20th European Interparliamentary Space Conference
"Big data: Development of value-added downstream services and applications"

Issues for the big data value chain

Massimo C Comparini

e-GEOS – Chief Executive Officer
Telespazio – Director Line of Business Geo Information
EarthLab Luxembourg - Chairman

20th EISC - 15-16 October 2018 Brussels, Belgium

Space Technologies and Services – a new era

- The fast transformation of the space industry is largely driven by new service and applications made possible through innovations in launch and satellite manufacturing technology and in the incredible growth in the computational capability
- The state of technology within the satellite industry is evolving rapidly. On one hand, improvements in launch systems, sensors and other input technologies, and innovations such as the smallsat architecture are driving down costs.
- On the other hand, more sensors and a greater diversity of sensor types mean greater spatial resolution, higher temporal cadence, and richer spectral coverage.
- "NewSpace" industry is based onto rapid inventions and developments, lower costs, commercially available parts and incremental development

Cadillac 60s

Saturn late 60s

Tesla mid 10s

SpaceX reusable rocket

The Space Sector – from exploration to SDGs

- The Space sector has contributed to open new technological frontiers due to the extreme and demanding nature of operating in deep space environment as well as tofay's to address new missions amd innovative requirements and new markets (space assets themselves, "fall out" markets)

The new Space Economy

Investors Can Get an Eye in the Sky

By Bradley Hope

The latest technological innovation for data-hungry hedge funds is a fleet of five dozen shoe-box-size satellites.

A company called **Planet Labs** Inc. has launched a small constellation of what it calls "cubesats" that can deliver much more frequent imagery of economically sensitive spots than traditional satellites. Those spots include retailers' parking lots, oil-storage tanks or farmland.

The company, founded by three former NASA scientists, has now signed an agreement to supply data to ***Orbital Insight*** *Inc., which mines satellite imagery for trading tips for hedge funds.*

Until now, Orbital has relied on monthly or bimonthly imagery for its analysis. The deal with Planet Labs will give them access to weekly images at first.

Next year, if Planet Labs succeeds in a plan to launch an additional 40 or so cubesats, Orbital will have access to daily images of every piece of land on earth.

"Almost all economic activity is change," said Jimi Crawford, a former **Google** executive who founded Orbital.

TECNOLOGIA

I Big data arrivano dei cieli

L'accordo di Leonardo con Spaceflights ra
italiana nel settore dei minisatelliti, sempr
rilevanti per la raccolta di dati dallo spazi
flessibilità e frequenza delle immagini sor
della raccolta di informazioni visive che di
indubbio valore nella space economy em

18/03/2018

Earth-i leads consortium to develop on-board processing for video imagery from space

By **News Desk** - July 18, 2018

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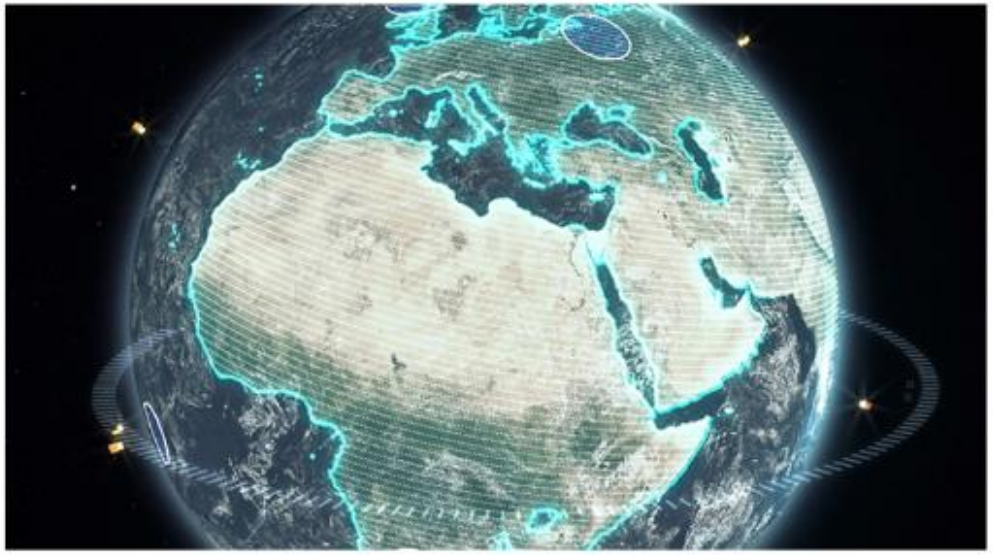


Lettori: n.d.
Diffusione: n.d.

Bloomberg Businessweek

26 GEN 2015
da pag. 52

simple device for use by individuals and public and commercial buildings, such as schools, stores, and hospitals. It will act as a kind of local Internet hub connecting with nearby devices via Wi-Fi or a cellular signal.

"You don't have to buy an antenna," Wyler says. "You just have to be near a school or a health center, and your phone or tablet will log on." He expects the antennas to start at about

see prices that are affordable to the consumer," he says.

A lot can go wrong before OneWeb's network is complete. A couple of companies—Teledesic and SkyBridge—tried 10-plus years ago to build similar networks and burned through billions of dollars before failing and scaring investors away from the idea for years. Wyler and others argue that these efforts were their time, and that the underlying technology has d enough to make the idea, with a couple of archi- weeks, feasible again. OneWeb says it will be able to area the size of India with three satellites. The machines, re always on the move in a griddlike pattern. As such, the ust develop ways to pass a communication signal from lite to the next and run millions of calculations every figure out how to best divvy up bandwidth among all le tapping into one satellite.

handful of companies build satellites, and they're usually designed for a specific purpose. OneWeb will need one of nufacturers to produce its machines at scale. It will also ork with most of the major rocket-launch companies to nprecedented goal of sending up a new satellite every "This is the biggest thing that has ever been done in the ndustry," says David Bettinger, who left his job as chief y officer at HDirect, a satellite communications company, yler. "It takes a Greg to do something like this."

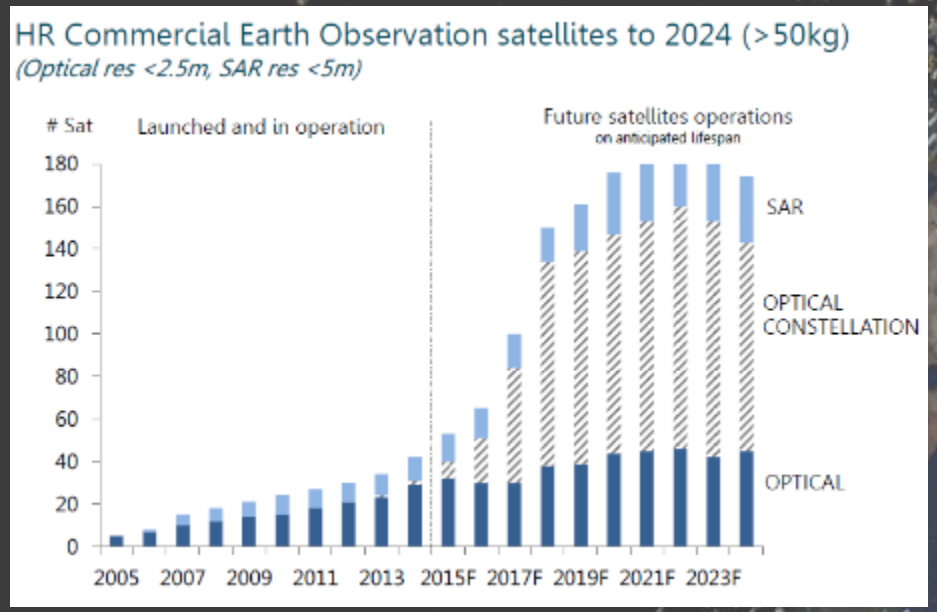
who's put in $6 million of his own money so far, expects more than $1 billion to get OneWeb going. The company up Virgin Group and Qualcomm as investors, with each "tens of millions," according to Virgin founder Richard who's joined the OneWeb board. "We have the capac- up nearly 2,500 satellites," Branson says. "If we have es right, this will be a highly profitable business that mpasses charity and delivers a much-needed service." hopes to have OneWeb up and running by 2018. In time, rivals will be expanding their efforts to connect f the world. Google had at one point looked to fund and make it part of the company's broad Internet con- efforts, but Wyler and Google CEO Larry Page decided to , Branson says. Google is charging ahead with its own ject Loon, in which giant weather balloons rigged with ications gear will float above remote areas to create a network. Facebook has a number of schemes, too, and exploring everything from drones and lasers to more placed cell towers in rural areas to bridge gaps in Inter- ectivity.

ggest challenge may come from Musk, who used to crash s guesthouse and has just announced plans to create his ion of an Internet space network. Musk's plan is to build s of satellites at a SpaceX factory, launch them with his ets, and use them to handle much of the world's Inter- . "We want a satellite that is an order of magnitude more ned than what Greg wants," he says. "I think there should mpeting systems."

n counters that Wyler's the only person to have thought ll of the technical issues and acquired the International pectrum rights to provide Internet service from space. hink Elon can do a competing thing," says Branson, who's ith both men. "If Elon wants to get into this area, the ing for him would be to tie up with us."

g a walk-and-talk interview with Wyler in Atherton, the tion turns to his reputation as brilliant but flighty. "I am nt," he says, explaining that he's good at figuring how l work, assembling the right team, attracting investors, g the machine in motion. With OneWeb, Wyler might nd longer than he has at past ventures. Once he gets it assuming no catastrophes happen, he'll complete the e gave himself after his mother died. "This is the second " he says. "It will be there for everybody."

Space Economy – Geo Information evolution



many satellites in orbit today…
and the number is growing fast…

680

EO Satellite in orbit (2017)*

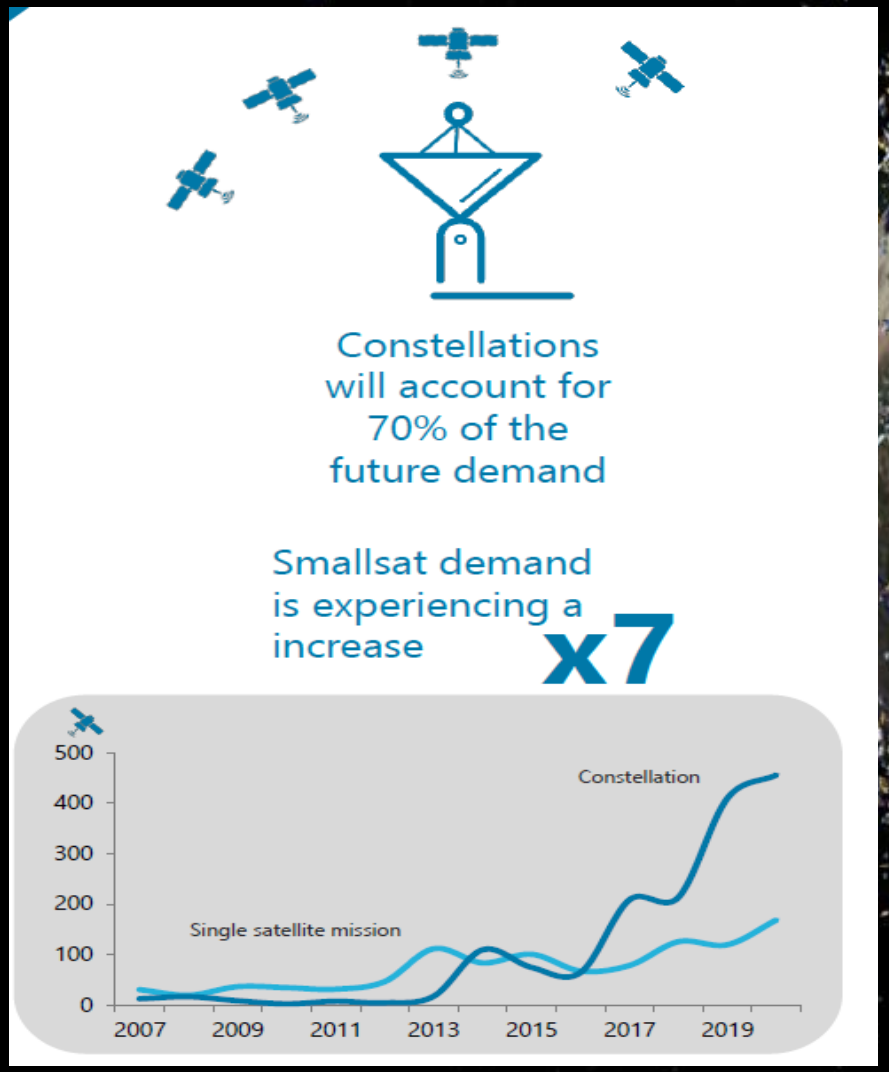
>1,740

Satellite expected (2017 – 2024)

+66%

Frost & Sullivan's 2018 first quarter update of the 'Small Satellite Launch Services Market' estimates that over 11,000 small satellites will be launched by 2030. The central value proposition offered by these commercial players to end-users is real-time imagery and seamless global connectivity.

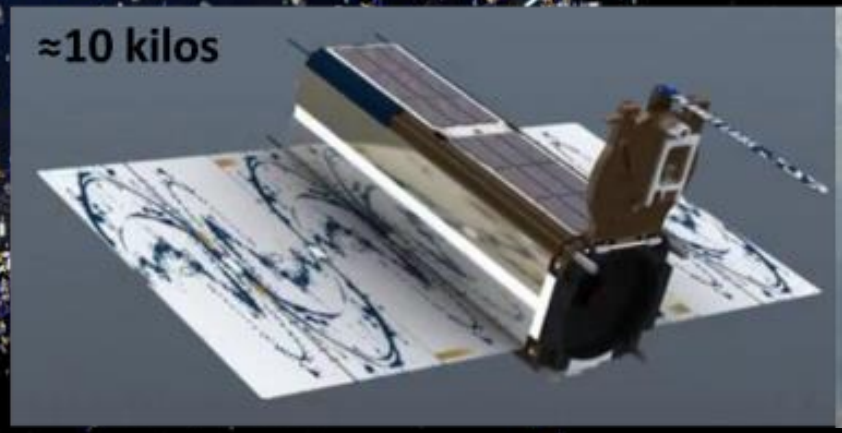
Space Economy – Geo Information evolution

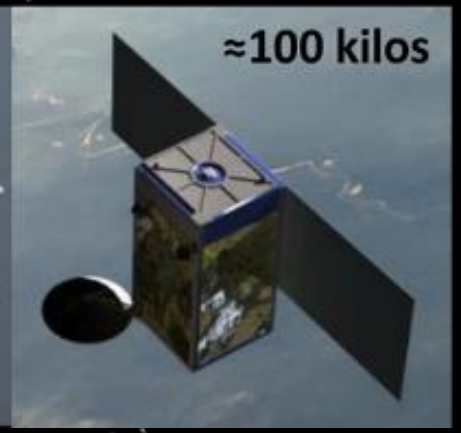


evolution of large infrastructure (high end sensors few sats)

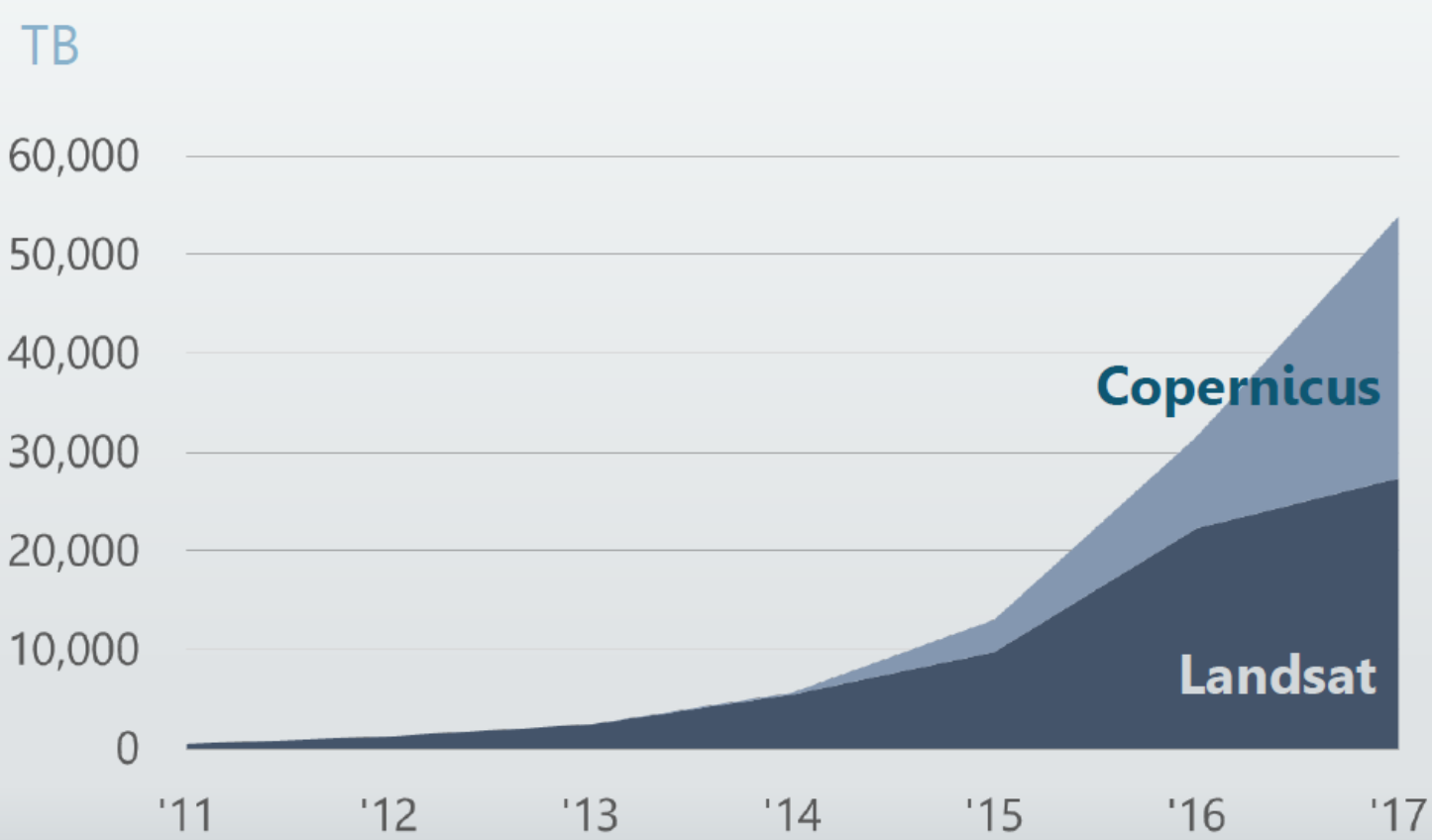
≈2 tons

emerging constellations (low end sensors/many sats)





Space Economy – EO space data explosion



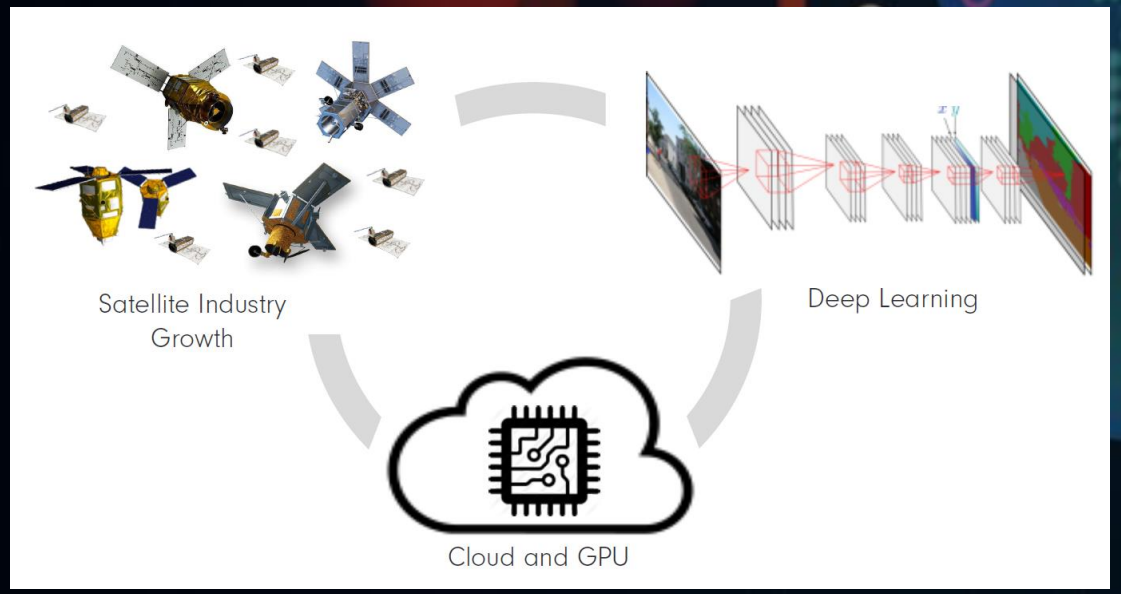
Downloads of free satellite data & products accelerating

Only **a fraction** of that data may already be turned into operational applications

Upcoming solutions to combine commercial fresh, commercial archived and free data

The new space race – global geospatial

- The possibility to complement Earth Observation space systems based on large space infrastructure and very high end performance sensors allows as well in Earth Observation to conceive very high revisit observation capabilities, in perspective to realize a quasi-persistent surveillance and in general to feed with an exponential growing amount of data a new class and generation of service and application platforms



7 The convergence of IoT, cloud, and big data create new opportunities for self-service analytics

Space and Democratization

From data → Generating information → To customized platforms

IMAGE CONTENT

REPORTS

GEO CONTENTS

LAND

DEFENCE

MARITIME

AGRICULTURE

EMERGENCY

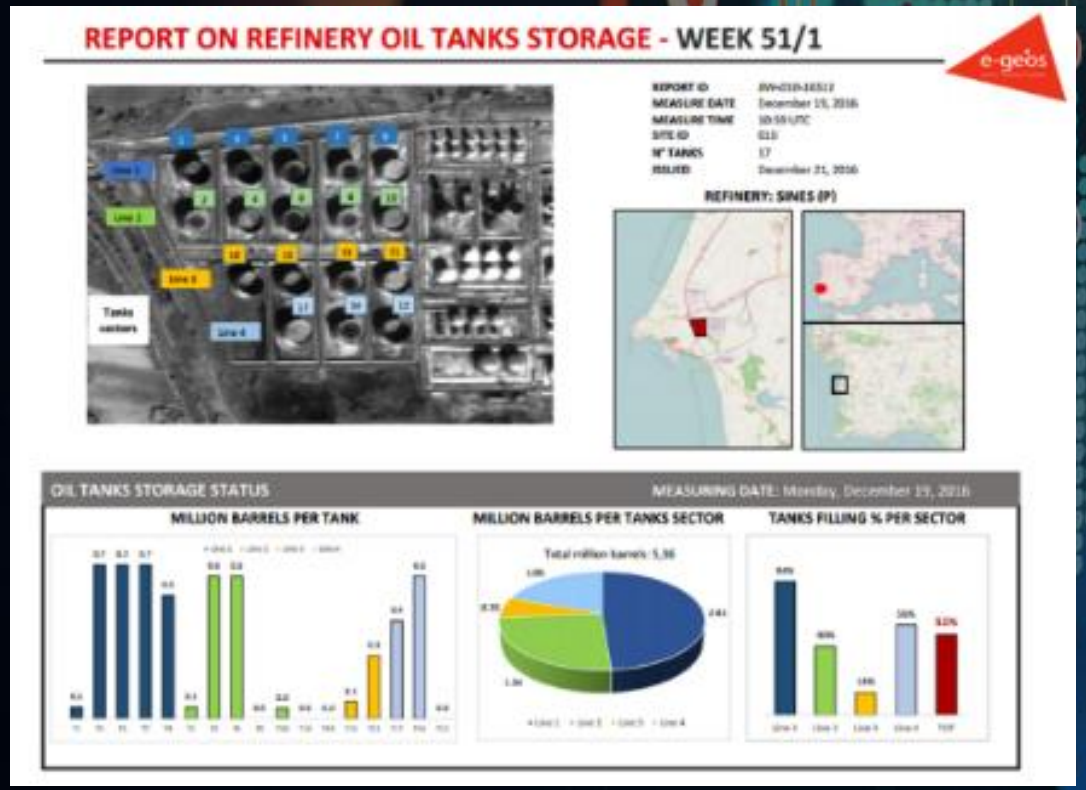
ENVIRONMENT

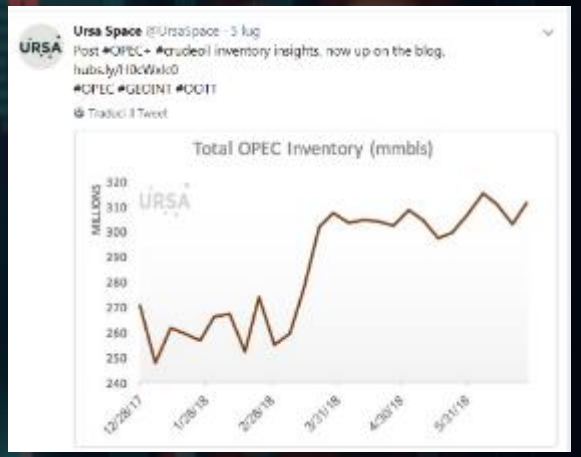
e-geos

The new space race – global geospatial

Space and Democratization

From data → Generating information → To customized Information Products and BDA





Massimo C Comparini – Space Big Data, Issues for the value chain

THE VALUE CHAIN FOR THE NEW VALUE ADDED SERVICES

More value addition/processing to the raw data

High

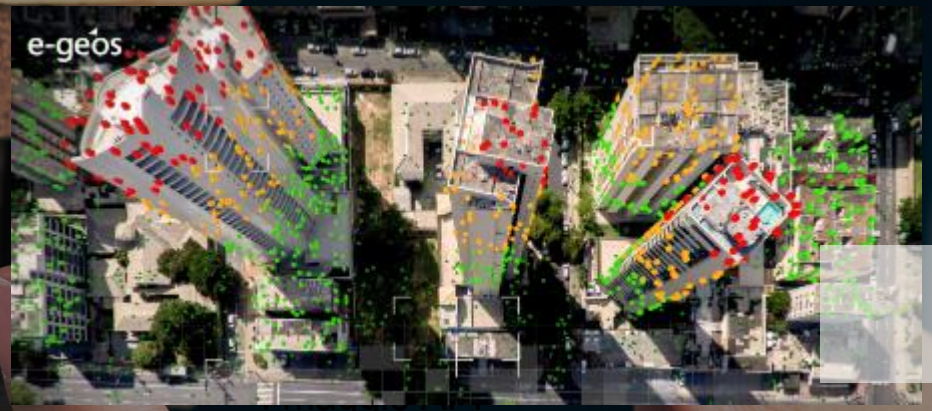
Big data analysis

Information Products

Value Added Services

Data

Low



Services for Financial user comunity

e-geos

AU

500 m

-19.965486, -43.949274

AssetWatch

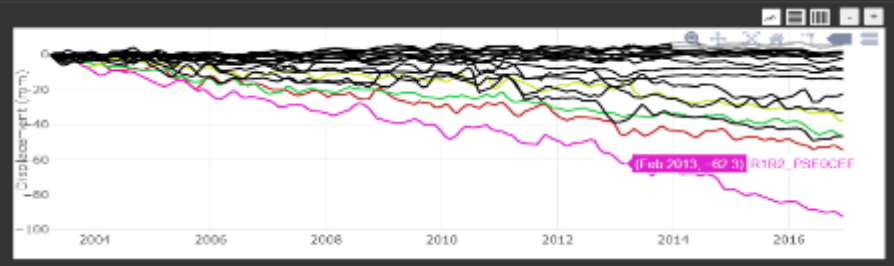
from punctual analysis to areal behaviours

1M+

Years of time series analysed

10+

Years of time series analysed at the same time



Statistics

Selected PS	2346
Measures	36
Starting date	20160508
Ending date	20170425
Velocity	Min: -29.9000 Max: 13.6000 Mean: -0.7389 mm/year
Height	Min: 1012.4000 Max: 1218.1000 Mean: 1084.4307 m
Velocity stdev	Min: 0.2000 Max: 1.1000 Mean: 0.4890 mm/year
Coherence	Min: 0.6400 Max: 0.8900 Mean: 0.7285

Filtering, Statistics and advanced analysis tools applied over hundreds of measuring points enables to move the analysis **from punctual analysis to areal behaviours**

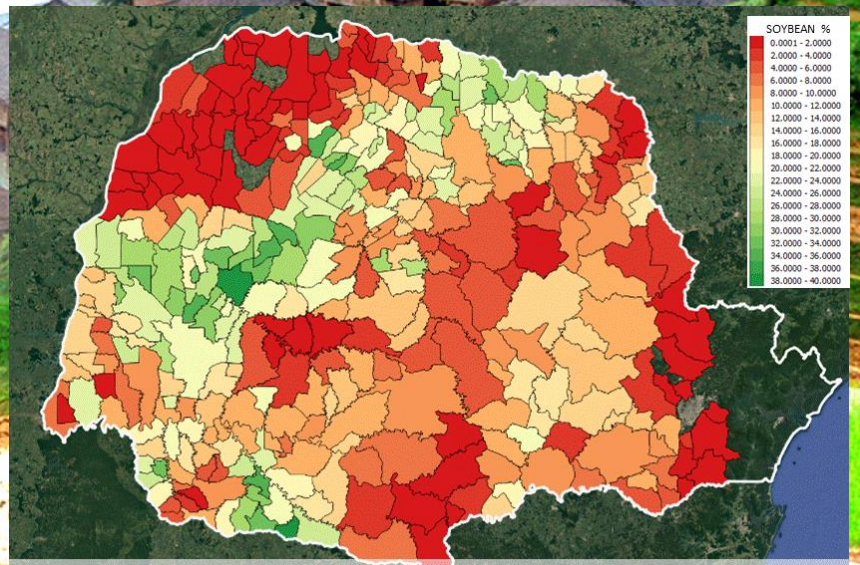
e-geos

AGRICULTURE AND FOOD PRODUCTION

AgriGeo

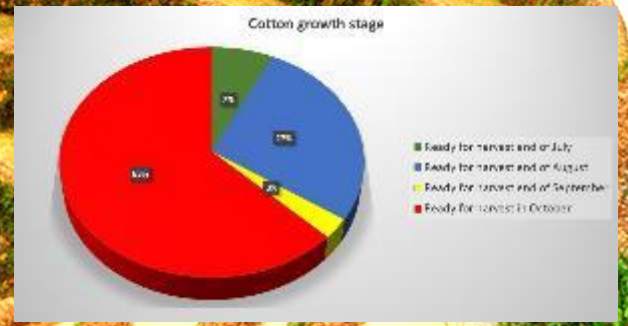
For supporting governments and farmers in the management of the **agricultural and food activities**, as well as the **crop lifecycle**

- **Precision farming analysis**
- **Crop monitoring reports, acreage and crop yield assessment, for early estimation, analytics monitoring services**
- **Agro-Environment Geo-Information Products**
- **Services of crop monitoring for claim management, funding\subsidies management, production processes**



2016 Soybean Acreage Statistics at Municipality level

COUNTY	Cotton area	Flooded Cotton Area	
	ha	ha	%
Louise	7932	59	1%
Ganado	1770	0	0%
Edna-Cordele	1718	0	0%
Garwood	1765	132	7%
Eagle Lake	2535	922	36%
East Bernard	5994	1273	21%
Wallis	648	218	33%
Orchard-Kendleton	4401	803	18%
Wharton	1460	721	49%
Boling-Newgulf	2900	822	28%
El Campo	10197	509	5%
TOTAL	41388	5452	13%



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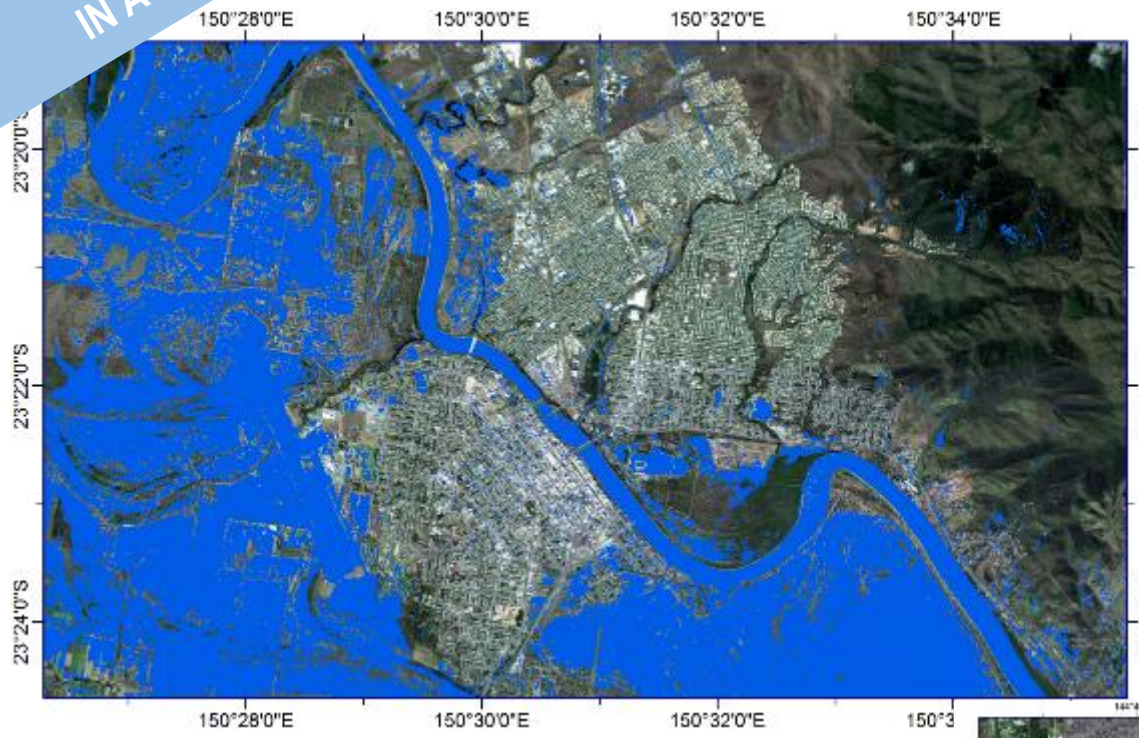
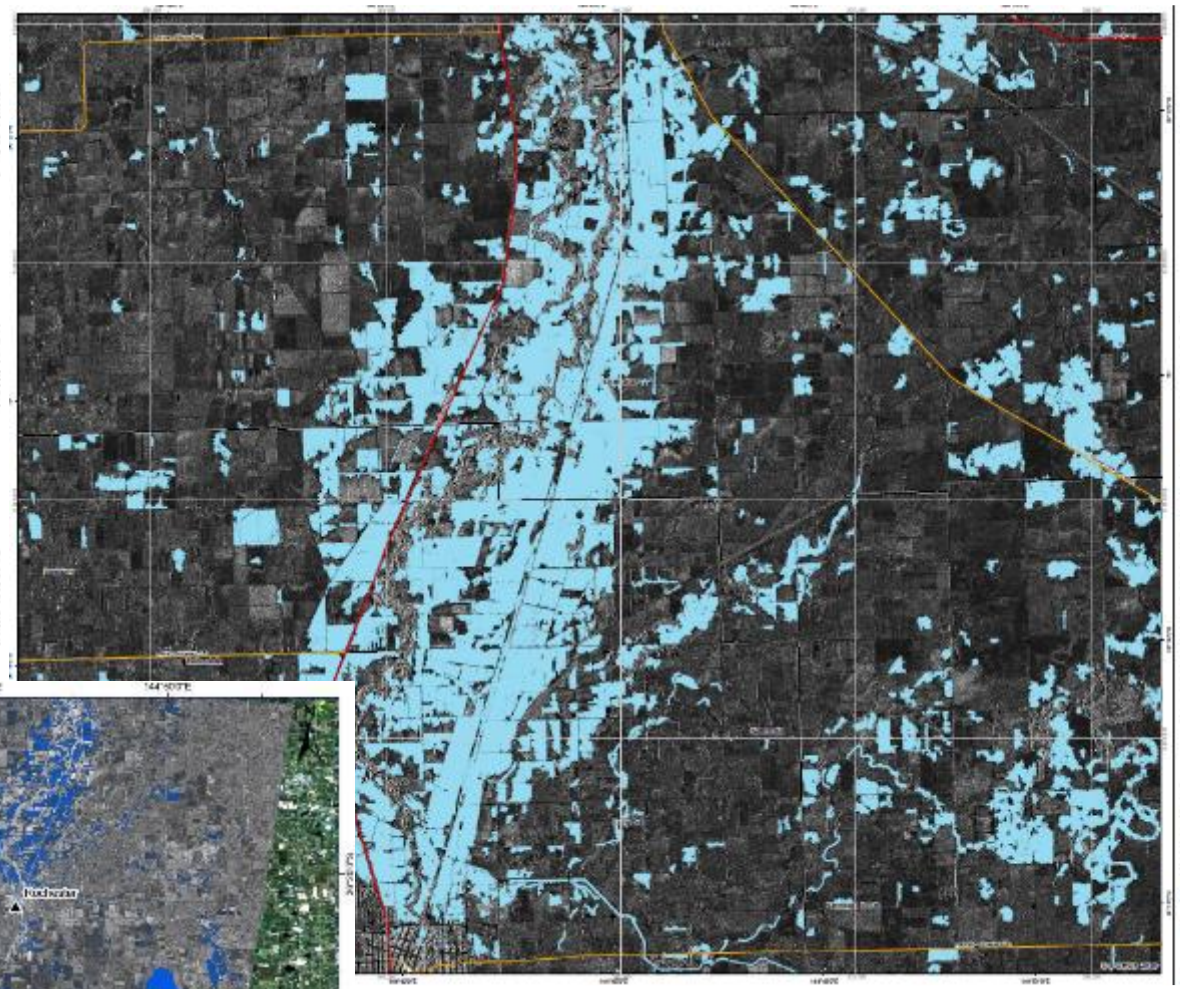
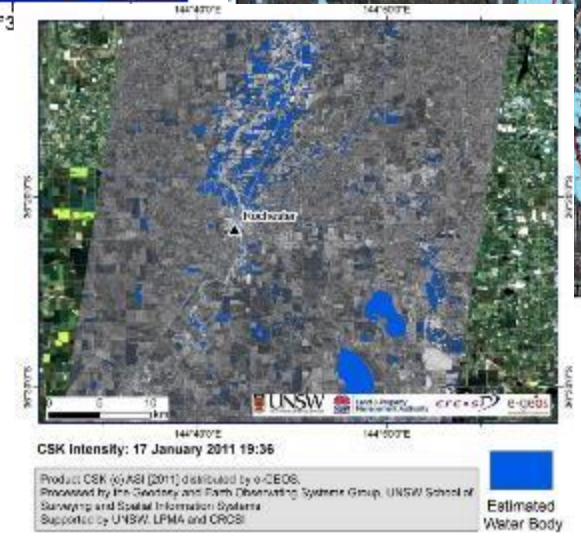
FLOOD
IN AUSTRALIA

FLOODED AREAS EXTRACTION







200+
Images Acquired

70+
Products generated and delivered

e-geos
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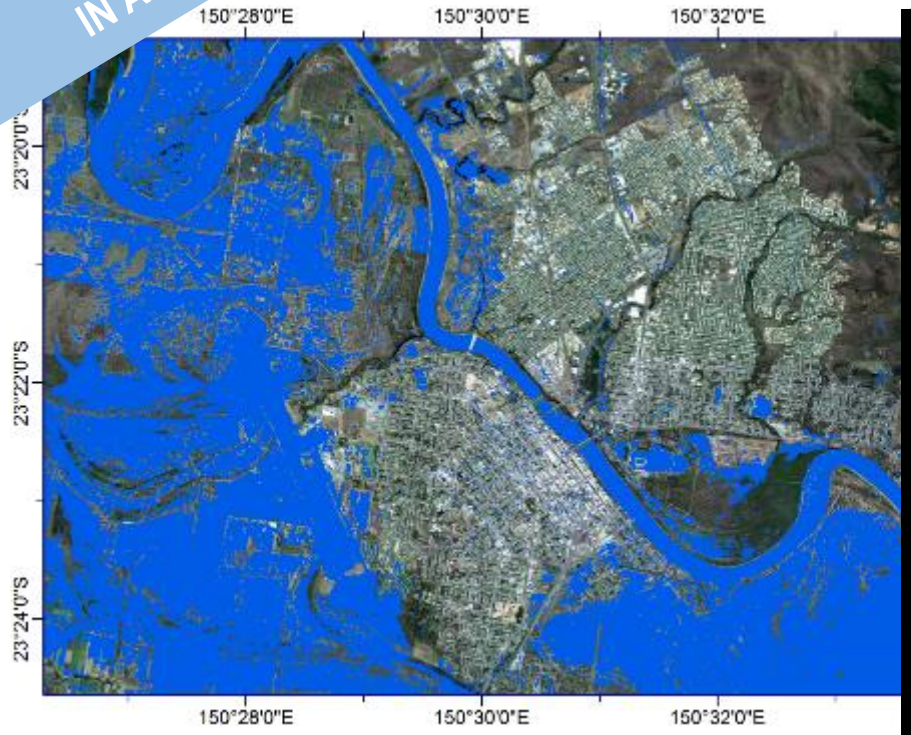
FLOOD
IN AUSTRALIA

FLOODED AREAS EXTRACTION

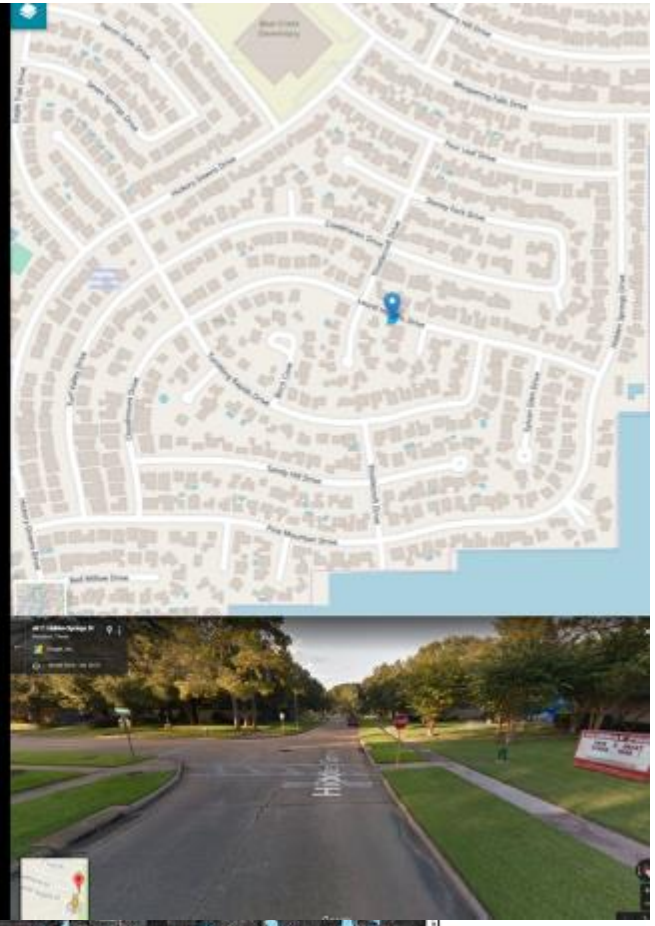


2M+
social media data

1sec
Content validation

5sec
Accurate content GeoLocalization

20k+
Crowd sourcing community for content enrichment



200+
Images Acquired

70+
Products generated and delivered

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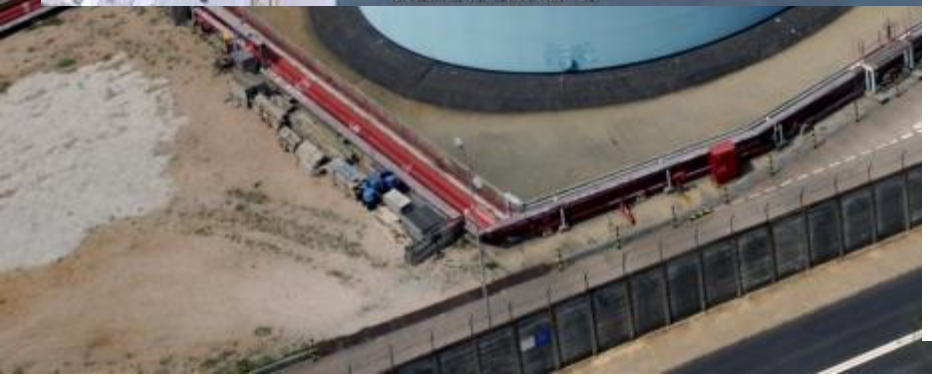
THE ECONOMY OF SHADOWS

OIL TANKS MONITORING

THE ECONOMY OF SHADOWS

OIL TANKS MONITORING



REPORT ON REFINERY OIL TANKS STORAGE - WEEK 51/1

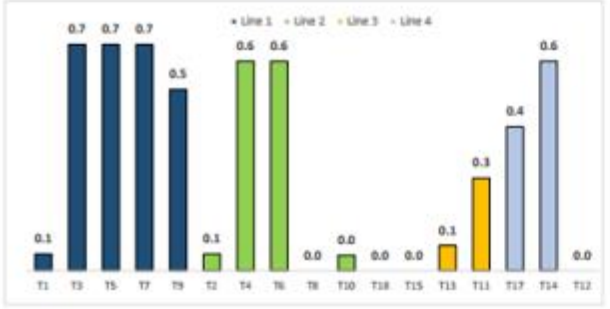
e-geos

REPORT ID	*BW-010-16511*
MEASURE DATE	December 19, 2016
MEASURE TIME	10:59 UTC
SITE ID	010
N° TANKS	17
ISSUED	December 21, 2016

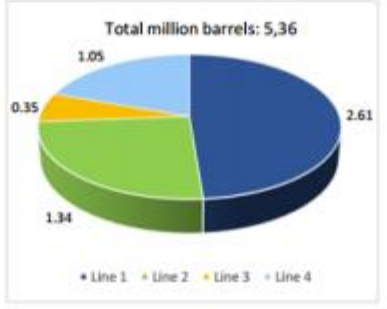
REFINERY: SINES (P)

OIL TANKS STORAGE STATUS — **MEASURING DATE:** Monday, December 19, 2016

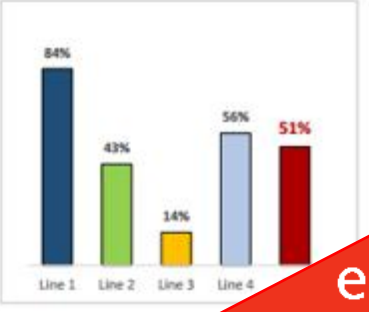
MILLION BARRELS PER TANK



MILLION BARRELS PER TANKS SECTOR



TANKS FILLING % PER SECTOR



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Geo Spatial paradigms and Business Models are fast changing

Biggest Trends in Satellite Earth Observation

- Data, more and more, are just a part of the game
  - High temporal resolution to complement high and very high spatial resolution sensors
  - Federation of existing and planned new assets through smart multi missions tasking platforms

- Convergence in the data analytics business for the EO
- Data derived information driven market
- EO Geospatial business as inherent part of IoT

(re)evolution if the entire eco-system (business, value chain, technology, partnership, public private cooperation, …)

GEOSPATIAL WORLD FORUM

GEO4IR

e-geos

THE BIG DATA PROMISE

GEO Big Data + IA + Analytics are changing the game in the data consumption

AI

Machine learning

Deep learning

Automated action

Big Data

Self Program

Predictive Analysis

Prescriptive Analysis

e-geos

Big Data and Space Democratization

Car Counting

Commodity Stockpiles

Building Classifying

Plane Counting

Road Network Detection

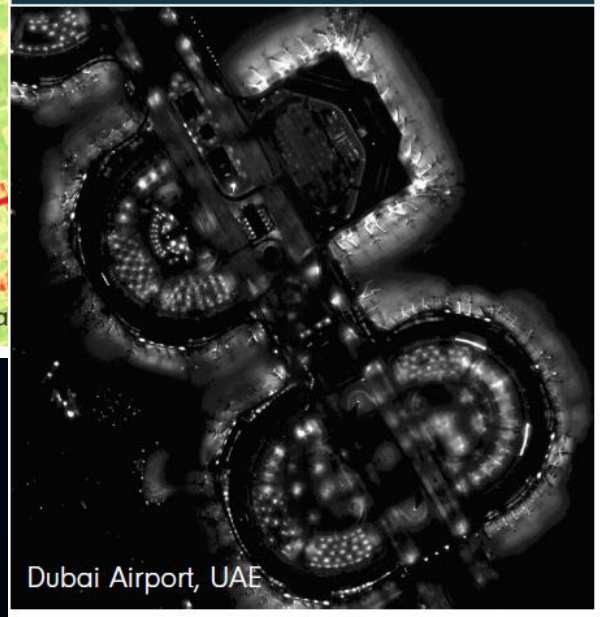
Trucks & Buses

Crop Yields and Health

Floating Roof Tank Levels

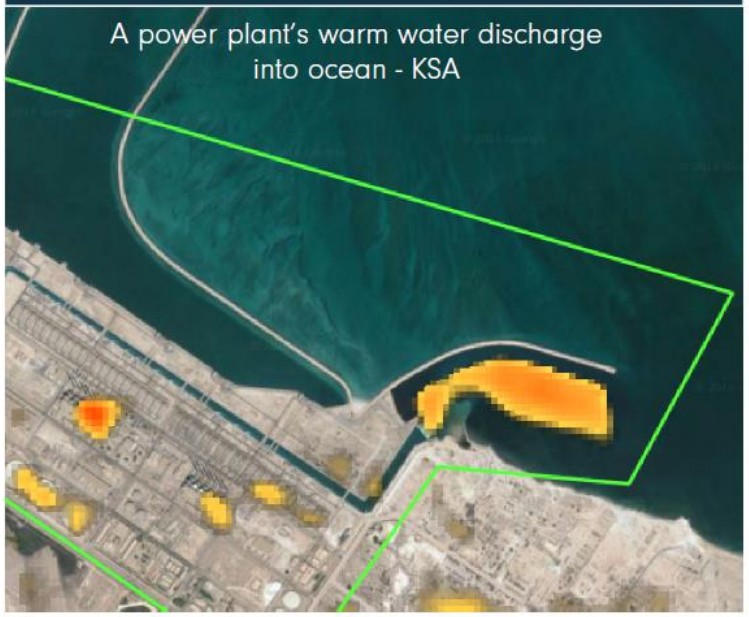
Water Levels

High Resolution Night Lights

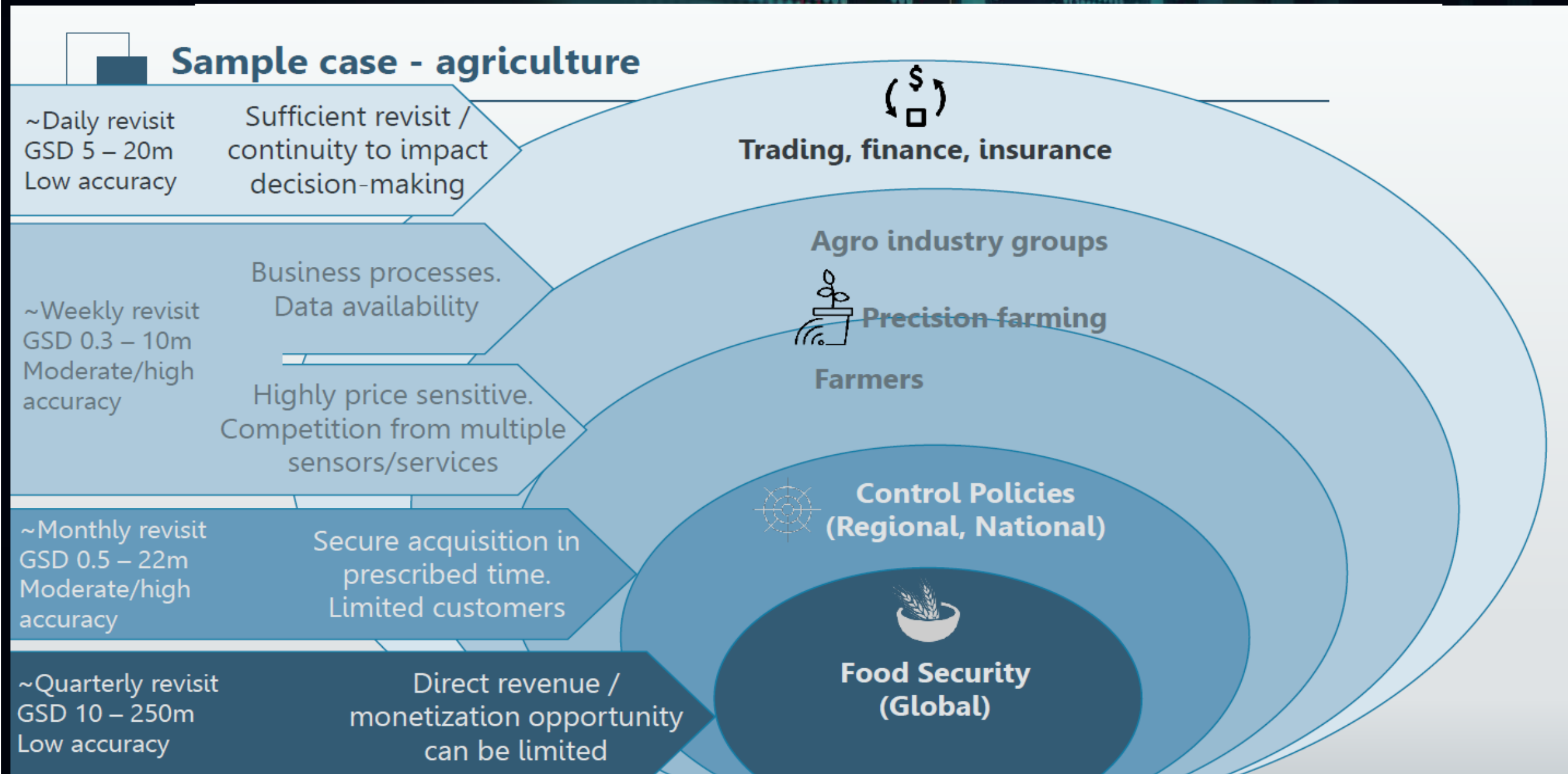


SWIR Flares

Thermal



Evolution and impact on value chain and new users



Space Democratization

first space wave

Space as Political Power
Cold War

moon landing
1969

JFK Speech
1962

2nd space wave

Science and Exploration
Early Communicactions

inmarsat

1979

Navstar 1
1978

INTELSAT

3rd space wave

DAB DBS
HTS
Comms LEO/MEO
Earth Observation
Navigation
Systems

2007-
2010

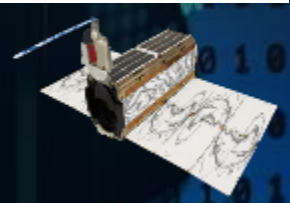
COSMO SkyMed

mid 90's

mid 2010's

OneWeb

Globalstar

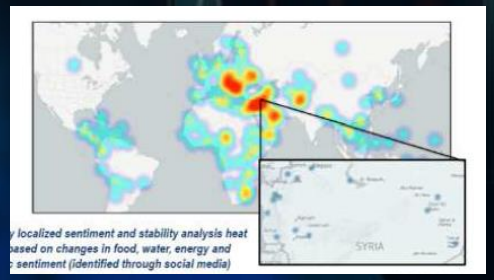


4th space wave

Democratization
Sharing Economy
In Space

Earth Digital Twin

Pattern of life



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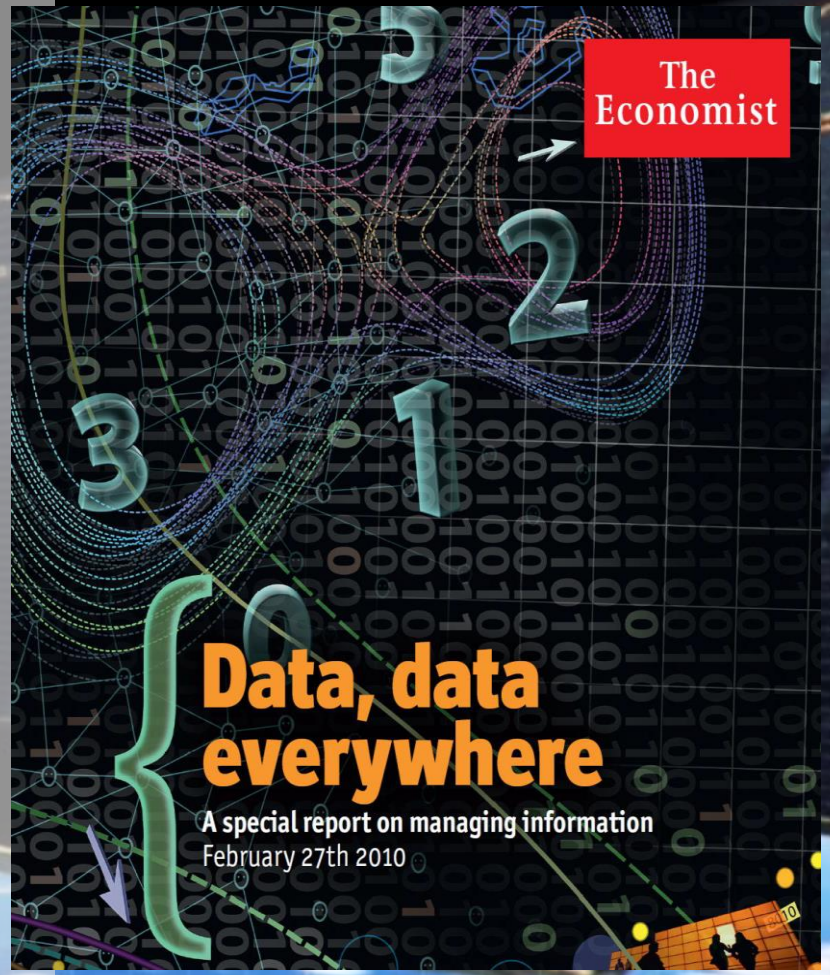
From Earth Observation – static imagery to **pattern of life** monitoring

Thanks to Space Big Data, to faster revisit time offered in both radar and optical domain, we can answer to much more questions that in the past. The challenge is to design advanced algorithms to generate to process big data and to generate info reports for each vertical domain

e-geos

Space Democratization

- The space industry is fast moving to a new paradigm as consequence of breakthrough innovations in the space domain and in the data exploitation through a global connectivity infrastructure, incredible growing computing capabilities from mapping/imagery to continuous monitoring and information flow
- The evolution of a new class of satellites and constellations allows a new space economy, a space democratization based on a great number of new services to be offered
- New value propositions are enabled by paradigm shift in data and information exploitation through new data and services access platforms to address the need of a vast range of traditional and new users
- Customer base is moving to a wide community of users and Space dimension of IoT just started. IT will surely play a key role in this (r)evolution



WE SCAN THE EARTH

EYES ON THE EARTH

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