Self-driving Transportation Service Company Strategy Analysis

An analysis of the positioning of self-driving transportation service providers

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Yale
SCHOOL OF MANAGEMENT

The transportation service market is HUGE. *Transportation service includes the service for passengers and the service for goods. The passenger transportation service is also called mobility service. From traditional automakers to the new self-driving software start-ups, everyone knows that transportation service, rather than auto manufacturing or software development, will be the most attractive market.*

Traditional automakers and self-driving technology companies are entering the transportation service market.

On one hand, there are many cases showing that traditional automakers are building their mobility service arms. Daimler initiated its car2go in 2008, Ford acquired Chariot in 2016, GM acquired Sidecar in 2016 and built the new Maven, BMW launched its ReachNow in 2016, and VW strategically invested $300M in Gett in 2016. Moreover, Ford envisions its future as the Most Trusted Mobility Company. On the other hand, self-driving software companies are also trying to enter the transportation service market: Zoox, Optimus Ride, and Voyage are entering the urban taxi market; TuSimple, Embark, and Starsky Robotics are entering the long-distance freight trucking market; Nuro, Udelv, and Starship are entering the local "last-mile" delivery market.

Self-driving transportation service companies vary in strategies: whom to deliver for, what to deliver, where to deliver, and how often to deliver.

Self-driving software companies have different strategies when entering the transportation service market. A group of companies deliver goods, and the rest deliver passengers. Within each of these groups, the companies have different strategies that vary in the content to deliver, the customers to deliver for, the place and distance to deliver, and the frequency and speed to deliver.

Companies that serve the high-frequency rigid demands with simple and low-cost solutions will have the largest potential and value.

Given the differences in strategies, companies will have different solutions. These solutions will vary in capacity, coverage, speed, storage environment, self-driving requirement, and business model. The difference in targeting markets means different potentials for different companies, while the difference in solutions means how fast these companies can realize their potentials. Those companies that serve the high-frequency rigid demands, such as food delivery and urban taxi, with a relatively simple and low-cost solution will have the highest value.
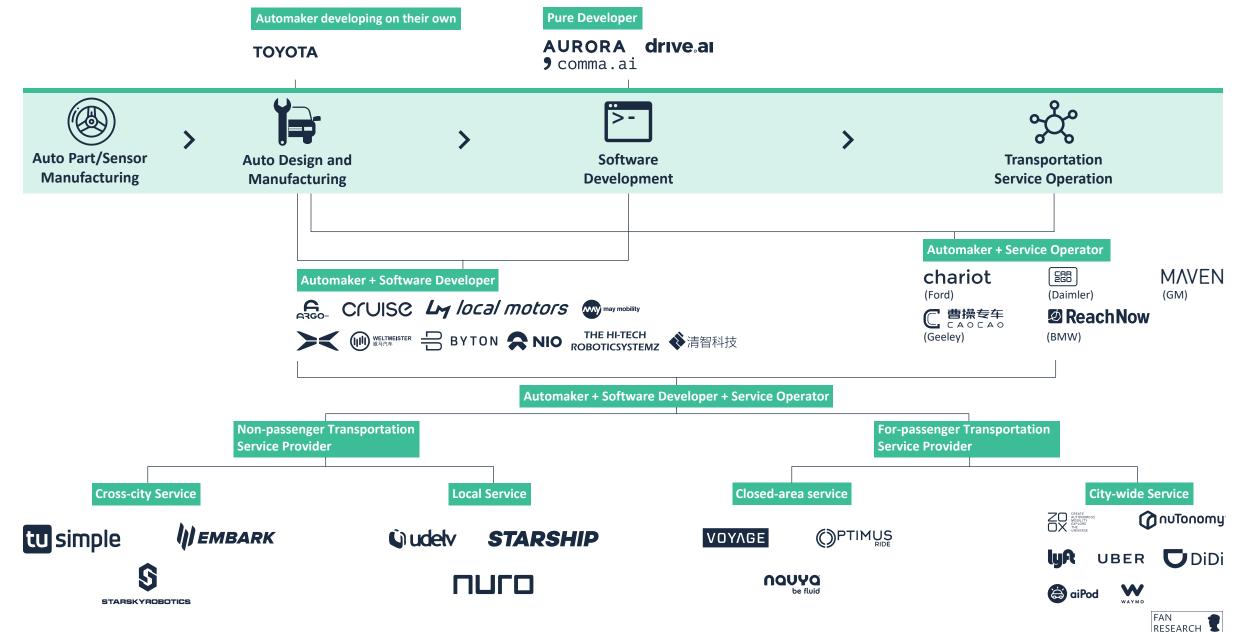
Self-driving Industry Value Chain Integration and Positioning

Self driving

Automaker developing on their own

TOYOTA

Pure Developer

AURORA   drive.ai
comma.ai

| Auto Part/Sensor Manufacturing | > | Auto Design and Manufacturing | > | Software Development | > | Transportation Service Operation |

Automaker + Service Operator

chariot (Ford)   CAR2GO (Daimler)   MAVEN (GM)

曹操专车 CAOCAO (Geeley)   ReachNow (BMW)

Automaker + Software Developer

ARGO AI   cruise   LM local motors   MAY may mobility

✕   WELTMEISTER 威马汽车   BYTON   NIO   THE HI-TECH ROBOTICSYSTEMZ   清智科技

Automaker + Software Developer + Service Operator

Non-passenger Transportation Service Provider

For-passenger Transportation Service Provider

Cross-city Service

tu simple   EMBARK

STARSKYROBOTICS

Local Service

udelv   STARSHIP

nuro

Closed-area service

VOYAGE   OPTIMUS RIDE

navya be fluid

City-wide Service

ZOOX CREATE AUTONOMOUS MOBILITY EXPLORE THE UNIVERSE   nuTonomy

lyft   UBER   DiDi

aiPod   WAYMO

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Self driving

Non-passenger Transportation

For-passenger Transportation

Whom to deliver for

?

What to deliver

?

Where to deliver

?

How often to deliver

?

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Positioning in the Transportation Service Market – Solve Different Problems

Self driving

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

Whom to deliver for	**By Customer Type**	Individual	Transportation service provider (e.g. SF Express, bus companies)	Transportation service operator (e.g. Uber, Didi, Hertz)	Non-transportation company (e.g. JD, Amazon, KFC, McDonalds)
	By Customer Size	Small (e.g. individuals, small business)	Medium (e.g. local grocery stores, local chain restaurants)	Large (e.g. global chain stores)	-
What to deliver	**By Delivery Type**	Passenger delivery (e.g. bus companies)	Non-passenger delivery (e.g. SF Express)	-	-
	By Delivery Category	Massive transit (e.g. urban bus, cross-city bus)	Shared mobility (e.g. Didi, Uber, shuttle)	Car rental (e.g. Hertz, Avis)	Private car
		Food delivery (e.g. small/chain restaurants)	Grocery delivery (e.g. small/chain grocery stores, online grocery stores)	Logistics (e.g. over-the-road cargo transportation)	-
Where to deliver	**By Distance**	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
How often to deliver	**By Frequency**	Low (e.g. <=3 deliveries per person per week)	Medium (e.g. 3-7 deliveries per person per week)	High (e.g. >=7 deliveries per person per week)	-
	By Time Requirement	Intensive (e.g. food delivery)	Flexible (e.g. grocery delivery)	-	-

Non-passenger
Transportation

For-passenger
Transportation

Safety

Coverage

Speed

Capacity

Storage
Environment

Self-driving
Technology

Business
Model

? ? ? ? ? ? ?

Positioning in the Transportation Service Market – Provide Different Solutions

Self driving

Self-driving Transportation Service Solutions (Design The Products and Business To Satisfy The Customers/Needs)				
Safety	**Delivery type**	Passenger delivery	Non-passenger delivery	-	-
Coverage	**Distance**	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
Speed	**Operation speed**	Walking speed (e.g. <=9KM/H)	Normal speed (e.g. 10-60KM/H)	High speed (e.g. >=60KM/H)	-
Capacity	**Capacity**	Small (e.g. <=100 Pounds, <=5 Passengers)	Medium (e.g. 100-1,000 Pounds, 6-25 Passengers)	Large (e.g. >=1,000 Pounds, >=25 Passengers)	
Storage Environment	**Interior design**	Basic design	Special design (e.g. interior temperature, size.)	-	-
Self-driving Technology	**Software solution**	Basic solution for single scenario (e.g. solutions for closed community/free-way)	Advanced solution for complex scenario (e.g. solution for urban area)	-	-
Profitability	**Business model**	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	Delivery service provider (e.g. UPS, FEDEX)

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Example: a comparison between Nuro's, Udelv's, and Starship's strategies

Self driving

Positionings of Nuro [green] , Udelv [blue] , and Starship [yellow]

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Example: a comparison between Nuro's, Udelv's, and Starship's strategies

Self driving

Solutions from Nuro ■ **, Udelv** ■ **, and Starship** ■

Safety	**Delivery type**	Passenger delivery	**Non-passenger delivery**	-	-
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Storage Environment	**Interior design**	**Basic design**	**Special design (e.g. interior temperature, size.)**	-	-
Self-driving Technology	**Software solution**	**Basic solution for single scenario (e.g. solutions for closed community/free-way)**	**Advanced solution for complex scenario (e.g. solution for urban area)**	-	-
Profitability	**Business model**	Software provider (e.g. Microsoft, Adobe)	**Software + hardware provider (e.g. DJI, Apple)**	Operating platform provider (e.g. Didi, Uber)	**Delivery service provider (e.g. UPS, FEDEX)**

They are different in…

Targeting customer groups and the pain points to resolve

1. **Different types of customers.** *Udelv primarily serve medium-sized local grocery stores, while Nuro and Starship are going to serve those local small businesses such as restaurants. The number of grocery stores will be smaller than that of the small restaurants. However, the transportation demand from each grocery store will be higher than that from a single restaurant. Given the smaller number of grocery stores, it might be easier for Udelv to acquire new customers and sustain customer relationships. Besides, the grocery stores will possibly have a higher requirement for user experience, as the value of each order to its customers will be higher.*

2. **Different categories of customers and pain points.** *Udelv is going to help grocery stores deliver their orders to customers, while Nuro and Starship are going to help small local restaurants deliver their food. Given that the local grocery stores are facing strong competition from e-commerce, the transportation demand from the grocery stores will fall in the long run. However, the transportation demand from the local restaurants is a rigid demand with a high frequency.*

3. **Different distance to deliver.** *Starship is helping with the last-mile delivery, while Nuro and Udelv are helping with the last 3-mile or 5-mile delivery. The difference in the delivery distance will result in different delivery modes: Starship will use a point-to-point delivery, while Nuro and Udelv will provide a one-to-multiple delivery that requires complicated route planning and operation management. The two types of delivery will also have different requirement for the batteries: Starship can use low-capacity batteries, while Nuro and Udelv will need high-capacity batteries.*

4. **Different delivery frequency.** *Most households will buy groceries once or twice per week, while many people will call food delivery for more than twice per week. The higher frequency of demand means a larger market.*

5. **Different time requirement.** *For grocery stores, their deliveries are not time-intensive. However, for small restaurants, they need to deliver the food to their customers in the shortest time. The higher time requirement means a higher requirement for the speed of the service and operation.*

Solutions to address the pain points

1. **Different coverage.** *Due to the difference in deliver distance, the cars from the three companies will have different coverages. The coverage of Starship is around 3 KM, while that of Nuro and Udelv can be over 50 KM.*

2. **Different speed.** *Due to the different requirement for time, the cars from the three companies run in different speeds. Particularly, as Udelv and Nuro are going to provide one-to-multiple service per trip, the two companies need to increase the speed to improve user experience. Starship does not have this incentive, as the speed change will not have a big impact on the delivery time for a 1-KM trip.*

3. **Different capacity.** *As the three companies are going to deliver different types of goods that have different sizes, Udelv and Nuro will need a larger space for their cars than Starship. As Udelv is going to deliver grocery goods that are usually larger than food boxes, Udelv will have a higher demand for space than Nuro.*

4. **Different storage environment.** *As the three companies are going to deliver different types of goods that have different requirements for storage, Nuro and Starship need to carefully design the interior space to keep the food clean and hot, while Udelv does not need to do much.*

5. **Different self-driving technology.** *As the coverage and speed requirements vary from firm to firm, the three companies will have different requirements for their self-driving technology. The 1-KM delivery task along the sidewalk will be relatively easier than the 10-KM delivery in a completely urban transportation environment.*

6. **Different business model.** *As the delivery task for Starship is relatively simple and does not need rich operation experience, Starship has a low-cost product that small businesses can buy and run their own fleets. Starship will make money by selling its hardware + software. However, this is not true for Udelv and Nuro, which are going to provide delivery service to their customers.*

Appendix

Positionings and solutions of different self-driving transportation service companies

Positioning Analysis of Nuro **nuro**

Self driving

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

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	By Customer Size	Small (e.g. individuals, small business)	Medium (e.g. local grocery stores, local chain restaurants)	Large (e.g. global chain stores)	-
What to deliver	By Delivery Type	Passenger delivery (e.g. bus companies)	Non-passenger delivery (e.g. SF Express)		-
	By Delivery Category	Massive transit (e.g. urban bus, cross-city bus)	Shared mobility (e.g. Didi, Uber, shuttle)	Car rental (e.g. Hertz, Avis)	Private car
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	By Time Requirement	Intensive (e.g. food delivery)	Flexible (e.g. grocery delivery)	-	-

Solution (Design The Products and Business)

Safety	Delivery type	Passenger delivery	Non-passenger delivery	-	-
Coverage	Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
Speed	Operation speed	Walking speed (e.g. <=9KM/H)	Normal speed (e.g. 10-60KM/H)	High speed (e.g. >=60KM/H)	
Capacity	Capacity	Small (e.g. <=100 Pounds, <=5 Passengers)	Medium (e.g. 100-1,000 Pounds, 6-25 Passengers)	Large (e.g. >=1,000 Pounds, >=25 Passengers)	-
Storage Environment	Interior design	Basic design	Special design (e.g. interior temperature, size.)	-	-
Self-driving Technology	Software solution	Basic solution for single scenario (e.g. solutions for closed community/free-way)	Advanced solution for complex scenario (e.g. solution for urban area)	-	-
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Positioning Analysis of Udelv · udelv

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

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Profitability	Business model	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	**Delivery service provider (e.g. UPS, FEDEX)**

Positioning Analysis of Starship STARSHIP

Self driving

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Profitability	Business model	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	Delivery service provider (e.g. UPS, FEDEX)

Positioning Analysis of Zoox

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

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Positioning Analysis of Voyage VOYAGE

Self driving

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Positioning Analysis of Optimus Ride

Self driving

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		Food delivery (e.g. small/chain restaurants)	Grocery delivery (e.g. small/chain grocery stores, online grocery stores)	Logistics (e.g. over-the-road cargo transportation)	-
Where to deliver	By Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
How often to deliver	By Frequency	Low (e.g. <=3 deliveries per person per week)	Medium (e.g. 3-7 deliveries per person per week)	High (e.g. >=7 deliveries per person per week)	-
	By Time Requirement	Intensive (e.g. food delivery)	Flexible (e.g. grocery delivery)	-	-

Solution (Design The Products and Business)

Safety	Delivery type	Passenger delivery	Non-passenger delivery	-	-
Coverage	Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
Speed	Operation speed	Walking speed (e.g. <=9KM/H)	Normal speed (e.g. 10-60KM/H)	High speed (e.g. >=60KM/H)	
Capacity	Capacity	Small (e.g. <=100 Pounds, <=5 Passengers)	Medium (e.g. 100-1,000 Pounds, 6-25 Passengers)	Large (e.g. >=1,000 Pounds, >=25 Passengers)	-
Storage Environment	Interior design	Basic design	Special design (e.g. interior temperature, size.)	-	-
Self-driving Technology	Software solution	Basic solution for single scenario (e.g. solutions for closed community/free-way)	Advanced solution for complex scenario (e.g. solution for urban area)	-	-
Profitability	Business model	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	Delivery service provider (e.g. UPS, FEDEX)

Positioning Analysis of TuSimple **tu**simple

Self driving

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

Whom to deliver for	By Customer Type	Individual	Transportation service provider (e.g. SF Express, bus companies)	Transportation service operator (e.g. Uber, Didi, Hertz)	Non-transportation company (e.g. JD, Amazon, KFC, McDonalds)
	By Customer Size	Small (e.g. individuals, small business)	Medium (e.g. local grocery stores, local chain restaurants)	Large (e.g. global chain stores)	-
What to deliver	By Delivery Type	Passenger delivery (e.g. bus companies)	Non-passenger delivery (e.g. SF Express)		-
	By Delivery Category	Massive transit (e.g. urban bus, cross-city bus)	Shared mobility (e.g. Didi, Uber, shuttle)	Car rental (e.g. Hertz, Avis)	Private car
		Food delivery (e.g. small/chain restaurants)	Grocery delivery (e.g. small/chain grocery stores, online grocery stores)	Logistics (e.g. over-the-road cargo transportation)	-
Where to deliver	By Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
How often to deliver	By Frequency	Low (e.g. <=3 deliveries per person per week)	Medium (e.g. 3-7 deliveries per person per week)	High (e.g. >=7 deliveries per person per week)	-
	By Time Requirement	Intensive (e.g. food delivery)	Flexible (e.g. grocery delivery)	-	-

Solution (Design The Products and Business)

Safety	Delivery type	Passenger delivery	Non-passenger delivery	-	-
Coverage	Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
Speed	Operation speed	Walking speed (e.g. <=9KM/H)	Normal speed (e.g. 10-60KM/H)	High speed (e.g. >=60KM/H)	
Capacity	Capacity	Small (e.g. <=100 Pounds, <=5 Passengers)	Medium (e.g. 100-1,000 Pounds, 6-25 Passengers)	Large (e.g. >=1,000 Pounds, >=25 Passengers)	-
Storage Environment	Interior design	Basic design	Special design (e.g. interior temperature, size.)	-	-
Self-driving Technology	Software solution	Basic solution for single scenario (e.g. solutions for free-way scenario with a driver to supervise)	Advanced solution for complex scenario (e.g. solutions for free-way scenario with a remote virtual driver)	-	-
Profitability	Business model	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	Delivery service provider (e.g. UPS, FEDEX)

FAN RESEARCH

Positioning Analysis of Embark — EMBARK

Self driving

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

Category	Sub-category	Option 1	Option 2	Option 3	Option 4
Whom to deliver for	By Customer Type	Individual	Transportation service provider (e.g. SF Express, bus companies)	Transportation service operator (e.g. Uber, Didi, Hertz)	Non-transportation company (e.g. JD, Amazon, KFC, McDonalds)
	By Customer Size	Small (e.g. individuals, small business)	Medium (e.g. local grocery stores, local chain restaurants)	Large (e.g. global chain stores)	-
What to deliver	By Delivery Type	Passenger delivery (e.g. bus companies)	Non-passenger delivery (e.g. SF Express)		-
	By Delivery Category	Massive transit (e.g. urban bus, cross-city bus)	Shared mobility (e.g. Didi, Uber, shuttle)	Car rental (e.g. Hertz, Avis)	Private car
		Food delivery (e.g. small/chain restaurants)	Grocery delivery (e.g. small/chain grocery stores, online grocery stores)	Logistics (e.g. over-the-road cargo transportation)	-
Where to deliver	By Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
How often to deliver	By Frequency	Low (e.g. <=3 deliveries per person per week)	Medium (e.g. 3-7 deliveries per person per week)	High (e.g. >=7 deliveries per person per week)	-
	By Time Requirement	Intensive (e.g. food delivery)	Flexible (e.g. grocery delivery)	-	-

Solution (Design The Products and Business)

Category	Sub-category	Option 1	Option 2	Option 3	Option 4
Safety	Delivery type	Passenger delivery	Non-passenger delivery	-	-
Coverage	Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
Speed	Operation speed	Walking speed (e.g. <=9KM/H)	Normal speed (e.g. 10-60KM/H)	High speed (e.g. >=60KM/H)	
Capacity	Capacity	Small (e.g. <=100 Pounds, <=5 Passengers)	Medium (e.g. 100-1,000 Pounds, 6-25 Passengers)	Large (e.g. >=1,000 Pounds, >=25 Passengers)	-
Storage Environment	Interior design	Basic design	Special design (e.g. interior temperature, size.)	-	-
Self-driving Technology	Software solution	Basic solution for single scenario (e.g. solutions for free-way scenario with a driver to supervise)	Advanced solution for complex scenario (e.g. solutions for free-way scenario with a remote virtual driver)	-	-
Profitability	Business model	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	Delivery service provider (e.g. UPS, FEDEX)

Positioning Analysis of Starsky Robotics

Transportation Market Segmentation (Choose The Customers/Needs To Satisfy)

Whom to deliver for	By Customer Type	Individual	Transportation service provider (e.g. SF Express, bus companies)	Transportation service operator (e.g. Uber, Didi, Hertz)	Non-transportation company (e.g. JD, Amazon, KFC, McDonalds)
	By Customer Size	Small (e.g. individuals, small business)	Medium (e.g. local grocery stores, local chain restaurants)	Large (e.g. global chain stores)	-
What to deliver	By Delivery Type	Passenger delivery (e.g. bus companies)	Non-passenger delivery (e.g. SF Express)		-
	By Delivery Category	Massive transit (e.g. urban bus, cross-city bus)	Shared mobility (e.g. Didi, Uber, shuttle)	Car rental (e.g. Hertz, Avis)	Private car
		Food delivery (e.g. small/chain restaurants)	Grocery delivery (e.g. small/chain grocery stores, online grocery stores)	Logistics (e.g. over-the-road cargo transportation)	-
Where to deliver	By Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
How often to deliver	By Frequency	Low (e.g. <=3 deliveries per person per week)	Medium (e.g. 3-7 deliveries per person per week)	High (e.g. >=7 deliveries per person per week)	-
	By Time Requirement	Intensive (e.g. food delivery)	Flexible (e.g. grocery delivery)	-	-

Solution (Design The Products and Business)

Safety	Delivery type	Passenger delivery	Non-passenger delivery	-	-
Coverage	Distance	Walkable level (e.g. <=3KM)	Community level (e.g. 4-10KM)	Urban level (e.g. 10-100KM)	Cross-city level (e.g. >=100KM)
Speed	Operation speed	Walking speed (e.g. <=9KM/H)	Normal speed (e.g. 10-60KM/H)	High speed (e.g. >=60KM/H)	
Capacity	Capacity	Small (e.g. <=100 Pounds, <=5 Passengers)	Medium (e.g. 100-1,000 Pounds, 6-25 Passengers)	Large (e.g. >=1,000 Pounds, >=25 Passengers)	-
Storage Environment	Interior design	Basic design	Special design (e.g. interior temperature, size.)	-	-
Self-driving Technology	Software solution	Basic solution for single scenario (e.g. solutions for free-way scenario with a driver to supervise)	Advanced solution for complex scenario (e.g. solutions for free-way scenario with a remote virtual driver)	-	-
Profitability	Business model	Software provider (e.g. Microsoft, Adobe)	Software + hardware provider (e.g. DJI, Apple)	Operating platform provider (e.g. Didi, Uber)	Delivery service provider (e.g. UPS, FEDEX)