

Reference Frame in Practice

Manila, Philippines 21-22 June 2013



STATUS OF THE GEODETIC INFRASTRUCTURE OF THE PHILIPPINES

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Sponsors :



Inception and Development

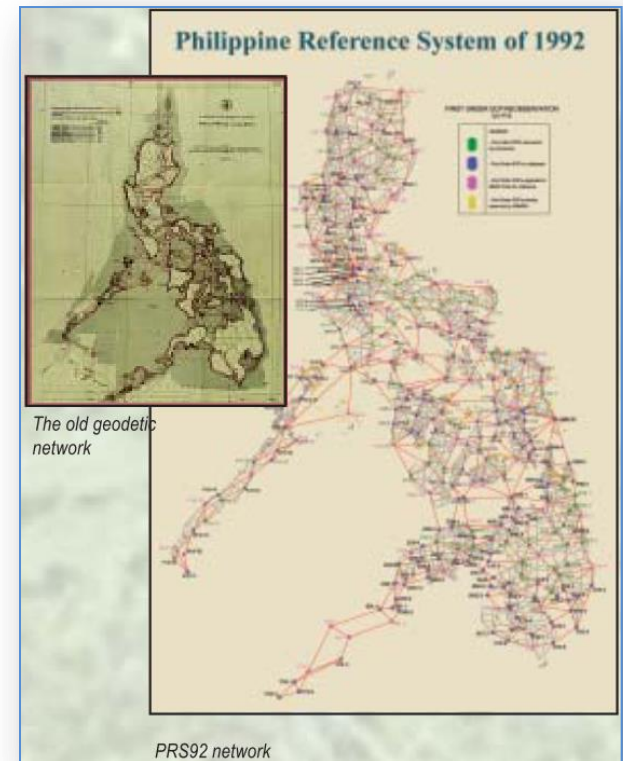
Philippine Reference System of 1992 – the datum (1989-1992)

- *A local geodetic datum established in 1992 using GPS*
- *Modification of the old Luzon Datum of 1911*

Reference Ellipsoid: Clarke Spheroid of 1866
Origin: Station Balanacan
Latitude 13°33'41.000" N
Longitude 121°52'03.000" E
Reference Azimuth (from South)
9°12'37.000" (to Sta. Baltasar)

Geoid-Spheroid Separation 0.34 m

- *A local WGS84 was defined to facilitate the processing of GPS observations and adjustment of the network (approximates the WGS84 to within 6m in latitude, longitude and height)*
- *Transformation parameters available to relate the local WGS84 to PRS92 and vice versa*

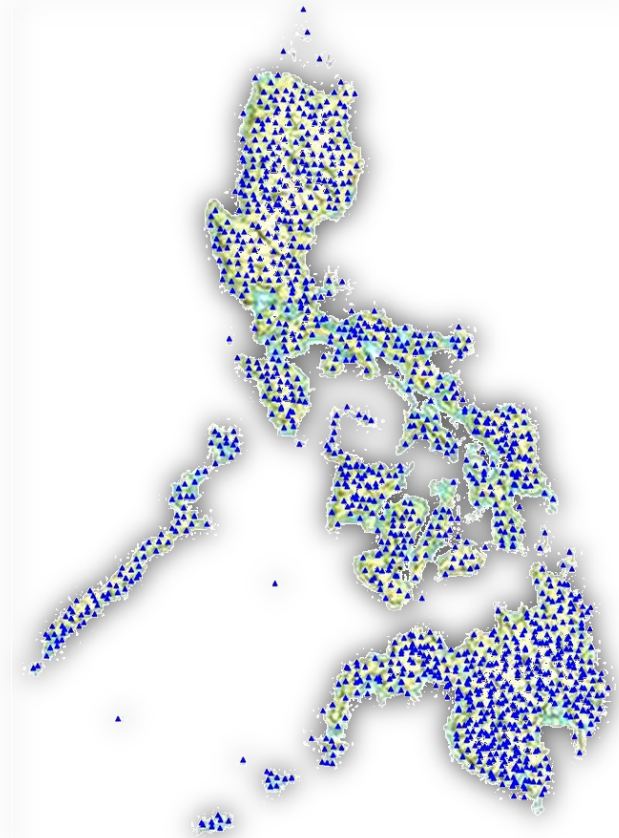


Inception and Development

Philippine Reference System of 1992 – the Project (2007-2010)

- *Full-scale Implementation of PRS92 as standard reference system*
 - Densification of the geodetic control network
 - Recovery and re-observation of 1st order geodetic control points
 - Data integration of old surveys and maps

- *Upgrading of PRS92*
 - Establishment of zero order control network
 - Levelling with inter-island benchmark connections
 - Gravity observations
 - Establishment and upgrading of tide stations
 - **Establishment of the Philippine Active Geodetic Network**
 - i-systems development support
 - Research and development
 - Policy formulation

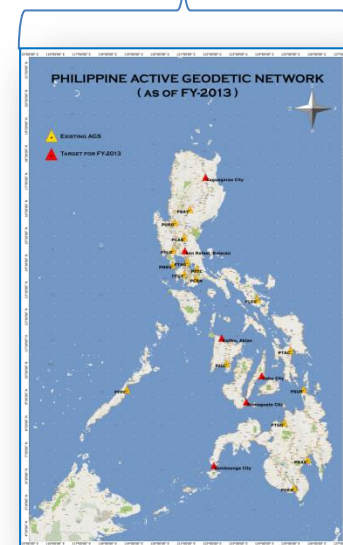
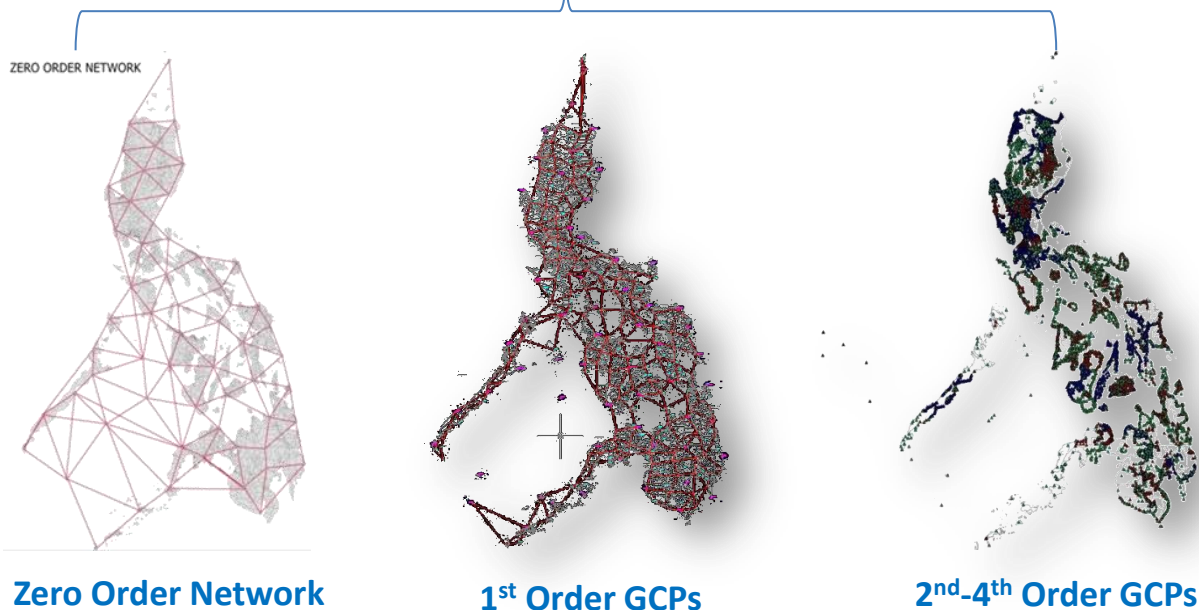


Inception and Development

Philippine Reference System of 1992 – the Project (2007-2010)

PASSIVE (HORIZONTAL)

ACTIVE

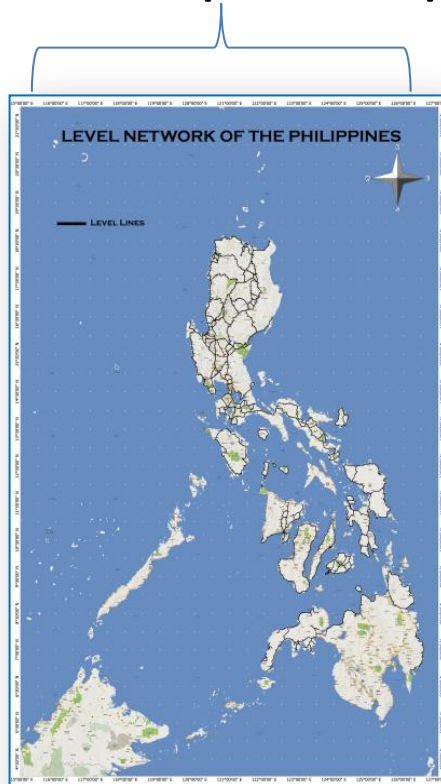


	Order of Accuracy				
	Zero	1st	2nd	3rd	4th
1992-2006		318	723	2,218	-
2007-2010	65	-	1,471	1,376	23,213
TOTAL	65	318	2,194	3,594	23,213

Inception and Development

Philippine Reference System of 1992 – the Project (2007-2010)

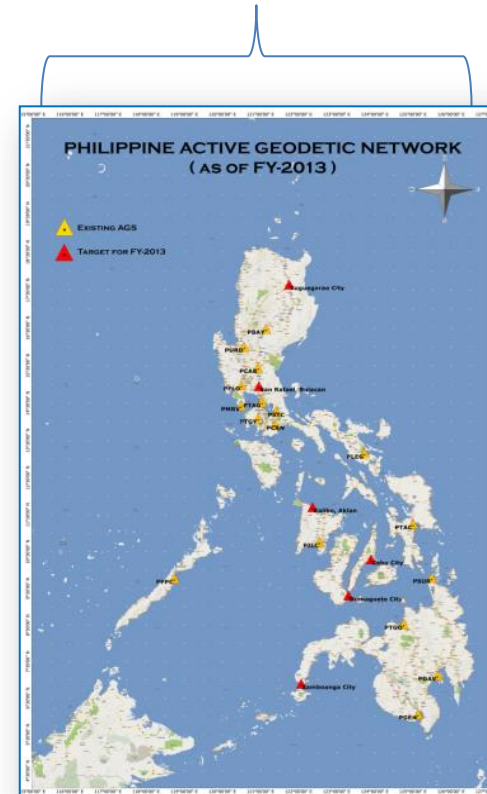
PASSIVE (VERTICAL)



Vertical Control Network

Accurate orthometric height differences of 20,000 km. of benchmarks

ACTIVE



PageNET

Provides WGS84 ellipsoidal heights. Seven (7) stations with orthometric heights from geodetic leveling.

Inception and Development

Philippine Reference System of 1992 – the Project (2007-2010)

PASSIVE (GRAVITY)



Gravity Stations

Currently consists of 80 1st Order and 1200 2nd Order Gravity Stations all over the country. Data from this will be applied as correction to the national network of levels and in the determination of a geoid model for the country.

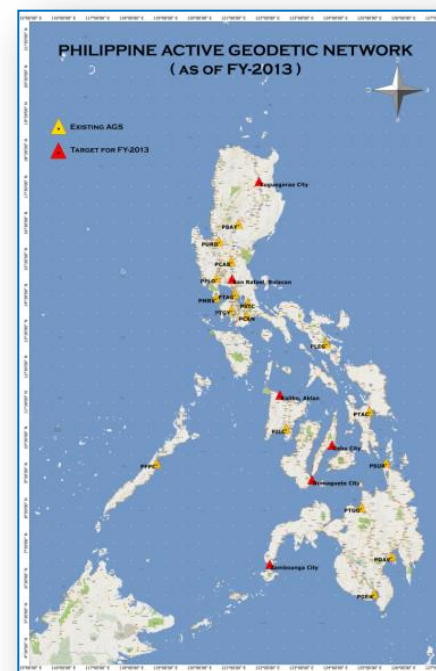
Inception and Development

Philippine Active Geodetic Network (PageNET)

- 2007 – Establishment of the PageNET
 - Support the implementation of the PRS92 Project
 - Provide a modern fundamental referencing infrastructure
- 2008 – 2 ground-based and 4 roof-based stations installed
- 2009 – Real-time and post-process services made available to the public
- 2010 – 5 ground-based and 2 roof-based stations installed
- 2011 – PTAG was included in the IGS Network
- 2012 – 4 roof-based stations installed
 - Launched 1-yr. free access promo



Mapping the Philippines, Linking the World.



PageNET

Currently has 17 CORS or AGS nationwide.

Manager/Organization

National Mapping and Resource Information Authority (NAMRIA)

- Central mapping agency of the Philippines
- Mandated to establish and maintain the National Geodetic Network including the PageNET



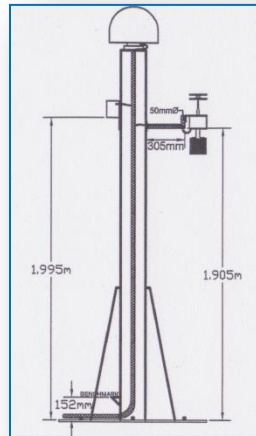
➤ Data Policy

- PageNET data and services are free for government sectors
- With minimal fee for private users



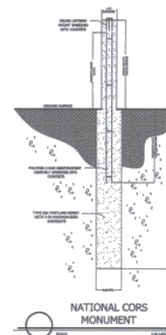
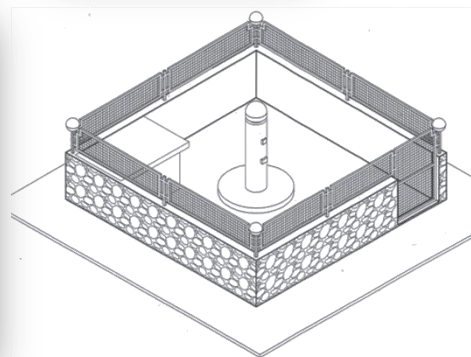
The Active Geodetic Stations

Typical AGS installation



Roof-based Installation

Pillars are anchored on reinforcement bars of the building using four (4) 20mm expansion bolts.

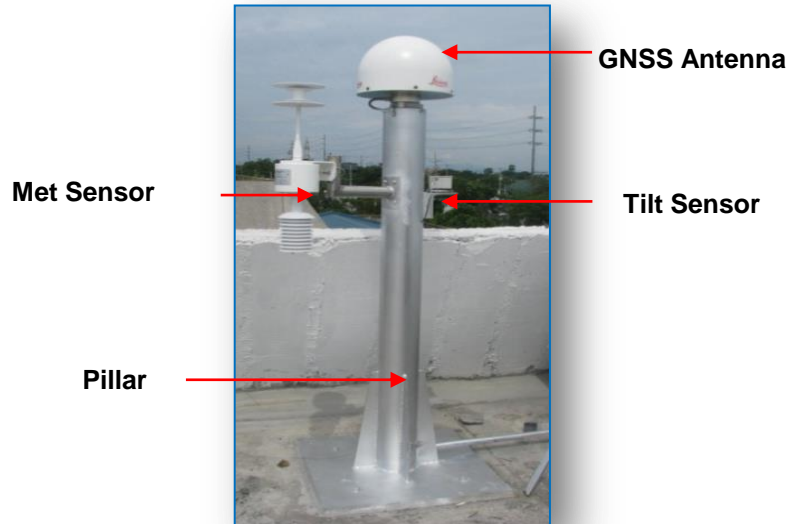


Ground-based Installation

Made of concrete pillar embedded on a ~3m-deep drilled hole. Polymer c-bar reinforcement assembly is also embedded on the concrete pillar for stability.

The Active Geodetic Stations

Typical AGS installation



➤ Sensors

a. GNSS Antenna

Leica AT504GG

Leica AR25

Trimble Zephyr Geodetic

b. Tilt Sensor

Leica Nivel 210

c. Meteorological Sensor

Paroscientific Met3

➤ Equipment Panel

a. Dual-frequency GNSS Receiver

Leica GRX1200 Series

Trimble NetR9

b. Modem

Wireless or leased lines (at least 64kbps)

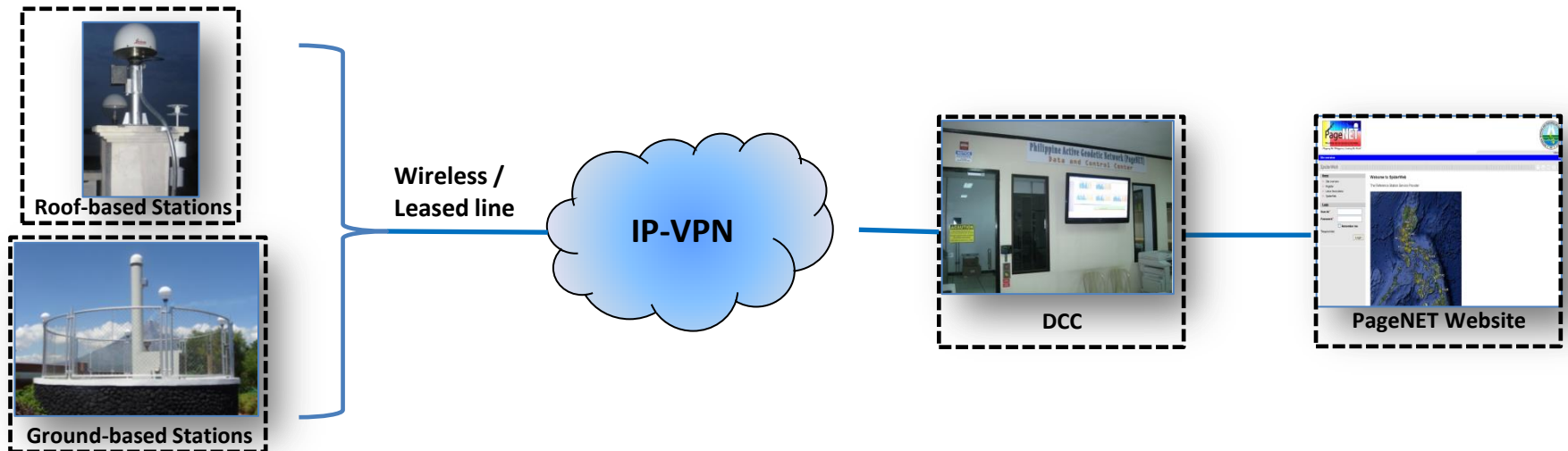
c. Solar Panel or UPS Online

d. Back-up Batteries

The Data and Control Center



- Data and control center set up at the Fort Andres Bonifacio office of NAMRIA in Taguig City
- PageNET run by Leica GNSS Spider software suite
- AGS connected to the DCC via wireless or leased line over an IP-VPN

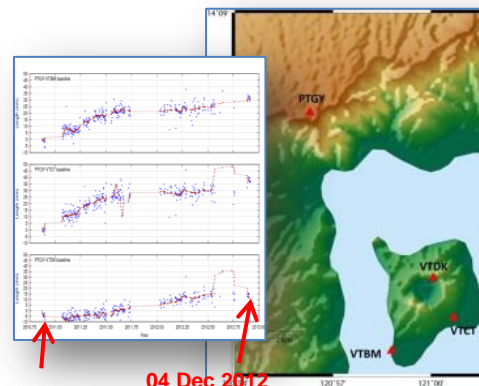
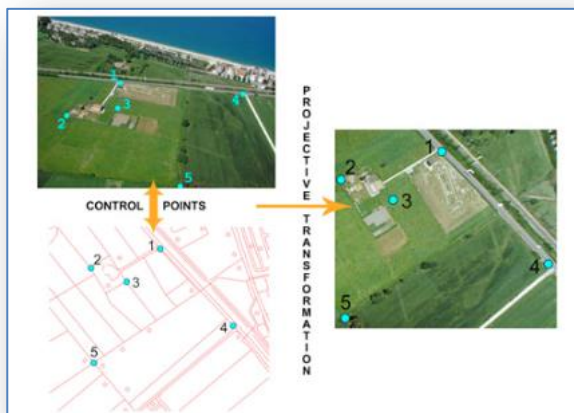


Geodetic Services

- **Development of geodetic datum**
 - In support of PRS92 Project
 - Adjustment of Zero Order Control Network
 - Adjustment of 1st-4th Order Control Network
 - Adjustment of Inter-island benchmark connection
- **Primary source for control surveys**
 - Land surveying
 - Deformation monitoring
 - Utilities mapping
 - Aerial photography

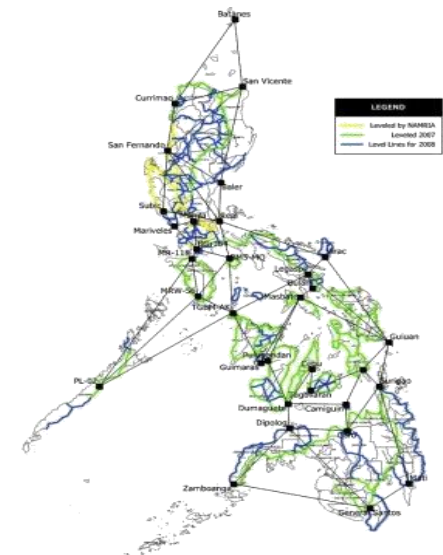


Zero Order Network



17 Nov 2010

04 Dec 2012



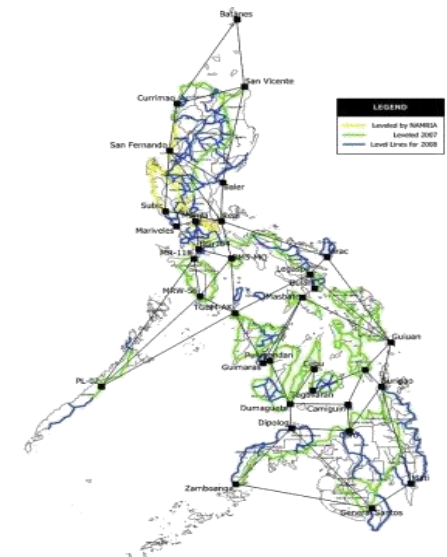
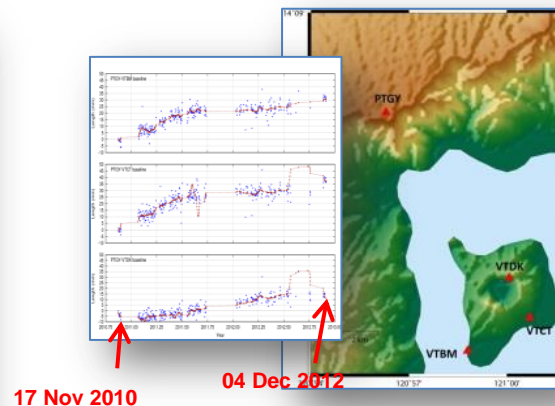
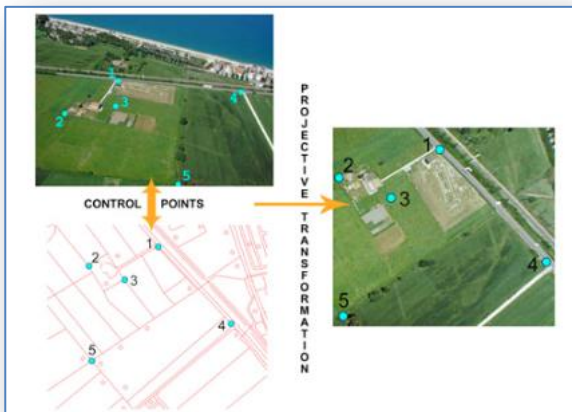
Inter-island Benchmark Connection

PageNET Services

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Zero Order Network



Inter-island Benchmark Connection

PageNET Services

- **Multi-GNSS Services**

1. RINEX download for post-processing
2. Coordinate computation
3. Single-base Real Time Kinematic Service
- will be upgraded to Network RTK for Mega Manila area

- **User access**

- Through the internet at <http://pagenet.namria.gov.ph>



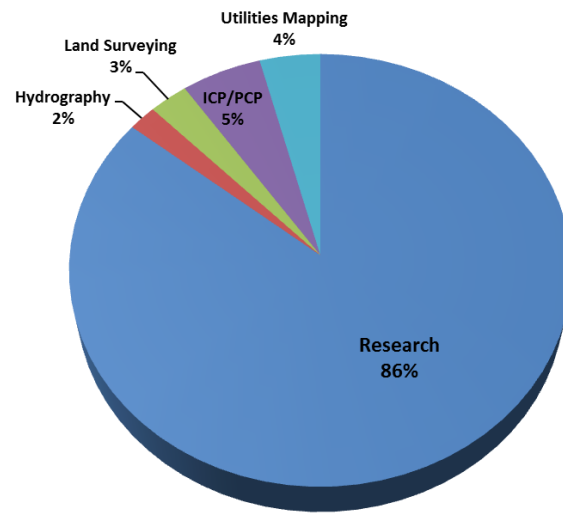
PageNET Users

- **NAMRIA**
 - a. Datum development
 - b. Surveying and mapping

- **Government**
 - a. Land surveying
 - b. Deformation monitoring
 - c. Utilities mapping
 - d. Aerial photography

- **Private**
 - a. Land surveying
 - b. Utilities mapping
 - c. Aerial photography

2012-2013 PageNET Detailed Data Usage (Local)



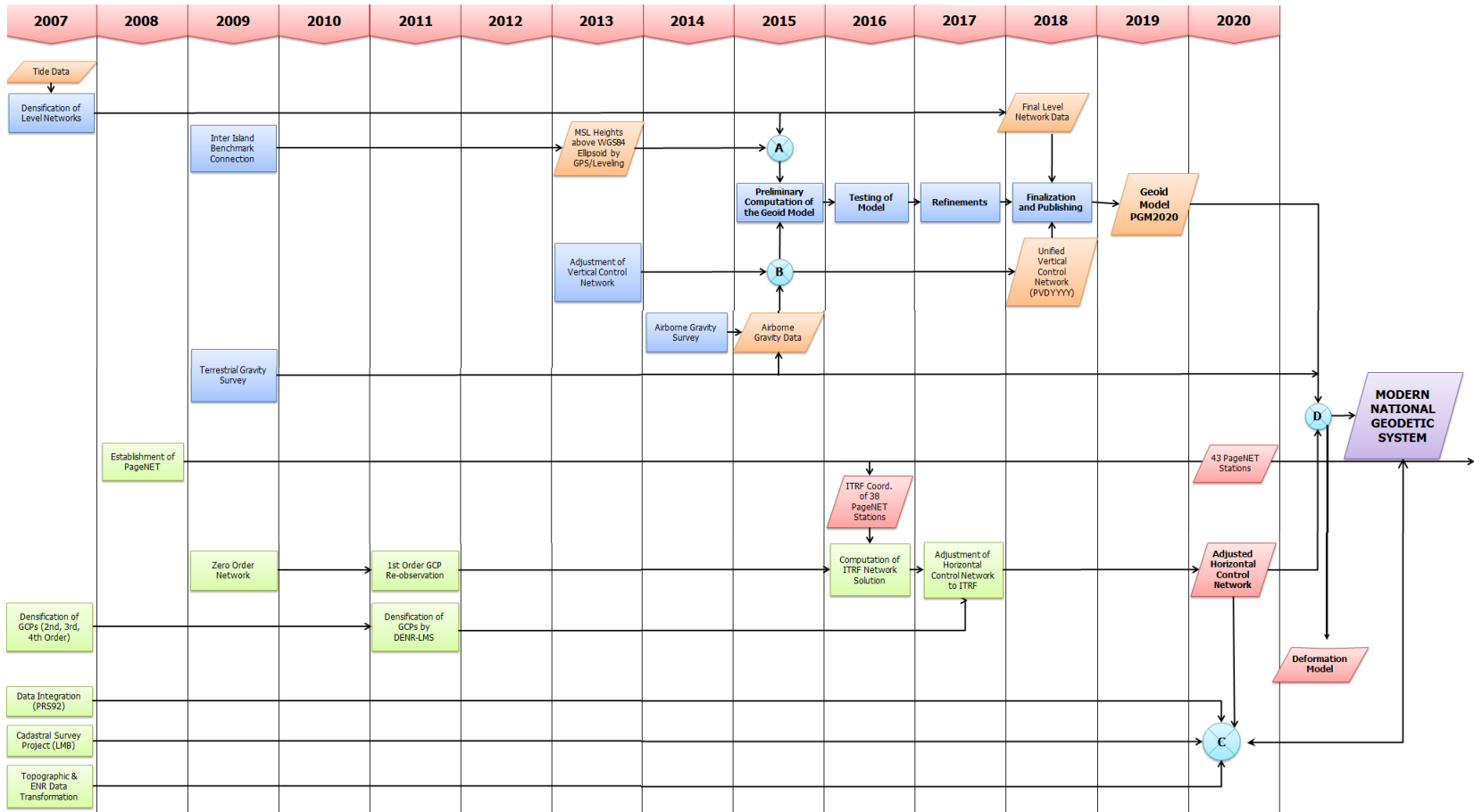
Issues to be resolved

- PageNET
 - a. Datum issues (local datum
 - b. Power and Communication Reliability
 - c. Cost recovery schemes

- Need to strengthen geodesy not just within NAMRIA but for the whole country as well
 - Infrastructure
 - Research and development
 - Human resource component

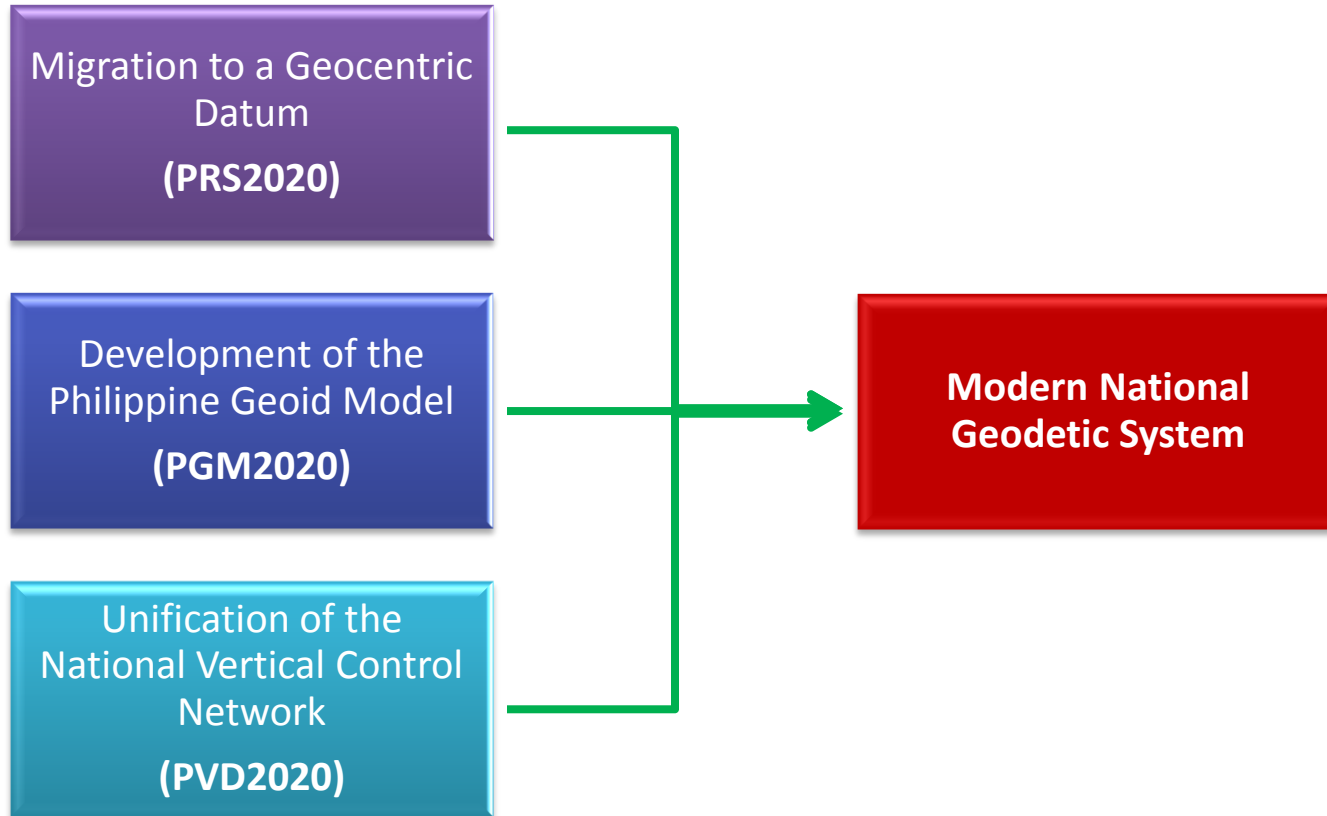
Future Direction

Road Map to a Modern National Geodetic System



Future Direction

Road Map to a Modern National Geodetic System



IAG / FIG / UNGGIM / UNICG / PhilGEGS

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Sponsors :

