

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

FROST & SULLIVAN BEST PRACTICES AWARD

SMART CITY SOLUTIONS - GLOBAL

Visionary Innovation Leadership 2019

FROST & SULLIVAN

2019

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Background and Company Performance

Industry Challenges

As rapid population growth and urbanization continue to spur urban density around the world, communities will face the difficult challenge of mitigating the negative impacts they have on their environments. Without intervention, the effects of pollution, congestion, and resource scarcity will all create public health issues and diminish life quality, especially in high concentration megacities.

Efforts to combat these issues abound, as municipal leaders seek the help of forward-thinking innovators to develop and implement solutions that alleviate congestion, minimize environmental impacts, and create newer and more efficient ways of living. However, many of their usual strategies are now no longer adequate. For instance, adding lanes to a congested stretch of road only creates more traffic through induced demand.

In search of solutions, Frost & Sullivan monitors how many of these cities are now turning to smart city concepts in which they infuse technology into various aspects of operations including street lights, public transportation, information technology connectivity, water, and power supply, sanitation, waste management, and security. New capabilities achieved through the Internet of Things (IoT), data analytics and cloud not only aim to solve the problems created by urban development, but also provide value to citizens by enhancing their comfort and convenience, and overall safety. The smart city solution also provides an additional revenue stream to cities and municipalities.

Frost & Sullivan's own research confirms that city planners that choose to pursue this route face challenges related to high initial investment costs, spatial concerns, as well as regulatory barriers. Each new functionality—i.e., camera operating, electric vehicle (EV) charging, or Wi-Fi and telecom—requires its own infrastructure, hardware, and often difficult integration. In many cases, they reach the ends of their lifecycles before they can provide sufficient return on investment. Therefore, in order to achieve success in this challenging space, Frost & Sullivan points out that smart city integrators and solution providers must create solutions that maximize value with limited space. Moreover, as each city is different and has its unique set of challenges, these providers must be able to customize their solutions and cater to each city's needs.

Focus on the Future and Best Practices Implementation

Founded in Copenhagen, Denmark in 1945, Ramboll Group A/S (Ramboll) leverages synergies from local knowledge and the global expertise of 15,000 talented individuals companywide to develop innovative and sustainable smart city solutions. With nearly 300 offices in 35 countries, Frost & Sullivan recognizes how the self-described independent engineering, design, and consultancy institution provides a multidisciplinary approach to sustainability, addressing the critical needs of the public sector and private businesses in the Nordic region, the United Kingdom, North America, Continental Europe, the Middle East, and Asia-Pacific.

Reflecting Company Values in Design and Implementation

As a global telecom pioneer, Ramboll has a keen understanding of the data requirements in IoT-based systems. The company leverages this heritage to design, develop, and implement multi-utility solutions for a range of smart city purposes, in use cases such as building, transport,

water, environment and health, planning and urban design, oil and gas, energy, and telecom. These solutions aim to reduce operational and capital expenditures while also mitigating environmental impact, preserving natural resources, and promoting sustainability.

Under its owner guidance, the Ramboll Foundation, Ramboll adheres to a strict system of values which permeate throughout the organization. With innovation and sustainability at its core, the company's mission aligns well with smart city concepts, nicely reflecting the ideals in its product design and implementation. Ramboll's smart city poles, for instance, integrate different equipment with multiple functionalities to introduce new possibilities and solve numerous citywide issues. The team combines various capabilities into a single all-in-one solution that embodies Ramboll's values and capabilities, benefitting cities and citizens, reducing total cost of ownership, streamlining deployment, and minimizing CO₂ emissions. On average, these poles last about 25 years, providing a quick and continuous return on investment.

With each product, Ramboll's team follows a strict and uniform process in which both Ramboll's partners and staff monitor the production process quality. Each manufacturing location hosts between eight and ten full-time Ramboll employees, which are present around-the-clock to ensure these factories adhere to the company's entire end-to-end production process. In addition to performing quality checks on the products, these employees also check for health and safety, and they monitor the process, including procurement, production, and distribution. Ramboll also suitably involves its partners, which visit the locations and can view the production. By installing quality assurances employees at facilities and inviting its partners to observe the process, Ramboll fulfills its commitment to quality. These standards affect each Ramboll location across the globe.

Leveraging a Telecom Background to Anticipate Customer Requirements with Multi-utility Solutions

Ramboll understands the extent to which client needs can vary, and the company designs its solutions to be both flexible and modular; customers can easily upgrade or customize them with various types of equipment—i.e., telecom antennas, environmental sensors, EV chargers, light-emitting diode lights, cameras, and Wi-Fi equipment—to accommodate new requirements or functionalities either in advance, or as they arise. For instance, the company's smart utility poles vary by design tremendously from case to case. In India, where the company anticipates the EVs influx, Ramboll integrated a smart charging solution for EVs into its smart poles, which can accommodate direct current or alternating current chargers. Conversely, in Europe, where 5G implementation has already begun, the company combined radio and telecom antennas as well as backup power storage into its smart poles, addressing spatial and connectivity concerns about challenges related to the 5G transition. Clients can also exclude services which they deem unnecessary. Ramboll can deploy miniature versions of its poles when clients do not need all of its features. Ramboll stresses that it is a technology-neutral company, and it can easily adapt to meet client needs.

Ramboll can also leverage its telecom backbone to integrate different connectivity options—data connectivity, a Microlab link, or wireless networks—to address challenges in areas which lack fiber optic cabling systems. For instance, while some regions—i.e., Europe—plan for future connectivity, other areas—i.e., India—lack sufficient data bandwidth and can pose a threat to the

quality of services communities receive. In such areas, Ramboll focuses on bringing smart city solutions by providing better connectivity. Instead of depending on antiquated options, Ramboll offers the opportunity to use its telecom network for optical fiber connectivity, which not only helps telecom operators reach out to clients, but also helps end consumers enjoy better connectivity.

To ensure it develops the best solutions possible that meet client needs accurately, Ramboll often spends several months in the research and development process, during which it develops prototypes, deploys them on test runs, and solicits client feedback. The company then uses this client feedback to make adjustments and improve its product. Ramboll employs this process before launching with every product it develops.

The company's preparation for the EV explosion in India and 5G integration in Europe is only one of the many instances in which Ramboll has seized on an opportunity to anticipate customer requirements. Additionally, Ramboll's ability and willingness to adjust its solutions and adapt to client needs is a testament to the company's commitment to delivering the right product for each project, as well as exceptional customer service.

Case Study, Amaravati: In Amaravati, India, which has initiated an 8-year, multi-phase infrastructure development, Ramboll created a smart pole solution with capabilities and design that appeal to the city's specific needs. Some of the key features include an emergency announcement system, a power-efficient LED lighting system with dimmable sensors, WiFi antennae, high-definition surveillance cameras, an emergency call box, electric vehicle charging, and a 19" cabinet.

Case Study, Vishakhapatna: Ramboll customized a series of smart city poles for a project in Vishakhapatnam, India. The multifunctional structures addressed the cities aesthetic and sustainability requirements with a range of heights, camouflage, various colors, and simple installation. Ramboll and the city of Vishakhapatnam expect these poles to enhance safety, improve smart city infrastructure, and optimize the usage of resources with a single solution.

Frost & Sullivan concludes that these best practices directly indicate that Ramboll is an innovative and forward-thinking company that envisions what the future holds and develops appropriate products in advance of market trends.

Frost & Sullivan commends Ramboll for offering immense value to its customers by providing the best and differentiated solution, revenue maximization, safe environment, and asset value maximization, compared to its other competitors.

Flexible Business Model for a Litany of Global Clients

Ramboll works on projects all over the world and structured itself to be present in more than 35 countries, catering to clients in these countries from multiple locations to make efficient use of its resources. As a global company, Ramboll has refined its methodology to be flexible to variable business models required by different types of cities and clients. To learn about the market needs, Ramboll participates in numerous conferences all over the world and interacts with people—i.e., Barcelona, Dubai, the United States (US), India, Europe, and Asia. The company then uses its learned information to develop new products.

Ramboll has developed its global reach not only from a technical perspective, but also from a business development perspective. By developing its expertise in various domains, Ramboll positions itself for financial growth through its portfolio and geographical reach with nearly 600 projects worldwide. In recent years, the company has made multiple major acquisitions of strategic companies in different sectors such as OBG and ENVIRON in the US. The company's smart city solution has been growing in sales volume at double-digit rates. Ramboll's growth in smart city solution business is in-line with Frost & Sullivan's estimation of compound annual growth rate growth for global smart street lighting and smart lamp poles market.

Moreover, Ramboll remains confident that there is a more than an adequate field of opportunity for its products as the smart city element comes into place. For example, telecom operators are expecting growing demand from communities that are seeking replacements from their outdated telecom towers. As these municipalities gain funding, the smart tower solution will continue to gain traction.

Conclusion

In the challenging global industry of smart city solutions, Frost & Sullivan firmly believes that providers must distinguish themselves through product offerings and customer service that not only mitigate the issues caused by urban development, but also provide value-added benefits to cities and citizens like never before. Ramboll draws on its telecommunications heritage and system of values under the Ramboll Foundation to design, develop, and implement customized smart city solutions for a global customer base. In addition, the company customizes its products to address regionally specific and emerging market trends.

With its monumental ability to assist both its partners and municipalities to help them understand the transformational technologies significance and its impact on a country, Ramboll is now a more social and environmentally responsible conglomerate in the smart city ecosystem.

As a result of these best practices and the company's demonstrated market leadership, Ramboll earns the 2019 Frost & Sullivan Global Visionary Innovation Leadership Award.

Significance of Visionary Innovation Leadership

A Visionary Innovation Leadership position enables a market participant to deliver highly competitive products and solutions that transform the way individuals and businesses perform their daily activities. Such products and solutions set new, long-lasting trends in how technologies are deployed and consumed by businesses and end users. Most important, they deliver unique and differentiated benefits that can greatly improve business performance as well as individuals' work and personal lives. These improvements are measured by customer demand, brand strength, and competitive positioning.



Understanding Visionary Innovation Leadership

Visionary Innovation is the ability to innovate today in the light of perceived changes and opportunities that will arise from Mega Trends in the future. It is the ability to scout and detect unmet (and as yet undefined) needs and proactively address them with disruptive solutions that cater to new and unique customers, lifestyles, technologies, and markets. At the heart of visionary innovation is a deep understanding of the implications and global ramifications of Mega Trends, leading to correct identification and ultimate capture of niche and white-space market opportunities in the future.

Key Benchmarking Criteria

For the Global Visionary Innovation Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Focus on the Future and Best Practices Implementation—according to the criteria identified below.

Focus on the Future

Criterion 1: Focus on Unmet Needs

Requirement: Implementing a robust process to discover customers' unmet or underserved needs and create the products or solutions to address them effectively.

Criterion 2: Visionary Scenarios through Mega Trends

Requirement: Incorporating long-range, macro-level scenarios into the innovation strategy, thereby enabling first-to-market growth opportunity solutions

Criterion 3: Growth Pipeline

Requirement: Best-in-class process to identify and prioritize growth opportunities leveraging both internal and external sources.

Criterion 4: Blue Ocean Strategy

Requirement: Strategic focus on creating a leadership position in a potentially uncontested market space, manifested by stiff barriers to entry for competitors.

Criterion 5: Growth Performance

Requirement: Growth success linked tangibly to new growth opportunities identified through visionary innovation.

Best Practices Implementation

Criterion 1: Vision Alignment

Requirement: The executive team is aligned with the organization's mission, vision, strategy, and execution.

Criterion 2: Process Design

Requirement: Processes support the efficient and consistent implementation of tactics designed to implement the strategy.

Criterion 3: Operational Efficiency

Requirement: Staff performs assigned tasks seamlessly, quickly, and to a high quality standard.

Criterion 4: Technological Sophistication

Requirements: Systems enable companywide transparency, communication, and efficiency.

Criterion 5: Company Culture

Requirement: The executive team sets the standard for commitment to customers, quality, and staff, which translates directly into front-line performance excellence.

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

Frost & Sullivan Awards follow a 10-step process to evaluate Award candidates and assess their fit with select best practice 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 globe	<ul style="list-style-type: none"> • Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies 	Pipeline of candidates who 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-practice 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-practice 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-practice 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-practice 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-practice criteria
9 Communicate recognition	Inform Award recipient of Award 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 future 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, leading to 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 players and for identifying those performing at best-in-class levels.



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to 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 practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.