IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

FOR IMMEDIATE RELEASE

New research from IoT Analytics highlights the top 10 industrial technology trends—as showcased at Hannover Messe 2024

[Hamburg, Germany] – [June 04, 2024] – The recently concluded Hannover Messe 2024 offered attendees a glimpse into the future of industrial technology. Sustainability and industrial AI emerged as the hot topics, dominating discussions at the event. The latest industrial technology trends are reflected in the 141-page Hannover Messe 2024 event report. The report summarizes the fair's key highlights and dives deep into 40 insightful analyses, 10 of these are presented in the recently published research article:

1. Hardware and software sentiment for 2024 diverges
2. Modularity remains a top theme for future manufacturing
3. Many Generative AI showcases, but roll-out is taking time
4. Few noticeable enhancements to virtual controllers
5. Sustainability data management solutions maturing to enable streamlined ESG reporting
6. Vendors are taking steps to simplify AI deployment at the edge
7. New edge node and application orchestration solutions
8. DataOps continues to attract interest to improve data usability
9. Edge devices are getting enhanced with GPUs for AI capabilities

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

10. Private 5G sentiment mixed with managed 5G services in the spotlight

SELECT QUOTES

Knud Lasse Lueth, CEO at IoT Analytics, remarks "*Hannover Messe 2024, once again, gave us a great view of the latest industrial technology trends. Our team found that edge technologies and ecosystem collaborations are becoming very important. While AI is still a key focus, there's a wider range of important tech developments happening, for example around sustainability, virtual controllers, and private 5G. Our detailed 141-page event report covers these insights and more, highlighting the key trends shaping the future of industrial technology.*"

Anand Taparia, Principal Analyst at IoT Analytics, adds that "*My personal highlight of Hannover Messe 2024 was the advancements in edge orchestration. Edge orchestration, driven by the proliferation of edge nodes and the need for efficient management, was a focal point. Vendors showcased innovative solutions with centralized deployment, zero-touch orchestration, and secure authentication. These developments highlight the industry's focus on enhancing edge capabilities for more scalable deployments*."

[The full research article is attached below]

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

Hannover Messe 2024

Hannover Messe (or Hannover Fair) is the top global industrial tradeshow, and it was back in action in Hannover, Germany, from 22 to 26 April 2024. It once again showcased the latest developments and industrial technology trends.

Attendance matched 2023 numbers with 130,000 visitors and 4,000 exhibitors, which is still roughly 40% below pre-COVID levels; however, the organizers noted their target attendance was reached, and that the lower number was due to the biennial rotation of several component events. Still, the fairgrounds were buzzing and filled with senior executives from many of the leading industrial hardware, software, and service providers. The conference remains one of those rare fairs where you randomly walk into senior executives, like a head of engineering for a major industrial conglomerate, and not only the pre-sales representatives giving you the usual pitch.

"*Hannover Messe remains the best place for [] a true spirit of optimism, because manufacturers, customers, political decision-makers and the media come together here in greater numbers than anywhere else*."
Thilo Brodtmann, Managing Director of the German machinery manufacturers association VDMA

IoT Analytics had 25 team members on the ground to uncover the latest industrial technology trends and contribute to IoT Analytics' Hannover Messe—The latest industrial IoT/Industry 4.0 trends report—available for IoT Analytics' subscribers. In total, our team visited over 450 booths, conducted over 300 individual interviews, and attended a number of presentations to gauge and assess the state of industrial technology amid the rise of AI and continued corporate discussions around economic concerns.

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

Top 10 industrial technology trends at Hannover Messe 2024

Apart from comparing key vendors and offerings in the report (e.g., hyperscaler comparisons or generative AI solution comparisons), the IoT Analytics team compiled 40 individual insights from their time on exhibit floors and presentations. Here, the team presents 10 industrial technology trends based on these insights (with select exhibitor examples where pertinent).

1. Hardware and software sentiment for 2024 diverges

Many vendors with a large hardware footprint (e.g., large industrial automation suppliers) appeared cautious in their 2024 business outlooks. Many are still grappling with customer inventory surplus and limited demand, which may lead to a dip in sales, especially for hardware like controllers. For example, a few weeks after Hannover Messe 2024, Germany-based industrial automation solutions company **Siemens** shared in their earnings call that orders in their industrial automation segment declined 12% year over year. Despite some optimism from several exhibitors about a potential market turnaround in the second half of 2024, no proof points were shared at the fair.

Meanwhile, large software vendors appeared extremely optimistic in their 2024 business outlooks—a stark contrast to their hardware counterparts. Driving this positive sentiment is excitement around AI products and their adoption.

This enthusiasm was almost palpable in conversations with large IT vendors like **Microsoft**, **Amazon**, and **SAP**. Affiliated systems integrators such

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

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as **Avanade** and **Cognizant** mirrored this sentiment, highlighting how customers are initiating new AI- and data-related projects that drive business.

This sentiment toward AI adoption parallels recent IoT Analytics surveys indicating that AI is likely to become a top-5 technology priority in 2025 (IoT Analytics plans to publish an article on notable technology priorities shifts in early June).

2. Modularity remains a top theme for future manufacturing

Manufacturers looking ahead at smart factory concepts are increasingly embracing modular, collaborative, and flexible systems to enhance adaptability and efficiency.

SmartFactory KL, an industry association focused on smart manufacturing, showcased this by presenting its Production Level 4 factory ecosystem for the third consecutive year at Hannover Messe 2024. This ecosystem features modular production stations that can be independently created, upgraded, or replaced to enhance flexibility and scalability.

Modularity is also emerging as a key focus in robotics, enhancing customization and scalability. Taiwan-based robotics and machine automation provider **NexCOBOT** showcased modular robots with functional safety standards, offering customizable designs and simplified maintenance. Meanwhile, Germany-based automation technology provider **Beckhoff Automation**'s ATRO modular robotic system includes modular drives and components that connect via Hirth couplings and EtherCAT drives, allowing for flexible and scalable adjustments to robot configurations.

NexCOBOT's modular robot, certified with functional safety standards (Source: IoT Analytics/NexCOBOT)

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Zirkusweg 2
D-20359 Hamburg

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3. Many Generative AI showcases, but roll-out is taking time

30% of the generative AI showcases that the IoT Analytics team examined were for coding, with PLC programming being the top use case. Examples included:

- **Siemens** showcased its Industrial Copilot offering, which helps to automatically write/generate PLC programming code through natural language input.
- **Schneider Electric**, a France-based digital automation and energy management company, demonstrated its solution that helps to iteratively generate PLC programming code through natural language input, available context, and Schneider Electric's own automation libraries.
- **Beckhoff Automation**, a Germany-based automation control technology provider, showcased its TwinCat Chat, which integrates with Visual Studio and TwinCat XAE to offer a chatbot interface for PLC programming.

A few of these showcases were also seen at SPS 2023 in Nuremberg, Germany.
Other use cases on display include the following:

- **3D model design:** Siemens's copilot uses Siemens NX, RuleStream, and Teamcenter, along with simulation software from Germany-based industrial connectivity solutions provider **HARTING**, to generate a 3D model design from a simple prompt.
- **Machine troubleshooting: Softserve**, a Ukraine- and US-based software development and consultancy company, showcased its Industrial Copilot, which helps shop floor workers resolve machine issues. It uses documentation, guidelines, and manuals for step-by-step solutions and troubleshooting and offers a digital visualization of the recommended steps.
- **Document analysis: Tulip**, a US-based software company, showcased its Frontline Copilot, which provides frontline workers quick access to important information and can answer questions while simultaneously providing source PDF documentation.

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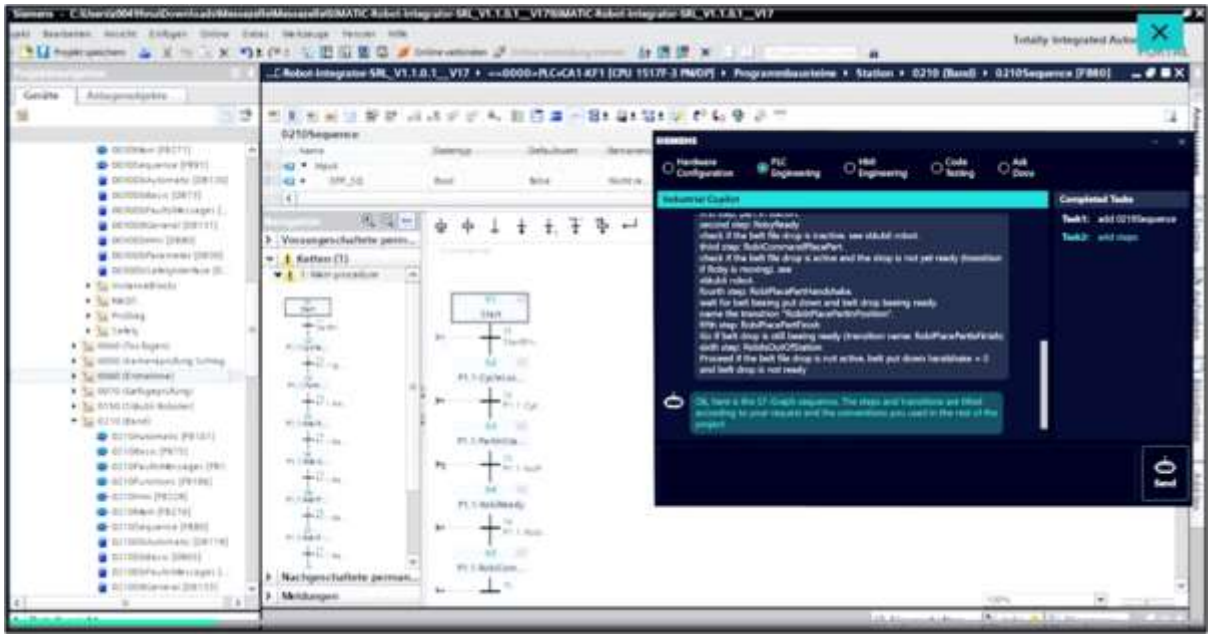

Siemens exhibit of its AI-assisted Industrial Engineering Copilot, which helps engineers generate PLC code faster for special machinery (Source: IoT Analytics/Siemens)

During IoT Analytics' interviews with vendors showcasing their generative AI solutions, many indicated that (public) rollouts are taking time. Vendors are primarily delaying release to ensure thorough testing of industrial-grade AI to address legal questions and meet performance and safety standards.

Meanwhile, end-users struggle with data quality and accessibility issues, which is leading to slow adoption. These struggles have prompted vendors to focus more on data management solutions in the near term. For example, US-based AI-based predictive and generative solutions company **SymphonyAI** showcased its Industrial Reasoning and Insights Service (or IRIS) Foundry, which the company designed to aggregate, query, and manage industrial data for scalable AI solutions.

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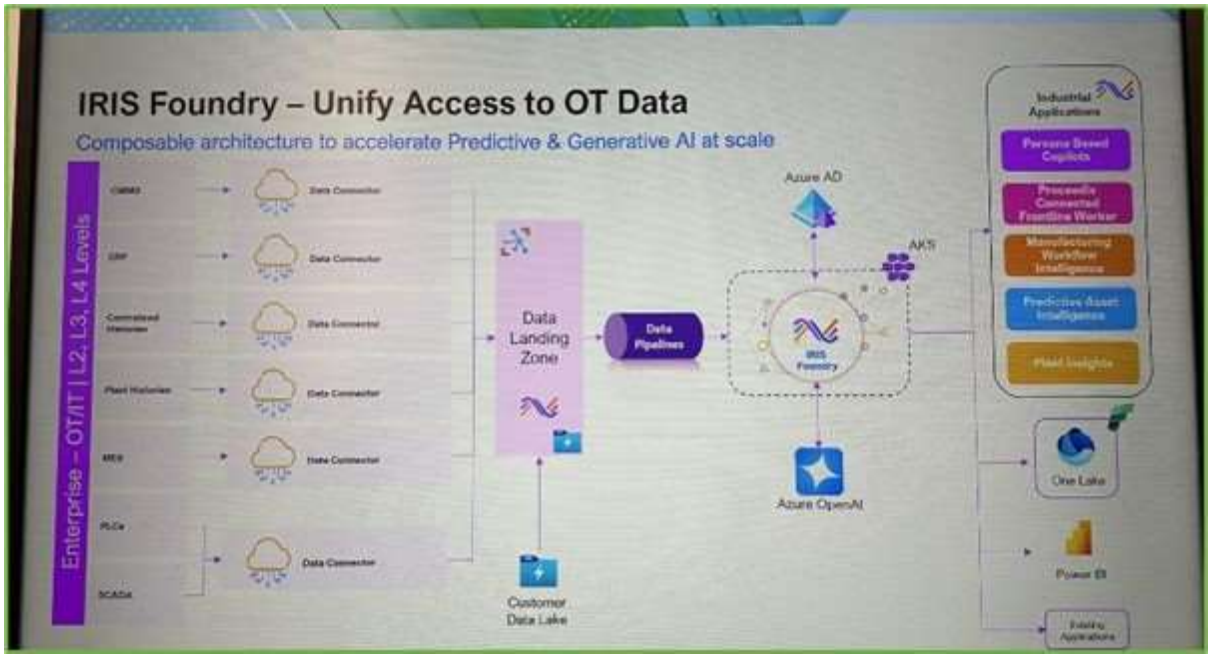

IRIS Foundry architecture components shown at the SymphonyAI stand in the Microsoft booth (Source: IoT Analytics/SymphonyAI)

India-based IT services and consulting company **Tata Consultancy Services (TCS)** also acknowledged that data quality and accessibility are major hurdles for scaling industrial AI. Instead of a specific technical fix, the company addresses data challenges through a broad network of partners and its own cross-industry expertise. Additionally, cloud computing services platform **Google Cloud** introduced its Cortex Framework, aimed at managing and transforming data for AI applications, acknowledging the challenges of unstructured and inaccessible data.

4. Few noticeable enhancements to virtual controllers

Continuing from Hannover Messe 2023, vendors highlighted the decoupling of hardware and software for control by showcasing their soft/virtual PLCs products:

- **Siemens** highlighted ongoing deployments of its SIMATIC S7-1500V (together with their customer **Audi** as an example).
- **Schneider Electric** demonstrated its EcoStruxure Automation Expert, which integrates the IEC-61499 standard for software-based controllers as part of its software-defined automation vision.
- **Bosch Rexroth**, a Germany-based industrial automation engineering firm, showcased its ctrlX PLC solution, a virtual PLC running on VMware's hypervisor.
- **Beckhoff Automation** showcased its TwinCAT-based soft PLC and introduced TwinCAT Runtime for Linux.

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

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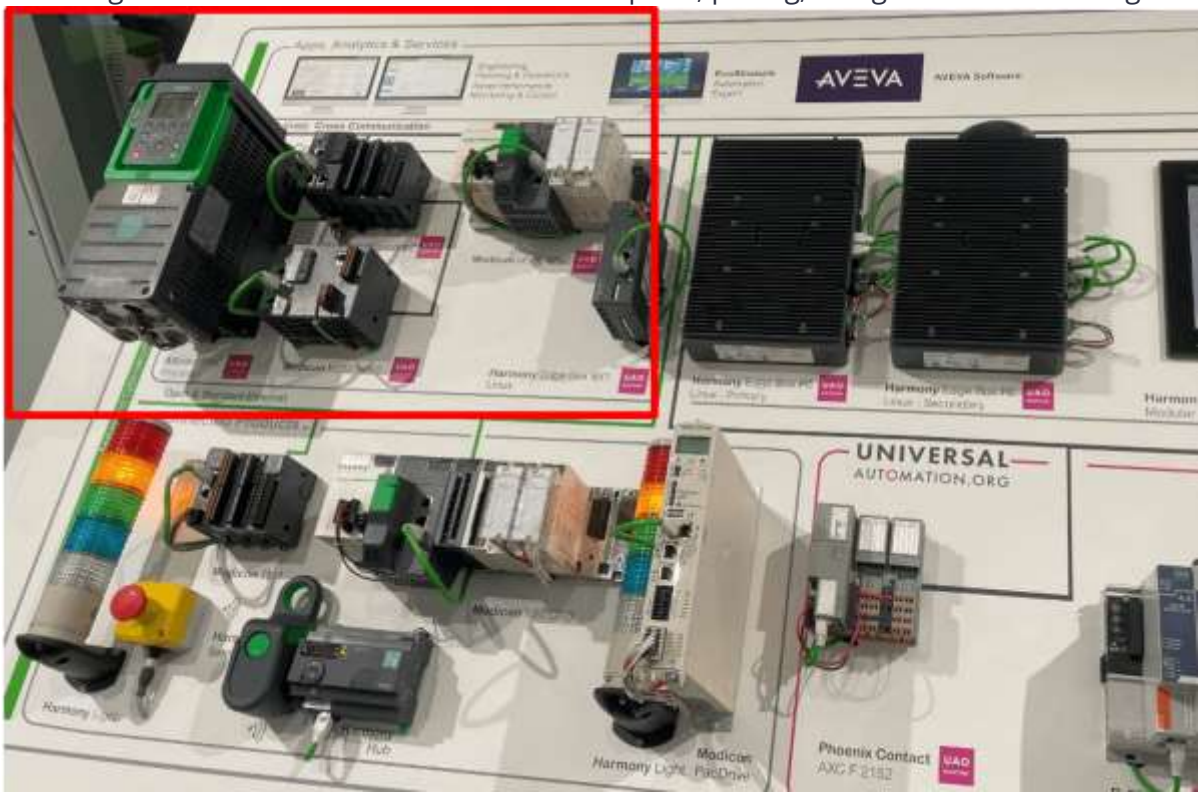
Despite these demonstrations, the absence of substantial advancements, new features, or new powerful customer stories was notable. This may be due to the nascent nature of these technologies and markets as vendors assess adoption, pricing, and go-to-market strategies.



Schneider Electric hardware with IEC-61499 support (Source: IoT Analytics/Schneider Electric)

5. Sustainability data management solutions maturing to enable streamlined ESG reporting

Sustainability remained a central theme at this year's Hannover Messe, driven by upcoming ESG reporting regulations that impact IoT product launches. Vendors are focusing on enhancing data management solutions and adopting sustainability data standards.

- **Microsoft** demonstrated its Cloud for Sustainability, leveraging AI to build ESG data lakes for clients like **Kuka Robotics**,a Germany-based industrial robots and factory automation systems manufacturer.
- **AWS** introduced its Sustainability Intelligence Portal for customizable carbon footprint tracking.
- **SAP**, a Germany-based enterprise software company,highlighted its Sustainability Control Tower for integrated ESG data management across business functions.
- **Fujitsu**, a Japan-based IT and communications technology provider,showcased its approach to ESG management for the manufacturing industry, which consists of two parts: an energy consumption and optimization platform and ESG optimization.

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Zirkusweg 2
D-20359 Hamburg

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Meanwhile, initiatives like the Partnership for Carbon Transparency (PACT) framework and the Digital Product Passport (DPP) are also making significant progress in standardizing data exchange and promoting circular economies.

6. Vendors are taking steps to simplify AI deployment at the edge

Several vendors highlighted solutions that facilitate the deployment of AI on edge devices. US-based technology and communications services company **Hewlett Packard Enterprise (HPE)**, for example, showcased its new machine learning platform, which enables model training and inferencing on various GPU-accelerated infrastructures. It integrates with frameworks like TensorFlow and PyTorch and supports both cloud and on-premises deployments.

Meanwhile, US-based intelligent device platform provider **Edge Impulse**'s Edge AI Platform allows users to collect data from multiple sources, build and train models, and evaluate performance using the ONNX file format. These platforms aim to streamline the deployment process by providing pre-trained models and optimizing AI performance on specific hardware, ensuring scalable AI integration at the edge.
Vendors are also focusing on making AI functionalities and solutions available on various edge devices.

- **Siemens**, for example, has integrated **Inspekto**'s machine vision solution with their Industrial Edge platform (Siemens AG acquired Inspekto in February 2024).
- **Sony Semiconductor Solutions**, a Japan-based semiconductor designer and producer, highlighted its edge AI sensing platform, AITRIOS, which includes a marketplace of pre-trained AI models for machine vision applications.
- **Beckhoff Automation** introduced the TwinCAT Machine Learning Creator platform, aiming to help non-expert customers simplify AI development for real-time control and address the shortage of AI expertise.

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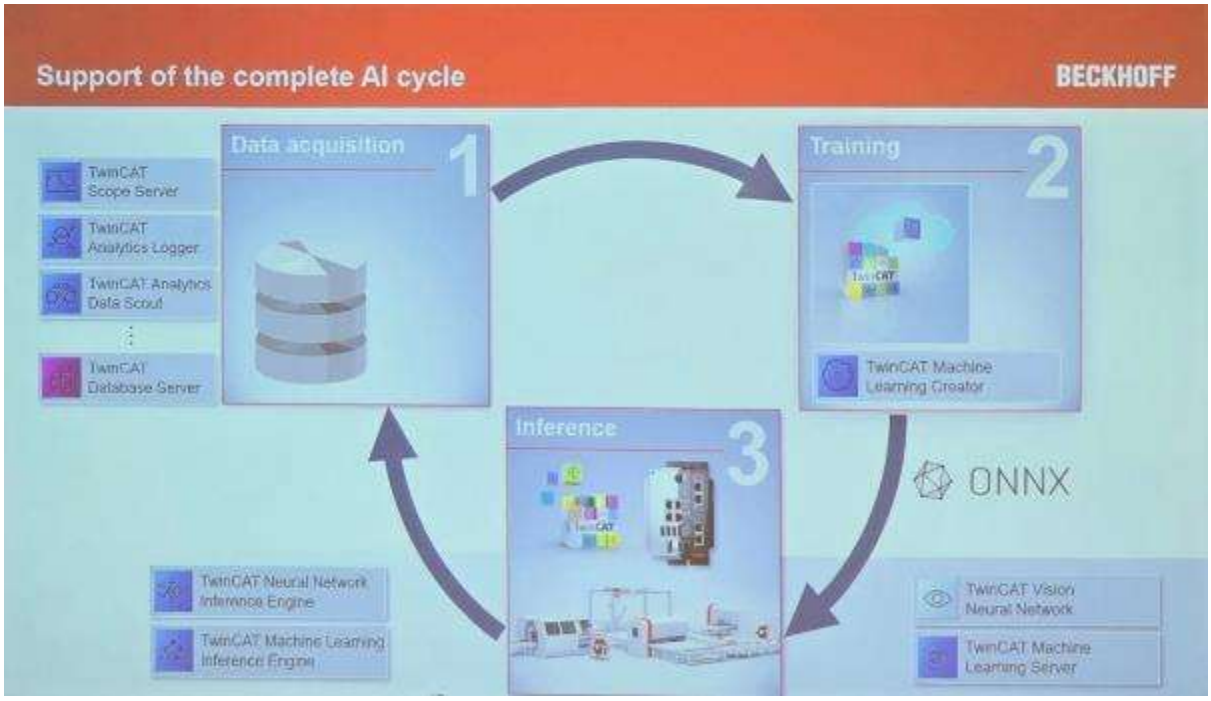


Beckhoff Automation's TwinCAT Machine Learning Creator supports the A cycle, from data collection and training to integration of a trained AI model into a production environment (Source: IoT Analytics/Beckhoff Automation)

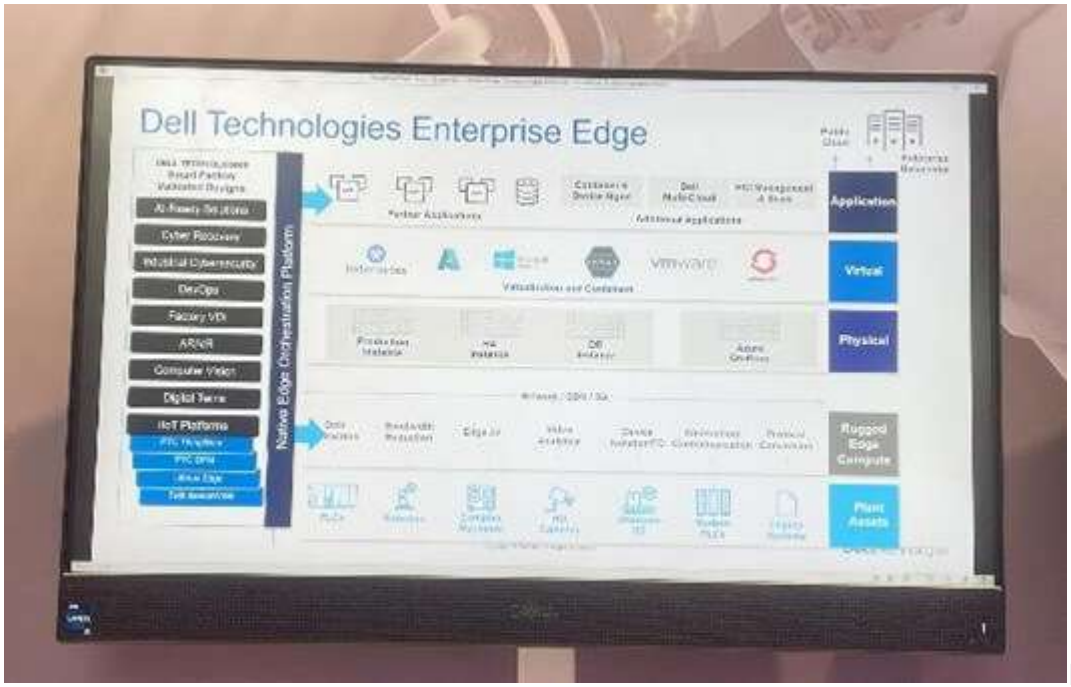
7. New edge node and application orchestration solutions

Edge orchestration as a topic garnered significant attention at the fair. Driven by the anticipated explosion of edge nodes and the need to update/maintain them, IT and traditional OT vendors alike showcased their latest products in this space.

- **Dell**, a US-based computer and IT equipment manufacturer, showcased NativeEdge, a platform for centralized deployment and management of edge infrastructure and applications. It features zero-touch orchestration, pre-validated blueprints, and secure voucher-based authentication.
- The **Linux Foundation**, a 501(c)(6) non-profit that provides a neutral hub for developers, introduced Margo, an open standard for edge orchestration to simplify the deployment and management of edge applications across multi-vendor environments.
- **Advantech Co.**, a Taiwan-based industrial automation solutions company, and **Namla**, a France-based tech startup specializing in cloud and edge computing, demonstrated a cloud-edge orchestration solution for managing devices and orchestrating applications.
- **Siemens** also presented its SIMATIC IPC ORCLA framework for setting up, updating, and maintaining Siemens industrial PCs for driver and firmware updates.

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com



Dell's *Native Edge orchestration platform. Highlighted in blue are also some of Dell's pre-validated blueprints (Source: IoT Analytics/Dell).*

8. DataOps continues to attract interest to improve data usability

Building on last year's interest, DataOps remained a key topic of interest. US-based industrial software company **HighByte**, present at the **AWS** booth, showcased its Intelligence Hub with features like a connector for **Snowflake** and AWS IoT SiteWise integration, emphasizing its Series A funding success.

Meanwhile, US-based industrial software company **Litmus Automation** introduced its MQTT broker-based Unified Namespace (or UNS), which is compatible with major cloud platforms and supports ISA-95. Several companies (e.g., **Google** and **Dell**) highlighted Litmus as a key strategic partner for OT data ingestion and orchestration, underscoring the importance of DataOps for established vendors. Litmus is also pairing with **Microsoft**'s new manufacturing data solutions (MDS) in Microsoft Fabric, acting as a DataOps platform at the edge to extract, normalize, and model data.

Germany-based DataOps startups **Cybus** and **United Manufacturing Hub** were two other promising companies in this space that our team interacted with.

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

"*Information models are important for interoperability. We see a significant interest from the customers to standardize how their data [are] transmitted and saved. It's a slow process but gives huge benefits in the long term.*"
CXO at a major DataOps vendor

9. Edge devices are getting enhanced with GPUs for AI capabilities

Several industrial automation and edge device vendors highlighted the integration of GPUs to enhance edge AI capabilities and decision-making speeds by boosting parallel computation and on-device model training.

- **Beckhoff Automation** introduced new C6043 IPC variants with NVIDIA GPUs, enhancing computing performance for AI applications.
- **Zotac**, a China-based computer hardware manufacturer, presented its mini-IPCs, leveraging AMD and NVIDIA GPUs to provide high-performance AI inference.
- **APQ**, a China-based industrial AI edge computing manufacturer, showcased its TAC-3000 robotic controller, designed for autonomous mobile robots and featuring NVIDIA GPUs for powerful on-edge processing.

APQ's TAC-3000 (left) robotic controller for AMR embedded with NVIDIA GPU as showcased at Hannover Messe 2024 (Source: IoT Analytics/APQ)

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

10. Private 5G sentiment mixed with managed 5G services in the spotlight

Interest in private 5G solutions (Hall 14) appeared muted this year, and some vendors seemed to mirror this sentiment, highlighting significant adoption obstacles for private 5G, such as high deployment costs, network maintenance complexity, and an immature ecosystem lacking necessary devices. Telecom vendors like Japan-based **NTT** and Sweden-based **Ericsson** remain optimistic, though. They emphasized their flexible pricing models (e.g., NTT's OpEx-based solutions) and the launch of new industrial devices to overcome these barriers (e.g., Wireless Bolt 5G and MultiTech 5G Redcap modems).

Managed private 5G services and device-as-a-service models were also presented as cost-effective solutions to encourage uptake and address key pain points. Managed services simplify the deployment and management of private 5G networks by reducing complexity, providing expert management, and offering scalability. These cost-effective services address the existing skills gap, allowing adopters to focus on their core operations without needing in-house expertise. Ericsson highlighted its private 5G solution that includes a network management portal and integration with several operator services, while NTT showed custom-built 5G services for sectors like healthcare, automotive, and manufacturing.

Putting the observations into perspective

Hannover Fair 2024 did not present any new, radical technology breakthroughs. However, a closer examination reveals important developments beneath the surface, with several trends becoming more prominent and new nuances emerging.

Beyond the top 10 trends highlighted in this article, here are **5 other characterizations of Hannover Messe 2024:**

1. **Exhibitors showcased solutions, not technology.** Exhibitors continued to put a heavier focus on showcasing their technology as part of solutions rather than standalone technology showcases. For example, this year, **Siemens** had several end-to-end manufacturing demonstrations (e.g., for automotive and chemical manufacturing) that characterized their booth, showcasing their various solutions in context.
2. **Exhibitors focused on ecosystem collaboration.** IoT Analytics observed that industrial software vendors continue to emphasize integrating and showcasing solutions within ecosystems, actively working with other vendors (e.g., Rockwell Automation showcased its human-machine interface software embedded with **Tulip's** MES).
3. **Exhibitors addressed workforce challenges.** Many exhibitors focused on addressing the urgent need for skilled labor and innovative training solutions

IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

(e.g., **Hexagon** announced that **Safran Aircraft Engine** is now using its machine trainer software for faster workforce onboarding).

4. **Most innovation was related to edge technologies.** The team witnessed a growing number of edge orchestration solutions to make the growing number of edge nodes easier to manage, and vendors are preparing to find a place in the edge AI market by enhancing edge solutions with AI capabilities, both in hardware and in AI software simplification.
5. **AI was not as prominent as expected.** There was a striking difference between the world's biggest telecommunication fair, **Mobile World Congress 2024** (February 2024), and the world's biggest industrial fair, **Hannover Messe 2024** (April 2024), when it comes to AI showcases. AI absolutely dominated MWC showcases and discussions, according to our perception, while AI was just one of several key themes at the Hannover fair. Though AI is clearly becoming a bigger theme among industrial companies, it felt clear that it is just one of many developments and not necessarily the leading one (yet?).

The 25 analysts from IoT Analytics' on-the-ground team at Hannover Messe 2024

Disclosures

Companies mentioned in this article—along with their products—are used as examples to showcase market developments. No company paid or received preferential treatment in this article, and it is at the discretion of the analyst to select which examples are used. IoT Analytics makes efforts to vary the companies and products mentioned to help shine attention to the numerous IoT and related technology market players.

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IoT Analytics GmbH
Zirkusweg 2
D-20359 Hamburg

T: +49 (0) 40- 63911891
M: press(at)iot-analytics.com
www.iot-analytics.com

For more information or media inquiries, please contact:

Hoang Pham Van
IoT Analytics
+49 (0) 40 6391 1891
press(at)iot-analytics.com

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Our key workstreams across the tech stack include IoT applications, IoT platforms and software, IoT connectivity and hardware, and industrial IoT.
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