

Maxar Technologies (MAXR)

Returns Will Be Legion-dary

We are long shares of Maxar Technologies, a leading provider of space-based imagery and infrastructure as it nears the launch of a game-changing new constellation, WorldView Legion. The operational and financial benefits of the new fleet once it enters service will be nothing short of transformative. The constellation will expand on Maxar's already market dominating high-resolution imaging capacity, and enable new higher revisit use cases. We estimate the combination of higher growth and the conclusion of capital spending associated with Legion will drive free cash flow from a little over breakeven currently, to \$360m by 2023. This cash flow enables a virtuous cycle of balance sheet repair – with continued debt reduction and interest savings from refinancing working to de-risk the balance sheet, lowering leverage from 5.0x to well under 3.0x. Longer-term, this prodigious cash flow has the potential to be aimed more directly at shareholder returns. We estimate over the next 5 years Maxar is poised to generate an amount of cash equivalent to ~70% of its current market cap.

These are the kinds of changes that should launch a massive re-rating story, so why are shares unchanged from where they were 7 months ago?

Despite setbacks that are normal within the context of demanding space programs, after two negatively received delays in the past year, we believe the market has adopted a wait-and-see approach to the timing of Legion's launch. In addition, the outcome of a key government contract and the nature of competition from newly public satellite-based data and analytics peers have been identified as longer-term risks to the story. We believe all three concerns are overblown and the next several weeks and months are studded with potential positive catalysts.

First up: an update on the status of Legion on next week's earnings (Aug. 4th). Our research and industry checks confirm that Legion is on track to launch before year-end. In fact, we believe Maxar and its suppliers have worked so effectively to address the causes of the delays announced last May, that the engineering teams are now working with a bit of cushion. As far as the government contract, our conversations with former senior officers within the NRO and NGA with decades of procurement analysis and expertise gave us comfort that consensus forecasts are not at meaningful risk. Finally, a significant portion of this report is devoted to addressing the vast differences in design and capabilities which Legion enjoys versus smallsat peers, and how there is little overlap in their TAMs. With BlackSky and Planet engaged in SPAC mergers it's unsurprising there is a level of "new space" versus "old space" promotion circulating, but as an industry expert advised, "take it all with a grain of salt," as Maxar and newer entrants are not engaged in head-to-head competition.

At ~14% '23E FCF yield and 8x '23E EV / EBITDA, both substantial discounts to the S&P and defense peers, we believe the market is discounting far too pessimistic an outlook on the timing and success of Legion. When positive news flow hits regarding constellation launch, we see a stock no longer rooted to the ground, and Legion marching shares upward to our \$85 price target (+142%).

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I. Investment Highlights

All systems go: Legion remains on schedule for Q4 launch. Maxar's financial future rests on the success of its next-generation WorldView Legion constellation. After repeated delays, the timing of Legion's launch is a key catalyst for the stock. Two supply chain issues announced in May were the key culprits behind the most recent delay which pushed launch from September to 4Q. Conversations with industry experts and supplier checks suggest **these issues have been resolved** and confirm recent management comments that the program remains on track for a 4Q launch date. We believe management will reiterate this timing on next week's earnings call, and greater confidence in this long-awaited event will lift shares.

Key government contract will be awarded early next year in line with expectations. The NRO is in the process of awarding a multi-year government contract for the procurement of geospatial optical imagery. Known as the Electro-Optical Commercial Layer (EOCL), this contract will replace Maxar's current sole-source EnhancedView contract, worth \$300m/yr. There is some uncertainty as to the ultimate size and split of the new vehicle for Maxar given the presence of new entrants in the market. Our research into the issue yielded comfort that any significant reduction in dollar content to Maxar is highly unlikely and awards will be made in a manner in line with Maxar's 2023E financial objectives.

Market perception of risk from competition is misplaced. With several recent SPACs of earth observation companies, the potential for disruptive competitive pressure has been brought up as a risk in our conversations with the street. These concerns are overstated and reflect a poor understanding of new(ish) entrants' technical capabilities and TAMs. Maxar may be "old space" given its heritage, but its Legion constellation is state-of-the-art, and nothing about its ability to sell industry leading high-resolution imagery and analytics to the most discriminating of government entities is compromised by smallsat operators primarily chasing (limited to) commercial customers for growth. We see the addressable markets for smallsat players and Maxar as distinct, and the nature of competition being far from zero-sum.

FCF and de-leveraging will drive massive re-rating. Once Legion is complete, Maxar will embark on a multi-year capex holiday. The combination of improved topline performance and lower spend will drive transformative FCF growth from breakeven currently to over \$360m by 2023E, allowing for rapid de-leveraging and a de-risked financial profile. With visibility into sustained FCF growth and high EBITDA / FCF conversion, the case for Maxar to re-rate from its historical EV / EBITDA determined trading ranges to a FCF yield-based methodology is strong. There is clear precedent for such a shift: Iridium. Our report examines the uncanny similarities in the investment narratives of the two companies and why in the coming years Maxar is well-positioned for the same re-rating story.

Valuation upside is substantial. At current levels, we believe Maxar shares are mispricing the risk of additional Legion delay, providing an attractive entry point to our bull case price target of \$85 (+142%). Shares trade at just 14% yield on 2023E consensus FCF, a massive discount to defense companies. Recent buy-rated initiation reports from Morgan Stanley and Goldman Sachs assigned price targets of \$50+ (40%+ above the current stock price) on multiples they acknowledge to be conservative. Our price target is based on a 2023E target FCF yield of 6%, as the benefits of completion of Legion resets valuation more in-line with industry peers.

II. Company Overview

Capitalization and Summary Financials							
Capitalization (as of 3/31/21)		Financial Summary (\$ mm)					'23E Target ⁽¹⁾
			2020A	2021E	2022E	2023E	
Share price (\$)	\$35.03	Revenue	\$ 1,723	\$ 1,761	\$ 1,945	\$ 1,941	
Diluted shares (mm)	72						
Fully diluted market cap (\$mm)	\$ 2,520						
Total debt	2,189	Adj. EBITDA	422	418	501	572	~580
Less: cash	(22)	Capex	(308)	(244)	(167)	(125)	(128)
Enterprise value	\$ 4,731	Free cash flow	(65)	9	240	366	~360
EV / '22E EBITDA	9.4x	per share	nm	\$0.12	\$3.33	\$5.08	
Net leverage	5.2x	FCF Yield		0.4%	9.5%	14.5%	

Source: Company filings, Kerrisdale analysis

1. 2023E Maxar financial outlook, Feb 24, 2021. FCF guidance pro forma \$35m reduction in annual interest expense following \$350m pay down of 2023 notes, as disclosed on 1Q21 earnings call.

Maxar is a global provider of products and services focused on Earth Observation (EO) and space infrastructure. After a (complicated) series of mergers, Maxar is a combination of the world's leading satellite imagery company (DigitalGlobe) and a leading manufacturer of GEO communications satellites and supplier of space-based infrastructure and components. The company operates in two reporting segments:

- Earth Intelligence (60% of Revenue, 95% of EBITDA):** currently owns and operates a constellation of 4 satellites: WorldView-1, WorldView-2, WorldView-3, and GeoEye-1. Maxar offers its customers industry leading high-resolution imagery and sells advanced geospatial information, applications, and analytic services to national security and commercial customers. The segment includes Vricon, a provider of unique 3D imaging and analytics for a range of mapping, training simulation, and targeting applications. ~90% of segment revenue comes from US and international governments and defense agencies under largely recurring, multi-year contracts. Commercial customers include Amazon, Google, and Facebook. Excluding the effects of EnhancedView deferred revenue, the segment has posted a trailing 3-yr revenue CAGR of 5%. Northern Sky Research forecasts the EO market is entering a period of growth and will rise from \$3.4bn in total revenue in 2019 to \$8.1bn in 2029, a 9% CAGR driven by increased demand for downstream data and analytics.¹
- Space Infrastructure (40% of Revenue, 5% of EBITDA):** designs and manufactures communications and earth observation satellites, on-orbit satellite servicing vehicles, and robotics for space and planetary exploration. 60% of segment revenues come from commercial customers, the balance from US federal government and agencies. Maxar is building the Power and Propulsion Element for the lunar Gateway that will send the first woman to the moon. Sales have contracted and the segment has operated at a loss the past three years following a slump in the commercial GEO comsat market. Company guidance for 2021E reflects a stabilization of topline and a return to profitability.

¹ *Satellite Based Earth Observation*, 12th Edition report, Northern Sky Research.

The upcoming launch of Legion will replace lost capacity in the wake of the failure of [WorldView-4](#) in 2019, and re-accelerate growth in the Earth Intelligence segment with enhanced capabilities. The successful launch and operation of Legion is paramount to the company's financial future.

Space Infrastructure is poised for a turnaround after years of losses following the collapse of the commercial GEO communications satellite market, and management is executing on a return to profitability while diversifying the business into more civil and defense end markets. It's an interesting story and one we're constructive on, but from a financial and valuation perspective, we believe investor focus is best directed towards Earth Intelligence, given the near total contribution to EBITDA and FCF that segment represents.²

Maxar must navigate through a compact series of catalysts over the next year before harvesting returns on the \$600m of invested capital behind Legion:

Date	Key Event
August 4, 2021	2Q21 earnings, update on timing for Legion launch
Late Aug / Early Sept	Updates on final testing and delivery schedule
December 2021	Refinancing of 9.75% bonds due 2023
Late 4Q	Launch of first two Legion satellites
1Q22	NRO Electro-Optical Commercial Layer (EOCL) contract, successor government contract vehicle to EnhancedView (\$300m) awarded
2Q22	Second Legion launch carrying four satellites completes constellation

This report focuses on addressing prevailing market concerns: the timing of Legion, the outcome of the EOCL contract, and the perceived risk posed by newly SPAC'd smallsat competitors. The first catalyst occurs next week. Our work indicates the long-awaited launch has not suffered any new setbacks and the risk of management announcing any further material delay is minimal: Legion is on track for a 4Q launch.

III. Legion is on Track for 4Q Launch

"I'm told there's really no change to the schedule...they still have cushion, they haven't eaten into it, so it's looking good...they're thinking end of August / September – the satellite is going to be done."

— Legion supply chain source (July 15, 2021)

Potential for further delay in the launch of Legion is a chief risk for the stock cited by sell-side analysts. We would argue that pre-occupation with whether Legion launches in 4Q21 or slips to 1Q22 is silly given far more material delays are normal in the industry and the long-term financial benefits Legion will reap are clear, but one can sympathize with market participants who remain

² For more background information on Space Infrastructure, three sell-side firms have recently initiated coverage of Maxar: Morgan Stanley – Overweight, \$50 price target (July 15, 2021), Baird – Neutral, \$39 price target (July 14, 2021), and Goldman Sachs – Buy, \$52 price target (June 16, 2021).

skeptical after hearing about Legion for nearly 5 years. After all, each of the last two announced setbacks have resulted in dramatic stock declines.

On November 5th, 2020, Maxar announced pandemic-related manufacturing delays that required moving the launch of the first two Legions from 1H21 to early September. Though short-lived (shares regained previous highs before the end of the month), Maxar stock cratered -25% on news.

On May 5th, 2021, during the 1Q21 earnings call, unexpected supply chain-related setbacks from key vendors, Honeywell and Raytheon, and the knock-on effects these delays had on integration and testing, once again delayed launch, this time from September to sometime in the 4th quarter. Though a delay of a mere ~9 weeks, investors once again ran for the exits, this time sending shares down nearly -30%.

Since the May drawdown, shares have traded in a wide range, rebounding 45% to regain pre-first quarter earnings levels in June before reversing sharply through the first 3 weeks of July. We believe recent weakness, amid a broader risk-off environment for smaller cap names, is attributable to shorts pressing their positions (short interest is ~9% of float) as incremental buyers who are “twice bitten, thrice shy” sit on the sidelines, waiting for 2Q earnings to hear the latest on Legion timing. In our view, the current stock price now discounts a level of concern over timing that is inconsistent with our independent checks, management comments, and the implication of a recent contract announcement.

Risk of Further Delay is Minimal – Supply Chain Issues Resolved

Our checks with sources familiar with the Legion program supply chain not only confirm management comments that launch remains on schedule for 4Q, but support our belief that there is cushion in the schedule. We believe the two main issues identified back in May: rework of a Raytheon optical instrument and shortage of a Honeywell component used for stabilization of the spacecraft – **have been resolved** and the teams charged with on-time delivery, quality, and technical performance of the satellite are confident in meeting their deadlines. In the opinion of our source “everything is on track” and “things are going really well.” We believe delivery of the Raytheon instrument may have recently taken place, and the satellite should therefore be in the process of final integration. This suggests final testing should commence late August / early September, leaving ample time to launch before year end.

One reason Legion has been able to remain on track is its elevated status among suppliers. On the 1Q earnings call, CEO Dan Jablonsky stated that the Legion program had received a “DX” rating under the Defense Production Act in response to the Honeywell component shortage. This is an important designation (though based on our conversations with the street, an underappreciated one). “DX-rated” programs must be approved by the Secretary of Defense and are reserved only for programs of the highest national urgency. The rating is not common. A [list](#) of DX-rated programs from 2018 has only 13 entries (5 related to Presidential aircraft) across all of the DoD, Navy, and Air Force and includes such high-profile programs as the B-2 Stealth Bomber and Integrated Ballistic Missile Defense System. The rating means suppliers *must* prioritize resolution of Legion’s supply issues above all programs (except other DX-rated programs), and that pressure from the DoD and Maxar has effectively backstopped the timeline from a supply chain perspective.

Our research uncovered other reasons to (finally) be bullish on the timing of Legion. With complex defense programs there are almost always multiple reporting layers between the on-site engineering teams directly engaged with production and the C-suite. These layers tend to create a spiral of optimism as timelines and estimates provided by those closest to the program are revised ever more aggressively to appease senior management (a potentially dangerous game of telephone). As a result, it is often prudent of the market to assume any timeline ultimately conveyed to investors has little to no wiggle room. We believe that, at least since May, Legion is an exception to this rule.

Jablonsky has [stated](#) he has spent time in person with the Raytheon team, overseeing efforts to resolve the workmanship issue. According to our source, direct CEO engagement with supplier engineers on-site is an extremely rare level of involvement. Our checks described close and constant communication between Jablonsky and program managers as reducing the risk that engineering concerns would not be heard or timelines set unrealistically. The typical layered chain of command between those tasked with completing the satellite and the CEO has been replaced with a single, short link. There was no built-in optimism when the delay into 4Q was announced.

Another datapoint suggesting Legion timing has suffered no additional setbacks occurred on July 7th, when Maxar announced an expanded [agreement](#) with an international defense and intelligence customer. The full significance of this announcement eluded even some of the bulls we have spoken to on the subject. The \$35m contract extends the customer's ability to directly task and download 30-cm class satellite imagery to its ground station, and will provide direct access to Legion satellites once they enter operations. According to our source, that contract is unlikely to have been signed now without the customer conducting due diligence into the status of Legion and being assured of timing after speaking directly with Maxar's program manager.

While our confidence in the timing of Legion is cemented by our independent research, we also point out that on 3 separate occasions since May earnings, Jablonsky has reiterated the timeline for Legion:

- May 20, 2021 (BofA Industrials Conference): "We are continuing to drive to a Q4 launch...I've been spending a lot of time with the senior leadership and actually with the site teams for Raytheon. And then Honeywell as well, and we have got lots of assurances, and I think they're on track to be able to make summertime deliveries, which would enable us to hold on those Q4 launches."
- June 8, 2021 (UBS Industrials Conference): "We made quite a bit of disclosure on the last quarter call, Q1 call, about where we were with the program and some of the issues that one of our suppliers was having. That supplier is still on track to do what we thought they would do..."
- June 23, 2021 (JPMorgan note summarizing meetings with Jablonsky and CFO Biggs Porter): "Legion remains on-track for Q4 launch. There is no change to the schedule from Q1 earnings, with Maxar still expecting Raytheon to deliver optical instruments this summer and we view this as the pacing item for the launch."

Lastly, with all the focus on timing we would be remiss to not include a word on quality. Our checks have indicated that particularly since the failure of WorldView-4, Maxar and its suppliers have set extremely tight parameters for component testing and raised requirements for redundancy. However uncomfortable they have been for investors, delays have arisen in part because Maxar has remained focused on quality and product integrity, rather than simply making a deadline.

IV. NRO Electro-Optical Commercial Layer Contract

At \$300m/year, the National Reconnaissance Office's (NRO) EnhancedView Contract represents nearly 1/3rd of Maxar's Earth Intelligence revenue and is the single most valuable contract in the commercial Earth Observation industry. DigitalGlobe (now Maxar) has been the sole provider of high-resolution commercial satellite imagery to the US government under this program since 2012, but that is almost certainly set to change.

In [2019](#), in response to growing demand and evolving intelligence community requirements, the NRO began an assessment of commercial satellite imagery providers through the award of study contracts to Maxar, BlackSky, and Planet Labs. As the director of the NRO's Geospatial Intelligence Directorate, Troy Meink, [stated](#) at the time, "The demand signal is growing. That's one reason why we're going to be stepping up our procurement of commercial imagery. We really need to look at increasing the number of vendors and getting access to more vendors to meet those capabilities. [Commercial imagery] is going to give us more capability for the dollar than we would have otherwise."

Historically, procurement decisions have been driven by resolution, geolocation accuracy, radiometric quality, and collection volume – attributes for which Maxar enjoys dominant technological capabilities. Over the past decade however, higher cadence and more rapid revisit rate capabilities have grown in importance within the intelligence community. Periodic imaging of a particular target has shifted to a need for more frequent image collection and persistent monitoring to better detect and react changes in activity. Consequently, all 3 vendors have publicly announced intentions to drive more global revisit rates with their current and next generation constellations.

Though the final option year of EnhancedView runs until 2023, the study contracts with these three companies will inform NRO spending under a new procurement vehicle dubbed the Electro-Optical Commercial Layer (EOCL), which will replace EnhancedView and likely award contracts through 2025 and beyond.

Given the importance of EnhancedView and the perceived risk that newly SPAC'd smallsat competitors could encroach on Maxar's historical monopoly, how and when it is restructured has been identified as an investment risk and important catalyst for the stock. Trying to gain insights into this contract when NRO budgets are classified is no easy task. Nevertheless, over the last several weeks we conducted interviews with satellite industry experts, former executives from Maxar and other imagery providers, and former senior executives at the NGA and NRO with decades of geospatial imagery acquisition expertise.

The range of views on the ultimate size and split of the funding varied materially. Broadly speaking, those who foresaw a sizable increase in dollar content to Maxar based their views on the strength in overall geospatial imagery demand and political pressure on the NRO from Congress and the administration to further embrace commercial resourcing. Former NGA executives informed us only 20-40% of US government requirements are currently being satisfied even at the present funding level – a product of insatiable demand for imagery and an EnhancedView contract that has not kept pace with inflation over the past decade. Given this backdrop, it would seem logical that a \$50-\$100m increase in the overall budget, a pittance in the grand scheme, would be justified and provide Maxar with upside to its present funding.

Other industry experts espoused a more pessimistic view for Maxar, believing a drop below \$250m in the initial years of the new contract was possible. From their vantage, a shift away from budgets allocated to foundational imagery that provides mapping, safety of navigation (more “tree-hugging” use cases as one put it), to more tactical, persistent monitoring was warranted, and in alignment with the NRO’s warfighting priorities. Maxar, for the record, has shied away from providing any discrete numbers and, according to an analyst who recently initiated on the stock, the company’s house view is simply “\$300m is the floor.”

In the end, the most reasoned, nuanced (and in our opinion, unbiased) views on this subject came from conversations with veterans of the NRO and NGA, with years of experience overseeing acquisitions and directing acquisition policy. It was their shared opinion that a reasonable expectation for an increase in the NRO budget would be to roughly \$320m-\$330m for the first year. Why such a seemingly modest rise? In short: old habits die hard. As an agency established to develop, build, and operate its own reconnaissance satellites, there is a lingering [bias](#) within the NRO to save budget requests for multi-billion national systems they build versus increasing support (however modest by comparison) for commercial. Hence, though an increase is in the cards, it is only a token one to blunt potential criticism from overseers.

As for how that contract will be split, the EOCL request for proposals (RFP, a document we believe few on the street have read) provides some clues. The [RFP](#) describes 3 imagery capability areas: Foundation Imagery, Intelligence Points/Area Imagery, and Non-Taskable Theater Collection Imagery. We were advised Maxar is destined to earn the lion’s share of first year funding as nearly 80% of the total requirements of the RFP are tied to Foundation Imagery – a capability for which Maxar has no serious competition. As an ex-NGA official described, “There are things that were clearly written to be favorable to Maxar...crumbs will accrue, relatively, to Planet and BlackSky.” With Maxar unlikely to be completely shut out in either of the other capability areas, particularly given BlackSky’s constellation is still under development, the company should be able to earn a figure at, or slightly below, its historical \$300m under EnhancedView in year 1. Note, unlike EnhancedView, EOCL will not be fixed and is anticipated to grow in years 2-5 as budgets and constellations evolve. In the end, we believe a starting point for Maxar modestly below \$300m will conclude the 5-year period comfortably above it, such that the average contract value approximates its current \$300m/yr of funding – a figure consistent with consensus expectations.

Our work not only indicated to us that EnhancedView funding levels will remain largely intact, but that the timing of new awards under EOCL will likely slip to next year. The RFP which was supposed to be [finalized](#) last year is still in draft stage; any NRO budget increase for new programs and projects would be stalled as part of overall federal budgeting that appears headed to a series of Continuing Resolutions. The presence of annual EnhancedView extensions through 2023 also has the effect of removing urgency in the process. All the experts we surveyed on the timing of this contract expressed a low degree of confidence in awards being made before the end of this calendar year. We believe this sets up a difficult catalyst path for those who are short because, to the extent there is any disappointment in how EOCL plays out, it would only come *after* Legion is launched in 4Q and Maxar slashes interest costs by refinancing its 9.75% bonds that are callable December 15, 2021.

V. Concerns Over Competition Are Misplaced

According to sell-side analysts, the spate of satellite imagery SPACs – BlackSky, Planet, and Satellogic – has been cited by some clients as evidence of disruptive, competitive pressure building against Maxar. We suspect these are under-informed generalists and/or SPAC-focused investors lacking nuanced understanding of the earth intelligence industry. We believe the narrative of newer entrants disrupting an “old space” company like Maxar is mostly marketing spin and posturing. Maxar and smallsat operators have vastly different constellations which enable vastly different use cases. Unless BlackSky and Planet are about to blow \$1bn in SPAC proceeds on next generation satellites, the cash from going public will not narrow any of the fundamental, space infrastructure-based differences. Smallsat constellations are no more disruptive to Maxar than a fleet of Kias is to a Ferrari. Maxar and smallsat operators are not in direct competition and success is not a zero-sum game.

The investor decks for [Planet](#) and [BlackSky](#) illustrate the clear differences in business models and addressable markets versus Maxar. The presentations emphasize “data lakes” and AI/ML enabled analytics – in part due to a shameless bid to be compared with richly valued companies like Palantir and Snowflake (they are after all, SPACs) – but also because their focus is on markets that do *not* require exquisite satellite imagery. In fact, BlackSky management has told investors it wishes to be thought of as a software and data analytics company that “just happens to own some satellites.”

While Maxar is completing an ambitious \$600m satellite capex program that will solidify and expand on its competitive moat, both BlackSky and Planet have tilted away from aggressive investment in their constellations. The shift is understandable – investing in satellite constellations is time consuming and expensive – even for smallsats. Two years ago BlackSky’s financial position was so tenuous that it fell [behind](#) in making payments to its satellite manufacturer and needed a \$50m rescue loan from Intelsat. At the time, BlackSky had a goal of operating 60 satellites and increasing revisit times to “hourly.” Fast forward through the SPAC process and instead of using those proceeds to accelerate that goal, the target has been cut in half to 30 satellites some time in the future.

Rather than invest in a new satellite architecture with a larger aperture to improve resolution capabilities, last year Planet decided to [lower](#) the altitude of its SkySats. While successful in saving money (a larger aperture would require a completely redesigned larger spacecraft), industry experts believe the maneuver will result in shorter lifespans and reduced collection capacity. Going forward, Planet has signaled no desire to use any of the SPAC proceeds to enhance its constellation, [stating](#) it does not need to add new satellites to its fleet beyond ordinary course replacement.

So where is all the money raised being spent? Primarily sales and marketing. As Planet described in its call announcing the SPAC transaction, spending will be geared toward doubling customer success teams, increasing sales account executive headcount by 2.5x, and a plan to “significantly increase marketing spend to support awareness of the Planet brand and solutions.” The reason for this spending is because unlike Maxar, BlackSky and Planet have forecasts dependent on rapidly growing their commercial customer bases. Trying to sell space-based data to mining companies, shipping operators, and insurance firms is wholly different from selling to government agencies. US and foreign defense intelligence agencies don’t need to be educated on the capabilities of geospatial imagery – they invented it. Commercial, on the other hand requires raising awareness and customer education of what the data can do for their business

and how a subscription generates a sufficient ROI. That Planet stated a need to invest in teams to “improve customer retention” suggests that cultivating and maintaining commercial customers will not be an easy task.

The Legion constellation was purposely designed and built to solve the specific demand requirements of Maxar’s current customers. In contrast, Planet and BlackSky began as (and still are) interesting technologies that are now trying to stimulate demand and develop new use cases for markets that are still being defined. No part of Planet’s and BlackSky’s growth plans impinge upon Maxar’s ability to sell its differentiated, exquisite high-resolution imaging capabilities and analytics to its core set of ~10 long-standing, highly discriminating US and international government accounts, a group which accounts for 90% of its Earth Intelligence business.

To be clear, we are not dismissive of the potential for smallsats to change the earth observation industry. Persistent monitoring is an intelligence use case for which high revisit constellations are well-suited. A wealth of emerging commercial applications for remote sensing – natural resource monitoring for commodity firms, construction process monitoring for fraud, waste and abuse, port monitoring for fleet operators – are indeed exciting areas of growth for the industry. Where bears are wrong is in thinking growth along those vectors will come at the expense of Maxar’s current book of business or growth forecast.




VI. It Takes a Legion

In 2017, Maxar (then DigitalGlobe) initiated the development of WorldView Legion, a new \$600m constellation of six high-resolution earth observation satellites. In addition to assuring customer continuity by replacing satellites aging out of Maxar’s current fleet, the constellation will provide higher revisit rates (up to 14x depending on resolution), concentrate collection over high demand areas and triple its very high resolution (VHR) imaging capacity (generally defined as below 50cm). Two satellites will launch later this year with the remaining four to follow 3-6 months after. Below we review some of the key attributes of this next generation constellation while highlighting its advantages versus major smallsat peers.

Overview of Peer Constellations

Maxar's new Legion class satellites cost \$100m each, have useful lives of 10+ years and can collect massive amounts of commercial industry leading VHR imagery (~30cm). BlackSky and Planet have developed (or are targeting) constellations of ~21-30, low-cost, high revisit, mini fridge-sized satellites that pair lower resolution imagery with analytics and differentiated monitoring capabilities. While current smallsat constellations may hold some advantages in revisit / persistence use cases, Maxar dominates across every other key consideration: resolution, spectral quality, geolocation accuracy, and collection capacity.

Comparison of Key Constellation Characteristics

			
Satellite Name	WorldView Legion	SkySat	BlackSky Global
Constellation Size (Current / Long-term)	0 / 6	21 / 21	5 / 30
Launch Date	4Q21	2013	2016
Cost per Satellite (\$m)	\$100	\$5	\$10
Design Life (years)	10+	~6	3
Mass (kg)	750	110	44
Orbit (km)	450	400	450-670
GSD (Pan)	29 cm	50 cm	~1.0 m (50-70 cm in 3rd gen.)
Positional Accuracy	<1.5m	<10m	>10m
Max Revisit	6-14x / Day*	10x / Day*	12-15x / Day (2023E)

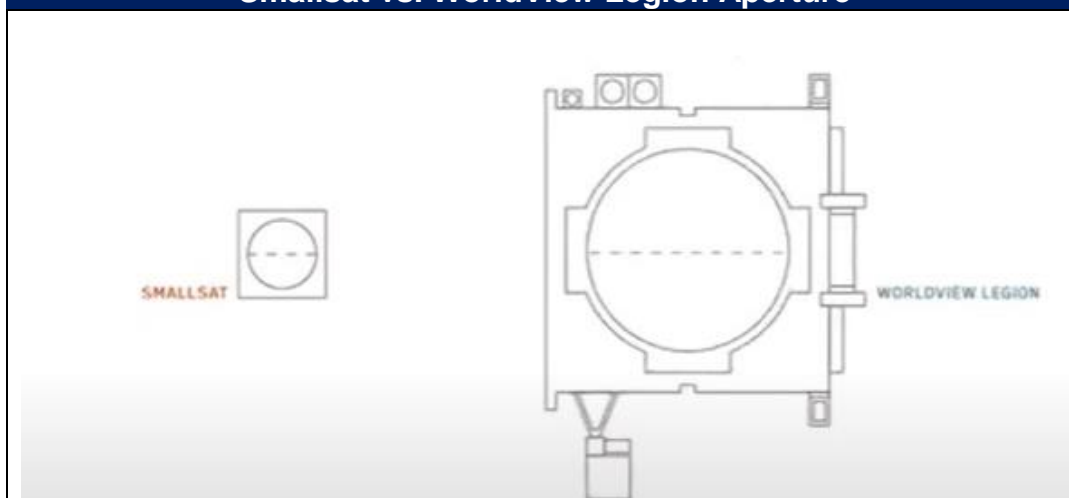
Source: Kerrisdale analysis, company investor presentations, [Gunter's space page](#), [Design Drivers for a Viable Commercial Remote Sensing Space Architecture](#) by Dr. Walter Scott, CTO Maxar.

* Varies by region. Max revisit for Maxar also varies by resolution level.

Industry Leading Resolution

One of the defining competitive advantages of Legion is resolution. Maxar is the only US commercial provider of 30cm geospatial imagery and Legion will expand on that capability. What enables this very high resolution is the satellite's much larger aperture. Legion satellites have apertures slightly below 1m versus sub ~30cm for smallsats.

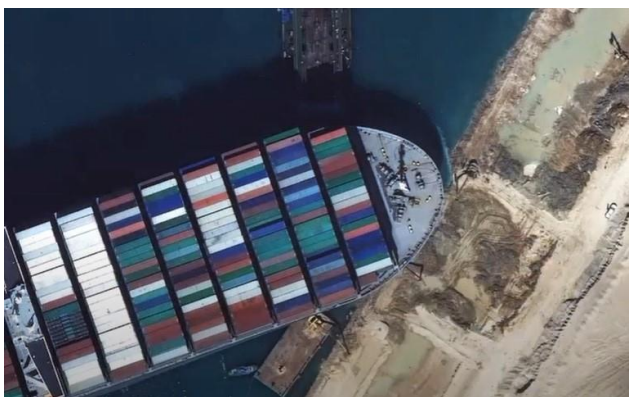

Smallsat vs. WorldView Legion Aperture



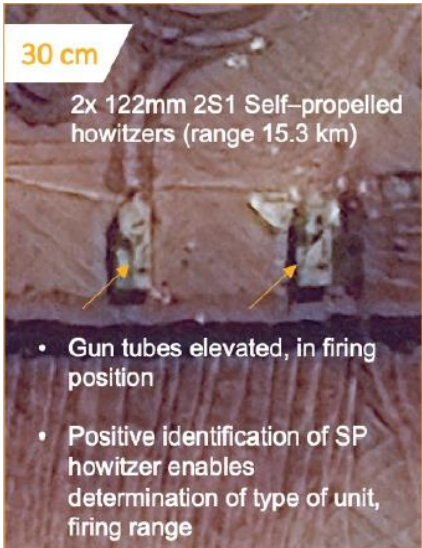
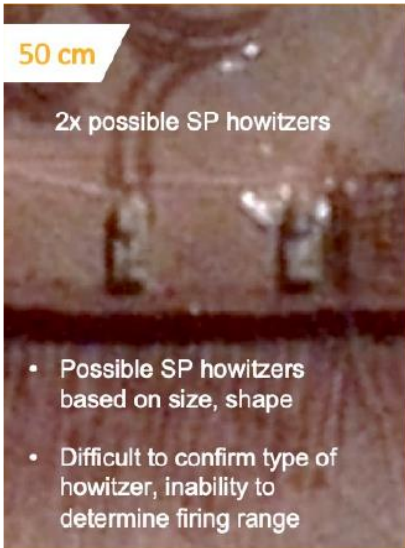

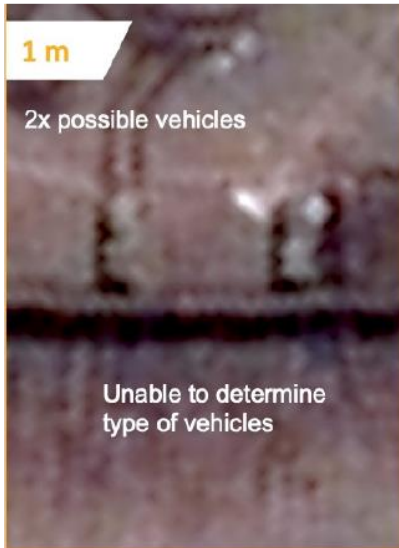
Source: [GeoIgnite Lunch Keynote: "Why it Takes a Legion"](#), presented by Maxar CTO, Dr. Walter Scott

The difference in image quality and the ability to extract actionable analysis from 30cm VHR vs. smallsat imagery is stark. For example, only with the detail provided at 30cm does the challenge to free the Ever Given container ship which ran aground in the Suez Canal this past March become apparent.


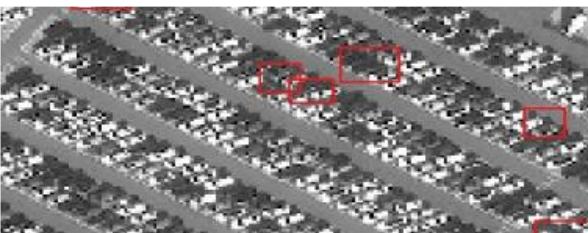
Maxar 30cm Imaging vs. Smallsat

Maxar 30cm Resolution	BlackSky 1m Resolution
	
Source: GeoIgnite Lunch Keynote: "Why it Takes a Legion"	

For the most discriminating customers on the planet, defense and intelligence agencies, VHR data is justifiably viewed as the gold-standard. In the below example, at 1m resolution (bottom right), the presence of 2 vehicles is not confirmable. Even at 50cm+ (Planet's best resolution after lowering the altitude of its SkySats) the type of vehicle is not readily determinable from the image. Only at 30cm resolution (top left), does the image contain sufficient detail for actionable battlefield intelligence: the exact type of military equipment (122mm howitzers with a firing range of 15.3km) and their potential threat (gun tubes elevated, in firing position).

Higher Resolutions Deliver More Actionable Intelligence	
30cm	50cm
<p>30 cm</p> <p>2x 122mm 2S1 Self-propelled howitzers (range 15.3 km)</p>  <ul style="list-style-type: none"> • Gun tubes elevated, in firing position • Positive identification of SP howitzer enables determination of type of unit, firing range 	<p>50 cm</p> <p>2x possible SP howitzers</p>  <ul style="list-style-type: none"> • Possible SP howitzers based on size, shape • Difficult to confirm type of howitzer, inability to determine firing range
70cm	1m
<p>70 cm</p> <p>2x possible armored vehicles</p>  <p>Unable to determine type of vehicles</p>	<p>1 m</p> <p>2x possible vehicles</p>  <p>Unable to determine type of vehicles</p>
<p>Source: Design Drivers for a Viable Commercial Remote Sensing Space Architecture, Dr. Walter Scott.</p>	

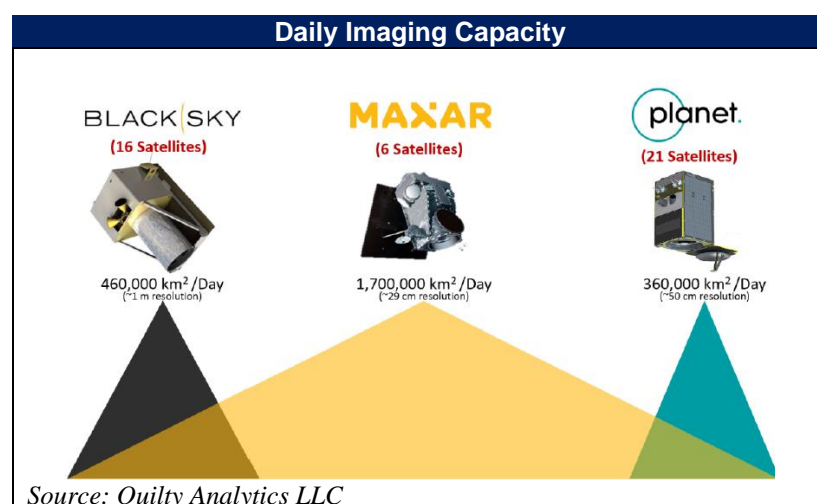
BlackSky and Planet tout marrying AI/ML with their lower resolution images but there are limits to what those technologies can do.

Higher Resolutions Support Superior AI/ML Generated Insights	
ML on 30cm Imagery – 1,267 cars identified	ML on 60cm Imagery – 31 cars identified
	
Source: Maxar March 2021 Investor Presentation	

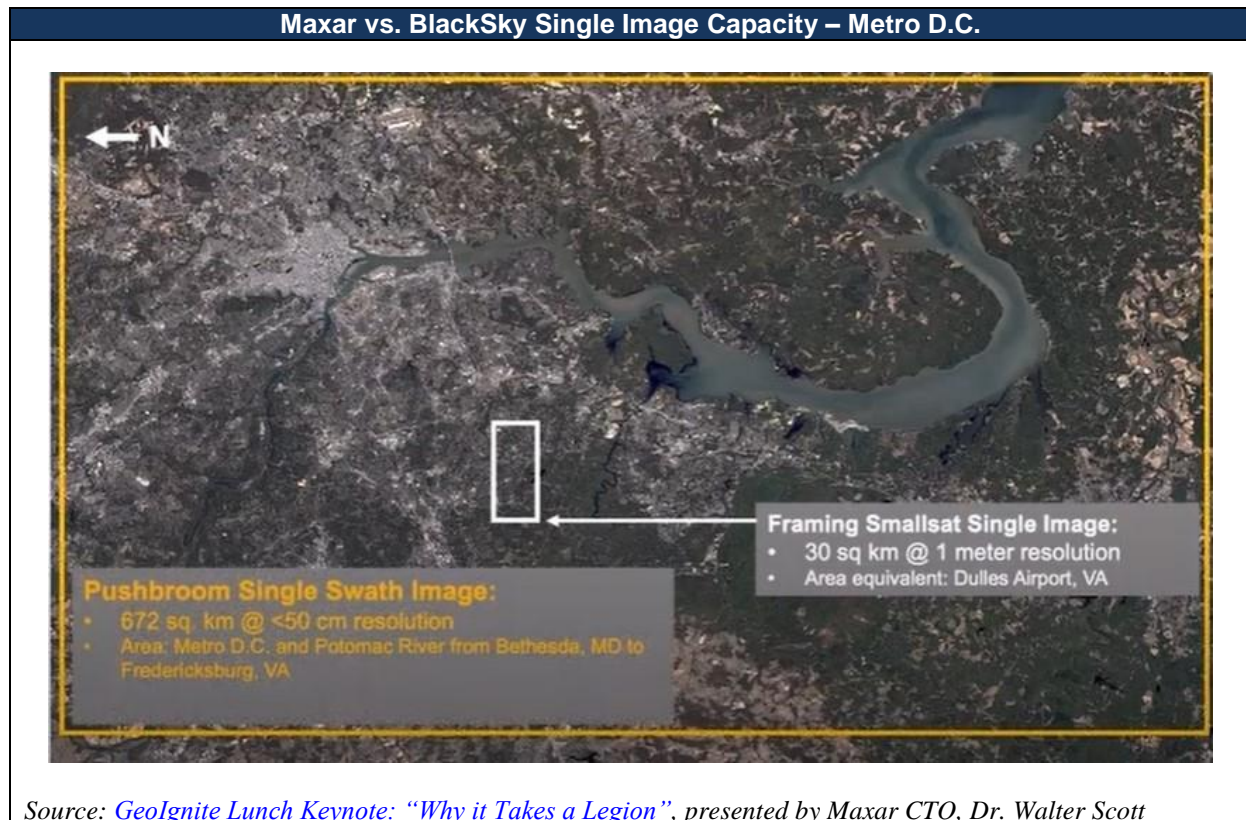
Above is an example of how AI/ML data becomes much more accurate and actionable when supplied with VHR imagery as opposed to lower resolutions. On the left, 1,267 closely spaced cars were identified by an ML algorithm provided with a 30cm resolution image. On the right, the algorithm only identified 31 cars given the same image at 60cm resolution. The only way to ensure accuracy is to have sufficient detail in the underlying image. Much like how the facial recognition algorithm on your phone won't recognize you if you're seated across the room, AI can't pull details out of lower resolution pixels because the information simply isn't there. Tuning the algorithm to simply recognize any object invites the problem of not knowing if what's being counted is a car or shed or dumpster – undermining the usefulness of the exercise in the first place.

Collection Capacity

Legion not only provides industry-leading resolution, but the ability to capture orders-of-magnitude more area at once in a single pass. The diagram below illustrates the vastly larger area Maxar can image per day versus smallsat peers. With Legion, Maxar will be able to collect 1.7m sq. km / day at ~30cm resolution (yellow triangle), 3-5x more than smallsat operators' ability to collect lower quality images.



The image below illustrates what this collection advantage means in practice. The yellow framed border is the entire Metro D.C. area from Bethesda, MD to Fredericksburg, VA that Maxar can image at 50cm in a single swath (672 sq. km). The relatively puny white box in the center is BlackSky's imaging capacity at 1m resolution. To identify change, it's important to capture the entire area at once, or at least within the time constant of the change that is measured. Smallsat apertures are so small, and their field of views so narrow, it is often likened within the industry to viewing the world through a straw. Capturing larger swaths in a single orbital pass literally helps analysts see the bigger picture, which is particularly helpful if attempting to assess the hardest hit areas of a country after a hurricane or to track a set of highly mobile targets like tanks, field guns, and aircraft.



In the below chart we layout the unassailable advantage Legion enjoys when it comes to collection capacity and how it translates to capital efficiency. With the ability to image 800 sq. km per day (the size of Texas) at 50cm resolution and a 10-year design life, each individual Legion has a lifetime capacity equivalent to 78 Planet SkySats. Over its lifetime, a single Legion will image 93x more area at 50cm than BlackSky can at ~1m resolution. BlackSky presentations highlight its cheap satellite costs versus Legion, but what they get is what they pay for. When Legion's \$600m constellation cost is divided into its lifetime collection capacity (amortized cost), the result is much lower costs per sq. km than BlackSky or Planet, even at much higher resolutions.

Collection Capacity Comparison

	BLACK SKY	planet.	MAXAR	
Satellite Name	BGS	SkySat	WorldView Legion	
Constellation Size	16	21	6	6
Resolution	~1 m	50 cm	50 cm	30 cm
Aggregate Collection Capacity ('000s sq. km / day)	460	360	4,800	1,700
Daily Capacity per Satellite ('000s sq. km / day)	29	17	800	283
Annual Capacity per Satellite ('000s sq. km / year)	10,494	6,257	292,000	103,417
Design Life (years)	3	6	10	10
Lifetime Capacity per Satellite ('000s sq. km)	31,481	37,543	2,920,000	1,034,167
Multiple of SkySat			78x	28x
Multiple of BlackSky			93x	33x
Satellite Cost (\$ m)	10	5	100	100
Constellation Cost (\$ m)	160	105	600	600
Amortized Capacity Cost (\$ per sq. km)	\$0.32	\$0.13	\$0.03	\$0.10

Source: Kerrisdale analysis, BlackSky and Planet investor decks, [GeoIgnite Lunch Keynote: "Why it Takes a Legion"](#), presented by Maxar CTO, Dr. Walter Scott

Higher Revisit in Mid-Inclination Orbits

As a constellation of six satellites, Legion represents a sharp departure from Maxar's historical practice of procuring "one-off" improvements to its fleet. In addition, the satellites will be launched into a mixture of orbits: two will be placed into sun-synchronous orbit (SSO) and four into 45° mid-inclination orbit (MIO). Having more spacecrafts enables higher revisit and more persistent monitoring use cases. Their presence in inclined orbits concentrates time spent over areas most in demand while providing the ability to capture images throughout the day. These are profound enhancements to Maxar's capabilities that we have seen little appreciation for in the financial press.

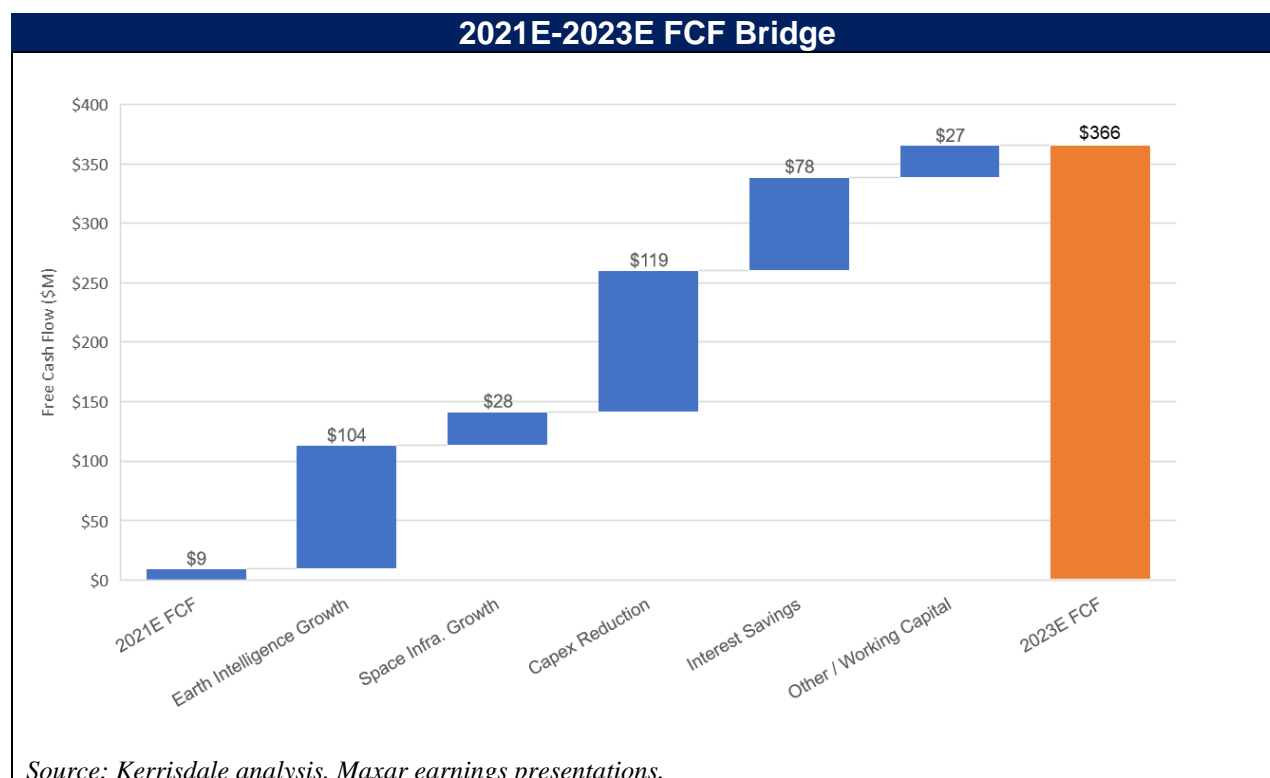
Roughly 95% of the world's population lives in the $\pm 50^\circ$ latitude band. Most change occurs, and the most in demand to be imaged places are naturally, where people live. Traditionally however, earth observation satellites have operated in SSO, meaning the satellite orbits over the poles, spending considerable time outside of those latitude bands and away from areas of high interest. The reason for this is because SSO allows for imaging at the same local time every day (mid-morning is a common pass time), during optimal illumination and cloud cover conditions. By comparison, a single satellite in MIO would spend more time over the interesting parts of the world, but because the local time of imaging varies, there would be multi-day blackouts when the satellite passing would occur at night, local time.

Legion addresses this problem with four satellites in MIO. This optimizes capacity over high interest areas, eliminates the blackout periods, and provides resilience in the case of failure. It also means the constellation can image a given area throughout the day, from dawn to dusk rather than only wrapped around noon. Mid-inclination orbits are critical for applications involving persistence monitoring and ensuring “custody” (making sure what is being tracked is not switched at some point) because, obviously, activity takes place at times other than between 10:30am and 1:30pm. Maxar has never had satellites in mid-inclined orbits before, thus this represents a game-changing enhancement to its monitoring capabilities. Of Planet’s 21 SkySats, only 6 are in MIO, a nod to its founding mission to map the world. This means that while Planet certainly has high-revisit rates, depending on the region, much of it may be clustered around mid-day. As a result, when it comes to monitoring highly mobile targets throughout the day – necessary for military applications unless one thinks that planes, tanks, and field artillery only move at lunch – its constellation may not be as well-suited as a headline revisit rate suggests.

VII. FCF Growth to Drive Re-Rating of Shares

Our optimism for Maxar shares is grounded in the ability of the company to rapidly de-lever and generate meaningful FCF once spending on Legion winds down. We estimate the combination of a reacceleration in topline growth from new Legion capacity, lower capex from the start of a multi-year holiday (until ~2026 when WorldView-3 approaches end of life), and interest cost savings from debt reduction and refinancing will drive FCF to over \$360m (~\$5.00 per share) while reducing leverage from ~5.0x presently to 2.6x by the end of 2023. This cadence of financial benefits is common to all capital-intensive companies in the satellite industry. Leverage peaks (well over 5x in some cases) when building, launching and putting new satellites into service, and then falls quickly when harvesting the returns on invested capital.

Below we provide a bridge from 2021E to 2023E FCF. Of the increase, roughly \$100m in EBITDA will be gained from increased Legion capacity (an additional ~\$190m in revenue at ~54% incremental margins) and \$28m from margin improvement within Space Infrastructure. The balance of the increase (a little more than half of the total) is driven by capex reduction with the completion of Legion spend (\$119m) and interest savings (\$78m).



Our estimates are broadly in-line with Maxar's 2023E financial targets which, despite being issued before the most recently announced delay in Legion timing to 4Q21, we believe remains intact. Even in the event that Legion slips modestly into 1Q22, potential interest savings (\$20m+) from refinancing \$500m of 9.75% bonds callable December 15th (currently *not* included in the company's 2023E estimates³) for a business that scales quickly, gives us comfort that \$5.00 per share in FCF would still be achievable.

We believe that once Legion is operational and the financial profile is on a de-risking glidepath, shares will re-rate meaningfully, not just toward the high end of historical EV / EBITDA trading multiples, but on a FCF yield basis. Why are we so convicted in our belief? Because we've seen this happen before.

Case Study: Iridium

Though likely lost on generalist investors, and only just beginning to be recognized by bullish sell side firms, Iridium's financial profile from 2015-2017 and how its shares traded in the back half of 2018 serves as a useful study in how the next few months (and years) may unfold for Maxar. The similarities are, frankly, uncanny. Much like Maxar is today, Iridium was a SMID-cap satellite services company dealing with a bloated balance sheet, attempting to launch a major new constellation (a whopping \$3bn investment over 8 years) beset by multiple delays. Iridium too, was engaged in the renegotiation of a key government contract, its shares were heavily shorted

³ Biggs Porter, Maxar CFO at UBS Industrials Conference (June 8, 2021): "Now we expect, we can continue to drive down interest too, so there's an opportunity to continue to make the numbers better through future re-financings, even without any other external sources of capital, we can take advantage of opportunities to refinance debt in addition to paying it down organically and reducing interest costs **and that's upside to the cash flow numbers.**"

(10-15% short interest), and the company had to contend with half-baked notions of how new entrants would disrupt its business (Value Investors Club is littered with failed short theses on how Starlink or OneWeb or Google Loon would wipe out Iridium's niche).

In May 2018 however, with announcement of the 6th successful Iridium NEXT launch (notably, still 8 months and 2 launches *before* final completion of the constellation in mid-2019), Iridium shares began to dramatically re-rate. It became apparent to the market that after years of delay, Iridium would indeed finish the project and begin to enjoy the benefits of another crucial similarity to Maxar: a long capex holiday. The path to meaningful positive free cash flow generation and balance sheet repair led shares to rise over 50% in the 3 weeks following the May 22, 2018 launch and Iridium shares went on to hold those gains in a year the S&P finished down -6% and the S&P 500 Communication Services Sector fell -16%.

In the years since, Iridium has successfully shifted cash flows from prioritizing debt paydown to rewarding shareholders with a meaningful buyback. In Iridium's 2019 [Investor Day](#) the company previewed this shift when describing a path to \$2bn in capital returns through 2025, equivalent to 70% of its then current market capitalization – an almost identical level of cash generation relative to market cap that Maxar now finds itself in. Since the initial re-rate in 2018, Iridium shares have gone on to *double*.

A crucial development in how the market has come to view Iridium also holds importance for the Maxar bull case: Iridium succeeded in shifting the street's primary valuation metric away from a historical emphasis on EV / EBITDA to FCF yield. In 2018, Iridium price targets were set using ranges of 11-13x EV / EBITDA. Examine sell-side coverage of Iridium now (Barclays or William Blair, for example) and price targets are based on 4-6% FCF yields (an implied EV / EBITDA over 17x, a complete break from how Iridium traded prior to completion of its constellation). The market rightfully rewarded Iridium's competitive moat, highly contracted, predictable level of topline growth, and high EBITDA margins and high conversion of EBITDA to FCF. Post-Legion, Maxar will share all these attributes.

While we acknowledge there are differences in the underlying businesses and Maxar's infrastructure segment arguably muddies comparison (only in an academic sense since we estimate the division contributes *de minimis* FCF to the overall company), we believe Maxar has both the potential and intent to execute a very similar re-rating story once Legion is complete.

VIII. Valuation

Our bull case price target of \$85 (+142%) is based on a 6% 2023E FCF yield, in line with defense primes, SMID defense companies, and Iridium (see: Appendix I - Trading Comparables). Given the disparate nature of Maxar's two reporting segments, we also provide a sum-of-parts analysis. Assigning 14x EBITDA to Earth Intelligence, again broadly in line with a blend of peer multiples (a slight premium to larger defense primes which is warranted given the segment's higher margins), a discounted 7x EBITDA for Space Infrastructure given its ongoing turnaround, and including cumulative interim cash flows from 2022E-2023E of \$605m, returns a price target of \$86.

Kerrisdale Valuation

FCF Yield

2023E FCF per Share	\$5.08
Target FCF Yield	6.0%
Target Price	\$85
Premium to Current	142%

Sum-of-Parts

	'23 EBITDA	Multiple		Enterprise Value	
		Base	Bull	Base	Bull
Earth Intelligence (70% of Corp.)	518	11.0x	14.0x	5,700	7,254
Space Infrastructure (30% Corp.)	59	5.0x	7.0x	293	410
Total EBITDA ⁽¹⁾	577			\$5,993	\$7,664
Less: 1Q21 Net Debt				(2,084)	(2,084)
Add: Interim Cum. Cash Flow (2022E-2023E)				0	605
Implied Equity Value				3,909	6,185
/ Shares Outstanding				72	72
Target Share Price				\$54	\$86
Implied '23E FCF Yield				9%	6%
Premium to Current				55%	145%

Source: Kerrisdale Analysis, consensus estimates for peers per Bloomberg.

1. Assumes 70% of corporate overhead is assigned to Earth Intelligence, 30% to Space Infrastructure.

IX. Conclusion

The hackneyed phrase “space is hard” gets tossed around nearly every time there’s a delay in a program or high-profile failure. And indeed, there is no harsher, more challenging engineering environment than the final frontier. But the reason why missions and investment dollars continue to pour in is because, as demanding as space is, it is often also worth the risk. The next year for Maxar could not be more pivotal and will put that risk to the test. The path is littered with events and catalysts every quarter. The first step on the path occurs next week with the timing of Legion reconfirmed.

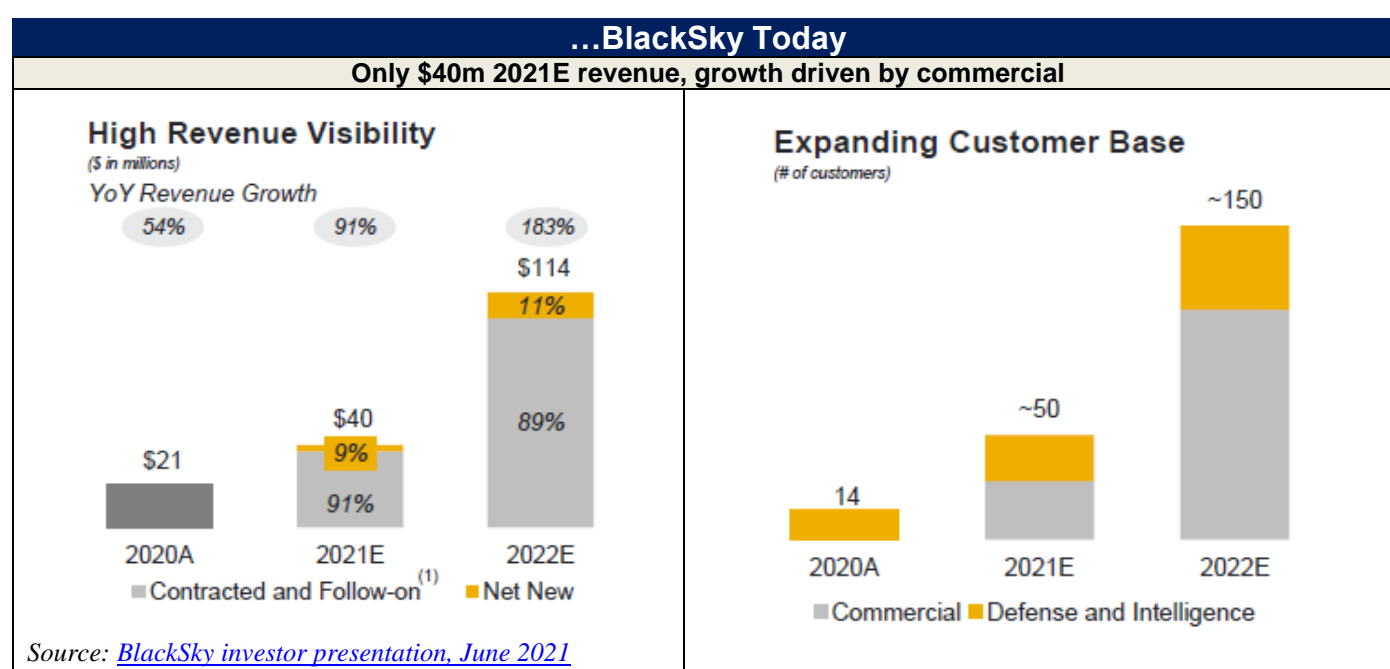
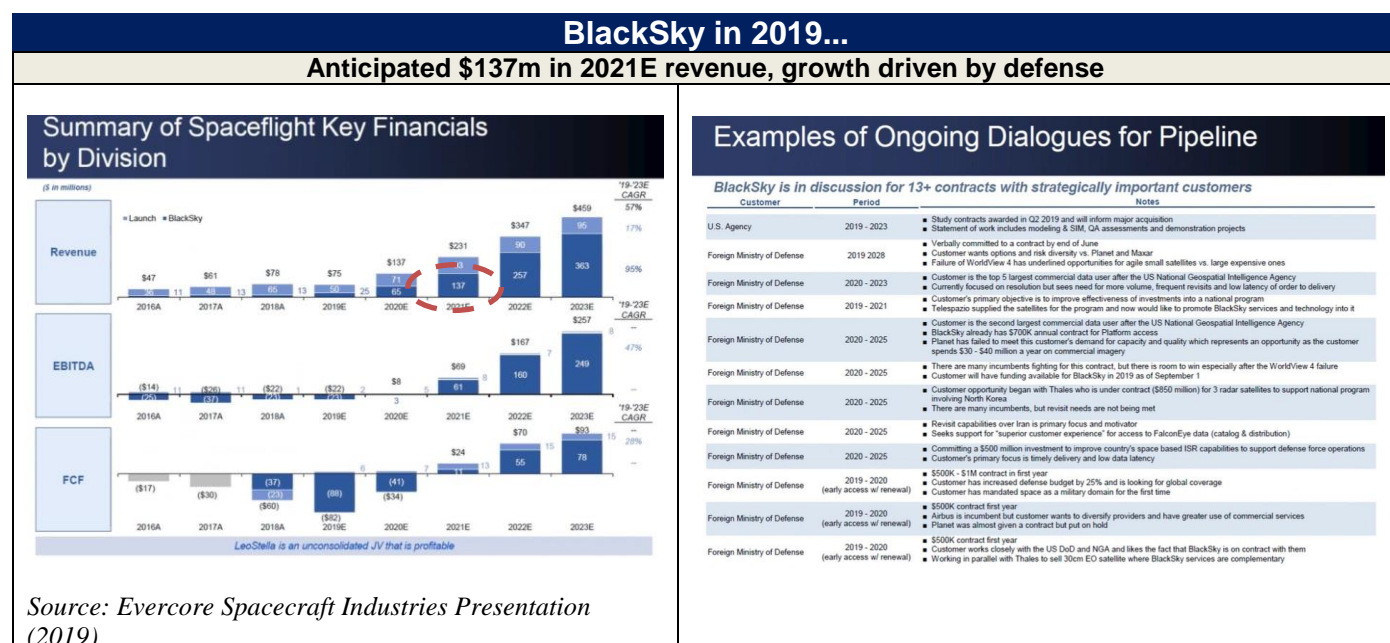
Appendix I: Trading Comparables

Trading Comparables						
	EV / EBITDA			FCF Yield		
	2021E	2022E	2023E	2021E	2022E	2023E
Defense Primes						
General Dynamics	13.4x	12.7x	12.0x	5.6%	6.5%	7.0%
L3 Harris Technologies	13.4x	12.6x	12.4x	6.1%	6.5%	6.8%
Lockheed Martin	10.7x	10.2x	10.0x	7.0%	7.2%	7.3%
Northrop Grumman	11.3x	12.8x	12.1x	5.0%	6.0%	6.3%
Raytheon	15.7x	12.9x	11.2x	3.5%	4.6%	5.8%
<i>Average</i>	12.9x	12.3x	11.5x	5.4%	6.2%	6.6%
<i>Median</i>	13.4x	12.7x	12.0x	5.6%	6.5%	6.8%
SMID Defense						
Huntington Ingalls	12.1x	10.6x	9.4x	3.2%	6.8%	8.9%
Kratos	41.2x	31.6x	25.8x	-0.7%	0.8%	1.3%
Mercury Systems	18.8x	17.0x	15.2x	1.4%	2.7%	3.1%
Teledyne	24.4x	16.9x	16.9x	3.0%	4.0%	4.4%
<i>Average</i>	24.1x	19.0x	16.8x	1.7%	3.6%	4.4%
<i>Median</i>	21.6x	16.9x	16.0x	2.2%	3.3%	3.7%
Iridium	17.9x	16.6x	15.7x	4.4%	5.1%	5.5%
Maxar Technologies	11.1x	9.3x	8.1x	0.4%	9.8%	14.9%

Source: Kerrisdale Analysis, consensus estimates for peers per Bloomberg.

Appendix II: BlackSky Then and Now

Below are presentation slides dating back to when BlackSky was a division of Spaceflight Industries. They illustrate how its business model has changed (and underperformed expectations). In 2019, BlackSky was a defense-driven, satellite imaging company with \$137m in anticipated 2021 revenue. Two years later, it is a data company that “only happens to fly satellites” on pace to do a fraction of what was anticipated, only \$40m in revenue, and with future growth increasingly driven by commercial customers.



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