Smarter Manufacturing across the Lifecycle with Analytics

Sponsored by IBM

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July 2018

Executive Summary

Manufacturers are under severe cost and competitive pressures to deliver highly customizable products. By delivering a single Analytics platform with AI capabilities throughout the supply and demand chain (planning, operations and service), IBM is helping manufacturing companies reduce costs, improve quality, productivity and drive innovation.

The Growing Value of Integrating Data Analytics in Manufacturing

The manufacturing industry continues to expand with new orders, production, prices and employment rising while inventories are tightening.[1] Manufacturers and their suppliers must innovate more and compete aggressively to improve productivity, time-to-market and deliver the highest quality products at the lowest costs. They are also challenged to integrate several disruptive technologies (Figure 1): Data Analytics, Augmented/Virtual Reality, 3D Printing, Robotics, Internet of Things (IoT) and new forms of human-machine interactions – touch, speech and visual processing based on Artificial Intelligence (AI)/Machine Learning (ML).
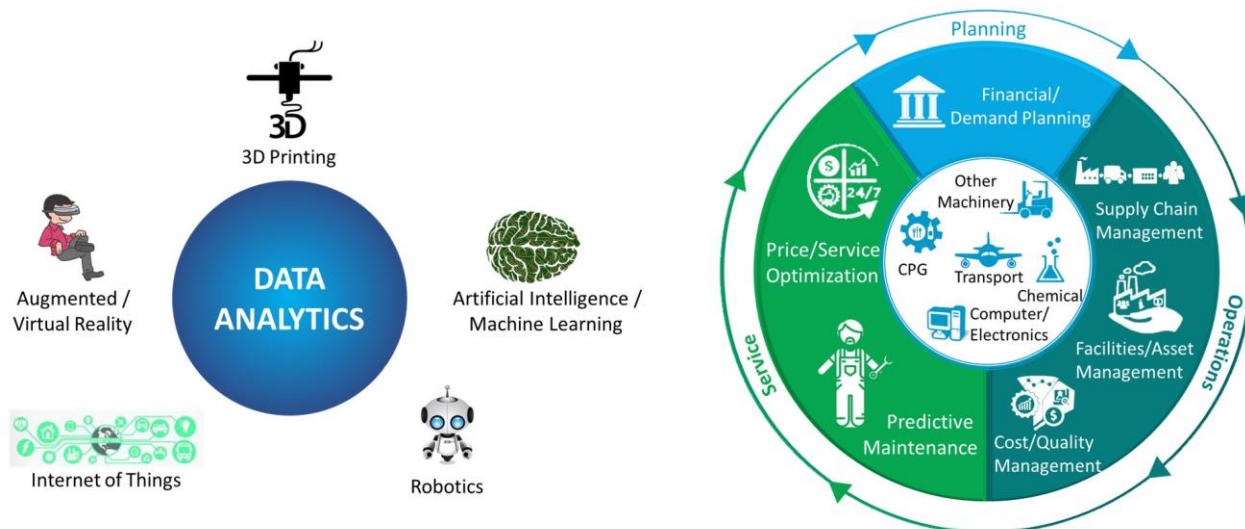

Figure 1: Emerging Technologies in Manufacturing   High Value Use Cases Enabled by Analytics

For years, manufacturers have been aware that they are drowning in data but starving for insight. To get deeper and actionable insights from the massive volumes of data they possess, almost every manufacturer (Consumer Packaged Goods – CPG, Transportation, Chemicals, Computers/Electronics and others) is investing in specific point Data Analytics solutions. Figure 1 (right) depicts some key high value use cases enabled by Data Analytics – from Financial/Demand Planning to Supply Chain Management to Cost/Quality Management to Predictive Maintenance and more. Consequently, the Manufacturing Data Analytics software and services market is expected to grow at a healthy 21.9% annually to $8.45B by 2021.[2]

As customers increasingly demand personalized products with little or no delivery costs and delays, manufacturers are becoming more distributed by geography and function, and are accelerating the speed and increasing the scope of decision making. Siloed Data Analytics solutions are becoming more cumbersome and often unable to deliver the best business outcomes throughout the entire manufacturing value chain: planning, operations and service.

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[1] https://www.instituteforsupplymanagement.org/ISMReport/MfgROB.cfm?navItemNumber=31053&SSO=1
[2] https://www.marketsandmarkets.com/Market-Reports/manufacturing-analytics-market-125191578.html

What's needed are Data Analytics solutions that integrate easily across geographies, functional silos and the entire the value chain from raw materials to final delivery of finished products to the customer. IBM provides this single Analytics platform for manufacturers.

Accelerate Value with a Single Analytics Platform from IBM

The Analytics landscape continues to evolve rapidly; giving manufacturers unprecedented capabilities to progressively solve complex problems and get higher value (Figure 2):

- **Descriptive** analytics is dominant today and condenses data into nuggets of insights summarizing <u>what is the plan</u> and <u>what happened.</u>
- **Diagnostic** analytics examines and drills down into data in greater detail to understand the causes of events and behaviors and determine <u>why did it happen.</u>
- **Predictive** analytics uses a combination of several statistical, modeling, data mining, and **AI/Machine Learning** techniques to analyze data to make probabilistic forecasts about <u>what will happen next.</u>
- **Prescriptive** analytics goes beyond descriptive, diagnostic and predictive analytics, and typically includes optimization to recommend <u>what should we do.</u>
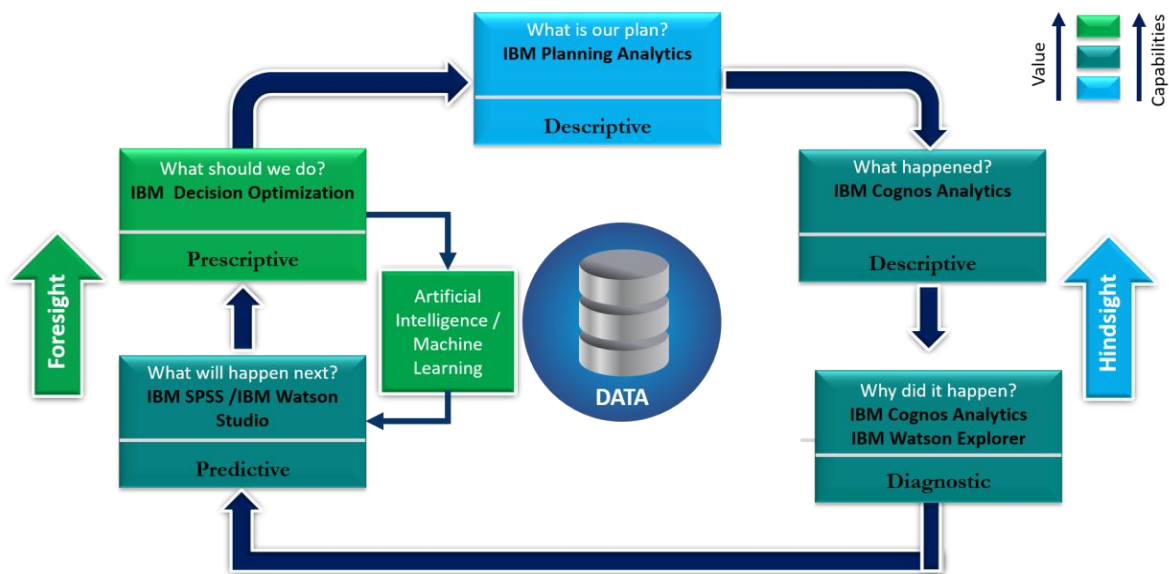
Figure 2: The Virtuous Analytics Lifecycle: IBM Analytics Portfolio (Value Increases Clockwise)

Most enterprises base their future actions predominantly on descriptive analytics (hindsight or past behavior) which is easy to understand. However, advanced analytics are more difficult to perform and implement: getting the required data is hard, and specialized software and integration protocols are needed to build a seamless analytics chain from descriptive through diagnostic, predictive, and prescriptive.

Manufacturing companies have the potential to realize up to 50% lower development cost, up to 25% lower operational cost, and up to 30% gross margin increase. However, they have realized only 20-30% of that potential because of siloed data in legacy IT systems and a lack of platforms/capabilities to build and implement higher value analytics such as AI/ML.[3]

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[3] McKinsey Global Institute, "THE AGE OF ANALYTICS: COMPETING IN A DATA-DRIVEN WORLD", December 2016.

The IBM Analytics portfolio (Figure 2 in previous page) addresses these challenges and provides the first and perhaps the only end-to-end ecosystem of data, analytics and AI capabilities and expertise. Available on the cloud, on premise or in hybrid deployments, the IBM portfolio is an integrated solution that helps manufacturers uncover insights from data to improve business processes and generate ideas to drive better business outcomes.

IBM Planning Analytics is a planning, budgeting, forecasting and analysis solution that has a customizable workspace for cost center owners and business managers. It can be deployed on-premises or in the cloud and helps organizations automate manual, spreadsheet-based processes and link financial plans to operational tactics.

IBM Cognos Analytics is an integrated business intelligence and analytics solution with several components designed to meet various organizational information requirements. It is a unified environment (on-premises or on the cloud) to support data discovery, ad-hoc analysis, managed reporting, score-carding, and monitoring of events and metrics. IBM is integrating more AI into Cognos to reflect the growing importance of "Smarter BI & Analytics" to make self-service analytics a reality for business users with:

- Easy to use smart data discovery capabilities for business analysts and data explorers
- Automated predictive analytics and machine learning, enabling users to interact with data, systems and applications simply and conversationally via natural language; helping augment our understanding of the world with big data insights
- An integrated environment supporting self-service data exploration, dashboard and infographic creation and managed reporting
- Ability to understand and analyze data to better predict outcomes.

IBM Watson Explorer provides access to insights from all internal, external, structured and unstructured data, mitigating the risk of missing any key piece of data and helping to improve business performance and growth.

IBM SPSS provides an intuitive graphical interface, empowering users to build models without programming and quickly deliver predictive insights to applications across their organizations.

IBM Watson Studio accelerates the machine and deep learning workflows required to infuse AI into the business to drive innovation. It provides tools for data scientists, application developers and subject matter experts to collaboratively and easily work with data and use that data to build and train models at scale.

IBM Decision Optimization is a proven prescriptive analytics solution that enables manufacturers to solve a breadth of complex optimization problems using general programming language APIs like Python, Java, or using OPL with powerful optimization engines. As an integral part of IBM Watson Studio, users benefit from all data science features in Watson Studio like access to machine learning models, the ability to pass output from predictive analytics to the Decision Optimization engine, access to open notebook features, visualization features and data connectivity options from the Watson Studio platform.

This single Analytics platform accelerates business value for manufacturers.

How Manufacturers Benefit from the IBM Analytics Portfolio

By delivering a single Analytics platform with AI capabilities, IBM is helping manufacturers further reduce costs, increase profits, improve quality, productivity and drive innovation throughout the value chain by integrating planning, operations and service (Figure 3):
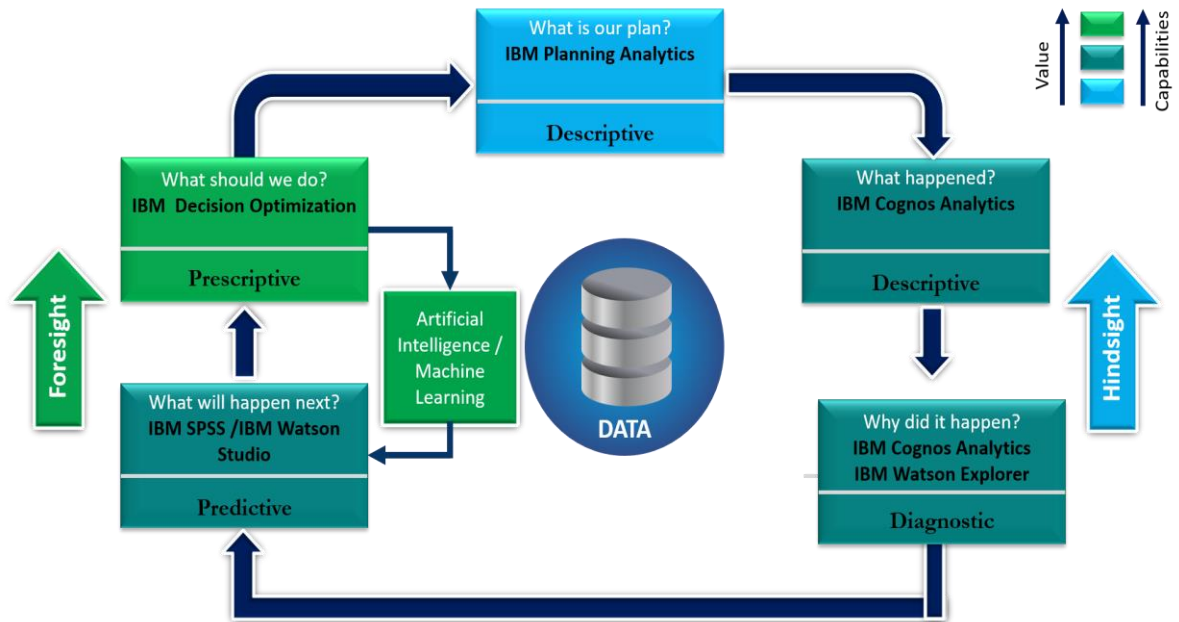

Figure 3: IBM Analytics Portfolio Streamlines Planning, Operations and Service in Manufacturing

Planning: With IBM Planning Analytics and IBM Cognos Analytics, manufacturers can analyze data across multiple sources to set performance targets and create more realistic financial and demand plans. They can also develop more accurate budgets that incorporate production, operation, sales and fulfillment data to optimize forecasting and planning.

Operations: With better planning and with IBM Cognos Analytics and other IBM Analytics solutions that provide greater foresight, manufacturers can track equipment and inventory usage across location and time and minimize costs. They can also optimize the supply chain, evaluate supplier performance, negotiate better terms and conditions, ensure timely product deliveries and maximize quality while minimizing production and manufacturing costs.

Service: With IBM SPSS/Watson Studio, IBM Decision Optimization and other IBM Analytics solutions with AI/ML capabilities, manufacturers can optimize operations and maintenance schedules, get deeper insights on how customers use their products and deploy new business models such as highly customized pay-as-you-go products/services. Further, when service insights from actual product purchase behavior and use are fed back into the planning process, the entire manufacturing process can be optimized to an even higher level. McKinsey claims integrating sensor data could further reduce operating costs by 5% to 15%.

Client Example

IBM Analytics solutions are generating significant value for numerous manufacturers worldwide, many of whom are pioneers. Here is one prominent example.

Rotkäppchen-Mumm Sektkellereien GmbH
Reduce inventory without risking stockout

Background/ Challenges	• German producer of sparkling wines, spirits and other drinks. Market leader in sparkling wine in Germany with a 55% share of the market. • Needed to boost working capital and cut warehouse costs by shrinking inventory levels without risking stockouts or impacting customer service levels.
Solution/ Results	• Automated and enhanced forecasting processes with IBM Planning Analytics and IBM SPSS. • Extracted data from ERP and CRM systems into Planning Analytics and using SPSS constructed time-series models to forecast sales. • Assessed the significance of several potential sales drivers, including seasonal factors such as public holidays, special events like the FIFA World Cup and trade promotions such as advertising and discounts. • Drilled down to the level of individual SKUs, enabling them to assess the accuracy of their models at a highly granular level. • Produced the optimal product quantities based on accurate insights into demand and future trends. The result was a 22% rise in the accuracy of selected sales forecasts with a corresponding decrease in stock levels without risking stockout.
Benefits	• Deployed a new hybrid sales planning and performance management solution that serves both sales and production teams with a three-month and a 24-month view of future sales and complements account team knowledge with proven, rigorous predictive statistical models.

Summary and Recommendations

Analytics is a game-changing business opportunity for manufacturers to become smarter and to deliver exceptional customer experience, enhance marketing effectiveness, increase operational efficiencies, reduce risks, improve product quality and reliability, and more.

While many manufacturers are already invested in descriptive analytics that provide hindsight, leaders are investing in AI/Machine Learning capabilities that provide deeper and more granular foresight on product use/purchase patterns, competition and price elasticity. This requires a strong foundation to leverage all the information about current performance.

With Cognos Analytics and Planning Analytics, IBM is probably the only software company that provides this robust foundation and proven solutions across the entire Analytics Lifecycle: from Data to Descriptive, Predictive and Prescriptive Analytics with AI/Machine Learning capabilities. This foundation includes expertise in data and analytics governance, so organizations have confidence in their data.

With a flexible pricing model, the IBM Analytics solutions portfolio reduces deployment risks, improves productivity and can drive revenues and profits and product/process innovation for manufacturers.