

VENTURE CAPITAL IN THE SPACE SECTOR

Is the Space Industry experiencing a speculative bubble?

In the last years we could have observed an increase in the venture capital funding in startups mainly located in Silicon Valley that propose new applications and disrupting innovations developing faster and cheaper satellites. The space industry has had a growth in 2.3 times since the last ten years as it's shown in the figure 1. In 2014, the space sector raised more than \$1.8 billion dollars. The venture capital is the money provided by investors in projects or startups that have a good potential in the long term.

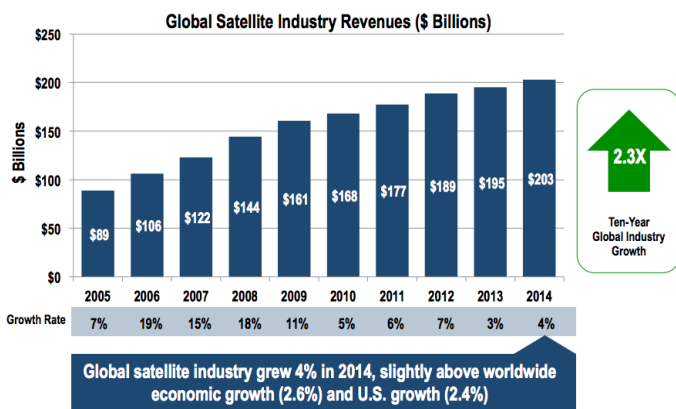
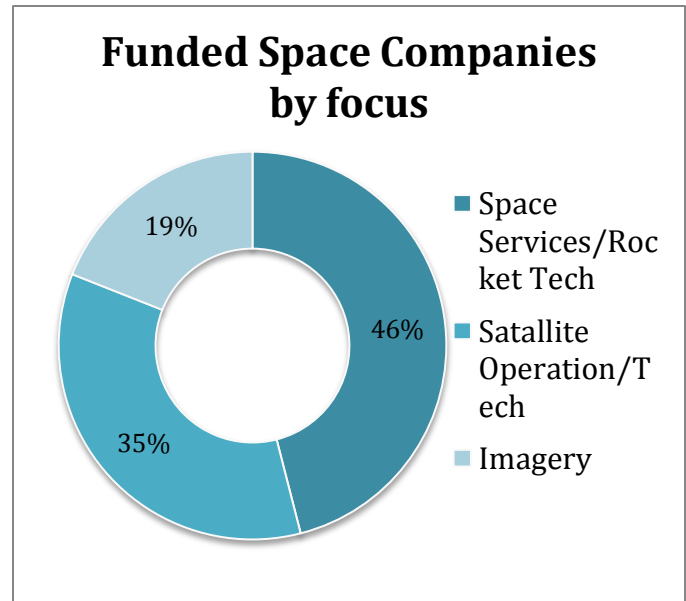


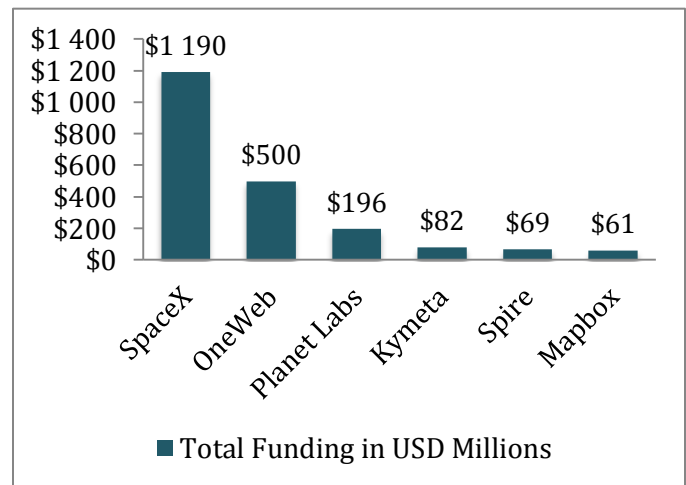
Figure 1. Global Satellite Industry Revenues (\$ Billions).

In the image 1, you can see the breakdown by focus in the new startups in the space industry, with companies like SpaceX that is developing reusable rocket technology, and Astroscale, which is working with space debris cleanup. In second place, the 35% of the funding companies are focus in earth-observation satellites to capture images of earth on a daily basis; an example of this startup classification is Planet Labs and Spire. And finally, the Imagery startups, like Orbital Insight and Windward, utilize satellite imagery to derive unique insights about earth, made the 19% in the market. The main investments are SpaceX that designs, manufactures and launches advanced rockets and space crafts; the second place on for One Web that is developing a Project to launch more than 600 satellites in space to give global access; Planet Labs is the third place who collects and analyses data about the earth via satellite; in fourth place Kymeta which develops a new form of satellite antenna to provide mobile networks; the next is Spire that

collects and analyses data related to global trade, weather and more information via satellite constellations and finally Mapbox that makes map data, design and publishes the information in their platform



The total funding these companies receive are in the next graphic:



Earth-Observation Startups

These spacecrafts are raised by venture capital funded startups and not by traditional aerospace companies. Even though, their per-pixel resolution can be worst quality, the satellites cost less than traditional spacecraft, and they are capable of visiting sites more frequently at a cheaper price. They are able to provide faster, fresher data, as they can revisit sites more times a day. (Kumagai, 2014) The startups are keeping their cost down by using other sector's components (such as radio

components from cellphones, cameras from photography, processors from automobiles, software from the internet) and by using smaller spacecraft. Besides offering a cheaper data, companies need to provide services, convert datas into useful information and create a user friendly interface for their customers. For that they need to analyse the images and piece the information with others to get the knowledge. (Kumagai, 2014) Services can include counting cars on the streets, monitoring the farmer's animals state of health or countries in bombing areas. In a decade, we can assume that more and more startups will be represented in this industry, and world will be everywhere detected. The list below contains the recent startups who are making this world become a reality.

Telecommunication Satellites

The telecommunication is the main commercial use for satellites. The domain includes activities such as:

- **Television:** nowadays the main application. The main asset of satellite television in comparison with other television communicating system is its ability to reach almost the whole planet with some exception, but the coverage area is approaching 100%, the digital terrestrial television (DTT) coverage area is lower. Another competitive advantage is the price, lower than DTT or cable television.
- **Telephone:** a declining application though it was the first commercial application for satellites. This application is declining due to the expansion of optic fiber and cables going through the ocean. Yet, this application is still used for place hard to reach for optic fiber or submarine cables, especially when these places aren't very populated.
- **Internet:** opposed today to the broadband Internet connection. Once again, the main advantage is the coverage area that reaches remote island, desert or countryside as long as the connecting device is located in the area covered by the satellite. The main drawback in comparison with broadband connection is that the large distance between the connected device and the satellite implies more or less short lags, which makes that system perfectible.
- **Radio:** opposed to ground-based radio, this system offers a strong alternative especially

thanks to a much bigger coverage area. This sector remains quite new.

Discussion

Investments can be considered as means to pay less taxes and therefore can be reckoned as a driver, citing *"if you have less profit, you have less taxes. More investment (considered as expense) means less profit and so less taxes. The choices are: either you put your money as an investment, or you take it as profit and you pay the tax."* (D. Hernandez, personal communication, October 21, 2015)

Another important incentive for placing money in the space sector is communication, incorporating the public communication and the information not published. Citing: *"The reality is [Google] have more failures than success, but the publications make it look like Google has only success. Then, people are motivated to invest in the same companies. The news suggest people to take more risks, to invest more."* (D. Hernandez, personal communication, October 21, 2015) Hence, there are more success stories reported than actual failures, which can create an unbalanced and false apparition of the actual situation. As these sort of news give hope and great expectations, it creates a condition where people want to invest.

Regarding the most evident source for investments - the availability of monetary resources, it might appear that people with an immense amount of financial means are possibly more prone to allocate their money, as these kind of people are looking a place to put their money. As long as there is a slight chance to get higher return, they will invest in the project. *"If [venture capitalist] would do nothing with the money, the money would just be gone because of inflation. So, if there is any demand, the investment will be made right away."* (D. Hernandez, personal communication, October 21, 2015) Combined with the "sweet talk and sweet news", this kind of people can be attracted to invest. Therefore, investors with greater financial means connected with the attractive advertisement, are willing to place their money in risky projects. Hazard, risks and the thrilling experiences that high level of uncertainty provides can be seen as a psychological driver, as D. Hernandez (personal communication, October 21, 2015) indicates following: *"people, especially US citizens like to*

take risks and they like the idea of conquest. People like to test. It is easy to test when you have nothing to lose (people with no or a huge amount of money)."

Globalization and maintaining the connection to the discovered, hardly reachable areas has its effect on venture capital investments. It can be reckoned as an incentive for people to contribute to the development by giving money to space projects. As J.-P. Noté (personal communication, November 18, 2015) states: *"the trend is to a worldwide connection without white regions (or "white oceans")... One cannot connect when travelling over oceans and deserts or semi desert regions; however, more and more people are travelling through those regions or working there..."* Taking into consideration the previous statement, it is clear that there are changes happening as nowadays, the regions in the world that before were considered as "white" regions are becoming more and more colorful. The term "white" marks an area where there are no people, villages, activities, transport routes or any kind of infrastructure over the area. Therefore, people want to connect those unconnected areas, thus support from space area and through various space projects enables to facilitate the connection process.

The probability of the bubble in a 5-year perspective

There are three industries that receive the highest amount of venture capital investments with investors hoping to get high return while not controlling the company: software industry, biotechnology and space. Space industry has a longer life cycle of projects compared to digital industry. A project in space area may take 5 – 10 years to be finalized. There are also some constraints that will make the development and breakthrough process in space area longer to succeed.

One major constraint that needs to be considered is related to the technical aspects and the cost. According to the conducted expert interview with D. Hernandez (personal communication, October 21, 2015), it appeared that issues related to the usage of appropriate technology in the long run, as the designated deadline can be distant, are important. In addition to that, the relevant number and expertise for launching satellites needs to be taken into account. The timeline and the financial resources need to be suitable, therefore considering

if there is enough money until the end of the project is crucial.

Another limitation embodies legal aspects. The great obstacle lies in *"the need to get authorization from hundreds of nations, the permission from ITU to use frequency, and many more."* (D. Hernandez, personal communication, October 21, 2015) ITU permission is mandatory for launching these frequency projects. Currently, there is no space left for new frequencies and the applicants who wants to use the frequencies, need to wait for 2 – 3 years, as this is the interval when the ITU make the decision with such uncertainty.

A further limitations lies in the market demand. As claimed by D. Hernandez (personal communication, October 21, 2015), when launching a system, the reflection needs to be done on *"how long does it take to get the minimum amount of customers to be considered as a business."* It will take time to get enough customers and necessarily not everyone in the world want to get connected or pay the services, as the final price for the customers is still relatively high in space industry. Therefore, having enough customers to succeed the project can be difficult and become as an obstacle in realizing the undertaking.

Taking into consideration both the drivers that push the venture capitalists to invest in the space sector as well as the limitation that can possibly pull down the success of the implementation of the space projects, it can be discussed that in 5-year perspective the current activity of euphoria will create highly likely merely a space bubble. The venture capitalists want fast return, they are not patient enough to willingly wait for 10 to 20 years. Any changing information in the market might make the euphoria collapsing, for example if ITU will not give permission to use frequencies or there are some government declaring they want to take care of their own people connectivity, etc. If one of the big projects like SpaceX or OneWeb collapses (resulting with the venture capitalists taking back their money), it will also affect the suppliers who will be crashed, therefore creating a domino effect. In this case the occurrence will be a bubble in the industry.

Nevertheless, in this event, there will be bubble only in economical term, in technological aspect, there will not be any collapse. The demand by the big player is pressuring many research entities like labs, universities, suppliers, etc. in order to

accelerate their pace in research and trial and errors to find the cheaper and more advanced technology. The development will always be there and someday will reach the maturity and a breakthrough will surely be achieved. The learning curve will not collapse either despite of the happening of economical bubble. What the researcher have learnt until now will keep increasing and expanding, so in the future there will be less costs, more effective and more efficient ways developed to produce and implement space projects.

The effect of the possible bubble to space companies

In case of the possible bubble occurrence and the resulting economy collapse, certainly the companies in space industry will be affected. However, the effect might be different for each company. The companies in space industry might be categorized into two distinctive groups and they will receive different effect. The categorization is as follows:

The “All in One”

The players of this groups are for example: SpaceX, OneWeb, O3B and Planet Labs. They need huge money and big resources to do their projects. For instance, OneWeb wants to launch 1000 satellites at once or in a short period of time. In order to do so, they need facilities to build all of the satellites and find the launchers. In addition to that, they also need to deal with permission and authorities from many institutions at once. If the bubble happens, this kind of company will lose a lot of money and has an instant bankruptcy as a result.

The “Specialists”

The players are small companies which usually target niche market. They usually serve small area of market and only need small amount of money or resources to operate. The example is a company who arise to serve the farmer in certain country in order to watch the crop condition from time to time. They can start with just only one satellite (can buy or just rent), and depending on the situation, they can grow bit by bit, by serving another country, and then expand more widely by comprehending more countries and satellites. These kind of companies might still survive after the explosion of the bubble, even if they experience a loss, it will be minor compared to the bigger ones. Due to their more realistic factor and their survivability, banks and other venture capitalists may want to invest in them, even after the crash of the bubble.

Conclusion

In the next 5 years, there will be a high chance that the bubble will happen. The history will repeat once again. The huge amount of the venture capital will not become solid as everyone expects.

Doubts from many experts and professionals has been raised about this success rate of the blueprint (SpaceX, OneWeb, O3B). This bubble is an economic bubble. If it happens, the thing that will collapse is the money, the venture capital. The project may loose money in two terms. Firstly, the money that has been used, will fail, file bankruptcy, and will not give the money back to the venture capitalists.

Secondly, there is bad news that will surely lead to the failing of the projects, affecting the venture capitalists take back their money before it vanished.

Both are bubbles. In term of technology, there will be no collapse. In 40 years history the level of technology maturity and learning curves has been continuously improving, and this development will not stop. Someday, the projects will achieve success, but not in the next 5 years. It may take more than 10 years.