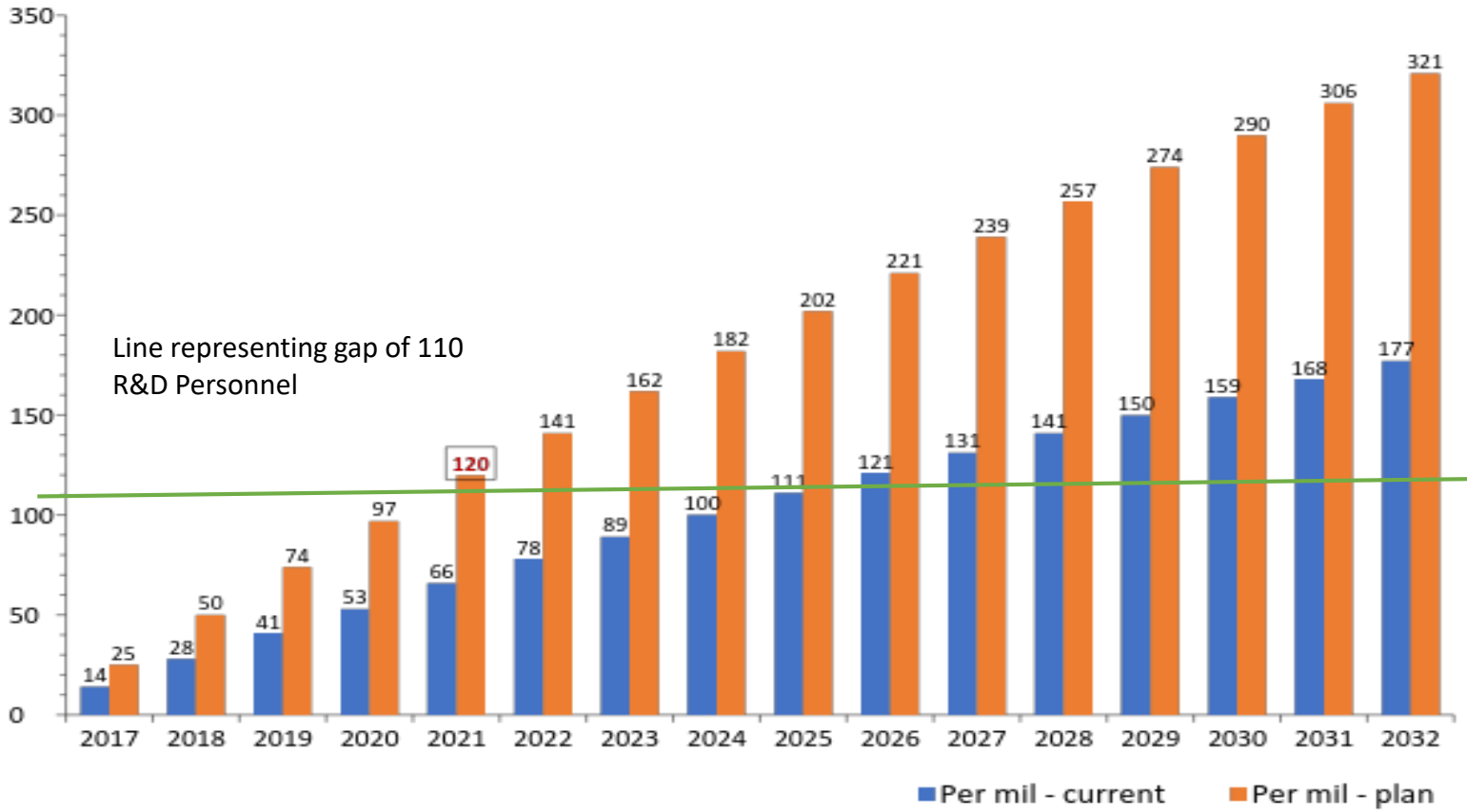
- ASTHRDP awarded scholarships for 4,335 MS and 889 PhD
- ASTHRDP graduates: 1,982 MS and 258 PhD

26 Disciplines

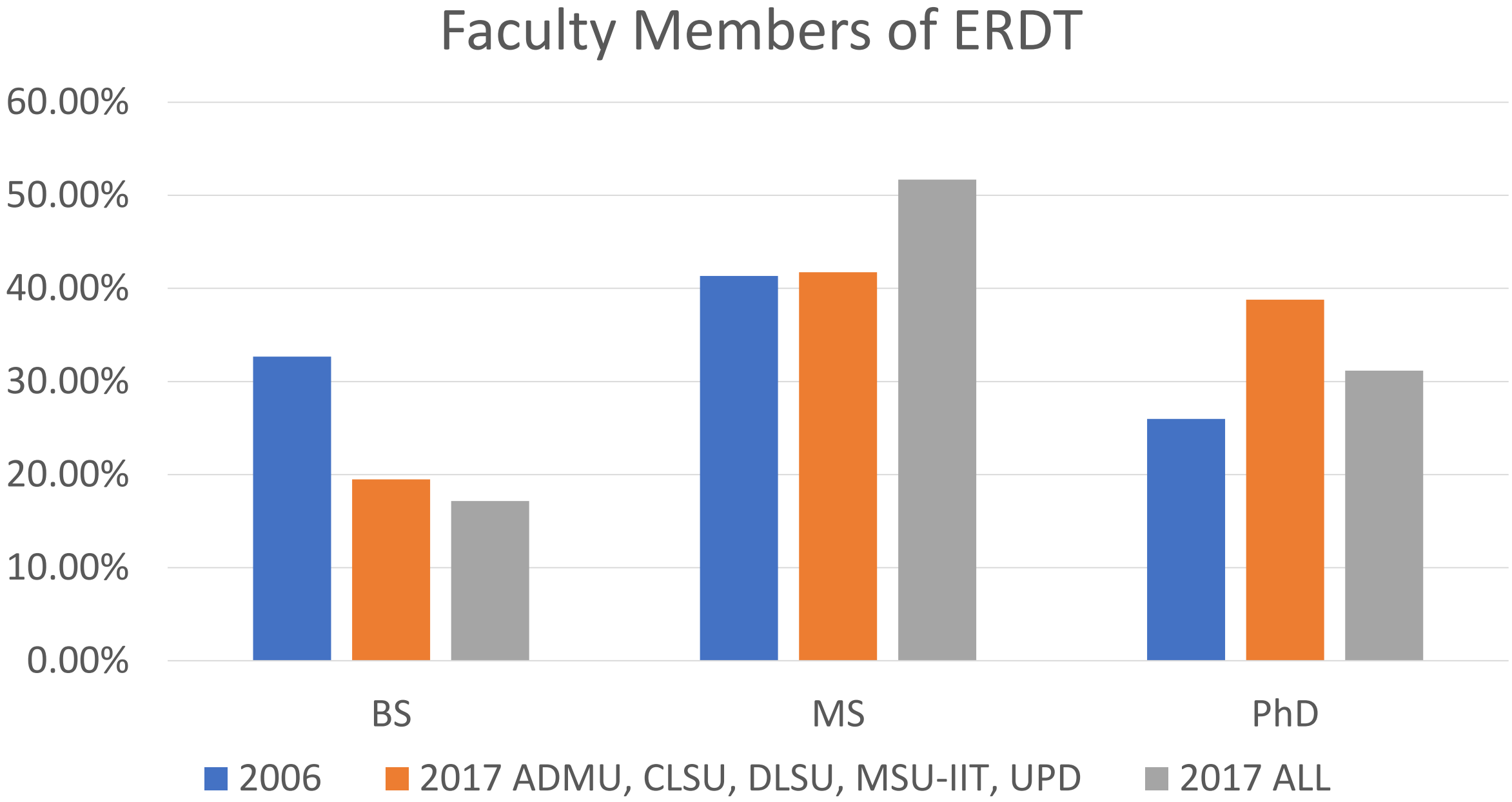
- ERDT awarded scholarships 2,244 MS and 366 PhD
- ERDT graduates 894 MS and 99 PhD

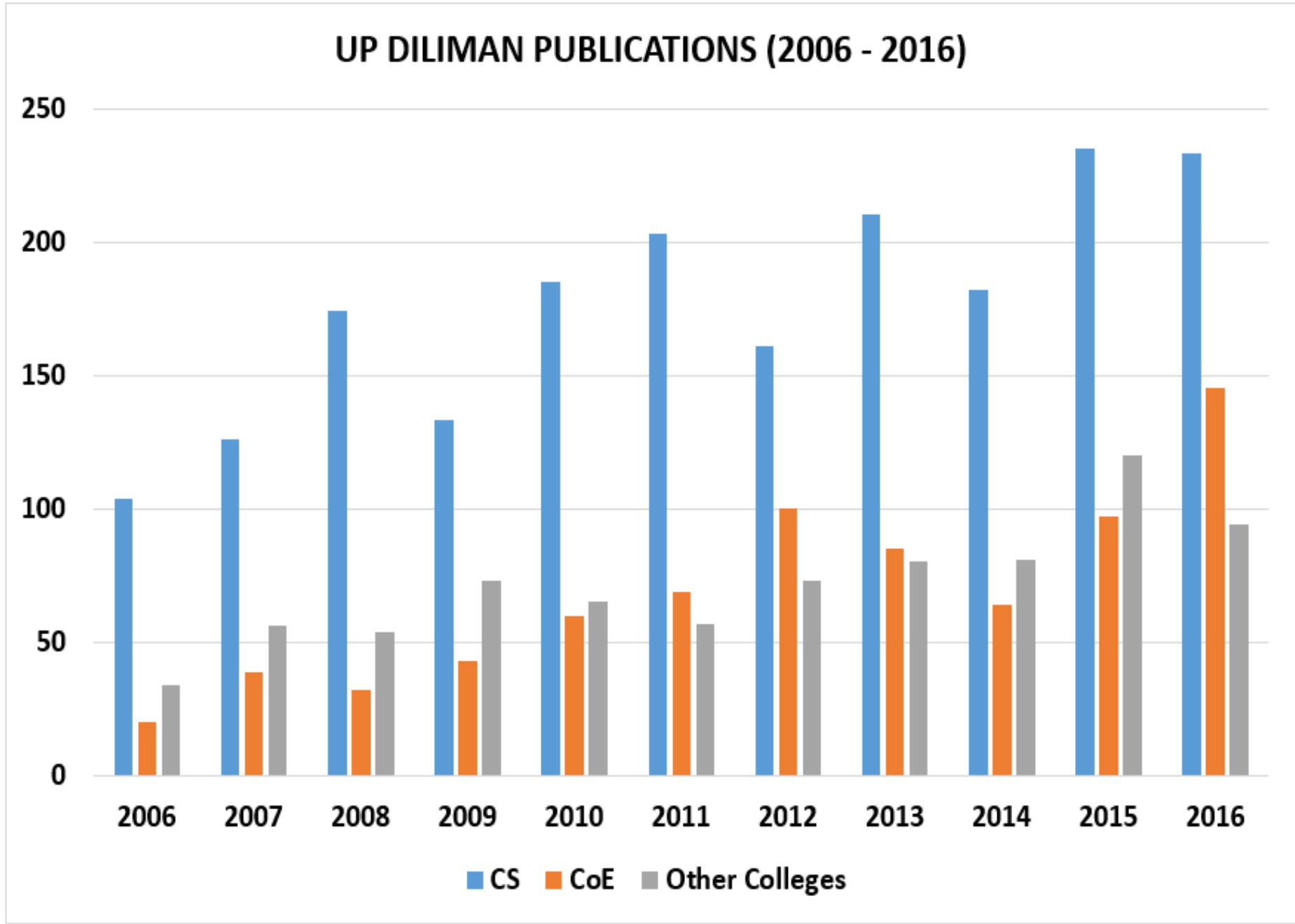
Number of years needed to meet UNESCO benchmark gap current vs. proposed

Assuming that all available slots are subscribed and that **only 30%** of the scholar-graduates go into R&D, the UNESCO benchmark **will be met in 2021** if the proposed number of slots will be followed.

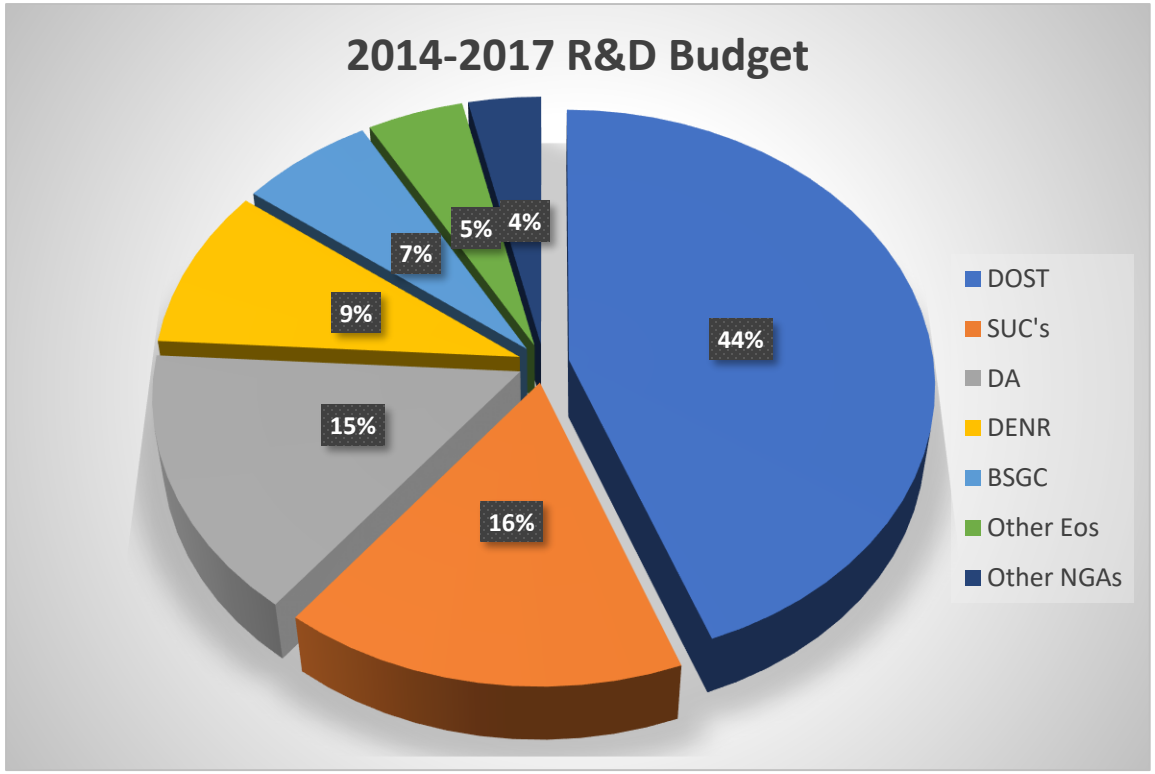


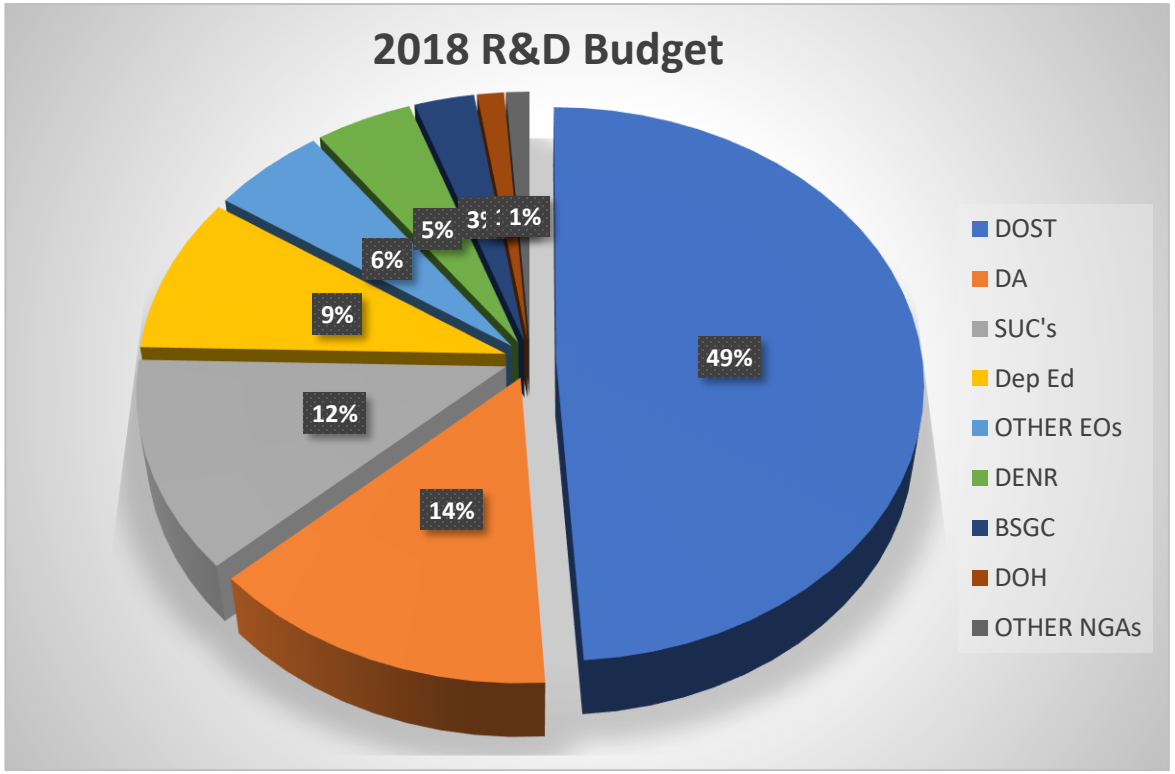
2018	P3.7 B
2019	P4.5 B
2020	P5.7 B
2021	P7.4 B
2022	P8.8 B


Faculty Members of ERDT
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
BS
MS
PhD
2006
2017 ADMU, CLSU, DLSU, MSU-IIT, UPD
2017 ALL


UP DILIMAN PUBLICATIONS (2006 - 2016)
250
200
150
100
50
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
CS
CoE
Other Colleges

R&D Budget of Government Departments* 2014 - 2018

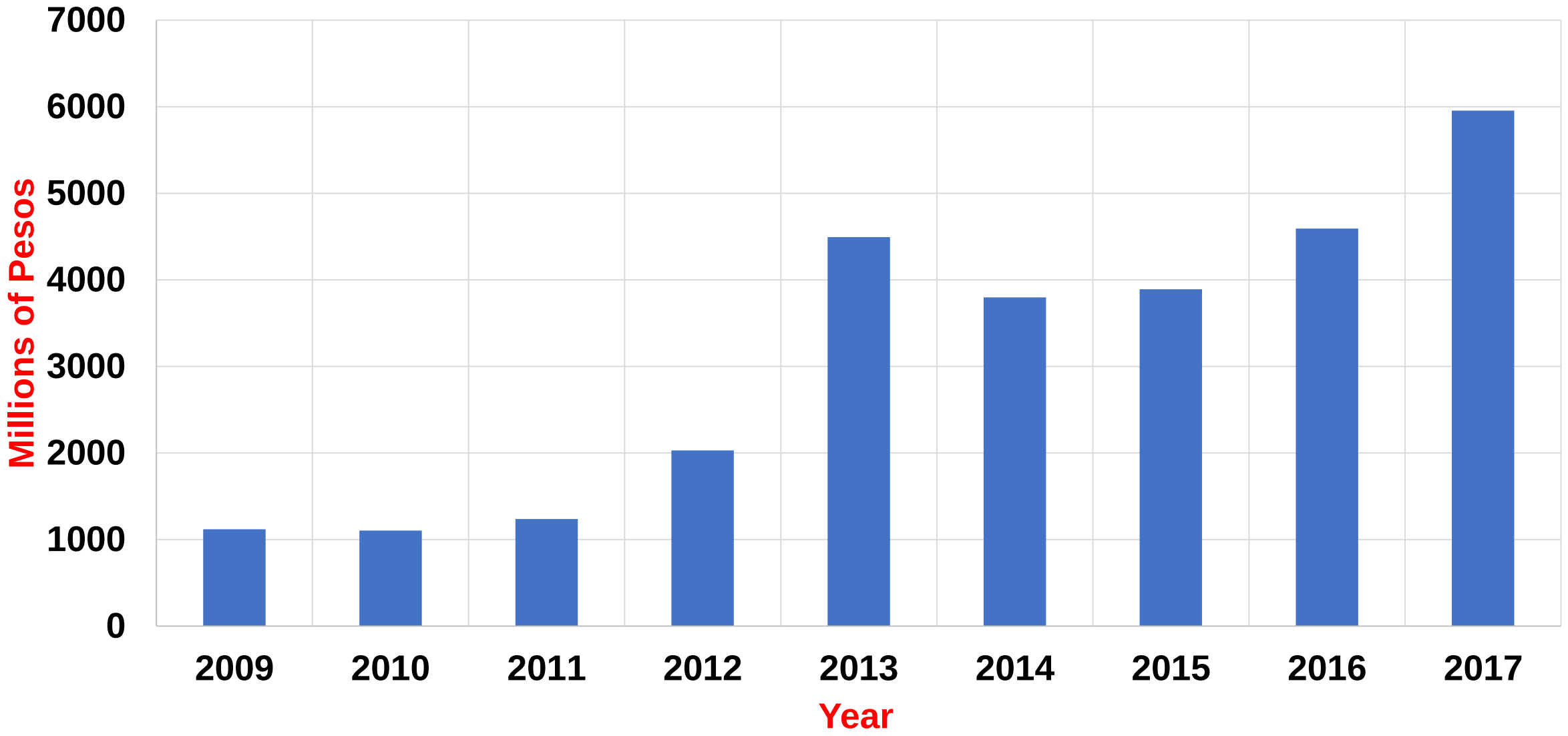




	2014	2015	2016	2017	2018
TOTAL National R&D Budget	10,084,009	9,491,484	13,015,050	13,667,462	16,705,661
Total GAA (National Budget)	1,608,503,084	1,862,824,653	2,138,604,596	2,499,486,952	2,861,527,550
Ratio of National R&D Budget against National Budget (GAA)	0.63%	0.51%	0.61%	0.5%	0.6%

*Based on Unified Accounts Code Structure (UACS)

DOST R&D Grant-in-Aid Funding



	Institution	Location	Number of Projects	Number of Personnel involved	Number of Papers published
1	**University of the Philippines Diliman**	Quezon City	194	1,572	141
2	**University of the Philippines Los Baños**	Los Baños	183	1,077	35
3	**Central Luzon State University**	Muñoz, Nueva Ecija	49	204	20
4	Visayas State University	Baybay, Leyte	31	194	5
5	University of the Philippines in the Visayas	Iloilo City	40	172	2
6	**Ateneo de Manila University**	Quezon City	21	170	20
7	University of the Philippines Manila	Manila	32	87	0
8	**De La Salle University**	Manila	14	116	27
9	Isabela State University	Echague	15	102	7
10	**Mindanao State Univ - Iligan Institute of Tech**	Iligan City	6	77	5
11	Central Mindanao University	Maramag	17	81	1
12	**Mapua Institute of Technology**	Manila	5	97	1
13	University of Southern Mindanao	Kabacan	19	76	4
14	University of the Philippines Mindanao	Davao City	4	63	1
15	Caraga State University	Butuan City	6	67	19
16	University of the Philippines Cebu	Cebu City	3	67	7
17	**University of San Carlos**	Cebu City	4	49	0
18	Ateneo de Naga University	Naga City	2	47	0
19	Ateneo de Zamboanga University	Zamboanga City	2	28	0
20	Mariano Marcos State University	Batac, Ilocos	4	35	0

2014 to 2016

“Not everything that **counts** can be **counted**,
and
not everything that can be **counted counts**.”

-Einstein

Evolution of the Role of R&D

Teaching-centric

-R&D conducted to improve teaching and capacity building

University Ranking

#PhDs/University

PRC passing rate

CHED COE/COD

Peers-centric

-R&D conducted to contribute to the overall scientific knowledge

Publications

Patents

Impact factors

Citations H-index

SCS

Society-centric

-R&D as a tool for positive societal change

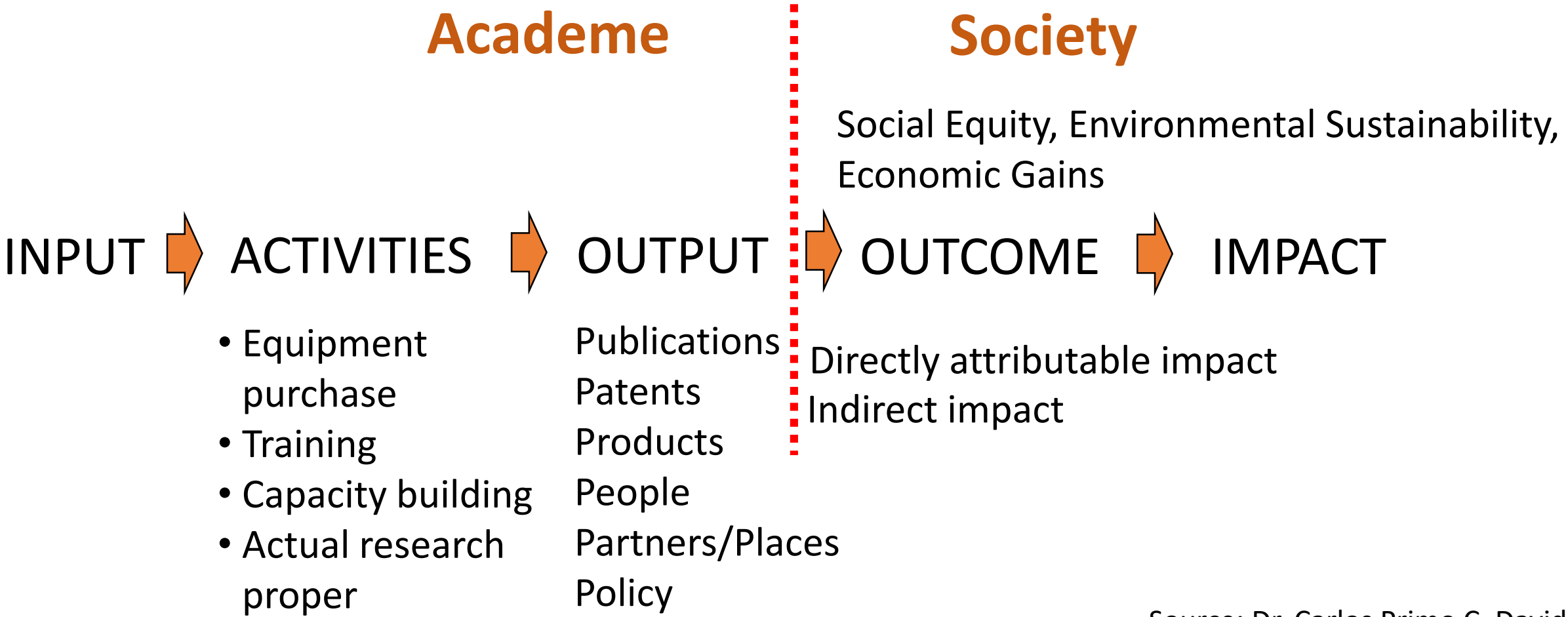
Impact Assessment

Economic gains

Startups graduated

Source: Dr. Carlos Primo C. David

Research Impact Framework

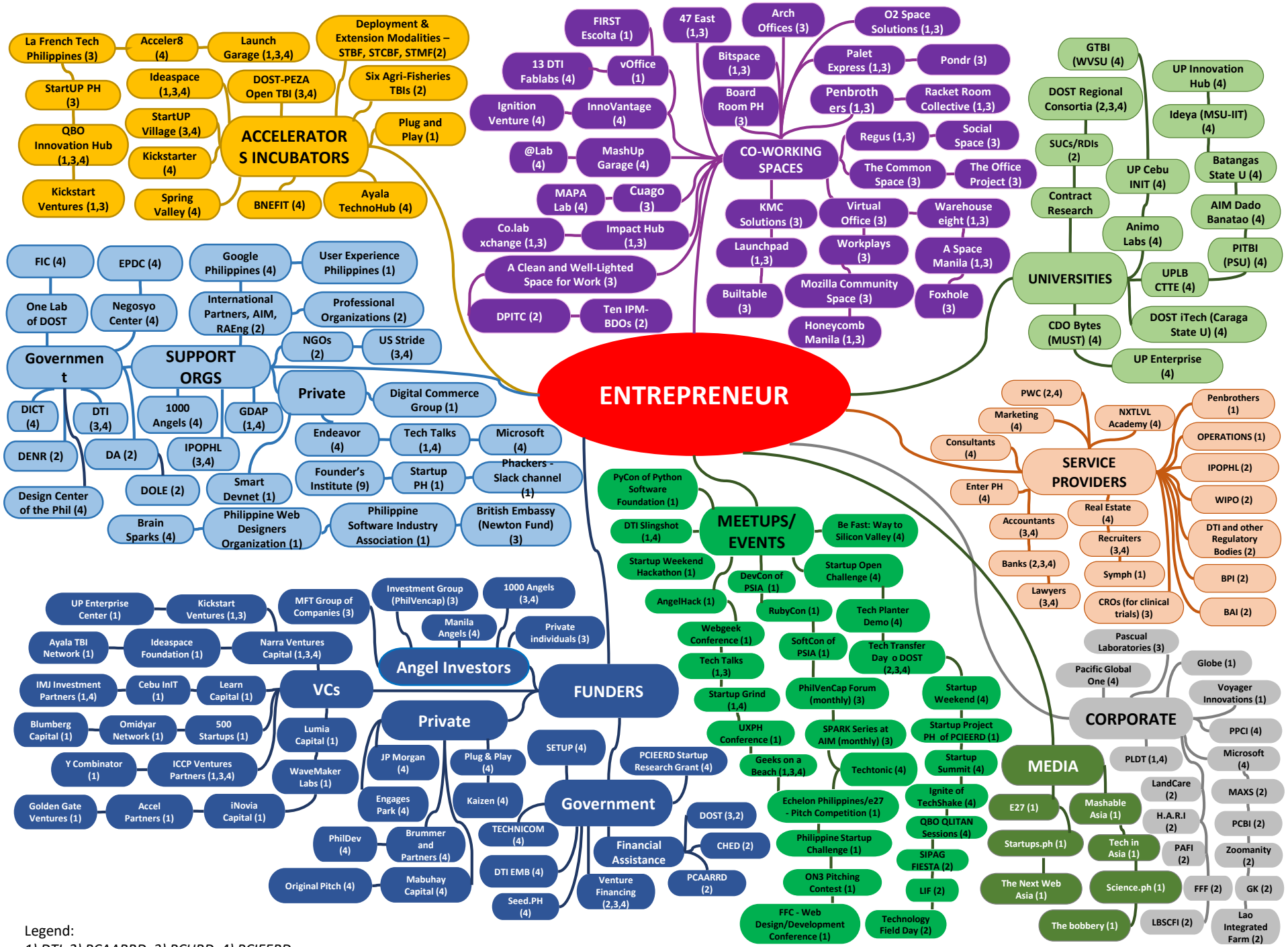


Source: Dr. Carlos Primo C. David

Impact categories

Source: Dr. Carlos Primo C. David

ECONOMIC IMPACTS	**ENVIRONMENTAL IMPACTS**	**SOCIAL IMPACTS**
economic performance	Air quality	Health and wellbeing
Trade and competitiveness		Access to resources, services and opportunities
Productivity and efficiency	Climate	Safety
Management of risk and uncertainty	Natural hazards mitigation	Quality of life (material security and livelihoods)
New services, products, experiences and market niches	Energy generation and consumption	Security (ecyber, biological, civil and military)
Policies and Programs	Land quality	Resilience
Animal health and prosperity	Aquatic environments	Indigenous culture and heritage
Securing and protecting existing markets	Built environments	Innovation and human capital (creativity and invention)
		Social cohesion (social inclusion, social capital and social mobility)



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

Innovation Drivers in the Investment Priority Plan 2017-2019

- Research and development activities
- Clinical trials (including drug trials)
- Centers of Excellence (e.g., academic and medical facilities)
- Innovation centers
- Business incubation hubs
- Fablabs/co-working spaces
- Shared Service Facility for MSMEs
- **Commercialization of new and emerging technologies and products of DOST or government-funded R&D**

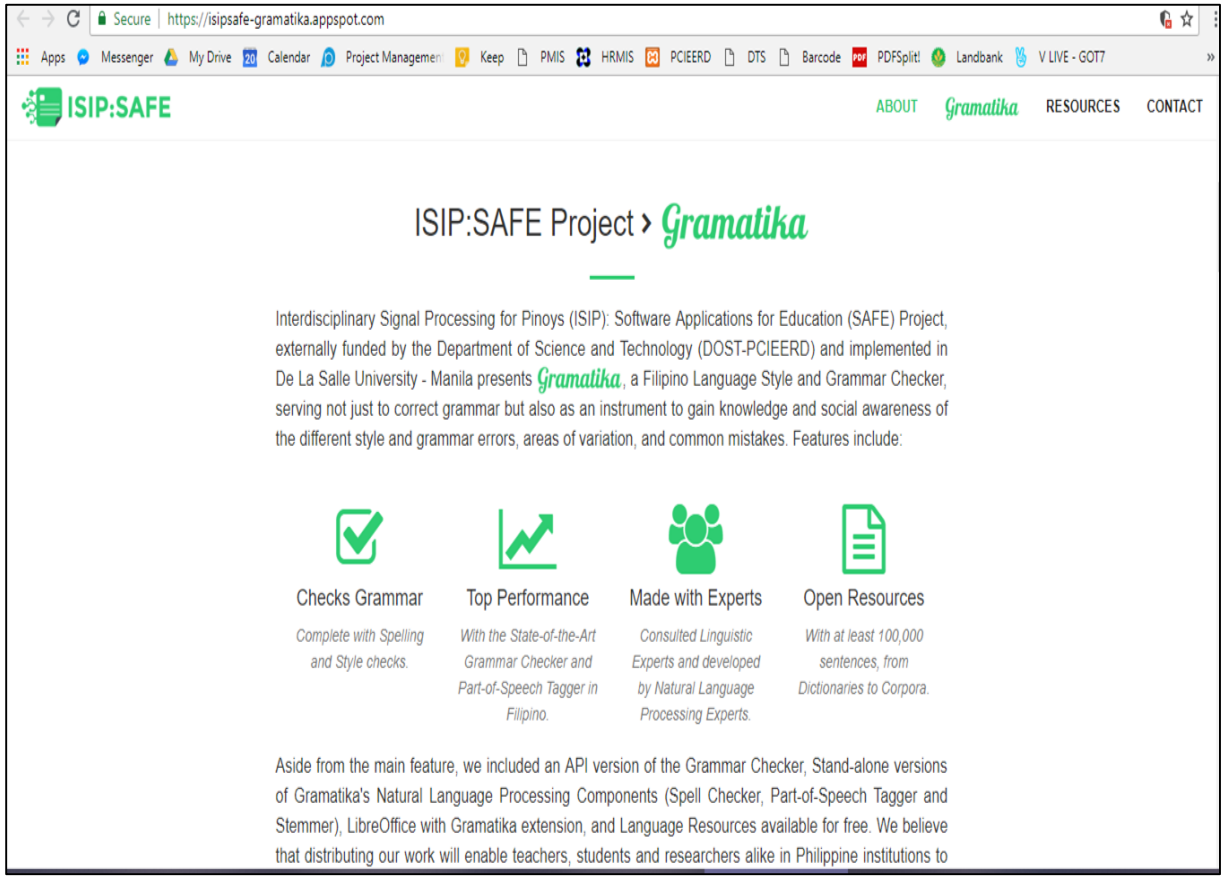
PCIEERD

R&D in Humanities and Social Sciences that involves Engineers

Interdisciplinary Signal Processing for Pinoys (ISIP): Software Applications for Education (SAFE)

UP Diliman, De La Salle University

July 16, 2015 – December 15, 2017



LEAP: Learning While Playing

UP Diliman

February 1, 2011 - August 31, 2012

Program/Project Leader: Dr. Rowel Atienza

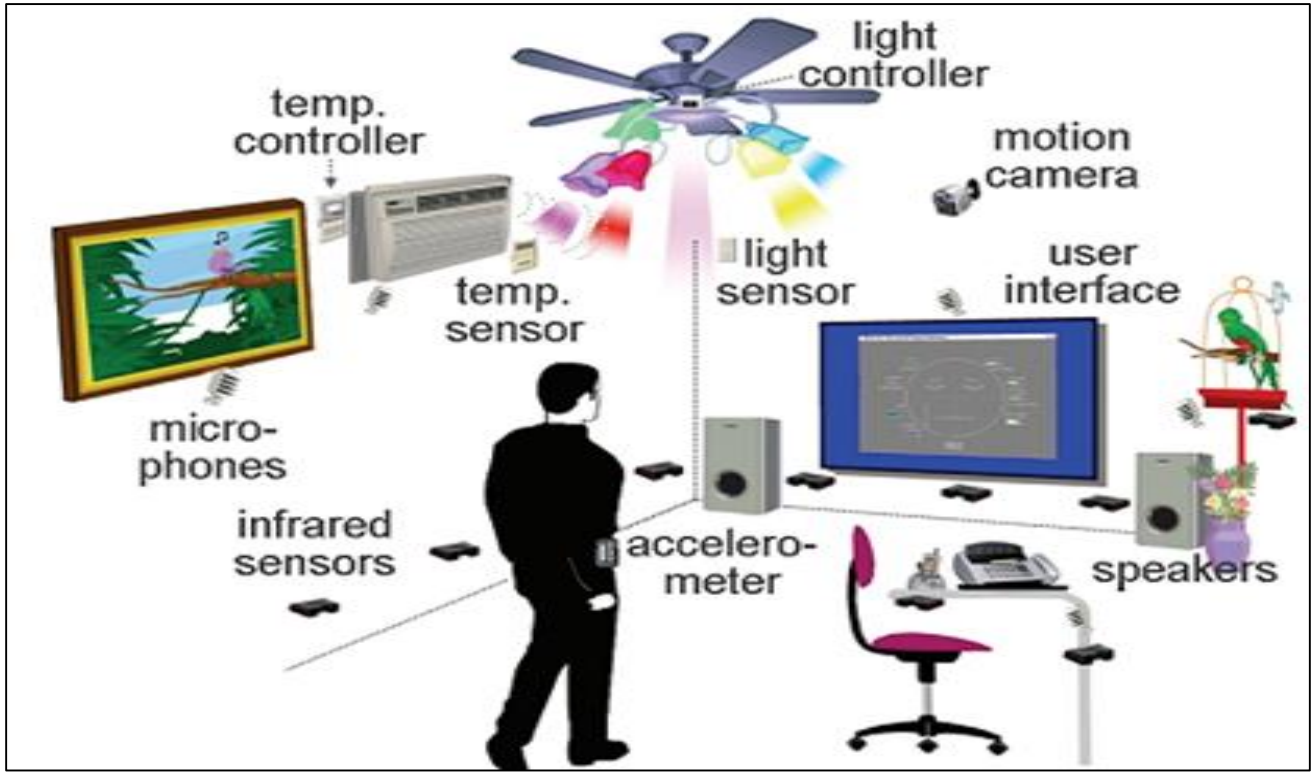
Budget: P3,301,204.00

- ✓ *The study and creation of a development framework that will be based on educational learning theories to ease integration of technological media with school curricula.*
- ✓ *The purpose of the framework is to create a solid foundation for future development of educational software, such as educational games and teacher-centric tools.*

Towards the Development of a self-Proving and ambient Intelligent Empathic Space: Data-centric, Multimodal Empathic Modeling from a Pluridisclipinary Perspective

UP Diliman

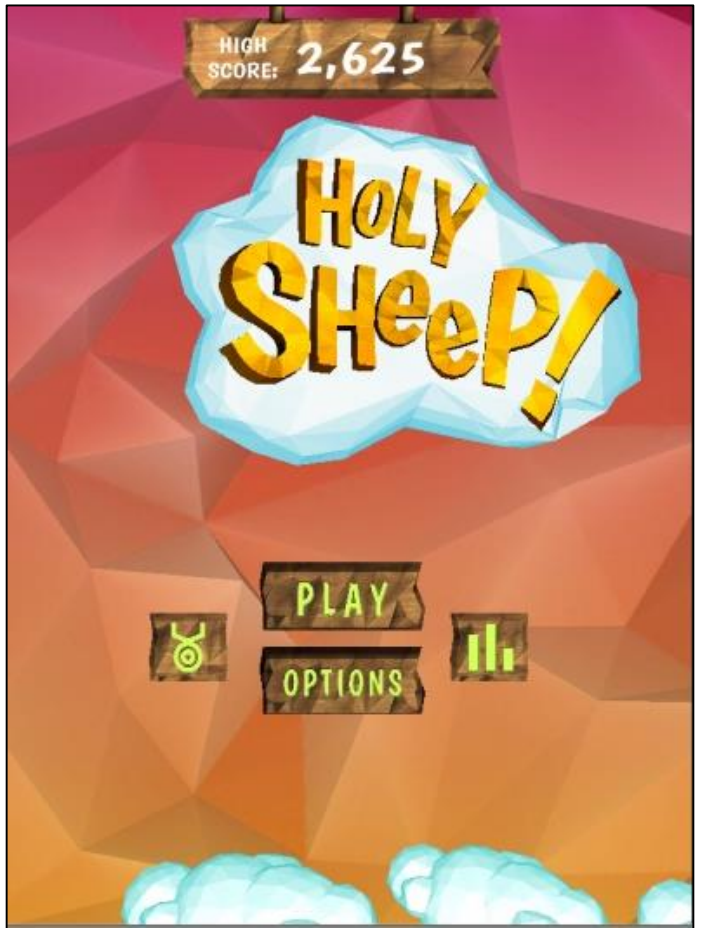
March 9, 2009 - December 28, 2013



3-D Gestures on 2-D Screen for User Interface

UP Diliman

February 1, 2013 - December 31, 2014



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

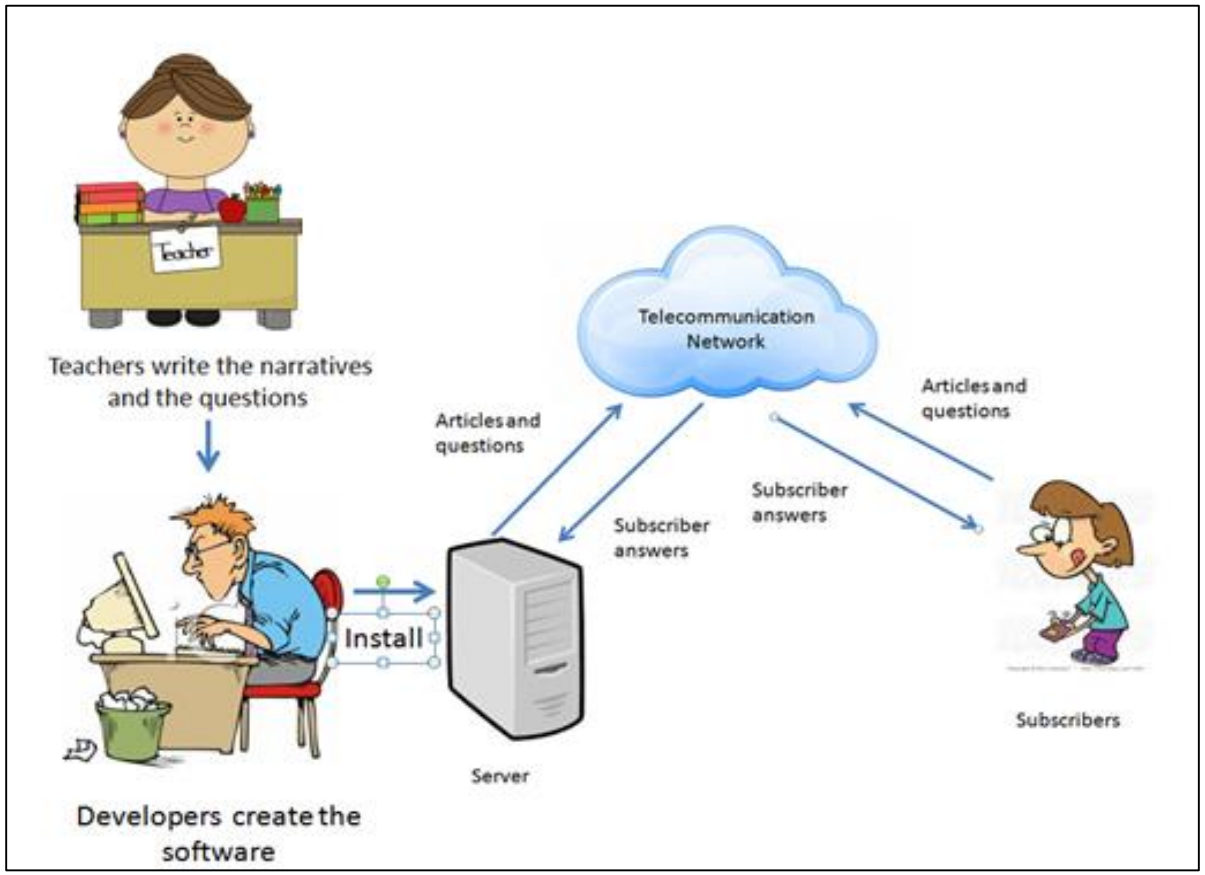
UP Diliman

December 1, 2014 - May 31, 2016

Development and Deployment of Adaptive, Interactive, SMS-Based Modules for English

Ateneo De Manila University

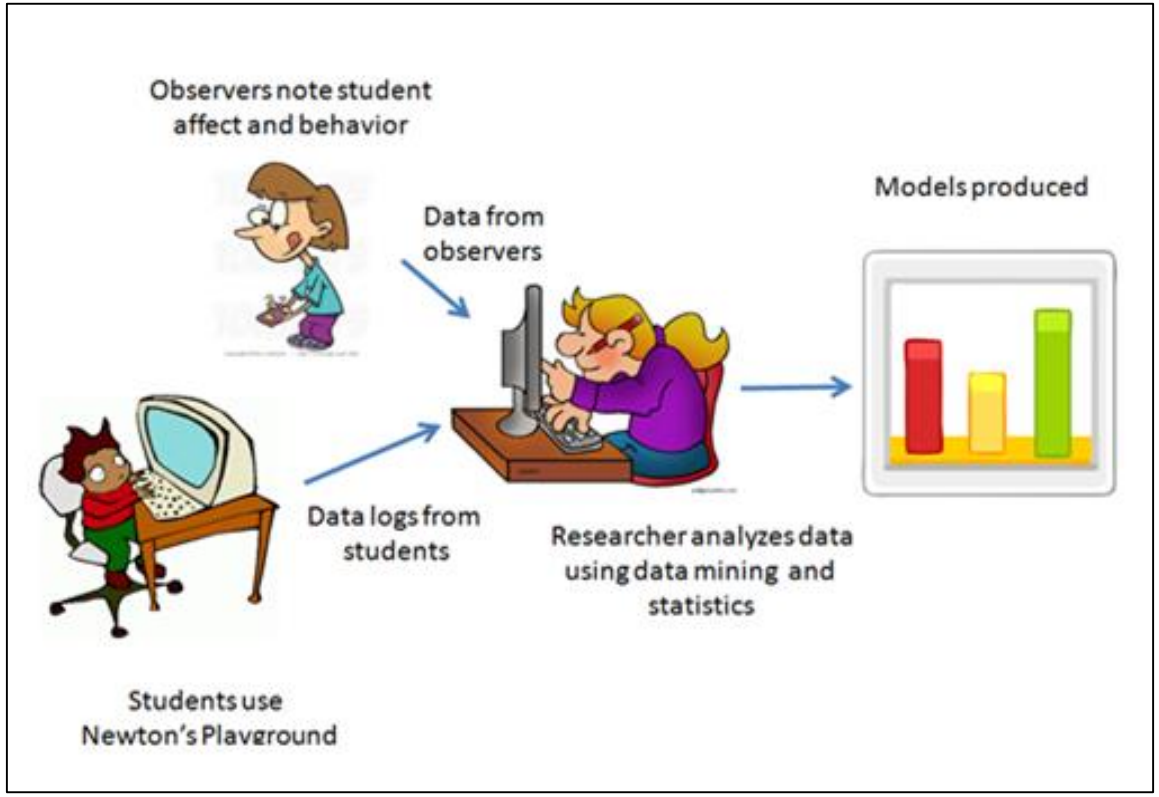
January 8, 2015 - January 7, 2016



Stealth Assessment of Student Conscientiousness, Cognitive-affective States, and Learning using and Educational Game for Physics

Ateneo De Manila University

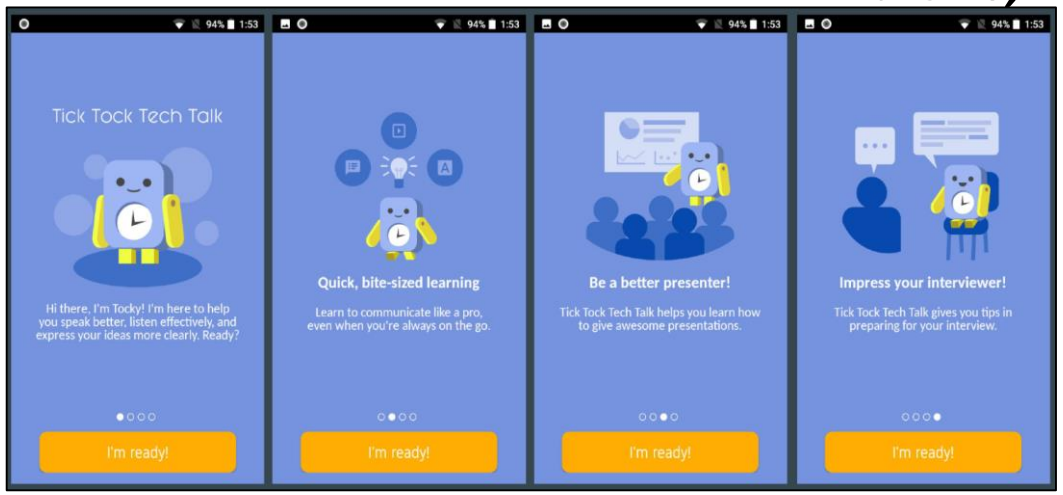
January 8, 2015 - January 7, 2016

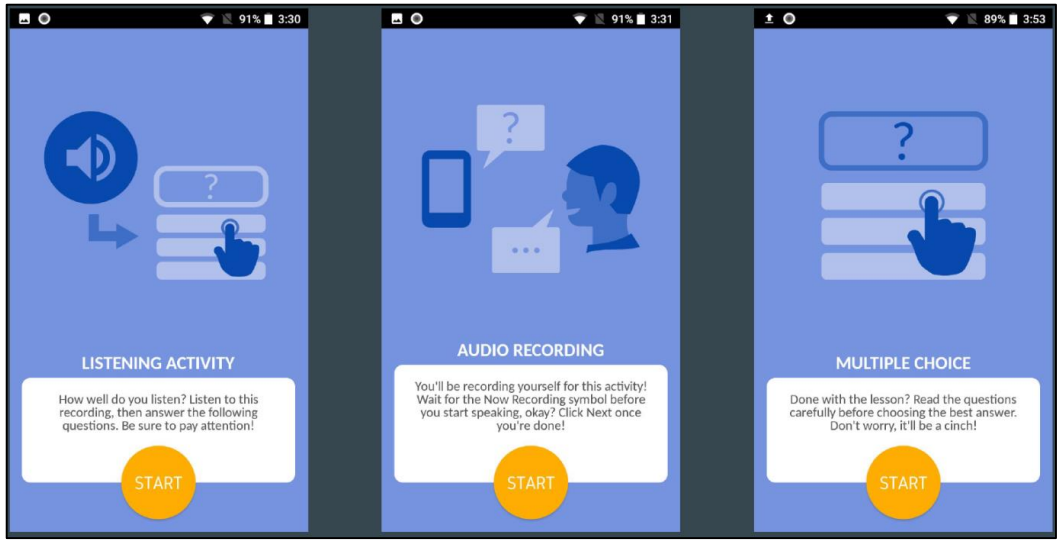


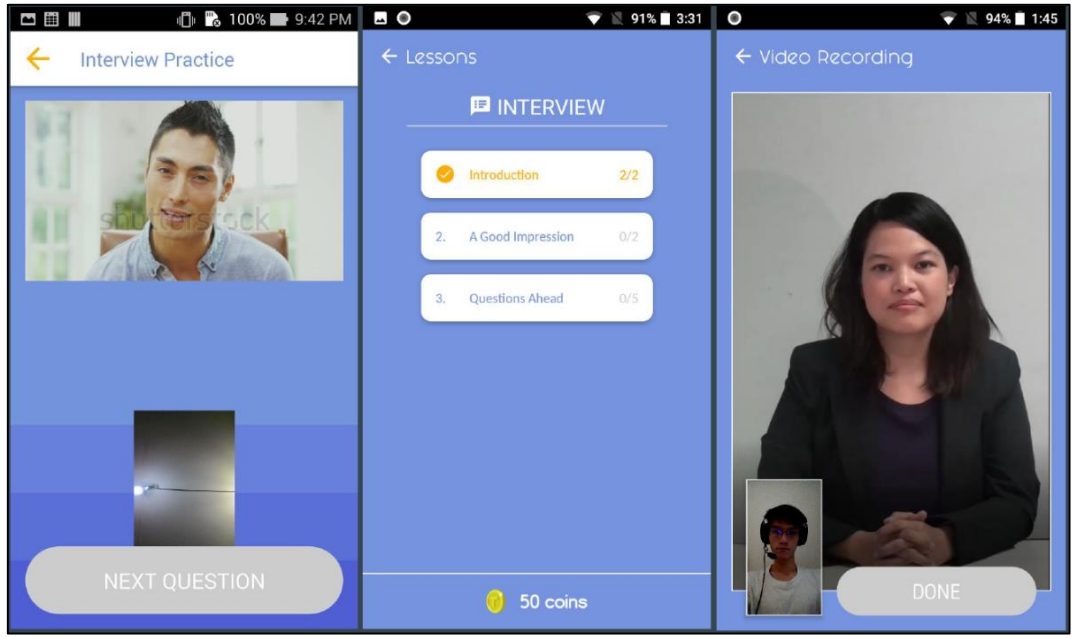
Tick-Tock Tech Talk

UP Diliman

March 6, 2017 - March 5, 2018







The application will primarily provide content that aims to teach English in a particular communication context

DOST Deep Learning using TensorFlow and Machine Learning Training

Thinking Machines Data Science Inc.

June 27, 2017 - December 27, 2017

Industry Defined
2D Basic Animation Course

Toon City Academy, Inc.

November 1, 2017 - October 31, 2019

2D Basic Animation Training Activities in the University of Pangasinan (left) and University of Iloilo (right)

Development of Interactive Software and Teaching Guides for Grades 7-10 Mathematics

mathplus ATENEO

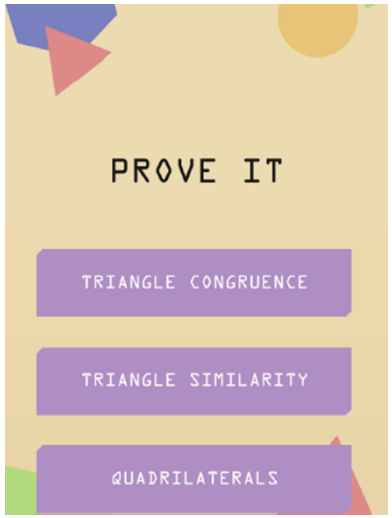
Ateneo de Manila University

May 1, 2015 - January 31, 2018

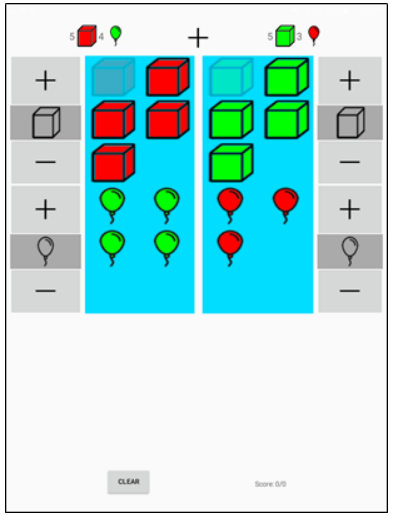
Math Plus Resources

Resources are organized based on strand and grade levels.

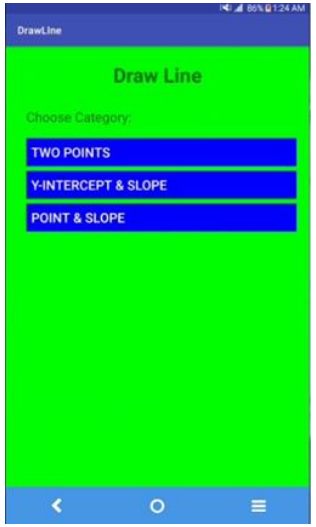
STRAND	GRADE 7	GRADE 8	GRADE 9	GRADE 10
ALGEBRA	$Y + X^2$	$Y + X^2$	$Y + X^2$	$Y + X^2$
GEOMETRY				



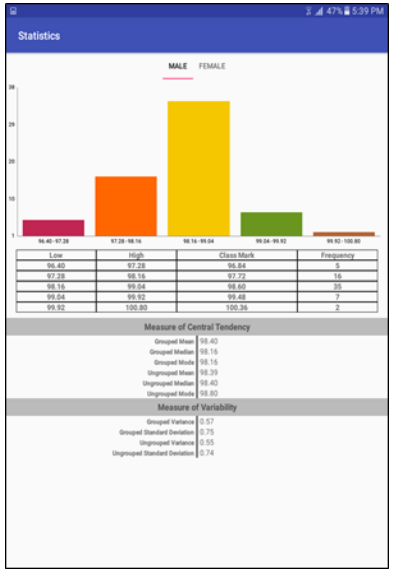
Prove It



AlgeOps



Drawline



Statistics

Human Hands as Input Device for an Immersive Virtual Reality Experience

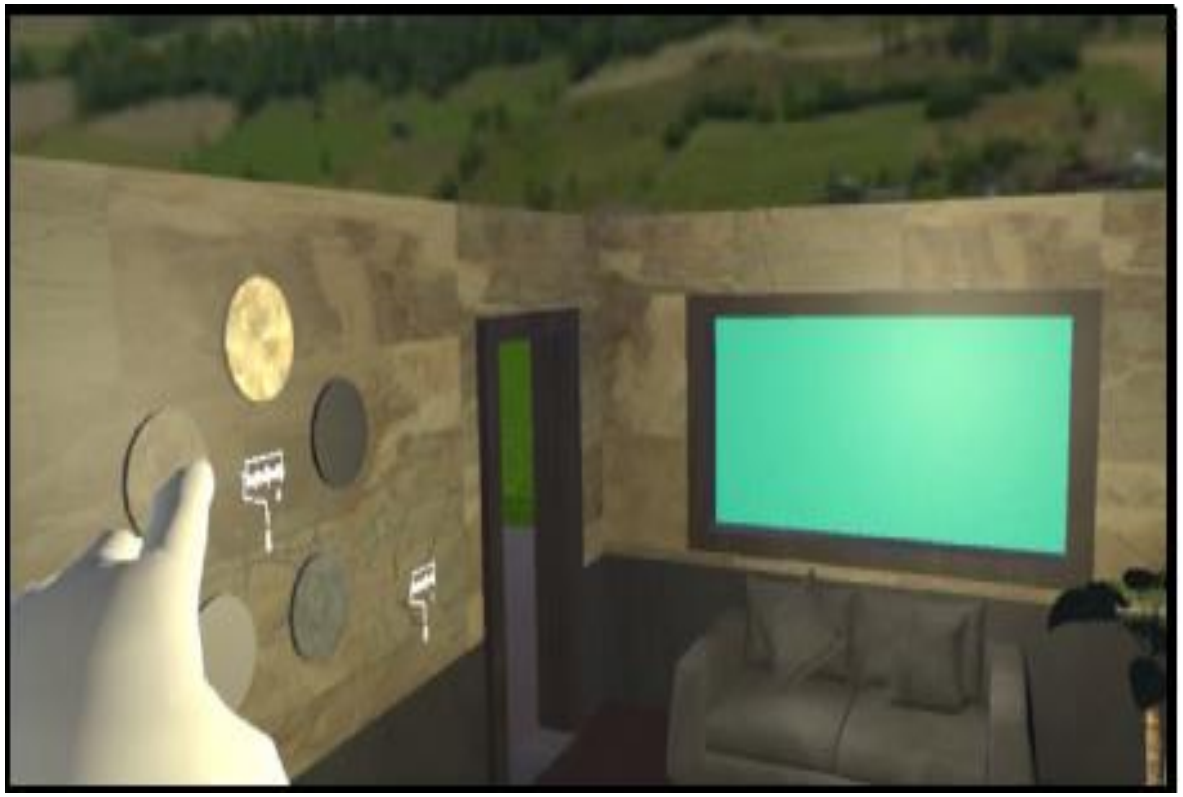
UP Diliman

March 20, 2015 - December 31, 2017

ANEEME: Synthesizing and Sharing Animation Building Blocks for Rapid creation of 3D Motion Scenes

UP Diliman

January 1, 2016 - April 31, 2018



PCIEERD

Technologies for Humans

RxBox2: Integrating Medical Devices in the National Tele-Health Service Program - Project 3 - Field Deployment of Telemedicine Devices

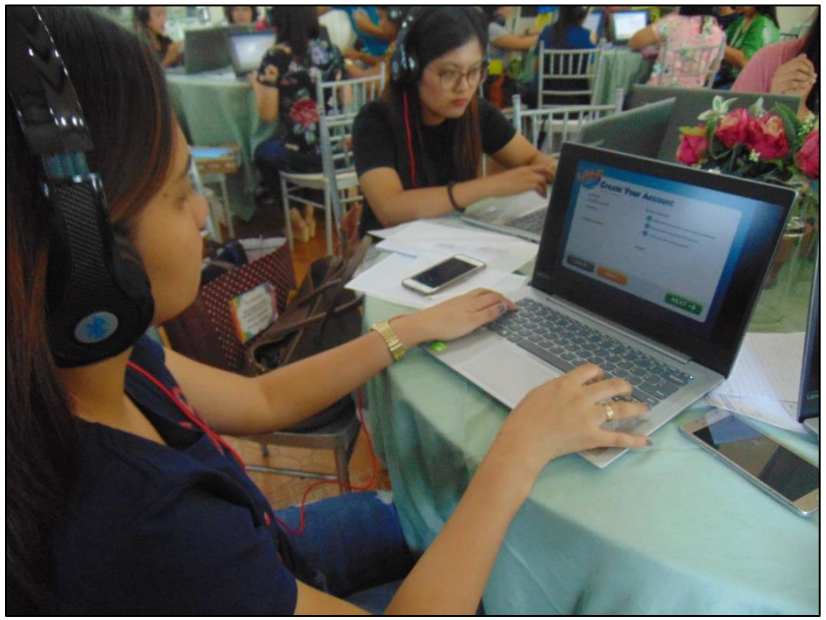
UP Manila

October 1, 2012 – December 31, 2014

LEAP: Learning English Application for Pinoy

UP Diliman

September 12, 2013 – March 15, 2015

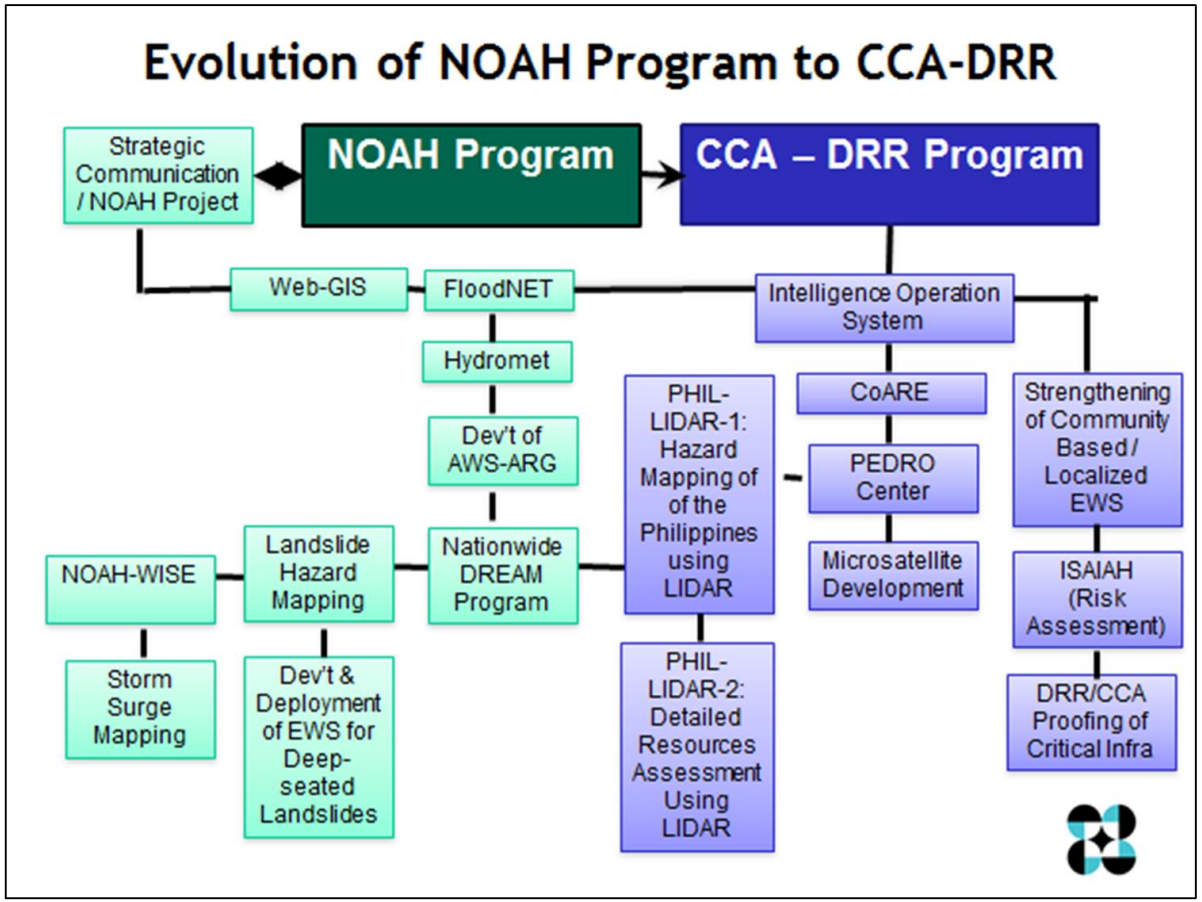


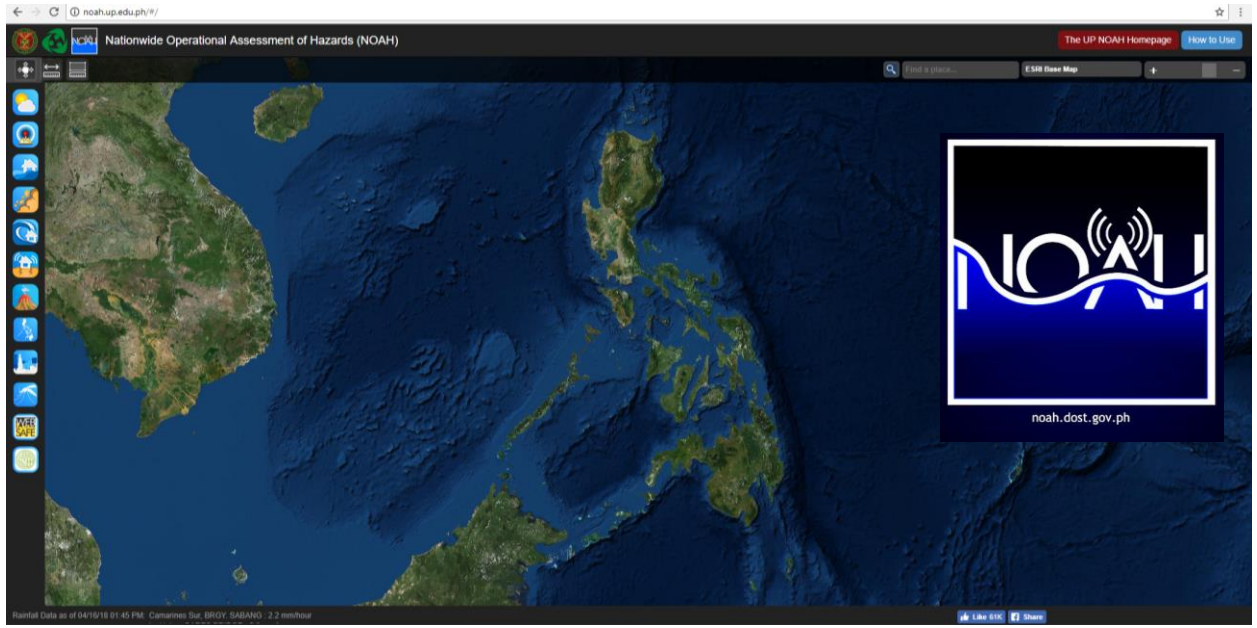
A stand-alone, computer-based training program for English language skill improvement

Nationwide Operational Assessment of Hazards (NOAH) Program

UP Diliman, DOST Agencies (ASTI, PHIVOLCS, PAGASA, STII)

2011 - 2018

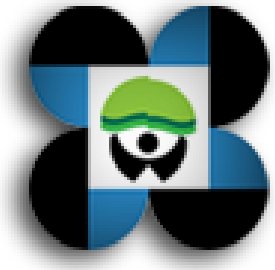




NOAH Website

PCAARRD

Technologies for Humans



Postharvest Mechanization and Storage Support System for Peanut

Machine for shelling peanut cum sorter with 150 kg/hr shelling capacity

Researcher/Affiliation:
Dr. Jose D. Guzman/ Cagayan State University

Duration:
Apr 01, 2013 – Dec 2016

Total Budget: P4,820,085

Status of Commercialization:
Pilot Testing (on-going), Freedom to Operate (FTO) Reviewed, Submitted application for UM patent

Peanut Sheller

The machine separates the kernels from the pods by aspiration and sorts the cleaned kernels into three size classes - large, medium, and small through a series of oscillating sieves.

Postharvest Mechanization and Storage Support System for Peanut

Machine for stripping peanut cum sorter with 116 kg/hr stripping capacity

Researcher/Affiliation:
Dr. Jose D. Guzman/ Cagayan State University

Duration:
Apr 01, 2013 – Dec 2016

Total Budget: P4,820,085

Status of Commercialization:
Pilot Testing (on-going), Freedom to Operate (FTO) Reviewed, Submitted application for Patent Claims

Peanut Stripper

Postharvest Mechanization and Storage Support System for Peanut

Machine for stripping peanut cum sorter with 116 kg/hr stripping capacity

Researcher/Affiliation:
Dr. Jose D. Guzman/ Cagayan State University

Duration:
Apr 01, 2013 – Dec 2016

Total Budget: P4,820,085

Status of Commercialization:
Pilot Testing (on-going), with Prior Art Search,
Submitted application for Patent Claims

Peanut Bulk Storage

Development of a local riding-type precision rice seeder

An 8-row riding-type precision seeder that is suitable for inbred and hybrid rice with field capacity of 2ha/day

Researcher/Affiliation:
Engr. Eden C. Gagelonia
Philippine Rice Research Institute

Duration:
Jul 01, 2013 – Oct 31, 2016

Total Budget: P5,545,813

Status of Commercialization:
For Pilot Testing, Market study (ongoing)

Precision Rice Seeder

Low cost, self propelled, 8-row riding type precision seeder that reduces labor requirement from 15 man-day/ha to 2 man day/ha

Development of a local riding-type Rice Transplanter

A 6-row mechanical transplanting system with field capacity of 2ha/day

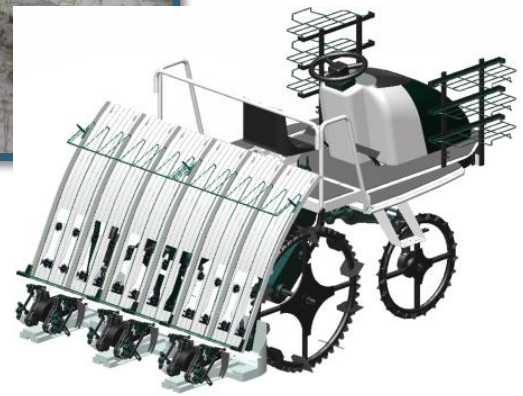
Researcher/Affiliation:
Dr. Arnold S. Juliano
Philippine Rice Research Institute

Duration:
Jul 01, 2013 – Sep 30, 2016

Total Budget: P4,757,5273

Status of Commercialization:
Pilot Testing (ongoing), FTO, Market study (ongoing), IPR claims submitted

Rice Transplanter



- ✓ Planting capacity of 2 ha/day, 24 hills/m^2 planting density (30 x 20 cm), 2 -3 seedlings/hill
- ✓ 4.7% reduction in labor cost

Development of a Combined Conduction and Far Infrared Radiation (FIR) Paddy Dryer

A rapid paddy drying technology using combined conduction and far-infrared radiation system with capacity of 1metric ton/hr.

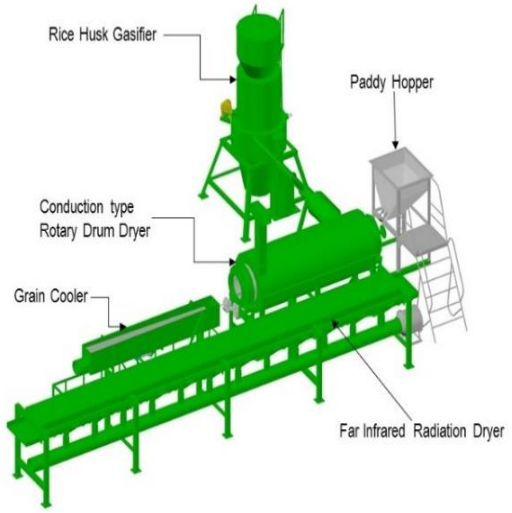
Researcher/Affiliation:
Dr. Manuel Jose C. Regalado
Philippine Rice Research Institute

Duration:
Jul 01, 2013 – Oct 31, 2016

Total Budget: P5,914,038

Status of Commercialization:
Pilot Testing (ongoing). FTO; Market study (ongoing), IPR claims applications drafted/submitted

Rice Combine Conduction and FIR Dryer



Development and Pilot Testing of Improved 1.3-meter Rice Combine Harvester

A combine harvesting/ threshing/ bagging system with field capacity of 2 ha/ day

Researcher/Affiliation:
Dr. Caesar Joventino M. Tado
Philippine Rice Research Institute

Duration:
Jul 01, 2013 – Sep 30, 2016

Total Budget: P4,757,5273

Status of Commercialization:
For Pilot Testing. FTO; Market study (ongoing), IPR claims submitted

Rice Combine Harvester

Development of a local riding-type Rice Transplanter

A new type of impeller huller ricemill with milling capacity of 230kg/hr that can produce both brown and white rice

Researcher/Affiliation:
Dr. Michael A. Gragasin
Philippine Center for Postharvest Development & Mechanization

Duration:
May 01, 2013 – Dec 31, 2015 (Devt)
Jan 01 2016 – Dec 31, 2017 (Piloting)

Total Budget: P4,043,627 (Devt)
P3,667,933 (Piloting)

Status of Commercialization:
Pilot Testing; FTO; Valuation study; Market study (completed), IPR claims submitted

Impeller Type Rice Mill

Design and Development of Hand Tractor Attachment: Harvester and Transplanter

A locally fabricated harvester-attached hand tractor prototype and transplanter-attached hand tractor

Researcher/Affiliation:
Engr. Isidro D. Millo
Metals Industry Research and Development Center

Duration:
July 01, 2013 – March 31, 2016 (Devt)
Feb 01,2015 – Dec 31,2017 (Piloting)

Total Budget: P8,108,228 (Devt)
P4,962,558 (Piloting)

Status of Commercialization:
Pilot Testing (completed) FTO; Business Plan, Valuation study; Market study (ongoing), IPR claims submitted

Harvester

Transplanter

Design and Development of Superheated Steam Treatment System (SSTS) for Stabilized Brown Rice

The Superheated Steam Treatment System for Stabilized Brown Rice is used to prolong the shelf life of brown rice from 1- 2 months to 5 – 9 months

Researcher/Affiliation:
Dr. Dominic Guevarra, MIRDC
and Dr. Rosemarie G. Garcia/ FNRI

Duration:
July 01, 2013 – Dec 31, 2016

Total Budget: P6,923,135 (MIRDC)
P2,227,318 (FNRI)

Status of Commercialization:
For Pilot Testing. IPR claims submitted

Batch Type SSTS

Continuous Type SSTS

Development Postharvest Facilities for Mango Production in Region XI

The automated hot water tank are used to treat postharvest diseases of newly harvested mangoes.

Researcher/Affiliation:
Dr. Roger C. Montepio
University of Southeastern Philippines

Duration:
May 16, 2012 – May 15, 2015

Total Budget: P3,799,136

Status of Commercialization:
Pilot Testing (ongoing). IPR claims submitted

Mango Hot Water Treatment

Automated Hot water Tank

Design and Development of Sugarcane Harvesting Equipment for Small Scale Farms

The machine is design to harvest sugarcane by mimicking the actions done by farmers when harvesting.

Researcher/Affiliation:
Engr. Emerito V. Banal
MIRDC

Duration:
Jan 1, 2015 – Dec 31, 2017

Total Budget: P6,991,159

Status of Commercialization:
For Pilot Testing. IPR claims submitted

Sugarcane Cutter

Design and Development of Sugarcane Harvesting Equipment for Small Scale Farms

The machine is design to cut or remove leaves and leaf sheath from the harvested cane stem.

Researcher/Affiliation:
Engr. Emerito V. Banal
MIRDC

Duration:
Jan 1, 2015 – Dec 31, 2017

Total Budget: P6,991,159

Status of Commercialization:
For Pilot Testing. IPR claims submitted

Sugarcane Leaf Stripper

Design and Development of Sugarcane Harvesting Equipment for Small Scale Farms

The machine is design in loading the bundled cane to the truck or trailers through side loading

Researcher/Affiliation:
Engr. Emerito V. Banal
MIRDC

Duration:
Jan 1, 2015 – Dec 31, 2017

Total Budget: P6,991,159

Status of Commercialization:
For Pilot Testing. IPR claims submitted

Sugarcane Loader

Development of improved postharvest technologies for coffee

A simple, inexpensive alternative yet accurate coffee moisture meter for green coffee beans and coffee parchments

Researcher/Affiliation:
Dr. Romualdo C. Martinez
PhilMech

Duration:
Feb 1, 2015 – Mar 31, 2017

Total Budget: P3,029,669

Status of Commercialization:
For Pilot Testing. FTO reviewed. IPR claims drafted

Coffee Moisture Meter

Development of improved postharvest technologies for coffee

A greenhouse-type solar dryer (GTSD) for drying coffee berries.

Researcher/Affiliation:
Dr. Romualdo C. Martinez/ PhilMech

Duration:
Feb 1, 2015 – Mar 31, 2017

Total Budget: P5,405,948

Status of Commercialization:
For Pilot Testing. FTO reviewed. IPR claims drafted

Coffee Dryer

PCHRD

Technologies for Humans

Lagundi and Sambong Medicinal Plant Products

The Lagundi tablet and syrup is a cough and asthma drugs from Vitex negundo while Sambong tablet is a remedy for kidney stone dissolution derived from powdered leaves of Blumea balsamifera.

Researcher: Dr. Nelia Cortes Maramba
National Integrated Research Program on Medicinal Plants (NIRPROMP)

Duration (start and end): 1974 – 1998

Budget: PhP ~100 M (for 10 medicinal plants, including 10 years clinical trials)

Commercialization/transfer status:
Commercialized with well known brand names (ex: ASCOF, RE-LEAF, PLEMEX, REMOSTON, LAGUNDEX, etc) in the Philippine market. At present, adopted by more than 14 pharmaceutical companies

RxBox – Telehealth R&D Program

The RxBox is a biomedical device capable of capturing patient vital signs such heart rate, pulse ox, ECG, blood pressure, fetal heart, maternal contraction, and temperature. These signals were stored in an electronic medical record system and can be transmitted through the internet. It also capable of telemedicine and teleconsultation when there is a good internet connection.

Researchers:
Dr. Portia F. Marcelo, UP Manila
Dr. Luis G. Sison, UP Diliman

Duration (start and end): June 2009 - present

Budget: PhP 268M (including ongoing 1000 sites field testing)

Commercialization/transfer status

- Currently licensed to a private manufacturing partner (IONICS EMS) for scale up production.
- Ongoing partnership with DOH, DOH and DOST regional office for training and field testing of the device
- There is an initial plan for the manufacturing of the device for exports

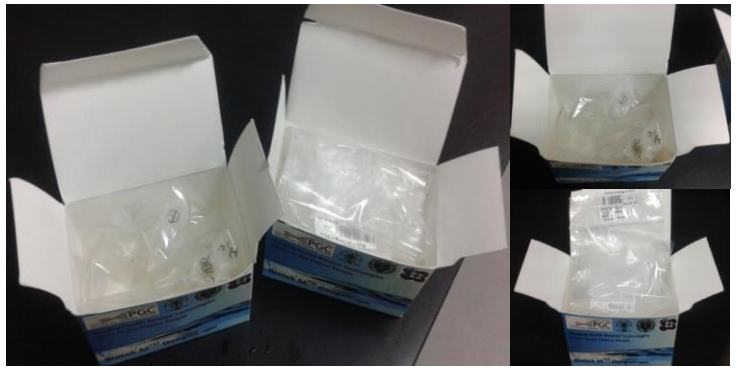
BIOTEK M: Dengue Diagnostic Kit

BIOTEK-M is an affordable and locally developed rapid test kit for accurate detection of dengue infection within an hour. It is part of the "Lab-in-a-Mug Project" where diagnostic kits are integrated in an isothermal unit as small as a "mug" which functions as a diagnostic device similar to a portable laboratory. The local innovation has high sensitivity, high specificity, robust, and less expensive than current diagnostic tests in the market.

Researcher: Dr. Raul V. Destura, UP Manila

Duration: 2010 – 2015

Budget: PhP 19 M (including field testing)



Commercialization/transfer status

- Commercialized by Manila HealthTek, first spin off company of the University of the Philippines
- Secure a contract with DOH to supply dengue infection detection kit to 3 regions with high dengue incidence

eHATID: eHealth TABLET for Informed Decision Making of LGUs

The eHATID (eHealth TABLET for Informed Decision Making of LGUs) is an electronic medical records (EMR) designed for health facilities for recording of patient data and runs in a tablet device. It has can offline and online capabilities which uses the GovCloud facility of the government. One of the PhilHealth-certified electronic medical records system in the Philippines.

Researcher: Dr. Dennis B. Batangan
Institute of Philippine Culture, Ateneo de Manila University

Duration: June 2014 – Sept 2016

Budget: PhP 33 M
(including roll out to 450 municipalities)

Commercialization/transfer status

Adopted by rural health units for enlistment of 4Ps members for PhilHealth primary care benefits. Business development and commercialization strategies are being developed with private partner under the DOST TECHNICOM funding.

Knee Axis Replacement System

The Knee Axis Replacement system is an implant that has three components: the femoral (thigh) component made of a highly polished metal alloy, the 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

Researcher: Dr. Ramon Gustilo and Engr. Jude Sasing
Orthopaedic International Inc.
Duration: 2012 - 2015
Budget: PhP 48 M

Commercialization/transfer status
Manufactured and commercialized by Orthopaedic International Inc.

ERDT 2018-2040

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