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Enterprise Internet of Things Trends shaping the Market

Findings from Avasant's Internet of Things Services RadarView™ 2019

Internet of Things has crossed the proof-of-value cusp and is recognized by enterprises as a critical element of their business growth strategy. IoT is driving innovation, efficiency, and increasing utility across the value stream for all industries, improving customer experience and enabling development of new products and business models. By examining over 400 IoT uses cases, and evaluating 43 providers on their adoption of IoT services, Avasant's Internet of Things Services RadarView™ Report unveiled key enterprise IoT trends shaping the market.

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Enterprise Internet of Things Trends shaping the Market

Digital Singularity – the point where technological omnipresence and human experience converge, has embedded a realm of global interconnectedness, not just among people, but among connected devices, and between people and devices. A key technology prerequisite that is driving this wave of connectivity and fuelling Industry 4.0 is the Internet of Things (IoT).

Avasant defines Internet of Things as an interconnected system of assets/objects that are equipped with sensors and embedded systems designed to extract information about the devices or their surrounding environment that can then be used for real-time analysis to enable intelligent actions. It is the network of "smart" devices, machines and physical objects that have embedded technologies which allow them to connect to the internet and interact with their physical surroundings and other IoT objects.
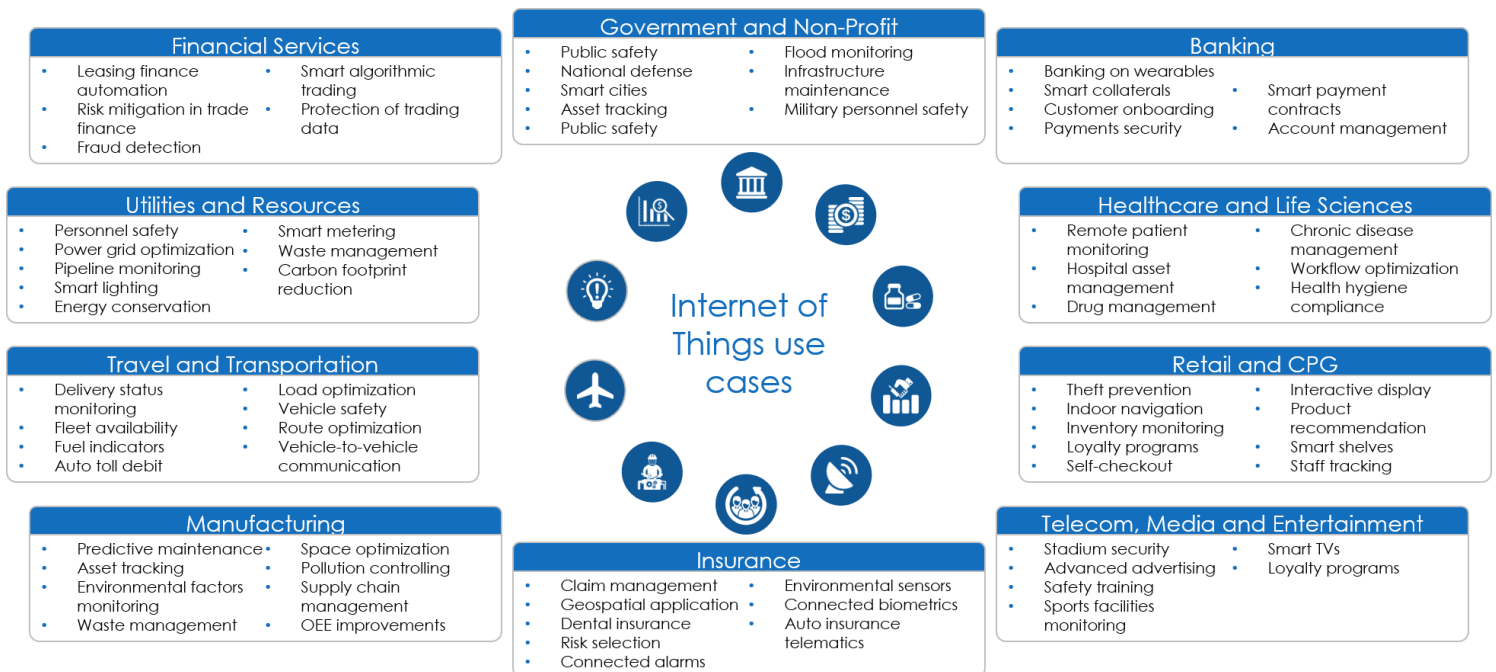
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IoT Stack		
	AI and Advanced Analytics	• Predictive analytics and artificial intelligence modelling
	Cloud	• Big data processing, Business Logic, and Machine Learning
	Edge Computing	• Real-time data processing and basic analytics
	IoT Gateways & Platforms	• Aggregate collection and data structures
	Sensors & Controllers	• Convert physical inputs / parameters into data streams

IoT is revolutionizing the way we explore, observe, understand and interact with our environment. With connected devices growing faster than both the population and number of internet users globally, IoT presents an unprecedented business opportunity which organizations should capitalize

on to support and enable enterprise growth and derive true business value. IoT has enabled enterprises to not only streamline their supply chain, but also reinvent new business models, as well as new product and service offerings.

Today, organizations are recognizing Internet of Things as an integral technology pre-requisite for a connected enterprise with the power to transform their business and seize new opportunities for growth. Its applications and use cases have been profoundly increasing, not just across corporate entities, but throughout governments, non-profits, educational institutions, etc.

Financial Services
- Leasing finance automation
- Risk mitigation in trade finance
- Fraud detection
- Smart algorithmic trading
- Protection of trading data

Government and Non-Profit
- Public safety
- National defense
- Smart cities
- Asset tracking
- Public safety
- Flood monitoring
- Infrastructure maintenance
- Military personnel safety

Banking
- Banking on wearables
- Smart collaterals
- Customer onboarding
- Payments security
- Smart payment contracts
- Account management

Utilities and Resources
- Personnel safety
- Power grid optimization
- Pipeline monitoring
- Smart lighting
- Energy conservation
- Smart metering
- Waste management
- Carbon footprint reduction

Healthcare and Life Sciences
- Remote patient monitoring
- Hospital asset management
- Drug management
- Chronic disease management
- Workflow optimization
- Health hygiene compliance

Travel and Transportation
- Delivery status monitoring
- Fleet availability
- Fuel indicators
- Auto toll debit
- Load optimization
- Vehicle safety
- Route optimization
- Vehicle-to-vehicle communication

Retail and CPG
- Theft prevention
- Indoor navigation
- Inventory monitoring
- Loyalty programs
- Self-checkout
- Interactive display
- Product recommendation
- Smart shelves
- Staff tracking

Manufacturing
- Predictive maintenance
- Asset tracking
- Environmental factors monitoring
- Waste management
- Space optimization
- Pollution controlling
- Supply chain management
- OEE improvements

Insurance
- Claim management
- Geospatial application
- Dental insurance
- Risk selection
- Connected alarms
- Environmental sensors
- Connected biometrics
- Auto insurance telematics

Telecom, Media and Entertainment
- Stadium security
- Advanced advertising
- Safety training
- Sports facilities monitoring
- Smart TVs
- Loyalty programs

Internet of Things use cases

Key Internet of Things trends shaping the market

Internet of Things, as a technology, has crossed the proof-of-value cusp and is recognized by enterprises as a critical element of their business growth strategy. Enterprises are putting more broad scale implementation into action, especially in conjunction with other emerging technologies, for generating true business value. By examining over 400 IoT uses cases, and

evaluating 43 providers on their adoption of IoT services, Avasant's Internet of Things Services RadarView™ Report 2019 unveiled the following key enterprise IoT trends shaping the market.

1. IoT enables data driven business and Industry 4.0 enterprise transformation

Over 45% of Global 2000 organizations are leveraging the tracking and data acquisition capabilities of IoT to enable a transformation towards becoming data-driven enterprises. Enterprises are using IoT in conjunction with big data/analytics, to drive real-time monitoring and performance improvement.

IoT has also created opportunities for enterprises to identify and monetize previously untapped data assets, enabling organizations to develop and scale alternate business paradigms such as product-to-subscription, asset sharing, as-a-service and usage-based pricing models. Enterprises are successfully adopting these models at scale across the spectrum of industries and are reaping the benefits of connecting information with processes.
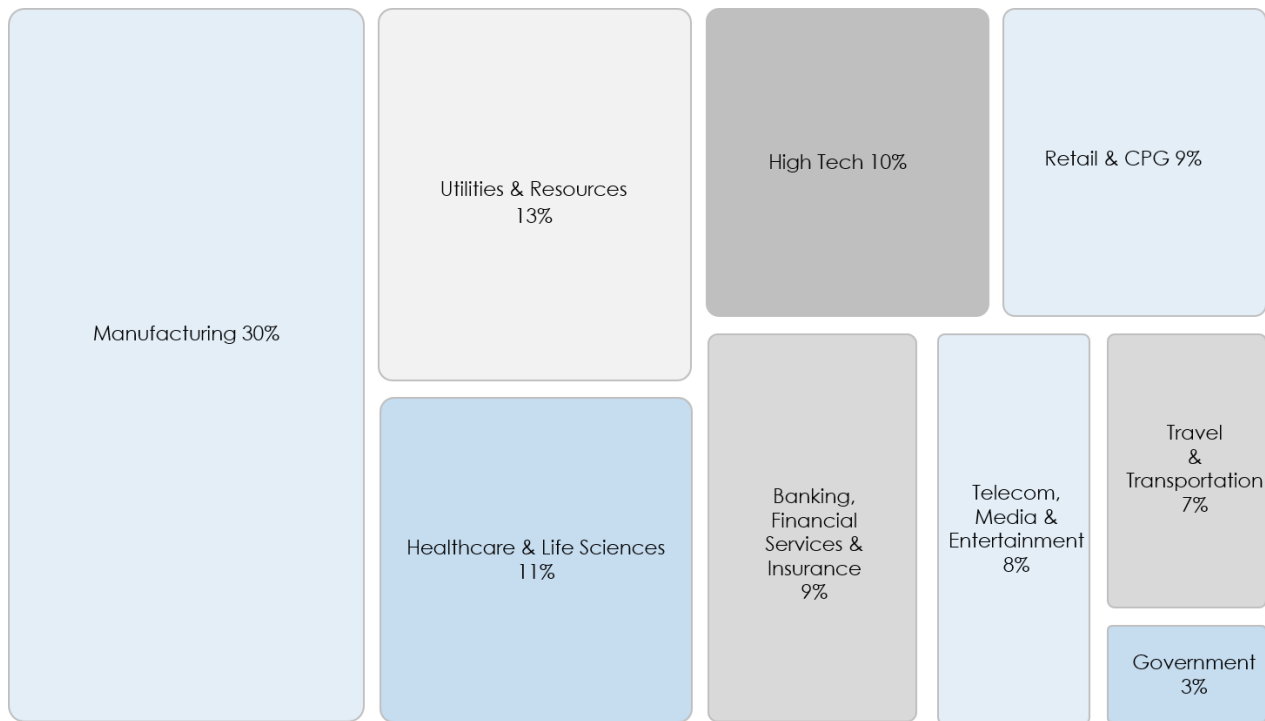
Enterprise adoption of Business Models

Business model	Organization	Highlight	Description
Product-to-subscription transformation model	JOHN DEERE	Helping rural communities through equipment leasing	• In 2018, John Deere partnered with Hello Tractor in Nigeria and enabled small farmers to lease its IoT-enabled tractors during the harvest period. From assigning tractors to farmers to monitoring usage, the IoT platform is central to the whole program.
	PHILIPS	From buying lamps to buying light	• Philips Lighting has developed a light managed services model that allows building owners and households to pay for the light (based on usage) while the equipment, replacement and maintenance remain with the company.
Allied services stream model	amazon	Simple one-touch replenishment service	• Amazon developed the Dash Replenishment Service back in 2014 based on an IoT button that can be attached to household products. This enables on-demand replenishment of household goods. It was expanded in 2017 with the integration of Alexa.
	hp	Automated tracking of printer consumables	• HP used IoT to enhance and optimize its Instant Ink program. This helps HP in automatically tracking the level of ink in its printers and enables the shipping of cartridges to its subscribers before the ink gets depleted.
Asset-sharing model	stem Energy Superintelligence™	Shared batteries between utilities and households	• Stem Inc, a provider of energy storage solutions, has deployed smart batteries in commercial buildings where they are treated as a shared asset between the building and the electric grid. Customers get a reduced energy price without paying for the entire system.
	koolicar moteur de libertés	Peer-to-peer car sharing	• Koolicar, a French car-sharing company, enables customers to rent out their cars to other users. It employs IoT to provide updates on vehicle status and access to vehicle through their application
Usage-based pricing model	metromile	Innovated a pay-per-mile car insurance model	• Metromile, a San Francisco-based insurance company, uses an ODBC adapter, an IoT device that comes with the insurance. It enables the company to analyze driving data to calculate risks and provide a per-mile pricing for car insurance.

2. Enterprises across industries are taking IoT use cases to scale production

IoT has long been associated with asset tracking and industrial automation. However, various industries are increasingly looking beyond these operational measures and leveraging IoT as a driver for reinventing their business models and developing new revenue streams.

IoT combined with other digital technologies has become the first mile as well as the last leg for a data-driven enterprise. Asset-centric manufacturing, travel, logistics, and utilities industries scaled IoT implementation in industrial asset, fleet and inventory management use cases. Other industries, such as healthcare, financial services, retail and government have also accelerated adoption.

Share of IoT Implementation across various industries

Manufacturing 30%	Utilities & Resources 13%
	High Tech 10%
	Retail & CPG 9%
	Healthcare & Life Sciences 11%
	Banking, Financial Services & Insurance 9%
	Telecom, Media & Entertainment 8%
	Travel & Transportation 7%
	Government 3%

Enterprises that moved beyond proof-of-concept and pilot stage to enter broadscale implementation doubled in the last 12 months. This two-fold increase in enterprise-wide implementations of IoT based solutions indicates improved maturity and value proposition.

3. Enterprises converge IoT with other disruptive tech to drive innovation

IoT has woven a thread across industry verticals, supported by a confluence of disruptive technologies to drive innovation. More than 90 percent of top IoT platforms used by enterprises include features related to at least 3 emerging technology areas, including edge computing, big data/analytics, and machine learning. This is enabling enterprises to move beyond simply monitoring the state of their connected processes to supporting predictive maintenance and optimization to real insights.

IoT integration with Disruptive Technologies

Organization	Industries	IoT + AI/ML	IoT + Analytics	IoT + Edge Computing	Description
KOHLER	Manufacturing	✓	✓		• Developed KOHLER Konnect solution, which connects remote devices (tubs, faucets, etc.) to the Azure IoT Hub, where data moves through Azure Stream Analytics for anomaly detection. Vendor-agnostic voice recognition such as Amazon Alexa is integrated via APIs to command and control IoT-enabled devices. • Connecting the products enabled to learn homeowners' preferences and predict their needs.
Shell	Utilities and Resources	✓		✓	• Royal Dutch Shell, a British-Dutch oil and gas company, is deploying a new machine at retail locations to automatically identify and respond to safety hazards in near real-time. • The onsite camera captures a hazardous situation, the image is edge-processed and relayed through an IoT platform to the cloud, where AI models detect patterns for danger.
powel	Utilities and Resources	✓			• Tracked water flow using SCADA sensors in the water distribution networks of Norway. • Then, analyzed normal water flow data using machine learning algorithms and abnormal water flow data through an IoT platform to locate problems in municipal water supplies and alert the appropriate utilities, thereby saving time, money and water.
PCL CONSTRUCTION	Real Estate	✓	✓	✓	• Took new approach to construction by creating smart buildings that have IoT enablement, real-time data access and analytics. • The constant flow of data from IoT sensors via PCL's application aids in job site monitoring. ML is used on the data set to do predictive analytics for smarter construction.
Southern Company	Utilities and Resources		✓		• Deployed a solution in which sensor data collected in large sets from its crew trucks flow into a cloud-based IoT platform and is analyzed and transformed into a standard message through stream analytics. • Promoted safe working conditions by being able to detect employees' locations. Also resulted in highly efficient operations, improved customer service and fast storm recovery.
DRONEWORKS	High Tech	✓	✓	✓	• A Japanese drone operator built a standardized industrial drone management system to predict maintenance needs and malfunctions of its drones. • Collected drone data from dozens of sensors on the drones, processed the raw data at the edge and then transmitted to the cloud for further analysis.

AI and Blockchain combined with IoT capabilities are driving new efficiencies in industry value chains and becoming the foundation for Industry 4.0 and autonomous enterprise. IoT connects machines and AI stimulates learning intelligent behaviour in those machines. Combining the two helps in predictive, prescriptive and adaptive analytics.

Further, leading organizations have already initiated key pilot projects around the three main application areas of IoT + Blockchain: smart contracts, automated payments and shared economies. Blockchain converged with IoT handles the privacy and reliability concerns of IoT and uses a cryptographic algorithm to help privatize consumer data. Blockchain can

also track connected devices, allow the processing of transactions and help to create a more resilient ecosystem as it keeps a record of all the smart devices.

4. Acquisitions across the IoT ecosystem to build adjacent stack capabilities

Market participants, i.e., hardware, technology, connectivity and service providers across the IoT ecosystem, have been acquiring firms to access adjacent opportunities. IoT acquisitions are enabling a faster time to market, cost savings and new revenue streams. This new trend in IoT investment is having an impact on the way organizations are interacting as IoT has become a driver of M&A activity. There have been over USD 20B worth of tech provider acquisitions and over 16 major service provider acquisitions in the last four years.

Technology providers are using marquee acquisitions to expand capability and develop adjacent services. Service providers are increasing IoT capability through inorganic means, with over eighty-five percent actively seeking more acquisitions in the IoT space.

Enterprises are also betting big with multi-billion dollar acquisitions of IoT solution providers to transform their businesses and accelerate industry-disruptive product development.

Enterprise IoT Acquisitions

	Date	Company	Acquired	Deal Size	Description
Enterprises	Oct 2018	Munich RE	relayr.	USD 0.3B	• Munich RE acquired relayr to obtain critical business data associated with relayr's IoT solutions.
	Feb 2018	amazon	ring	USD 1B	• Amazon acquired video doorbell and home security camera maker Ring to push further into the IoT and in-home-delivery space.
	Aug 2017	COMCAST	stringify	Not Disclosed	• Comcast purchased IoT start-up Stringify to deliver more powerful IoT and home automation experiences to its customers.
	Mar 2017	SAMSUNG	HARMAN	USD 8B	• Samsung completed the acquisition of electronics company Harman International to accelerate its growth in connected car technologies.
	Jan 2014	Google	nest	USD 3.2B	• Alphabet Inc. merged the team of smart home device maker Nest with its Google hardware group to make its mark in the smart home devices market.

Conclusion

The IoT ecosystem is complex and vibrant. Across industries, new IoT applications are being defined as enterprise value chains adopt disruptive technologies. IoT is driving innovation, efficiency, and increasing utility across the value stream for all industries, improving customer experience and enabling development of new products and business models. New IoT use cases are mushrooming every day and a number of them have already reached scale.

As enterprises aim to become more data-driven, they will need to implement IoT as a foundational technology for data acquisition across people, assets, and processes. However, progressive organizations are realizing that true business value from these initiatives is contingent on integrating IoT with other disruptive technologies to fundamentally reshape their value chains. This has led to a significant increase in demand for comprehensive IoT services across all key industries. Enterprises, to stay competitive, must consider IoT as a lever for operational and business transformation, with its potential to drive new business models and product lines.

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About Avasant's Internet of Things Services RadarView™

Internet of Things, as a technology, has crossed the proof-of-value cusp and is recognized by enterprises as a critical element of their business growth strategy. Avasant's ongoing interactions with enterprise digital leaders indicate that taking IoT to scale and using it for business transformation and for developing new revenue streams is an area of significant focus. They are looking to identify service providers that take a progressive, business-centric view to support them. The Internet of Things Services RadarView 2019 Report aims to address this need and to equip enterprises with granular understanding of key service providers.

Avasant evaluated 43 providers using a rigorous methodology across 3 key dimensions: practice maturity, investments and innovation, and industry development. Of the 43, 24 are recognized as having brought the most value to the market over the last 12 months. This report also highlights the Avasant's viewpoint on the future direction of the industry over the next 12 to18 months.

About Avasant

Avasant is a leading management consulting firm focused on translating the power of technology into realizable business strategies. Specializing in digital and IT transformation, sourcing advisory, global strategy, and governance services, Avasant prides itself on delivering high-value engagements through industry focused innovation and flexible client based solutions.

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