# Next generation Geomatics: Innovative solutions Roadmap

**Updated as of February 2024**

Legend (Text Font): Ongoing | Done | Target

## R&D SOLUTIONS

### 2020
176 M
- SAR and AIS applications: vessel detection, post disaster & operations, flood mapping, off-shore change detection, coastal mapping which can be used for aquaculture and other uses

Potential of S-band SAR and AIS applications

### 2021
107 M
- Continuous development and utilization of S-band SAR and AIS for terrestrial applications and maritime surveillance
- Use of satellite altimetry to assess coastal sea level rise
- Development of Global Satellite Navigation Systems (GNSS) applications

- S-band SAR and AIS applications
- Provide research and assessment on coastal sea level rise in the country

### 2022
181 M
- Develop Earth Observation solutions in public services
  - Land use/land cover change mapping and monitoring system of watershed and ecosystems
  - EO solutions for implementation of precision agriculture (i.e. Site-crop suitability, suitability, crop monitoring and yield, pest detection and disease management, nutrient management, irrigation, soil management)

- New STA applications developed for the enhancement of public services
- Enhanced coordination, decision making, and provision of public services
- Wider applications of satellite remote sensing

### 2023
157 M
- Continued Develop Earth Observation solutions for public services:
  - Climate monitoring
  - Ocean and climate change
  - Landscape generator and Landuse/land cover scenario modeler for urban development and sustainable land use and transportation policies
- Develop applications using other various available satellite data (i.e. Jason-3, Sentinel-6, Landsat-9, TOPEX/Poseidon, GRACE-FO, ASTER, BIOMASS, TROPICS, Cygnss, GHGSat, Hyperspectral EO, Pleiades Neo, TerraSAR-X, Tandem-X)
- Develop EO Data Cubes for Big Data Analytics and Management of EO data
- Develop thematic applications for EO Data Cubes

- Enhanced monitoring system for GHG, sea surface temperature and other climate conditions
- Provide persistent monitoring of climate condition using available EO satellites to improved hazard management and disaster risk planning
- New HEIs/SUCs conducted R&D on applications using available satellite data
- EO Data Cubes
- Establishment and operationalization of Philippine Data Cube for country level develo

### 2024
100 M
- Continued development of Earth Observation solutions for public services:
  - 3D Mapping for Smart Cities
  - EO-based Smart City Decision Support Services
- Develop application for single-photon LIDAR (the next generation of LIDAR technology for 3D mapping)
- Complementation of various remote sensing technologies to be used for indoor and underground applications
- Development Earth Observation Application Products from the Open Data Cube addressing Sustainable Development Goals and contributing to Global Policy Frameworks
- Establishment of web-based or cloud computing services for big data EO analytics

- EO-based Smart City Decision Support Services
- EO solutions in support to SDG Goals and Global Policy Framework
- Science-based, data-driven, geospatial monitoring of SDG indicators
- Web-based and cloud computing services for big data EO analytics

### 2025
30 M
- Develop GNSS-based applications for public services and innovative applications.
- Expanding research in regional universities on small satellite subsystems and components to advance next-gen geomatics and innovative solutions.

- Provide potential innovative applications using GNSS for public services
- Strengthening the research capabilities of regional universities leading to innovations in small satellite technologies that contribute to the development of next generation geomatics and innovative solutions

### 2026
70 M
- Development of High-Altitude pseudosatellite (HAPS) and High Endurance Long Endurance (HALE) unmanned aerial vehicle as a new platform for telecommunications and other remote sensing applications
- Conduct research on the integration of IoT and remote sensing data using small satellite for various geospatial applications.

- Establishment of new platforms for telecommunications and remote sensing
- Creation of advanced geospatial applications that leverage integrated IoT and remote sensing data

### 2027
50 M
- Develop applications for space-based quantum sensing and computing

- Enable new measurements and solutions to broaden the applications of EO

### 2028

## VISION

Philippines as a global leader in geomatics, utilizing innovative solutions to drive advancements in geospatial technologies through local talent development and strong public-private sector collaboration.

## OVERALL OUTCOME

A technologically advanced nation leveraging innovative geomatics solutions services to provide comprehensive services for a wide range of applications including climate change, disaster mitigation, natural resource management, human security and communication.

## MILESTONES

## OVERALL STRATEGIES

**Facilities and Services**

Environment and Climate Change

- Decision support system for resource management using space-based information
- Update agricultural/land classification, assessment and other EO government use cases monitoring through satellite data
- Enhance the monitoring system for GHG, sea surface temperature and other climate conditions through EO data
- Provide persistent monitoring of climate condition using developed satellites for improved hazard management and disaster risk planning. This is also to expand the conduct of climate studies and disaster risk assessment in the country.
- Improve environmental assessment and monitoring, precision agriculture, maritime domain awareness and disaster management through EO solutions

EO solutions for Government and Industries

- Embed end-to-end EO solutions to government institutions to deliver complete solutions
- Expand utilization of satellite data to improve public service through partnerships with government institutions and private industries
- Enhance efforts toward safeguarding the national security and territory through EO solutions
- Establish Climate change resilient communities through EO solutions
- Launch National Open Data Platform for mainstreaming EO data
- Establishment of web-based or cloud computing services and platforms for big data EO analytics

**R&D technologies**

- SAR and AIS applications for terrestrial applications and maritime surveillance
- Develop Earth Observation solutions for public services:
- Develop applications using other various available satellite data.
- Complementation of various remote sensing technologies and integration of IoT for innovative solutions
- Complementation of GNSS for various applications
- Develop EO Data Cubes for Big Data Analytics and Management of EO data
- Develop thematic applications for EO Data Cubes
- Development Earth Observation Application Products from the Open Data Cube addressing Sustainable Development Goals and contributing to Global Policy Frameworks
- Develop applications for space-based quantum sensing and computing

**Human Resources**

- Broaden the research and application of EO to regional universities and research institutions
- Partner with universities/colleges to embed EO applications to engineering, science and business courses

**S&T Policies**

- Develop open data policy for Earth Observations data
- Develop supporting policy for the establishment of Philippine Data Cube as an open data platform for Earth Observation data
- Develop regulations for the collection, distribution and use of EO data
- Forge partnerships with international institutions for EO data sharing and utilization and adoption of global policies and standards
- Develop a plan with the private sector for co-investment on EO resources that will result to inward capital investment in the Philippines and industry revenue of Php 10 billion/annually in 5 years

## NAST Foresight

**Environment and Climate Change**
- Geospatial technology (i.e. remote sensing, GIS and spatial statistics)
- 3D Mapping and modeling tools
- Computerization and Big Data Analytics
- Precision agriculture
- Comprehensive long-term watershed ecosystem observation systems

**Shelter, Transportation and Other Infrastructure**
- Real-time continuous disaster-monitoring technology using remote sensing information of multiple satellites

**ICT**
- Cognitive Technologies
- Big Data and Analytics
- Quantum computing

**Governance**
- Geographic Information System
- National defense technologies – Secure and reliable communication systems

**Space Exploration**
- Data Science
- Machine Learning and Artificial Intelligence
- Precision agriculture systems that make use of satellite data

# List of Projects under *Next generation Geomatics: Innovative Solutions* (2018-2024)

| R&D Technologies | Project Title | Budget Allocation | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| Space Technology | Geospatial Monitoring System for High Value Projects funded by the Department of Budget and Management (DIME Program) | | | | | | | | |
| | Project 1. Monitoring and Assessment of Planting Activities and other Applications (MAPA2) | 10,171,821.20 | | | | | | | Completed (PCIEERD-GIA) |
| | Project 2. Remote Assessment for Irrigation Networks (RAIN) | 5,076,365.00 | | | | | | | Completed (PCIEERD-GIA) |
| | Niche Centers in the Regions for R&D (NICER) Program | | | | | | | | |
| | Astronomical Near-Earth Observation Light Pollution (ANEO-LiPo) Program | 22,003,180.80 | 14,409,713.23 | | | | | | Completed (DOST-GIA) |
| | Establishment of Niche Center on Environmental Informatics (CENVI) for Central Visayas | 17,542,110.00 | 9,244,154.59 | 9,407,627.80 | | | | | Completed (DOST-GIA) |
| | Geospatial Assessment and Modelling of Urban Heat Islands in Philippine Cities (Project GUHeat) | | 18,883,279.00 | 768,892.80 | | | | | Completed (PCIEERD-GIA) |
| | Flood Risk Assessment for Mitigation and Effective Response (FRAMER) of Riverine Towns in Selected River Basins in Cavite, Batangas, and Quezon Provinces using Most Recent LiDAR DEM | | 15,960,000.00 | 9,259,650.00 | | | | | Completed (PCIEERD-GIA) |

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|---|---|---|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| Space Technology | Project 1. Optical Payload Technology In-depth Knowledge Acquisition and Localization (OPTIKAL) | 99,290,992.00 | 60,758,986.67 | 27,951,912.26 | | | | | Completed (DOST-GIA) |
| | Project 2: Building PHL-50: Localizing the Diwata-1 and Diwata-2 Bus System as the Country's Space Heritage 50kg Microsatellite Bus (PHL-50) | 28,846,207.07 | 34,745,439.84 | 22,786,018.36 | | | | | Completed (DOST-GIA) |
| | Project 3: Space Science and Technology Proliferation through University Partnerships (STeP-UP) | 39,561,389.90 | 39,927,195.61 | 12,281,819.06 | | | | | Completed (HRIDD) (DOST-GIA) |
| | Project 4: Ground Receiving, Archiving Science Product Development and Distribution (GRASPED) for the STAMINA4Space Program | | 23,460,000.00 | 35,680,040.85 | 26,750,830.50 | | | | Completed (DOST-GIA) |
| | Project 5. Advanced Satellite Development and Know-How Transfer for the Philippines | | 414,734,706.00 | | | | | | Completed (DOST-GIA) |
| | Synthetic Aperture Radar (SAR) and Automatic Identification System (AIS) for Innovative Terrestrial Monitoring and Maritime Surveillance (ongoing) | 182,698,667.20 | --- | 70,121,212.15 | 128,393,996.84 | 197,439,535.56 | 191,366,630.20 | | Ongoing (Extended until July 2024) (DOST-GIA) |
| | Integrated network-based management for SEA coasts (InMSEA) | | | | | 4,786,132.52 | | | Completed (DOST-GIA) |
| | Development of Underwater Sensor Network for Tsunami Detection through Ground Station Terrestrial and Nanosatellite | | | | | | 8,517,959.08 | 1,260,271.52 | New (PCIEERD-GIA) |
| | Development of An Automated Land Use and Zoning Compliance Assessment and Monitoring (AutoCAM) Tool using Remote Sensing and Geographic Information System | | | | | | | 6,160,520.00 | Ne (PCIEERD-GIA) |