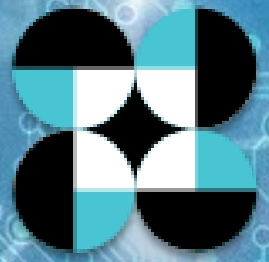
Science for Change Program (S4CP)



DEPARTMENT OF SCIENCE AND TECHNOLOGY

Photo credit:http://www.ecovallee-cotedazur.com/key-stakes/economy-and-employment/enabling-innovation; http://www.cosmetic-360.com/en/pages/open-innovation--68.html

United Nations
Educational, Scientific and
Cultural Organization

380 researchers, scientists and engineers (RSE) per million

1% GDP Expenditure on R&D (GERD)

180 RSEs (2009) -> **270 RSEs (2013)**

P5.7B (2009) -> **P20.8 (2017)**

P1B (2009) -> **P5.8B (2017)**

11 (2010) -> **16 (2016)**

1,840 (2009) -> 8,083 (2017) -> **9,500 (2021)**

1250 (2010) -> **5,590 (2015)**

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Photo credit: https://www.vecteezy.com/vector-art/88744-outline-science-icons-vector

S4CP

endeavors to significantly accelerate Science, Technology and Innovation (STI) in the country through massive **increase in investment** on S&T Human Resource Development and R&D through the program

A. Program Expansion in 10 areas
B. New Programs in 5 areas
C. S&T Human Resource Development
D. Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness.

Science for Change Program (S4CP)

A. Program Expansion (10)

1. Health Self Sufficiency
2. Renewable Energy
3. Nuclear Science for Energy, Health and Agriculture
4. Climate and Environmental Sciences
5. Food and Nutrition
6. Agricultural and Aquatic Productivity
7. Biotechnology for Industry, Agriculture, Health and Environment
8. Technology Business Incubation
9. Foreign Scholarships for STI
10. Promotion of Culture of Science

B. New Programs (5)

1. Human Security R&D
2. Strengthening of R&D and S&T Services in the Regions through infrastructure (R&D Centers)
3. Space Technology and ICT Development
4. S&T for Creative Industries, Tourism Industry and Service Industry
5. Artificial Intelligence: From HRD to R&D Industry

C. S&T Human Development

SEI Grand Plan

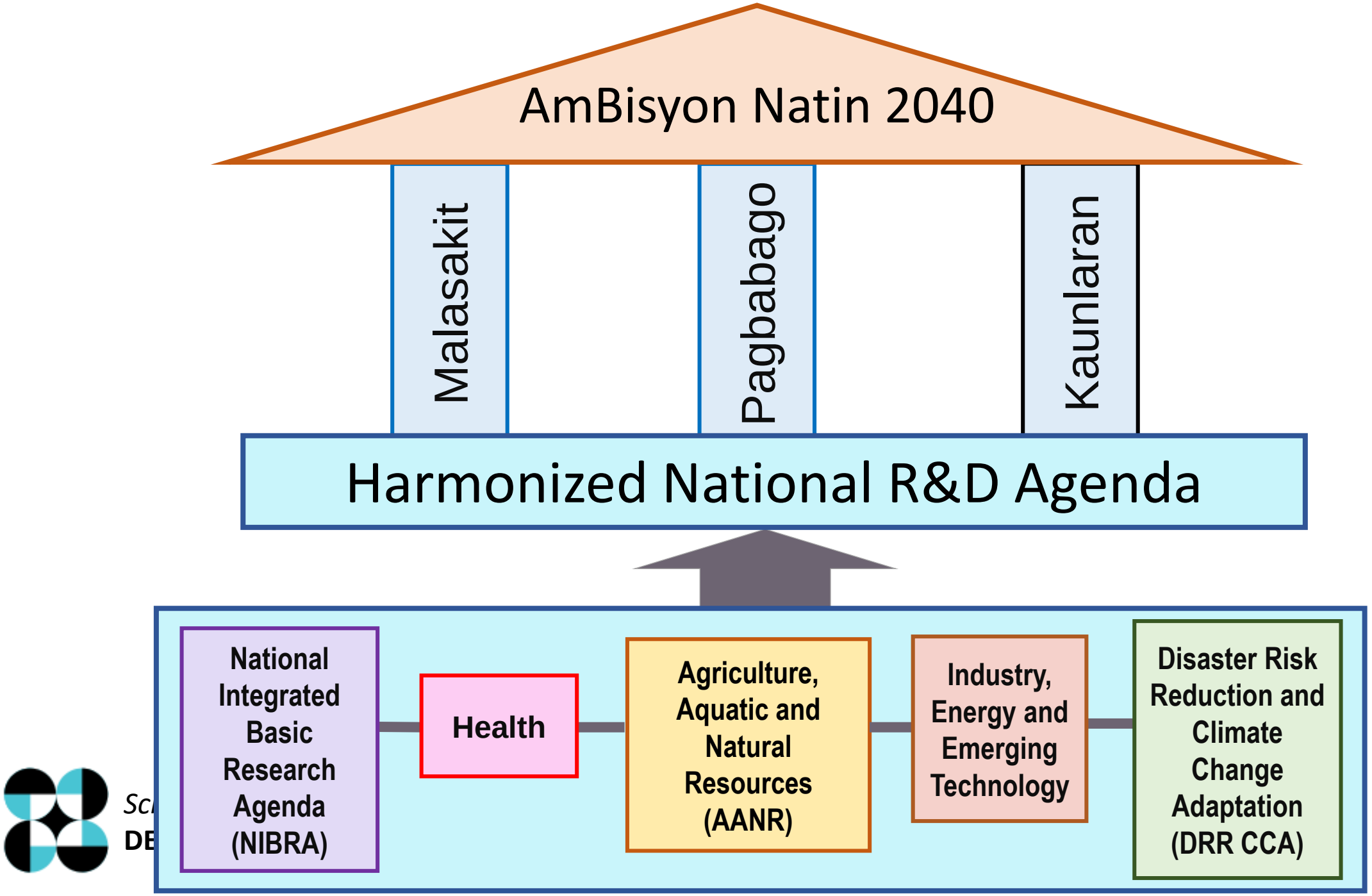
D. Accelerated R&D Program for Capacity Building of R&D Institutions and Industrial Competitiveness (4)

1. NICER
2. RDLead
3. CRADLE
4. BIST

Science For The People

1. R&D to Address Pressing Problems
2. R&D for Productivity
3. R&D to Tap, Manage and Store Renewable Energy Resources
4. R&D to Apply New Technologies Across Sectors
5. Disaster Risk Reduction and Climate Change
6. Maximize Utilization of R&D Results Through Technology Transfer and/or Commercialization
7. Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness
8. Assistance to the Production Sector
9. Upgrading of Facilities and Improvement of S&T Services
10. Human Resource Development for Science & Technology
11. Capacitate and Utilize Institutions in the Regions – SUCs who do R&D and Develop Human Resources in S&T
12. Collaboration with industry, academe and international institutions

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY


AmBisyon Natin 2040
Malasakit
Pagbabago
Kaunlaran
Harmonized National R&D Agenda
National Integrated Basic Research Agenda (NIBRA)
Health
Agriculture, Aquatic and Natural Resources (AANR)
Industry, Energy and Emerging Technology
Disaster Risk Reduction and Climate Change Adaptation (DRR CCA)

Harmonized National R&D Agenda

R&D Priority Areas and Programs

National Integrated Basic Research Agenda (NIBRA)

- WATER SECURITY
  - Watershed studies, water quality, accessibility and availability
- FOOD AND NUTRITION SECURITY
  - Food safety, biodiversity studies
- HEALTHFUL LIFESTYLE
  - Fundamental studies on natural products development, animal health, social dimensions on health
- CLEAN ENERGY
  - Alternative energy
- SUSTAINABLE COMMUNITIES
  - Vulnerable ecosystems, data collection on natural phenomena, environmental and anthropogenic activities
- RE-ENGINEERING THE PHILIPPINES TOWARDS INCLUSIVE NATION-BUILDING
  - Documentation of indigenous knowledge, data collection on social phenomena, education, national security and sovereignty,, arts, history and culture

Health

- Drug Discovery and Development
- Diagnostics
- Genomics/Molecular Technology
- Functional Foods
- Hospital Equipment and Biomedical Devices
- Information and Communication Technology for Health
- Nutrition and Food Safety
- Disaster Risk Reduction - Health
- Climate Change Adaptation - Health

Agriculture, Aquatic and Natural Resources Sector (AANR)

- AGRICULTURE

Crops

- Germplasm research; Varietal improvement and selection; Good quality planting materials (QPMs); Cultural management and crop production systems; Postharvest processing and product development

Livestock

- Animal improvement; Improved reproduction, feeding and nutrition; Conservation and improvement of native animals; Vaccine, biologics and diagnostics; Detection of chemical residues and antimicrobial resistance; Decision support systems; Product development and processing

FISHERIES AND AQUACULTURE

- Applied genomics; Culture systems; Culture of new cultivable species; Fish health, disease diagnostics and management; Nutrition, feeds and feeding systems; Postharvest handling, processing and product development; Automation of feeding, water and culture management and post production; Fishkill warning and mitigation systems and environmental management; Management of fisheries

FORESTRY

- Development and sustainable management of tree plantations; HYV development of priority timber species; Production protocols for the production of QPM; Sustainable cultural management practices, harvesting and postharvest techniques and marketing strategies

NATURAL RESOURCES AND ENVIRONMENT

- Biodiversity; Watershed management and utilization; Soil management and rehabilitation; Agricultural and forest waste-based product development; Climate change strategies and decision support tools; Resource assessment and monitoring; Habitat management; Marine environmental management; Innovative systems for unique landscapes and ecosystems

TECHNOLOGY TRANSFER

- Upscaling of technology transfer and commercialization; New and innovative extension modalities; Technology business incubators

SOCIO-ECONOMICS AND POLICY RESEARCH

CAPACITY BUILDING

Industry, Energy and Emergying Technology

- Food and Nutrition Security
- Countryside Development
- Competitive Industry
- Delivery of Social Services
- National Security

Disaster Risk Reduction and Climate Change Adaptation (DRR CCA)

- Observation and Monitoring Networks
- Technology Development and Application for Monitoring
- Modelling and Simulation for Improvement of Monitoring and Forecasting
- Hazards, Vulnerability and Risk Assessment
- Warning and Communication of Information
- Technology Development and Application for Climate Change Mitigation and Adaptation
- Technology Development and Application for Disaster Risk Management

A. Program Expansion

1. Health Sufficiency

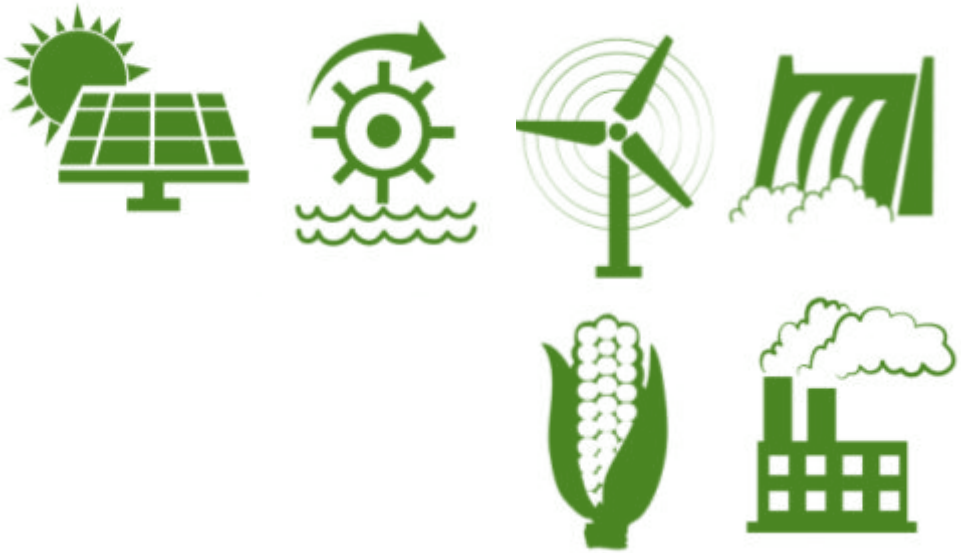
Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Photo credit: http://www.dqindia.com/4g-health-the-care-goes-techy/;
https://www.vecteezy.com/vector-art/128754-medical-circle-icons-vector

A. Program Expansion

2. Renewable Energy

"Technology Development initiatives on innovative and cost-effective renewable energy and its secondary form of energy systems…"



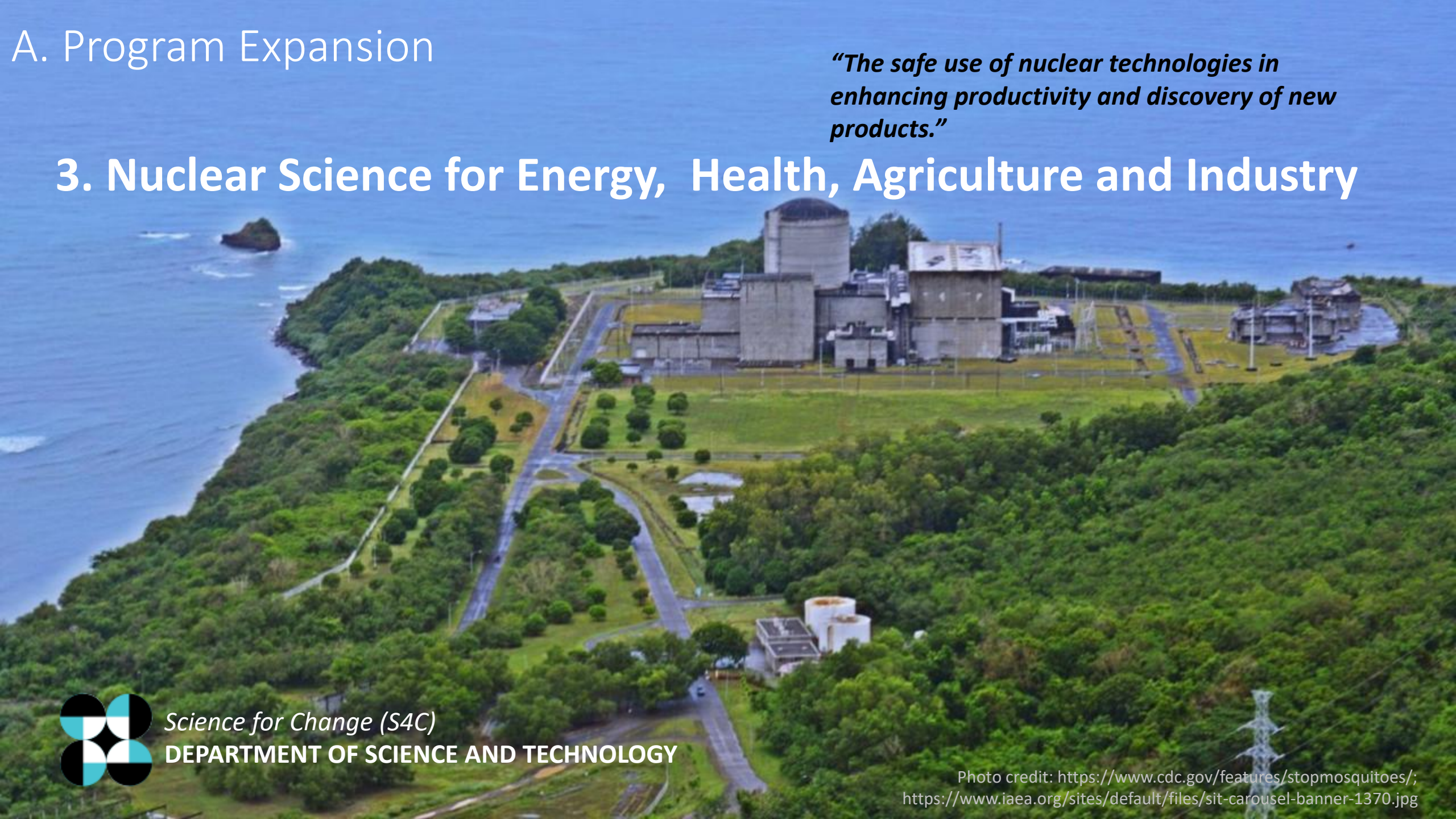
Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Photo credit:http://si.wsj.net/public/resources/images/BN-PY630_Energy_J_20160923112959.jpg

A. Program Expansion

"The safe use of nuclear technologies in enhancing productivity and discovery of new products."

3. Nuclear Science for Energy, Health, Agriculture and Industry



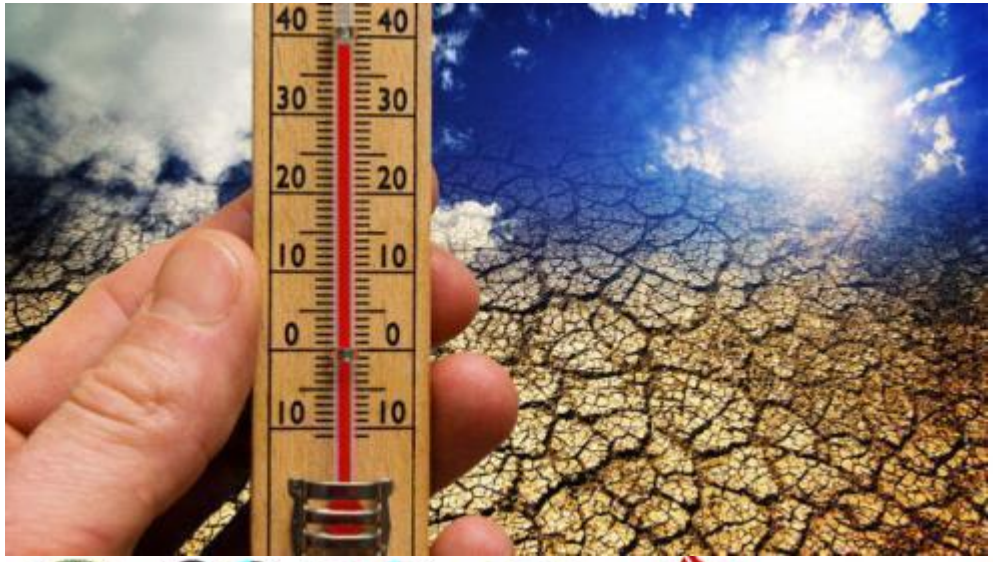
Science for Change (S4C)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

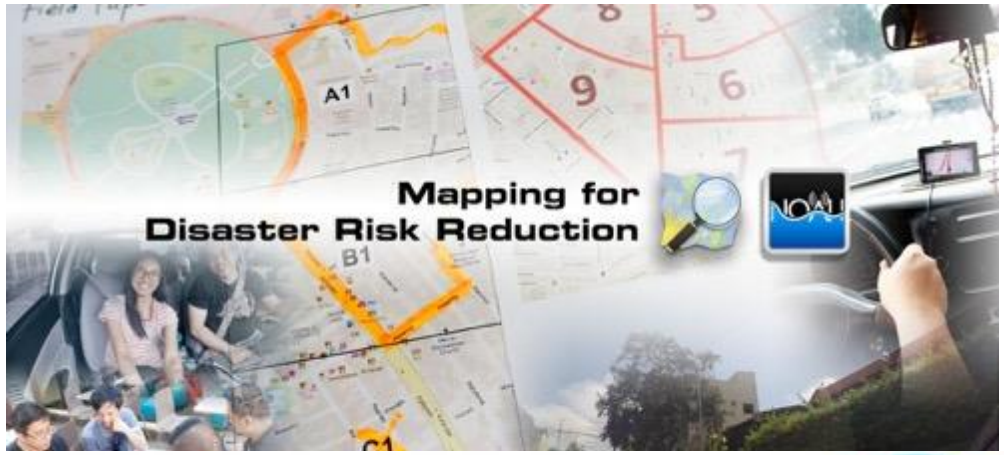
Photo credit: https://www.cdc.gov/features/stopmosquitoes/; https://www.iaea.org/sites/default/files/sit-carousel-banner-1370.jpg

A. Program Expansion

"To save lives, and reduce potential damage to properties and natural resources, as well as to the national economy.

4. Climate and Environment Sciences





Phil-LiDAR 2

Nationwide Detailed Resources Assessment Using LiDAR

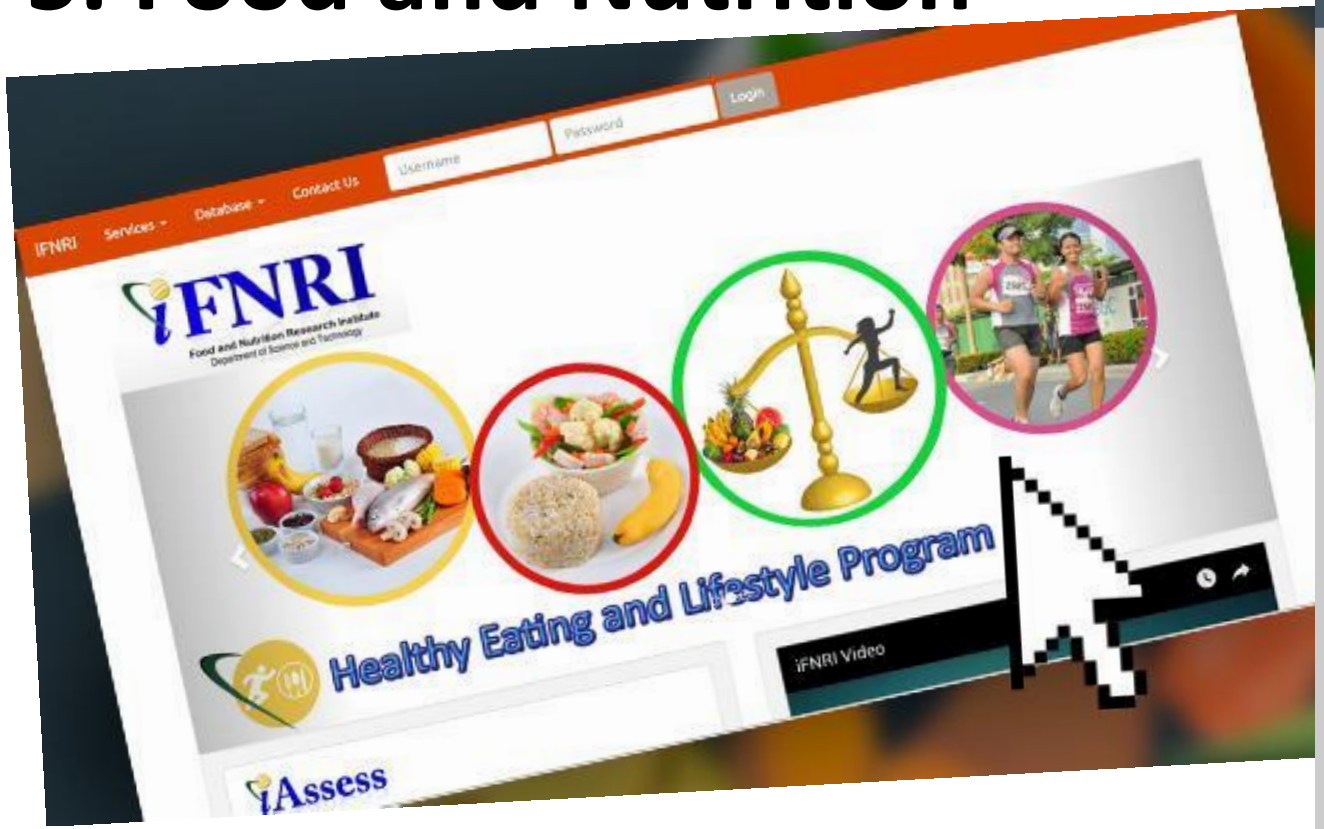
Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Photo credit: http://www.rappler.com/move-ph/issues/budget-watch/70175-department-science-technology-2015-budget

A. Program Expansion

"Juan mission of achieving a well-nourished nation."

5. Food and Nutrition



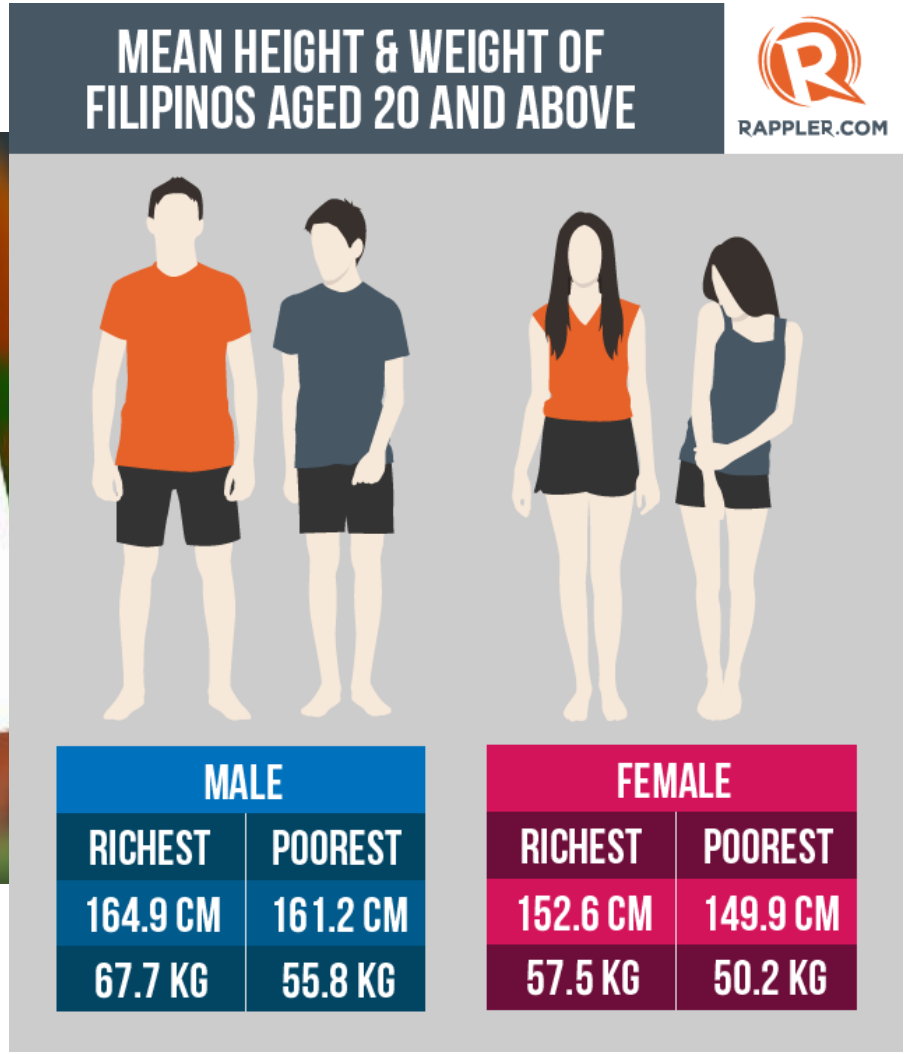


Photo credit: http://www.rappler.com/move-ph/issues/budget-watch/70175-department-science-technology-2015-budget

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

A. Program Expansion

"Production efficiency, productivity and competitiveness in the farms."

6. Agricultural and Aquatic Productivity

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

A. Program Expansion

7. Biotechnology for Industry, Agriculture, Health & Environment

PGC
PHILIPPINE GENOME CENTER

Core Facility for Bioinformatics

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

A. Program Expansion

"To nurture would-be start-ups until they become free-standing enterprises…."

8. Technology Business Incubation

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

9. Foreign Scholarship for STI

DOST
DEPARTMENT OF SCIENCE AND TECHNOLOGY
SCHOLARS

Photo credit: http://junebridesanctuary.blogspot.com/2011/06/dost-havent-forgotten-yet.html; http://www.vectorea.com/free-vectors/649-international-flags-icons

A. Program Expansion

10. Promotion of Culture of Science

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

1. Human Security R&D

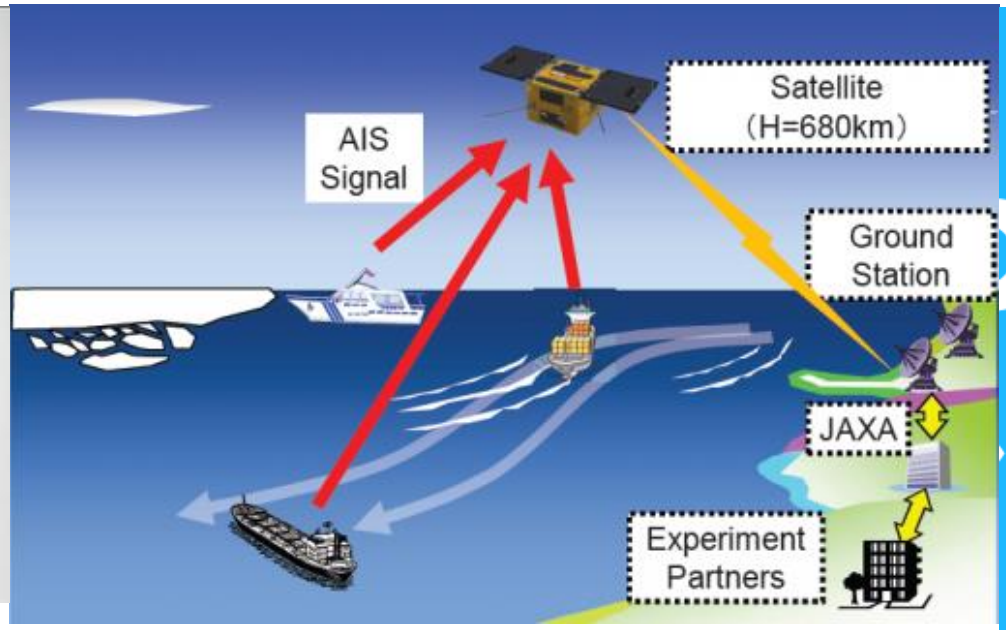


Photo credit: http://www.savetheinternet.com/cybersecurity; http://spaceflight101.com/spacecraft/alos-2/

2. Strengthening Regional R&D and S&T Services

Infrastructure (R&D Centers), facilities, HRD & R&D funding

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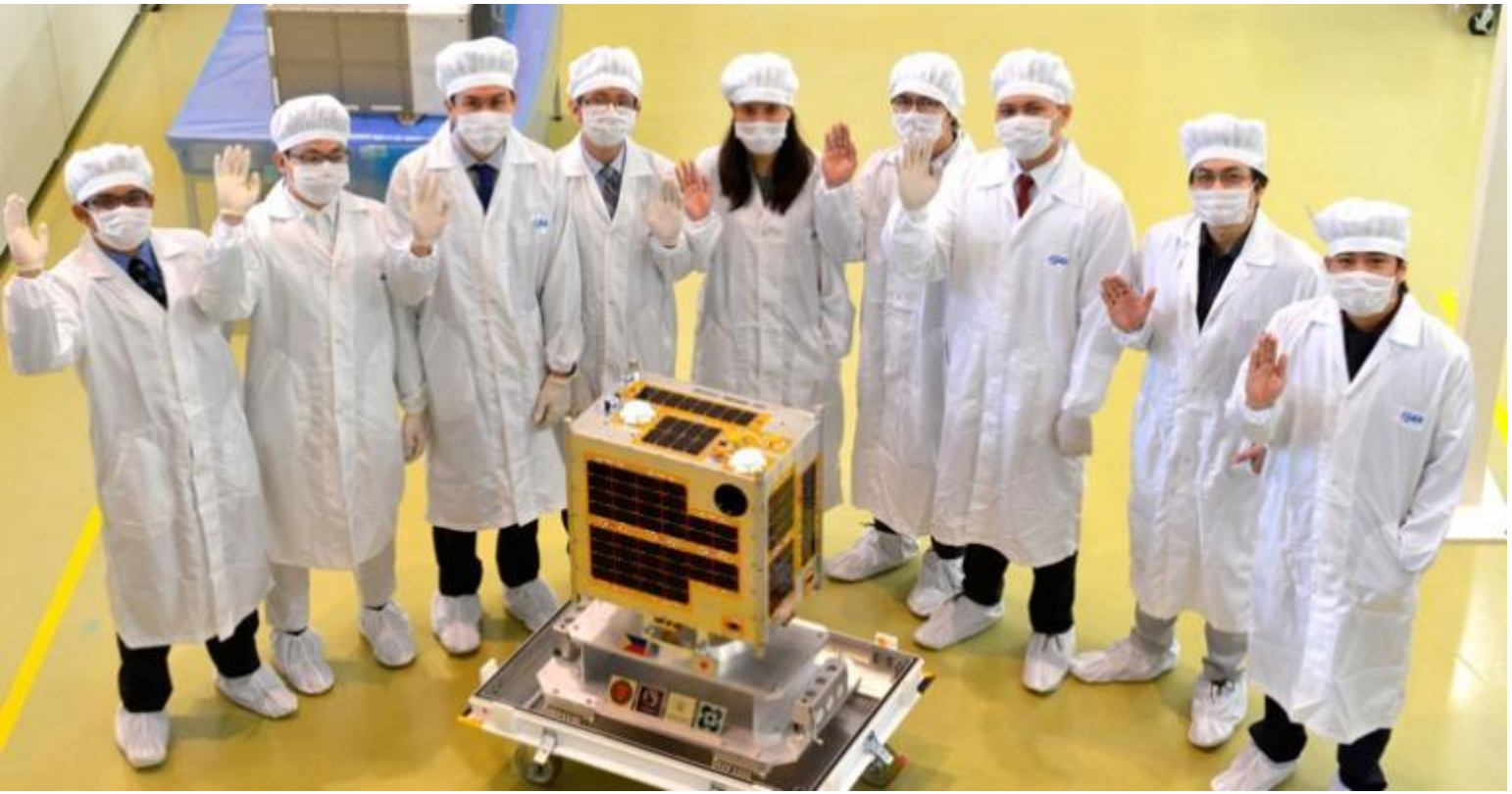
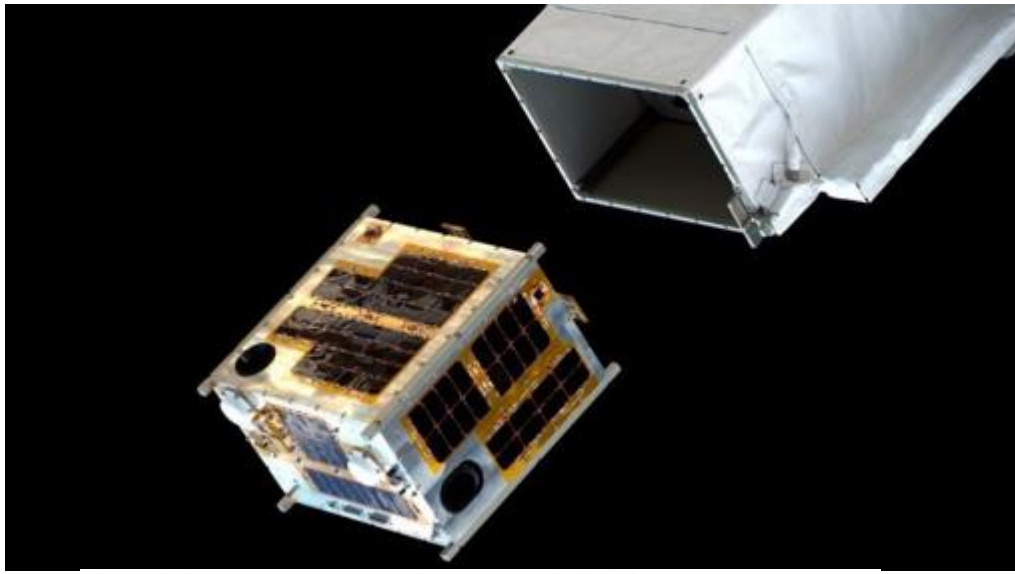
3. Space Technology and ICT Development





PHL MICROSAT

Science for Change Program (S4CP)
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4. S&T for Creative Industries, Tourism Industry & Services Industry

It's more fun in the Philippines

Photo credit: https://business.inquirer.net/53163/it-bpo-revenue-reached-11b-in-2011

5. Artificial Intelligence: From HRD to R&D to Industry

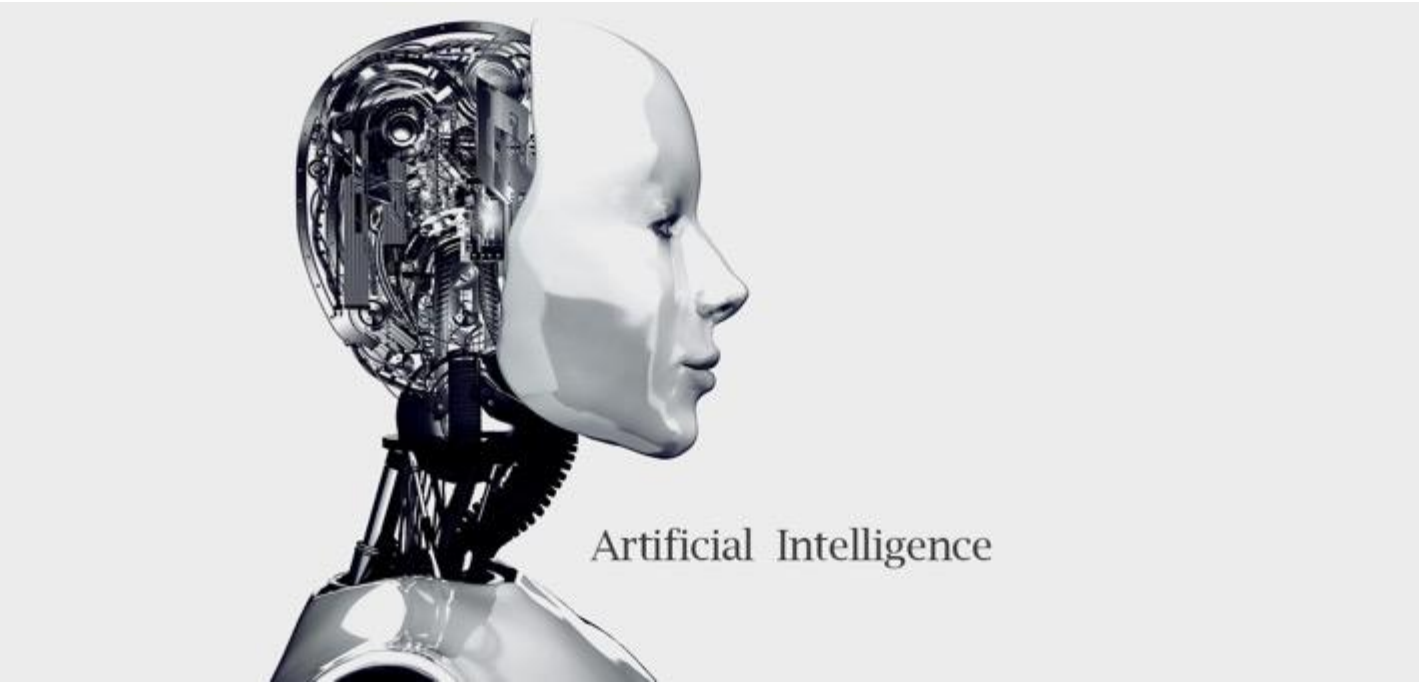


Photo credit: https://thefinancialbrand.com/52735/robots-artificial-intelligence-ai-banking/

C. S&T Human Development

Estimated Number of Required BS, MS and PhD Graduates of STEM and Involved in R&D

UNESCO Benchmark	**380 R&D personnel per million population**
Philippine Data **(Based on 2013 DOST R&D Survey)**	**270 R&D personnel per million population** **(26,495 total headcount)**
GAP	**110 R&D personnel per million population**
Total number of R&D personnel required to meet benchmark in 5 years (2022)	**46,462* STEM personnel working in R&D** **(headcount)**
Additional number of R&D personnel required to meet benchmark in 5 years (2022)	**16,652 STEM personnel working in R&D** **(headcount)**

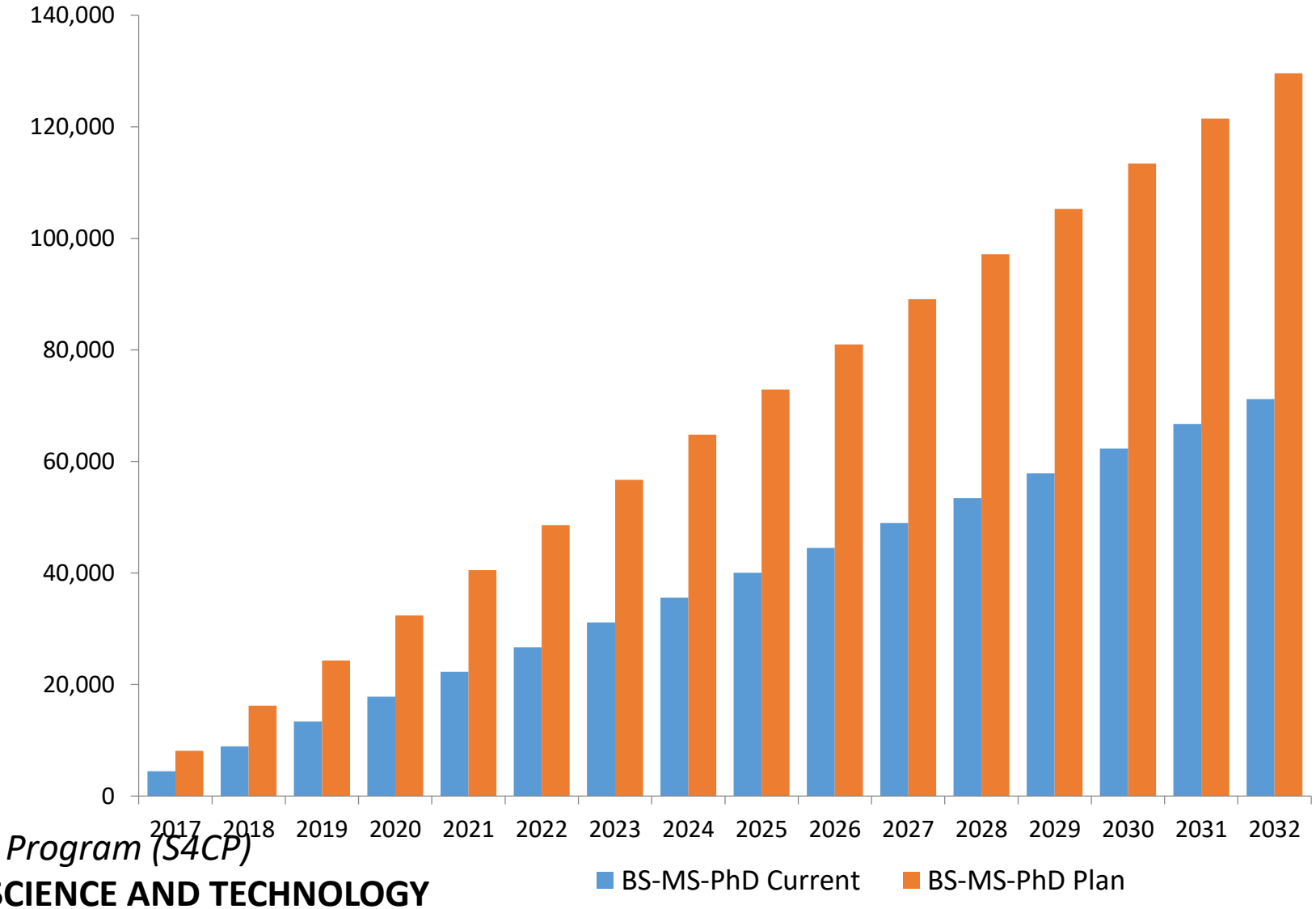
Assuming 10% attrition, 3,663 STEM graduates should be added to the R&D pool every year

* Based on 2010 census and 1.6% population growth

C. S&T Human Development

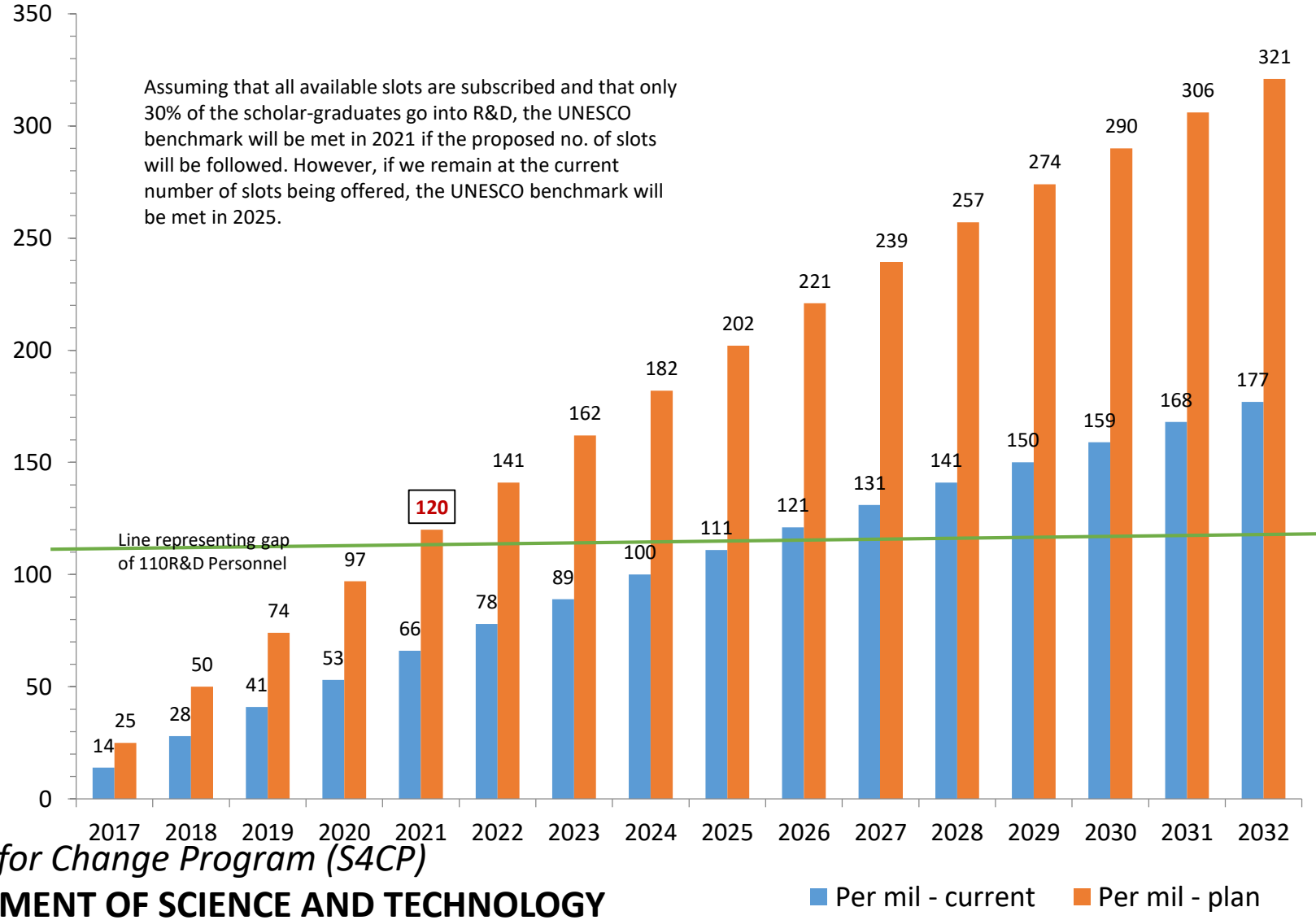
Comparison in the cumulative number of BS-MS-PhD scholarship slots based on the current vs. proposed from 2017-2045

Level	Current # of slots per year	Proposed # of slots per year
BS	3500	6000
MS	700	1400
PhD	250	700
Total	4450	8100



C. S&T Human Development

Comparison in the number of years needed to meet UNESCO benchmark gap current vs. proposed



2018	P5 B
2019	P7.3 B
2020	P10.9 B
2021	P16.2 B
2022	P24.3 B

Science for Change Program (S4CP)

DEPARTMENT OF SCIENCE AND TECHNOLOGY

NOTE: Slots (30% of the figures in the previous slide) were converted to per million population for easier comparison with UNESCO figure

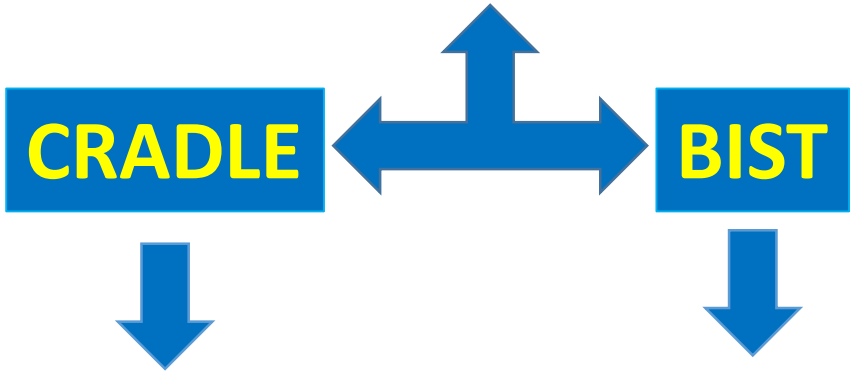
D. Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness

1. Niche Centers in the Regions for R&D (**NICER**)
2. R&D Leadership (**RDLead**)
3. Collaborative R&D to Leverage Philippine Economy **(CRADLE)** for RDIs and Industry
4. Business Innovation through S&T (**BIST**) for Industry

Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness

Accelerate industrial competitiveness by **capacitating HEIs in the Regions** to undertake quality research that will promote regional development

Employ experts with strong leadership, management and innovative policy-making proficiencies to be in charge of strengthening the research capabilities of the HEIs



Create a synergistic **relationship between the academe and the industry** with the goal of invigorating R&D

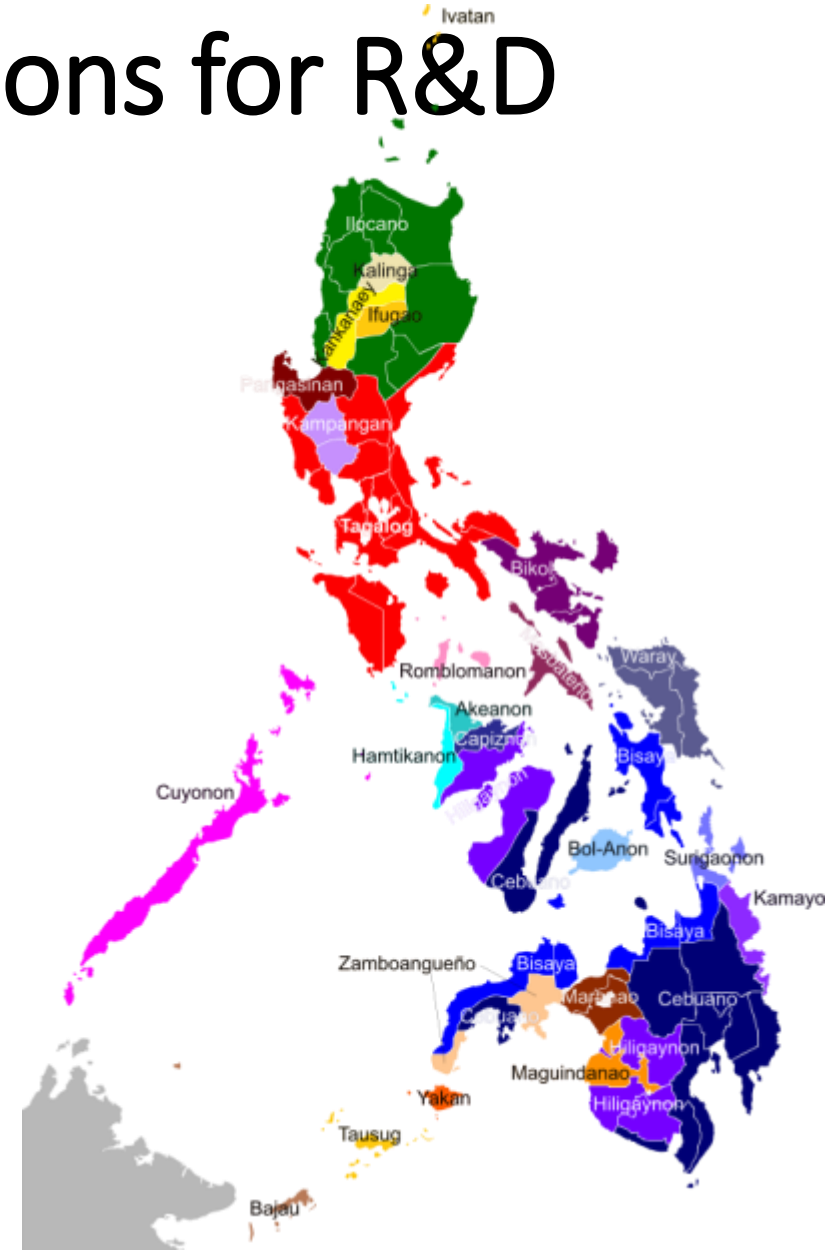
Level-up the Philippine Industrial Sector through the industry R&D, and acquisition of strategic and relevant technologies to enhance their technology level and production processes.

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

D.1. Niche Centers in the Regions for R&D (NICER)

- Capacitate Higher Education Institutions (HEIs) in the Regions to undertake quality research that will promote regional development.

- Provide institutional grant for HEIs in the Regions for R&D capacity building to improve their S&T infrastructure.



Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY

D.2. R&D Leadership Program (RDLead)

- Intended for HEIs in the Regions, under the NICER Program and upgrading of existing R&D facilities in HEIs and Research and Development Institutions (RDIs).

- Improve and hasten the use of research results that will contribute to the socio-economic development of the country and help address pressing challenges

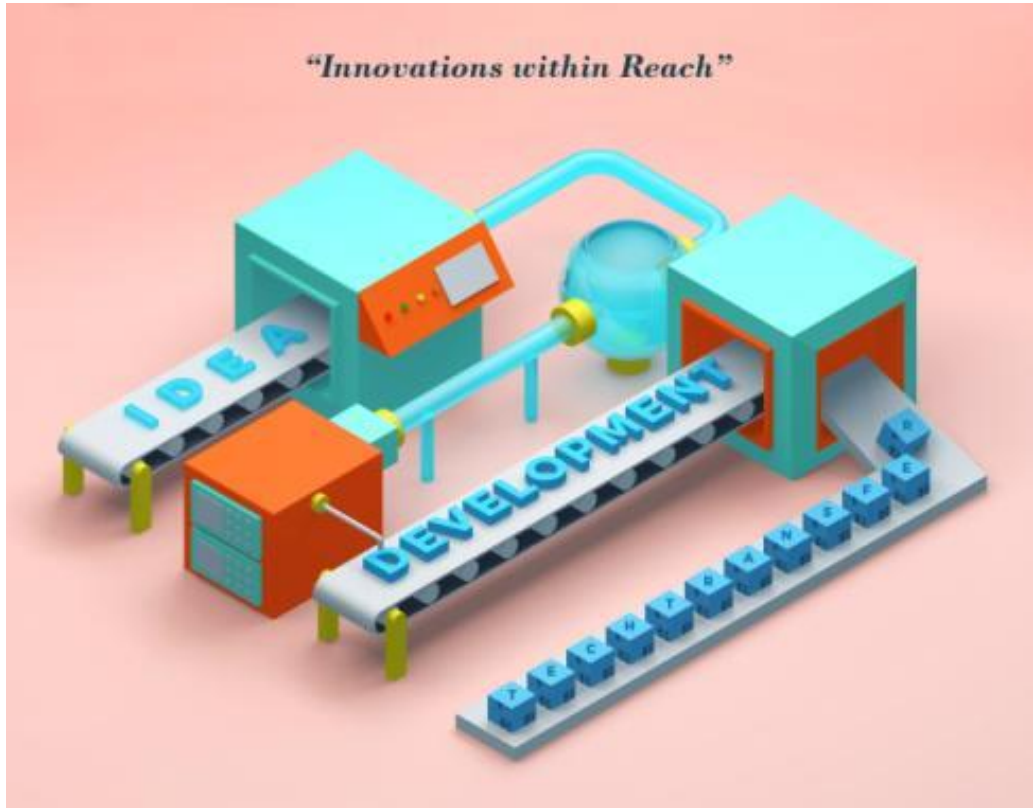
Photo credit: https://www.vecteezy.com/

D.3. Collaborative Research and Development to Leverage Philippine Economy (CRADLE)

-create a **synergistic relationship between the academe and the industry** with the goal of invigorating Philippine R&D.

To improve the R&D innovation system, the program aims to:

- bridge the academe and the industry; and
- to stimulate **collaboration** that meets the needs of both academe and industry in one shot.



Science for Change (S4C)
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D.4 Business Innovation through S&T (BIST) for Industry

- To strengthen the S&T innovation activities and technological capacity of private sectors
- To provide for the purchase of relevant high-tech equipment and machinery, technology licensing, and acquisition of patent rights

Photo credit: https://www.vecteezy.com/vector-art/89769-3d-factory-vector

Science for Change Program (S4CP)

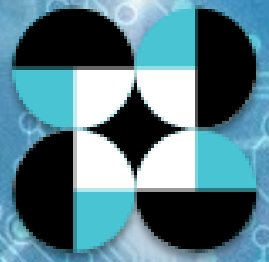

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Photo credit:http://www.ecovallee-cotedazur.com/key-stakes/economy-and-employment/enabling-innovation; http://www.cosmetic-360.com/en/pages/open-innovation--68.html