

The Convergence of Artificial Intelligence and Industrial IoT

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Keywords

Artificial Intelligence (AI), Industrial IoT, IT/OT Convergence, Aspen Technology

Summary

AIoT, the confluence of AI and Industrial IoT technological forces, gives rise to a new digital solution category – the Artificial Intelligence of Things (AIoT). AIoT is built for industrial companies looking for better ways to connect their evolving workforce to data-driven decision tools and digitally augment work and business processes and making better use of industrial

Artificial Intelligence of things (AIoT) is built for industrial companies looking for better ways to connect their evolving workforce to data-driven decision tools and digitally augment work and business processes. Aspen Technology announced its Aspen AIoT Hub, which provides integrated data management, edge, and cloud infrastructure to build, deploy and host Industrial AI applications at enterprise speed and scale.

data already collected. ARC Advisory Group has observed that the convergence and overlap of IT and OT groups, driven largely by the digital transformation of industry in recent years has created organizational confusion and a significant “gray-space” of common technologies between each area, one area being AI.

However, leveraging AI requires data science capability, which adds additional complexity to an already complex environment. While engineering roles are skilled in analyzing large amounts

of data, setting up and creating production grade machine learning environments is not easily accomplished. Unlocking the value of industrial data through AI requires a hybrid approach. This is where we get to the paradigm of Industrial AI, which combines data science and AI with software and domain expertise to deliver measurable business outcomes for capital-intensive industries.

At one time, this manufacturing digital nervous system was primarily based solely on legacy systems and architectures. But today, the industry is

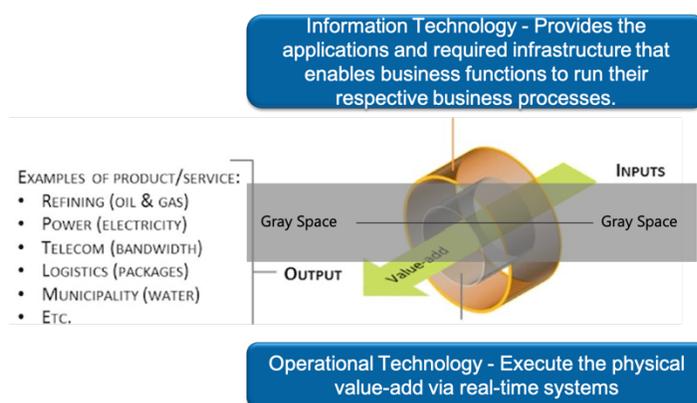
borrowing from IT approaches and architectures developed for enterprise systems with a focus on speed and scale. These next generation of Industrial AI solutions make it easier for the industry to embed and deploy AI into industrial systems and allow users to solve industrial problems without retraining or adding data science capabilities to industrial organizations.

Key drivers for AI-IoT convergence include:

- The overlap of IT and OT groups driven largely by the digital transformation and significant “gray-space” of common technologies between each area.
- Interest in the democratization of the application of AI in the industrial domain by converging data science with IT systems and OT domain expertise.
- Aspen Technology announced the Aspen AIoT Hub providing production-grade integrated data management, edge, and cloud infrastructure to build, deploy and host industrial AI applications and unlock the business value from industrial data assets at enterprise speed and scale.

IT/OT Organizations Leave an Abundance of Gray Space

Information technology or “IT” commonly provides the applications and infrastructure that enables business functions to run their respective business processes. Operational technology or “OT,” in turn, executes the physical value-add via real-time systems.



Respective Functions of the IT and OT Organizations

Historically, the scope and ownership of IT covers the spectrum of systems that support centralized corporate functions like Finance, HR, Supply Chain, Order Management, Sales, etc. These functions and their processes tend to have commonality across industries. However, OT involves the spectrum of systems that deal with the physical transformation of products and services. These task-specific and often mission-critical systems are highly customized for individual industries. They typically fall under the domain of a centralized (global) engineering services group or de-centralized (plant-level) engineering group.

ARC has observed that the convergence and overlap of IT and OT groups driven largely by the digital transformation of industry in recent years has created organizational confusion around ownership and responsibility. This historical view is somewhat clouded by technology change and convergence, centralization versus decentralization, and the prevalence of significant “gray-space” of common technologies between each area.

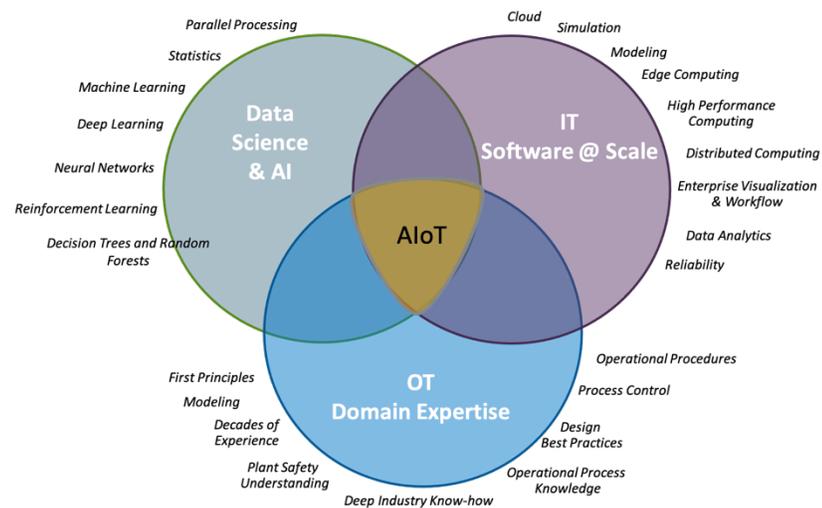
Convergence of AI and Industrial IoT

Industrial companies are looking for better ways to connect their workforce to decision tools and digitally enhance or augment work and business processes. At the center of industrial technology strategies, leaders are looking to make better use of industrial data already collected and help diverse personas within the organization make better decisions that improve business performance. We see this dynamic across all aspects of manufacturing, from design engineering to operations and maintenance to supply chain and human resources.

However, leveraging AI requires data science capability, adding additional complexity to an already complex environment. An AI system built for industrial processes without adequate knowledge of a plant or process or without appropriate controls and systems could create a potentially dangerous situation by introducing serious errors and impacting plant decision-making.

Industrial manufacturing has not typically built organizational competency in data science. While engineering roles are skilled in analyzing large amounts of data, setting up and creating production-grade machine learning environments is not easily accomplished.

AIoT is the convergence of AI and the IoT, bringing intelligence from the edge to the cloud in industrial environments, transforming the data into useful information for an improved decision-making process, with processing done in a location where it is most needed. The foundation of Industrial IoT is the ability to collect massive quantities of data at high frequency and making these integrated datasets mobile and accessible across the organization for strategic decision-making. AIoT is the democratization of AI and machine learning in the industrial domain by converging Data Science with IT providing software at scale and OT domain expertise.



The Convergence of IT-OT-AI: Democratizing and Embedding AI

Artificial Intelligence is the brain of a system, while the Industrial Internet of Things functions like the digital nervous system. At one time, this digital nervous system was primarily based solely on legacy systems and architectures, such as control systems, networks, and process historian infrastructure. But today, the industry is borrowing again from IT and approaches and architectures developed for enterprise systems including the cloud. These systems make it easier for the industry to embed AI into operational technologies by leveraging a scalable data infrastructure to power Industrial AI models from training to productization and allow users to solve industrial problems without significantly adding data science capabilities to industrial organizations.

AspenTech Industrial AI Infrastructure: Aspen AIoT Hub

To help embed data science, [Aspen Technology announced the Aspen AIoT Hub](#) -- a fit-for-purpose, cloud-ready and built-for-industry industrial AI infrastructure solution. The AIoT Hub provides the integrated data management, edge and cloud infrastructure and production-grade AI environment to build, deploy and host industrial AI applications at enterprise speed and scale.

The [Aspen AIoT Hub](#) consists of several well-established and innovative technologies. At its core is [Aspen InfoPlus.21](#), which integrates cloud-native connectivity, capabilities providing the ability to assemble and deploy AI-driven IoT applications, and the advanced enterprise workflows, analytics, and governance that is designed for industrial companies. Key capabilities of the Aspen AIoT Hub include:

Data Integration & Mobility

Through the Aspen AIoT Hub, organizations will be able to access and leverage fully integrated data, from sensors to the edge and cloud, across the enterprise.

Cloud-ready Infrastructure

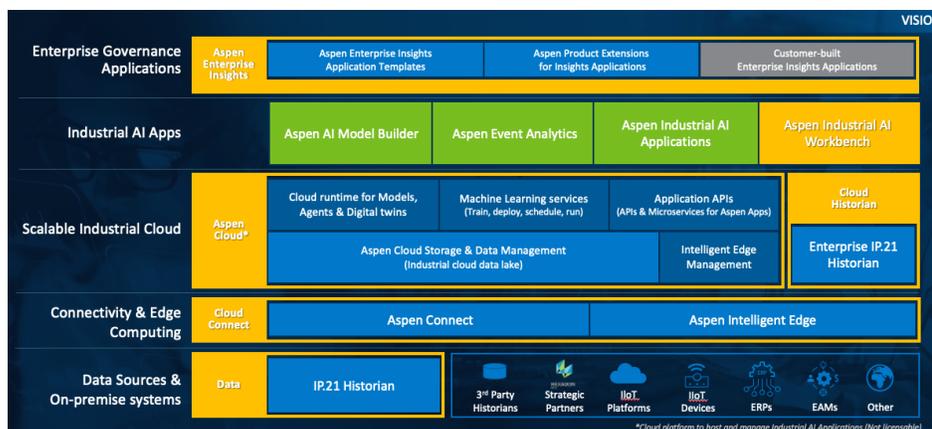
Scaling AI requires providing the tools, infrastructure, and workflows for broader collaboration between development, data science and infrastructure capabilities such as CloudOps, DevOps, MLOps and others.

Enterprise-wide Visualization

The Aspen AIoT Hub enables enterprise users access to real-time data and analytics to do all of this - improving collaboration, project efficiency and operations by tapping into the power of accelerated insights and enhanced visualizations.

Industrial AI Applications Ecosystem

Provides an embedded workbench for feature engineering, training, and rapidly productizing machine learning (ML) models, as well as supports versioning and collaboration. It empowers data scientists, at customers and partners, to collaborate with domain experts on data-rich AI apps.



AspenTech Industrial AI Applications Ecosystem

Conclusion

ARC Advisory Group research finds interest in AI in manufacturing to be strong; however, a recent digital transformation study of 157 process manufacturers finds barriers to organizational accountability, change leadership, and competency. This disconnect between ambition and ability is cause for industrial companies to seek ways to democratize application of AI through Industrial AI, just as Industrial IoT has democratized the access to data.

The confluence of AI and Industrial IoT technological forces gives rise to a new digital solution category -- the Artificial Intelligence of Things (AIoT) -- that centers on unlocking the untapped business value in industrial data. This category describes the combination of AI technologies with the Industrial IoT to enable the next generation of Industrial AI infrastructure, allowing organizations to enable seamless human-machine workflows, harmonize industrial data management, and rapidly transform raw data into tangible business outcomes.

Today, the industry stands at a tipping point – they must tap into the disruptive power of these technologies to transform their business operations and redefine their sustainable competitive advantage or else risk obsolescence. As AI and Industrial IoT converge into AIoT, the information technology (IT) and operations technology (OT) functions are also converging -- unlocking additional opportunities and challenges.

Drivers for AI and Industrial IoT convergence place an emphasis on using data already gathered. ARC Advisory Group recommends industrial users consider the following business drivers to justify an AIoT strategy.

Driver	Benefit
Improve the capability of IT and OT organizations	Address acceleration of digital transformation and Industrial IoT while avoiding duplication of effort
Implement new technologies and AI	Improve business performance, margin optimization and operational excellence
Developing skills and competency	Address technology change, micro-learning
Extracting more value from systems	Leverage data and infrastructure already being gathered
Improve the capacity for internal customers	Better absorb technology and accelerate work process change

Drivers for AIoT Convergence

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