

A large-scale industrial construction project featuring a complex network of dark steel beams and girders. The structure is set against a backdrop of a snowy, rocky landscape with evergreen trees. The sky is overcast and grey. The steel framework includes multiple levels with blue safety railings and ladders, suggesting a multi-story facility. The overall scene conveys a sense of heavy engineering and industrial development in a cold climate.

MongoDB & IIoT

Managing data at scale for best in-class manufacturing needs



Why IIoT Today?



Why IIoT today?



We are at the cusp of a new industrial revolution, and it's fundamentally based on digital connectivity and the industrial transformation of consumer devices. This epoch has been coined as Industry 4.0, the convergence of the digital and physical worlds and the next generation of digitalization in manufacturing. It is composed of top booming trends that have the potential of changing how the manufacturing industry operates as a whole: big data, advanced analytics, human-machine interfaces, digital-to-physical transfer, and cloud, edge, and network connectivity. These are technologies that have existed for a while, of course, but have only now reached a point of higher reliability, increased level of integration, and lesser cost, where they can be adapted on a large scale for industrial infrastructures.

IoT (Internet of Things) is at the core of Industry 4.0, as devices become more connected for convenience and necessity, from smart devices to cars, homes, and cities. IoT has shaped consumer expectations as well, as virtually each industry now leverages some consumer device (think connected devices in healthcare, retail, or energy). This brings us to IIoT (Industrial Internet of Things), as it is shaping modern day factories and supply chains. To shape an example, this can look like preventive maintenance in solar panels or wind turbines. If the degradation per a certain number of production hours or rotations is known, from the data collection of IIoT sensors, predictive maintenance and reliable information can easily be generated to make performance-driving decisions.

Creating value by leveraging IIoT

Business Insight:

Through real-time data ingestion, IIoT provides insight on business analytics and improvements, bringing value and sustainability to businesses for making informed decisions.

Operational Improvements:

Businesses can improve efficiencies and operations, by gaining insight on current processes (i.e. strengths, weaknesses, etc.) and reduction of consumption costs based on these insights. The ability to collect ultra-granular data, connecting an entire shop floor together, leads to improvements that were otherwise near-impossible to gather.

New Revenue Streams:

IIoT also contributes to potentially building new revenue streams, as there is an overall improvement in processes, efficiency, and customer experience. Integrating more connected devices means collecting larger amounts of superior data and context for new features, products, or services, thus a faster route-to-market.

Predictive & Prescriptive Maintenance:

Predictive maintenance is a huge benefit of IIoT, as the ingestion of data can reveal where weak points or malfunctions could potentially evolve, as well as specialized recommendations, based on historical data and analyses. Maintenance also means the ability to monitor and update applications and machines remotely, reducing personnel efforts.



What drives IoT & IIoT?



What Drives IoT & IIoT?

Growth in IoT and IIoT is being accelerated by advances in adjacent technologies and changing business models. Discussing the drivers of IoT shows how the rapid progress of this new industrial revolution is not a siloed pocket. It is an effect of increased digital connectivity, consumer demands, and industry expectations that will only continue to grow and become more intertwined.

Manufacturing:

Margin compression in manufacturing is resulting in a change in business models with an increased focus on digital services as primary differentiators and revenue generators.

The Cloud:

The Cloud enables cost effective, flexible storage and processing of the large volumes of data generated by IoT systems.

Connectivity:

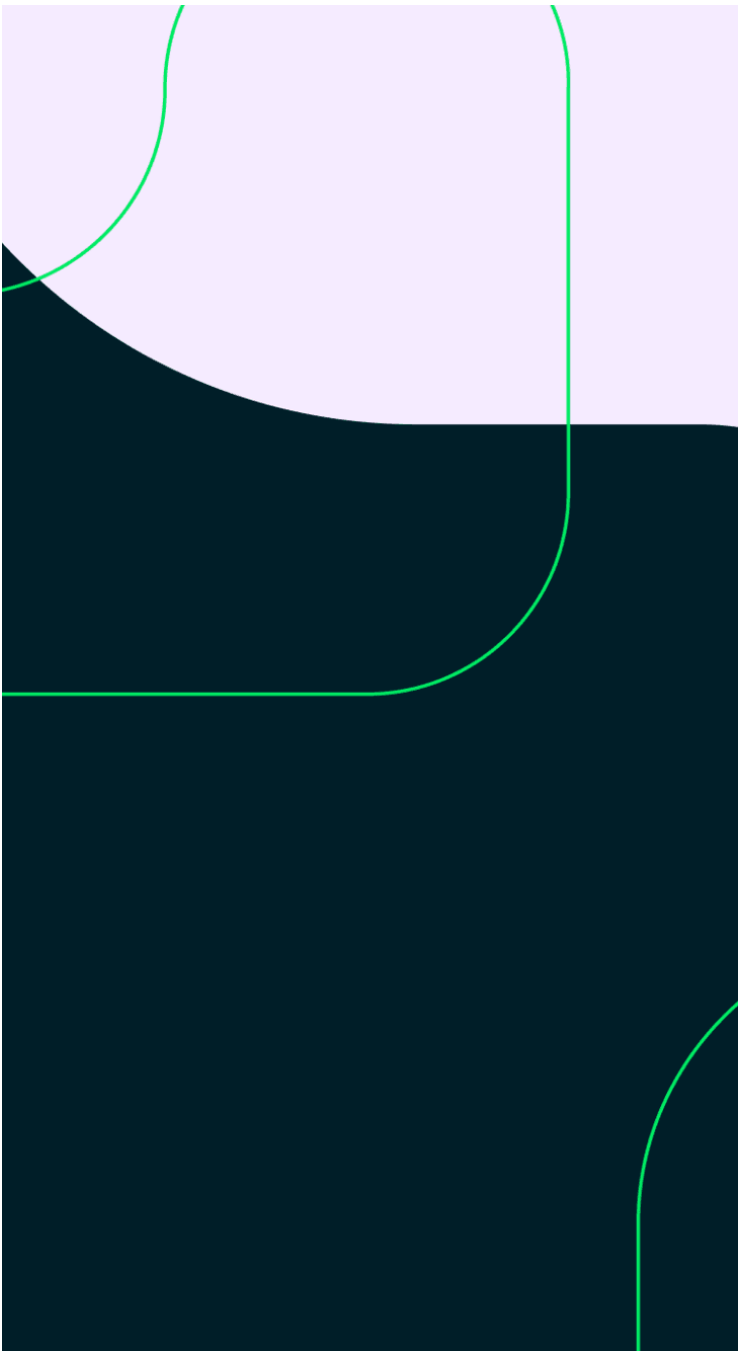
Advances in connectivity technology and infrastructure, such as 5G, has resulted in increases to speed, reliability and coverage enabling more data to be sent from devices at faster speeds.

Artificial intelligence:

Large amounts of IoT data enables AI algorithms to be effectively trained to be able to analyze and react to data autonomously to improve customer experience, reduce costs and improve quality.

Big Data:

Advances in Big Data technologies enable IoT data to be effectively stored, processed, analyzed and acted upon in real time to drive value for businesses and users.



“For the developers, it is easy – really easy – for them to work quickly. They’re spending time on building business value rather than data modeling.”

Filip Dadgar, Principal Solutions Architect and IT Manager at Toyota Material Handling Europe

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MongoDB & IIoT

How can your business leverage MongoDB for IIoT?



IIoT is a major component of digitalizing manufacturing, one of the most essential industries of today's economy. This digitalization means mixing data from both IT(Informational Technology) and OT(Operational Technology), providing access to people and algorithms for higher levels of automation and efficiency, with less waste.

MongoDB's application data platform is optimized for large varieties and volumes of data, with a powerful query language for stronger decision making. MongoDB's Atlas solves the requirements and demands of digitalized manufacturing with its array of functions, including:

- **Real Time Analytics:** Atlas is capable of ingesting enormous amounts of sensor and event data to support real time analysis for catching any critical events or changes as they unfold.
- **Performance & Scale:** Proven schemas and best practices maximize performance while minimizing storage and memory requirements. MongoDB Atlas and Realm provide automated scalability allowing dynamic adaptation for clusters based on demand.
- **Time-Series:** MongoDB supports time-series data natively through optimized storage with clustered indexes and optimized time-series query operators to analyze trends and identify anomalies quickly.

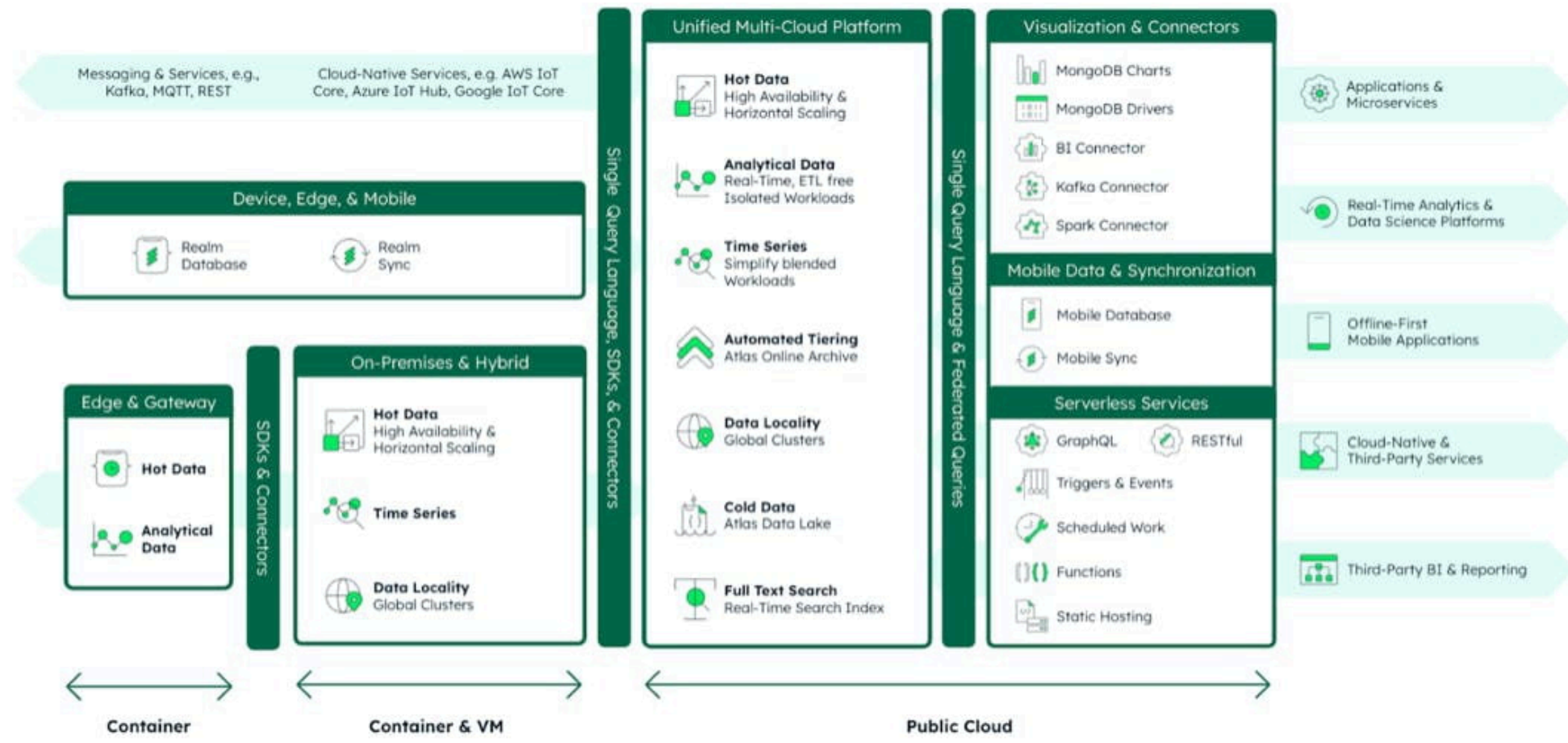
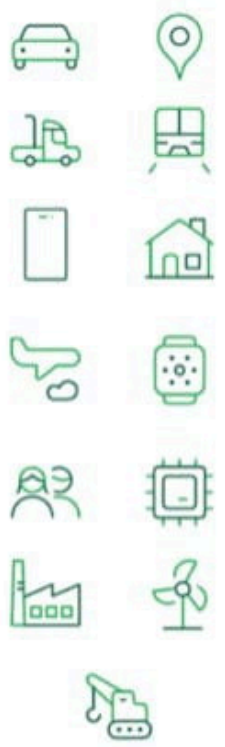
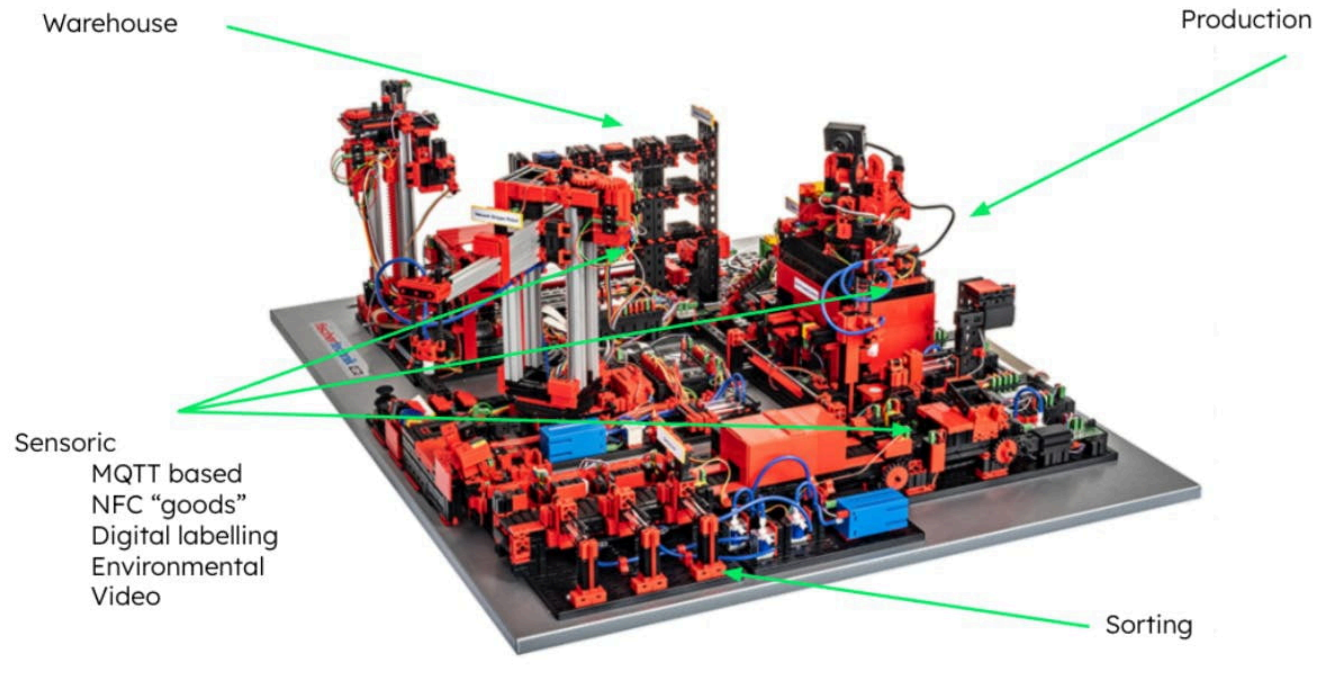


Fig 1: MongoDB Atlas, Realm, & IIoT Integration

Manufacturing at Scale: MongoDB & IIoT

To demonstrate MongoDB's easy integration as a solution for challenges of IIoT, the MongoDB team used a small scale model of a smart fabrication factory to collect and send data via MQTT and process it in Atlas and Realm. You can read about it in the blog below, as it breaks down how MongoDB's application data platform accelerates digitalization of manufacturing processes.

[Read full blog](#)



AIoT (Artificial Intelligence of Things)



Watch Dirk Slama, Director of Business Development and Mark Porter, MongoDB CTO discusses AIoT.

[Watch here](#)



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MongoDB & IIoT

Hear more from customers leveraging IIoT devices on MongoDB

Toyota

Toyota is one of the world's most renowned automotive manufacturers, and has been progressively modernizing its organization and processes to keep up with global and client demands. Inspired by the acceleration of Industry 4.0 as the default, Toyota is making a shift in their manufacturing processes through their machines and data platforms. MongoDB Atlas is at the core of this shift, with its fully-managed, global cloud database service. This switch moved them from a monolithic codebase to a microservices approach, allowing more productivity from developer teams and an improved user experience for customers.

[Learn more about Toyota and MongoDB](#)

The Toyota logo, consisting of the word "TOYOTA" in a bold, red, sans-serif font.

MATERIAL HANDLING



mongoDB®

Vaillant

With over 30 million customers in 60 countries, Vaillant is a global leader in heating, ventilation, and air conditioning. They have long been using IoT for building, installing and maintaining complex machines. As a result, reaping the benefits of IoT has created new revenue streams for them, from remote condition monitoring to better product design.

However they faced a challenge of being able to handle the large volumes of data they were producing and being able to analyze it quickly for actual real time feedback.

Read here to learn more about how Vaillant migrated from Azure CosmosDB to MongoDB Atlas for automated scalability, real time analytics, data security, and a faster development experience.



"When we implemented MongoDB Atlas, there was no downtime at all, and our customers immediately noticed the performance improvements. The whole experience was fantastic."

Jürgen Stauvermann, Senior Java Software Engineer, Vaillant



Bosch

Bosch is an engineering group with a vast array of connected products for virtually every industry today, and IoT has unfolded as a major opportunity to increase efficiency and the development of new business models. However the massive volume and unstructured nature of IoT data presents unprecedented challenges for design, development, and operations.

This required Bosch to rethink their entire underlying data infrastructure, where rigid tabular relational models were simply not meeting the needs anymore for modern applications. With that, MongoDB is now a technology provider and partner of Bosch. With MongoDB, flexibility, scalability, and the real time analytics needed to handle IoT data intelligently is essential, providing powerful operational insights, business agility, and unified views of arrayed information.



Prior to MongoDB 5.0, the Bosch IoT Insights cloud service relied on a custom solution with its own bespoke data model for time series data. This approach added complexity and friction to both our own developers and to our customers"

Erwin Segerer, Bosch.IO



Learn more about Bosch's innovation using MongoDB



BOSCH

**Interested in learning
more? Contact your
MongoDB team today.**

