

F R O S T & S U L L I V A N

FROST & SULLIVAN BEST PRACTICES AWARD

AUTONOMOUS SHUTTLE - GLOBAL

Product Leadership 2019



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Background and Company Performance

Industry Challenges

The global autonomous shuttle industry faces a bevy of challenges before reaching commercial viability, and autonomous developers must pass stringent vehicle testing, software testing, and regulatory hurdles before selling their services in the United States and worldwide. In addition, city authorities must invest in smart infrastructure that can communicate with autonomous vehicles and charge electric batteries. Overcoming these hurdles demands significant investment from public and private entities as well as millions of miles of on-road and simulated testing before autonomous shuttle companies can profit from core services.

Developers need to find other ways to monetize or stay afloat as they test and improve systems. Additionally, autonomous vehicle developers must familiarize consumers with their technology and services. Many riders are apprehensive to relinquish complete control to autonomous systems; therefore, developers must incur costs by demonstrating their services for free. Proper education and positive testing are imperative to the successful and sustainable rollout of autonomous shuttles.

Once regulatory obstacles have been passed and public trust earned, autonomous vehicles have the potential to remedy major urban pain points. Although many years out from reality, autonomous shuttles will be a cornerstone of smart city design. Traffic and congestion can be greatly reduced with the proper infrastructure and autonomous services. Moreover, autonomous shuttles will be a central aspect of burgeoning mobility-as-a-service companies. With more efficient routing and the removal of human drivers, these services can offer the absolute lowest prices to consumers, thereby reducing the cost of travel across nearly all modalities.

Product Family Attributes and Business Impact

Match to Needs

France-based NAVYA began developing electric autonomous shuttles in 2014, and collaborators, clients, and city authorities appreciate NAVYA's ability to meet their hyper-specific needs. Collaborators seek reliable partners that can deliver autonomous services with a tested track record. Full vertical integration between all processes means complete control over all aspects of production and research and development (R&D), allowing NAVYA to create bespoke solutions for its clients, irrespective of use case or geography. Offering highly tailored offerings means that in each region in which NAVYA operates, complying with specific regulations is easier.

NAVYA fully tailors its products and offerings around the specific needs of each client or geography, which greatly accelerates the go-to market and commercial viability of its business models because less time is spent overcoming regulatory hurdles. In North America, NAVYA works closely with the National Highway Traffic Safety Administration (NHTSA) and Transport Canada to hasten regulatory compliance. Moreover, authorities in cities and municipalities desire mobility solutions that make better use of road space and infrastructure at a level of safety that is greater than with traditional public transit.

Reliability and Quality

NAVYA's localization layers provide the most robust and accurate navigation in the market, between 2 and 3 centimeters (cm). Other participants in the autonomous market have localization ranges that are half as accurate, between 4 and 6 cm and up to 8 cm. NAVYA achieves this optimal navigation by using satellite technology to localize rather than cameras.

In severe weather and dynamic urban environments, NAVYA's level of accuracy and reliability provides a safer and more consistent autonomous driving experience. Moreover, when autonomous vehicles share the road with pedestrians, bikers, and other vehicles, this level of accuracy is an essential safety aspect that can prevent accidents while keeping traffic flowing. In terms of riders, reliability and quality are perceived, and NAVYA bolsters consumer confidence by launching public demonstrations. These pre-launch debuts have successfully increased consumer confidence by 30%, thus improving brand perception and the likelihood of commercial viability in the years to come.

Product/Service Value

NAVYA's vehicles are fully electric and thus require less maintenance than internal combustion engine (ICE) shuttles or first-mile/last-mile transportation options. Remote monitoring services further enhance the product quality because faults can be detected and avoided early through remote diagnostics. Remote monitoring services greatly reduce the cost of maintenance and allow service providers to maximize the lifespan of their vehicles. Furthermore, monitoring features allow for planned maintenance and service schedules that do not impede or slow route times.

Design

NAVYA stands out from competitors by making the most equitable autonomous shuttles on the market. One of the key aspects of these shuttles' autonomy is that they enable transportation for the hearing and sight impaired, elderly, and disabled. Surprisingly, accessibility is not standard in the global autonomous shuttle industry; therefore, this level of accessibility is a major differentiator in a space that draws competition from tech companies and OEMs that may treat accessibility features as an afterthought.

Committed to full accessibility, NAVYA's shuttles serve the disabled with fully automated wheelchair ramps (coming soon), the sight impaired with audible information, and the hearing impaired with detailed visual information. This accessibility is paramount for NAVYA in terms of offering comprehensive first-mile/last-mile support for public and private transportation.

Growth Potential

Autonomous development requires rigorous on-road and simulated testing. Rather than waiting to profit from commercial-ready autonomous services, which are hampered by strict regulations and testing, NAVYA has found new entry points to grow its profits while honing and improving its autonomous driving platform.

In addition to shuttle services, NAVYA licenses its autonomous software to third parties enabling them to retrofit existing vehicles for fully autonomous operation in geofenced areas like airports and industrial sites for the movement of goods and people. This allows transport vehicles to become fully autonomous through retrofitting in geofenced areas. Although still a long-term goal, to preempt when autonomous shuttles will become commercially viable, NAVYA has launched a three-year partnership with Axa Insurance, from 2018 to 2021, to build comprehensive insurance policies. This partnership allows NAVYA to test trip-based use policies before the widespread use of its vehicles.

Operational Efficiency

NAVYA provides customers with dedicated, 24/7 customer service, including scheduling maintenance and providing service and software updates. In addition, clients using NAVYA's software or vehicles and cities in which the company's services operate have access to monthly reports that detail use parameters and vehicle efficiency, which can be tailored to share specific details as regularly as necessary.

This level of visibility is unmatched by competitors that often charge more for oversight or dedicated support teams. The operational efficiency provided by NAVYA's customer service allows clients to have complete oversight and control over their platforms, enabling smarter service, route, and maintenance planning.

Conclusion

NAVYA is an established market leader in the competitive autonomous shuttle space. While major participants, such as tech companies and OEMs, are working on developing a wide scope of offerings, NAVYA has focused its efforts on creating best-in-class autonomous shuttles for short-range transportation. Full vertical integration allows NAVYA to control every aspect of production and address clients' specific needs. Furthermore, working closely with NHTSA, Transport Canada, and other regulatory entities, NAVYA can adapt its products and services to meet specific legislations.

NAVYA has invested time and resources in proving to customers through public demonstrations that its shuttles are safe, resulting in an average 30% increase in consumer confidence. NAVYA's technology provides the highest level of localization accuracy by using satellites, and its shuttles provide accessible modes of transportation for the disabled, elderly, and sight/hearing impaired.

Moreover, partnerships, such as with insurance providers, bolster NAVYA's growth strategy and will allow it to be well positioned in the market once the technology becomes commercially viable in the United States and in the other countries. Licensing its autonomous technology and retrofitting existing vehicles in airports and industrial sites allow NAVYA to improve its platform more rapidly, thereby effectively reducing the time for new features and abilities to market.

With its strong overall performance, NAVYA has earned Frost & Sullivan's 2019 Product Leadership Award in the global autonomous shuttle industry.

Significance of Product Leadership

Ultimately, growth in any organization depends on customers purchasing from a company and then making the decision to return time and again. A comprehensive product line filled with high-quality, value-driven options is the key to building an engaged customer base. To achieve and maintain product excellence, an organization must strive to be best in class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Product Leadership

Demand forecasting, branding, and differentiating all play critical roles in finding growth opportunities for your product line. This three-fold focus, however, must be complemented by an equally rigorous focus on pursuing those opportunities to a best-in-class standard. Customer communication, customer feedback, pricing, and competitor actions must all be managed and monitored for ongoing success. If an organization can successfully parlay product excellence into positive business impact, market share will inevitably increase.

Key Benchmarking Criteria

For the Product Leadership Award, Frost & Sullivan analysts independently evaluated 2 key factors—Product Family Attributes and Business Impact—according to the criteria identified below.

Product Family Attributes

Criterion 1: Match to Needs

Requirement: Customer needs directly influence and inspire the design and positioning of the product family.

Criterion 2: Reliability and Quality

Requirement: Products consistently meet or exceed customer expectations for performance and length of service.

Criterion 3: Product/Service Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 4: Positioning

Requirement: Products or services address unique, unmet needs that competitors cannot easily replicate or replace.

Criterion 5: Design

Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

Business Impact

Criterion 1: Financial Performance

Requirement: Overall financial performance is strong in terms of revenue, revenue growth, operating margin, and other key financial metrics.

Criterion 2: Customer Acquisition

Requirement: Product strength enables acquisition of new customers, even as it enhances retention of current customers.

Criterion 3: Operational Efficiency

Requirement: Staff is able to perform assigned tasks productively, quickly, and to a high quality standard.

Criterion 4: Growth Potential

Requirements: Product quality strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

Requirement: Company culture is characterized by a strong commitment to product quality and customer impact, which in turn enhances employee morale and retention.

Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate award candidates and assess their fit with select best practices criteria. The reputation and integrity of the awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 Monitor, target, and screen	Identify award recipient candidates from around the world	<ul style="list-style-type: none"> Conduct in-depth industry research Identify emerging industries Scan multiple regions 	Pipeline of candidates that potentially meet all best-practice criteria
2 Perform 360-degree research	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> Interview thought leaders and industry practitioners Assess candidates' fit with best practices criteria Rank all candidates 	Matrix positioning of all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> Confirm best practices criteria Examine eligibility of all candidates Identify any information gaps 	Detailed profiles of all ranked candidates
4 Initiate research director review	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> Brainstorm ranking options Invite multiple perspectives on candidates' performance Update candidate profiles 	Final prioritization of all eligible candidates and companion best practices positioning paper
5 Assemble panel of industry experts	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> Share findings Strengthen cases for candidate eligibility Prioritize candidates 	Refined list of prioritized award candidates
6 Conduct global industry review	Build consensus on award candidates' eligibility	<ul style="list-style-type: none"> Hold global team meeting to review all candidates Pressure-test fit with criteria Confirm inclusion of all eligible candidates 	Final list of eligible award candidates, representing success stories worldwide
7 Perform quality check	Develop official award consideration materials	<ul style="list-style-type: none"> Perform final performance benchmarking activities Write nominations Perform quality review 	High-quality, accurate, and creative presentation of nominees' successes
8 Reconnect with panel of industry experts	Finalize the selection of the best practices award recipient	<ul style="list-style-type: none"> Review analysis with panel Build consensus Select recipient 	Decision on which company performs best against all best practices criteria
9 Communicate recognition	Inform award recipient of recognition	<ul style="list-style-type: none"> Present award to the CEO Inspire the organization for continued success Celebrate the recipient's performance 	Announcement of award and plan for how recipient can use the award to enhance the brand
10 Take strategic action	Upon licensing, company is able to share award news with stakeholders and customers	<ul style="list-style-type: none"> Coordinate media outreach Design a marketing plan Assess award's role in strategic planning 	Widespread awareness of recipient's award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, resulting in errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, helps clients accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's growth team with disciplined research and best practices models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit <http://www.frost.com>.