About NSR


Clients Across the Value-Chain

Satellite Operators:
- INTELSAT
- Iridium
- Eutelsat
- OneWeb
- SES
- Inmarsat

Service Providers:
- Speedcast
- Panasonic
- RigNet
- Marlink

End-Users:
- Department of Defense
- NASA
- IDA

Finance Industry (PE, Bank, Funds, ECA, Debt)
Startups
EO and Data Analytics
Software/Hardware
ANY Aspect of Satellite/Space

Manufacturers/Ground/Launch
The NSR Webinar Series

NSR Webinar 1
Space Tourism & Travel: Are We There Yet?
Date: April 1, 2020
Date: 10AM EDT

NSR Webinar 2
In-orbit Servicing: Space Tugs & Gas Stations
Date: April 21, 2020
Date: 10AM EDT

NSR Webinar 3*
Satcom Pricing in 2020 and Beyond
Date: May 13, 2020
Date: 10AM EDT

*Details and Registration: https://www.nsr.com/category/webinar/
NSR Webinar Agenda

About NSR
Where Are We Now?
Small Satellites
Earth Observation
Big Data Analytics via Satellite
Bottom Line
Q&A
A large number of commercial constellations are bringing more EO data down than ever and, with growing data archives, these are increasing the requirements for strong capabilities to make sense of it all.

This is why the interaction of smallsats, Earth Observation imagery and Big Data analytics today is driving a sea of change in how commercial, government and military users capitalize on geospatial information.

“There’s a great need for an enormous amount of sensors and the commercial industry can help fill that gap.”
Maj. Gen. Michael Guetlein, Deputy Director, NRO
Space News, May 1 2020
Smallsat Markets
Smallsat Markets, 6th Edition Overview

What’s New:

- Update on leading Dedicated Small Launcher development
- Assessment of latest launch trends
- Update on emerging smallsat satellite servicing and in-space relocation technologies
- Small satellite constellations market competitive assessment

Key Features:

- A base forecast of the number of satellites to launch in each application, region, mass range and operator type between 2018-2028.
- Manufacturing and launch revenue forecasts for each application, region and mass range
- Manufacturing and LSP Market share
- Pricing and technology trends
- Assessment of constellations landscape

SSM 6th Ed. Market Segmentation:

Applications:
- Technology Development
- Science
- EO
- Comms
- SA
- Others

Regions:
- NAM
- LAM
- EU
- MEA
- Asia

Mass Ranges:
- 1-10 kg
- 10 - 50 kg
- 50 - 100 kg
- 100 - 500 kg

Operators:
- Commercial
- UPO
- Government
- Military

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2018 Market Performance

• Total market value of over $2 billion of which EO leads with $1 billion followed by Tech Dev with $600 million.
  - Technology Development : 45% of all smallsats
  - Earth Observation : 29% of small satellites

• Most smallsat are operated by commercial entities, with 50% of smallsats launched globally. Gov’t/mil. accounts for 20%

• Majority of manufacturing and launch cumulative market values continues to be the 100-500kg mass range
Despite a few DSLVs making it to orbit (Rocket Lab, iSpace, Expace) the availability of smallsat launch options is increasing as new actors come to market and accelerate their launch cadence.

SpaceX announced a new smallsat dedicated rideshare program in August 2019 with prices considerably below market rate, and dropped them even further in late 2019:
  - Feeling the competition, traditional LSPs are buying into the utility of developing smallsat launch capabilities. Arianespace announced a similar program in late 2019.

Cargo launch and deployment from the ISS is another option but is a limited schedule and orbit opportunity.

Significant delays are still present in the launch segment and are not expected to ease in the near future.
In-house manufacturing is perceived as having lower costs, greater control over quality, redesigns, and production timelines – it is the preferred strategy for a majority of smallsat constellations.

Overall, the In-House model is still preferred by 48% of all Constellations.
**Earth Observation Smallsat Segment Characteristics**

**Common Characteristics By Mass Range**

<table>
<thead>
<tr>
<th>Mass Class</th>
<th>Use Cases</th>
<th>Mission Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 10kg</td>
<td>Mostly Imaging and SA, some Technology Development</td>
<td>Almost exclusively Commercial; some UPO</td>
</tr>
<tr>
<td>10 – 50kg</td>
<td>Meteorology, Radio Occultation and Imaging</td>
<td>Almost exclusively Commercial</td>
</tr>
<tr>
<td>50 – 100kg</td>
<td>Hyperspectral and Imaging</td>
<td>Mostly Commercial, some Government</td>
</tr>
<tr>
<td>100 – 500kg</td>
<td>Most Video &amp; Imaging and Reconnaissance</td>
<td>Mostly Government and Commercial, some Military</td>
</tr>
</tbody>
</table>

**BOTTOM LINE:** Earth Observation is a blend of constellation and single satellites with interest from all operator, ranging from commercial cubesat constellations to higher mass government satellites. **Growth will be driven by constellation replenishment cycles and new government and military interest from all regions.**

*Source: NSR*
Earth Observation Smallsat Market Trends

Smallsat Earth Observation Market Forecast

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellites Launched</td>
<td>85</td>
<td>1,500</td>
</tr>
<tr>
<td>Manufacturing Market Value ($M)</td>
<td>$747</td>
<td>$8,750</td>
</tr>
<tr>
<td>Launch Market Value ($M)</td>
<td>$301</td>
<td>$3,000</td>
</tr>
</tbody>
</table>

Source: NSR
Earth Observation
Satellite-Based Earth Observation, 11th Edition

- **Satellite-Based Earth Observation, 11th Edition** forecast all market segments from 2018 to 2028. The report is structured into 4 segments, 7 verticals, covering all available instrument resolutions and satellite-based EO datatypes.

- **NEW to this Report:**
  - Top EO Deals of 2018-2019
  - Smallsat EO Revenues by Instrument Resolution
  - Optical, SAR, and Non-Imagery Supply Analysis

Source: NSR
Earth Observation - Market Size

- Satellite-Based EO market revenues reached $3.3B in 2018, with 52% from Data, VAS, and IP revenues from satellite operators
- Defense & Intelligence and Public Authorities remain the largest verticals accounting for almost 50% of market
- Emerging commercial data types, (i.e. radio occultation, greenhouse gas emissions monitoring, infrared, and microwave), show promising growth
- Data continues to transition to volume-based platforms, but pricing and service offerings are not yet standardized, leading to fragmented market adoption
Earth Observation – Demand Trends

- No single data type serves all, with needs differing by segment, vertical, and region
- GovMil segments drive VHR data sales, but have shown interest in all data and services
- **Value of persistence is growing**, with more monitoring services offered, and constellations aimed at this “gap” coming soon
- Subscription and cloud-based access growing in demand, but **market is slow to change**
# Earth Observation – Business Models

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Pricing</th>
<th>Market Examples</th>
<th>NSR Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Per Scene imaging</strong></td>
<td>Traditional method of imagery purchasing</td>
<td>See Chapter 4, $/square km or by scene</td>
<td>All satellite operators</td>
<td>Valid for VHR imagery, Priority tasking, and/or for applications requiring few images</td>
</tr>
<tr>
<td><strong>Area Monitoring/Data Subscription</strong></td>
<td>Several images/data points over target area, over time</td>
<td>$/sq.km value drops significantly</td>
<td>Maxar (EarthWatch), Airbus DS (OneAtlas)</td>
<td>From several images to TB of data, area monitoring is becoming increasingly popular</td>
</tr>
<tr>
<td><strong>Bulk Purchasing</strong></td>
<td>Arrangement for large volume of data from provider</td>
<td>$/sq.km value drops significantly</td>
<td>SIIS agreement with Ursa Space, Planet and Orbital Insight, Bird-I subscription</td>
<td>Pushed mostly by Big Data analytics firms, seeking large volumes of data</td>
</tr>
<tr>
<td><strong>Imagery Rental</strong></td>
<td>Access to imagery over cloud, ownership remains with provider</td>
<td>Typically, through a one-time access fee, ongoing subscription, or revenue sharing</td>
<td>Planet (API), Maxar (GBDx)</td>
<td>Preferred by some IP/Big Data players who can leverage assets and tools of data provider</td>
</tr>
<tr>
<td><strong>Services Subscription</strong></td>
<td>Information, Software, or Insights-as-a-Service</td>
<td>$/sq.km insignificant, value shifts to services provided</td>
<td>Planet (API), Maxar (GBDx), Ursa Space, SatSure</td>
<td>Developed from Imagery Rental and API access, insights-hungry customers further pushing commoditization of data</td>
</tr>
</tbody>
</table>

Source: NSR
Earth Observation - Market Outlook

• Data growing slightly faster than in previous years

• VAS continues to slow, as processes become internalized by data providers (seeking value) or IP/Big Data players (seeking efficiency and automation)

• IP remains largest segment, owing to established relationships, fusion of new data types, and “middle ground” of value/effort between Data and Big Data

• Big Data analytics to grow the fastest, but slowed in the near-to-mid term

Global EO Revenues by Segment

Source: NSR
Big Data Analytics via Satellite
Big Data Analytics via Satellite, 3rd Edition

What’s New in Big Data Analytics via Satellite, 3rd Edition

• Deep dive into additional vertical markets, with a total of 11 market segments across Transportation, Government & Military, Energy and Enterprise.
• Regional Forecasts
• Continued qualitative discussion on business trends & strategies, key market trends and value chain evolution

Key Features

• NSR carried out extensive interviews alongside tracking of major announcements amongst players in the value chain to build base year data and carefully formulate forecast data.
• The forecast period for all market segments covers ten years, from 2018 to 2028. The report is structured into 7 main markets, with the more important ones including key segment splits.
The Big Data value chain describes the information flow within a Big Data system as a series of steps needed to generate value and useful insights from data.

- The solution and delivery process in such an application is enabled by the machine learning and cloud service technology stack to derive value.
- Depending on the business viability, either of the three CSP delivery models (Infrastructure/Platform/Software-as-a-Service) is used to reach customers.
While much of the (M2M/IoT) satellite communications market is vertically integrated, EO data providers are increasingly reaching across the value chain into the Big Data analytics layer.

The Big Data paradigm in satellite continues to evolve as satellite players are beginning to adopt trends from the larger “Big Data ecosystem”.

Source: NSR
Smaller platforms are reducing the cost of services, leading to a rise in Big Data applications.

Increased adoption of hardware and software to store, access, analyze and distribute information.

Users are data-agnostic, focusing on value-add to their business and saving on operating costs.

Different verticals demand different solutions, and newer business models are expected.

Market consolidation is expected in the future.
EO Big Data Analytics - Market Evolution

- NSR expects the Big Data analytics via satellite market will be a **cumulative revenue opportunity of over $9 billion by 2028**

**Key Driving Factors: EO Apps**

- Proliferation of geospatial intelligence as an integral part of business intelligence
- Scalability opportunity of the business globally
- Fast growing ecosystem of closed and open architectures/systems for processing geospatial Big Data
- An inherent “cool” quotient among non-traditional satellite markets to adopt satellite image-based services

**EO Satellite Big Data Revenues**

Source: NSR
Bottom Line
Rising Tide, Sails Up

- Gov’t/Mil applications continue to dominate the market and shown interest in all data types (optical, SAR + new datasets)
- Persistence/continuous monitoring is deep trend which helps market grow across value chain
- Big data technology maturing helps make sense of all data types

Not all Winds in Right Direction

- Commercial Enterprise applications slow to adopt EO
- EO Big Data seeing growth, but there are challenges to scale.
- Business models changing, however no ‘one-size fits all’.
- Integration issues across different native and commercial platforms
Questions?

Thank you!