

Department of Science and Technology
Science Education Institute
Engineering Research and Development for Technology



National S&T Human Resource Development thru Engineering Research and Development for Technology (ERDT)

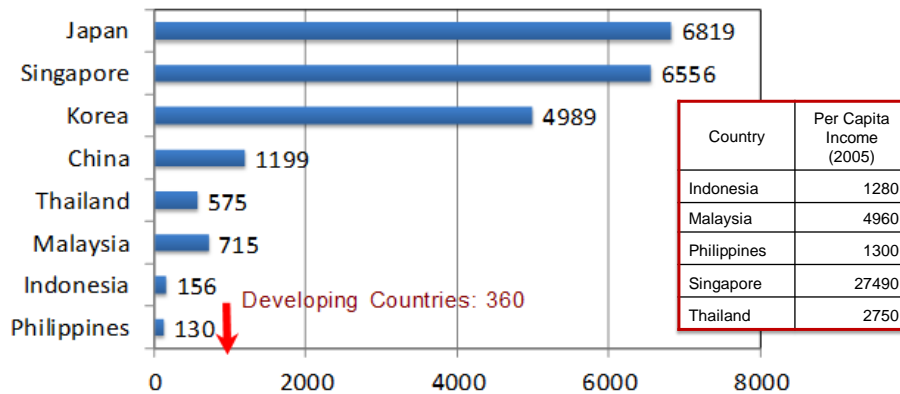
National Academy of Science and Technology - Philippines
S&T Human Resource Development: Looking Back and Looking Forward
30 June 2016
Astoria Plaza Manila, Pasig City



The Problem: Large gap between UNESCO Benchmarks and Philippine situation (UNESCO Institute for Statistics, 2006*)

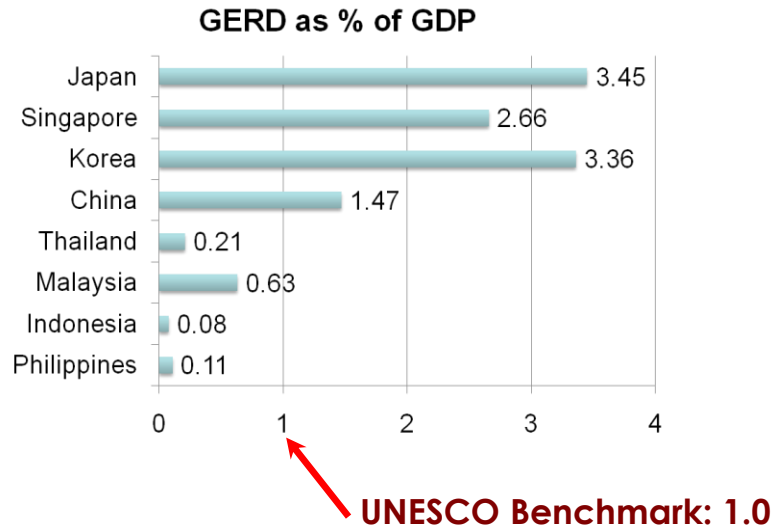


Comparison of RSE's per 1M population



* Latest statistic recorded in UNESCO data library (updated from 2004)

**The Problem: Large gap between UNESCO
Benchmarks and Philippine situation
(UNESCO Institute for Statistics, 2006)**



**Engineering Research and Development
for Technology (ERDT)**

Philippines need specialized engineers for solutions thru R&D.

- from disaster mitigation to poverty alleviation,
- from agriculture to semiconductor industries,
- to ensure a sustainable environment and affordable energy for the future
- to produce low cost indigenous technologies





ERDT CONSORTIUM

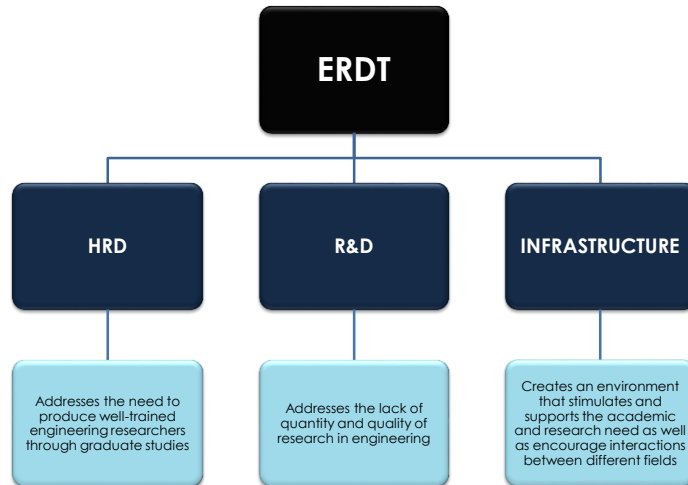
University of the Philippines Diliman
Ateneo de Manila University
Central Luzon State University
De La Salle University
Mapua Institute of Technology
Mindanao State University-Iligan Institute of Technology
University of San Carlos
University of the Philippines Los Baños



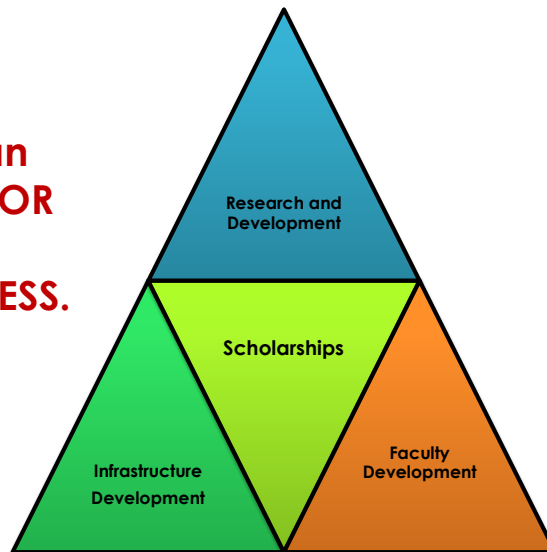
ERDT MoU Signing (25 May 2011)



ERDT Components



**The ERDT is an
INVESTMENT FOR
GLOBAL
COMPETITIVENESS.**





GOALS

ERDT was created to:

1. Implement high impact research agenda that is aligned with the National Science and Technology Plan (NSTP) and Medium Term Philippine Development Plan (MTPDP)
2. Attain a critical mass of graduates with Master's and PhD degrees
3. Upgrade the qualifications of practicing engineers
4. Upgrade the quality of engineering colleges and make engineering graduate education accessible
5. Develop a culture of research and development (R&D)

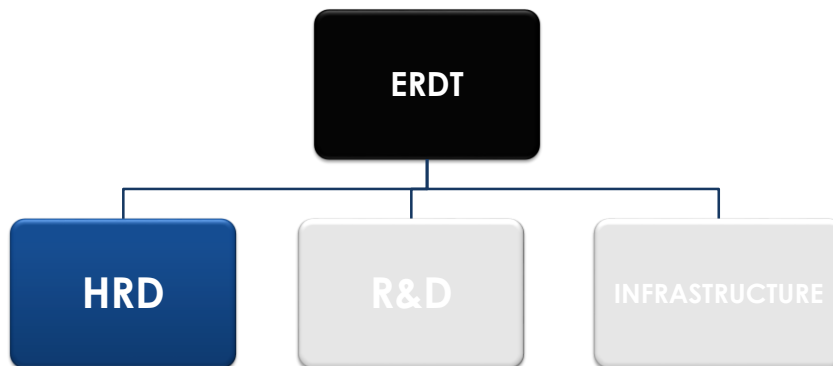
ERDT Master's Programs

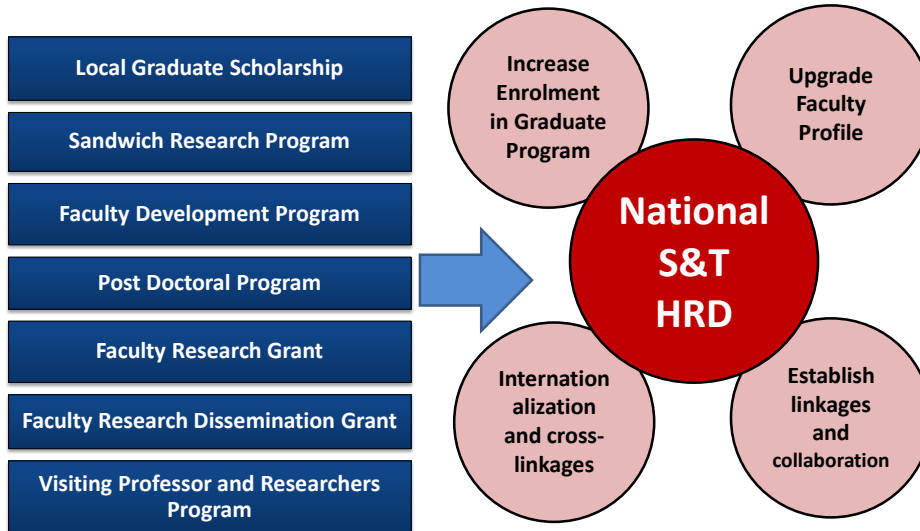
Master's Program	ADMU	CLSU	DLSU	MIT	MSU-IIT	UPD	UPLB	USC
Agricultural Engineering		✓					✓	
Agrometeorology							✓	
Chemical Engineering			✓			✓	✓	✓
Civil Engineering			✓	✓	✓	✓		✓
Computer Application					✓			
Computer Engineering	✓			✓				✓
Computer Science	✓		✓	✓	✓	✓		
Computer Studies			✓					
Electrical Engineering				✓	✓	✓		✓
Electronics and Communications Engineering	✓		✓	✓				✓
Energy Engineering						✓		
Engineering Sciences	✓							
Environmental Engineering			✓	✓	✓	✓		
Industrial Engineering			✓	✓		✓		✓
Manufacturing Engineering			✓					
Materials Science and Engineering				✓	✓	✓		
Mechanical Engineering			✓	✓	✓	✓		✓
Metallurgical Engineering						✓		
Mining Engineering				✓		✓		
Geomatics Engineering				✓		✓		

ERDT Doctoral Programs

Doctoral Programs	ADMU	CLSU	DLSU	MIT	MSU - IIT	UPD	UPLB	USC
Agricultural Engineering		✓					✓	
Chemical Engineering			✓			✓		
Civil Engineering			✓		✓	✓		
Computer Science	✓					✓		
Electrical Engineering						✓		
Electronics and Communications Engineering			✓	✓				
Environmental Engineering				✓		✓		
Energy Engineering						✓		
Industrial Engineering			✓					
Mechanical Engineering			✓		✓			
Materials Science and Engineering				✓	✓	✓		

ERDT Components





Human Resource Development

Local Graduate Scholarship

To achieve critical mass of RSEs to about 1000 MS and PhD degree holders in next five years (2020), local scholarship is awarded to deserving Filipino engineering graduates and practitioners in order to improve the quality of engineering profession.

Entitlements

	MS (2 years)	PhD (3 years)
Tuition and Fees	Actual	Actual
Research Grant	P225,000	P450,000
Book Allowance	P20,000	P30,000
Thesis/Dissertation Allowance	P30,000	P60,000
Stipend	P20,000/mo.	P28,000/mo.
Transportation Allowance	P10,000	P10,000

Human Resource Development

Local Scholarship (Intakes 2007-2016*)

	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		Total Intake	
	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD
UPD	55	18	34	15	88	15	85	13	66	6	88	17	89	8	56	11	72	14	25	4	658	121
ADMU			16	0	16	0	20	2	16	1	11	1	14	2	18	3	8	3	2	2	121	14
CLSU			15	2	9	3	13	1	8	4	29	1	27	2	24	6	6	5	9	1	139	25
DLSU			11	2	22	1	34	2	32	5	38	8	18	6	29	4	38	4	20	3	242	35
MIT			8	1	32	2	14	1	16	7	27	4	46	14	37	5	43	5	36	6	259	45
MSU-IIT			10	2	8	2	15	3	21	3	16	4	29	6	26	8	10	2	8	1	143	31
USC			13	0	15	0	10	0	11	0	2	0	14	0	16	3	29	7	11	6	121	16
UPLB					8	4	13	3	3	0	11	3	12	4	17	0	16	3	4	0	84	17
ACTUAL INTAKE	55	18	107	22	198	27	204	25	173	26	222	38	249	42	223	40	222	43	115	23	1767	304
TARGET	106	23	133	20	171	32	208	44	233	50	260	55	233	50	233	50	240	60	265	60	2082	444
HIT RATE (%)	52	78	80	110	116	84	98	57	74	52	85	69	107	84	96	80	93	72	43	38	85	69

*As of June 2016



Human Resource Development

Local Scholarship (Graduates 2008-2016*)

	2008		2009		2010		2011		2012		2013		2014		2015		2016		TOTAL	
	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD	MS	PhD
UPD	4		19		18	1	28	4	38	11	48	6	52	9	48	3	25	4	281	38
ADMU					8		10		12		6	1	3		13	2	6	1	58	4
CLSU					1		6		5	2	10	2	11	1	7	1	7	3	47	9
DLSU			2		8		6		24	1	10		21	1	23	3	7	1	101	6
MIT			1		6		5		5		4		25	1	21		7	1	74	2
MSU-IIT			1		2		3		7		14	1	21	2	11		8		67	3
USC					5		5		8		3		3		5		4		33	0
UPLB					7		4		4		5		2	1	1	1	11	2	30	4
TOTAL	4	0	23	0	48	1	70	4	103	14	100	10	138	15	129	10	75	12	691	66

*As of June 2016



Human Resource Development

ERDT Sandwich Program

The Sandwich Program is a fellowship offered to ERDT scholars who wish to conduct research in a reputable university abroad for a maximum period of one year.

Year	Slots	Actual Intake	Status
2008	7	1	Graduated
2009	10	3	Graduated
2010	12	3	Graduated
2011	8	7	Graduated
2012	8	5	4 Graduated, 1 Returned
2013	13	12	6 Graduated, 6 Returned
2014	10	9	3 Graduated, 6 Returned
2015	23	10	4 Returned, 6 On-going,
2016	20	4	3 Approved, 1 On-going
Total	111	54	27 Graduated, 17 Returned, 7 On-going, 3 Approved



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— PARIS-EST



CASE WESTERN RESERVE
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think beyond the possible

Human Resource Development

ERDT Sandwich Program



Jhalique Jane R. Fojas inside a clean room facility of the microfluidics core at Goldenson Building, Gordon Hall at Harvard University.

"Thank you to the ERDT Sandwich Program for the opportunity to do research abroad where I get to work with complete resources, collaborate with great minds, and at the same time make new friends and share new experiences."

Jem Valerie D. Perez
Department of Chemical Engineering
UP Diliman

Took Sandwich Program at the Department of Civil and Environmental Engineering, University of Houston, USA



Human Resource Development

ERDT Sandwich Program

"Working, failing and succeeding side by side with polymer experts inspired me a career path. But what inspired me in a most amusing way are the friends I've made and the strangers I met, the buses I ran after and the subway ticket machines I had to climb and everything in between. In awkward metaphors, ERDT promised me a sandwich but I slipped into a buffet!"

Ghizelle Abarro
Department of Mining, Metallurgical and Materials Engineering
University of the Philippines Diliman

Took Sandwich Program at the Department of Macromolecular Science and Engineering, Case Western Reserve University, USA



Human Resource Development

ERDT Sandwich Program



"The Sandwich Program, DOST in general, had a huge influence on me and completely changed how I viewed my life, plans and future. I am honoured to have been given this opportunity. Vielen Dank DOST-ERDT."

Engr. Mary Anne Sy Roa
Department of Electronics Computer and Communications Engineering
Ateneo de Manila University

Took Sandwich Program at the Department of Electrical and Electronics Engineering, Technological University of Munich, Germany

"Sandwich program opened new opportunity for me in acquiring and sharing new knowledge, meeting new people in the field and gaining new experiences. Everyday is a learning process."

Denvert C. Pangayao
PhD Chemical Engineering
De La Salle University

Took Sandwich Program at the Laboratoire Geomatériaux et Environnement (LGE), University of Paris-Est, France



Human Resource Development

Faculty Development Program (Foreign PhD)

To improve the faculty roster of the UP Diliman College of Engineering, faculty members are given opportunities to pursue advanced degrees in a reputable, highly recognized international institution abroad through the ERDT Faculty Development Program (Foreign PhD Scholarship).



Year	Awarded	Graduated	Returned	Terminated	On-Extension	On-going
2006-2008	10	6	2	2		
2009	7	4	1	2		
2010	5	3		1	1	
2011	4	1			2	1
2012	5	2		1		2
2013	6					6
2014	2					2
2015	8					8
2016	2*					1
Total	49	16	3	6	3	20

*The other awarded faculty is set to leave in September 2016.

Human Resource Development

Faculty Development Program (Foreign PhD)



"The ERDT Faculty PhD Fellowship gave me the flexibility to choose where I'll get my PhD and the complete support that I need in order for me to focus on research and academics."

Joey D. Ocon
 Foreign University: Gwangju Institute of Science and Technology, South Korea
 Department: Environmental Science and Engineering/Electrochemical Engineering / Materials Engineering
 Ph.D Duration: September 2011 – June 2015

As a PhD students in the UK, we were able to have the privilege of working with respected academics in our field. We immensely enjoyed the state-of-the-art facilities of the University of Southampton, which offered us the best environment for performing our respective dissertations. We are grateful to the ERDT program for giving us this opportunity to study abroad together. We hope to be able to impart not only the knowledge that we gained, but also the practices we observed, that will hopefully improve a student's learning experience in UP.

Franz De Leon and
 Ma. Teresa Gusad-De Leon
 Foreign University: University of Southampton,
 United Kingdom
 Department: Electronics and
 Computer Science
 Ph.D Duration: February 2010 – May 2014



Human Resource Development

Post-Doctoral Program

This continuing education program of ERDT provides our faculty to retool and further advance their knowledge in their field of expertise.



"My two months of post doctoral fellowship at the Global Earthquake Model Headquarters at the University of Pavia allowed me to interact directly with a global network of specialist and experts in earthquake risk management. It is also allowed me to study the possibility of analogous approach to flood risk management."

Benito M. Pacheco
Post-doctoral Fellow, University of Pavia
Professor, UPD Institute of Civil Engineering

YEAR	RECIPIENTS
2009-2016	12



Human Resource Development

Faculty Research and Dissemination Grant

Faculty participates in international conferences to present their researches under the ERDT program



A few of the conferences attended:

- 5th International Conference on Concrete Repair
- 13th Global Joint Seminar on Geo-Environmental Engineering (GEE 2014)
- 9th International Materials Technology Conference and Exhibition
- 7th International Conference on Advances in Computer Interactions
- Mechanics of composite Materials XVIII International Conference
- 19th International Conference on Digital Signal Processing
- 7th IEEE International Workshop on Selected topics in Wireless and Mobile Computing
- IEEE TENCON 2014
- AUN-SEED/Net 8th Regional Conference on Electronics and Electrical Engineering

YEAR	RECIPIENTS
2008	1
2009	17
2010	51
2011	25
2012	32
2013	43
2014	72
2015	62
2016	28
TOTAL	331

Human Resource Development

Faculty Research Grant

In 2014, Faculty Research Grant was implemented to help faculty members who are currently enrolled in the ERDT supported graduate programs in an ERDT member university to complete all their requirements leading to a successful thesis/dissertation defense.

YEAR	RECIPIENTS
2014	6
2015	7
2016	1
TOTAL	14



"The ERDT program (Faculty Research Grant) is instrumental to the completion of my master's degree which became a starting point for the research activities of my undergraduate advisees."

Charlimagne M. Montealegre
MS Chemical Engineering
UP Diliman
2015 ERDT Faculty Research Grant Recipient

Human Resource Development

Visiting Professors Program

Internationally recognized professors from reputable academic institutions deliver lectures at the member universities of the consortium



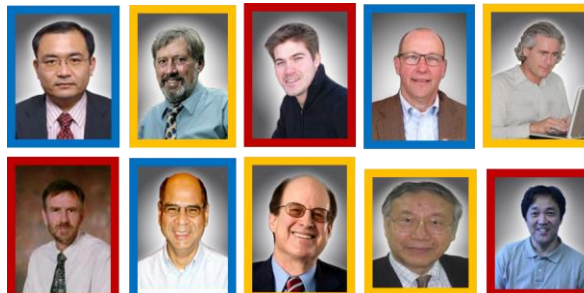
Engineering Research and Development for Technology
College of Engineering
University of the Philippines

Frontiers in Engineering and Innovation 2014
Engineering Forum Series

**Rehabilitating Polluted Rivers:
The Solution is not in the Water**

YEAR	RECIPIENTS
2008	10
2009	21
2010	12
2011	3
2012	9
2013	11
2014	9
2015	12
2016	6
TOTAL	93

2013 ERDT VISITING PROFESSORS

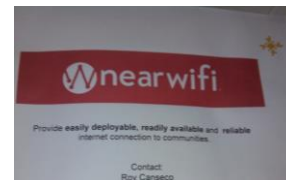




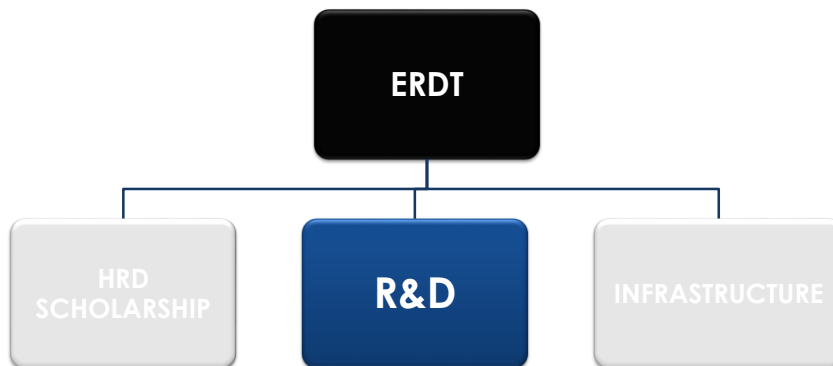
Technology Entrepreneurship Course



*Preparing our scholars to
be techno-entrepreneurs*



ERDT Components



Research and Development

- R&D is one of the three pillars of the ERDT program.
- Whereas the HRD component of the ERDT addresses the need to produce well trained engineering researchers through graduate studies, the R&D component addresses the lack of quantity and quality of research in engineering.



The R&D and the HRD components of the ERDT, however, are closely inter-related such that one cannot possibly exist without the other.

DOST-funded projects

BETTER MINE

CLOUD TOP

ENTERPRISE

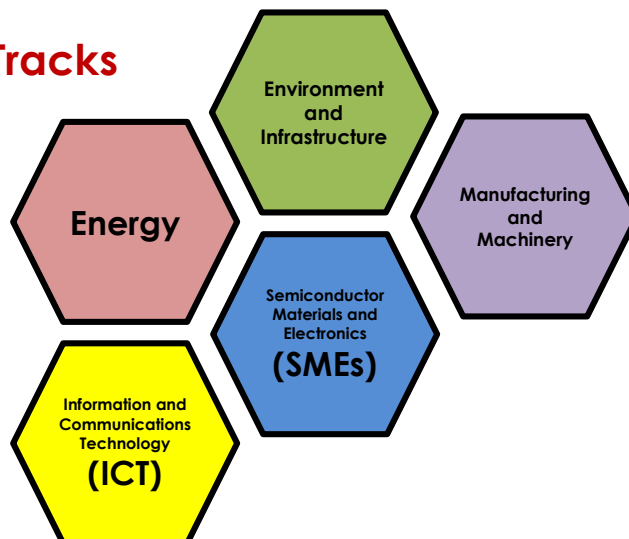
ISIP

PhilMATIS Project

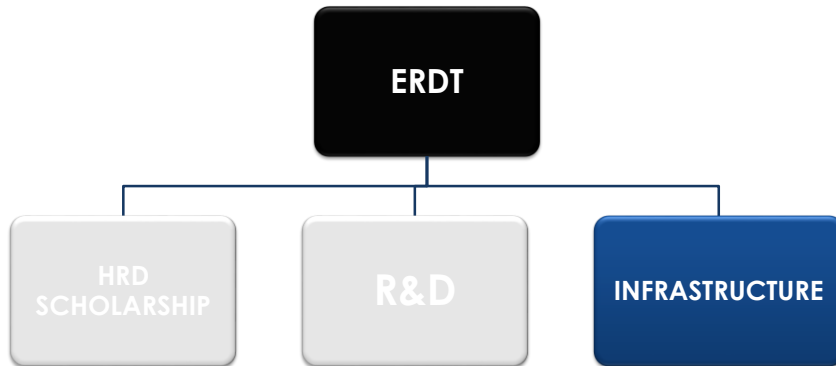
and many more!

Research and Development

Research Tracks



ERDT Components



Infrastructure Development

- The third pillar of the ERDT program is Infrastructure Development. This will house state of the art laboratory equipment in support of the R&D thrust of the ERDT Program.
- The ERDT Infrastructure Program includes the construction of six new buildings (MMM, EEE, CE, IE-ME, Envi, and ChE) and the renovation of the existing facilities (GE and Eng'g Science) in the College of Engineering at Melchor Hall.

Infrastructure Development

New Buildings



UP MMME BUILDING
Mining, Metallurgical and Materials Engineering Building



Electrical and Electronics Engineering Power Laboratory Building



UP DILIMAN INSTITUTE OF CIVIL ENGINEERING
INSTITUTE OF CIVIL ENGINEERING BUILDING



Proposed UP - IE/ME Building
View - 3 Color Option



PROPOSED U.P. DILIMAN ENERGY AND ENVIRONMENTAL ENGINEERING BUILDING



Chemical Engineering Building

Infrastructure Development

Status of Infrastructure Projects (As of November 2015)

Project	Accomplishment	Remarks
Buildings		
Industrial Engineering - Mechanical Engineering Phase I	100%	The building was turned over and is currently being used by ME Department. The 2 departments are currently in the process of procuring services for the construction of IE-ME Building Phase 2.
Electrical and Electronics Engineering	99.9%	The building was turned over by the contractor and is currently being used by the Institute. However, the defective structured cabling system is not yet replaced by the contractor.
Chemical Engineering	99.9%	The building was turned over by the contractor and is currently being used by the Department. The final report regarding Variation Order No. 2 will be submitted by the Office of the Campus Architect to the Diliman Legal Office.
Civil Engineering	98%	The beneficial turnover is scheduled in December 2015. The Institute is planning to hold office and classes at the new building starting January 2016.
Energy and Environmental Engineering Renovation	97%	Until now the Office of the Campus Architect has not acquired the building permit. The end-user needs to look for funding due to the unresolved issue on Variation Order No. 2.
Engineering Science and Geodetic Engineering	100%	The offices and rooms are already being used.

ERDT Conferences

EVENT	THEME	DATE	NO. OF ATTENDEES
1 st ERDT Conference	Setting the Backdrop for the ERDT R&D in the Next 10 Years: Challenges and Opportunities	12 September 2008	400
2 nd ERDT Conference	Synergy in Multi-disciplinary R&D	20 February 2009	400
3 rd ERDT Conference	Post Graduate Multidisciplinary Approach to Solving Philippine Problems	11 September 2009	631
4 th ERDT Conference	Charting the R&D Roadmap of the Philippines	19 February 2010	638
5 th ERDT Conference	Philippine Competitiveness through ERDT	10 September 2010	770
6 th ERDT Conference	Addressing the Grand Challenges Through Engineering Innovations	18 February 2011	700
7 th ERDT Conference	Sustainability Through ERDT: Towards a Carbon-Neutral Economy	16 September 2011	755
8 th ERDT Conference jointly with IEEE TENCON 2012	Sustainable Development through Humanitarian Technology	19-22 November 2012	800

ERDT Conferences

EVENT	THEME	DATE	NO. OF ATTENDEES
9 th ERDT Conference jointly with APIEMS	Operational Excellence towards Green Growth	3-6 December 2013	400
10 th ERDT Conference jointly with IEEE HNICEM ISCIII	7th IEEE International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management 2014 IEEE HNICEM ISCIII 2014 co-located with 10 th ERDT Conference	12-16 November 2014	250
11 th ERDT Conference joint with 8 th AUN/SEED-Net Regional Conference on Electrical and Electronics Engineering	Envision, Enable and Empower Smarter and Resilient Societies	16-17 November 2015	120
12 th ERDT Conference joint with 3 rd Regional Forum on Agricultural Mechanization in Asia and the Pacific, 11 th Annual GC and TC Sessions of the UNESCAP-CSAM and 3 rd ASEAN Conference on Agricultural and Biosystems Engineering	Human resource Development for Sustainable Agricultural Mechanization	9-11 December 2015	500

Congress, Summit and ERDT-supported Conferences

EVENT	THEME	DATE	NO. OF ATTENDEES
1 st ERDT Congress	The Inventive Engineer: Patents and Commercialization	24 February 2012	740
2 nd ERDT Congress	K2M: Knowledge to Market (Engineering to Enterprise)	14 June 2013	700
3 rd ERDT Congress	Science and Technology for Disaster Preparedness and Resiliency	25 July 2014	700
4 th ERDT Congress	Agriculture and Science and Technology for Inclusive Growth	20 July 2015	641
ERDT R&D Summit 2012	Strengthening Synergies between Industry and Academe towards a Needs-Based Research	7 December 2012	250
SB13 Manila Conference	Sustainable Buildings, Infrastructures, and Communities in Emerging Economies	25-27 November 2013	200
7 th ASEAN Environmental Engineering Conference	"How can communities be ready for the next big hazard?: The Role of Environmental Engineering in Community Preparedness, Immediate Response and Environmental Sustainability"	21-22 November 2014	140



Engineering Research and Development for Technology

R&D MANPOWER

Academe
(Project Leaders and Faculty Advisers)

Graduate Students and ERDT Scholars

Government Researchers



ERDT PARTNERS

Government (funding support, policies)

Intl Universities (student and personnel mobility)

Industry (linkage, internships and thesis partners)

Alumni (support and linkage)



Role of ERDT

- Implement High Impact Research
- Create Innovation thru Technoentrepreneurship
- Make S&T Work for Filipinos



Challenges

- Lack of space and equipment to conduct research
- Small funds for research
- Small incentive for research
- Long and tedious government procurement (affecting on-time graduation, late processing of benefits for visiting professors and refusal of some potential visiting professors to invitations)
- Reneging fellows
- Lack of interest/poor investment of local industries to R&D



Moving Forward

- University and Industry Advisers (Academe-Industry Research Collaboration)
- ERDT Consortium Expansion
- Advising to potential consortium university member
- More partnerships with international organizations and societies in conducting conferences
- Intra and inter-consortium R&D activities



Thank you!

