Data Science in Operations

Today's fast-changing business climate demands real-time visibility and up-to-the-minute recommendations from data and analytics. Companies must both protect and leverage data; there's a tension between providing the utmost security and governance and getting the most insight from analytics. This becomes more challenging as data volumes and sources increase, challenging companies to keep up with growing data and the insights it contains.

Your organization can achieve data-driven leadership amidst competitive threats and global disruptions by intelligently connecting data sources, maintaining access to accurate data, and fueling insights and predictions with real-time data.

This whitepaper explores key data science capabilities and how they can drive innovation in specific industries, demonstrating how some industry leaders are already succeeding in the field.

Why Your Business Needs Data Science

Data science is a multi-disciplinary approach to finding, extracting, and surfacing patterns in data through a fusion of analytical methods, domain expertise, and technology. Data science includes the fields of artificial intelligence (AI), data mining, deep learning, forecasting, machine learning (ML), optimization, predictive analytics, statistics, and text analytics.

95%
of Fortune 1000 organizations undertaking some form of pilot or AI rollout[1]

92%
of executives cite measurable results for data and AI investments[2]

73%
of leading organizations have employed a chief data and analytics officer (CDAO)[3]

1 "Data and AI Leadership Executive Survey," NewVantage Partners, 2022.

2 ibid.

3 ibid.

Your business needs data science to seize opportunities, lower costs, and increase efficiency using past and present data and knowledge to predict what might happen in the future. While basic business intelligence (BI) can provide a snapshot of your operations, advanced data science provides the ability to forecast future trends or outcomes for a deeper understanding of your business. Hyperconverged analytics offers a wider set of capabilities to deal with challenges that traditional, rearview BI cannot, enabling strategic decision-making for your company's future.

Common Methodologies

Hyperconverged analytics brings visual analytics, data science, and streaming capabilities together in a seamless experience that delivers immersive, smart, and real-time business insights in an easy-to-use and tailored way. Here are some common methodologies included in hyperconverged analytics:

Predictive Analytics

Predictive analytics uses data to model forecasts about the likelihood of potential future outcomes. It uses historical and current data combined with ML to model unknown future events. Predictive analytics can help you assess potential risks or optimize operations.

AI/ML Models

Artificial intelligence (AI) is the simulation of cognitive processes with computer programs. Machine learning (ML) is an application of AI where computer programs use algorithms to find data patterns. Deep learning is a subfield of ML that creates artificial neural networks, similar to how a human brain works to analyze images, video, and voice analysis. AI/ML-based models can predict potential outcomes or behavior, sustain accuracy in manual processes, or power virtual assistants.

Data Mining

Data mining helps teams answer questions they can't handle with basic query or reporting techniques. It is data exploration and analysis that uncovers meaningful patterns or rules. Data mining, combined with AI, can include search engine algorithms or recommendation systems.

Streaming Analytics

Streaming analytics derives insights from a real-time data stream, using continuous queries to analyze data from multiple sources and scoring models in real time (in the case of anomaly detection). Some examples of streaming analytics applications include health monitoring systems, traffic monitors, and financial transactions.

Data Science Industry Use Cases

Many innovative organizations today are investing in data science.

Financial Services

Financial service institutions need access to dynamic pricing and intelligent fraud detection applications to compete with fintech disruptions and respond to increasing cybersecurity concerns. With dynamic pricing, insurance companies can reduce losses with greater underwriting insight and increase earned premiums by identifying profitable customers—with the latest models, ML, and AI techniques. Banks can increase their operational resilience with fraud and risk management analytics developed to prevent problems before they occur.

AA Ireland, a home, motor, and travel insurance provider, wanted a robust, future-proof analytics solution. With its new TIBCO solution built on TIBCO Connected Intelligence, the insurer can simultaneously optimize pricing, provide 360-degree views of customer data, meet regulatory requirements, and prevent fraud.

4 https://www.tibco.com/customers/aa-ireland
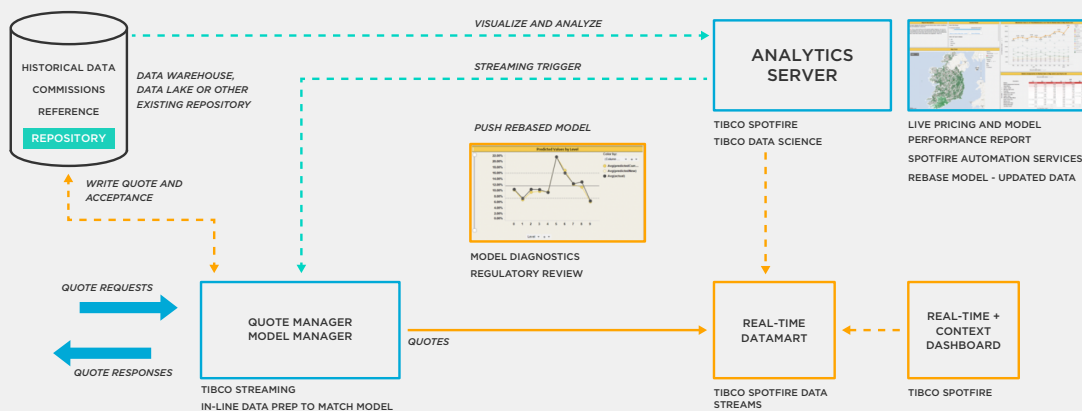
According to Colm Carey, former CAO at AA Ireland, "You don't sit in an IT queue for a year and a half. You build a model yourself and generate a lot of revenue for the company. It's that power. You can build it, and you have the computational power to do things like fraud identification and embedded customer value, and update those models in live environments."[4]

Manufacturing

Defects in products are costly and wasteful. Manufacturers need to increase yield and reduce costs to increase potential profits. Leading organizations use historical and real-time data from systems and suppliers to create AI models that detect and can help prevent quality issues before they occur. With IoT, integration, data unification, and ML, you can:

- Automate root-cause analysis
- Detect and classify defects
- React in real time to proactive alerts
- Dynamically learn to improve quality and reliability

Hemlock Semiconductor (HSC), a global producer of polycrystalline silicon for semiconductors, wanted to remain competitive in the global industry. With TIBCO, the manufacturer re-engineered its manufacturing process using real-time process monitoring to maximize output, efficiency, and quality. HSC reports monthly savings of $300,000 from optimized resource consumption.

> **According to Kevin Britton, program manager at HSC, "With TIBCO, we're connecting data in ways we never could before, which helps us better manage maintenance and plan improvements. We are able to confirm where we are doing things most efficiently and track our performance, which is a key enabler to being able to improve."[5]**

Transportation

Costs increase as the need for maintenance increases. Scheduled maintenance is resource-intensive as it involves some level of unnecessary checks and part replacements. However, if you don't schedule maintenance, you end up with urgent and unplanned maintenance, which is expensive as it typically involves longer down-time and bigger repairs. What if you could find the optimal time to maintain your assets?

With reliability analysis and predictive analytics, you can. TIBCO Spotfire analytics makes predictive analytics easy, consumable, and accessible for everyone. Out-of-the-box, Spotfire software provides one-click data science with statistical and ML methods to predict real-time outcomes, helping all users improve their efficiency.

Trains run better on data. Siemens Mobility, a leading railway provider in Germany, partnered with TIBCO to achieve its goal of 100 percent asset availability for transportation provider customers. Siemens deployed a robust analytics solution with predictive maintenance and edge computing that helps anticipate train failures and breakdowns. With advanced data analytics at the edge, Siemens saw a 30 percent reduction in the lifecycle costs of its customers' trains.

5 https://www.tibco.com/customers/hemlock-semiconductor

According to Gerhard Kress, vice president of data services at Siemens Mobility, "We use TIBCO Spotfire software for advanced analytics and data cleansing, and with Railigent and Spotfire software, customers have seen a decrease in unplanned downtime by 30–50 percent."[6]

EVENT-DRIVEN ARCHITECTURE: RAILWAY EXAMPLE
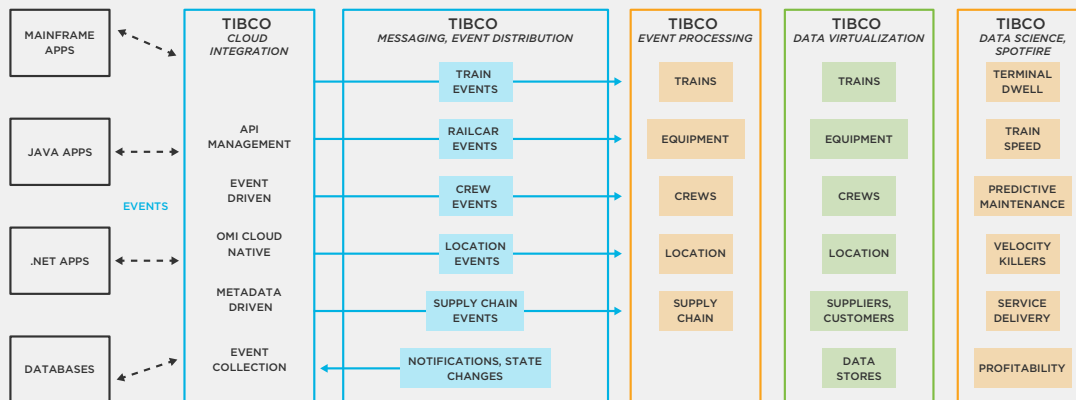
Operationalize Data Science with TIBCO

No matter your industry, you need to democratize and operationalize data science across your organization. TIBCO Connected Intelligence software helps organizations innovate and solve complex problems faster to ensure predictive findings quickly turn into optimal outcomes.

To get started with data science, your company needs to integrate your system architecture and access trusted data to spark optimal insights. TIBCO Connected Intelligence has all you need from one vendor, featuring cloud integration, data fabric, and hyperconverged analytics.

Cloud Integration

Digital business excellence requires smarter, connected apps, faster development, and cloud adoption. Data holds 100 percent of your business opportunities. Unlock business value with the ability to access and activate that data for your people, processes, and systems. Enable your IT and business stakeholders to connect all your apps, data sources, and processes—in the cloud, on-premises, or on-device.

6 https://www.tibco.com/customers/ siemens-mobility

Agile Data Fabric

Reimagined customer intimacy, operational excellence, and business reinvention efforts require intelligent management of every kind of data—meta, reference, master, transactional, and streaming. Managing this diversity with logical governance and consistency is the objective of TIBCO's line of data management products. Enable your team with the capabilities required for better data access, trust, and control.

Hyperconverged Analytics

Successful data-centric enterprises have mastered the data-to-insights-to-action journey and built a continuous, real-time loop of learning and adaptation. By predicting and acting on discovered opportunities, they sustain innovation and optimize their business processes, operations, and customer experiences. Enable your team with analytics and data science to find meaningful insights from data and confidently predict and deliver the next wave of success.

With TIBCO, digital leaders like you successfully realize their digital journey and unlock the potential of their data in extraordinary ways. Learn more at tibco.com/connected-intelligence.

TIBCO Software Inc. unlocks the potential of real-time data for making faster, smarter decisions. Our Connected Intelligence platform seamlessly connects any application or data source; intelligently unifies data for greater access, trust, and control; and confidently predicts outcomes in real time and at scale. Learn how solutions to our customers' most critical business challenges are made possible by TIBCO at www.tibco.com.