Geospatial Information in The 4th Industrial Revolution (IR 4.0): Indonesian Cases

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esri Indonesia

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Outlines

- ✓ Territorial and Socio-cultural characteristics of Indonesia
- ✓ The Movement towards 100 Smart Cities Program in Indonesia
- ✓ Geospatial data and information for supporting Smart City
- ✓ Utilization of Geospatial Information: Indonesian Cases

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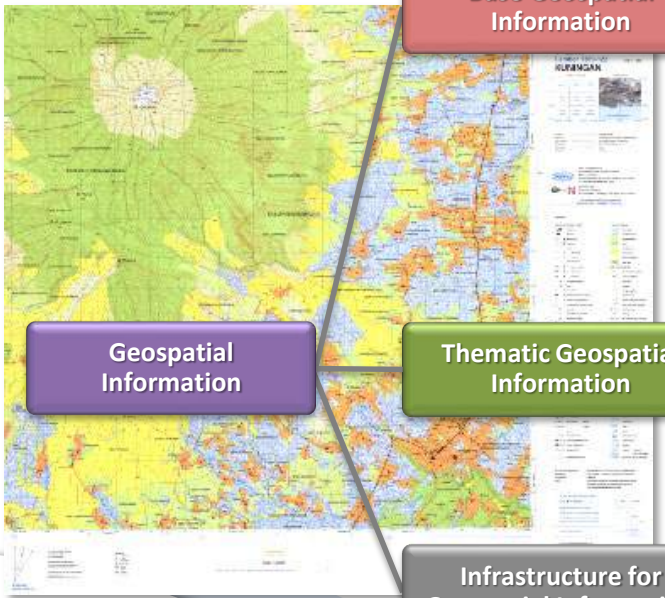
INDONESIA is a “maritime continent”

- ✓ One of the largest archipelagic countries
- ✓ Territorial:
  - 16.056 named islands
  - Land: 1.9 million km^2
  - Sea: 5.8 million km^2
  - Coastline: 108.000 km
- ✓ Population: > 250 million
- ✓ Hundreds of ethnic group
- ✓ 652 local languages

Indonesia as wide as European Continent

BUSINESS PROCESS OF GEOSPATIAL INFORMATION AGENCY OF INDONESIA (BIG) → State Law no.4 / 2011 : IG



- Geospatial Information
  - Base Geospatial Information
    - Base Maps
      - Topographic
      - Admin. Boundary
      - Coastal & Marine
    - Geodetic Control Network
      - Horizontal & Vertical
      - Gravity & Ocean Tide
      - Geodynamic
  - Thematic Geospatial Information
    - Natural Resources 87 Theme Maps
    - Spatial Planning Map and Atlas
  - Infrastructure for Geospatial Information
    - Geodatabase Management and Dissemination
    - Standard & Institutional of Geospatial Information

- *executor*
- *regulator*

- *coordinator*
- *integrator*

- *executor*
- *regulator*
- *coordinator*

Base Map Features:

1. *Coastline*
2. *Hypsographic*
3. *Hydrographic*
4. *Geographical Name*
5. *Administrative Boundary*
6. *Transportation & Utility*
7. *Building & Social Facility*
8. *Land Cover*

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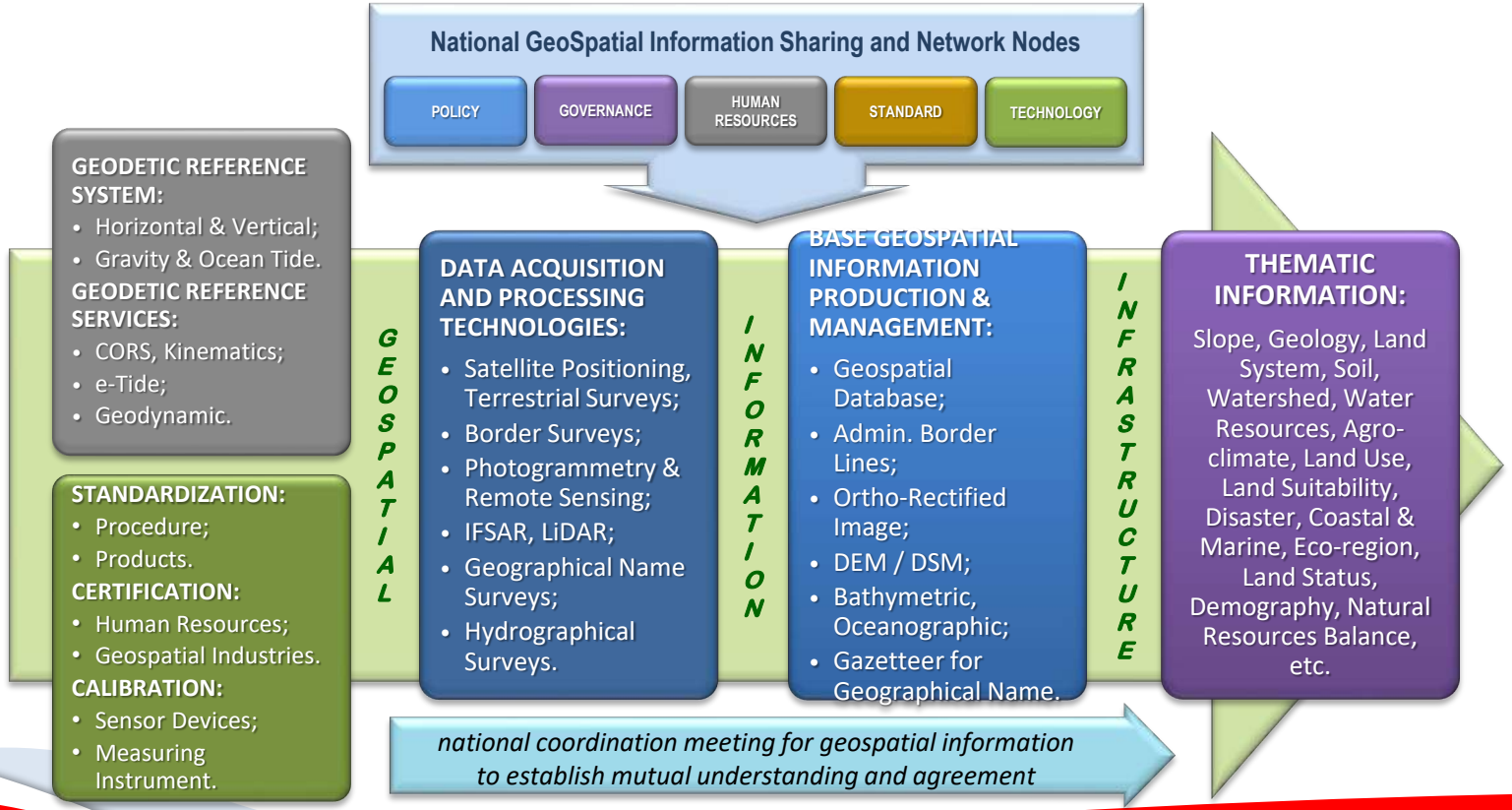
BUSINESS PROCESS OF GEOSPATIAL DATA PRODUCTION & SHARING



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Geospatial Information for Sustainable Development

NSDI : NATIONAL SPATIAL DATA INFRASTRUCTURE

- Presidential Decree
- No. 27/ 2014 (NSDI)

GEOSPATIAL DATA PRODUCTION

Geospatial Information Law
No. 4 / 2011

ONE MAP POLICY
Coordination & Supervision

Presidential Regulation No. 9 / 2016
Acceleration of OMP Implementation

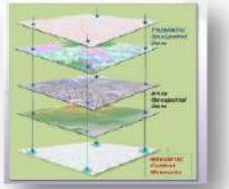
GEOSPATIAL INFORMATION UTILIZATION & MODELING

National Planning Law

- POLICY
- GOVERNANCE
- HUMAN RESOURCES
- DATA & STANDARD
- TECHNOLOGY

National Geospatial Information Network

STATISTIC DATA (Social and Economy)



GEOSPATIAL INFORMATION

DATA SHARING

SYNCHRONIZATION

INTEGRATION

COMPILATION

SD Planning

By integrating multi sectors, product of one map will be used for developing or for updating district spatial planning which contributes to sustainable development

National Sustainable Development Program

Harmony With Nature: Social-Economic Environment

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Kebijakan Satu Peta Untuk Mendukung Perencanaan Pembangunan Berbasis Spasial

Paradigma Pembangunan

Tematik
Holistik
Integratif Spasial

Ilustrasi Pengunaan Peta dan Informasi Geospasial Untuk Menjawab Tantangan Pembangunan Nasional

DATA SPASIAL DAN DATA STATISTIK

Peta Strategi Prioritisasi Penurunan Kesenjangan

Peta Strategi Prioritisasi Pengembangan Pusat Pertumbuhan Baru

Peta Strategi Pencetakan Sawah Baru

Mendukung Pencapaian Tujuan Pembangunan Nasional

1. **Meningkatkan konektivitas** untuk **mengurangi kesenjangan antar-wilayah**
2. **Mendukung pertumbuhan pusat ekonomi baru berbasis keunggulan potensi wilayah,** khususnya di Kawasan Timur Indonesia
3. **Meningkatkan pelayanan sosial dasar secara merata di seluruh wilayah Indonesia**

Ref. Kemenko Perekonomian (Agt. 2018)

Perencanaan pembangunan harus dilakukan dengan mengintegrasikan data spasial dan data statistik (Contoh: Index Pembangunan Manusia, Rasio Gini, Tingkat Kemiskinan, Pertumbuhan Ekonomi, dll.).**secara komprehensif** untuk mencapai tujuan pembangunan nasional yang inklusif dan berkelanjutan.

Typical Requirement of Base Map in Indonesia

Program	Required Base Maps
One Map Policy	1 : 50.000
New Harbour Development (Maritime Toll Road)	1 : 10.000
Village Mapping	1 : 5.000
Detail Spatial Planning (RDTR)	1 : 5.000
Peatland Management	1 : 2.500
Development of Special Economic Zone and Industrial Zone	1 : 1.000
Smart City Development	1 : 1.000
Acceleration of Land Registration	1 : 500 - 1 : 5.000
Hazard Mitigation and Adaptation	1 : 1.000 - 1 : 5.000

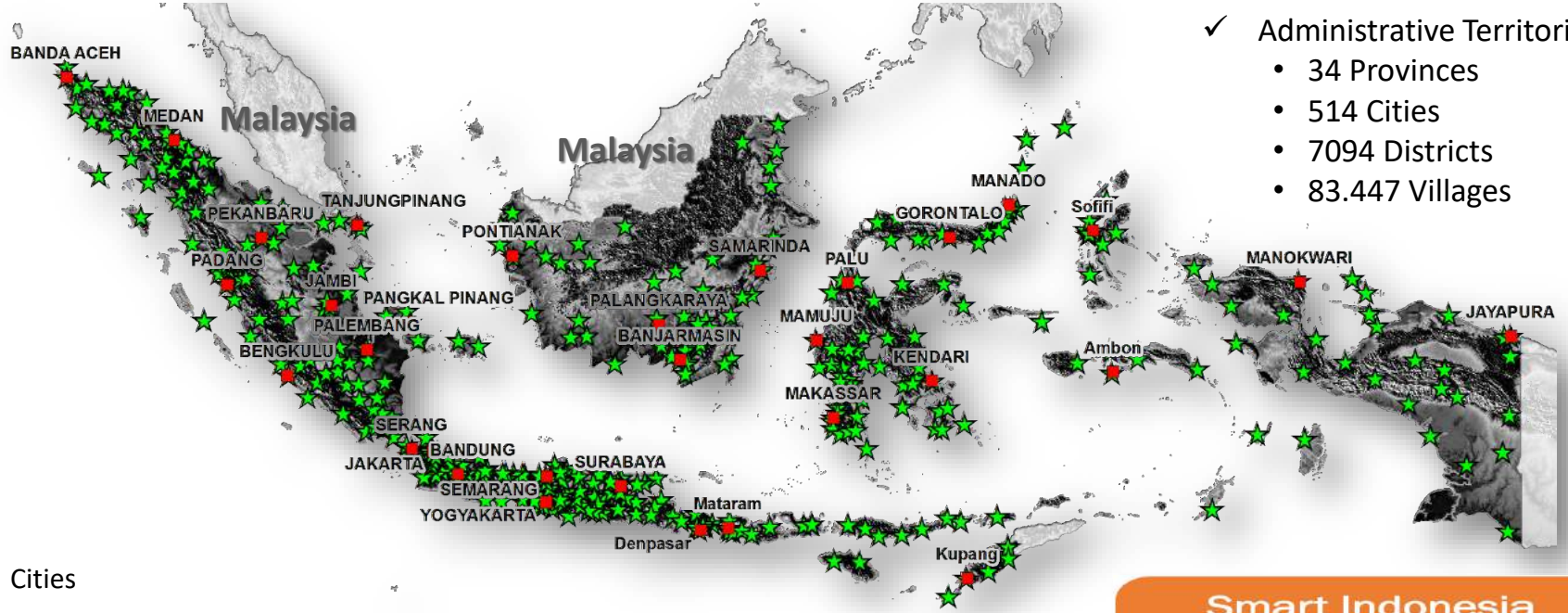
Variasi Tahun & Sumber Data Vektor/TLM/masspoint

Wilayah	Jenis dan Periode Tahun Sumber Data					
	FU	IFSAR	TerraSAR-X	Radarsat	Citra Optis	RBI cetak
Sumatera	1969-2005	2007-2012	2012	-	2002-2011	1984-1992
Kalimantan	1989-1995	1993-2013	2009-2011	2003-2010	2000-2014	1973-1995
Sulawesi	-	2003	2011	-	2000	1981-1992
Maluku	1989-1994	2005	2011	-	2003-2007	-
Papua	1992-1996	-	2009-2010	2009-2010	1999-2011	-
Jawa-Bali-Nusra	1992-1997	2004-2007	2011	-	2000	2000

Geospatial Technology in IR 4.0

Data Acquisition	Data Processing	Data Distribution and Publishing
Aerial Photo	Digital Image Processing	Big Data
LiDAR	Cloud-based paralel computing	Location Based Services
Airborne Radar	OBIA and sub-pixel classification	We-based services
Spaceborne Radar	Artificial Intelligence	Blockchain
Optical Satellite Images	Automatic Feature Extraction	Geoportal

Indonesian Cities (Municipalities & Regencies)



- ✓ Administrative Territorial:
  - 34 Provinces
  - 514 Cities
  - 7094 Districts
  - 83.447 Villages

★ Cities

■ Capital of Provinces

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The Movement Towards 100 Smart Cities Program

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The Movement Towards 100 Smart Cities Program

Officially launched in 2017 at Makassar City by The Minister of Communication and Information, The Government of Republic Indonesia

The movement towards 100 Smart City is a program with the Ministry of Communication and Information, the Ministry of Home Affairs, the Ministry of Public Works, Bappenas and the Presidential Staff Office. The movement aims to guide the Regency / City in compiling the Smart City Masterplan in order to maximize the use of technology, both in improving community services and accelerating the potential in each region.

The Movement Towards 100 Smart Cities Program

Objective

Guiding 100 selected cities / regencies to plan smart city development in their respective regions by taking into account the challenges and potential in each region

Stakeholders

Ministry of Communication and Information, Ministry of Home Affairs, Ministry of Public Works, Ministry of Administrative Reform, Ministry of Economic Affairs, Ministry of Finance, Bappenas, Presidential Staff Office, APEKSI, regions with adequate KKD, technology and media providers.

Program Stages

2017 : 25 Cities
2018 : 50 Cities
2019 : 25 Cities

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WHY Smart City

By 2045, it is estimated that 82.37% of Indonesia's population will live in cities. To answer the problem while utilizing this potential effectively, the city government must be able to utilize technology.

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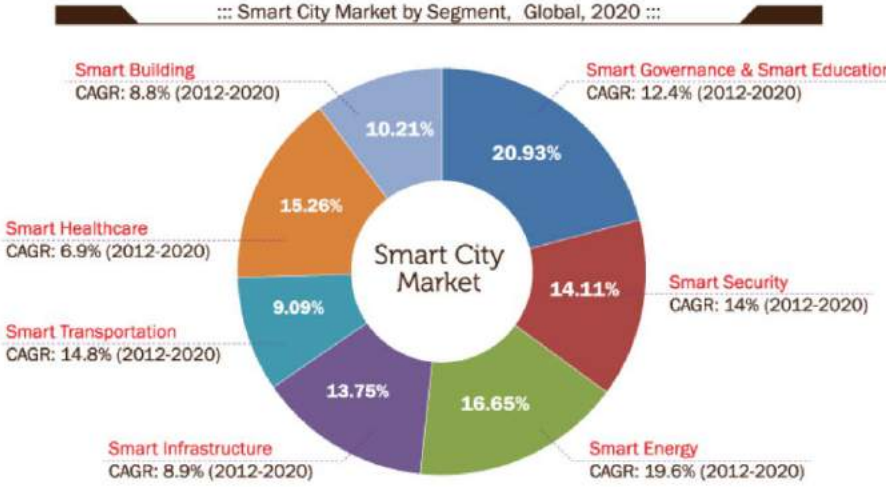
Indonesia's Smart City Market Opportunity



US$ 400 Billions

Indonesia's Smart City Market Opportunity in 2017

Approximated by Citiasia Center for Smart Nation

Note: The graph represent the market share of each segment ih the smart city market. Ref: http://www.iismex.com/

53.3% (2015) → Percentage of Indonesia's population lives in urban areas/cities (Proyeksi Penduduk Indonesia 2010-2035 - BPS) → **66.6%** (2035)

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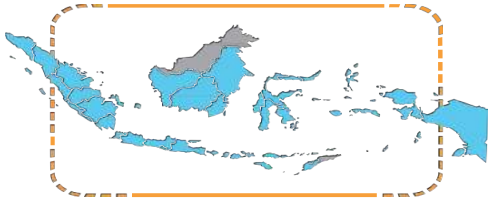
Internet users penetration

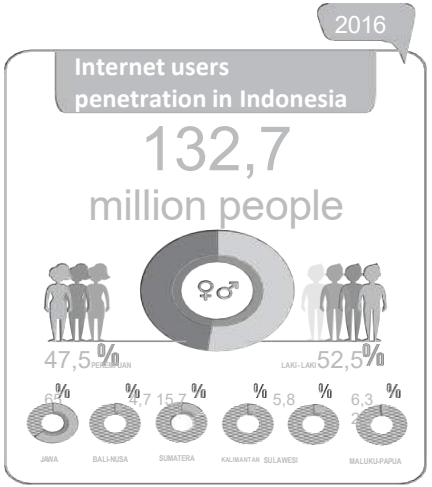
54.68 %

143,26
Million People



Out of Total Population of Indonesia

262 Million



Geospatial technology is a key component of Smart City

Information and Communication Technology (ICT)

ICT builds a bridge between citizen and government where citizens can interact with the government and in return the government builds the city as per the choice of its citizens.

Internet of Things

Internet of Things is like veins of the city spread all across and connecting each dot. All smart solutions in smart cities are based on Internet of Things where they are connected and smart enough to decide their action.

Sensors

Sensors are hidden but ubiquitous components of the urban landscape. Sensors are a crucial component of any intelligent control system. They are like converters that convert parameters of a physical nature to an electronic signal which can be interpreted by humans or can be fed into an autonomous system.

Geospatial Technology

Geospatial technologies provide the underlying foundation and ultimately the fabric upon which solutions for smart cities can be built. It provides location information which allows pinpointing exactly on the need so that better solution can be applied to it.

Artificial Intelligence

Smart city is a digital revolution generating huge amount of data. This massive amount of data generation brings the role of Artificial Intelligence that can make sense out of those data. AI allows machine-to-machine interaction by processing the data and making sense out of that.

Blockchain

Blockchain application is new to smart cities. Its integration into smart cities could better connect all city services while boosting security and transparency. Blockchain is expected to influence cities through smart contracts. It can also be used in smart grids to facilitate energy sharing, a concept which trending these days.

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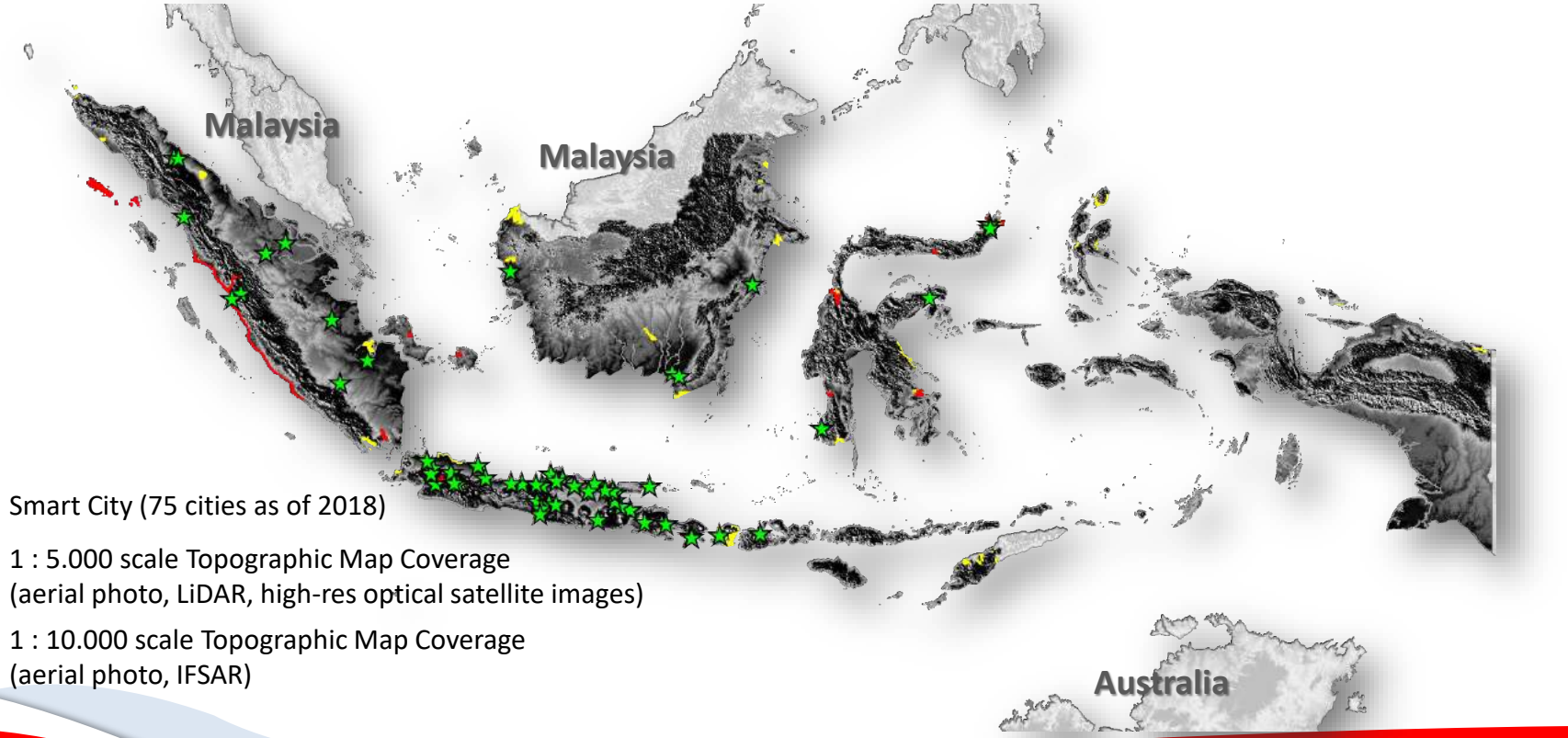
Geolocation of Indonesian Smart Cities



Smart City (75 cities as of 2018)

1 : 5.000 scale Topographic Map Coverage
(aerial photo, LiDAR, high-res optical satellite images)

1 : 10.000 scale Topographic Map Coverage
(aerial photo, IFSAR)

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Geolocation of Indonesian Smart Cities

1 : 1.000 scale Topographic Map (aerial photo, LiDAR)

★ Smart City

Medan (aerial photo, 2011)
Surabaya (aerial photo & LiDAR, 2015)
Bandung (aerial photo, 2016)

smart bdg city

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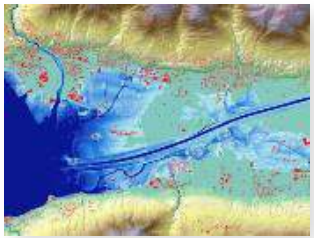
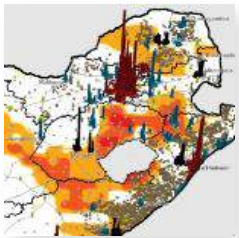
PERAN INFORMASI GEOSPASIAL DALAM MENDUKUNG PENANGANAN KEBENCANAAN DAN EVAKUASI

Simulation for Flood Disaster Management

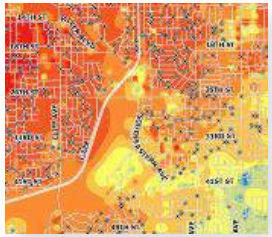
Flood Risk Map



Effects of Flooding



Distribution of Officers in the area of disaster



El Nino and La Nina

Floods

Drought

Plantations on Forest Fire Mapping

Earthquake Risk

Police Facilities Distribution on Earthquake Prone Regions

Rob Disaster Study on unemployment

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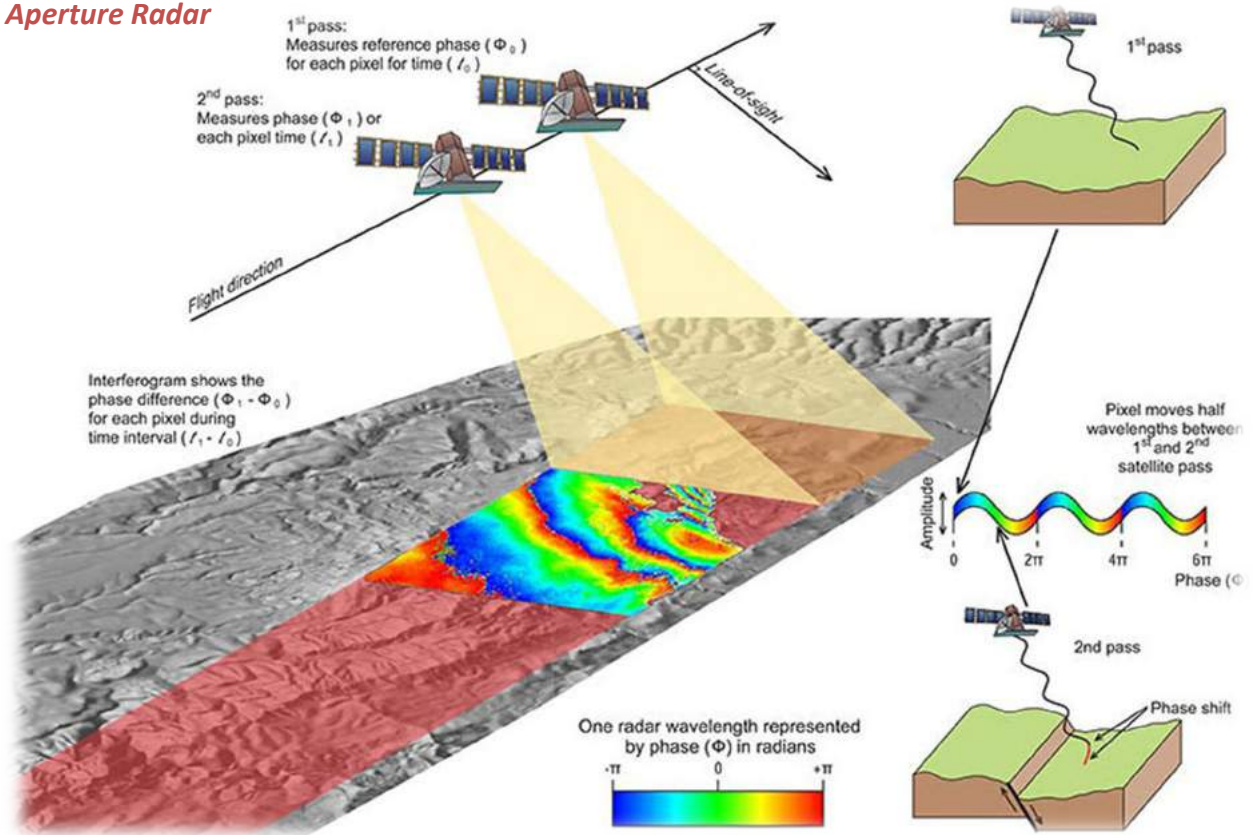
DInSAR Technology : Basic principles

Differential Interferometric Synthetic Aperture Radar

DInSAR

Ground Deformation Monitoring



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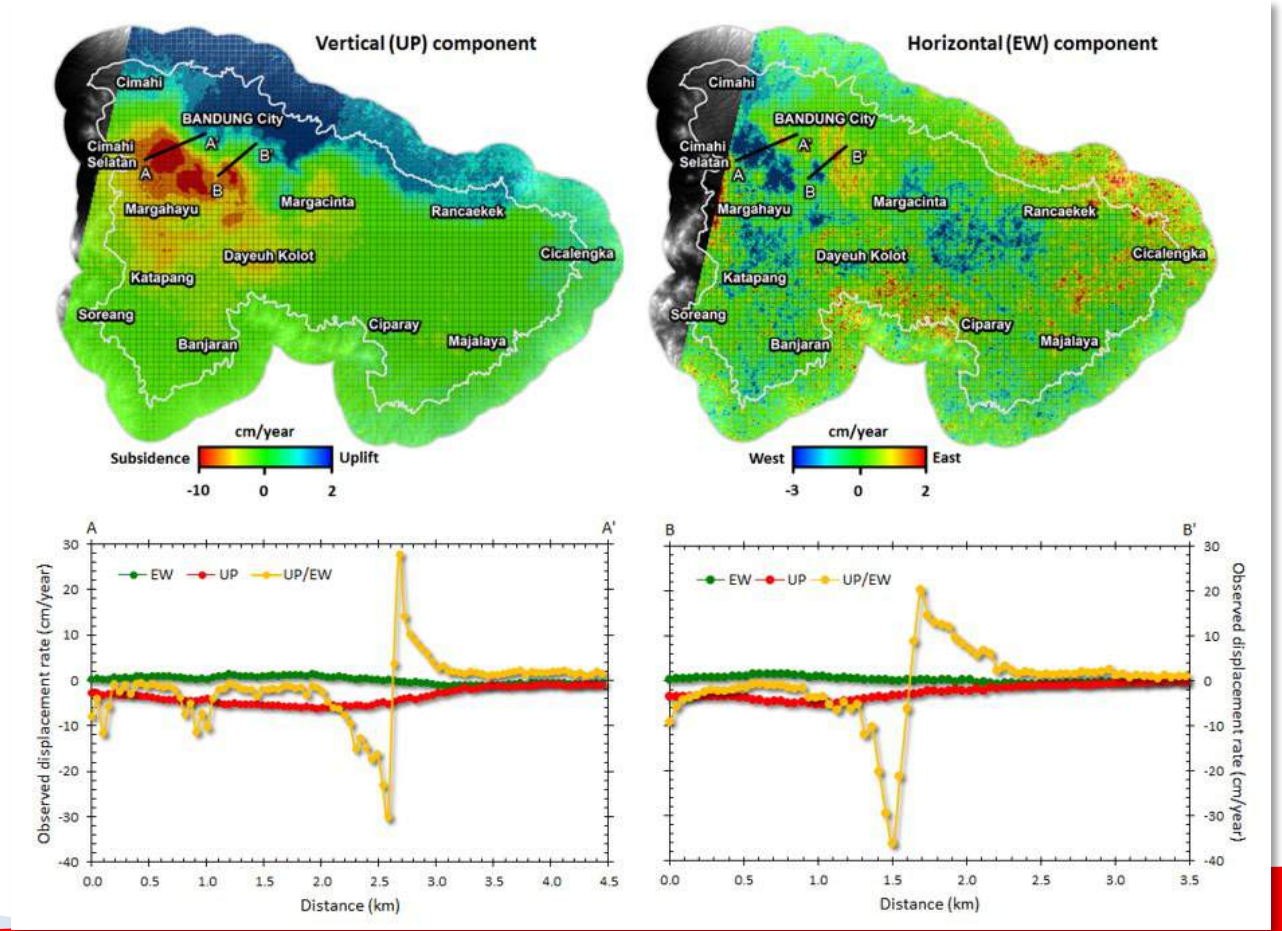
Elastic Groundwater-induced Deformation of Bandung City and Its Vicinity

Observed by Satellite Radar Interferometry (Euopean Envisat ASAR and Japanese Alos PALSAR) from 2000 to 2011 → showing the vertical and horizontal motion of ground surface



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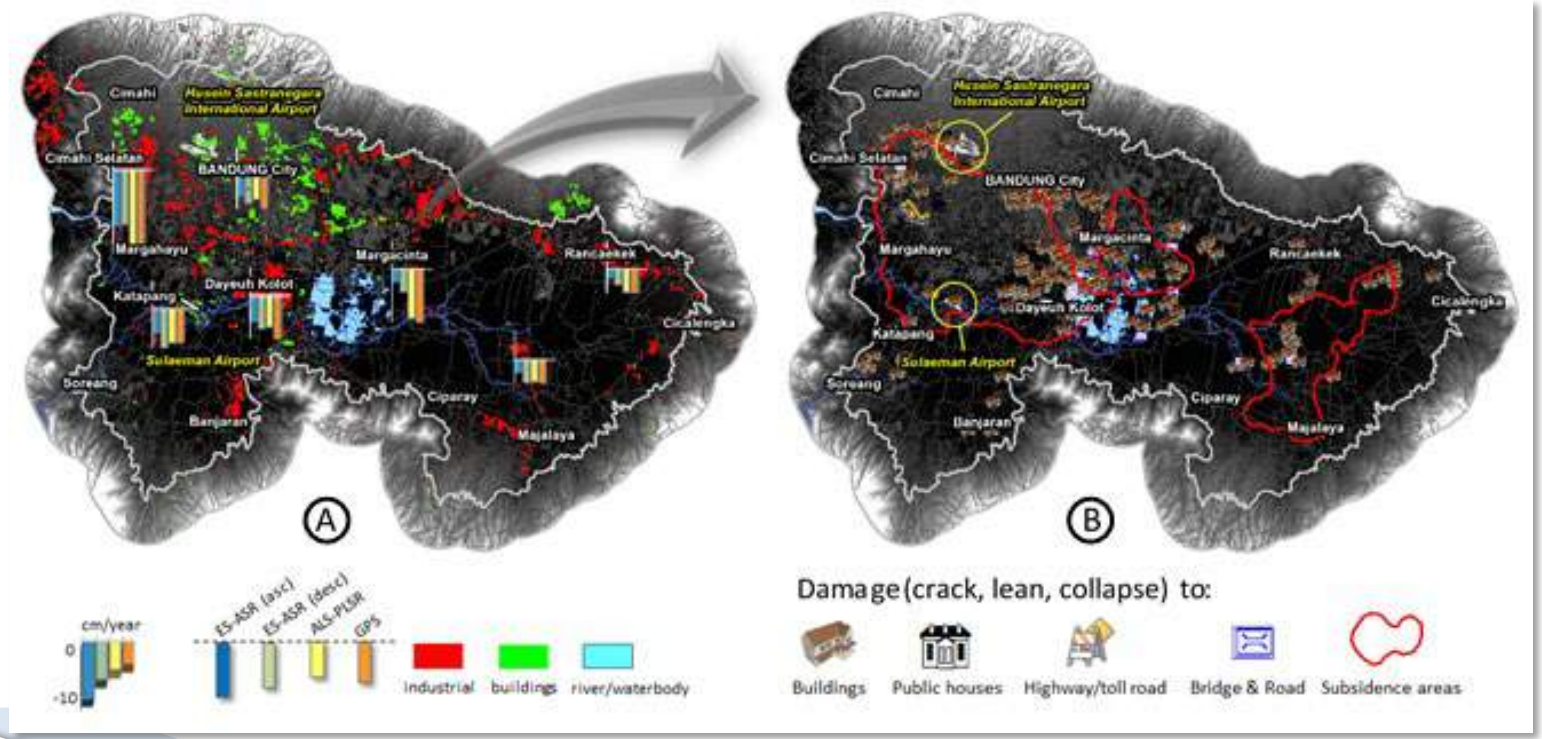
Effects of Subsidence to Environment and Civil Infrastructures in Bandung Basin



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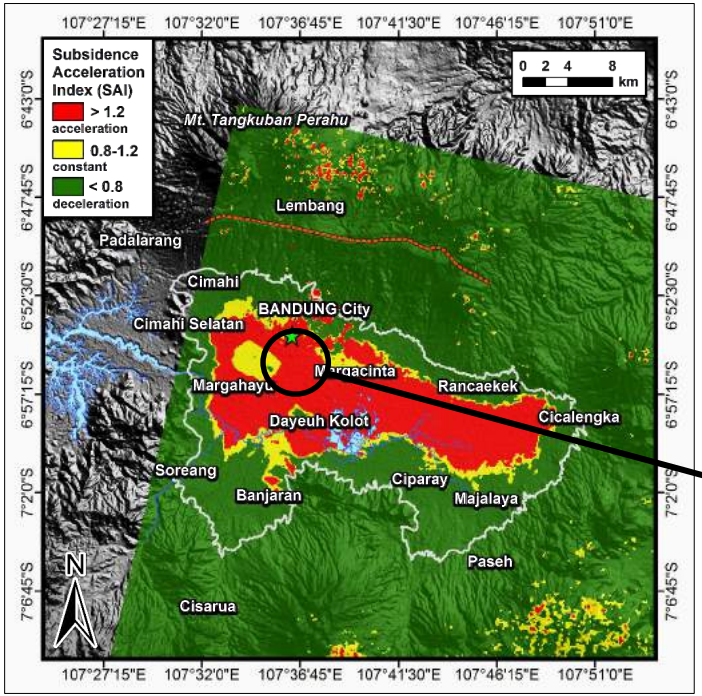
Effects of Subsidence to Environment and Civil Infrastructures in Bandung Basin



Land Subsidence Acceleration Index (SAI) map of the Bandung basin (left).
The green star is the geolocation of **sinkhole at Pajajaran Street of the Bandung city** occuring on 26 November 2010

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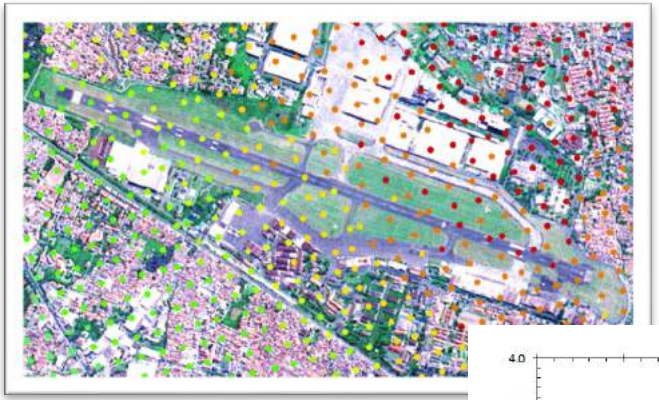
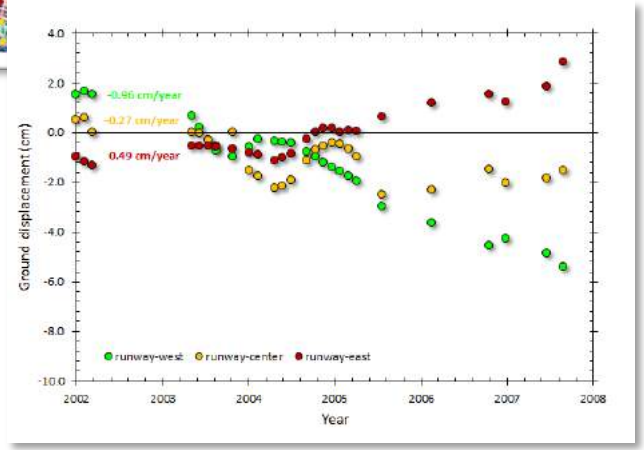
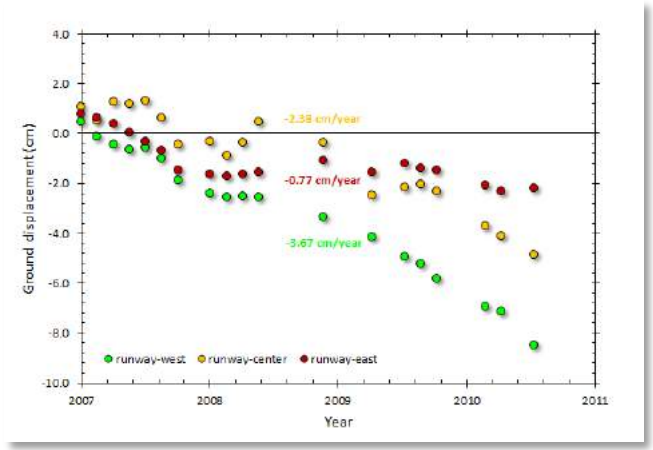
Husein Sastranegara International Airport



- It is observed by two Satellite Radar Interferometry (*Japanese Alos PALSAR and European Envisat ASAR*) that the runway of Husein Satranegara Airport has deformed at various velocity rates
- Does it indicate as differential settlement?





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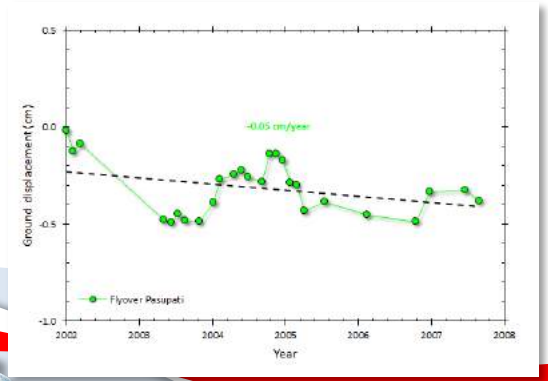
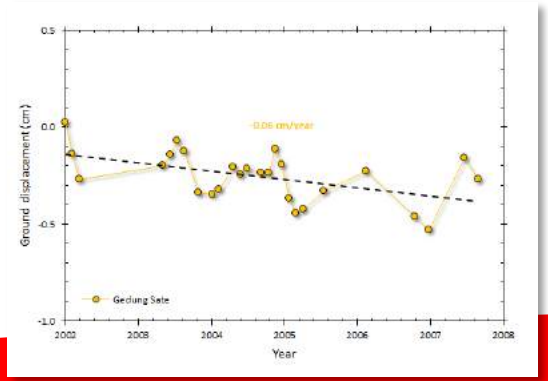
Pasoepati Flyover and Gedung Sate





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Three Components of **GEOINT "Geospatial Intelligence"**

Imagery – likeness or presentation of any natural or man-made feature or related object or activity and the associated positional data acquired at the same time

Imagery Intelligence (IMINT) – the technical, geographic, and intelligence information derived through the interpretation or analysis of imagery and collateral materials

Geospatial information **– the geographical location and characteristics of natural or constructed features and boundaries on Earth**

Thank You …

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