

) GEOSPATIAL INTELLIGENCE A REVOLUTION IS UNDERWAY

JUNE 2015

Bottom Line Up Front

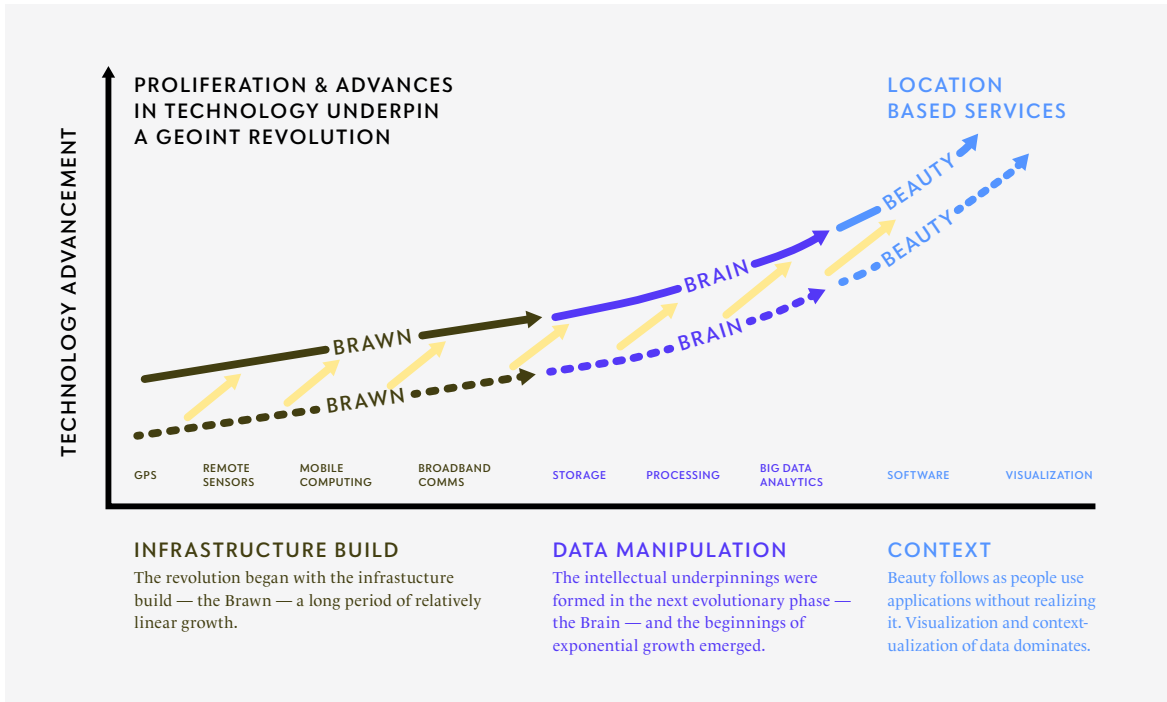
In the not-too-distant past, imaging from space was the sole provenance of governments, and governments were also the primary drivers of geospatial demand and innovation; however, with the proliferation of technology, the commercial world is now taking a more prominent role in both, shifting the focus from intelligence to information.

Today the commercial world is taking notice of the competitive advantage that geospatial **information** can create for businesses, and the lifestyle impact that it can have on everyday consumers. This recognition has caused the demand for geospatial information to grow exponentially from both government and commercial consumers. But, importantly, the change has also started to shift where innovations are born. “Non-traditional” companies, such as Google and Amazon, and new entrants are bringing a revolution through new talent, ideas, innovations, and applications to the geospatial marketplace.

Trends & Issues

-) **GEOSPATIAL CAPABILITIES PROLIFERATE, GOING MAINSTREAM** As technologies advance and accessibility improves, the impact of and demand for geospatial intelligence has increased significantly over the last decades. Geospatial information is going mainstream and that has caused a paradigm shift where innovation is born. In the future, look for the government to rely more heavily on “non-traditional” companies for leap ahead capabilities.
-) **TECHNOLOGY MATURITY EXPANDS MARKET, CREATING DEMAND** Precision GPS, advanced algorithms, mobile computing, big data analytics and cloud computing are just some of the recent technological developments that have allowed geospatial data to accelerate in value. As new applications for location-based services and location-based intelligence are developed, demand will grow in both the government and commercial markets.
-) **COMMERCIAL REMOTE SENSING** The proliferation of remote sensing means that classified satellites are no longer the sole source of image data, which opens accessibility to new markets. With advances in commercial remote sensing capabilities, geospatial information is now an important part of everyday life.
-) **POLICY AND PROGRAMS** Policy cannot keep up with rapid technology advances, with data privacy concerns as the most contentious piece of any future legislation.

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Discussion

) GEOSPATIAL CAPABILITIES PROLIFERATE, GOING MAINSTREAM

Geospatial intelligence, or GEOINT, is the exploitation and analysis of imagery, imagery intelligence, and geospatial information of all types. Driven by increased operational demands, and supported by significantly higher levels of funding, almost every technical aspect of GEOINT has evolved and improved since 9/11. The results of this technical evolution, combined with certain policy changes, have benefitted the geospatial and imaging marketplace. Improving technology has increased end-market demand, which has required more ground, air, and space based sensors. The demand for more sensors has then attracted companies to invest resources in this area.

This cycle has resulted in an unprecedented period of innovation in the geospatial intelligence marketplace, and subsequently a significant competitive advantage for the United States on the battlefield. Moving from providing granular classified satellite images decades ago to providing social media tagged geospatial data on ISIL cell locations today, the intelligence community, led by the National Geospatial-Intelligence Agency (NGA), has developed remarkable collection and analytical capabilities and at increasingly lower classification levels. Consumers of this data, including the Department of Defense (DOD) and the State Department (DOS), have come to rely extensively on geospatial-linked data to fulfill their missions. Infantry units depend on imagery and the associated analysis to

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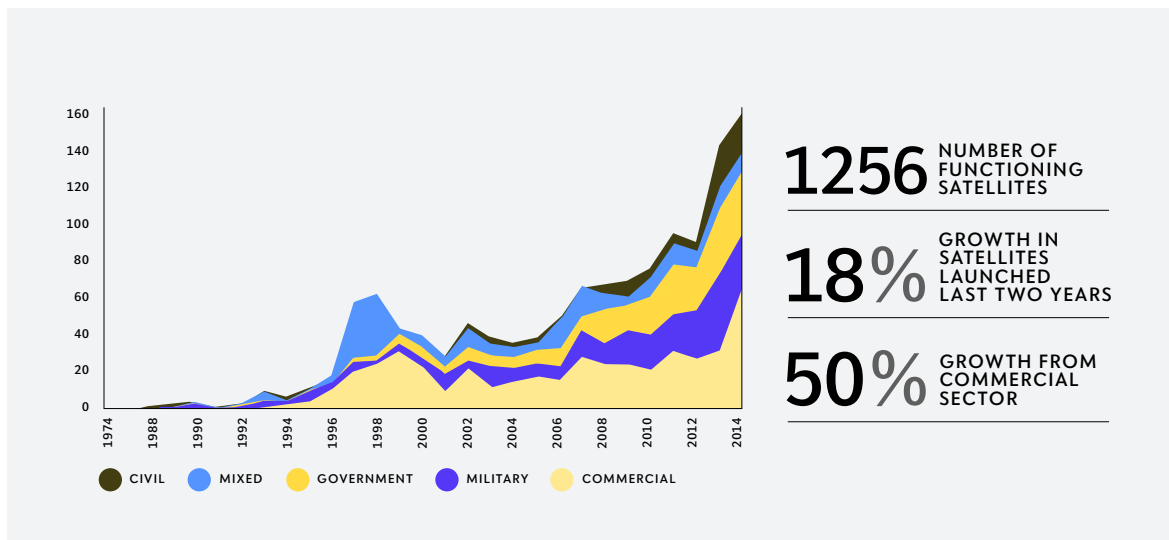
conduct ground operations, while DOS can leverage unclassified images to inform treaty negotiations and to help conduct humanitarian response missions across the globe. The federal government is recognizing that “where” matters, and geospatial intelligence provides the “where”.

The evolution in geospatial intelligence continues and it is picking up speed. This increasing speed of the marketplace is attracting new entrepreneurs as well as “non-traditional” companies to the space, such as Google, Amazon, and Facebook. These companies will help re-shape what the industry looks like, how it behaves, and how it evolves. Increased demand, exponential growth and an evolving threat environment demand fresh ideas, innovation and new competition. In short, the evolution in geospatial intelligence will continue, but the influence of “non-traditional” companies and new players will force it to look different and be faster in the future than it has in the past.

In fact NGA has already recognized this, both in a recent letter to the workforce emphasizing agile acquisition and in a recent Request for Information (RFI):

“NGA requires commercial GEOINT capabilities to execute its mission. . . NGA is willing to consider alternative creative or unconventional solutions to architectures to satisfy its commercial GEOINT capability requirements.”

Satellite Launches



Source: UCS Data

A recent example of customer demand and policy changes transforming the shape of geospatial intelligence has occurred in the satellite industry. Once an area solely for classified government agencies (for example the National Reconnaissance Office (NRO)), commercial satellite companies have proliferated in recent years driven by, among other things, a policy

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change in 1992 called the Land Remote Sensing Policy Act. Further policy changes in 2003—the US Commercial Remote Sensing Policy—has also had an influence by increasing demand and opening the aperture of companies wanting, and capable of, being part of the solution. With a variety of companies entering the field to launch satellites and other space assets, costs have come down (for both launch and spacecraft development) and capabilities have increased creating a positive symbiosis between the government customer and the commercial world. We expect this to continue.

) TECHNOLOGY MATURITY EXPANDS MARKET, CREATING DEMAND

The infrastructure buildup of the last two decades has made the current GEOINT revolution possible. Global Positioning System (GPS) is more precise and nearly ubiquitous. Remote sensing consumers have an array of choices including extremely high quality images, full motion video, or high revisit rates. Processing speeds, mobile computing, storage of data, and the analytical muscle to use all the data have created a positive environment for the use and application of location based services and GEOINT. And now, these applications are everywhere.

As more pixels are collected every day, both consumers (the government and commercial customers) and providers are now moving beyond the need to just look at pictures. This collection has increased the demand for context and analytics—essentially intelligence — which increasingly includes unclassified information. That is where we are headed, and at warp speed.

**INNOVATION NO LONGER
DRIVEN BY GOVERNMENT**

50%+ PERCENTAGE OF FUTURE
MICROSATELLITES DESIGNED
FOR REMOTE SENSING,
UP FROM CURRENT 12%

**200GB VIDEO
EACH DAY** AMOUNT URTHECAST SHOOTS
FROM THE INTERNATIONAL
SPACE STATION

ARGUS 6 PETABYTES —
IMAGING SYSTEM OR 6,000 TERABYTES —
OF VIDEO DATA PER DAY

**8% TO
56%** GROWTH IN SATELLITE
CONTRIBUTION FROM
COMMERCIAL SECTOR

**4 MILLION
KM²** AREA DIGITALGLOBE
CAPTURES EVERY DAY

) COMMERCIAL REMOTE SENSING

No longer the sole purview of classified satellites, remote sensing applications and geospatial data are integral to our daily lives. To get the data, more and more companies are launching satellites, and new satellite companies in the micro- (< 100 kg) and nano- (<10 kg) satellite

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market are pushing the government to reconsider how it collects data. With companies such as Skybox Imaging, Planet Labs, BlackSky Global, and Spire launching numerous satellites over the next five years, the skies will “darken with hundreds of smallsats,” as NGA Director Robert Cardillo recently stated. Much of this growth is in the area of earth observation, as companies are moving from taking pictures to providing context and “intelligence as a service.” This innovation shift has prompted NGA to begin planning for the use of these constellations and the data they collect. The commercial world will undoubtedly leverage these assets as well, creating a “fidelity of the earth” that was unimaginable prior to 9/11.

The growth in the number of satellites orbiting the Earth over the next few years will be driven by the increasing demand for remote sensing capabilities. These payloads account for over 70% of the total increase of commercial satellite growth from 2015 to 2016.

| COMMERCIAL SATELLITE GROWTH | 2015 | 2016 | 2017 |
|--|-----------|------------|------------|
| COMMERCIAL TELECOM | 10 | 30 | 40 |
| COMMERCIAL REMOTE SENSING | 42 | 92 | 97 |
| COMMERCIAL CARGO & CREW TRANSPORTATION | 7 | 8 | 10 |
| OTHER COMMERCIALLY LAUNCHED SATELLITES | 4 | 5 | 4 |
| TECHNOLOGY TEST AND DEMOS | 2 | 1 | 2 |
| TOTAL PAYLOADS | 65 | 136 | 151 |

Source: Federal Aviation Administration

Interestingly most of these companies have no interest in being described as “satellite operating companies,” which is how they have historically been defined. For them the asset or infrastructure (the satellite) is only the “means,” but it is the “ends” that they dream about—the data, information, and the knowledge they can provide as a service. How do they package it, provide context and leverage data to its highest value? The opportunities and applications are endless, from tracking ships across the globe, to search and rescue missions, commercial and government global supply chain real-time tracking, to analyzing crop yields or soil moisture levels. Look for data analysis, manipulation, application, and visualization to command vast amounts of talent, resources, and as a result, innovation over the next few years.

) POLICY AND PROGRAMS

Technology is advancing so rapidly policy and legislation cannot keep up. With privacy concerns being the issue of the day, the continuous locational data being collected from smartphones, cameras, satellites, and sensors has the public concerned about the capture and use of this data. Senator Ron Wyden (D-OR) and Rep. Jason Chaffetz (R-UT) introduced the

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Geolocation Privacy and Surveillance Act (GPS Act) to provide guidelines on how geolocation data can be used. Currently in committees in the House and Senate, the GPS Act faces a full legislative calendar this coming summer. Understanding the different positions the leadership has on these issues will be important as Congress contemplates these pieces of legislation.

Additionally, Congress and DOD are also supportive of using open source intelligence, with the National Defense Authorization Act (NDAA) requiring DOD to designate a senior official to oversee open-source intelligence. While behind most of industry’s willingness to adopt open-source applications, the move by the government indicates that open-source development, rather than proprietary development, is the wave of the future.

The geospatial industry is moving rapidly to iterate and advance with several federal programs trying to take advantage of the on-going stream of innovation. The previously mentioned NGA RFI is encouraging for industry. The GPS III program, the third iteration of satellites that provide geolocation information, is opening up to competition whereas its predecessors were dominated by Lockheed Martin. NASA is also embracing the move to smaller satellites with its Venture Class Launch Series. With a draft RFP released last month, NASA indicated its support of launching cubesats, a vehicle that typically rides along as payload for another satellite. Companies that are positioned for customizable solutions with rapid innovation and iteration will succeed, but there is a long way to go.

Glossary of Terms

| | |
|----------------|--|
| <u>GEOINT</u> | Geospatial Intelligence |
| <u>GPS</u> | Global Positioning System |
| <u>GPS Act</u> | Geolocation Privacy and Surveillance Act |
| <u>IC</u> | Intelligence Community |
| <u>NGA</u> | National Geospatial-Intelligence Agency |
| <u>RFI</u> | Request for Information |

Neptune Advisory

| |
|--|
| 202-827-0277 |
| www.neptuneasc.com |
| 415 8th Street SE Washington, DC 20003 |
| Scott Ellison scott@neptuneasc.com |
| Kevin Jiang kevin@neptuneasc.com |
| Patrick McCarthy, CFA patrick@neptuneasc.com |
| David Schopler schop@neptuneasc.com |

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