

EUROCONSULT BRIEFING

30TH MEETING OF THE ADVISORY COMMITTEE ON COMMERCIAL REMOTE SENSING

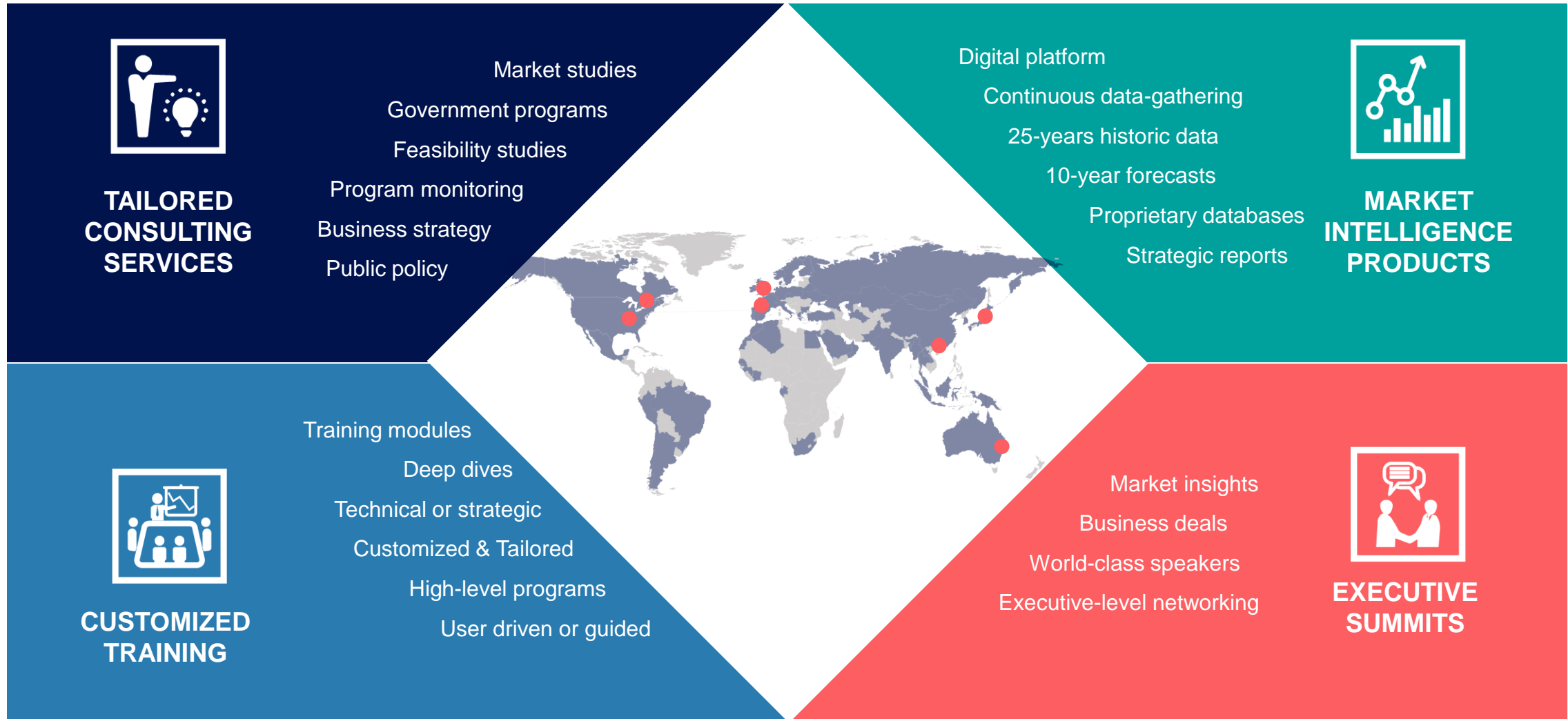
Adam Keith, Affiliate Principal Advisor

November 3, 2021





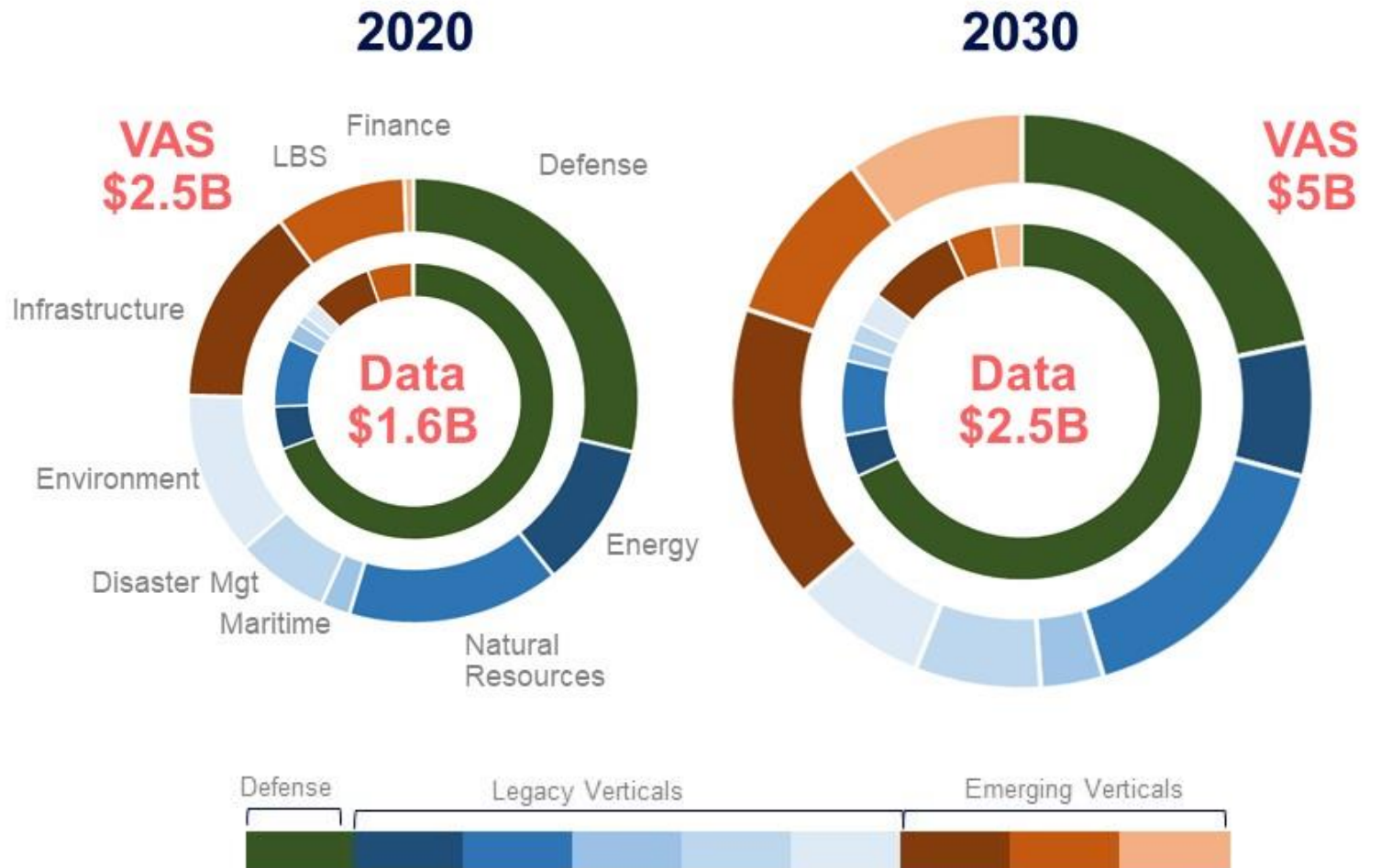
EUROCONSULT – WHO WE ARE





EARTH OBSERVATION: THE MARKET

- Earth observation data and value-added-services combine for a total of \$4.1B in 2020.
- The \$1.6B commercial data market remains driven by defense users.
- VAS market totaled \$2.5B. More diverse in vertical demand, lower-cost/free data can be leveraged to build greater-value VAS
- There is expected to be a growing emphasis on information delivery.
- New services based on change detection analytics brought by acquiring data on specific points/areas at a high frequency.

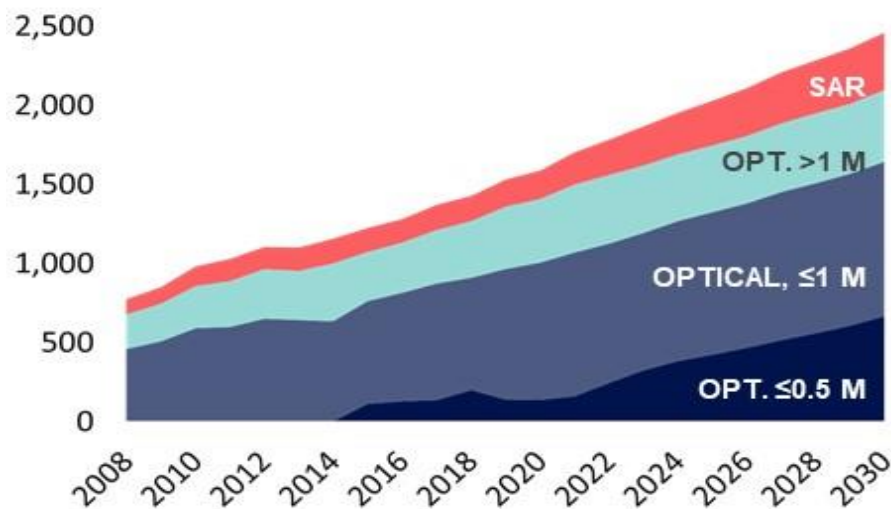
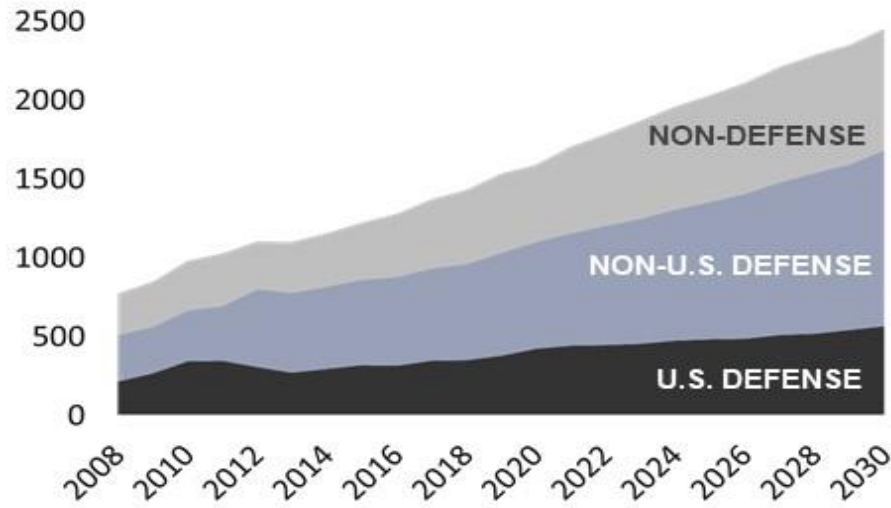


Source: Euroconsult – Earth Observation Data & Services Market



THE COMMERCIAL DATA MARKET

REVENUES (\$ MILLION) – DATA ONLY



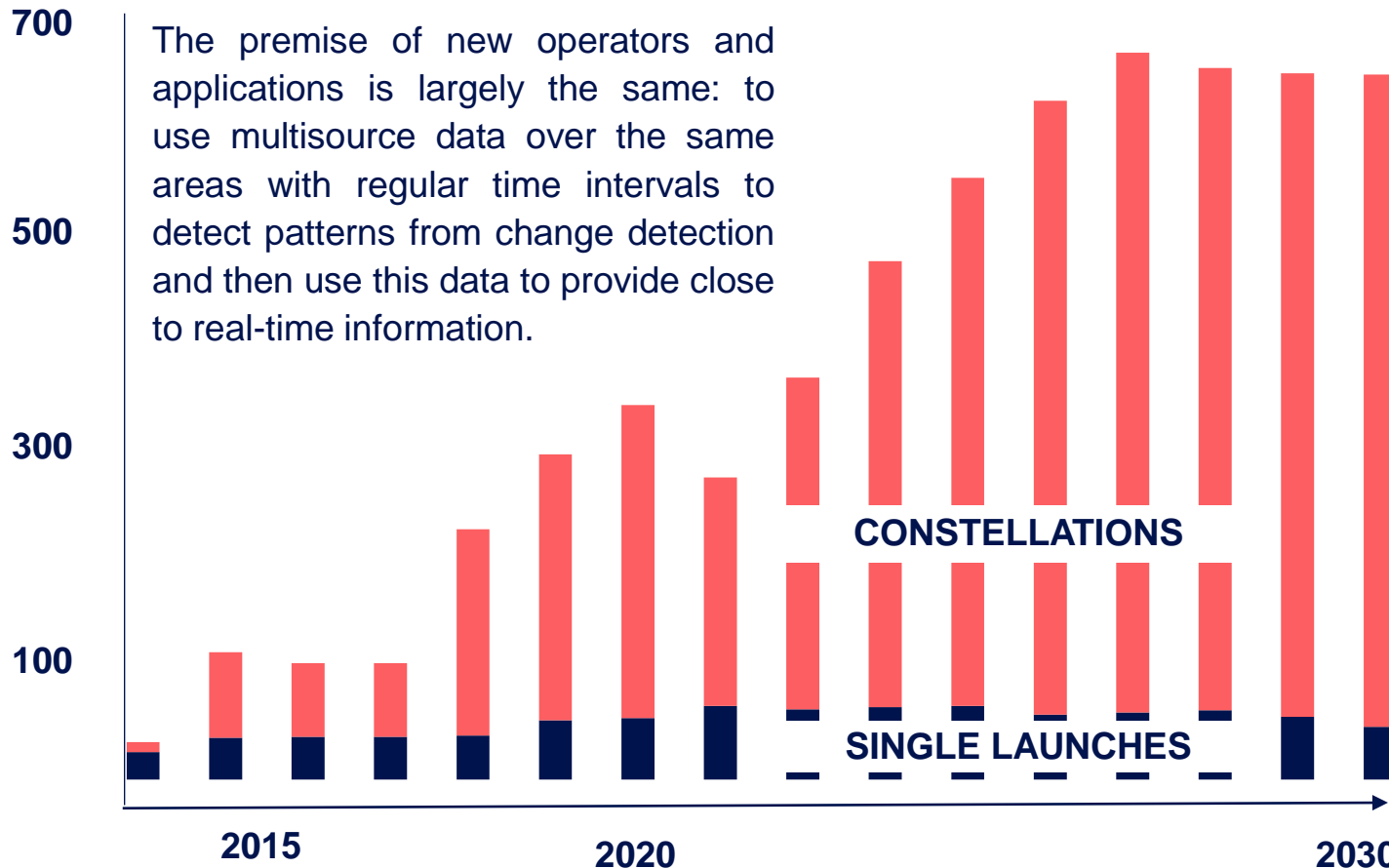
- Sales to non-U.S. defense reached \$650 million in 2020. With limited govt. systems to support defense, the importance of commercial data will remain.
- Highest resolution, high accuracy data are priced higher, makes up the most revenues. This data will always command the highest price – no evidence this is coming down.
- The arrival of constellations with ~1m data will decrease the price point with a focusing on leveraging the data for VAS.
- Net result will be a gradual slowdown of the 1m ground resolution market despite increased usage.
- Two companies still account for <50% of the data market in 2020. However supply is starting to increasing significantly...

Source: Euroconsult – Earth Observation Data & Services Market

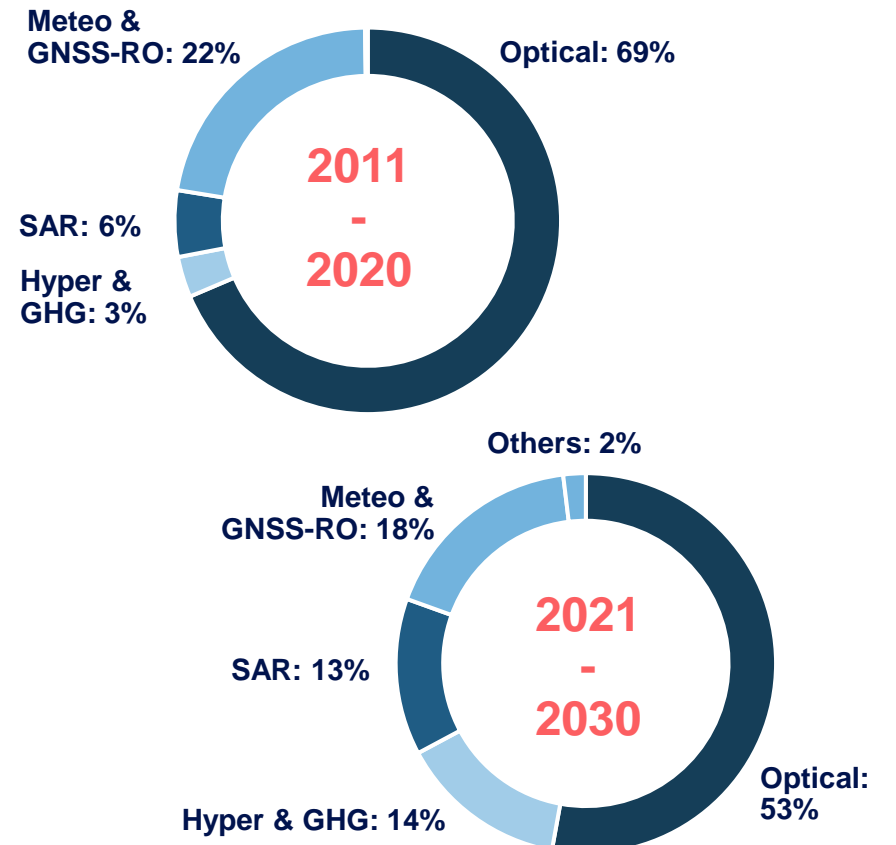


BUILDING NEW SERVICES WITH NEW SUPPLY

CAPACITY INCREASING... OPERATIONAL COMMERCIAL EO SATELLITES



....AND DIVERSIFYING PAYLOAD DISTRIBUTION



Source: Euroconsult – Earth Observation Data & Services Market



GOVERNMENT POSITIONING

Govts. taking steps to promote NewSpace activities and build space economies.



PROVIDING FUNDING

Government provides direct funding in the form of grants and co-funding.



STRATEGIC PARTNER

Government provides in-kind services such as technical support, access to facilities, experts, network opportunities, etc.



TRADITIONAL PROCUREMENT

Industry acts as prime manufacturer/subcontractor for space missions which are owned and operated by governments



PUBLIC-PRIVATE PARTNERSHIPS

Mission jointly developed between government and industry sharing cost, risks, and responsibilities



CUSTOMER OF DATA AND SERVICES*

Government procures commercial services from industry



POLICY AND REGULATIONS

Government develops policies and regulations to support the development of the private sector.

GOVERNMENT'S
ROLE

- U.S. remains the primary source for NewSpace activities, >30% of all companies.
- Companies are characterized by fast-paced timelines, which do not typically match the long-term timelines of government programs.
- To remain competitive companies must be able to navigate government licensing, grants processes and funding mechanisms quickly.
- Countries adopt a degree of data commercialization oversight – more viewed as policy guidelines than strict regulation.
- Most policy/regulation concerns <1m GSD data. Above this there are few limitations.



GOVERNMENT HIGHLIGHTS



- Aiming to create a £40B space economy by 2030
- Satellite Vu, receiving \$6.5M in govt. grants

\$149 million
5% 5-yr CAGR *National EO budgets*



- CNES initiated CosmiCapital, a venture fund dedicated to space.
- Post-Pleiades, CO3D (2023), funded by govt. Airbus will own the system and able to produce recurrent models for export.

\$300 million
1% 5-yr CAGR



- Regulatory regime that does not impose an absolute limit for the spatial resolution of data being sold commercially
- ConstellR received \$2.3 million in grants

\$407 million
4% 5-yr CAGR



- Guiding practices for collecting <1m data over China, otherwise adheres to agreements of the foreign operators.
- Targets gaining market share for imagery than security concerns from the satellites it allows for commercialization

\$1.3 billion
0% 5-yr CAGR



- Data <1m GSD to be screened & cleared.
- INSPACe, a regulatory and space promotion organization announced in 2020, is designed to facilitate interactions between ISRO and the private sector.

\$216 million
18% 5-yr CAGR



- The Remote Sensing Records Act stipulates an approval process for the use of some instruments, inc. <1m GSD
- In 2018, it announced a pool of ¥100B (\$940M) of capital offered over 5-yr to the space sector.

\$1.1 billion
5% 5-yr CAGR



BENCHMARKING TECHNOLOGY: OBJECTIVES

- The **NOAA Commercial Remote Sensing Regulatory Affairs office** engaged Euroconsult to provide a global understanding of Earth observation technologies.
 - Aims to show where technology leadership is at in the commercial context and how this may shift.
 - Assesses the value proposition of different projects, provides technical comparisons and the markets to be addressed.
 - Assess the likeliness of projects coming to fruition based on the funding levels and tech. readiness.
 - It demonstrates where the “cutting edge” is today, and expected to be in the future.
- It took two metrics: ground resolution, and persistence. Other factors e.g. geolocation accuracies were not measured.

Technology Definitions

SECTOR	NOTES
PAN	•Single band. greyscale image. The sensor collects data normally across the visible part of the spectrum.
MS	•Imaging in multiple pre-select imaging channels across the spectrum. Take here as across the VNIR (400 to 1,100 nm)
HYPER	•Imaging across a spectral range which is then delineated into many bands. Inclusive of VNIR and SWIR.
SWIR	•Considers both multispectral and hyperspectral imaging in the 1,400 to 3,000nm range.
THERMAL	•Imaging in both the medium-wave infrared (MWIR, 3,000 to 5,000nm) and the long-wave infrared (LWIR, 8,000 – 14,000nm)
EMMISSIONS	•Sensor specific targeting the monitoring of emissions. Mostly imaging in the VNIR and SWIR.
SAR	•Active, radar imaging. Inclusive of C, X, L, and P-band.
LIDAR	•Active, light imaging



BENCHMARKING TECHNOLOGY: COMMERCIAL RELEVANCE*

- Different sensors do different jobs. Due to how the data is collected, standards may differ. For example, while panchromatic data can be collected at 30 cm from WorldView-3, the SWIR data at 3.7m is also considered “cutting edge”.
- In longer wavelengths ground resolution and revisit are still key. Being able to monitor at a localized level (e.g. buildings), brings the most commercial potential: thus the target of companies developing thermal imaging solutions.

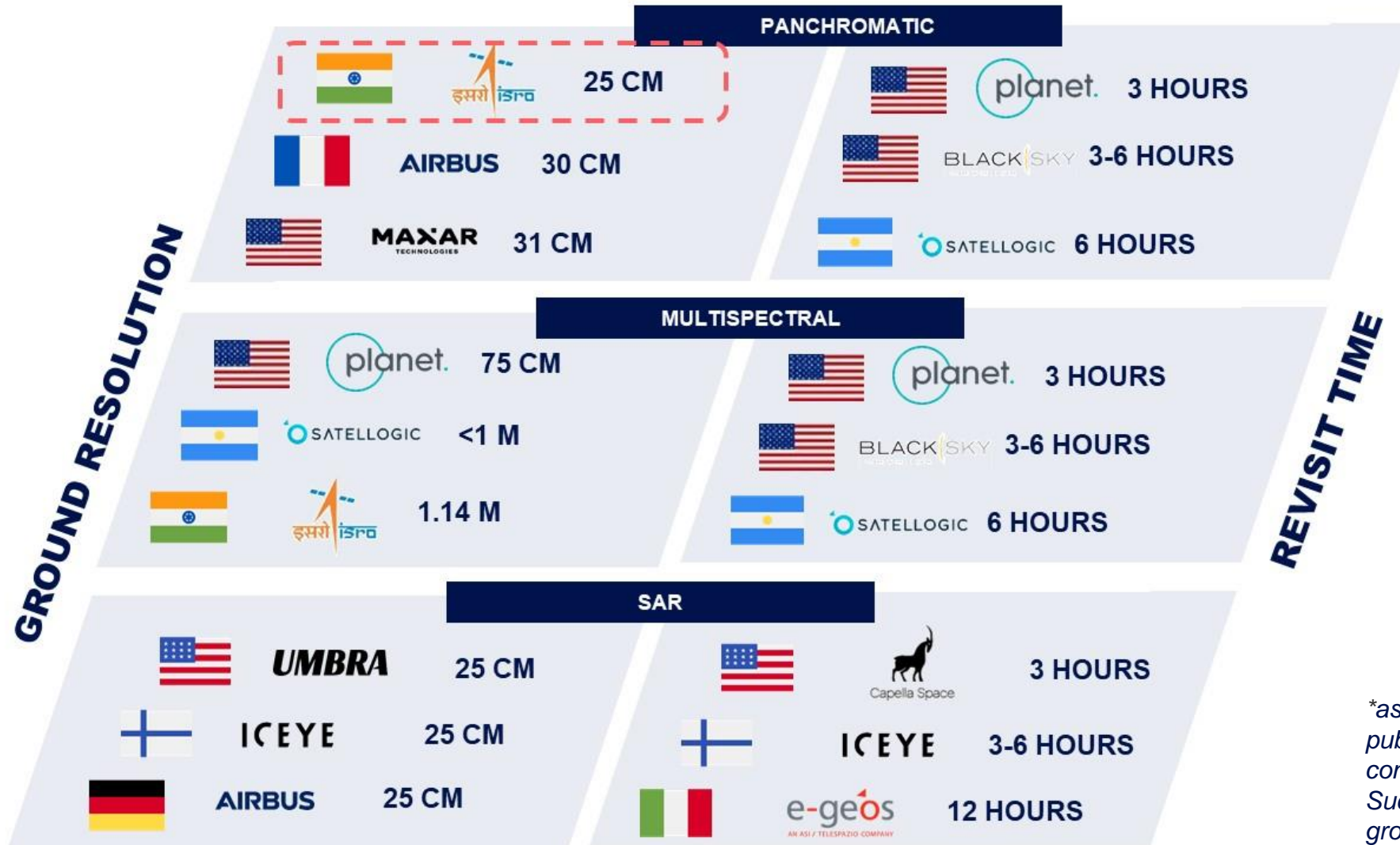
SECTOR	PAN	MS	HYP.	SWIR	THERMAL		EMM.	SAR	LIDAR
					MWIR	LWIR			
Defense									
Agriculture									
Forestry									
Water (inland)									
Infrastructure									
Location-Based Services									
Finance									
Environment Monitoring									
Maritime									
Disaster Management									
Oil & Gas									
Mining									

*Commercial relevance being if the data is suitable to meet the requirement of the user sector. These requirements vary by application. In other words there is “high relevance” for SWIR in defense if ground res. of 5m can be achieved and a regular revisit.

High relevance	Moderate relevance	Low relevance
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BENCHMARKING TECHNOLOGY: CURRENT SITUATION

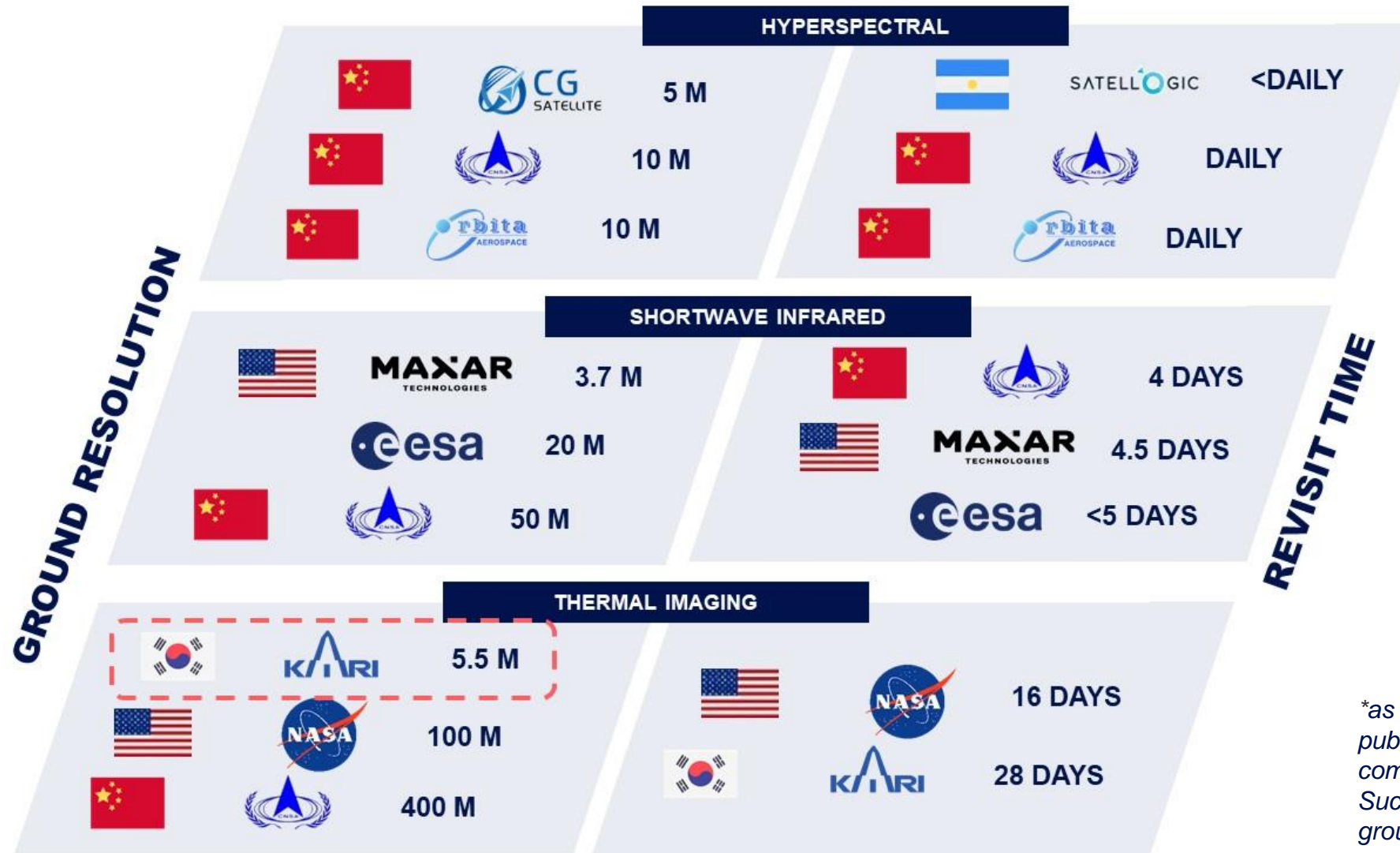


Not currently commercialized

**as much as possible - based on public information - like-for-like comparisons are being made. Such as matching maximum ground resolution to its revisit.*



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BENCHMARKING TECHNOLOGY: FORWARD LOOKING

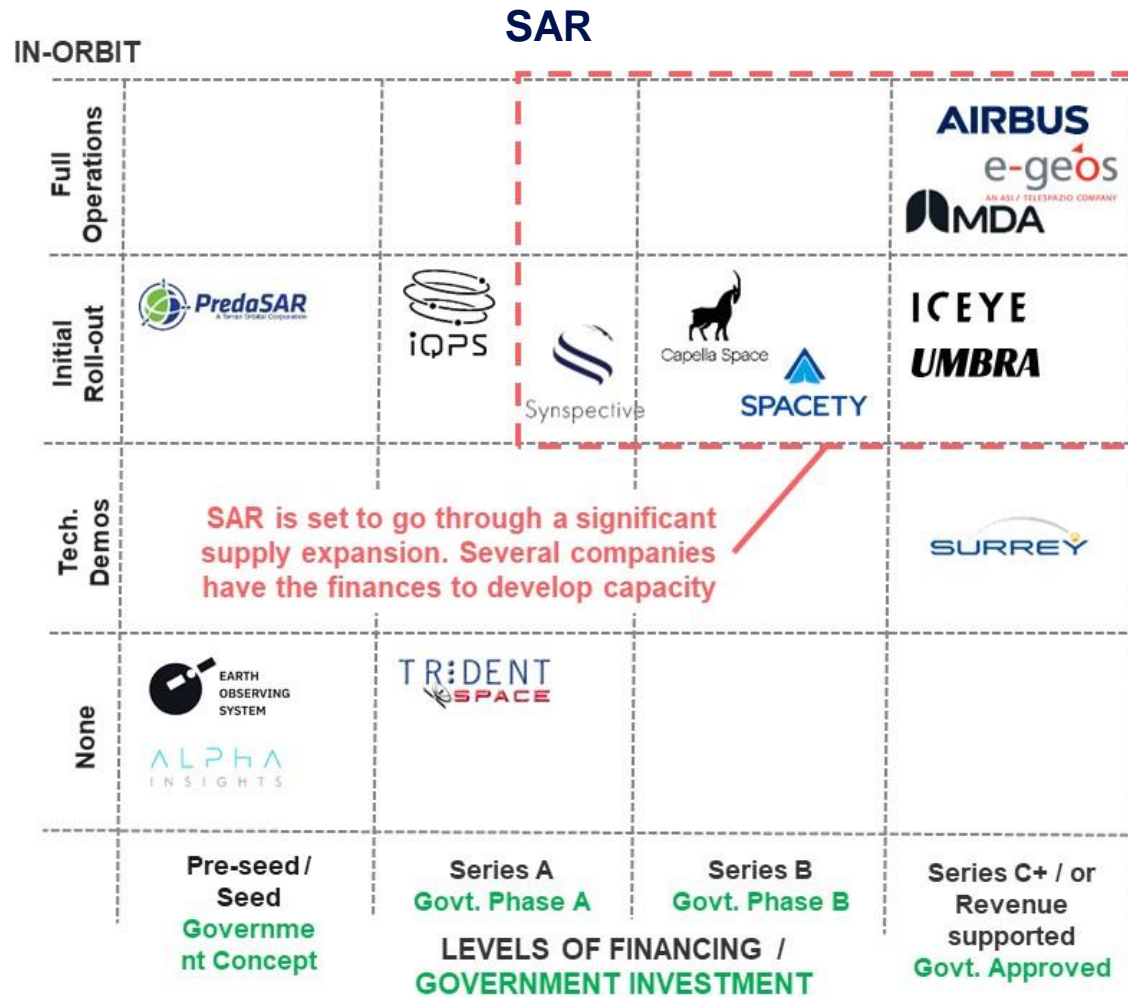
- Competition is increasing: U.S. companies will compete globally for market share.
- Margins are smaller for the “best data” available.
- In 5 yrs, U.S. companies unlikely to be the “best” in each category, but, will have capacity in each area.
- It will remain a leader in pan. and ms imaging; challenged in longer wavelengths.
- SAR is more competitive: U.S. companies + incumbents + new entrants
- The rise of China: expected to have strong offerings in several sensor categories.

	SAMPLE ORGANIZATIONS		FUTURE CAPABILITIES (FIVE YEAR WINDOW)
PAN	Albedo, ISRO, Maxar, Airbus, Planet		<ul style="list-style-type: none"> • Getting to 0.25m ground resolution will be the new standard. Companies such as Albedo may push this to 0.1m.
MS	Maxar, CG, iSi, Satellogic, Earth Observant		<ul style="list-style-type: none"> • Multispectral <1m becomes standard. Several companies aiming at 0.75m. Earth Observant aims for 0.25m.
HYPER	Northstar, Hypersat, OSK, Wyvern, Pixxel, CG		<ul style="list-style-type: none"> • 5m VNIR and <10 SWIR expected as standard, at least at daily revisit. To 1m VNIR and lower SWIR by end of decade. • Multispectral SWIR, WorldView-3, still the highest.
SWIR			
THERMAL	Satellite Vu, Albedo, ConstellR		<ul style="list-style-type: none"> • 5.5m MWIR is found on Kompsat-3A, in five years <5m ground res. data is expected to be delivered commercially.
EMISSIONS	GHGSat, Bluefield		<ul style="list-style-type: none"> • Getting to ~20m ground res., daily for various emissions. Can be more entrants as hyperspectral venture into SWIR.
SAR	Umbra, Iceye, Spacety, Capella, PredaSAR...		<ul style="list-style-type: none"> • The new standard for SAR to be 25 cm imagery. Some companies will target a higher ground resolution (15 cm – Umbra) whilst others focus on revisit (<30 minute – Spacety)

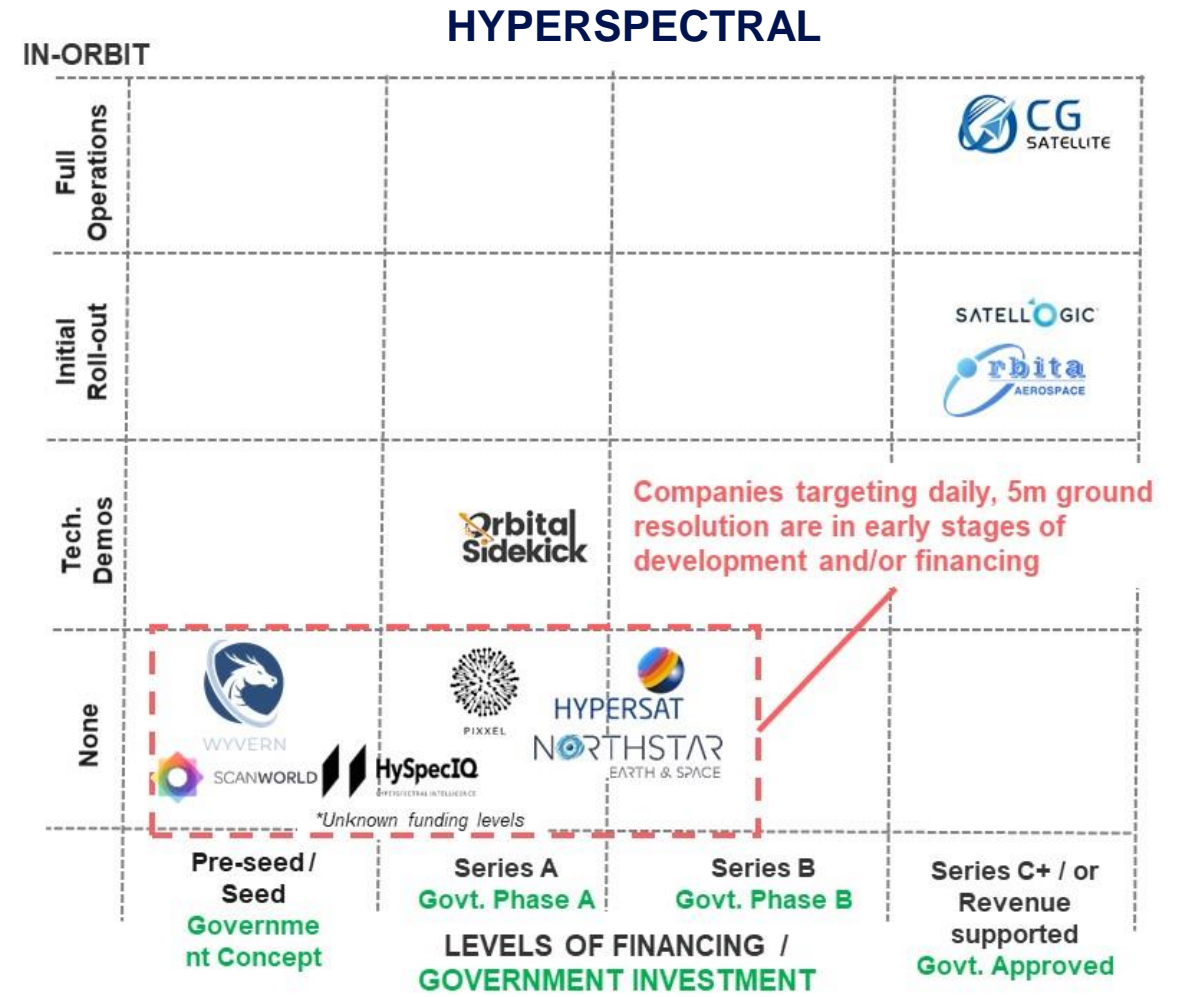
*It is expected that not all projects will come to fruition, noting in numerous cases significantly more financing is required. However with multiple companies aiming at similar targets “some” are also assumed to succeed.



BENCHMARKING TECHNOLOGY: SAR & HYPER COMPARISON



Similar story for Pan/Multispectral



Similar story for thermal imaging

Muchas Gracias

Дякую

Danke

Merci

谢谢

شكرا

Thank you

спасибо

Շնորհակալություն

ありがとうございました

Euroconsult Group

France · USA · Canada · Japan · Australia

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