Analysis of Commercial Earth Observation Satellite Operators' Market

in N. America region

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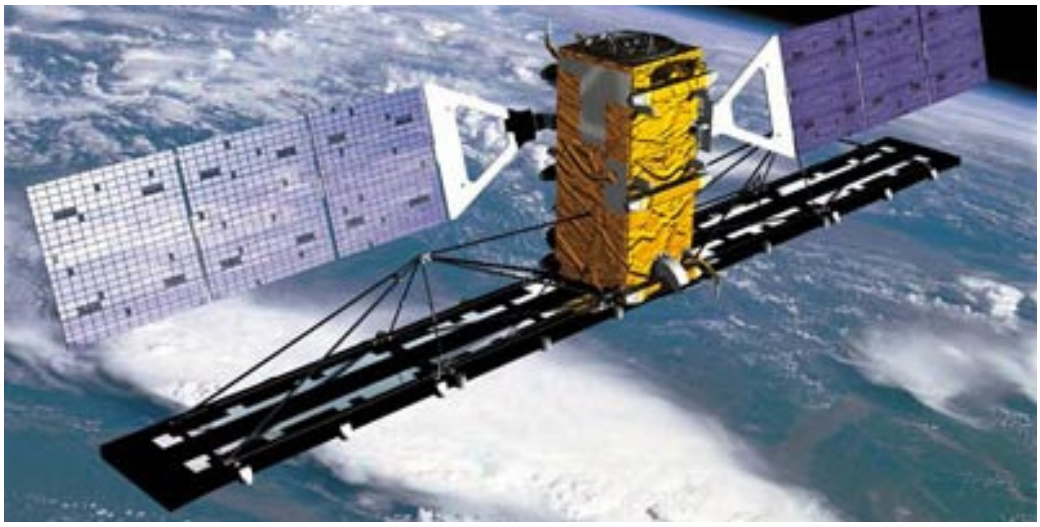

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I. INTRODUCTION

Satellite Earth Observation is a means of watching earth and indentifying objects and changes in it. Typical Earth Observations consist of Ground In-Situ monitoring by human observers and Overhead Observation by flying aircraft. Unlike these two methods, satellite Earth Observation has an advantage in the use of space with nearly a decade long in orbiting time and offers a wide scale of economy per unit of measured area. With innovation in the new improved sensor technology, in the very near future, the satellites would be able to identify objects as small as the size of a human head from the space, in which the current highest resolution 50 cm is very much closed but it is not clear enough to differentiate objects with this size (a human's head). (See the table 2)

Since the initiation of Earth Observation satellites nearly five decade ago, North America governments have been the main providers and users of satellite data. However, this has changed with several commercial companies, including Geoeye (U.S), DigitalGlobe (U.S) and MDA Corporation (Canada) proceeding with plans to acquire and launch their own imaging satellite systems since a few years ago. [1](O'Connell, K. et al., 2001)

This report is an overview analysis of the Commercial Earth Observation satellite Operators Market in North America Region. It represents current and future business and technology, including technical, political, economic and Environmental trends, key players, and main users.

[1] O'Connell, K., Baker, J., Lachman, B., Berner, S., Frelinger, D. and Gavin, K., 2001. U.S. Commercial Remote Sensing Satellite industry, Santa Monica, CA: RAND.

II. LITERATURE REVIEW

A. BACKGROUND

Ever since the space age ago, the remote sensing satellites were only used for national security purposes. However, in 1972 when the first release of the U.S. government owned civilian satellite (Landsat) data, the world has started to realize the potential value of earth observation data remotely sensed by satellite to serve both public good and private interest [2](Williamson, R. and Baker, J., 2004). With the integration of the geospatial information system (GIS) and the user friendly imagery software tools during the 1990s, the data have been able to use more effectively. These value adding services has continued to develop new applications and gain recognition in the commercial sector. Unfortunately, Landsat series are not included in the commercial satellite operators since they are owned and operated by the U.S Government (NASA).

With the U.S and Canada Government long term interest on supporting commercial industry involvement in the earth observation activities, the Radarsat International was the first commercial company established to operate radar satellites and provide commercial radar data in 1989 (See Figure 1). The U.S Government mandated the 1992 Land Remote Sensing Policy Act according to issue the commercial licenses to companies (Williamson, R. and Baker, J., 2004). The Lockheed Martin was the first company to apply the formal license from NOAA (See Figure 1). The first formal policy on licensing of commercial remote sensing/earth observation was made in order to allow to sell data internationally when the Clinton Administration issued Presidential Decision Directive 23 (PDD 23)[3] (The White House Office, 1994).

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[2] Williamson, R. and Baker, J., 2004. Current US remote sensing policies: opportunities and challenges, George Washington University: Washington and RAND Corporation: Arlington.

[3] The White House Office, 1994. Foreign Access to Remote Sensing Capabilities. Available at http://fas.org/irp/offdocs/pdd23-2.htm (Accessed on 31 July 2008)

In 1995, the first ever commercial and radar satellite, Radarsat-1 was launched. In 1997, the first successful commercial land and ocean observation satellite, OrbImage-2 was launched. IKONOS 2 was the first successful commercial Land Imaging satellite, launched in 1999, after the two successive launched failures of similar typed commercial satellites. With the recent increase in numbers, the world has now owned 11 commercial satellites and 6 of which are belonged to the North American commercial satellite operators (see the figure 1).

During 1990s, the start-up experiences of the commercial earth observation industry had been less than satisfactory, since they got a lot of hurdles in selling satellite imagery data competing with the traditional overhead earth observation by aircrafts. Despite the slow market development in the 1990s, the multimillion commercial satellite data business has been opened by the year 2001 when the development in commercial satellite technology and value added information has proved very effective for wide variety policy purposes, from disaster management to providing up to date maps of Afghanistan, during the brief war in Afghanistan. With the improvement in high resolution and multi-spectral satellite systems, the commercial Earth Observation business has entered a new era.

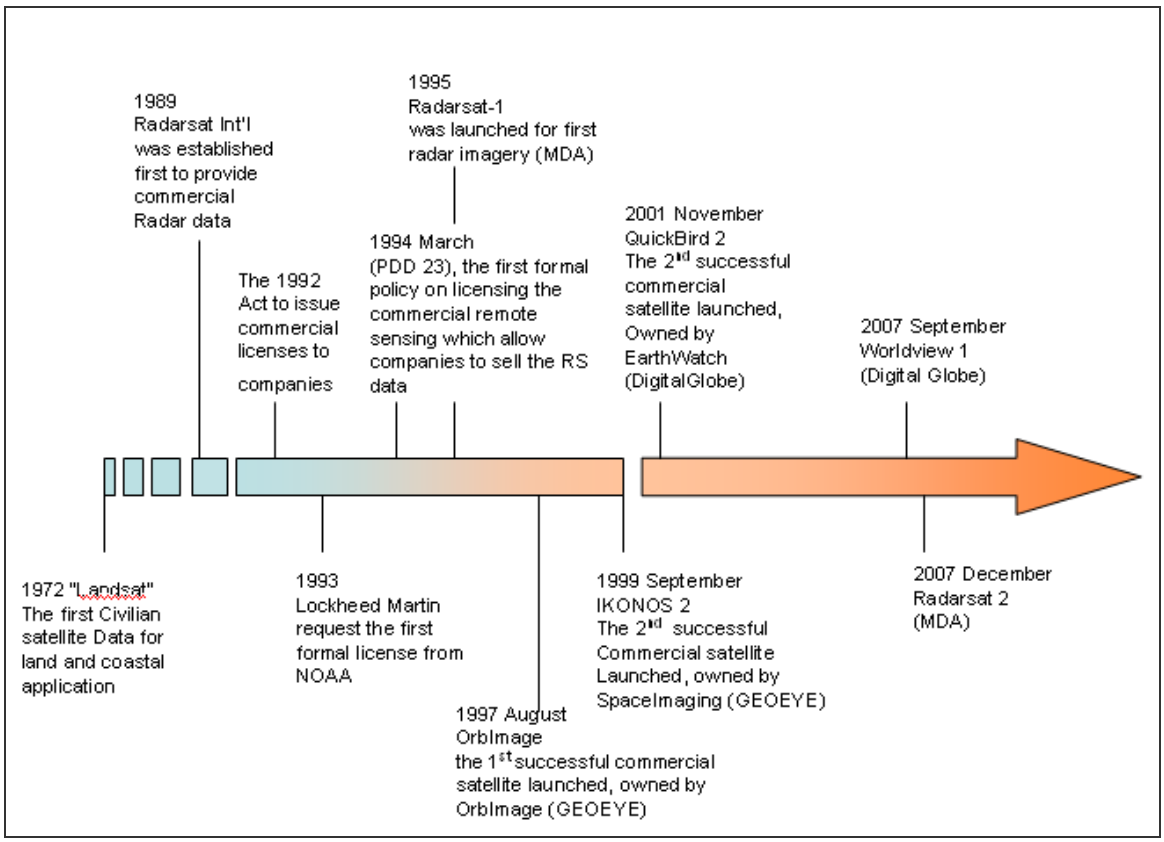

Figure 1 Emergence of commercial earth observation industry

B. Technology, Orbit & Applications

All satellite observes some portion of the electromagnetic spectrum, ranging from gamma rays to passive radio wave. Each region of the electromagnetic spectrum has its own unique applicability for observations. Gamma rays contain high frequencies, short wavelength, and intense energy while the other end of the electromagnetic spectrum, the radio wave has low frequencies, longest wavelength and low energy compared to others. Most of the Earth Observation satellites sense regions of spectrum, including ultraviolet, visible, IR and microwave.

Earth Observation sensors can be classified as either active or passive system, based on the method of sensing. Passive sensors detect reflected sunlight (Visible or Near-infrared) or emitted radiation (Thermal-infrared or Microwave). Active sensors illuminate/pulse the electromagnetic pulse or beam to its target and sense the reflected rays and it has the advantage of operating under any condition of solar illumination, but it consume large amount of power.[4] (Farrow, 2007)

Earth Observation satellites are repeatedly placed in sun-synchronous low earth orbit (inclination~98.2˚, Altitute~800km) because the short distance between onboard instruments and the earth features can enhance the performance of the sensors. The disadvantage of this orbit is the higher level of the atmosphere drag and its relative repeated orbital cycle is quite long (15 days) compared to the second most used orbit, the geostationary orbit (Altitude ~36000 km), which has the repeated cycle of ~30min.

Most of the Earth Observation satellites on geostationary orbit are primarily used for meteorological and weather application (e.g. GOES series). More applications can be found on the sun-synchronous orbit such as cartography, land surface, ice surface, agriculture and forestry, civil planning and mapping, and environmental monitoring. See the table below.

[4] Farrow, J., 2007. RS Payloads and Platform, ISU

Mission	Sensors	Orbit	Data Application
GOES	Passive: Imager, Sounder	Geostationary	Meteorology
RadarSat	Active: C band SAR	Sun-synchronous	Mapping, cartography and surveillance
Worldview 1	Passive: Panchromatic Imager, multispectral Camera	Sun-synchronous	0.5 m resolution for the sensitive area mapping

Table 1 missions by Sensors, Orbits and Applications

C. VALUE CHAIN NETWORKS

Satellite Data Value Chains consist of satellite operators, network station data distributors, and value added reseller and tool providers.

Satellite Operators control and trigger the satellite and constellations in the orbits in the timely manners and downlink the received data to it operation and ground centers (in local and international) and distribute the satellite sensor data (raw) and geographic information solutions (value added by the operators) to private and public sector worldwide. They are the main satellite data provider and also ones who control the license agreement of data sales.

Network stations data distributors are the main channel partners of the satellite operators and have a right to access the satellite data directly from their ground stations and to achieve data from the operators' data base. They also have the exclusive right to distribute/sell the satellite data to their local and international customers in the given territory.

Traditionally, **value Added resellers**, who the customers of the satellite operators, enhance the data and add the information to the satellite data to assist their end users with acquisition, depending on the capabilities of the data providers.

Tool providers are companies that provide the hardware and software tools that enable value added users or customers to manipulate and process the data and information. A significant number of these companies now target the rapidly expanding market for GIS applications as well as their integration with both navigation and communication technologies. See the Figure 2.

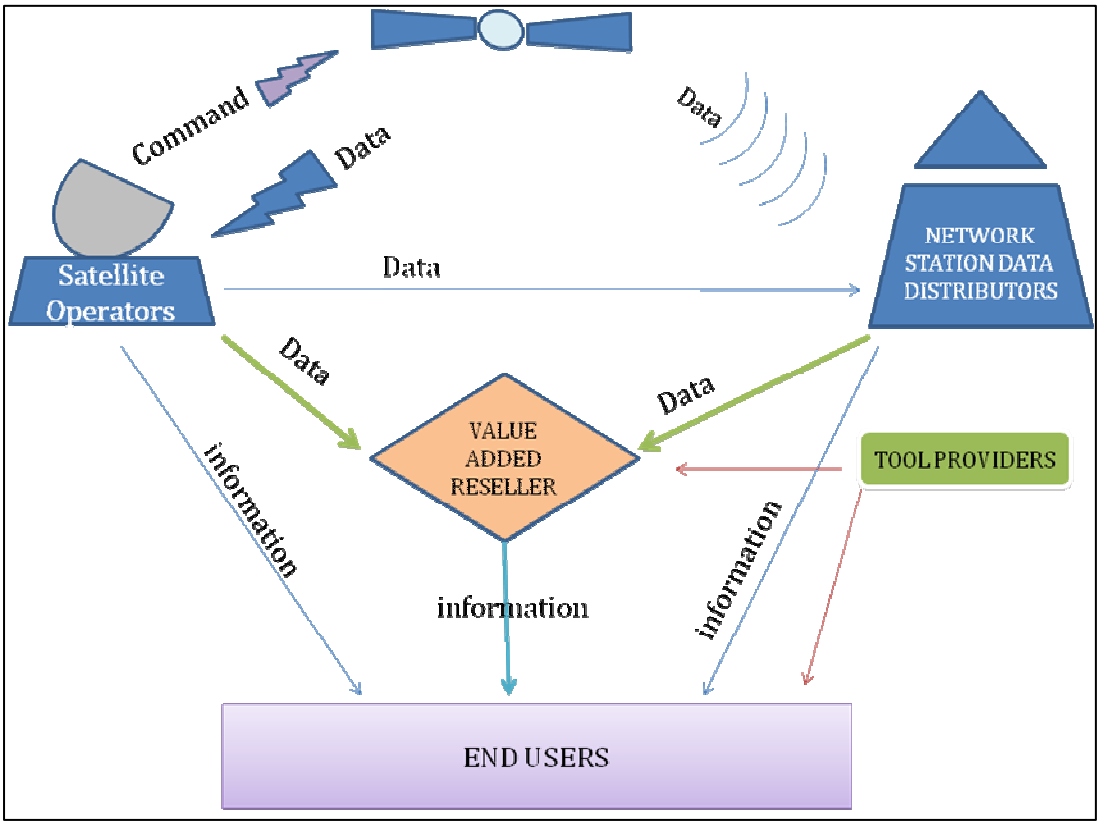

Figure 2 Value Chain Networks

D. Satellite Licensing Policy

Commercial Earth Observation satellite technology has made significant advances in the recent years. High capabilities remote sensing satellites have raised national security, defense and foreign policy concerns[5] (Baines, 2007).

Regulatory licensing policies exist primarily in countries where commercial earth observation companies actively operate. In U.S., commercial operators that distribute satellite data (mostly imagery) must obtain government licenses for the operation of the satellite and the distribution of data; Canadian remote sensing laws are associated with those of the U.S[6] (Bates, 2006).

The policy framework of the U.S. commercial satellites is rooted in the legislative authority of the 1992 Act (see Figure 1 to recall the timelines). According to the 1992 Act, the commercial companies have the rights to apply the license to operate the satellites. The National Oceanic and Atmospheric Administration (NOAA) within the department of Commerce develop the regulations and grant the licenses. With the issues of the Presidential Decision Directive 23 (PPD 23) in 1994, the commercial satellite companies have been allowed to sell these data abroad under the guidelines of the supervision from the U.S. Laws (Williamson, R. and Baker, J., 2004). However, before the licenses are issued, the process also requires reviewed by the White House, Pentagon, the State Department and the intelligence community. A granted license is also valid for a certain period and is non-transferable without the explicit permission from the Secretary of the Commerce. As parts of the license agreements, the U.S. government has right to access the commercial satellite data and the U.S. companies have to notify its Government before issuing licenses to the new foreign customers.

In Canada, the ministry of the foreign Affairs grants the license to its commercial operators but they must commit to dispose of the system, including satellites according the Canadian Remote Sensing Space Systems Act, 1995 (Baines, 2007). The Canadian Government has agreements with the U.S. Government to facilitate access to sensitive U.S. controlled goods and technology by Canadian companies (Baines, 2007).

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[5] Baines, J. P., 2007. The *Remote Sensing Space Systems Act, 1995.*

[6] Bates, J., 2006. Canadian Bill would align remote sensing law with U.S., Available at http://www.space.com/spacenews/businessmonday_050207.html (accessed on July 26, 2008)

III. ANALYSIS

A. Supply Analysis

As mentioned earlier, in North America, NOAA grants the commercial licenses to the U.S. commercial companies and the Canadian Ministry of the Foreign Affairs grants its commercial license to its operators. Currently, there are only eleven commercial companies in that region which have licenses to operate private, commercial, space-based, remote sensing systems [7] (NOAA, 2007). Ten out of them are U.S. commercial operators including DigitalGlobe, Geoeye, AstroVision, Ball Aerospace, Northrop Grumman, Transorbital, Earth Search Science, Technica and EchoStar, which have licenses to operate private, commercial, space-based, remote sensing systems (NOAA, 2007). In contrast, there is only one Canadian Satellite operator, MDA Corporation (rebranded from the former Radarsat International), which has a public-private partnership between Canadian governments.

With the significant support of the new U.S. Commercial Remote Sensing policy on the commercial Earth Observation market, U.S. companies are enabled to develop via the **ClearView** and then **Nextview** contracts that are awarded by the Department of Defense national Geospatial-Intelligence Agency (NGA-the former NIMA) [8](Adam, 2008). This includes up to USD 500 million contracts awarded to each NextView winner (with the minimum guarantee purchases of nearly $100 million each) (Williamson, R. and Baker, J., 2004). DigitalGlobe and Geoeye are the main two commercial satellite operators which have ultimately succeeded in building the relationship with national governments and emerged the global Earth Observation Markets.

DigitalGlobe (the former EarthWatch, Inc.,) based in Longmont, Colorado, USA, is a privately commercial supplier of space imagery and geospatial information, and operator of commercial earth observation. The company offers the world's highest resolution commercial satellite and aerial imagery. Its customers range from the U.S. federal agencies,

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[7] NOAA, 2007 (last updated). Licensing of Commercial Remote sensing satellite systems. Available at http://www.licensing.noaa.gov/licensees.html (accessed on July 26, 2008)

[8] Keith, A., 2008. SatMagazine: an interview article on "Transformation of the EO Sector". Available at http://www.satmagazine.com/cgi-bin/display_article.cgi?number=58249124 (accessed on July 27, 2008)

including NASA, the U.S. Department of Defense's National geospatial Intelligence Agency, to the urban planners, as well as the virtual globes such as Google Earth and Microsoft. It has nearly 80 exclusive data resellers/distributors around the world [9] (DigitalGlobe, 2008).

Table 2 Information on DigitalGlobe

Satellites	Status	Launch Year	Revisit	Highest Resolution (m)		
				PAN	Multi	Band
QuickBird-2	In Orbit	2001	1-3 days	0.615	2.46	4
WorldView-1	In Orbit	2007	1.7 days	0.50	-	-
WorldView-2	Planned	2009	1day	0.46	1.8	8

Geoeye (the former SpaceImaging) headquartered in Dulles, Virginia is a commercial satellite imagery company and operators, reformed in 2006. The company has solid ground relationship with the National Geospatial Intelligence agency (NGA) and provides 1 meter satellite imaging to the public and private. More than 50% of its revenues are from contracts with the National Geospatial Intelligence agency (NGA). Primarily, imaging products are sold to Defense and Intelligence and governmental agencies abroad. It also provide its imagery data to the search engines such as Google Earth and Yahoo which have created sonic boom of public awareness in the earth observation market which is not going-back to the era of Cartoon mapping [10](Brender, M., 2008). It has 110 global reseller and distributors around the world [11] (Geoeye, 2008).

Table 3 Information on Geoeye

Satellites	Status	Launch Year	Revisit	Highest Resolution (m)		
				PAN	Multi	Band
IKONOS-2	In Orbit	1999	3-4 days	0.82	3.28	4
OrbView 2	In Orbit	2003	3	1	4	4
GeoEye-1	Planned	2008	1-3 days	0.41	1.64	4

MDA Corporation (the former Radarsat International) holds the exclusive distribution rights to Canada's RADARSAT-1 and RADARSAT-2 synthetic aperture radar (SAR) satellites. MDA is responsible for RADARSAT-2 operations. Most of the funding for the satellite, which

[9] DigitalGlobe, 2008 (last updated). Company Overview. Available at http://www.digitalglobe.com/index.php (Accessed on July 27, 2008)

[10] Brender, M., 2008. Commercial Earth Observation: the evolution of demands. [Phone] (Personal Communication, July 3, 2008)

[11] Geoeye, 2008 (last updated). Company Network. Available at http://www.geoeye.com/CorpSite/ (Accessed on July 27, 2008)

is being built by MDA, based on British Columbia, is being provided by the Canadian Space Agency (CSA), but Radarsat-2 was the first imagery satellite to be owned by a Canadian company and not the government[12] (MDA, 2008). RADARSAT products are valuable information for major application areas in coastal and marine surveillance, and security and foreign policy. NOAA is one of the leaders in exploiting radar imagery of hurricane disasters. MDA provides SAR data to commercial customers, industrial partners and governments (civil, defense, security, space, and R&D agencies). It has 36 global distributor points; most of them are located in Europe.

Table 4 Information on MDA

System	Launch Year	Status	Revisit	Band	Best Resolution (m)	Polarization Options
Radarsat-1	1995	In Orbit	24 days	C	8	Single (HH)
Radarsat-2	2007	In Orbit	24 days	C	3	Single, Dual, Quad
Radarsat Constellation (6 satellites)	2012-14	Proposed	4 days	C	3	Single, Dual

[12] MDA, 2008 (last updated). MDA: Overview. Available at http://gs.mdacorporation.com/ (Accessed on July 28, 2008)

Table 5 Review of Major satellite Operators in North America Regions

Operator	Satellite	Product and Services	Employee	2007 Revenue	Market Served	Market Strategy	Comments
Digital Globe	2 (in Orbit), 1 (planned)	Standard images, panchromatic images, multispectral images, and color infrared images, as well as mosaics and digital elevation models.	410	151 M	International	Global Commercial Wholesale with "80" resellers including wholesales U.S DOD market with increasing end-user services	The company's customers come from fields such as agriculture, civil government, oil and gas exploration, and military intelligence. Morgan Stanley owns 38% of DigitalGlobe; satellite instrument maker Ball Aerospace & Technologies and Japan's Hitachi industrial conglomerate also own stakes in the company[13] (Yahoo, 2008).
Geoeye	2 (in Orbit), 1 (planned)	standard images, value-added, imagery-based geospatial-intelligence products including the company's airport mapping product line	440	183.80 M	International	Global Commercial Wholesale with "" resellers including wholesales U.S DOD market with increasing end-user services	The company's imagery and information is used for a variety of applications, including mapping, environmental monitoring, urban planning, resource management, homeland defense, national security, and emergency preparedness. GeoEye also offers advanced image processing and production software and services[14] (Yahoo, 2008).
MDA	2 (In Orbit), 6 (Proposed)	SAR data, information products and services from commercially available radar and optical satellites.	3000 (Overall; Global)	~ 73 M (Geospatial Division)	International	Radarsat Operators and Big retailers of optical satellites with increasing end-user services	Global uses of resource mapping, environmental monitoring, offshore oil and gas exploration, ice reconnaissance, maritime surveillance and disaster management[15] (MDA, 2008).

[13] Yahoo, 2008. DigitalGlobe, Inc. Company Profile. Available at: http://biz.yahoo.com/ic/53/53072.html (accessed on 31 July, 2008)

[14] Yahoo, 2008. GeoEye, Inc. Company Profile. Available at: http://biz.yahoo.com/ic/139/139140.html (accessed on 31 July, 2008)

[15] MDA, 2008. Radarsat 2. Available at: http://gs.mdacorporation.com/news/press/2007/nr_r2_launch_dec142007.asp (accessed on 31 July, 2008)

B. Demand Analysis

The demand for Earth Observation data is dedicated by specific user application for raw and processed imagery. Figure 3 shows the global sale of Earth Observation data by the main user applications.

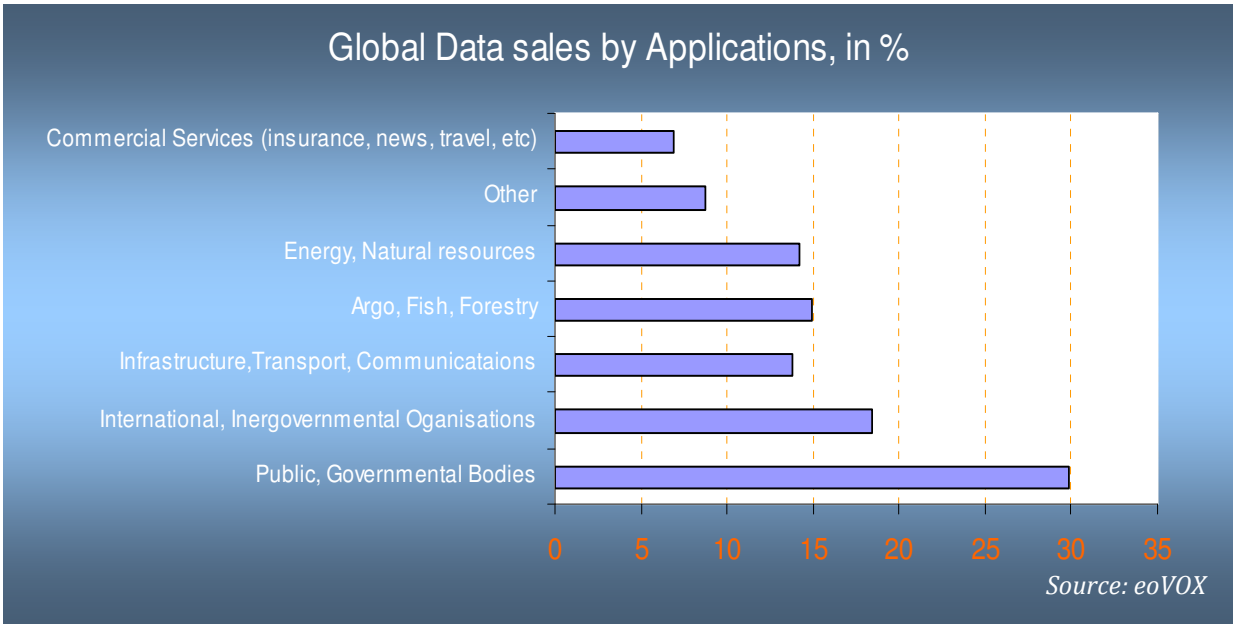

Figure 3 Global Data Sales by Applications

It can also been seen that the main customers of the satellite operators, the value added resellers, uses 22 percentages of data from North America commercial operators. (See the figure 4)

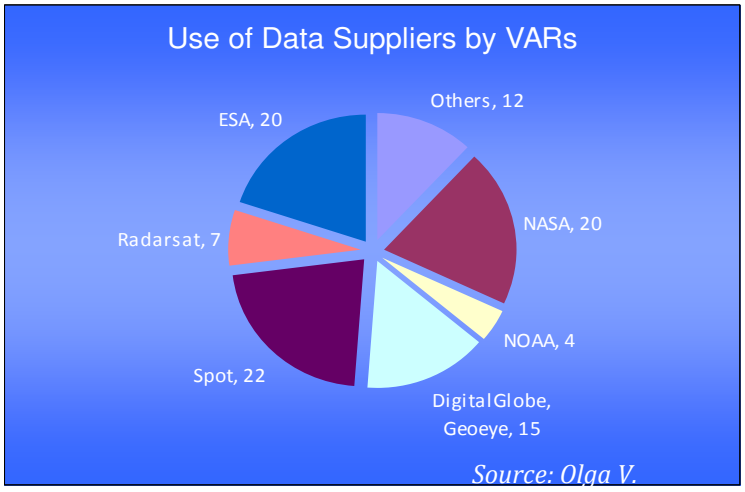

Figure 4 Use of data suppliers by VARs, 2007
(Comparison between private and public operators' satellite data distributions)

With new laws and new launch agreements, the today's commercial earth observation market has been driven where it would have been never seen in 10 years ago. Based on the previous studies/discussion on the operators' revenues and its future launches, which obviously raises the stocks and market revenues of the operators, the Commercial Imaging revenues generated by the North America commercial operators are forecasted as shown in the figure 5.

In order to present the forecasting material effectively, the two regional assessments were made where "R1" represents for the Past time lines from the beginning of 21st century and "R2" for the Present and the Future. As mentioned before, most commercial companies suffered a lot during the earlier stage of U.S regulations (i.e. PDD 23 allowed only a few companies to sell to the foreign customers), but also Canada policy were always merged with U.S regulations so that the growth rate of both countries were very slow process before the 21st century.

Grounded on the past revenue forecasts made by Frost and Sullivan[16] (O'Connell et. al., 2001) and on the last year revenues (2007) made by the main players (see the table 5), the R1 region for the U.S commercial satellite imaging revenues were estimated. The overall revenue for the 2007 by the U.S companies (including all 11 companies) was estimated to generate USD ~450 millions. Point to the facts that the two fluctuating points were inserted on the graph rather than smoothing the revenue trend; in order to show that these policy and new increases in commercial players could create the major booms in the future market growth based on the personal interview material (Brender, 2008). For R2 region, by looking at successes of new launches; Geoeye-1 and Worldview-2 (see Table 2 and 3), these two growth drivers were considered. From there, the revenues generated by the U.S operators were extrapolated (see Figure 5).

For the Canada segment, the revenue of MDA was USD 73 millions approximately (see the table 5) for the geospatial division, including sales from Radarsat 1, 2 imagery and retails

[16] O'Connell, K., Baker, J., Lachman, B., Berner, S., Frelinger, D. and Gavin, K., 2001. U.S. Commercial Remote Sensing Satellite industry: "Commercial satellite and aerial imaging revenues (1995-2005)", Santa Monica, CA: RAND.

from other satellites'. According to the CSA's Revenues by sectors of activity[17], EO revenues over a five year timeframe (2002 – 2006) have increased 18 % and the revenues increased noticeably increased by 42.2% during 2006. According to an ISU lecturer's note[18] (Singhroy, 2008), the revenues for data sale was USD 25M per year (between 2007 and 2008) so the growth rate is 33% and with future development in Radarsat constellation, the revenue growth rate is assumed to be continued. From those assumptions, the cumulative revenues trend for data sale is estimated to hit USD 400 millions in 2013.

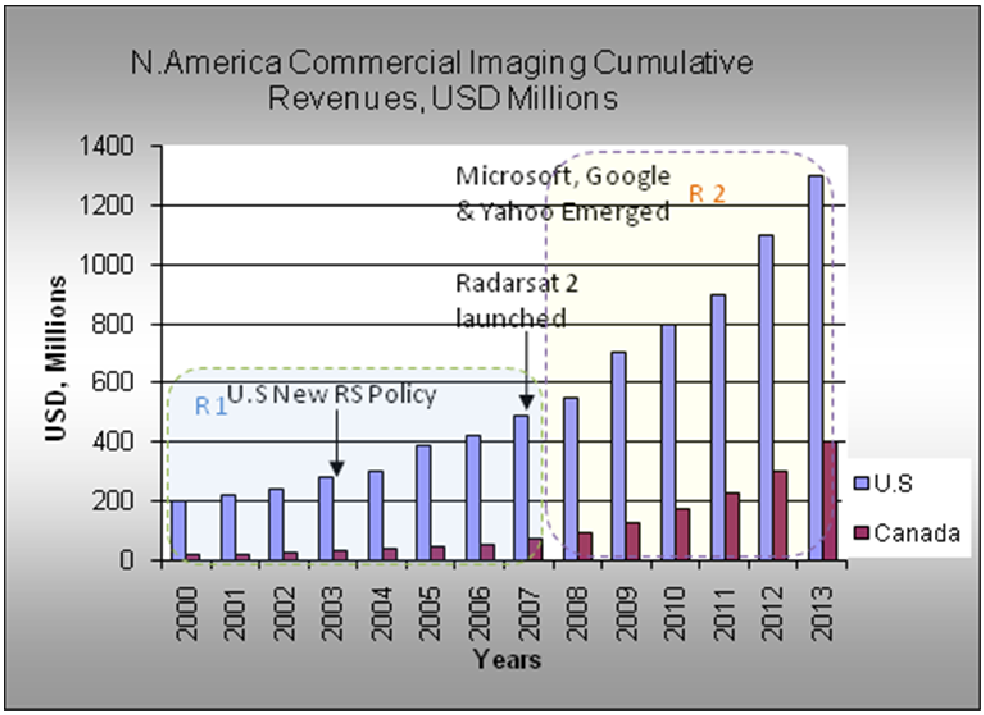

Figure 5 N. America Commercial Imaging revenues

To sum up this, it can be seen that there are some inflexion points when the new policy and new market opportunities are initiated, which helps the market to grow dramatically. By adding these points on the spreadsheet, the market revenues for these regions are forecasted. Its overall revenues would grow USD 560 Million (2008) to 1.7 Billion (2013).

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[17] CSA, 2007. Revenues by sectors of Activity: Earth Observation. Available at: http://www.space.gc.ca/asc/eng/resources/publications/pr-2007.asp (accessed on 15 July 2008)

[18] Singhroy, V., 2008. Radarsat Business and Application: "Data Sales $25m (US)/year", ISU.

C. SWOT Analysis

To analyze and evaluate the current market trend and its potentials, SWOT analysis was applied in the studies. Factors in terms of technology, Economy, Sociology, Policy, and Environment were discussed in the following examples wherever they were suitable on that analysis.

i. Strengths

Technology advancements, such as better resolutions (e.g. Worldview-1 (0.5 m) (2007), Geoeye (0.41 m) (2008)), more accuracy in mapping, wider coverage and faster revisit time, make the people more reliable to the satellite imagery technology and its data.

Space borne mapping are pretty much safer than others' methods; aerial and in-situ ground mapping, hence it doesn't need any agreement for mapping other territories.

New user friendly tools such as GIS tools, new delivery system (online, CD, DVD etc.), and online mapping applications (e.g. Google Earth search engine), are rising public awareness over the uses of satellite imagery (e.g. DigitalGlobe Imagery on the Google Earth).

Satellites' imagery is cheaper in terms of nearly a decade long in orbiting time offering a wide scale of economy per unit of measured area which is the unique advantage which cannot be done by any other types of mapping system.

ii. Weaknesses

Failures such as Launch Vehicles, Spacecrafts and Sensors can result addition investment on the current plan and cost on more expenditure on insurance in terms of next launches.

Industry requires more reliable methods to compress the timeline from data collection to data delivery to the customers in order to stabilize the common work flows [19] (EIJ, 2008).

Market becomes segmented since the emergence of new players in the market (e.g. swaying away from the traditional value added company; there is more company who do consultancy, brokering and software and tools developing).

[19] EIJ, 2008. Exploring the world of Remote Sensing. Available at www.eijournal.com/SWOT.asp (accessed on 21 July 2008)

U.S ITAR issue policy over Export Control can discourage foreign customers and partners (e.g. the foreign giant market such in China cannot buy U.S equipment can discourage the Chinese customer to use U.S. products)

Publicly available government imagery can deter buying from the commercial expensive and relatively better quality satellite imagery.

iii. Opportunities

The recent emergence of Google and Microsoft make optical imagery more publicly available in the market (EIJ, 2008) and people has started to realize the value of this satellite imagery via the online mapping applications.

By combining service application offered by Google and Microsoft with SAR data would offer value to a broader and more mainstream marketplace (EIJ, 2008).

Dramatic Global Climate changes (Storm, Global Warming, Earthquake, Floods etc) make more demand on the spatial data regarding satellite capabilities; especially in the disaster management and monitoring (e.g. China Earth Quake; Geoeye sell its data via its local distributor points in China) (Brender, 2008).

iv. Threats

Pushing the prices of the imagery data down by Governments can threat the commercial market (e.g. free or nearly data distribution by the Governments) (EIJ, 2008).

Geopolitical situation such as war or terror treat the commercial suppliers who are majorly focusing on the civilian applications in which the government would be more willing to spend more on the defense rather than civilian application so that some portion of funds for the civilian would be cut off during those time.

U.S policy on 24 hours delay rule could interfere distributing the data for the customers who need the near-real time imagery; that can result customer moving to the other foreign suppliers [20] (CRSSymposium, 2006). Limiting of imagery distribution less than 0.5 m

[20] CRSSymposium, 2006. Key trends and challenges in the global marketplace. Available on http://www.crssymposium.com/program/CRSSymposiumProceedings.pdf (accessed on 30 July 2008)

resolution (by NOAA regulation) could lose competitive edges for U.S commercial companies (CRSSymposium, 2006).

The table below summarizes the strengths, weaknesses, opportunities and threats of the today commercial earth observation satellite operator market that would provide a unique look at the current state of the industry and help the operators make decisive moves and contributions to the future growth of the market.

Table 6 Summary Table of SWOT analysis

STRENGTHS	WEAKNESSES
Technology Advancement; better resolution , more accuracy, and wider coverage in mapping make the people more reliable to the satellite imagery data Safer method; in terms of space borne mapping, compared to overhead-flying and ground mapping New GIS tools, new delivery system and online mapping applications; rises the public awareness over the uses of space imagery Cheaper in terms of mapping a wide range of economy per measured area	Launch or spacecraft failures can result addition investment and insurance expenditures Industry requires more reliable method to compress the timeline from data collection to data delivery to the customers Market is fragmented with more and more players Complex licensing (ITAR export control) can discourage foreign investors and partners Public access to low cost or free overhead U.S government imagery can reduce the potential demand for more expensive satellite imagery
OPPORTUNITIES	**THREATS**
Google and Microsoft make optical imagery more publicly available in the market By combining service application offered by Google and Microsoft with SAR data would offer value to a broader and more mainstream marketplace. Global Climate changes make more geospatial information needs	Pushing the price of data down (free or nearly free access to government data) Geopolitical situations can hinder future growth U.S. policy on 24 delay and limitation on distribution less than 0.5 could lose competitive edges for U.S commercial operators

III. RECOMMENDATION AND CONCLUSION

From the point of the industry views, the North America Commercial Earth Observation satellite operators are pretty much confident over market growth for next 5 years. Their market continues to grow as the new application such as the Google earth like developments and wide availability of new satellite navigation techniques (GPS/GIS) are revolutionizing the market.

Economical, demographic and social factors together with political and technological factors are also likely to impact on the market revenues. Moreover, the development of new services and applications will extend the demand for more users.

On all around new value chain networks, regulations, political situations and technological innovation and limitations will come into play to impact the market share and growth prospects.