



Seagate success story

Seagate Technology, a \$10B manufacturer of data storage and management solutions, is a prominent counterexample to the challenges outlined above. It has massive amounts of sensor data in its factories and has been using that data extensively over the last five years to ensure and improve the quality and efficiency of its manufacturing processes.

Seagate is using machine vision for microscopic inspection of silicon wafers throughout the manufacturing process. Based on deep learning algorithms, these ADC (Auto Defect Classification) models were first deployed in late 2017, and since then the scale and power of image detection has grown extensively across Seagate's wafer factories in the US and Northern Ireland, realizing multi-million dollar savings in inspection labor and scrap prevention. Visual inspection accuracy was at 50% several years ago, but **now exceeds 90%**.⁶ Automated defect detection and classification systems are now institutionalized in the Seagate wafer factories as a strategic asset.

More recently, the company has actively focused on exploiting value out of the terabytes of sensor data coming out of their high precision tools. As a result, they now have several automated fault detection solutions making wafer and tool decisions in the manufacturing line. In addition to the operationalization of the fault detection systems, they also boast an impressive portfolio of AI augmented detectors that are autonomously monitoring and controlling critical processes in the factories.

Symphony Industrial AI Digital Manufacturing – Delivering on the promise

The Symphony Industrial AI Digital Manufacturing Platform provides an intuitive

low-code, point-and-click platform which empowers business leaders in engineering and operations to easily create Smart Manufacturing solutions, digitize processes, automate work and replicate high value solutions across global factories. We store data when a process starts and ends, and we store data as it changes and as the product goes through the manufacturing process enabling deeper insights and better decision making.

Digital thread

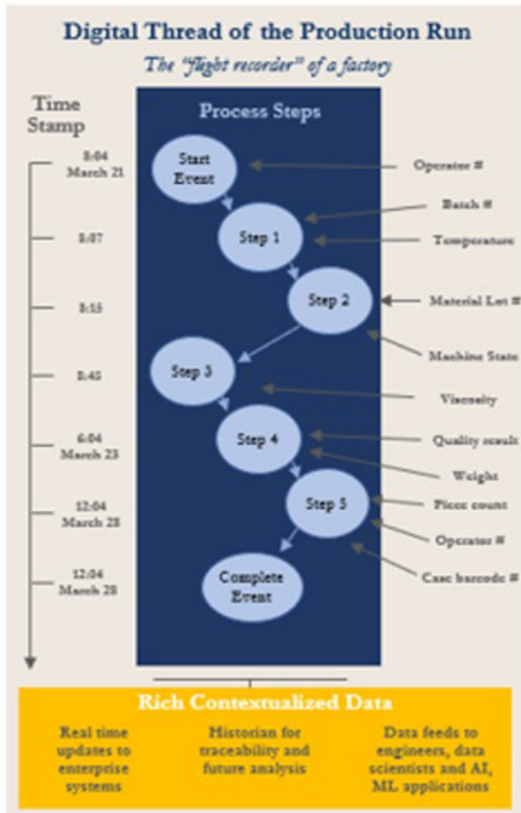
Digital thread captures all runtime meta data about a product, processes, and activities, (e.g. process steps, timestamp, operators involved, actions taken, process branch, machine states, parametric data, quality results) and contextualizes and transforms raw data into complex data model and useful information in real time. The digital thread preserves the data of the production run for automated decision making and real time updates to ERP and other decision support systems.

The integration of contextual data in the digital thread has been particularly empowering for the data team within Seagate, who would otherwise have to build the necessary pipelines to connect the highly complex streams of data that their manufacturing processes generate. The digital thread enables connected, holistic views of events which can be modeled by powerful AI algorithms.

Additionally, one of the unexpected benefits was extending the life of assets and equipment. Seagate was able to avoid new capital outlays by predicting and isolating equipment that is out of calibration and better plan for needed maintenance. With these new performance insights, acquiring new capital equipment can be delayed are avoided altogether.

References

6. Tom Davenport, "Pushing the Frontiers of Manufacturing AI At Seagate", Forbes, January 27, 2021



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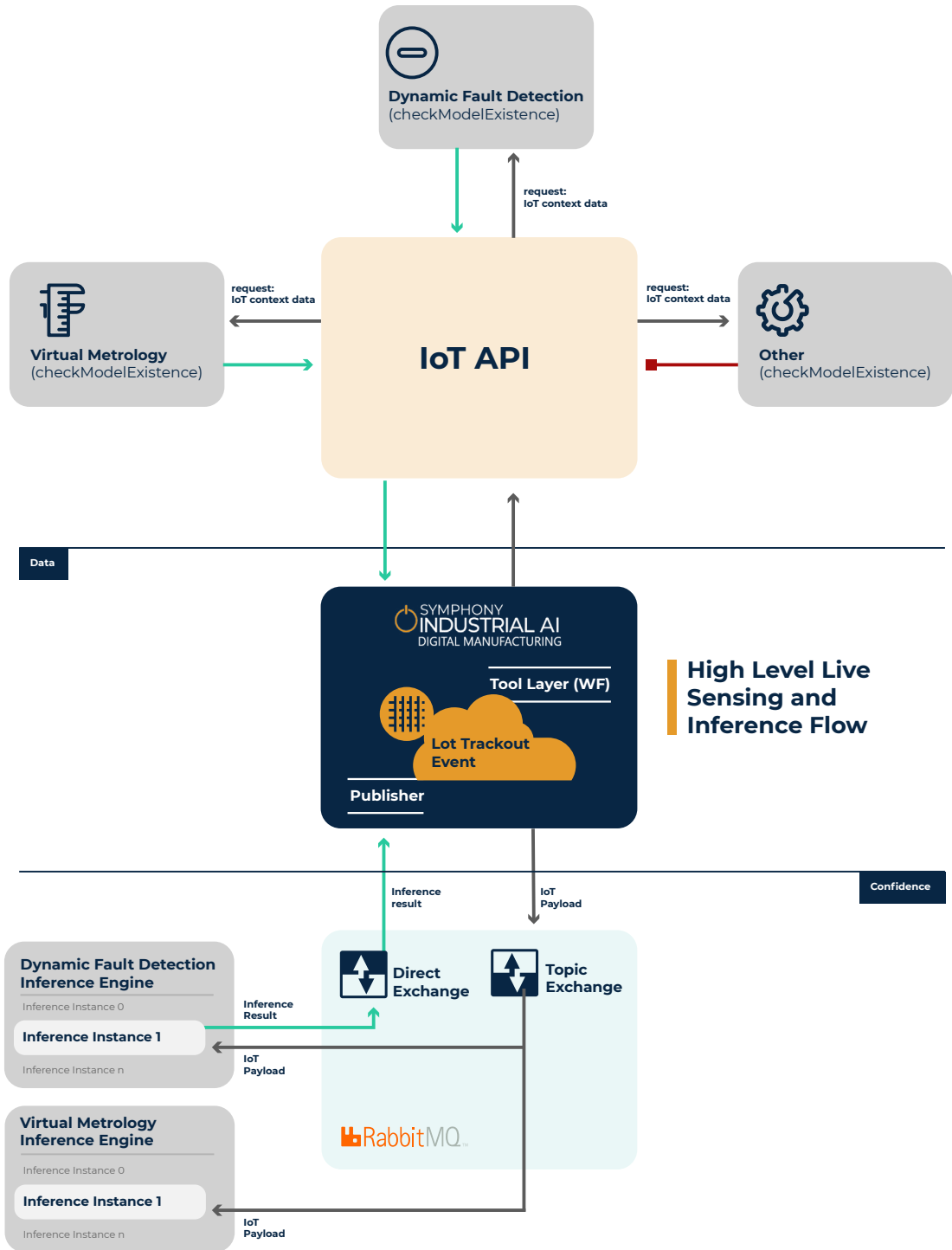
The results

Seagate's strong focus on digital transformation has enabled improved operating performance, accountability and speed of decision making. It has increased the effectiveness of enterprise systems with timely and accurate visibility into the manufacturing processes and key input and output variables.

As a result of this deep-learning approach, Seagate is realizing multi-million-dollar savings from cost and operational efficiencies gained from capital avoidance, scrap avoidance and labor reallocation. Its factory-wide initiative to monitor every process variable has resulted in autonomous monitoring algorithms running continuously in the background to monitor an entirely new set of key process variables. This higher granularity and dramatic increase in data make it impossible for operators to monitor. This deep learning system of algorithms providing supporting evidence for other factory control systems. Together with Symphony Industrial AI Digital Manufacturing, Seagate can harness terabytes of data for virtual metrology and process control.

"I believe in creating a culture where systems drive operational excellence. The collaboration with Symphony Industrial AI Digital Manufacturing has helped us capture data critical to the development of cutting edge solutions that know how to harness data for value."

– Sthitie Bom, Senior Director – Factory Controls, Analytics, and Reporting at Seagate



What's next?

For manufacturers, the opportunities are clear. Leaders should embrace the transformation and performance opportunities already available to them (and their competitors) from data, analytics, and digitization, as well as the rapidly evolving opportunities in AI/ML. To harness these benefits, business leaders will not only have to invest in technology, but also in transforming their organizations. Specific approaches will vary by business; however, several new mindsets will be critical:

- **Testing, experimenting, learning, and scaling fast:** Beyond book knowledge, business leaders will need to amass practical knowledge from devoting resources to experiments applying technologies to real problems, and then scaling those that show promise.
- **Reimagining business models and business processes:** To make full use of the power of AI/ML, and other digital technologies will require a thorough reimagining of processes, with priorities for which processes to transform and in what order. Similarly, leaders will need to reimagine how current business models could be transformed and how new business models could be created based on these capabilities.
- **Digital assets and capabilities as the “new balance sheet”:** These assets and capabilities, both hard and soft, are increasingly becoming a competitive differentiator and platforms for innovation and disruption. Each business regardless of industry and sector will likely need to assess how distinctive its digital assets and capabilities are vs. those of competitors.
- **A new focus on human capital, including integrating workers and machines:** Companies are likely to face gaps in skills they need in a more technology-enabled workplace, and would benefit from playing a more active role in education and training. Humans and machines will need to work together much more closely.

An organization's digital exhaust is becoming its most valuable asset—and its value is only going to grow. If companies want to gain a competitive advantage, embrace this new field of competence now and get a big head start.

About Symphony Industrial AI Digital Manufacturing

Long before Industry 4.0 and IIoT, Symphony Industrial AI Digital Manufacturing was innovating capabilities that today drive this one-of-a-kind technology.

The recent advancements in cloud technologies, storage capabilities, processor speed combined with the decrease in sensor costs, have created a perfect storm for customers to maximize Symphony Industrial AI Digital Manufacturing's powerful platform.

Innovation and industry leadership are the launch pad for continuous improvement and the journey toward lights-out manufacturing. We are proud to work with professional associations dedicated to driving standards, improving business results, and communicating best practices to global manufacturing.