FROST & SULLIVAN

FUJITSU

2022
ENABLING
TECHNOLOGY
LEADER

*ASIA-PACIFIC DIGITAL TWINS FOR
SUSTAINABLE MOBILITY INDUSTRY*

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Fujitsu Limited excels in many of the criteria in the digital twins for sustainable mobility space.

AWARD CRITERIA

Technology Leverage	Customer Impact
Commitment to Innovation	Price/Performance Value
Commitment to Creativity	Customer Purchase Experience
Stage Gate Efficiency	Customer Ownership Experience
Commercialization Success	Customer Service Experience
Application Diversity	Brand Equity

Innovative Market Player with Significant Industry Experience

Founded in 1935 and headquartered in Japan, Fujitsu Limited (Fujitsu) is a global provider of information and communication technology solutions. The company operates through three segments of solutions: technology, ubiquitous, and device. In addition to multi-cloud and hybrid information technology systems, Fujitsu offers a broad range of products related to data centers, such as integrated systems, storage solutions, servers, and network switches. In addition, Fujitsu delivers cybersecurity consulting, managed security services, security operations, advanced threat centers, and the Internet of Things (IoT) and artificial intelligence (AI) platforms. Its latest solution is a platform to create digital twins of entire mobility ecosystems which ultimately aid in solving mobility problems. The platform can be employed to solve a wide array of issues in the mobility domain, including reforming vehicle insurance claims and providing insights on traffic in an area. Focus on sustainability has been incorporated into the very fabric of this platform making it an exemplary solution to be emulated across the industry.

Outstanding Sustainable Technology Leadership

From 2019 to 2021, Fujitsu presented its own digital twin services series, "Digital Twin Utilizer, "Digital Twin Analyzer" and "Digital Twin Collector" to automobile manufacturers and insurance companies in Japan and Asia-Pacific, followed by North America and Europe, contributing to developing new mobility services worldwide. With Fujitsu's new integrated virtual platform, users can seamlessly integrate and manage information across connected cars, smartphones, and tablets. The platform is a unitary solution

that can be customized and adapted to address different problems. It provides wholesome solutions factoring in people's behaviors and environmental impact in the process. The company displays social and environmental responsibility by considering the impact on society and environment rather than narrowly focusing on issue resolution.

> *"The company's platform collects raw real-world data on people, things, and processes to provide insights to services and applications. As it directly processes raw-data, data from IoT devices can be directly fed without the need to prepare them for processing. Additionally, its data coverage control allows comprehensive data collection without duplication. These features significantly reduce costs and time, improving efficiency."*
>
> *- Norazah Bachok,*
> *Best Practices Research Analyst*

Fujitsu's Digital Twin Utilizer implements proprietary stream data processing technology called Dynamically Reconfigurable Asynchronous Consistent EveNt-processing Architecture (Dracena) to handle vast amounts of data from many sources simultaneously. Access to computing power in the cloud enables this on-demand scalability. The company's platform collects raw real-world data on people, things, and processes to provide insights to services and applications. As it directly processes raw-data, data from IoT devices can be directly fed without the need to prepare them for processing. Additionally, its data coverage control allows comprehensive data collection without duplication. These features significantly reduce costs and time, improving efficiency.

Among the modules in the suite, is the security operations center that uses anomaly detection to prevent cyber threats and the combinatorial optimization digital annealer, which allows drivers to find the shortest route. The unique feature in all of Fujitsu's platforms and modules is that it incorporates algorithms to factor in human and societal behavior creating solutions that are sustainable and ultimately achieving:

- Smooth and safe transportation for all

- Realization of a society with carbon-neutral transportation

- Resilient and sustainable transport networks

Commitment to Innovation and Customer Value Delivery

The company continuously refines its approach to digital twins for sustainable mobility, continuously building on its technology. It provides customers with the tools and technology infrastructure they need to succeed featuring flexibility, agility, and configurability. The following are among the many benefits of employing Fujitsu's digital twins in achieving sustainable mobility:

- **Reducing the Cost of Storing and Collecting Data:** The platform manages only lightweight metadata instead of storing bulky amounts of data, such as video recorded by mobility devices in the cloud, thus virtually integrating distributed data. It allows users, including car manufacturers and insurance companies, to access only the data they need, significantly reducing cloud traffic and data, resulting in 50% cost savings.[1]

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[1] https://www.fujitsu.com/global/about/resources/news/press-releases/2021/0415-01.html

- **Providing Stable Access to Data by Regulating Congestion during Large-volume Data Transmission:** As an example, through its traffic scheduler function, the cloud burden increases rapidly when video data is collected simultaneously from one's vehicle and surrounding vehicles because of an accident, thus causes congestion on the cloud as data is copied and accessed from each device. As a result, data may flow more slowly or be less accessible. The traffic scheduler regulates bulk traffic by controlling requests for data replication from mobility devices, thus providing stable data access.

- **Managing Data Duplication, Replicating Comprehensively, and Ensuring Consistent Service Quality:** Data collection biases for self-driving systems may impact service quality. With the data coverage control function, many mobility devices will be analyzed simultaneously for their data access and acquisition status. This feature prevents duplication of similar data and ensures the data acquired is complete. This method produces high quality data used for analysis and, ultimately, services.

Fujitsu's robust digital twin technology and its utilizations of its cutting-edge features to achieve sustainability across the mobility spectrum, compels Frost & Sullivan to identify Fujitsu as a pioneer in the sustainable mobility domain.

Customer-centered Solution Delivery and Application Diversity

Fujitsu's offering goes beyond its extensive expertise and best-in-class capabilities, with customer value delivery as the strategic imperative. Some of the use cases where Fujitsu has employed its digital twinning platform to provide customer focused solutions are as follows:

- **Increasing Efficiency and Sophistication in Insurance Operations:** Upon detection of an accident, a video is automatically obtained from the vehicle and nearby vehicles simply by specifying the location and time. A company can provide automotive insurance that considers multiple perspectives when handling accidents.

- **Upgrading Traffic Management Services:** As the system tracks the behavior of vehicles on the road, it can capture images in real-time about traffic congestion, accidents, falling obstacles, bad weather, and other road events, allowing the road management company to provide detailed traffic control services in real-time.

- **Analyzing Vehicle Failure:** Automobile manufacturers can gather peripheral images when vehicle sensors detect abnormal values to estimate failure causes and provide feedback for vehicle design and development.

Fujitsu meets with customers to assess their needs and develop tailored solutions with roadmaps for seamless execution. This approach establishes ongoing trust with clients for long-lasting relationships extending throughout the service lifecycle.

Strategic Partnerships Aid Performance

The automotive industry explores the concept of providing transportation services as a "mobility service provider," which introduces new computing challenges. In 2022, Fujitsu announced a partnership with Amazon Web Services (AWS), enabling the company to manage its digital mobility tools on the AWS cloud. A set of these technologies, mobility digital twin, allows drivers to map their real-world surroundings onto a digital replica. While digital twinning is becoming widely adopted across the mobility spectrum, scaling

it to large areas or geographies is challenging. These two technology giants' expertise in systems integration, AI, and data analytics can significantly impact this area.

Fujitsu's mobility digital twin collects data to build a digital mirror of roads and vehicles using a wide-area distributed network. In real-time, this mirror world can provide dynamic information, such as service station locations and prices, traffic congestion areas, route optimization, smart parking, crash analysis, and traffic guidance alerts.

> *"Fujitsu recognizes that social, environmental, and behavioral factors have significant economic impact and require consideration to provide holistic solutions to mobility problems."*
>
> *- Sandhya Jesu,*
> *Industry Analyst, Mobility*

A real-time method of controlling the real-world will soon be possible using data and services from different industries. As part of its efforts to enhance its capabilities for system development, Fujitsu will train 750 new AWS-certified engineers.[2] Additionally, Fujitsu plans to increase its market share and revenues by utilizing the technology in other industries, such as insurance, transportation, and smart city. With this leadership focus, Frost & Sullivan expects Fujitsu to sustain its leadership in the digital twins for sustainable mobility market.

Conclusion

Fujitsu Limited (Fujitsu) is creating sustainable solutions to address issues across the mobility industry through its unique and robust digital twinning platform. In addition to handling large volumes of raw real-time data, the company also provides uninterrupted operations, an agile operating environment, and diverse applications. Fujitsu stands out from competitors based on its commitment to innovation, creativity, and ability to launch new solutions with far-reaching impact and application. It pairs its technology focus with a customer-centric approach, thus earning a solid reputation in the digital twins for sustainable mobility market. It provides wholesome solutions factoring in people's behaviors and environmental impact in the process. Fujitsu displays social and environmental responsibility by considering the impact on society and the environment rather than narrowly focusing on issue resolution. The company recognizes that social, environmental, and behavioral factors have significant economic impact and require consideration to provide holistic solutions to mobility problems.

With its strong overall performance, Fujitsu Limited earns Frost & Sullivan's 2022 Asia-Pacific Enabling Technology Leadership Award in the digital twins for sustainable mobility industry.

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[2] https://www.fujitsu.com/global/about/resources/news/press-releases/2021/0512-01.html

What You Need to Know about the Enabling Technology Leadership Recognition

Frost & Sullivan's Enabling Technology Leadership Award recognizes the company that applies its technology in new ways to improve existing products and services and elevate the customer experience.

Best Practices Award Analysis

For the Enabling Technology Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at http://www.frost.com.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous Flow of Growth Opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)