AURORA

RETROFIT AUTONOMOUS SOLUTION

ENTR6218 SPR24 TEAM 6

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1. EXECUTIVE SUMMARY

Aurora has innovated through R&D to develop a superior autonomous driving system and ancillary software and data collection systems, now they will turn that innovative spirit towards their business model or risk dependence on investment capital without turning a profit for many years. Aurora has an opportunity to focus on retrofitting their systems into existing vehicles, rather than being tied to automotive manufacturers. This is a major departure from industry norms and presents a large blue ocean within which they will quickly scale and become profitable in year 1.

2. INDUSTRY SUMMARY

The autonomous vehicle (AV) industry is dedicated to the development of fully self-driving vehicles. There are several business segments in this market. Some companies specialize in developing sophisticated software that allows these vehicles to learn and navigate their surroundings. Others specialize in producing the essential hardware components, such as sensors and processors, that enable these cars to "see". Companies developing advanced sensors such as lidar, radar, and cameras are primarily invested in the R&D of these technologies. Some organizations are developing precise maps and navigation systems specified for self-driving automobiles. A major trend in the AV industry are auto-manufacturers forming partnerships with specialty technology firms to prepare to launch a wide variety of makes and models of self-driving vehicles. The necessary parts such as computer processors, cameras, and sensors are often outsourced to contract manufacturers, developed in tandem with software, systems, and installation customization for individual auto makers.

Major players in the AV industry include: Waymo (Alphabet), Uber ATG, Cruise (GM), Tesla Autopilot, Ford (+Argo AI), and Aurora **(Appendix A, exhibit 1)**. Of these AV companies, Waymo, Uber, and Cruise are focused on the ride-hailing segment. Tesla and Ford operate in the integrated passenger car segment. It is important to note there are different approaches to key technologies and different autonomous levels achieved. Uber, Cruise, Ford, and Aurora rely on sensor fusion primarily. Three of these, Cruise, Ford, and Aurora have achieved Autonomous Level 4 (aimed). Level 4 is considered "High Driving Automation", meaning vehicles can "intervene if things go wrong or there is a system failure, and do not require human interaction in most circumstances" (Synopsys). Currently, Level 4 vehicles can only be operated in self-driving mode in designated geo-fenced areas, though there is active work towards modified policy at the Federal and State levels. Uber and Tesla at Level 2, or "Partial Driving Automation", are considered advanced driver assistance systems, and cannot be operated without a human operator in the driver's

seat. The future of this industry is Full Driving Automation where vehicles do not require any human attention and “will be free from geofencing, and able to go anywhere and do anything an experienced human driver can do” (Synopsis, Appendix A, exhibit 5).

Ancillary service segments within the AV Industry include fleet management and operation, ride-hailing and mobility, freight and logistics, public transportation (smart cities), last mile delivery, licensing and partnerships, hardware and software sales, data monetization, and consulting. As with many new viable technologies, an entire industry ecosystem with strong initial valuations, demand projections, and use cases has sprung up around AV.
(See Appendix A, all exhibits)

- **Industry Segment**: Aurora is entering the autonomous driving industry, with a focus on the autonomous truck fleets segment. This segment was selected after a thorough analysis revealed it to be less saturated than ride-hailing, autonomous shuttle/bus services, and last-mile delivery. We believe this segment offers a substantial growth opportunity and aligns with our vision to innovate in areas where we can lead and define the market.
- **Key Competitors**: In this burgeoning field, key players include Waymo (Alphabet), Uber ATG, Tesla, Ford (+Argo AI), and GM (Cruise), with most focusing on passenger mobility solutions. Our market entry in autonomous truck fleets is highly differentiated, catering to a sector with unaddressed needs and less direct competition.
- **Target Customers**: Our target customers are traditional freight and logistic companies, who will be both the users and the buyers of our autonomous fleet systems. This B2B approach allows us to create solutions that are directly integrated into the operations of our customers, fostering deeper business relationships, and ensuring our offerings are finely tuned to their operational needs.
- **Product/Service**: We are building our business around the retrofitting service, using the product, a self-driving system comprised of both hardware and software, versatile enough to accommodate a range of vehicle types, to quickly scale our delivery of autonomous long-haul trucks. This scalability is critical to our value proposition, as it ensures our solution can be integrated into any make Class 8 semitruck. It also allows independence from vehicle manufacturers, which will be a major revenue driver for Aurora.

- **Positioning**: In the market, our offering will serve as a differentiator in a niche yet vital segment. Our strategy leverages the first-mover advantage in the autonomous truck fleet space, a domain currently not being pursued aggressively by the major competitors.
- **Value Proposition**: Our value proposition addresses a critical industry pain point: the driver shortage in the logistics sector. By providing an autonomous system that enhances logistics efficiency, we aim to reduce operational costs and improve safety. Our technology is not merely a product but a strategic enhancement to our customers' business models, promising a future of more reliable and cost-effective logistics operations. Aurora can adapt current fleets to immediately take advantage of autonomous driving solutions, rather than only being available in new manufactured vehicles.

3. VENTURE STRATEGY

Our venture strategy centers around retrofitting our system into existing long-haul trucks. Our target market and customer are long-haul trucking fleets owned and operated by traditional freight and logistics companies and commercial retailers in the U.S. such as J.B. Hunt, XPO, Fed-Ex, UPS, Walmart, and PepsiCo. J.B Hunt and PepsiCo each have fleets of over 20,000 vehicles, PepsiCo operates on 15,000 North American routes; Walmart has 9000 tractors and 80,000 trailers, and each driver averages 100,000 miles a year. While Walmart is working on developing an “advanced vehicle experience concept truck”, a collaboration with Peterbilt, this solution focuses on alternative fuels, aerodynamics, and comes at a significant cost to manufacture new vehicles. Aurora answers the question, what about all our existing trucks that have plenty of useful life left? We will retrofit autonomous driving systems consisting of sensor fusion hardware and AI software into existing fleets of trucks, rather than working with truck manufacturers at the time of development and production of new trucks. Aurora is positioned in a narrow, differentiated market. We are not competing on cost but are differentiated through the efficiency of adapting existing fleets to take advantage of new technologies, and policies, in autonomous driving.

4. VENTURE BUSINESS MODEL

a. Revenue Model:

Logistics and freight companies will pay directly for services and products. Aurora's customers will purchase a bundled service, which includes a comprehensive autonomous driving solution of both software and hardware components for retrofitting existing vehicles, installation, and a maintenance plan. Additional Competitive annual subscription rates consider the initial cost of hardware installation and

tiered pricing based on fleet size and service level. With a subscription model, include the upfront cost of hardware and the ongoing cost of software, maintenance, and updates. The purchase cycle for Aurora's autonomous driving solution begins with a demo or trial period of 1 month, progresses through a detailed consultation (2 months), the development of a customized package based on the customer's needs (3-9 months), and concludes with the final purchase. For the software component, the yearly cycle involves regular updates, support, and subscription renewals. Primarily one-time hardware purchases, and annual subscription models for software and services, provide opportunities to upsell or upgrade hardware over time. Other sources of income may include premium services, fleet optimization consulting, and future hardware upgrades.

Price to Positioning → Authority Pricing: Aurora can position itself as an authority in autonomous driving technology by pricing its solutions to reflect advanced technology and premium quality. We have assumed the cost to provide the autonomous driving system and associated services is $40,000 and have determined the desired profit margin to reflect the value of advanced technology will be assumed to be higher, such as 40%, to position Aurora as a leading authority in the market.

To calculate the authority price, we have used the following equation:

Cost÷ (1−Profit Margin) = $40,000 ÷ (1−0.40) = $66,666.67.

Thus, an authority price could be set at approximately $67,000 to reflect the premium technology and quality. This is an example of how Aurora can effectively set Price to Positioning (Authority, Brand, Luxury, Cost Leadership) utilizing pricing as a strategic tool to position Aurora in the market.

b. Channel Design

Based on the Customer Design Journey and Value Curve analysis for Aurora **(Appendix B, exhibits 1 and 2)**, the optimal channel design for delivering autonomous driving solutions to the truck owner segment is as follows:

- Customization: The Customer Design Team is an internal team that interacts directly with truck owners to customize self-driving solutions to their specific needs. To minimize wait times and broader reach, the dealership network and installation service providers provide quick installation services at customer locations or nearby service stations.
- Product/Service Delivery: Aurora's sales operations team is responsible for the direct sale and initial setup of automated driving systems for truck owners. The team ensures that every sale is personalized to meet the needs of the customer, leading to the successful delivery of the product. External logistics partners are companies specializing in transportation and logistics that physically

deliver autonomous systems to customers, ensuring timely and safe delivery of hardware components.

- Quality Assurance and security: The internal quality control department continuously monitors and tests autonomous driving systems to ensure they meet the highest quality and safety standards before being delivered to customers. Certification bodies are third-party entities that provide additional assurance through independent testing and certification of autonomous driving systems, giving customers confidence in the safety and reliability of their products.
- After-Sales Service and Support: Customer Support is committed to providing customers with ongoing assistance, troubleshooting, and post-purchase updates to ensure that any issues are resolved quickly. The service network represents external service providers who provide on-site support, scheduled maintenance, or emergency services to customers in areas where Aurora may not have a direct presence.
- Availability: Internally established inventory management is responsible for ensuring ready-to-assemble components are in stock for prompt product assembly and delivery External supply chain partners could include component suppliers and logistics providers who ensure that the supply chain operates without disruptions, maintaining the flow of materials necessary for product assembly and delivery.

This channel design (**Appendix B, exhibits 3)** for Aurora combines direct customer engagement with strategic external partnerships to deliver customized, quality-assured autonomous driving systems with reliable aftermarket support that keeps operations ready to meet both standard and customized needs. However, as a startup in the autonomous driving sector, Aurora faces multiple constraints in its channel design. Resource allocation is a primary challenge, as recruiting a skilled Customer Design Team and Quality Control staff requires significant investment. Managing an efficient supply chain for customized components without overextending on inventory is another hurdle. Furthermore, seamlessly integrating this new technology into existing fleet operations is critical to avoid business disruption for truck owners. These challenges require Aurora to strategically establish a robust and compliant operation.

c. Operating Model:

Research & Development: Proprietary technology of sensor (LIDAR, RADAR) and AI developed internally, Aurora will seek acquisition of complementary or extended technology such as vehicle to vehicle connectivity. Software and data analysis coming from installed products is also managed internally, informing continual R&D.

Production: Sensor fusion hardware production, cameras, and computers will be outsourced and manufactured on demand to align production with installation contracts. Customers pay at contract signing rather than delivery, which offers a window of time and cash flow for manufacturers to deliver parts **(Appendix C, exhibit 1)**.

Go-to-Market: Direct sales team will focus on trucking hubs in Illinois, Arizona, and Arkansas, developing relationships through demos and retro-fitting estimates for freight/logistics companies. Channel distribution on installation once customization is complete.

Customer Service: Aurora provides ongoing 24/7 tech support as well as a connecting their customers to a maintenance partner network throughout North America.

5. BUSINESS MODEL VALIDATION:

In the Business Model Validation Plan **(Appendix D)**, we outline a comprehensive approach to verifying the viability and robustness of our business model. We focus on competitive pricing and the exploration of additional revenue streams through add-ons while tracking the customer's lifetime value to minimize churn. Decisions on technology development are based on a build-vs-buy analysis, with cost considerations guiding whether to conduct R&D in-house or outsource. Production efficiency is maintained through a careful bid comparison process and quality audits for outsourced manufacturing. Direct sales effectiveness and logistical efficiency are continually assessed to optimize market reach and delivery. Finally, we ensure customer satisfaction through after-sales support, service quality checks, and a feedback loop to improve the service network. These elements collectively form a responsive and adaptable business model tailored to meet customer needs and market demands.

In developing Aurora's business model validation, we made several key assumptions that needed to be rigorously tested. First, it assumes logistics companies will embrace the pricing and subscription model. This can be validated through internet research and customer surveys. If this assumption holds true, Aurora can proceed to scale up marketing efforts. If not, the pricing strategy may need revisiting. For R&D,

the belief is that in-house development will keep Aurora competitive. Validation will involve assessing internal capabilities and benchmarking against the industry. Success here means continuing aggressive R&D investment; failure would prompt a look into partnerships. Production efficiency is assumed via outsourced manufacturing. Supplier audits and bid comparisons will confirm this. If successful, Aurora can secure long-term supplier contracts; otherwise, it may consider alternate suppliers or in-house production. The go-to-market strategy bets on the effectiveness of direct sales combined with logistics partners. Customer feedback will guide validation. Positive results will optimize the existing strategy, while negative feedback will lead to reassessment. Finally, customer service quality is crucial. Satisfaction surveys and audits will test the assumption. If Aurora's service is well received, further investment in training is planned. If service quality falls short, enhancing the service network or developing an in-house team may be necessary.

Competitors might respond to Aurora's business model by introducing similar autonomous driving technologies, potentially at lower prices or with additional features. They could also form strategic partnerships or enhance their own technology to provide a more comprehensive package. To safeguard against such competitive responses, Aurora could focus on continuous innovation, ensuring that its technology remains at the forefront of the industry. They can also strengthen customer relationships through loyalty programs, tailored support, and comprehensive service offerings that emphasize the added value of their solutions. Another defense strategy would be to conduct ongoing market analysis to anticipate competitor moves and prepare proactive strategies. Building strategic partnerships with key players in the logistics and tech industries could create a robust ecosystem around Aurora's products, increasing the cost and complexity for competitors to challenge their market position.

6. FINANCIAL MODEL

Aurora’s five-year financial model **(Appendix E)** has been developed from several assumptions, extrapolated from industry standards in both autonomous driving systems development and long-haul trucking vehicle lifetime, depreciation, and demand. We first assessed the size and quality of our target customer, estimating our top targets to own and operate 100,000 trucks in the U.S. (or five major freight/logistics fleet owners with ~20,000 trucks each). Gaining just one percent (1000 vehicles, 200 per fleet) of these five fleets as customers represents initial retrofit system sales of $67m. According to the American Trucking Association, in 2021 there were 13.86 million single-unit (2-axle, 6-tire or more) and combination trucks registered. Aurora is assuming a growth rate of 29% YOY 1-2, as a result of direct sales

efforts prelaunch and in year 1. From year 2 to 3, the growth rate will decline to 3%, as we expect to gain traction in our segment early and then reach stasis due to the nature of replacement trucks, and limited autonomous routes. From year 3 to 4 revenues will only grow 2%, and 1% in year 5. We anticipate this stabilization of growth early on, and once Aurora has held profits for years 2-5 we will shift our strategic focus to partner with vehicle manufacturers. With pre-sale contracts, the direct sales team will move from an 8-month cycle time pre-launch to a 3-month cycle time in years 1-5. This assumption is based on establishing clients that will convert a small percentage of their existing fleet each year. Once they have experienced the cost savings, and when national policies allow for increased autonomous routes, they will purchase systems and convert additional trucks each year. We know that trucks are fully depreciated after 5 years, and an additional investment in Aurora's autonomous system extends the useful life of a vehicle and can offer fleet owners further depreciation tax savings, incentivizing their investment as they will keep these fully depreciated trucks in their fleets for more than five years but not have the same tax benefit. We believe Aurora will achieve repeat sales/retention, and no churn based on the demand for this technology, and ultimately a low cost for adoption when compared to the cost of a new vehicle (up to $200k) and the savings on driver salaries (as much as $100k/yr.).

We have also made assumptions about expenses, which are primarily SG&A, R&D, and outsourced manufacturing. Using competitors' expenses and size of company (Appendix E, exhibit 2) we notice a few things. Most of these companies have multiple business units, so we are not able to isolate expenses directly related to their autonomous driving segments, and they employ at minimum twice as many people as the actual company of Aurora. Our rational around expenses is simple – one quarter of Aurora's current actual company is related to trucking and can be assigned to our business model. We will also assign one quarter of the total headcount to our business model. This rationale is how we arrived at 425 total employees, $179m in R&D expenses, and $30m in SG&A expenses.

Specific revenue drivers include custom solutions and hardware sales and performance-based pricing. Our model does not include additional revenue generated from subscription sales, but it is notable that we will have secondary revenue streams. Our direct sales staff is part of our pre-launch strategy and represents both a revenue driver and creates an operations expense. R&D and outsourced manufacturing are our two main expense/cost drivers. Customer acquisition and support, while part of our SG&A costs, are minor in comparison, and drive revenue.

7. ASSESSMENT OF SUCCESS

Aurora will generate cumulative net profits of over $51 million in year 1, which is only possible through the innovative model targeting a somewhat captive market. We understand the costs sunk into vehicles and technology in the long-haul trucking industry to be written off expenses, and anything that will allow our customer companies to effectively be on the road moving shipments will be in high demand. There are millions of vehicles for Aurora to convert in the first five years, though beyond that strategy must shift. As vehicles are replaced, rather than retrofitted or repaired, this autonomous tech will be built in at vehicle manufacturers. This is a short-term model that will allow Aurora to become the go-to autonomous solution, immediately become profitable through installing in all trucks, then plan for a shift to partnership with vehicle manufactures. In ten years, Aurora's system will be the OEM automated system in all major trucking makes and models in the U.S.

Appendix A

Exhibit 1

Players	Industry	Key Technology	Autonomous Level	Segments
Waymo (Alphabet)	Software	Lidar focused +HD map	Level 4 (achieved)	Ride-hailing
Uber ATG	Ride-hailing	Sensor Fusion	Level 2 (achieved)	Ride-hailing
Cruise (GM)	Auto OEM	Sensor Fusion	Level 4 (aimed)	Ride-hailing
Tesla Autopilot	Auto OEM	Camera centric	Level 2 (achieved)	Integrated passenger car
Ford (+Argo AI)	Auto OEM	Sensor Fusion	Level 4 (aimed)	Integrated passenger car
Aurora	Independent	Sensor Fusion	Level 4 (aimed)	Autonomous fleets

Exhibit 2

Strategic Target	Cost Leader	Differentiator
Broad Market	**Tesla** **Other auto OEM (private vehicles)**	**Waymo (Ride-hailing)** **Uber ATG (Ride-hailing)** **Cruise (GM)(Ride-hailing)**
Narrow Market		**Aurora (Autonomous truck)**

Exhibit 3

The Industry Dynamics Scorecard		
Industry Dimension	**Target Industry Data**	**Industry Score**
The current industry segment/ niche size (i.e., sales)	The global autonomous vehicles market reached a value of approximately USD 119.14 billion in 2023 (*Expert Market Research, 2023)* Since the technology is new, there is no available data to address segment/niche.	10
The current industry segment growth rates	The autonomous cars market is projected to grow at a CAGR of around 25.75% between 2022 and 2030 (*Facts & Factors, 2023)*	9
Major trends sweeping across the industry	• Internet of Things • Advanced driver assistance systems (ADAS) • Artificial intelligence (AI) and deep learning technology • Vehicle connectivity solutions *(startus-insights, 2023)*	5 Applies to everybody
The competition in the industry and evidence of successful business models	Major players include companies like Waymo, Uber ATG, Tesla, Ford (+Argo AI), GM (Cruise). Successful companies have diversified their autonomous technology applications, from passenger vehicles (Tesla, Waymo) to freight and delivery (Nuro, Einride).	5 The tech is still pre-mature; plenty options in segmentation
The activity level of new companies, venture deals, and M&A transactions	Future mobility, which includes autonomous vehicles, saw more than 142 deals, the highest in terms of deal value in 2022 *(Global Data, 2023)* Boasting nearly $1B in funding, Zoox is a subsidiary of Amazon focused entirely on developing vehicles for the robo-taxi market. With $5.5B in funding, Alphabet's subsidiary Waymo began all the way back in 2009. *(Collimator, 2023)*	4 Major players have acquired pure tech companies similar to Aurora. An exit of being acquired by players closer to end market may be down the line.
The technology life cycle stage of the industry overall, often reflected by new technologies, products, and services recently announced by players in the industry.	Automation level: Level 0: No driving automation Level 1: Driver assistance Level 2: Partial driving automation Level 3: Conditional driving automation Level 4: autonomous cars: High driving automation Level 5: Full driving automation	5 Roadmap of standards are well, established

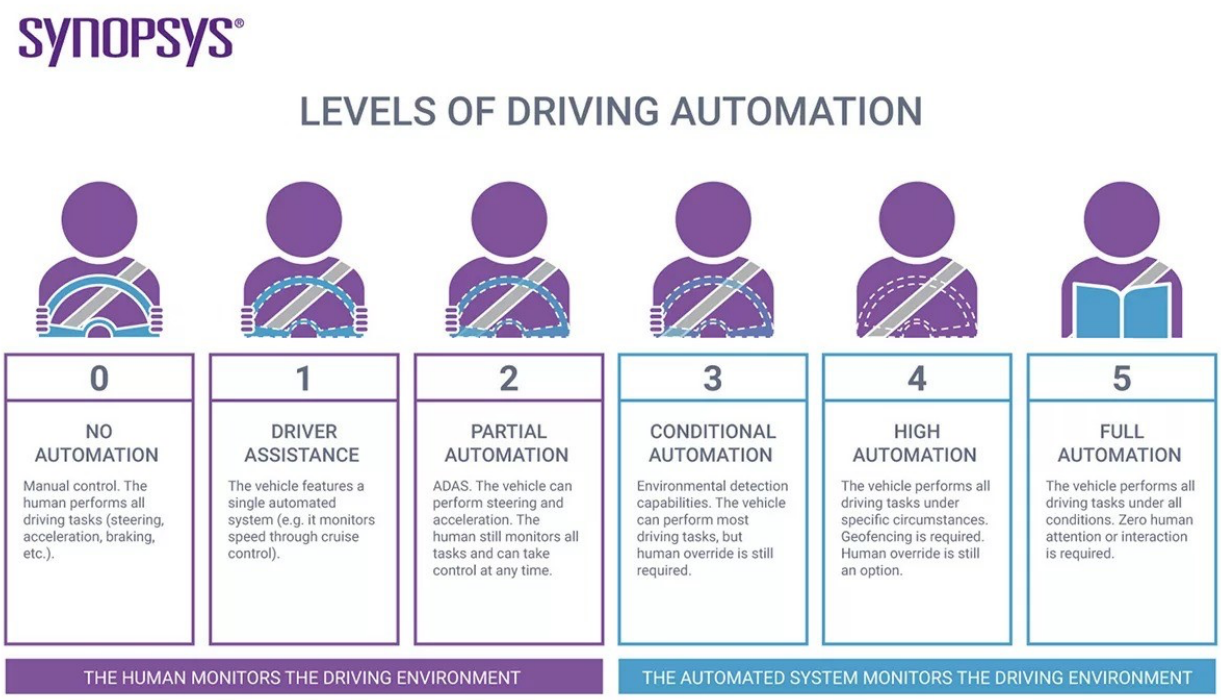
Exhibit 3 (cont.)

The Industry Dynamics Scorecard (cont.)		
Industry Dimension (cont.)	**Target Industry Data (cont.)**	**Industry Score (cont.)**
The channels of distribution within an industry	• Direct sale to OEM to integrate technology B2B sale of technology and retrofitting customization to fleet operators • Ride-hailing and mobility service platform selling of autonomous transportation service direct to the public/end users • B2G sale of technology to Government & public service sector on providing • autonomous public transportation service	8 Plenty of options with sizable market potential
There are reasonable, attractively priced suppliers for key components technologies, or ingredients that you need for your products or services	Waymo currently offers self-driving ride-hailing service in San Fransico and Phoenix area with LA and Austin on the next available area list. Though there is no publicized data on rides served, the mobile app platform offered priced rides the same way the incumbent ride-hailing companies conduct their business.	5 Segmentation varies and so as the pricing strategy. Plenty room to differentiate
Existing barriers to entry that might make your life extremely difficult as an entrepreneur	The current stringent permits requirements related to testing, registration, insurance etc.	2 Government approval is the most uncertain factor
	Total Score	53
Scoring Key: 1 to 10 where:1 is a potential showstopper for a new venture; 3 is a significant challenge; 5 is neither a barrier nor supporting success; 7 is conducive to a new venture, and 10 is an ideal setup for venture success		

Exhibit 4

Business Model Dimensions	Current industry Standard Business Model	Key Observations / Opportunities
REVENUE MODEL Types of revenue Frequency of revenue Price level relative to competitors Multiple streams of revenue	• Currently minimal direct revenues such as Waymo oneapp, equipment sales, intellectual properties, subscriptions, etc. funded by Alphabet as an investment in future driverless taxi services. • Plans to generate revenue through a driverless and delivery service. • Will eventually license them technology to automakers and fleet operators.	Our venture could collaborate with Waymo to adapt their technology for trucking/logistics before they tackle that market themselves. Look to partner with established trucking company like Rivian. Could open strong connection operation between sources. Also investigate working with Amazon/Walmart logistics services.
Operating model for R&D Build technology or buy? What is the "focus" of internal versus external R&D?	• Internal R&D focuses on developing software, hardware sensors, and AI capabilities. • External R&D leverage partnerships with automakers for vehicle Integration • Deepen focus on developing autonomous systems with specialization in trucking, matching the R&D efforts of industry leaders like Waymo. • Engage in strategic partnerships with logistics companies to refine and tailor the autonomous technology for the trucking industry.	Develop complementary technology not being focused on by Waymo, such as vehicle connectivity solutions.
Operating model for Production Manufacturing-internal or outsourced? Logistics-internal or outsourced?	• Outsource vehicle manufacturing to partners, such as Waymo. • Custom build vehicle prototypes in small volumes for testing with Waymo but look at other high activity level leaders like Ford • Craft a flexible production strategy that allows for customization to suit the specific needs of freight and logistics companies. • Leverage existing vehicle manufacturing capabilities and retrofitting expertise to provide scalable solutions for autonomous truck fleets.	Provide added hardware/software solutions for mass market vehicle integration.

Exhibit 5


SYNOPSYS®
LEVELS OF DRIVING AUTOMATION
0
NO AUTOMATION
Manual control. The human performs all driving tasks (steering, acceleration, braking, etc.).
1
DRIVER ASSISTANCE
The vehicle features a single automated system (e.g. it monitors speed through cruise control).
2
PARTIAL AUTOMATION
ADAS. The vehicle can perform steering and acceleration. The human still monitors all tasks and can take control at any time.
3
CONDITIONAL AUTOMATION
Environmental detection capabilities. The vehicle can perform most driving tasks, but human override is still required.
4
HIGH AUTOMATION
The vehicle performs all driving tasks under specific circumstances. Geofencing is required. Human override is still an option.
5
FULL AUTOMATION
The vehicle performs all driving tasks under all conditions. Zero human attention or interaction is required.
THE HUMAN MONITORS THE DRIVING ENVIRONMENT
THE AUTOMATED SYSTEM MONITORS THE DRIVING ENVIRONMENT

Appendix B

Exhibit 1

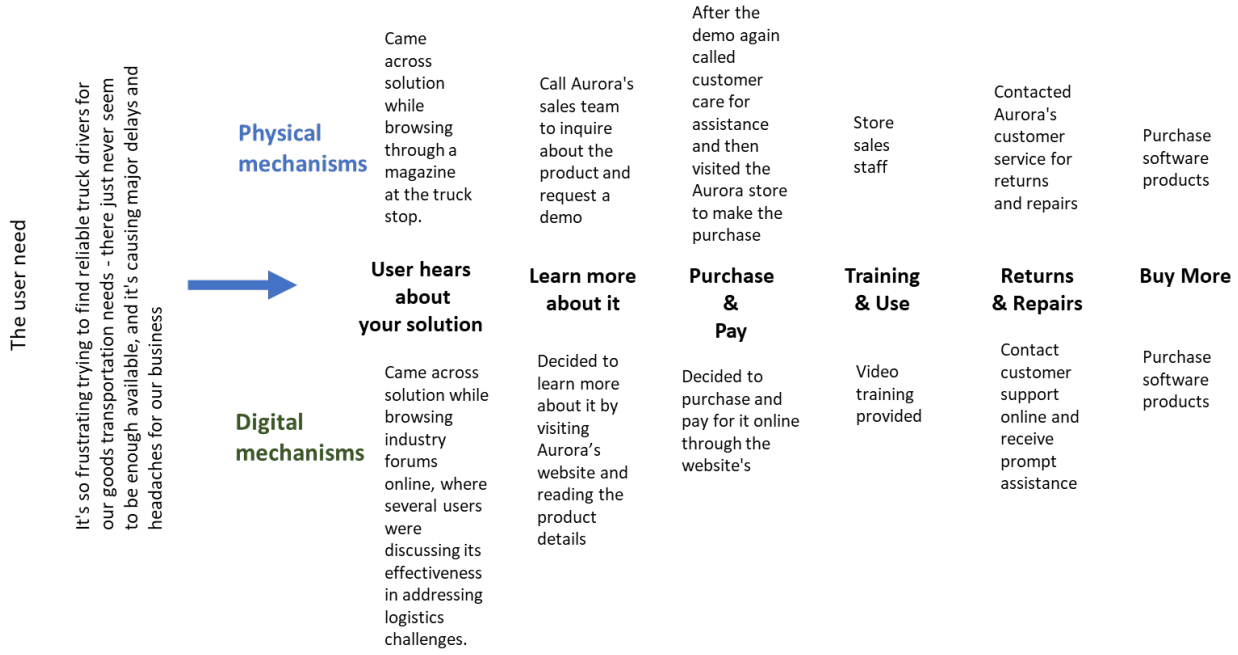


Exhibit 2

Characteristics	Low	Medium	High
Price		+	*
Performance		+ *	
Features			+ *
Customer Support			+ *
Customization		*	+
After Sales Service			+ *
Delivery		+ *	

Aurora -> +

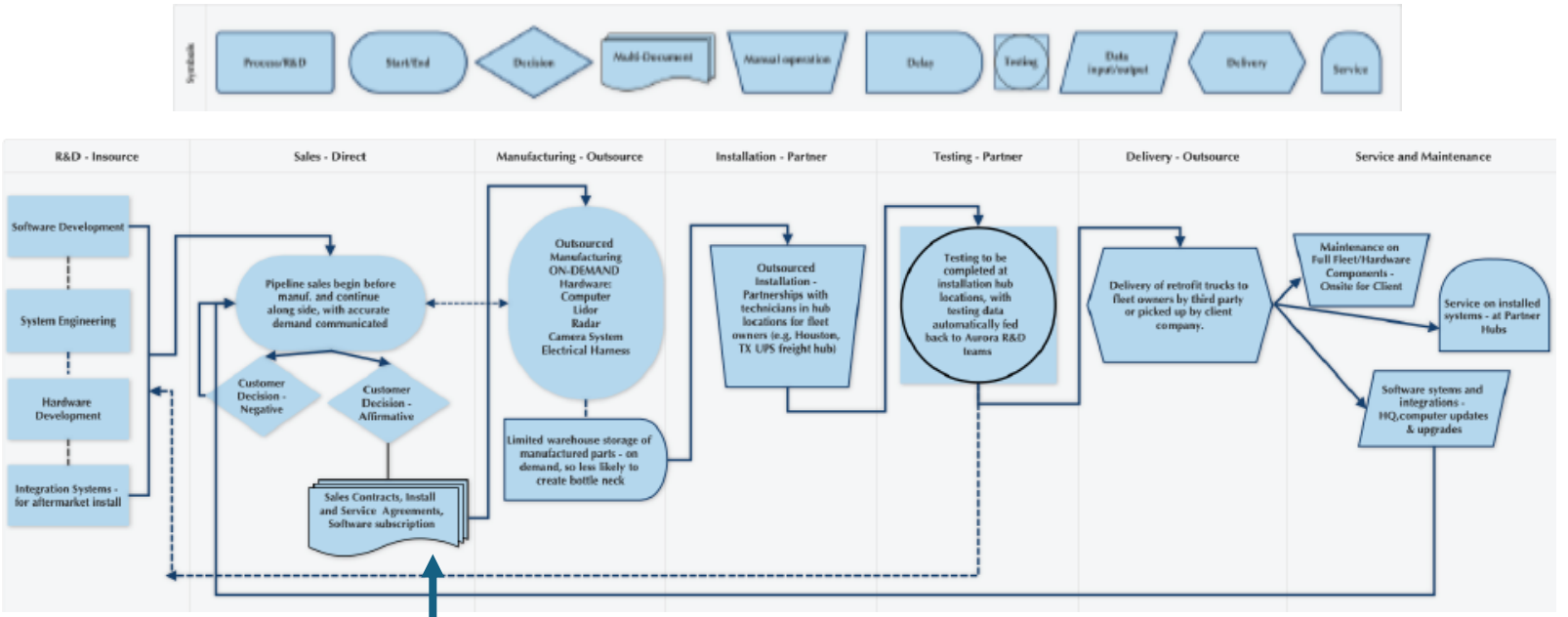
Waymo -> *

Exhibit 3

Channel Function		Channel Type					
		Marketing	E/N	Selling	E/N	Distribution	E/N
Customization	Int.	Customer Design Team					
	Ext.					Install Service Providers	
Product/Service Delivery	Int.			Sales Operations			
	Ext.					Logistics Partners	
Quality Assurance and Security	Int.	Quality Control Department					
	Ext.			Certification Agencies			
After—Sales Service and Support	Int.			Customer Service Team			
	Ext.					Service Network	
Availability	Int.	Inventory Management					
	Ext.					Supply Chain Partners	

Appendix C

Exhibit 1
Process Flow Diagram



Any customizations are ordered/indicated at the time of sales contract. The limited make/model variations of trucks in this industry have allowed Aurora to develop retrofit solutions for all, and any customizations are simply added features/upgrades that do not require additional development.

Appendix D

Business Model Validation Plan

Business model dimensions	What need to check	How you plan to do it
REVENUE MODEL	Acceptance of pricing and subscription model	Internet research, discussions with procurement managers, limited customer surveys
	Comparative pricing against competitors	Conduct interviews with industry sales reps and store managers
	Potential for add-ons and plugins	Run limited test markets, pop-up stores, and utilize AdWords for market response
	Customer lifetime value and churn rate	Kickstarter or other crowdfunding platforms to gauge interest and pre-market sales
Operating model for R&D	Decision to build or buy technology	Internal assessment, internet research on potential R&D partners/suppliers
	Costs and investments for in-house R&D	Get multiple bids for development work, compare internal vs. external cost analysis
Operating model for Production	Cost-effectiveness of outsourced hardware production	Compare bids from suppliers, perform quality control audits
Operating model for Go-to-Market	Effectiveness of direct sales operations	Track sales metrics, gather feedback from sales teams
	Efficiency of external logistics partners for product delivery	Assess delivery times and customer satisfaction, review partner service agreements
Operating model for Customer Service	Customer satisfaction with after-sales service and support	Deploy customer satisfaction surveys, analyze support ticket data
	Accessibility and quality of external service networks	Audit service network providers, implement a feedback loop with customers

Appendix E

Exhibit 1

Financial Model – Please see second attachment: Aurora Financial Model.xlsx,
Which is also linked here: https://northeastern.sharepoint.com/:x:/s/ENTR6218Team6-BusinessModelInnovation/ETze_TRPthpPjt51z-8tUBcBjCo33PbokzWRukWHjnijNQ?e=8ASDb1

Exhibit 2

- Uber Technologies, Inc.:
  - R&D Expenses: $2.054 billion (2022)
  - SG&A Expenses: $2.316 billion (2022)
  - Employees: 32,800 (2022)
- General Motors Company (Cruise):
  - SG&A Expenses: $10.667 billion (2022)
  - R&D Expenses: $8.58 billion (2022)
  - Employees: 3,800 (2022)
  - Note that this figure is for Alphabet Inc. as a whole and not exclusive to Cruise
- Alphabet Inc. (Waymo):
  - R&D Expenses: $142.472 billion (2022)
  - SG&A Expenses: $31.562 billion (2022)
  - Employees: 2,500 (2022)
  - These figures are for Alphabet Inc. as a whole, including all its operations and not exclusive to Waymo.
- (Actual) Aurora Innovation, Inc.:
  - R&D Expenses: $716 million (2023)
  - SG&A Expenses: $119 million (2023)
  - Employees: 1,700 (2023)

Bibliography

Synopsys. (n.d.). Retrieved from https://www.synopsys.com/automotive/autonomous-driving-levels.html#5

Resources:

Expert Market Research. (2023). Autonomous Cars Market Size, Share, Growth, Report 2024- 2032. Retrieved from https://www.expertmarketresearch.com/reports/autonomous-vehicles market

Facts & Factors. (2023, February 1). At 25.75% CAGR, Global Autonomous Cars Market Size to Hit USD 197 Billion by 2030 | Autonomous Cars Industry Trends, Share, Price, Demand, Analysis & Forecast Report by Facts & Factors. GlobeNewswire. Retrieved from https://www.globenewswire.com/en/news-release/2023/02/01/2599256/0/en/At-25-75-CAGR-Global-Autonomous-Cars-Market-Size-to-Hit-USD-197-Billion-by-2030-Autonomous-Cars Industry-Trends-Share-Price-Demand-Analysis-Forecast-Report-by-Facts-Factors.html

Collimator. (2023, February 16). The State of Autonomous Vehicles in 2023. Retrieved from https://www.collimator.ai/post/the-state-of-autonomous-vehicles-in-2023

StartUs Insights. (2023). 8 Autonomous Vehicle Trends in 2023. Retrieved from https://www.startus-insights.com/innovators-guide/autonomous-vehicle-trends/#internet-of things

GlobalData. (2023, February 13). Automotive Industry Mergers and Acquisitions Deals by Top Themes in 2022 – Thematic Intelligence. Retrieved from https://www.globaldata.com/store/report/automotive-industry-m-and-a-deals-by-theme analysis/

Competitor 10k's
GM/Cruise
Waymo/Alphabet
Uber

IBIS Industry Reports:

General Freight Trucking Truckload in the US Industry Report

Truck Dealers in the US Industry Report

Long Distance Freight Truckers in the US