

LUMINAR TECHNOLOGIES

LUMINAR IS POSITIONED TO MAKE LIDAR UBIQUITOUS IN THE AUTOMOTIVE MARKET

Dear Investors and Friends,

Crescent Cove is one of the earliest investors in Luminar Technologies (Nasdaq: LAZR), making our initial investment in 2016. We are pleased to share our thoughts on the company and hope this paper provides a better sense of how we think about Luminar and the level of conviction we have in the company.

Our investment framework for Luminar is based on two core concepts: (i) the company's key competitive advantages and (ii) the factors overlooked by the market that can provide potential upside in the future.

NARROW FOCUS ON SINGLE MARKET: AUTOMOTIVE

Despite overwhelming demand for lidar commercial use units outside of the automotive market, Luminar made the strategic decision to concentrate its business development efforts on OEMs and key distributors within the automotive industry. The company believed that the consumer automotive use-case had the best product market fit, with a focus on improving safety, and the deepest market opportunity in terms of commercial contracts. Robotaxi fleets had massive appeal to the market, but Luminar believed that use case was at least 10 years away from commercial production. This was in 2016.

Fast forward to today. Luminar is working on the inside track for commercial production with most major OEMs. Luminar's current market position is the result of years of collaboration and consensus-building that a single, well-designed product will work for the automotive market. The company's single-product approach has worked only because Luminar became both the "Performance Leader" and "Cost Leader" in the space.



A Mobileye autonomous development vehicle with Luminar lidar sensors on display at Mobileye's Investor Day in 2019 (Credit: Walden Kirsch/Intel Corporation).

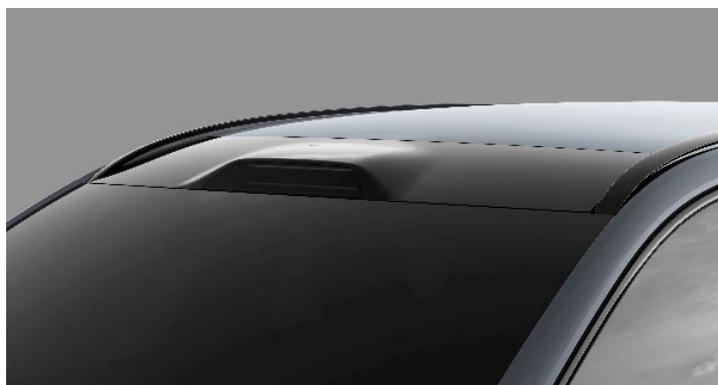
The simplicity and importance of “focus” can be easily overlooked. A notable example is Amazon’s initial focus on selling books. Amazon focused on book sales for three years before transitioning into CD and DVD sales in 1998. From there, it took Amazon only one year to transition to a broader product offering, selling toys and games and subsequently health and beauty products. By narrowing the focus of its initial product market, Amazon was able to build a beachhead strategy and create a launching pad for future horizontal and vertical markets.

We view Luminar’s narrow focus on the automotive market as a winning strategy. Although the automotive market has high barriers to entry, Luminar’s early efforts have led to long-lasting, direct partnerships with OEMs. Such strong partnerships have unlocked multi-year contracts and recurring revenues, high switching costs for manufacturers and a market with significant additional revenue opportunities compared to other ancillary markets. These traits make the automotive market a highly lucrative space. The odds of a strong number two competitor emerging and taking meaningful market share in the near term are low, and we believe Luminar is well-positioned to develop additional relationships with OEMs and grow its market share in the years to come

DEEP, COLLABORATIVE RELATIONSHIPS WITH OEMS

Luminar’s unique position within the automotive landscape is analogous to the integration of Mobileye’s advanced driver-assistance systems (ADAS) with OEMs several years ago. As the dominant supplier of one of the most critical technologies in the future of the automobile at that point in time, Mobileye revolutionized the supplier landscape and paved the way for technology companies to enjoy strong, direct relationships with OEMs. Unlike other tier-2 suppliers, Mobileye had direct R&D relationships with OEMs, which allowed it to develop a unique market position.

After securing major series production contracts, we expect Luminar’s partnerships with OEMs to continue to progress. As long as Luminar maintains its technological edge, OEMs will likely rely on Luminar for technological direction, while collaborating directly with the company on the development of tailored applications. These are deep, collaborative relationships that are difficult to dislodge.



Luminar’s Iris lidar sensors will be integrated in the roof Volvo Cars’ next generation SPA 2 modular vehicle architecture (Credit: Volvo Cars).

In addition, Luminar’s focus on the automotive sector has allowed it to develop key expertise that is particular to OEMs. Safety and autonomy will be critical technology pieces in the automotive industry for the next decade, and it is likely that major OEMs will form direct relationships with the core solutions provider to craft a hardware and perception solution. Once the fundamentals are in place, the respective OEMs will decide whether to utilize Luminar’s actuation software or develop alternatives internally. Needless to say, the switching costs to another lidar provider are not trivial. Based on our market analysis, while a winner-take-all situation is unlikely, we see potential for a duopoly or a market where one player is the clear leader.

AUTOMOTIVE GRADE AND QUALIFIED SPECIFICATIONS

The current “noise” in the market reminds us of the earlier days of our Luminar investment. Back then, lidar was touted as the ultimate solution to autonomy, and lidar start-ups were fielding multiple fundraising call requests a week. Most start-ups were making outrageous claims about their system specifications; use of a single test unit by a customer was advertised as a “strategic partnership.”

Today, we believe the market is underestimating the challenges of being vetted as “Automotive Grade” and the time required to integrate lidar technology into a commercial production vehicle. When Luminar was going through the initial vetting process with Volvo, there were multiple sub-processes that required certifications from the International Organization for Standardization (ISO) and International Automotive Task Force (IATF). Any firm that has gone through the process understands how tedious it is.

Luminar’s successful navigation through the certification process and achievement of automotive grade status is a direct result of its upfront focus of efforts to create the highest quality product. When Austin founded Luminar in 2012, he recognized that current devices were woefully inadequate. As he set out to design the best product, Austin realized that it would be necessary to build the lidar system from the ground up to optimize each component and provide the best technology, cost, reliability and commercial appeal to his OEM customers. The initial investment and effort to “get it right” has made Luminar the early leader in lidar for commercial automotive grade production, as exemplified by its order book, which currently exceeds \$1.3B. We believe Luminar’s technological and first-mover advantages will continue to provide a competitive edge and expect its order book to grow as the Company wins new commercial contracts.

FULL-STACK AUTONOMOUS SOLUTIONS PROVIDER VS. WIDGET SELLER

We believe the market is having difficulty estimating the expected value of the vertical stack of Luminar’s array of solutions. Luminar is a full-stack safety and autonomy solutions provider—not simply a pure-play hardware vendor. The lidar device alone is merely a way for Luminar to control its margin destiny; its software business of perception and actuation solutions will provide incremental margin growth.

On March 11, Luminar announced its new product suite, Sentinel, which is the first full-stack autonomous solution for series production in the industry.



Luminar Business Overview, November 2020.

Working in collaboration with Zenseact, a newly-formed software company owned by Volvo Cars focused on ADAS and autonomous software, Sentinel integrates Zenseact's OnePilot autonomous driving software solution with Luminar's Iris lidar, perception software, and other components as a foundation. The system will enable every automaker to offer hands-free, eyes-free true autonomous driving on highways and proactive collision avoidance capabilities on their production vehicles for the first time.

Zenseact is responsible for delivering its OnePilot software and Luminar's perception software to Volvo Cars, while Luminar is responsible for providing the holistic Sentinel solution to other automakers.

In our view, there is little reason for OEMs focused on highway autonomy and proactive safety not to utilize Luminar's lidar hardware and software package. Too much focus is being placed on the company's lidar sensors alone and margins for each widget. Instead, the market should be factoring in the full suite of solutions Luminar can provide OEMs with Sentinel.

UBIQUITY THROUGH SAFETY

When we first invested in Luminar, the Company's primary goal was clear from Day 1: to improve driver safety and reduce the 1.35 million annual deaths on the road each year. Increasingly, it is recognized that the human driver is prone to many errors, including speeding, distraction and impaired performance from intoxication or fatigue. The key demand driver for Luminar's ADAS is the industry's goal to make vehicles safer by removing human error from the equation. We agree with Austin's vision that there is a massive opportunity for improving even the most basic levels of assisted driving (e.g., automatic emergency braking systems and steering systems).

We believe the automotive lidar sensor industry is at an inflection point as costs for higher level sensing decrease and OEMs adopt lidar sensors to provide greater safety and comfort for vehicle passengers. Currently, most Level 0 (e.g., basic automatic emergency braking, blind spot detection) to Level 2 (e.g., simultaneous adaptive cruise control and lane keep assist) ADAS solutions employ vision and radar-based systems and do not utilize lidar. These systems can be greatly improved by integrating lidar. L2 functionality is currently integrated in 12% of new consumer vehicles produced and is expected to grow to >40% by 2025, with L2+ making up ~25% of that total. Luminar lidar will likely play a key role in the rollout of sensing technologies due to its superior range, resolution and motion-detecting capabilities. ADAS enhanced by Luminar provides higher confidence detection with faster and farther sensing capabilities than camera and radar. These superior sensing capabilities enable proactive collision avoidance at all speeds. Based on relevant NCAP test scenarios and Luminar internal simulations, Luminar's proactive safety tools decrease current reported collision occurrence rates by up to 7x.

OEMs are aggressively pushing to utilize technology to combat human errors and we believe Luminar is well-positioned to take advantage of the significant opportunities that will arise as OEMs adopt sensing technologies. For example, Volvo recently adopted its "Aiming for Zero" Safety Vision, which sets a goal that on one should be killed or seriously injured in new Volvo.

To meet this goal, Volvo, who has long been considered the trend setter in the auto industry for safety features, is adopting incremental technologies to improve its vehicles' driver-assistance capabilities and plans to incorporate Luminar's Iris sensor into the next generation XC90 SUV by 2022.

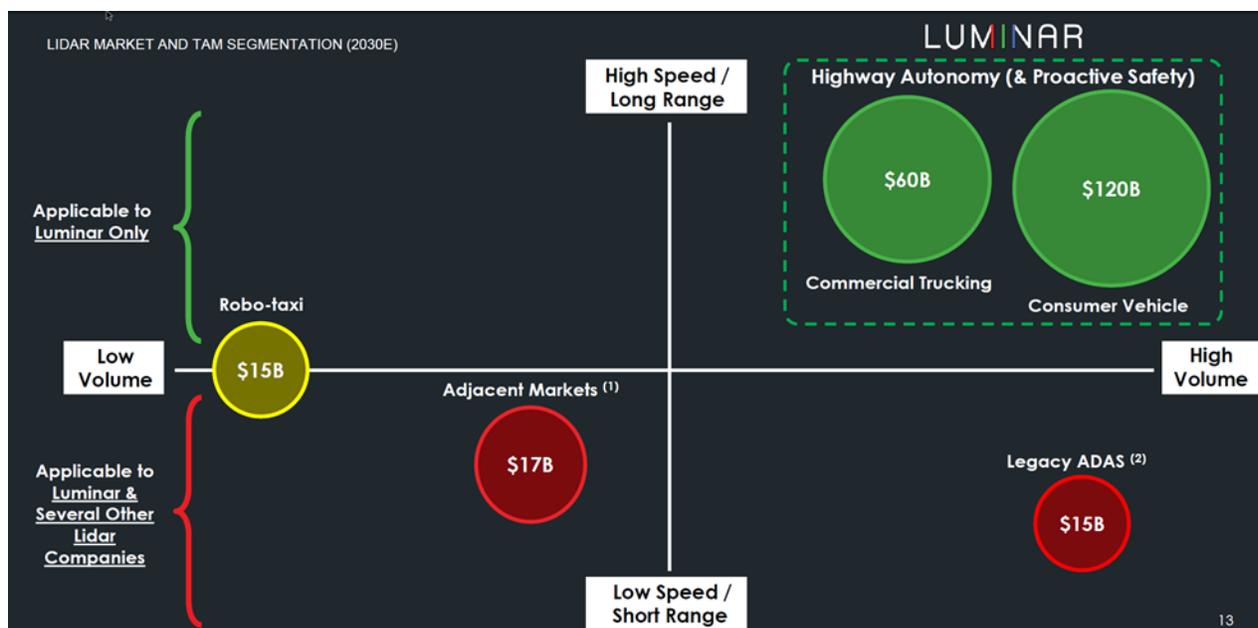
Commercial truck buyers are similarly demanding improved safety features to combat human errors. Although the segment has fewer units than the consumer vehicles segment, the market is substantial as each truck requires more lidar units per vehicle. The safety equipment market will also include software solutions designed to decipher data, process decisions and control vehicles to avoid hazards and accidents. These systems will provide a significant market opportunity, estimated at ~\$180B by 2030.



Luminar Business Overview, November 2020.

There are several other sizable adjacent and follow-on markets that provide opportunities to lidar manufacturers. The robotaxi market presents a strong opportunity for lidar. Commercial production for robotaxis is further out in time than the consumer vehicle and commercial trucking autonomous markets. However, once the technology develops to a level deemed safe by regulators, the robotaxi market will grow quickly. With pilots underway in several cities and growing demand by transportation companies such as Uber to move to a pilotless model, we expect this market to develop into a ~\$15B opportunity by 2030. There are several other adjacent markets, including defense, delivery bots and drones, construction, mining, agriculture, warehouse vehicles and other off-road vehicles that will require lidar solutions. These adjacent markets represent an additional opportunity estimated at ~\$17B by 2030.

In addition to improved vehicle safety, the adoption of lidar will generate substantial cost-savings for consumers and insurers. Insurance premiums are one of the most overlooked and significant costs of car ownership beyond the actual purchase of the vehicle. Luminar's proactive safety tools will reduce the number of accidents on the road, reducing costs to insurers and consumers. There is also potential for additional revenue streams to Luminar and OEMs through the subsidization and accelerated standardization of Luminar lidar across the industry. Luminar is poised to realize these opportunities, as evidenced by its partnership with Swiss Re, the world's largest reinsurance company, and hiring of Tesla's former head of insurance. Luminar's plan to work with insurers to appoint a highly credible, fully integrated Managing General Agent within the company illustrates that it is prepared to take advantage of the unique market opportunity.



Luminar Business Overview, November 2020. Source: Luminar estimates incorporating data from IABI Research, IDTechEx, IHS Markit, LMC Automotive, SESAR, Company Filings and Wall Street equity research. (1) Includes defense, delivery bots/drones, construction, mining, agriculture, warehouse and other off-road vehicles. (2) Based on projected L1 light vehicle volumes.

We believe the safety benefits and cost savings to all parties across the ecosystem generated by Luminar lidar will likely lead to the standardization of Luminar sensors within consumer vehicles. Once designed in, the integration will lead to recurring revenue across different vehicle platforms and models for years to come. To bridge the platform gap in the near term for existing models, it is possible Luminar will develop an aftermarket sensor that could be installed in vehicles without built-in lidar capabilities. This product offering could also generate insurance savings for fleet owners and ride-sharing companies. Whatever strategy the company chooses to pursue, it is inevitable that opportunities in the insurance industry will arise and provide Luminar with opportunities for natural horizontal product line expansion.

RISKS

It is critical for Luminar is to maintain its technological edge over competitors. The Company can take both organic and offensive measures to do so. Organic efforts will require continuous research and development of Luminar's core hardware and software products. Offensive measures will require the company to make acquisitions that augment its position. Luminar can also make acquisitions geared toward supply chain efficiency, keeping critical portions of the supply chain out of competitive hands.

Luminar might also need to take an aggressive stance against patent infringers with its robust patent portfolio of 92 patents. Luminar's patent portfolio encompasses all aspects of its lidar solutions, including software, system, emitter, scanner and receiver. Regardless of which aspect of its business is being infringed on, a rigorous approach might be required to protect its intellectual property.

Lastly, Luminar must focus on the execution of its manufacturing processes and its product delivery and reliability. Any shortfalls or delays will create customer issues and have a negative impact on incremental orders.

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