

FROST & SULLIVAN

# BEST PRACTICES

AWARDS

FROST & SULLIVAN

BEST  
2020 PRACTICES  
AWARD

**RIVIN**

**2020 NORTH AMERICAN  
VEHICLE INSPECTION SERVICES  
ENABLING TECHNOLOGY LEADERSHIP AWARD**

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## Background and Company Performance

### *Industry Challenges*

#### **Accountability for Exterior Damage to Vehicles**

Every five seconds, the exterior of a car is damaged, resulting in annual repair expenses of \$100 billion, globally, and a whopping 50% of that expense is incurred out-of-pocket by customers or by their insurance service providers for damage caused by a culpable third party.<sup>1</sup> Owning a vehicle and paying for both auto insurance and upkeep is a major investment not all drivers want to incur. Fast-changing consumer attitudes towards the concept of vehicle ownership across mature markets has heralded the dawn of new-mobility business models such as vehicle leasing and renting wherein a vehicle is likely to experience a substantially higher driver turnover during its lifetime, implying that the vehicles change hands frequently.

The United States car leasing and rental market is expected to grow at a compound annual growth rate (CAGR) of 4.9% between 2017 and 2030.<sup>2</sup> With mobility-as-a-service (MaaS) business models gathering momentum, an automobile on these platforms is likely to change hands more often during its lifetime than its predecessors from the pre-MaaS era. Often, these cars are driven by individuals with questionable skills, diverse risk appetites, and with little regard for the car's safety because it does not belong to them. Damage to a borrowed vehicle is often overlooked. This leaves fleet operators challenged to accurately ascertain when and how a particular dent or scratch was originally scored on the vehicle body. The problem is that the customary manual inspection process performed at the time of vehicle handover does not always fully capture and record fresh damages; therefore, damages are unwittingly attributed to innocent drivers who are left with no option but to pay for someone else's mistake. Even drivers for vehicle logistics companies regularly find themselves at the receiving end of such undeserved blame.

As models such as MaaS gain momentum, a robust, reliable, and cost-effective automated inspection system arrayed at appropriate checkpoints throughout a vehicle's life cycle will help alleviate these accountability concerns.

#### **Human Subjectivity in Vehicle Repair-Cost Estimation and Condition Reports**

In the post-damage insurance survey process, the element of human subjectivity often leads to damage estimation errors. Overestimation errors result in avoidable expenses being forced upon customers and insurance service providers alike. Alternately, underestimation invariably requires a second round of approval from the insurance service provider, resulting in delayed repairs and adversely affecting bay productivity at body shops.

In the used car market, individual sellers are required to visit the dealer for a trade-in appraisal and vehicle condition report, both of which have traditionally relied on a manual checklist process that is susceptible to human error. At times, the seller ends up getting

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<sup>1</sup> <https://www.coverager.com/ravin-ai-raises-4m/>

<sup>2</sup> <https://www.goldsteinresearch.com/report/us-car-rental-and-leasing-market-report>

much less for the used vehicle than its actual worth. Likewise, the dealer might incur a similar loss at the time of subsequent resale to the second owner, resulting in a substantial quantum of value going unrealized in the US used car business, an industry that in 2018 registered sales of 39.4 million units, more than double that of new car sales.<sup>3</sup>

### **Lack of an Integrated Vehicle Inspection History**

Finally, there is the hassle of a vehicle having to go through numerous inspections at different stages in its life cycle, the records of which are neither integrated nor digitized currently. Thus, a comprehensive inspection history cannot be successfully retrieved at a point later in the vehicle's useful life. A typical vehicle in the United States undergoes the following inspections at various stages, with no inter-stage information exchange or integration currently happening:

- Automaker vehicle inspection at the body-in-white stage
- Transporter vehicle inspection prior to dispatch to dealer storage yards, recorded using the bill of lading
- Pre-delivery inspection at the dealer before a new car sale is made
- The periodic (often yearly) vehicle safety and emissions inspection mandated by the Department of Motor Vehicles of the concerned state
- Used car vehicle inspection at the time of trade-in appraisals and at the time of vehicle resale to second owner

The first step towards integrating these inspection findings is to automate them by deploying artificial intelligence (AI) and machine learning (ML) tools. This approach will also mitigate the adverse impact of manual, paper-based vehicle inspection processes on stakeholder finances while enhancing the overall levels of trust and transparency in vehicle exchange transactions.

### ***Technology Leverage and Customer Impact***

Ravin.ai, an Israel- and UK-based start-up, specializes in offering automated vehicle inspection services to automotive industry verticals where it is common for cars to change hands frequently. The solutions create a time-stamped, geo-tagged report of a vehicle's condition, which can direct further course of action upon fresh damage detection during the vehicle exchange process.

### **Commitment to Innovation and Creativity**

With 15.28 CCTV cameras per 100 population, the United States is clearly the undisputed world leader in per capita CCTV installations.<sup>4</sup> Also, Newzoo's 2019 Global Mobile Market Report places the United States in the third position (79.1% penetration with 276 million smartphone users) behind only the United Kingdom and Germany in terms of smartphone

<sup>3</sup> <https://www.techsciresearch.com/report/us-used-car-market/4032.html>

<sup>4</sup> <https://aithority.com/news/top-10-countries-and-cities-by-number-of-cctv-cameras/>

penetration as a percentage of the population.<sup>5</sup> Ravin.ai was quick to capitalize on this ubiquity of cameras to assist the automotive industry's grappling with the trust-deficit associated with vehicle exchange transactions at different points along the chain of custody.

Two traits make the system cost-effective and simple, which distinguish Ravin.ai's Automated Vehicle Inspection solution from that offered by its competitors. First, the system's emphasis is skewed heavily in favor of software whereas the competition chooses to focus equally on hardware development. This software-laden approach has several advantages. Ravin.ai's system utilizes simple and readily available CCTV and smartphone cameras that rely on natural light to get the job done. This translates into cost savings for end-user industries as they do not have to purchase special-purpose cameras and scanning equipment and their subsequent installation in specially illuminated tunnels and gates erected on floor space devoted solely for the purpose of vehicle damage detection.

The second contrasting feature is the core technology's inherent capability to analyze intricate pixel data captured without artificial illumination or the need to be pre-acquainted with a vehicle model. The backend algorithms have been carefully designed to ensure that the final condition reports, even for an unfamiliar car model being inspected by the system for the very first time, are generated with a high degree of accuracy and consistency. The bottom-line is that even inexpensive off-the-shelf cameras can function as scanning tools in Ravin.ai's advanced AI-based automated vehicle damage inspection system that operates under fully natural lighting conditions.

### Application Diversity

Ravin.ai's software-centric vehicle inspection tool has already found strong traction at different stages of the automotive value chain in North America. The solution's simplicity (from an end-user's perspective) and cost-effectiveness position it to find more takers across the automotive industry when compared to its competition.

The following industry participants already appear quite enthused about the system's concomitant benefits.

**Car rental companies:** When a rented car is returned to the agency, timely detection of fresh damages on vehicle exteriors is critical to determine accountability and secure appropriate compensation from the culpable party. Performed correctly, damage detection minimizes the likelihood of an upcoming innocent customer having to pay for damage that he is not responsible for. In an automated process, the margin for error is low because a larger number of defects are captured by the system in comparison to the conventional checklist-based process that is performed manually. In vehicle rental demand hot-spots such as airports, there is higher probability of manual error creeping in, owing to the quick turnaround time between vehicle check-in and check-out. Ravin.ai's automated process is both quicker and more accurate than traditional and competing methods, thus gaining

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<sup>5</sup> <https://newzoo.com/insights/trend-reports/newzoo-global-mobile-market-report-2019-light-version/>

popularity among car rental companies.

**OEM leasing arms:** At the end-of-lease stage when vehicles are handed over, Ravin.ai's objective inspection system helps deliver an accurate and reliable excessive-wear estimate to provide initial vehicle grading information that is a crucial prerequisite for remarketing purposes.

**Used car industry:** Individuals willing to exchange their used cars for a different model can complete a preliminary remote trade-in appraisal from the comfort of their homes. They no longer have to visit the used car dealer. Upon receipt of a link via SMS, all they need to do is perform a 360-degree recording of the vehicle using their smartphone cameras, transmit the footage to the dealer's portal, and wait for a call back regarding the estimate. The solution can also be deployed for damage estimation and vehicle grading purposes at used car auctions.

**Auto insurance providers:** In the immediate aftermath of an accident, the vehicle user, if unharmed, can quickly perform a 360-degree recording of the vehicle and export an as-is condition report to the insurer who then plugs the information into a proprietary estimation tool and comes up with a provisional estimate, thereby improving transparency and certainty in the claims management process.

The technology has a high likelihood of being adopted by OEM dealers and independent aftermarket workshops as most of them regularly encounter claims from customers of their vehicles being damaged in the workshop or while being driven around by technicians as part of repairs and/or maintenance activities.

A few workshops also offer loaner-car services to customers in cases where substantial delays are involved in the vehicle delivery process. In such cases, Ravin.ai's tool can prove useful during the loaner vehicle check-in/check-out process as neither party can dispute a time-stamped and geo-tagged condition report.

### **Customer Purchase and Ownership Experience**

An inability to correctly and consistently fix responsibility for fresh damages at vehicle exchange points due to negligence/oversight errors typical of the manual inspection process is a constraint unique to participants at specific points in the automotive value chain. Ravin.ai's automated vehicle inspection system uses advanced ML methods to address this gap for industry participants who have long struggled with timely damage detection and therefore have ended up dealing with monetary losses. At the point of sale, business-to-business (B2B) customers such as car rental agencies and used car dealers are assured that their purchase of Ravin.ai's automated vehicle inspection solution would address most of the existing concerns associated with vehicle exchange interactions that are a regular part of their core business operations. Customers appreciate how enhanced transparency bridges the trust deficit at various vehicle exchange points, resulting in spin-off benefits that reflect in their balance sheets over time.

Other notable aspects of Ravin.ai's vehicle inspection system give it a competitive edge in this emerging landscape. For instance, the solution's use of widely available hardware is



only half of the success story; to enrich the user experience, the algorithm is designed to ensure that even an amateur vehicle inspector can successfully capture most of the damages and feed it to the system for subsequent analysis. This approach saves employers on manpower otherwise needed to get the job done. Now, they no longer need a specialist with the "eye" for spotting damages. The software is capable of accounting for errors in camera positioning relative to the vehicle, which enables it to filter out the noise and selectively absorb only the signal to appropriately capture angles that make the most of the ambient light conditions. When pitted against tools from the competition that insist that the image capture perfectly align with the cross wires and other markers on the camera screen, the offering from Ravin.ai scores highly on user convenience. Users are not forced to meet a highly restrictive positioning of the vehicle with respect to the image-capturing hardware. Also, the software is built with capabilities to weed out false positives, such as reflections that may resemble dents or scratches under inappropriately lit conditions.

The entire inspection process is incredibly simple from a user perspective and consists of 3 stages. In the first stage, which typically lasts up to a minute, the 360-degree image capture is performed wherein every pixel is scanned more than 10,000 times. In the next stage, the proprietary algorithm detects the vehicle type and recognizes damages and/or missing parts. In the final stage, an enterprise-grade modular cloud infrastructure delivers instant reports of the inspection findings over web, mobile, and application programming interface (API), which are then acted upon by the end user.

### **Brand Equity**

Ravin.ai does not invest excessive time, effort, and resources in marketing. It focuses on the quality of its offering instead. This approach has won the start-up investor and customer partners including Shell, Toyota and Avis-Budget. These prominent names in the North American automotive industry are well-networked, which means Ravin.ai can leverage its partners' industry connections to make the most of inbound requests, the majority of which eventually become deal wins. Within a short span of three years, Ravin.ai has built a reputation for itself as a provider of simple and cost-effective automated vehicle inspection solutions.

The company also maintains a regularly updated blog where prospective customers can gain a sense of its thought leadership and better understand its take on the latest trends that are shaping the industry. Constantly communicating its perspective on the latest industry developments and challenges has helped Ravin.ai build its brand in unconventional but effective ways.

## *Conclusion*

During its life cycle, a vehicle will routinely change hands several times. Until recently, car rental firms and vehicle logistics companies often found themselves faced with two equally undesirable choices: either pay for damage rectification themselves or claim compensation from an innocent opposite party due to the firm's inability to detect new damages on time. Similarly, in the insurance, car leasing, and the used car spaces, a manual checklist-based vehicle inspection process used to be the norm, making the process vulnerable to human error and subjectivity.

With the advent of technology in vehicle inspection processes, the likelihood of misreporting has declined substantially. An automated vehicle inspection system that leverages AI and ML methods and is amenable to integration can help enhance the trust, transparency, and speed of the overall vehicle exchange process. It will also pave the way for a comprehensive digital vehicle inspection history that has never before been achieved. The innovative startup Ravin.ai has delivered on each of these possibilities for serving various end-user industries, offering a cost-effective solution that generates a time-stamped, geo-tagged report of a vehicle's condition in a process that is highly user-friendly.

For its strong overall performance, Ravin.ai has earned Frost & Sullivan's 2020 Enabling Technology Leadership Award in the North American Vehicle Inspection Services Industry.



## Significance of Enabling Technology Leadership

Ultimately, growth in any organization depends on customers purchasing from a company and then making the decision to return time and again. In a sense, then, everything is truly about the customer. Making customers happy is the cornerstone of any successful, long-term growth strategy. To achieve these goals through enabling technology leadership, an organization must be best in class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



## Understanding Enabling Technology Leadership

Product quality (driven by innovative technology) is the foundation of delivering customer value. When complemented by an equally rigorous focus on the customer, companies can begin to differentiate themselves from the competition. From awareness, to consideration, to purchase, to follow-up support, organizations that demonstrate best practices deliver a unique and enjoyable experience that gives customers confidence in the company, its products, and its integrity.

## Key Benchmarking Criteria

For the Enabling Technology Leadership Award, Frost & Sullivan analysts independently evaluated Technology Leverage and Customer Impact according to the criteria identified below.

### Technology Leverage

- Criterion 1: Commitment to Innovation
- Criterion 2: Commitment to Creativity
- Criterion 3: Stage Gate Efficiency
- Criterion 4: Commercialization Success
- Criterion 5: Application Diversity

### Customer Impact

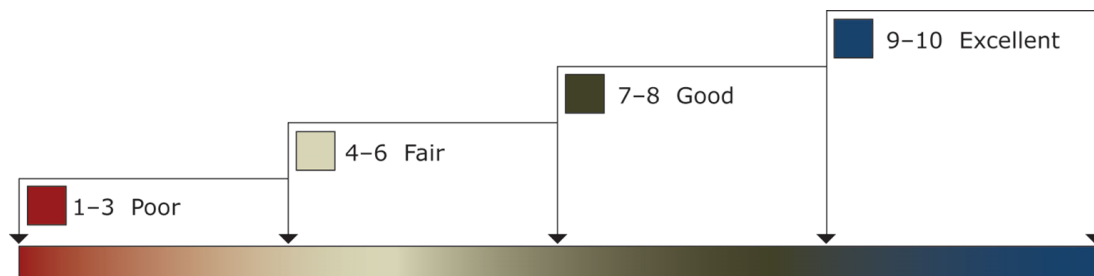
- Criterion 1: Price/Performance Value
- Criterion 2: Customer Purchase Experience
- Criterion 3: Customer Ownership Experience
- Criterion 4: Customer Service Experience
- Criterion 5: Brand Equity

## Best Practices Award Analysis for Ravin.ai

### Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

#### RATINGS GUIDELINES



The Decision Support Scorecard considers Technology Leverage and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, Frost & Sullivan has chosen to refer to the other key participants as Competitor 1 and Competitor 2.

<i>Measurement of 1–10 (1 = poor; 10 = excellent)</i>			
<b>Enabling Technology Leadership</b>	Technology Leverage	Customer Impact	Average Rating
<b>Ravin.ai</b>	<b>9</b>	<b>9</b>	<b>9</b>
Competitor 1	8	8	8
Competitor 2	8	7	7.5

## Technology Leverage

### Criterion 1: Commitment to Innovation

Requirement: Conscious, ongoing adoption of emerging technologies that enable new product development and enhance product performance.

### Criterion 2: Commitment to Creativity

Requirement: Technology leveraged to push the limits of form and function in the pursuit of white space innovation.

### Criterion 3: Stage Gate Efficiency

Requirement: Adoption of technology to enhance the stage gate process for launching new products and solutions.

### Criterion 4: Commercialization Success

Requirement: A proven track record of taking new technologies to market with a high rate of success.

### Criterion 5: Application Diversity

Requirement: The development and/or integration of technologies that serve multiple applications and can be embraced in multiple environments.

## Customer Impact

### Criterion 1: Price/Performance Value

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

### Criterion 2: Customer Purchase Experience

Requirement: Customers feel they are buying the optimal solution that addresses both their unique needs and their unique constraints.

### Criterion 3: Customer Ownership Experience

Requirement: Customers are proud to own the company's product or service and have a positive experience throughout the life of the product or service.

### Criterion 4: Customer Service Experience

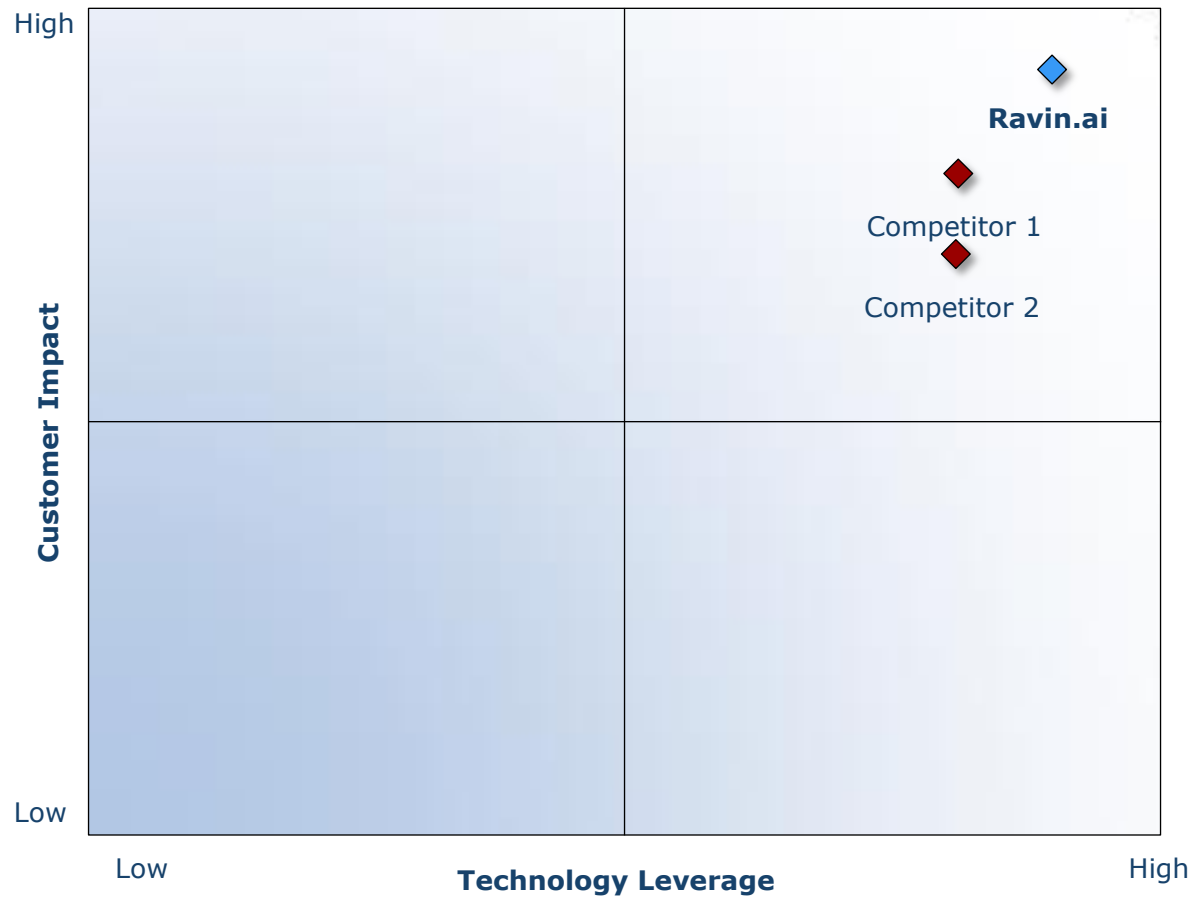
Requirement: Customer service is accessible, fast, stress-free, and of high quality.

**Criterion 5: Brand Equity**

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.

***Decision Support Matrix***

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.



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



### 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>.