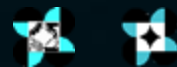# INNOVATION WORKS FOR THE PEOPLE

Dr. Enrico C. Paringit
Executive Director, DOST-PCIEERD

Who is PCIEERD?

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

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

INNOVATION COUNCIL
FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGIES (DOST-PCIEERD)

Our Mandate

Support for Research and Development

Human Resource and Institution Development

S&T Information Dissemination and Promotion

Support for Technology Transfer and Commercialization

Policy Development and Advocacy

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

Our Sectoral Coverage

INDUSTRY

- Electronic & Semiconductor Industries
- Mining & Minerals
- Metals & Engineering
- Food Processing
- Process

ENERGY

- Energy efficiency
- Transportation

EMERGING TECHNOLOGY

- Materials Science/ Nanotechnology
- Genomics/ Biotechnology
- Information & Communications Technology
- Space Technology Applications
- Photonics
- Artificial Intelligence
- Data Science
- Creative Industries

SPECIAL CONCERNS

- Climate Change Adaptation
- Disaster Risk Reduction & Management
- Environment
- Human Security

DEPARTMENT OF SCIENCE AND TECHNOLOGY
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INNOVATION COUNCIL
FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGIES (DOST-PCIEERD)

Mass transport in the Philippines

Moving people from one point to another may seem like an easy task, but not when you're situated within the busy and traffic-congested roads of Metro Manila and other major cities in the Philippines.

What are the problems that we want to address?

Volume- and Behavior-Based Traffic Congestion

Crowded Transits/ Overloading

Road Pollution

Dependence on expensive foreign technology

Insufficient mass transportation systems

Limited capability to maintain existing systems

No local industry for mass transportation

PHP 3.5 Billion economic loss per day due to traffic

Why do we need to solve it?

Php1.26T*
annual loss due to
traffic in the PHL

Php1.944
Trillion

TODAY

2035

* https://www.jica.go.jp/philippine/english/office/topics/news/180920.html

Why do we need to solve it?

Current law enforcement faces the challenge of a growing complexity in urban city management due to limited personnel and logistical resources.

2.35M vehicles in Metro Manila

4% annual vehicle sales growth

172,388 Total traffic violations apprehended in January to July 2017

Information from the CATCH-ALL Team

What is our role here?

Since its creation as the National Science and Development Board in the 1950s, DOST was able to contribute a huge chunk of the country's achievements today in the mass and intelligent transport scene.

Land Transport S&T Roadmap

GOAL:
Efficient, safe and cost effective land transport systems

S&T Outcomes

Improve safety and comfort level

Optimized fuel economy of urban passenger mass transport

2019 - 2022

Vehicle Recycling of PUVs

Develop standards for design improvement of buses

Establish solar fast charging stations

Improved fuel mileage of vehicles and reduce emissions

Establish E-payment scheme for EV charging station

Advanced transport system with less intrusive infrastructures

2014 - 2018

Fabricate hybrid electric PUVs with light body architecture

Roll-out optimized & cost reduced fast charging stations through integrated network system

Develop EV Parts and Components Standards

Fabricate hybrid PUJ with regenerative braking system

Develop lightweight body architecture of a conventional 22-seater PUJs

Develop a prototype diesel-electric parallel series hybrid vehicle

Demonstrate the centrally powered hybrid electric road train (CRT)

S&T Strategies

Mass Transport Projects

Automated Guideway
Transit (AGT)

Hybrid Electric
Train (HET)

Hybrid Electric
Road Train (HERT)

The AGT is a locally-fabricated system designed to lessen travel time and promote an environment-friendly mass transit. With cheaper costs than its imported counterparts like the LRT and the MRT, the AGT also has slimmer dimensions and can be built along narrow streets.

Automated Guideway Transit

Implemented with the goal of augmenting the number of trainsets currently being used by the Philippine National Railways (PNR), the HET is envisioned to be a long-term solution to heavy traffic congestions in many parts of the country, particularly in Luzon.

Hybrid Electric Train

Hybrid Electric Road Train

The 40-meter long train-like bus can run with a maximum speed of 50 kph, and is mainly powered by hybrid diesel fuel and electric-powered battery. Moreover, the train carries its own power source, thus, it does not need to be supplied with electricity through suspended cables to operate.

ADVANTAGES OF DOST-DEVELOPED MASS TRANSPORTATION TECHNOLOGIES

- All parts are locally available

- Availability of local experts

- Cost-effective

- Modernization of local mass transportation industry

- Job generation

- Foreign exchange savings

- Potential export

Engineering the PUV Using an OEM Vehicle Platform

Tata SFC407
22 pax

Engineering the PUV Using an OEM Vehicle Platform

Potential Platforms (Mr. A. Rufo – Toyota)

Intelligent transport systems

Intelligent Transport S&T Roadmap

GOAL: Integrated and responsive transport systems

S&T Outcomes

Critical Transport Infrastructure (CTI)

Smart inter-modal transport for better connectivity

Vehicle to Infrastructure connectivity

Establish on-board bus performance standards, i.e. "black box, speed limiters, GPS and video detectors

Improved urban mobility and accessibility and reliability of transport schedules

2019 - 2022

Transport Big Data Analytics

Intelligent Electric Vehicle Network

Cyber Physical Transportation System and advanced signalized networks

Roll-out of local traffic modeling and forecasting tools

Develop traffic modeling and forecasting tools

Deploy locally developed advanced traveler information systems

Develop web based air pollution and traffic monitoring system and prediction models

Develop and fabricate on-board console for automatic control signaling system

Establish passenger count with origin destination & route demand forecasting

2014 - 2018

S&T Strategies

LOCALSIM is a microscopic traffic simulation software, designed to be used by road and traffic engineers of LGUs as a decision support system for traffic management.
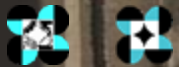
LOCALSIM 1

- Agent-based Traffic Behavior Models
- Pilot Traffic Simulation of EDSA
- Simulation And Evaluation Of Typical Traffic Schemes
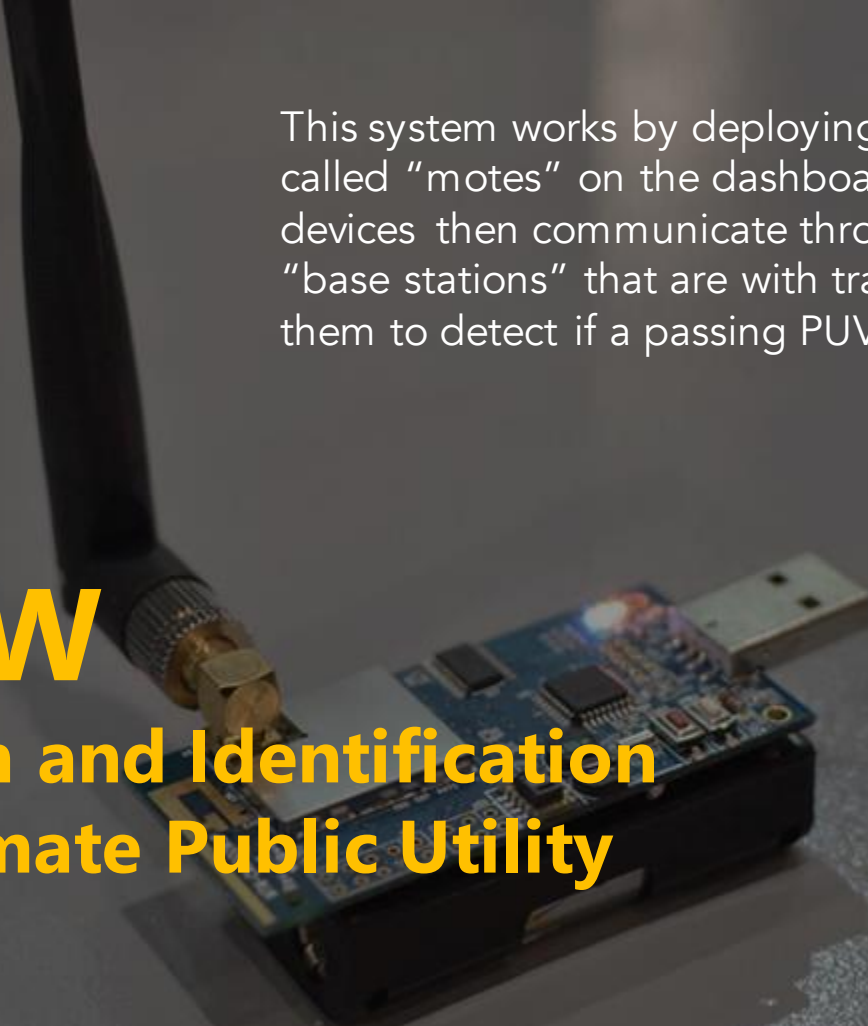
LOCALSIM 2

- Dynamic Traffic Assignment Model
- Conflict Area Model
- Further Calibration (MMDA Case Study)
- Report Generation Feature
- Benchmarking
- User-friendly Software
- LGU Acceptability

SOFTWARE FEATURES

- Can load any map image file formats (JPG, PNG, etc.)
- Map Scaling
- Model Road Network
- Road Curvatures
- Can input field traffic data
- Stimulate simple networks
- Unsignalized & Signalized Intersections
- Flow rate, average travel time and speed, density, level-of-service (LOS)
- Traffic flow controls and
- regulations

This system works by deploying handheld devices called "motes" on the dashboard of PUVs. These devices then communicate through radio with the "base stations" that are with traffic enforcers to allow them to detect if a passing PUV is colorum or not.

DILAW

Detection and Identification of Legitimate Public Utility Vehicles

CATCH-ALL is a camera-based traffic management system for traffic violations detection

license-plate: 99%

CATCH-ALL

Contactless Apprehension of Traffic Violators on 24-hours Basis, All Vehicle Detection System

license-plate: 95%

Milestones

DOST R&D Grant (3.5M)

DOST Spin-off Grant (14M)

1st paying client

More LGUs using CATCH-ALL

2016   2017   2018   2019   2020   2021   2022

First Completed Prototype (Jun 2017)
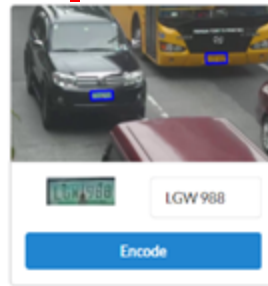
MMDA Testing (Jan 2018)

Commercial Grade System (Apr 2019)
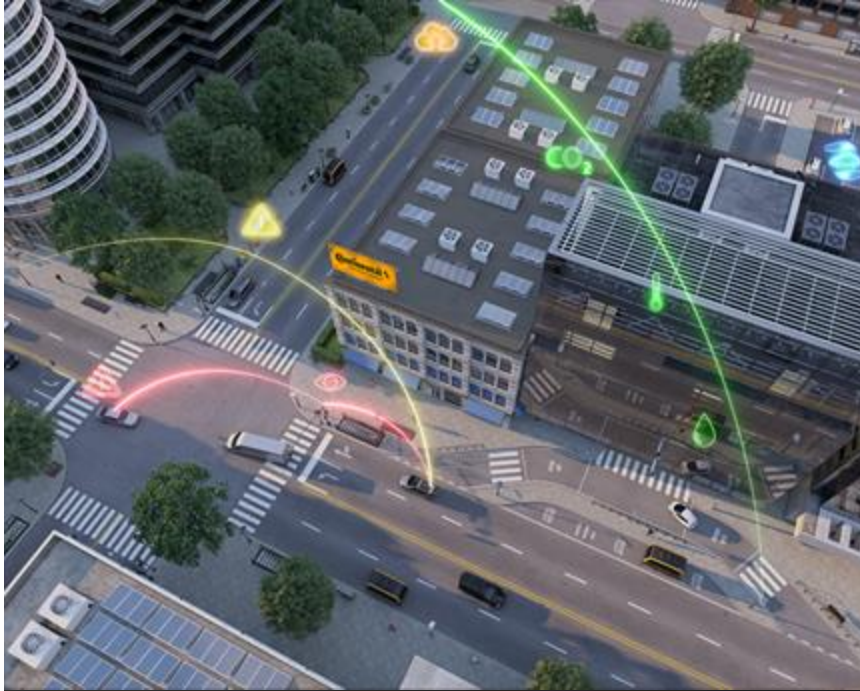
Cyber-Physical Transportation Systems

CPTS aims to initiate Intelligent Transportation Systems in the Philippines by creating a holistic system that **monitors**, **communicates**, **senses**, and **actuates** traffic information data through different components for an intelligent management of traffic flow in the road network.

The 4 facets of the CPTS project

Hardware

Fabrication of intelligent autonomous traffic controlling modular units (i-ATOMs)

Software

Creation of software for real-time and long-term actuation and planning

Command Center

Establishment of a command center responsible for monitoring and communication between i-ATOMs

Research

Continuous research on transportation science and computer science

i-ATOM

Intelligent autonomous traffic controlling modular units

T4Cast

A macroscopic travel demand analysis software

Featuring

- Automated four-step model
- Georeferenced roads and zones
- Multimodal transportation networks
- Dynamic traffic assignment
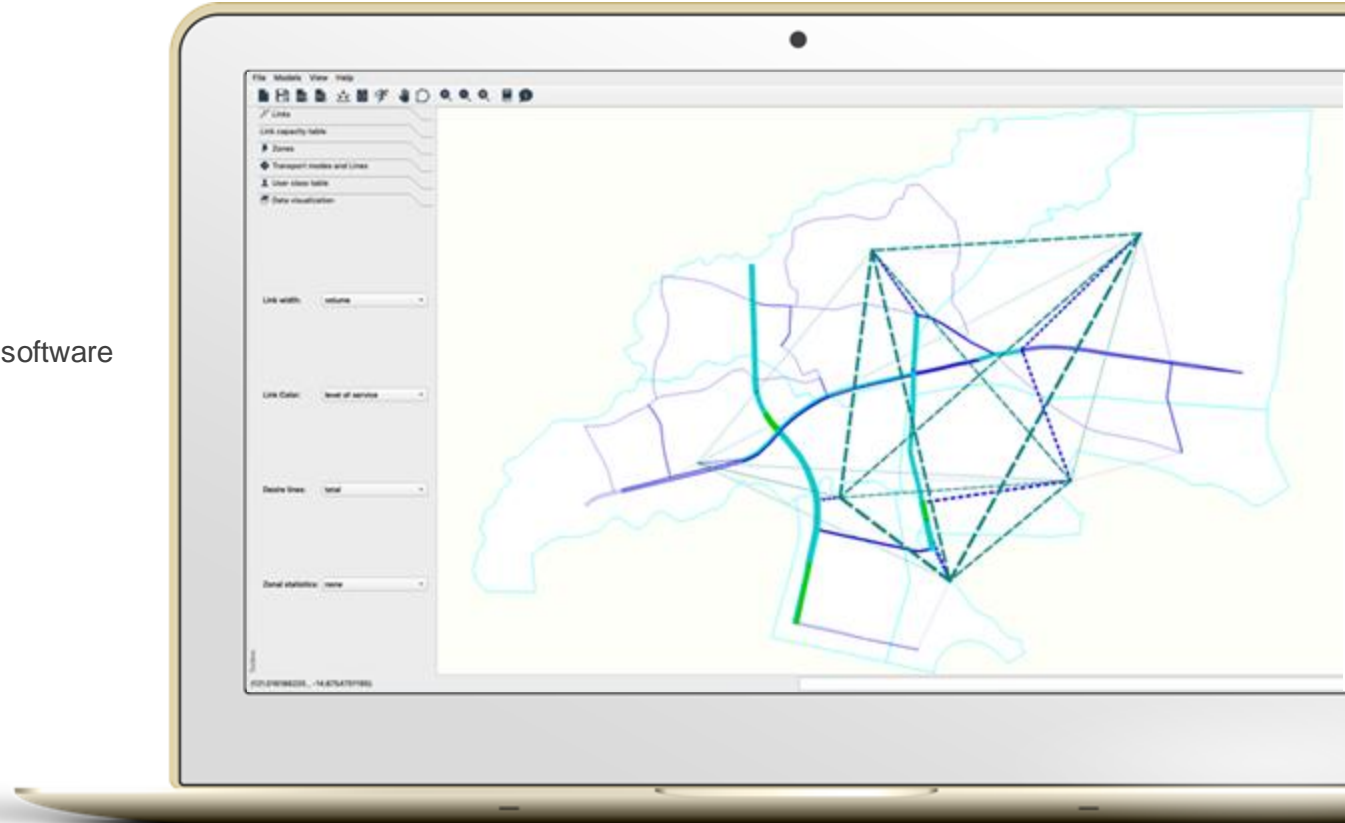
IntElecT: Intelligent Electric Transportation Network Program

Envisioned to develop a smart network of energy-aware electric vehicles and charging stations through cooperation between the electric vehicles and infrastructure. Operations such as scheduling of vehicles, route to take, when and where to charge, and charging time will all be coordinated such that the overall energy demand of the system will be optimized.

● Project 1. EmoCION: Electric Mobility and Charging Infrastructure Operating as a Network
● Project 2. Advice: Ad-hoc Vehicle – Infrastructure Cooperative Environment
● Project 3. E-trike Deployment and Utilization Study

Rapid Charging E-Vehicle Station

The Rapid Charging E-Vehicle Station, or simply CharM, is a project by the University of the Philippines-Electrical and Electronics Engineering Institute that is similar to a regular refueling station where the user utilizes a chademo-compliant connector to re-charge the e-trike. The difference lies in CharM's ability to charge the e-tryke's batteries in less than 30 minutes.

Maritime Transport S&T Roadmap

GOAL: Safer, cleaner and efficient maritime transport systems and services through S&T

Multi-modal (sea, land, rail) transport systems

S&T Outcomes

IMO compliant sea crafts

2019 - 2022

Alternative sea-worthy "green" vessel and components

2014 - 2018

7. Conversion Standard on Marinized Engine (Marine Engineers) 2019

8. LNG Marine Fuel Viability Assessment (2019)

Assessment on Energy Efficiency Systems and Operations for local ship application (2019)

Develop integrated data recording and archiving system 2020

6. SBSR Software System – (2018) (including no. of ships constructed, ships repaired)

Assess inter-connectivity of freight and passenger multi-modal transport system (2019)

2. Develop Local Navigational Route Simulation Software – categorization of navigational areas from NAMRIA) and wave height from NOVASAR 2018

5. Training for shipyard and ship repair certification (2018)

Develop Local Automatic Identification System (AIS)

Develop appraisal system tool for sea worthy compliant per IMO standards

1. Towing Tank and Cavitation Tunnel Test Facility – 2018

4. Prototype development of water taxi for bay/river and coastal waters

3. Boat Assessment and Utilization System

S&T Strategies

Development of Hybrid Trimaran

Development of Design Guidelines (right sizing of hull, engine, propulsion & materials) for fishing and passenger vessel // Design and construction standard for trimaran, mono hull, catamaran suited for Phil. water conditions

Hybrid Trimaran

FAME is in the business of uplifting the lives of fishermen thru our maritime transponders.

FAME

Transponders for Small Aircraft and Maritime Vessels

Futuristic Aviation and Maritime Enterprise, Inc.

FAME Transponders

Vehicles

RF communication

FAME platform

Mobile app

FAME gateways

Cloud

FAME platform receives the data from the gateways (speed / location / eta / sensor data / messaging)

Airplanes

Other Systems

Vessels

Sensors
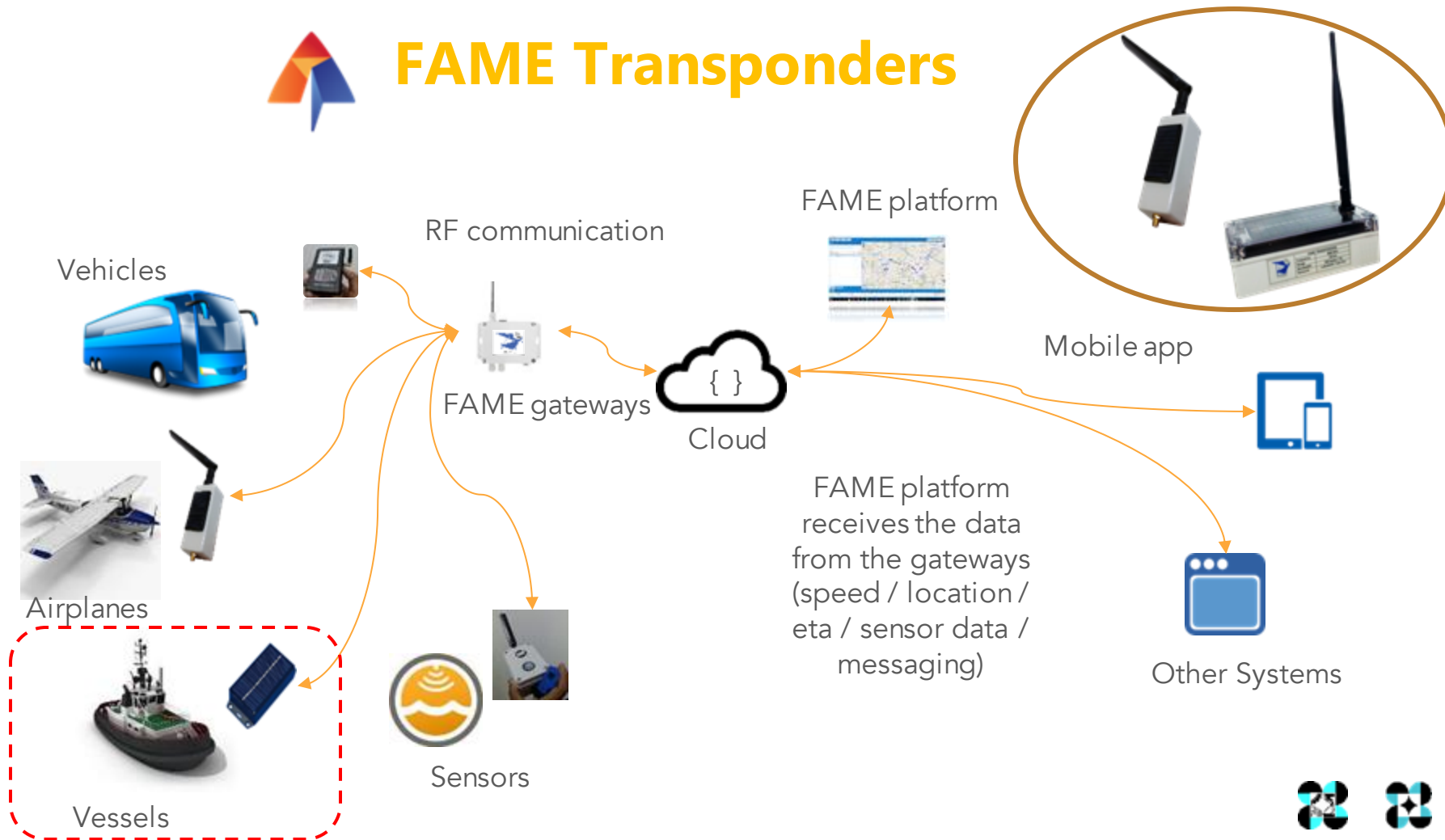
Philippine AIS for marine vessels

Automatic identification system for marine vessels

Real-time tracking & monitoring

Safe voyage

Collision avoidance

Search and rescue

Based on IEC Standards
for IMO compliance

IEC – International Electrotechnical Commission
IMO – International Maritime Organization

AIS for Maritime Vessel

Maritime Transport Route Information System (MARIS)

MARIS aims to develop and design a modular software and other related tools for an effective RCMS, as part of MARINA's modernization plan for the Philippine maritime industry.

DREAM Program

The Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program is one of the nine (9) components of Project NOAH. Through the use of cutting-edge technology, such as the LiDAR, it generates updated and top-quality flood maps and models.

PHil-LIDAR 1

An expansion of the DREAM Program, this project aims to produce 3D flood and hazard maps for the 2/3 of the Philippine river systems. Aside from addressing disaster risk reduction and climate change adaptation, the resource information to be generated from this project will also be useful in providing the information requirements of various sectors in the country.

PHil-LIDAR 2

The Phil-LiDAR 2 Program aims to produce detailed resource maps using LiDAR for the production of high value crops, irrigation assessment, aquaculture production, forest protection, and discovery of renewable energy sources.

Digital Imaging for Monitoring and Evaluation (Project DIME)
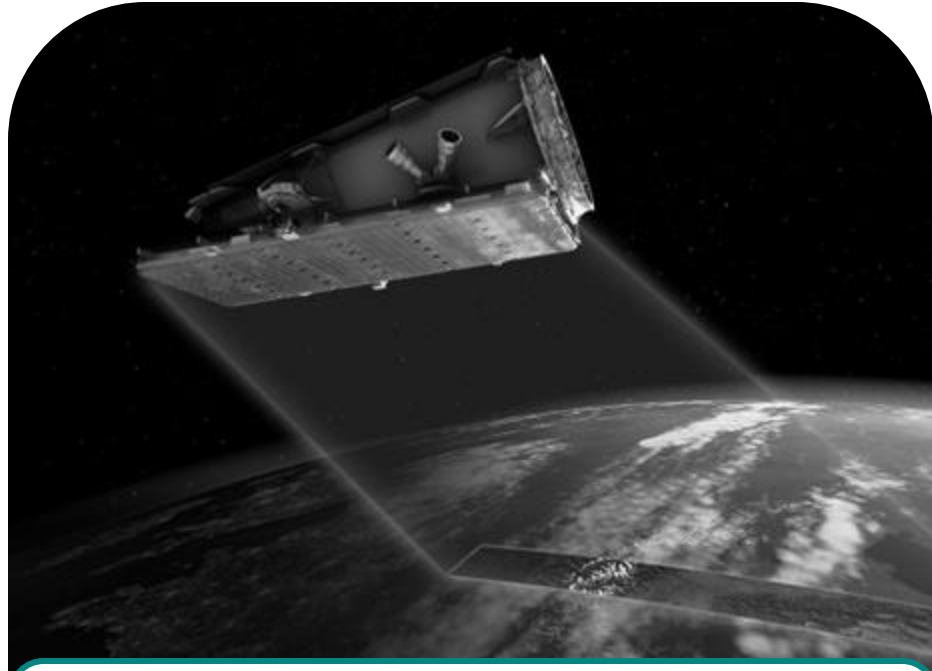
Synthetic Aperture Radar (SAR) with Automatic Identification System (AIS)

UP Center for Environmental Informatics (CENVI) – *Cebu City*

Geo-informatics for the Systematic Assessment of Flood Effects and Risks for a Resilient Mindanao (Geo-SAFER Mindanao)

Philippine Earth Data Resource Observation Center (PEDRO)
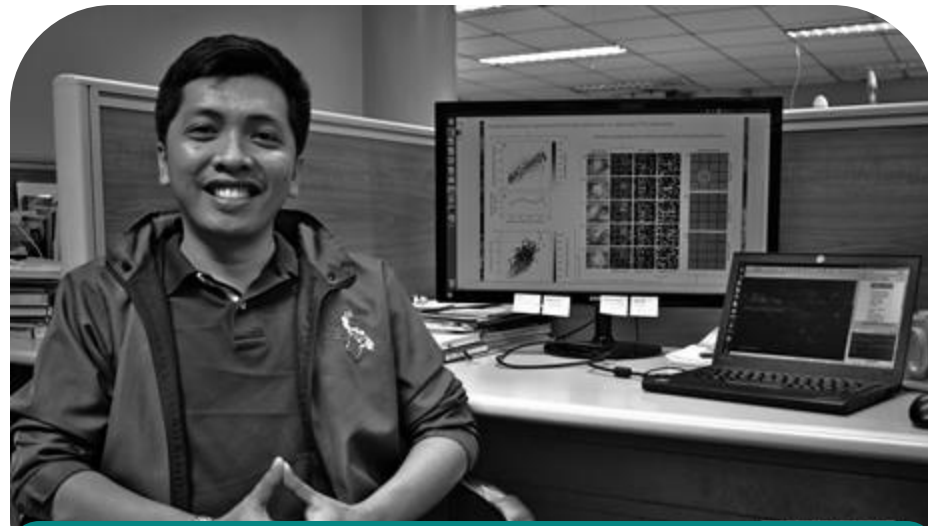
Computing and Archiving Research Environment (CoARE)

Remote Sensing and Data Science (DATOS)

DATOS capitalizes on the current advancements of computing technology and applies it in the fields of Geographic Information Systems (GIS), Remote Sensing (RS), Artificial Intelligence (AI) and Data Science to provide maps and other information for Disaster Risk Reduction applications.

DATOS exists to complement the existing efforts of mandated agencies through advanced research on Remote Sensing, Data Science, and Artificial Intelligence service for Filipinos, therefore being able to provide an advanced, quick, and reliable overall disaster management system for Filipinos.

2,287 992 | 1295
Total Applicants

969 353 | 616
Unique Learners Enrolled

3,000
Total Course Enrollments

2,528
Course Completions

382 141 | 241
Full Track Completions

43,489
Estimated Learning Hours

$3,821,516
Skill Value USD Estimate
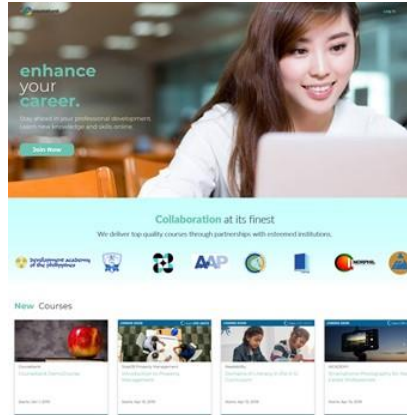
create

localized massive open online courses, with industry practitioners, in data science and its supporting fields that are aligned to globally recognized framework.

train

30,000 human capital in order to truly jumpstart the emerging field and address the industry's demand for the profession.

sustain

the created courses by institutionalizing its use with organizations aligned to its intended goals.

Productive and cost-effective solutions that work.

At DOST, we are always on the lookout for new innovations that will make the Filipino's life easier through science. The commercialization of these proudly Pinoy transport systems is only the beginning of our journey towards providing the Filipinos with efficient, cost-effective, and eco-friendly solutions to the problems we face everyday.
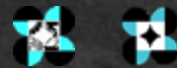
2019 Accomplishments

Top Programs
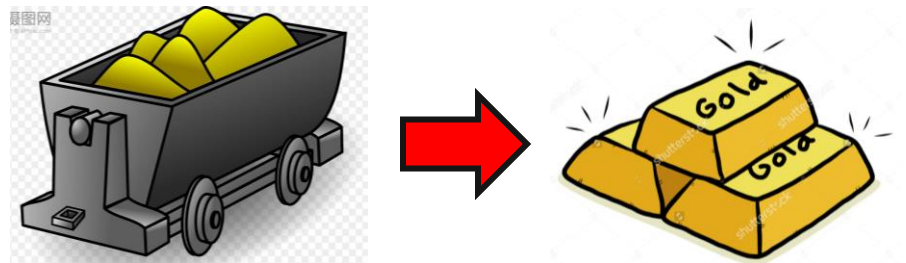
Image Source: DOST CARAGA and UP MPRO

KTTO - Impact Partnership

Aims to capacitate technology transfer offices among universities and support their Technology Business Incubator (TBI) counterparts

Community-Led Integrated Non-cyanide, No Mercury Gold Extraction Method (CLINN-GEM)

An environment-friendly technology for mine extraction that extracts 80 to 90 percent of gold without the use of cyanide and mercury. The CLINN GEM mineral processing plants can be found in **Cabadbaran City, Agusan del Norte; Itogon, Benguet; Compostella Valley,**

2019 Activities & Projects

Directed Researches

R&D Management

Collaborative Projects with Local
and International Organizations

Project Impact
Assessment

Consortia Program

Researcher's Capability Enhancement

Technology Transfer and Commercialization Programs

2019 - 2020 Vision

Integrated and Intelligent Sensors and Actuators (IISA) Program
To integrate sensors and actuators by coupling through AI and machine learning, and to improve existing systems and develop new IoT platforms and solutions for:

Traffic Management
Image Source: https://cmte.ieee.org

Disaster Management
Image Source: https://www.slideshare.net/GRFDavos/
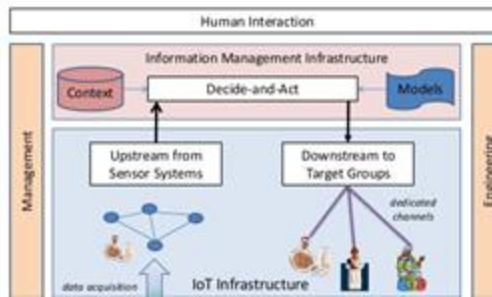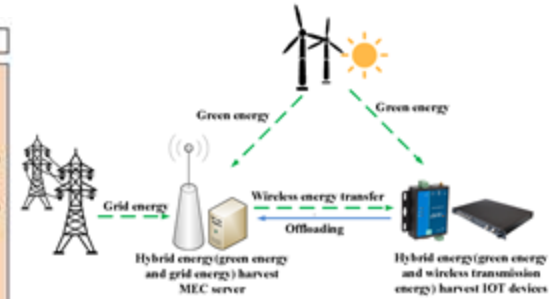
Resource Allocation
Image Source: https://www.mdpi.com/

Intelligent Factories & Human Security
Image Source: https://www.hanwha.com/
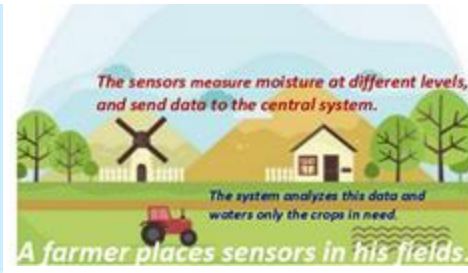
Environmental Management
Image Source: https://www.hanwha.com/

2019 - 2020 Vision

Smart Cities, Smart Governance
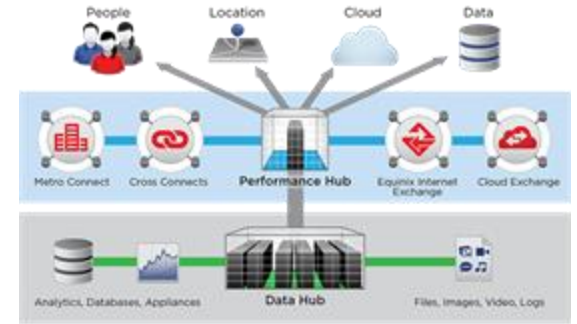
City Development
To provide a sustainable, cost-effective solutions for the city that can improve the provision of basic services and infrastructure.

Image Source: https://www.hanwha.com

Catalytic Projects
Data-driven approach in investment programming by identifying opportunities for optimal growth and local GDP increase, and by supporting startups through the use of local resources and talents

Image Source: https://www.rappler.com

Data Hub
Evidence-based planning and decision-making approach guided by a facility that can monitor the impacts, externalities, and progress of the city under its projects.

Image Source: https://www.equinix.com

PCIEERD Call for 2020 R&D Proposals

INNOVATION COUNCIL

FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGIES (DOST-PCIEERD)

2020

CALL FOR PROPOSALS

IISA PROGRAM
Integrated and Intelligent Sensors and Actuators for Intelligent Factories

We are in the pursuit of proposals on the integration of intelligent sensor networks, coupled with AI, to improve existing systems and/or develop new services and breakthroughs in science as applied to Intelligent Factories.

Proposed projects must develop technologies on Sensors, Nano- or Micromechanics and Microcontrols, Systems & Controls, Machine Vision, and Industrial IoT, Artificial Intelligence & Data Analytics. Partnership with an industry is required.

CONVERGENCE OF PHILIPPINE TECHNOLOGIES FOR SMARTER CITY DEVELOPMENT

We seek ideas that synergize developing smart cities through technologies that can address City Development Strategy, Catalytic Projects, and optimize the use of Data Hubs to address its challenges.

Proposals submitted should be targeted for implementation in the cities of Cauayan, Iloilo, and Butuan. An LGU partner is required.

Deadline for submission is on September 2, 2019*

ONE OF D'BESS
Optimized and Novel Energy Design for Battery Energy Storage System

We are on the lookout for researches that develop energy storage systems using indigenous materials to reduce dependence on imported high density-based energy storage systems.

The proponent should partner with a local battery manufacturer as a possible commercial producer.

RE4MSME
Technology on Renewable Energy and Energy Efficiency for Micro, Small, and Medium Enterprises

We are searching for new ways to introduce innovative Renewable Energy (RE) and Energy-Efficient Technologies for Micro, Small, and Medium Enterprises (MSMEs) applications. These technologies should improve the energy utilization index, reduce energy consumption, and cost competitiveness of the MSMEs.

The following technologies are prioritized: monitoring and control systems for energy management, energy sensors/ actuators, efficient thermal systems, and energy-efficient prime mover systems.

SAILS PROGRAM
Ships' Ballast Water and Biofouling Treatment Systems for Marine Vessels

We are looking for researches that aim to address the need to develop efficient and cost-effective ballast water treatment technologies to be used on board ships. It also aims to establish programs to develop, test, evaluate, and approve said technologies in accordance with the Ballast Water Management Convention.

GODDESS
Good Governance through Data Science and Decision Support

We are calling on research proposals geared towards enabling government to adapt data-driven governance and evidence-based management. The proposed project should be able to develop systems and technologies for national government agencies and local government units.

FOR FURTHER INQUIRIES, THE APPLICANT MAY CONTACT:

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

ATTN: MS. GRACE F. ESTILLORE
Chief SRS, Policy Coordination and Monitoring Division (PCMD)
4th Level Science Heritage Building, DOST Complex, Gen. Santos Ave. Bicutan, Taguig City
gfestillore@gmail.com | (+632) 837 - 2071 to 82 Local 2107

All questions or comments must be communicated in writing via postal mail, facsimile, or electronic mail to the above contact person.

* Deadline of submissions of full-blown proposals is on August 2, 2019, with the exception of the "Convergence of PH Technologies for Smarter City Development" Program.

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Will Machines take away our jobs?

No Worry. New jobs will be created!

New jobs are going to be created as we shift towards the digital automation landscape.

According to the WEF Report 2016,

65% of children entering primary schools today will ultimately work in new job types and functions that currently do not yet exist.

According to the report *The Next Era of Human-Machine Partnerships* by the Institute of the Future (IFTF),

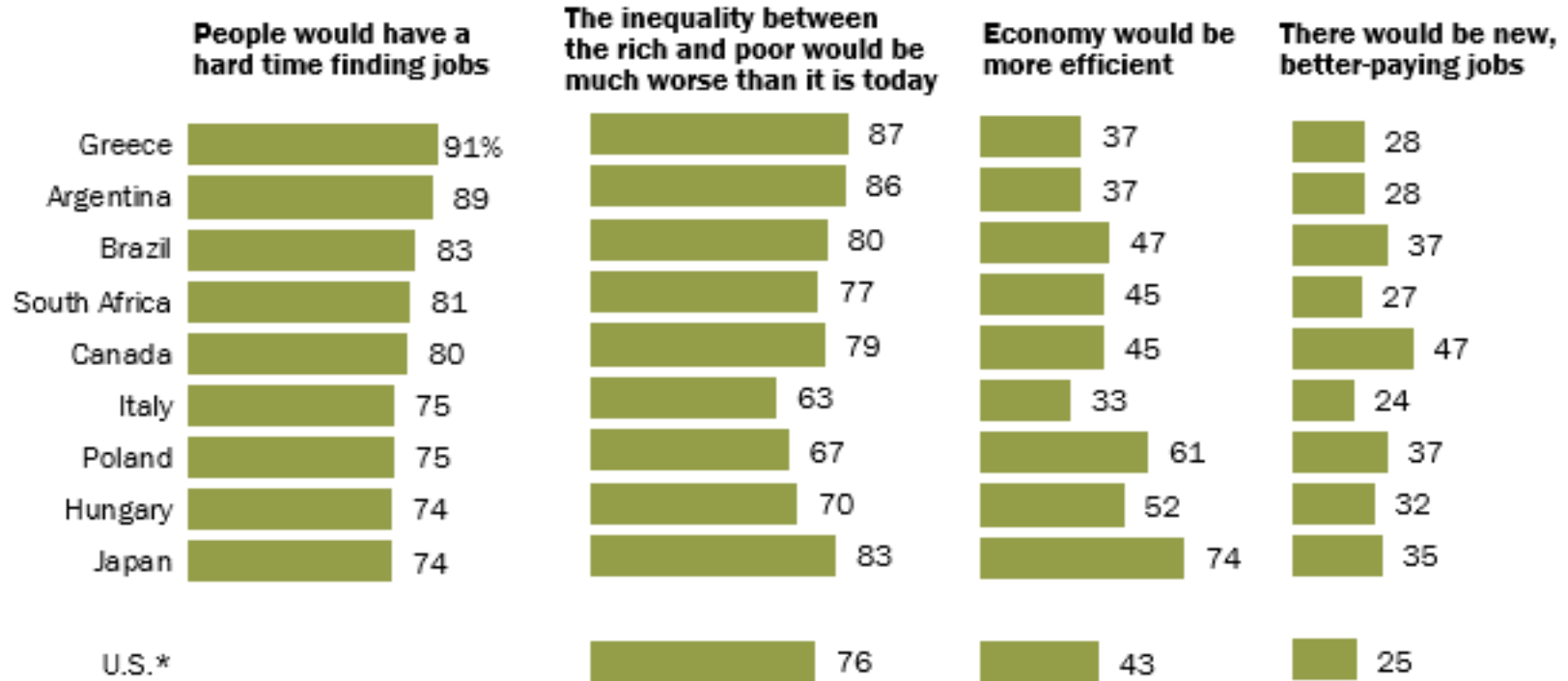**85%** of jobs that will exist in 2030 have not yet been invented.
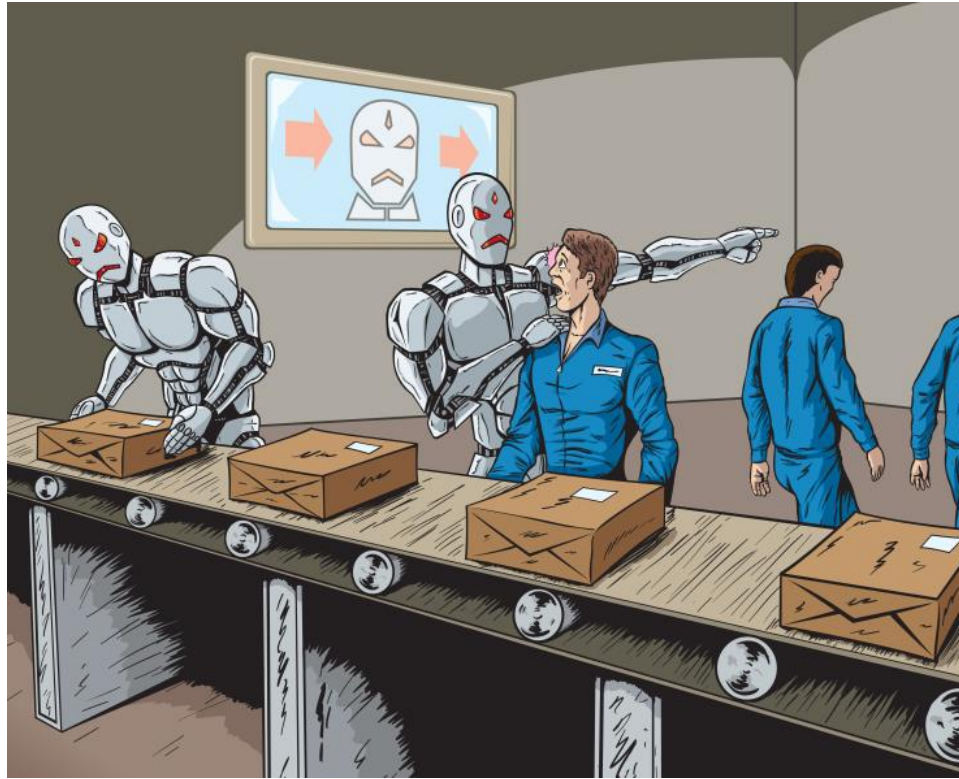
Many are less optimistic…

IMPACT ON OUR JOBS

Publics more convinced of the downsides than potential upsides of job automation

% of adults who think it is likely that ___ if robots and computers were able to do much of the work currently being done by humans

	People would have a hard time finding jobs	The inequality between the rich and poor would be much worse than it is today	Economy would be more efficient	There would be new, better-paying jobs
Greece	91%	87	37	28
Argentina	89	86	37	28
Brazil	83	80	47	37
South Africa	81	77	45	27
Canada	80	79	45	47
Italy	75	63	33	24
Poland	75	67	61	37
Hungary	74	70	52	32
Japan	74	83	74	35
U.S.*		76	43	25

Note: U.S. data from Pew Research survey conducted May 1 – 15, 2017.

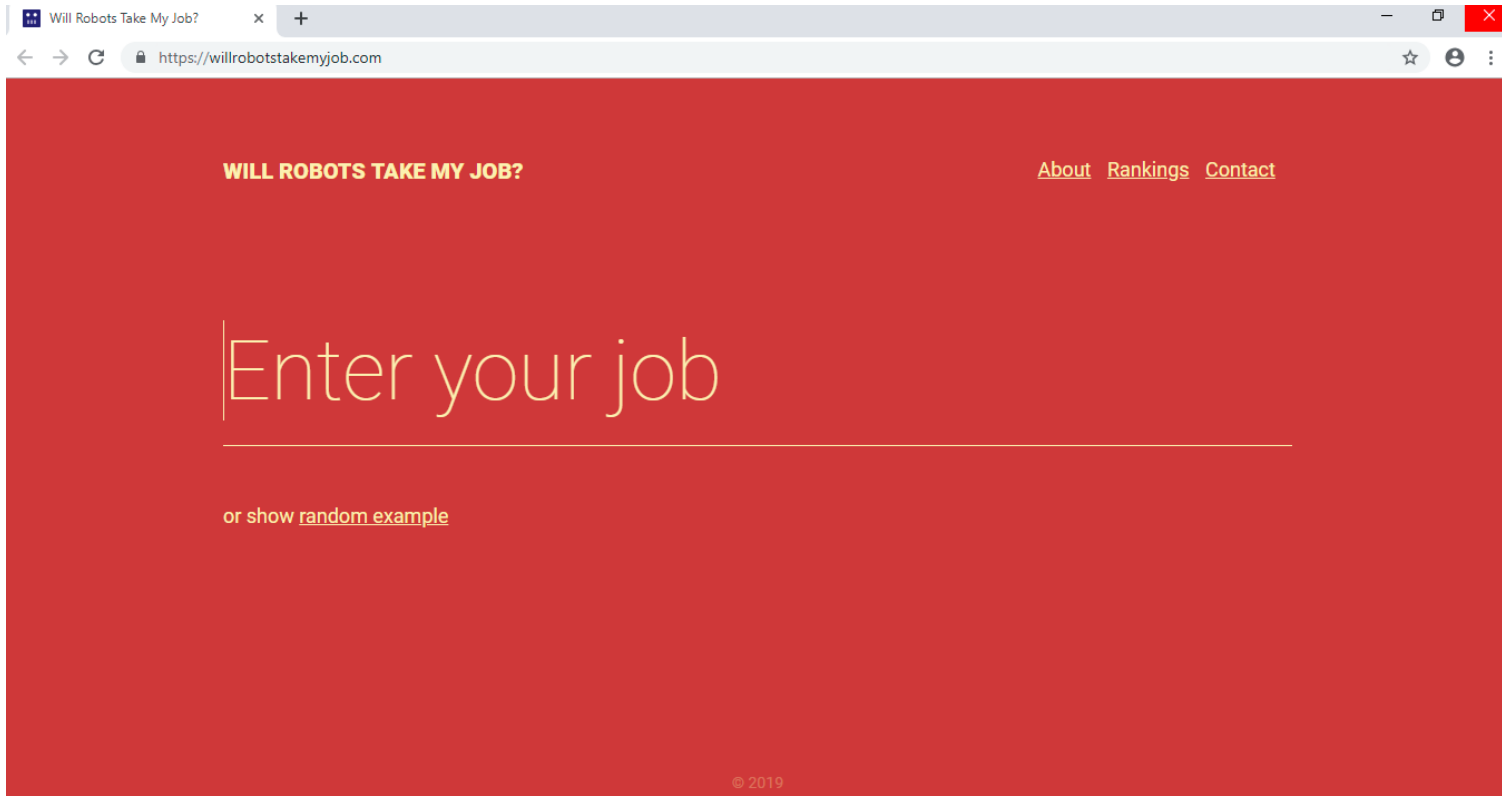Source: Spring 2018 Global Attitudes Survey. Q81a-d. 54
Image: Pew Research Center

Business

'What happens tomorrow, who knows': Deutsche Bank employees brace for more bad news

Deutsche Bank Plan to Cut 18,000 jobs in 5 Years

https://willrobotstakemyjob.com

88%

Construction Laborers

98%

Bookkeeping, Accounting, and Auditing Clerks

SOC CODE: 43-3031

0.4%

Elementary School Teachers, Except Special Education

SOC CODE: 25-2021

Preparing the Philippine workforce of the future

RATIONALE
Business Process Outsourcing Centers (BPOs) are important part of the Philippines' national economy. However, countless jobs are at risk due to advances in Automation and Artificial Intelligence. Projected demand for Data Science and Analytics practitioners highlighted by APEC DARE was a vital insight for launching the online training programs back in 2017.

KEY GOAL
To train the next generation of Data Science and Analytics practitioners across the Philippines.

MODEL
Massive open online training is identified as a key component solution to help address the digital skills gap in Data Science and Analytics due to scalability, accessibility, cost efficiency and improved learning experience due to availability of current technologies.

LEARNING PATHWAYS
Coursera Specializations   APEC Competency Framework/AAP Professional Maturity Model

1 Learning at Scale: Data Science

Cooperating agencies agreed on a learning track consisting of four courses aimed to introduce Data Science to qualified participants. Utilized content from Coursera.

2 Extension

Expanded the original scope to four additional learning tracks covering different aspects of the Data Science and Analytics field. Utilized content from Coursera.
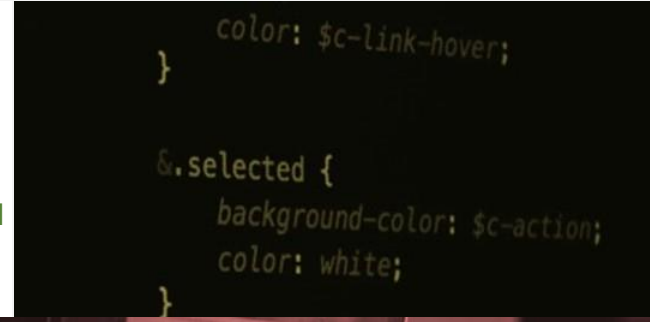
3 Sustainability Program for Analytics Reskilling, Training and Adoption

SPARTA builds on the success (and learnings) of the previous two implementations incorporating sustainability mechanisms to ensure continuity. Courses offered will be created and aligned with the APEC framework.

Data Science

University of Michigan

- Using Python to Access Web Data
- Using Database with Python
- Introduction to Data Science in Python
- Applied Plotting, Charting and Data Representation in Python
- Applied Machine Learning in Python
- Applied Text Mining in Python
- Applied Social Network Analysis in Python

Data Science

Johns Hopkins University

- The Data Scientist's Toolbox
- R Programming
- Getting and Cleaning Data
- Exploratory Data Analysis
- Reproducible Research
- Statistical Inference
- Regression Models
- Practical Machine Learning
- Developing Data Products
- Data Science Capstone

Excel to MySQL: Analytic Techniques for Business

Duke University

- Business Metrics for Data-Driven Companies
- Mastering Data Analysis in Excel
- Data Visualization and Communication with Tableau
- Managing Big data with MySQL

Data Warehousing for Business Intelligence

University of Colorado System

- Database Management Essentials
- Data Warehouse Concepts, Design, and Data Integration

Cybersecurity

University of Maryland, College Park

Usable Security

Software Security

Cryptography

Hardware Security