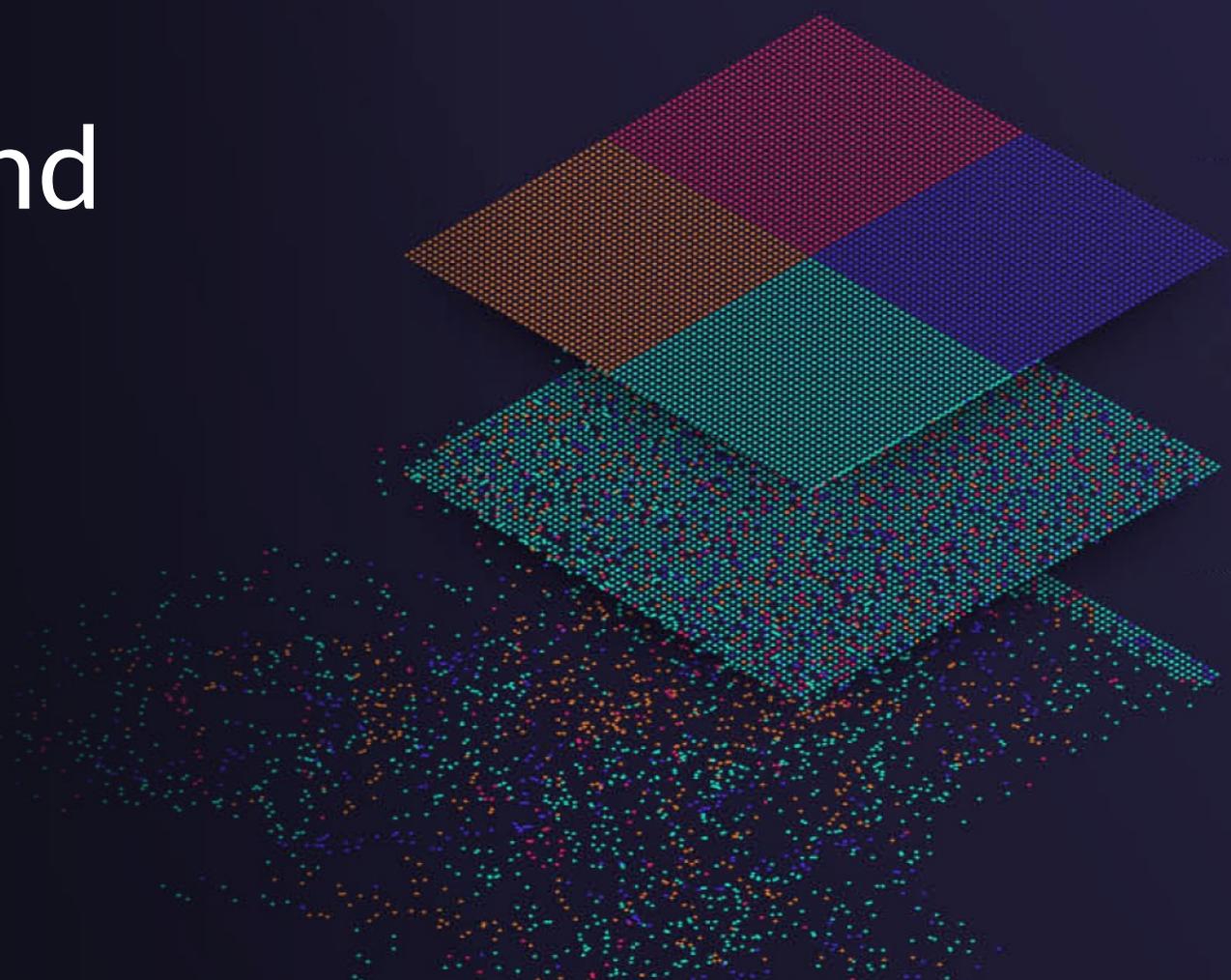


LESSON 6

Earth Observation and its applications for achieving National Priorities

Ananyaa Narain

Director – GW Consulting
Geospatial World



Jointly Organized by

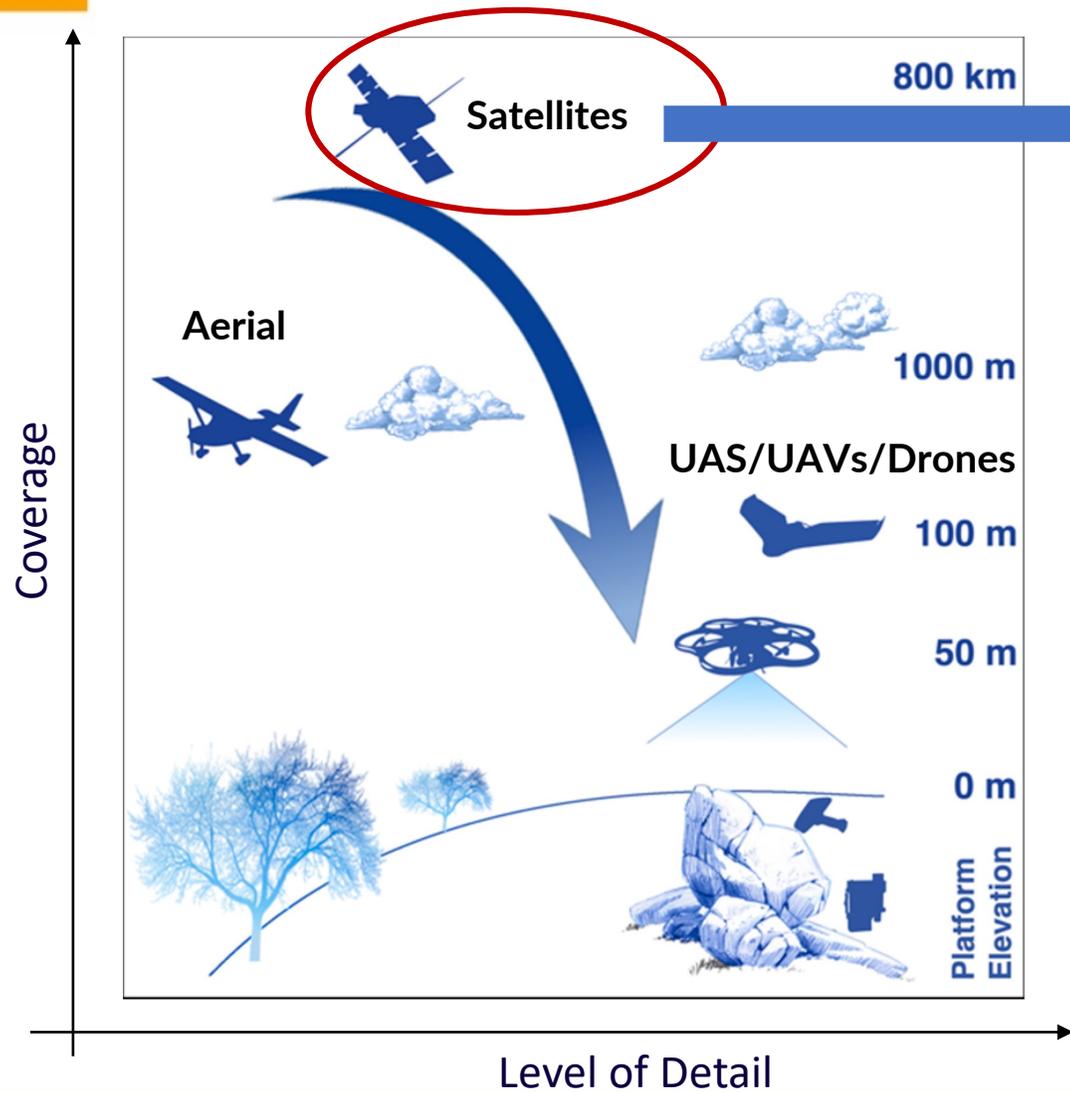


Discussion Points



1. What does earth observation mean to your organization?

Earth Observation Platforms



Low Res > 30m



Medium Res 5-30m



High Res 1-5m



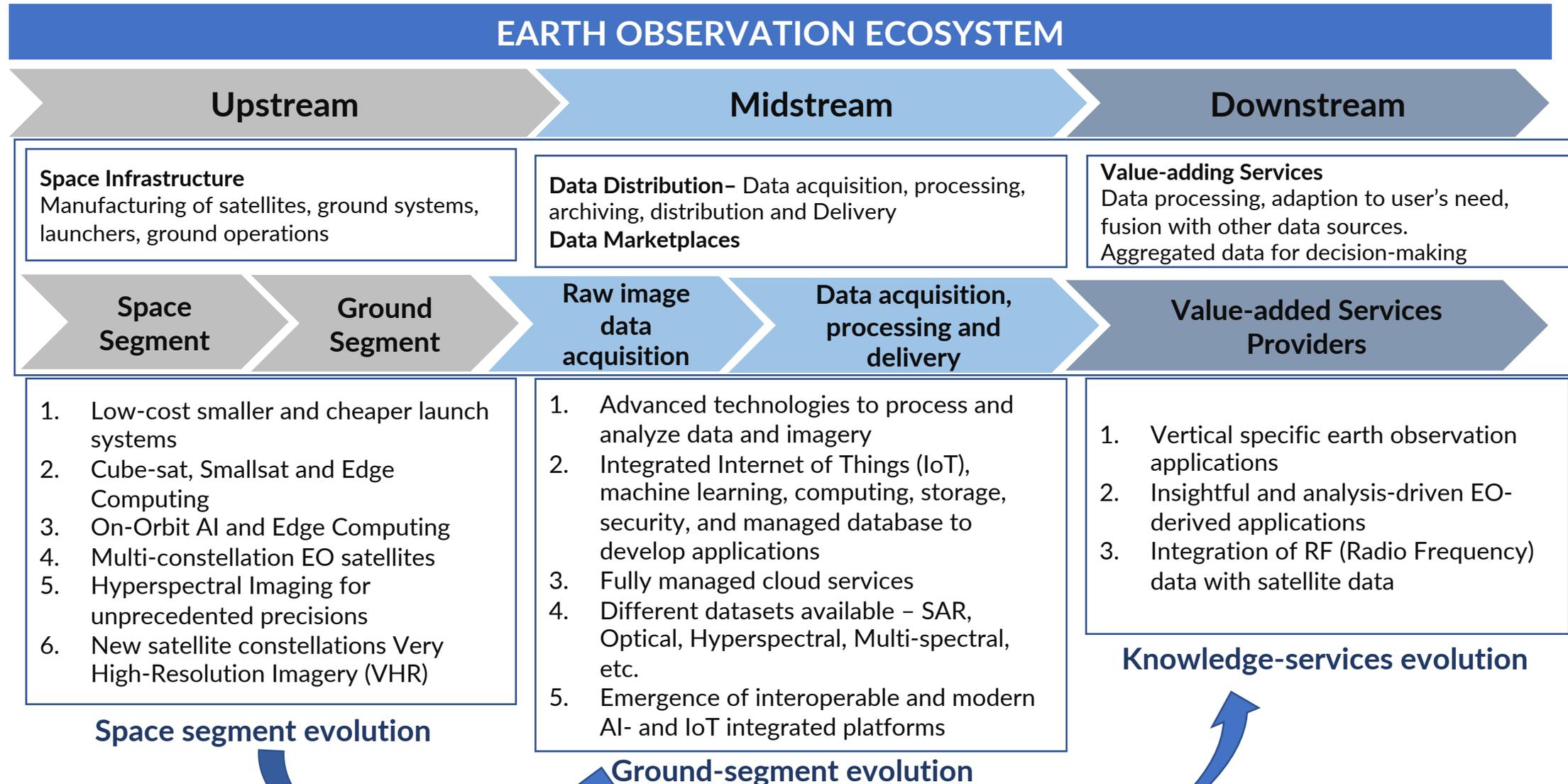
Very High Res <5m

Discussion Points



1. What does earth observation mean to your organization?
2. How is the earth observation value chain evolving?

Earth Observation Value Chain



How is the EO value chain evolving?

Hardware manufacturers are transitioning from capturing images to selling value-added services to be better differentiate and stimulate demand from early adopters

(Airbus, Planet, etc.)

Space segment evolution

Digital Giants have successfully entered the earth observation ecosystem – offering their massive computing capabilities and investment in satellite data and ground infrastructure

(Amazon, Google, Oracle)

Ground-segment evolution

Growing number of independent geospatial analytic providers are maximizing their access to data and market specific analytics capabilities (both vertical specific and market agnostic)

(Bluesky Analytics, GHGSat, SatelliteVu, HydroSat, CapeAnalytics, Ecopia AI, etc.)

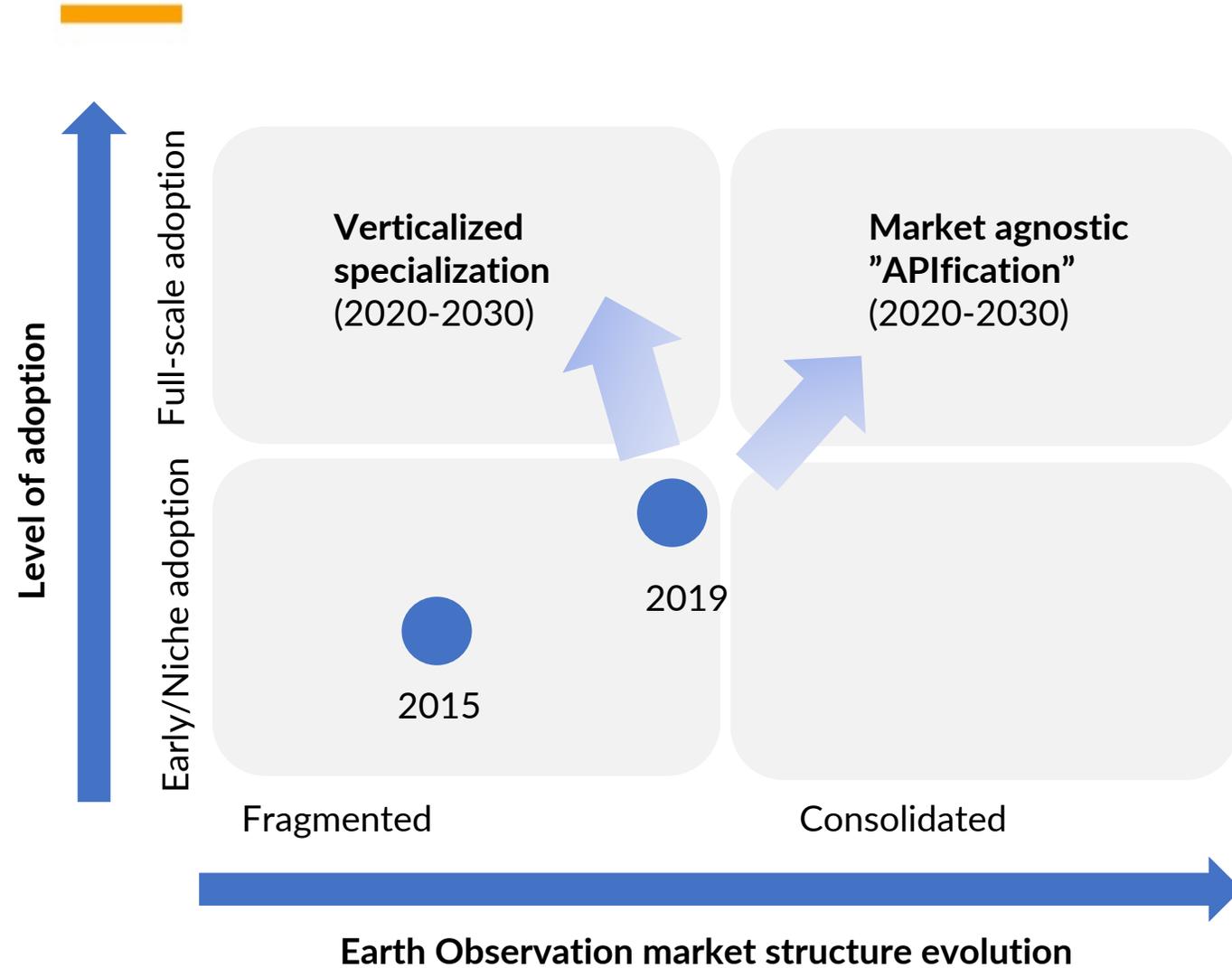
Knowledge-services evolution

Discussion Points



1. What does earth observation mean to your organization?
2. How is the earth observation value chain evolving?
3. How is the earth observation market scenario evolving?

Earth Observation market evolution scenarios



Verticalized specialization

Often key vertical (industry) markets, such as oil & gas, energy, construction, insurance, agriculture and environmental monitoring, requires deep understanding of market specifics, as well as working closely with clients to integrate analytics services into their complex operational models. In such markets earth observation based geospatial knowledge providers must leverage deep vertical expertise and customer intimacy for success.

Market Agnostic "APIfication"

A wide range of simpler analytics functionalities, such as change detection and identification of objects, allows provision of services across a wide range of markets. For these types of services, we foresee the emergence over the coming decade of generalist players addressing a wide range of markets with highly automated analytics. These players offer fully digitalized interfaces, which will allow their clients to seamlessly integrate these services into their own digital processes. In this model, the key success factor for geospatial knowledge providers will be scale: their ability to aggregate large volumes of demand and invest in best-in-class digital capabilities.

Discussion Points



1. What does earth observation mean to your organization?
2. How is the earth observation value chain evolving?
3. How is the earth observation market scenario evolving?
4. Why is the earth observation knowledge services industry taking off (in Geo4IR context)?

Why the EO-based knowledge services industry is taking off?

RAW DATA



Increasing Volume of satellites (more than 800 satellites)

- Investments in EO satellites from a growing number of government agencies
- Lower satellite manufacturing cost (nano-satellites)
- Decrease in the cost of launch (small and reusable rockets)

Increasing performance of variety of sensors

- Optical sensors (most widely used)
- Synthetic-Aperture Radar (SAR)
- Hyperspectral sensors (chemical composition of earth)
- GNSS reflectometry (monitoring of moving targets)
- Multispectral
- Thermal sensors

Advanced Computing Capabilities Enabled by Geo4IR

- Artificial Intelligence/ Machine Learning
- Cloud Computing
- GIS and Spatial Analytics
- Data Fusion

EO-based Geospatial Knowledge on Demand for National Priorities

(Agriculture, Forestry, Healthcare, Humanitarian Development, Construction, Water, etc.)

Discussion Points



1. What does earth observation mean to your organization?
2. How is the earth observation value chain evolving?
3. How is the earth observation market scenario evolving?
4. Why is the earth observation knowledge services industry taking off (in Geo4IR context)?
5. What is the relevance of earth observation in the national priority paradigm?

Relevance of Earth Observation in the National Priority Paradigm

ENABLERS

ICT Infrastructure
(inclusive of Geo4IR
Technology
ecosystem)

Public Policy Reforms
and Regulation

Communication and
Engagement

Education/Training

Partnerships and
Collaborations

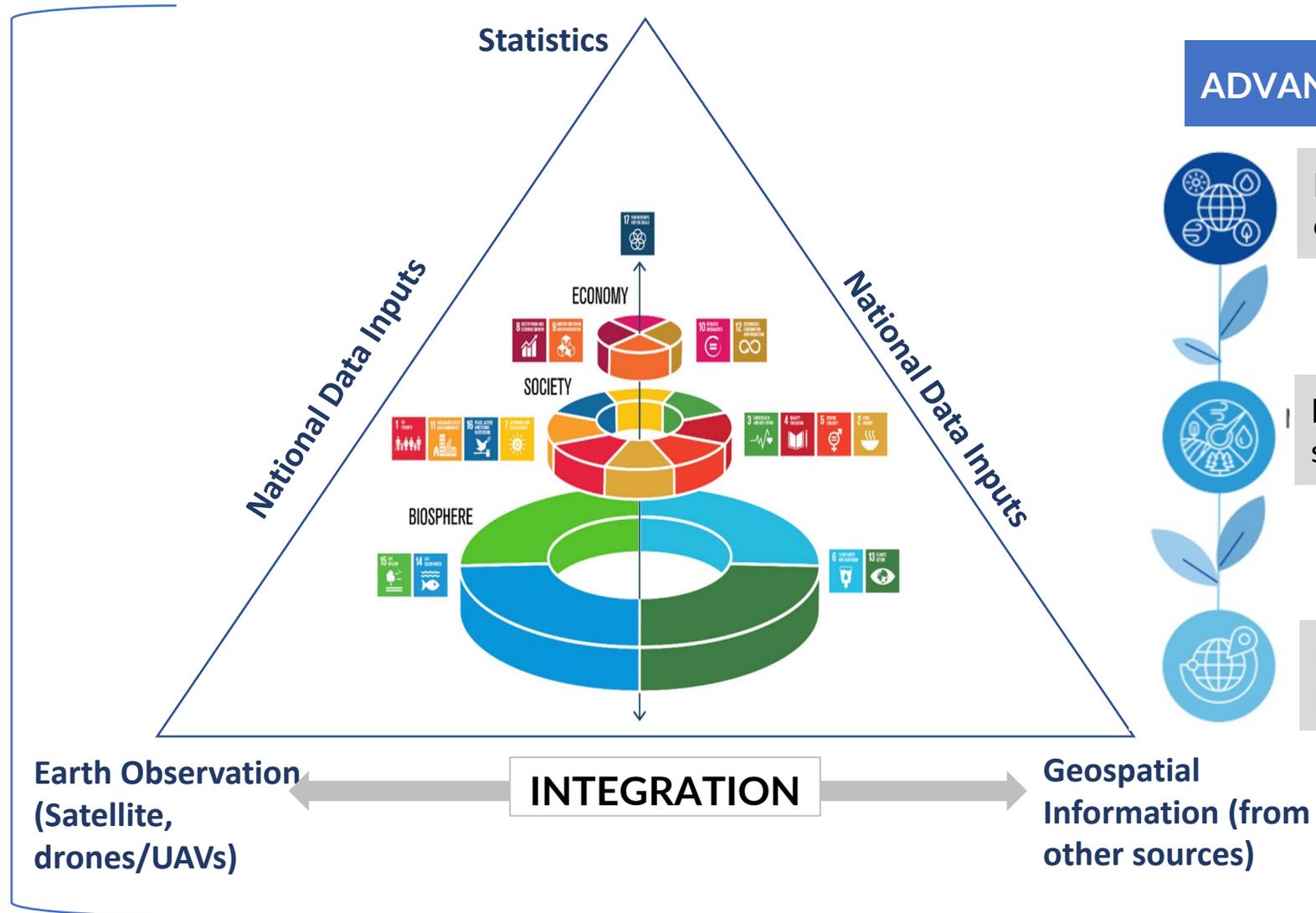
Financial

ADVANTAGES

Regular and repeatable
observations

Multi-annual time
series of observations

Cost-effective to
monitor remote areas



Discussion Points

1. What does earth observation mean to your organization?
2. How is the earth observation value chain evolving?
3. How is the earth observation market scenario evolving?
4. Why is the earth observation knowledge services industry taking off (in Geo4IR context)?
5. What is the relevance of earth observation in the national priority paradigm?
6. Which verticals will get the most out of earth observation over the next decade?

Application of integrated earth observation knowledge in thematic areas

Thematic Areas	EO-knowledge
Land Administration	<ul style="list-style-type: none">• Create accurate and effective cost-effective maps and 3D models for land reclamation, change detection, 3D models, and Digital Elevation models
Sustainable Cities	<ul style="list-style-type: none">• Integrated EO and GNSS dataset along with topography and cadastral dataset for urban mapping, infrastructure monitoring to help plan and manage the services and structures• Integrated EO-data with GNSS data with other fundamental datasets supports efficient traffic monitoring and management and helps to understand the city's growth dynamics and monitor the urban footprint.
Weather and Disaster Resilience	<ul style="list-style-type: none">• EO-based knowledge services help in developing early warning systems, resilient infrastructure, plan financial instruments, conduct impact and risk mitigation, weather event modelling and prediction, and real-time disaster mapping
Sustainability and Environment	<ul style="list-style-type: none">• EO-knowledge includes optimized energy system forecasting, smart meter enabled smart grids, data-driven smart grids, solar and energy plant assessment, solar flare prediction, and carbon emissions-monitoring,
Sustainable Land Use	<ul style="list-style-type: none">• Integrated EO-knowledge based products enables early crop yield prediction, precision agriculture, data-driven farming, hyper-local weather forecasting and reduced losses in the supply chain.

...and many more

Application of Integrated earth observation knowledge for Digital Twin Earth – Case Study European Space Agency

Digital Twin Forestry

Digital Twin Antarctica

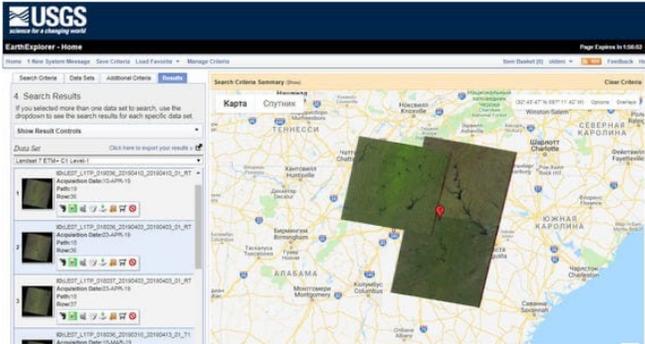
Digital Twin Hydrology

Digital Twin Ocean and Climate Hotspots

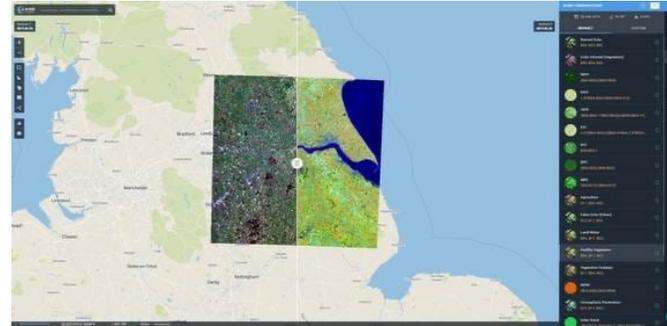
Digital Twin Ocean

Constantly fed with Earth observation data, combined with *in situ* measurements and artificial intelligence, **Digital Twin Earth** aims to help visualise and forecast natural and human activity on the planet. The model will be able to monitor the health of the planet, perform simulations of Earth's interconnected system with human behaviour, and help support European environmental policies.

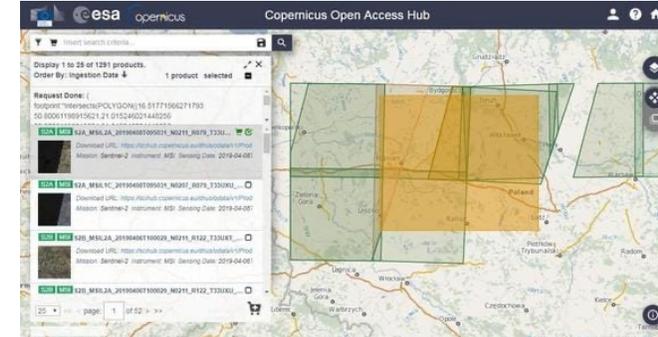
Publicly Available Satellite Imagery Sources



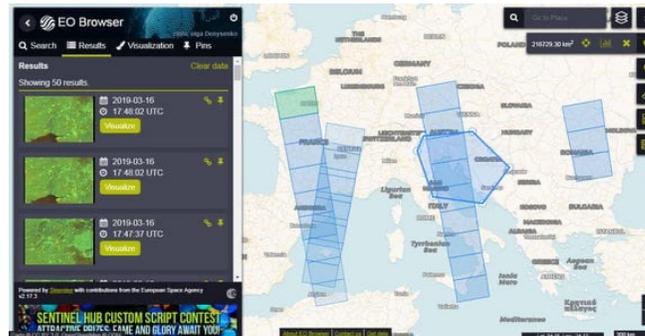
**USGS EarthExplorer
(LandSat/Sentinel/ISRO)**



Landviewer



Copernicus Open Access Hub



**Sentinel Hub
...and many more**



NASA Earth Data Search



Google Earth

Thank you!

Contact -

Ananyaa Narain

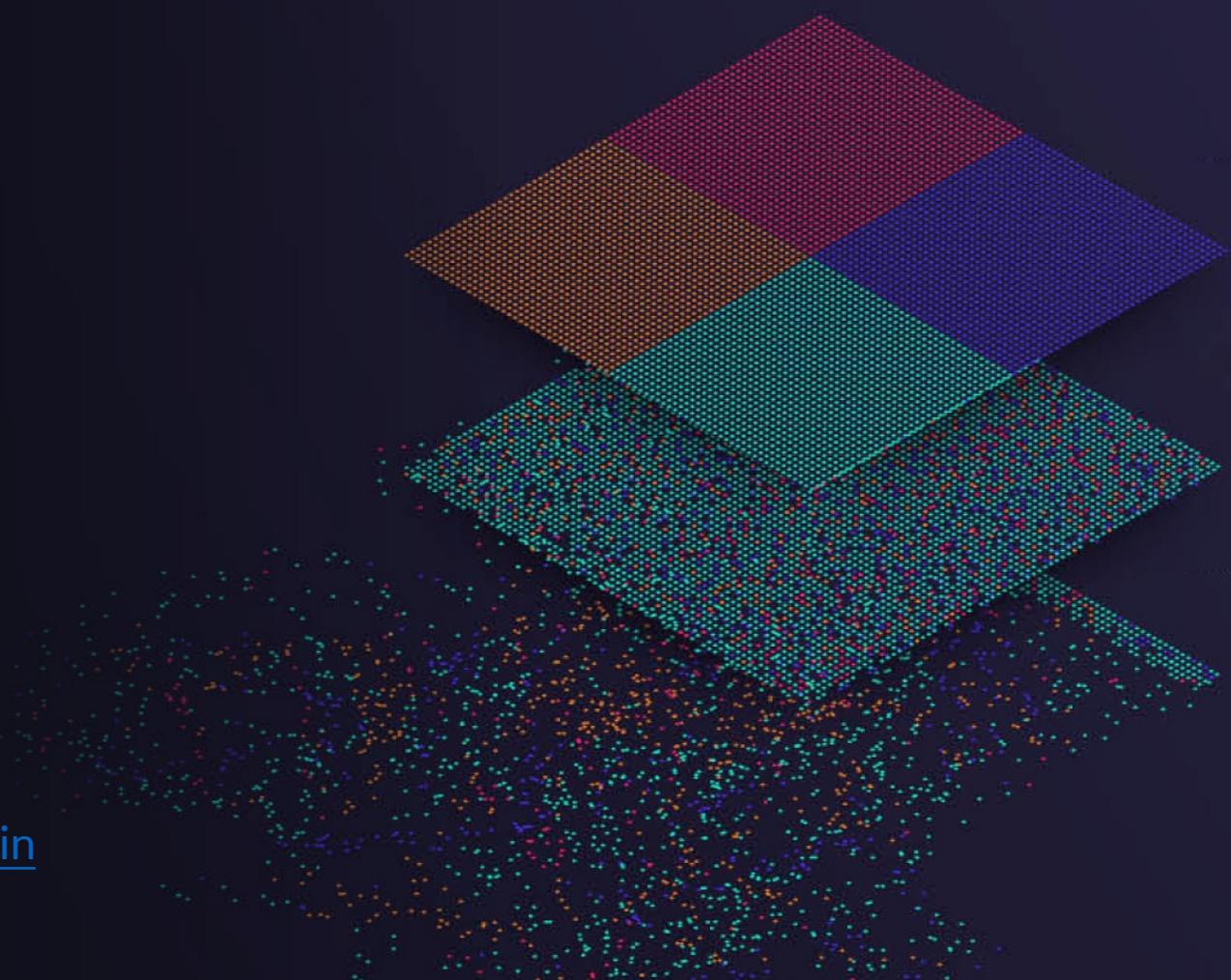
Director – GW Consulting

Geospatial World

Email id: ananya@geospatialworld.net

LinkedIn: <https://www.linkedin.com/in/ananyanarain>

Twitter: <https://twitter.com/narainananya>



Jointly Organized by

