



BEYOND THE HYPE

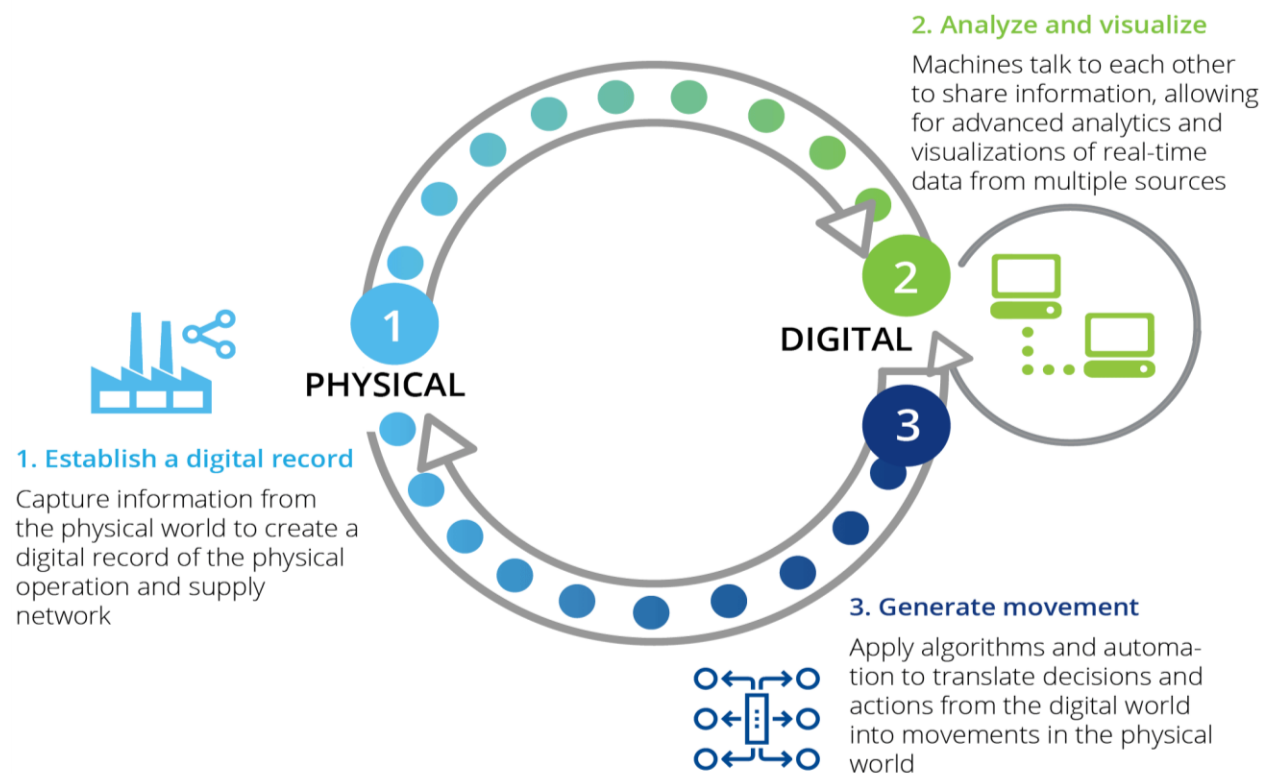
ABOUT MINITAB

Minitab helps companies and institutions to spot trends, solve problems and discover valuable insights in data by delivering a comprehensive and best-in-class suite of data analysis and process improvement tools. Combined with unparalleled ease-of-use, Minitab makes it simpler than ever to get deep insights from data. Plus, a team of highly trained data analytic experts ensure that users get the most out of their analysis, enabling them to make better, faster and more accurate decisions.

For over 40 years, Minitab has helped organizations drive cost containment, enhance quality, boost customer satisfaction and increase effectiveness. Thousands of businesses and institutions worldwide use Minitab Statistical Software, Companion, and Quality Trainer to uncover flaws in their processes and improve them. In 2017, Minitab acquired Salford Systems, a leading provider of advanced analytics which delivers a suite of powerful data mining, predictive analytics and modeling capabilities.

The convergence of the widespread availability of low-cost sensors, cloud and greater computing power has brought together a multitude of connected devices which can monitor, collect, exchange, analyze and deliver information on manufacturing operations like never before. Early adopters of these technologies are making investments into “smart manufacturing” and machine learning tools to drive significant improvements and ultimately maintain competitiveness.

Physical-to-Digital / Digital-to-Physical loop and related technologies

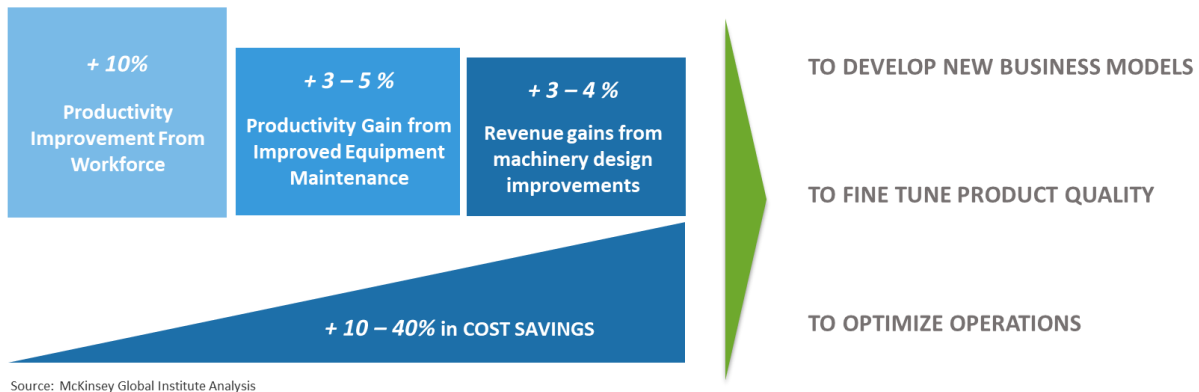


Source: Center for Integrated Research.

Deloitte Insights | deloitte.com/insights

To maximize these new technologies (and costly investments!), analytical technologies must also be utilized to unlock insights for deeper understanding that is needed to drive manufacturing decisions. For those that do, the rewards are great—the potential from productivity efficiencies,

increased revenue and overall cost saving can that can be reinvested in the business for continued competitiveness.

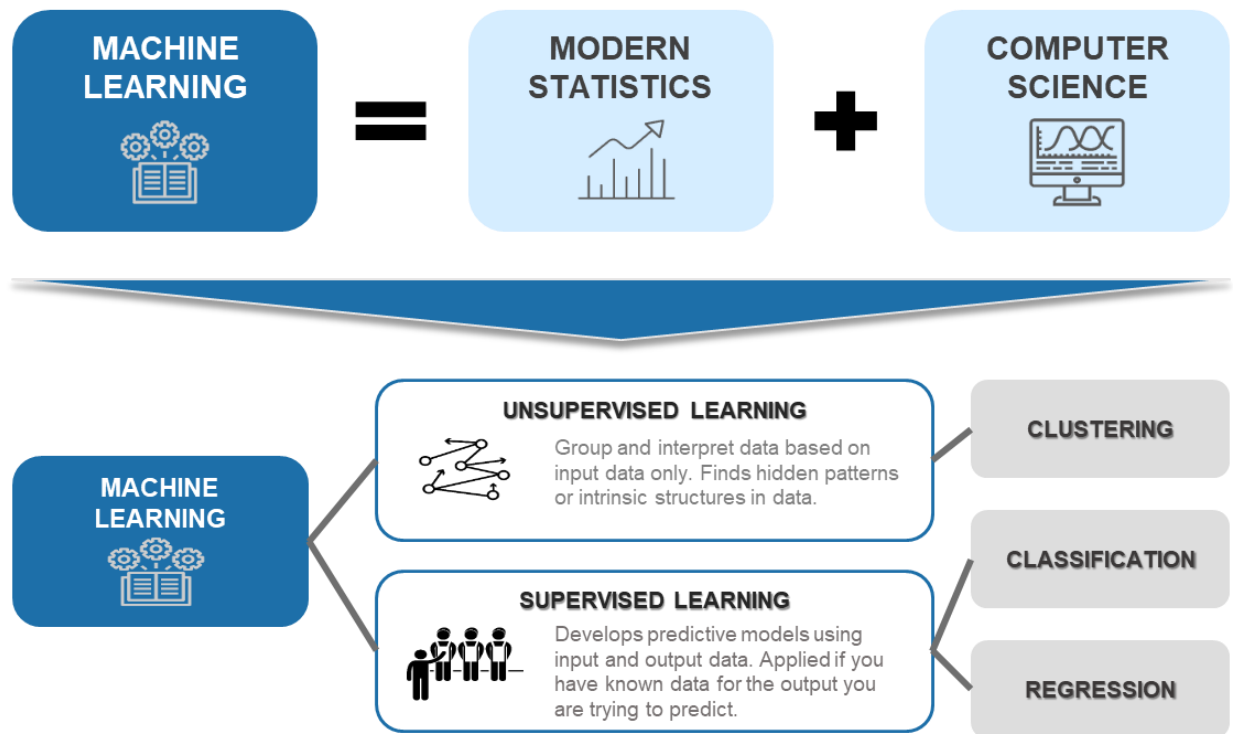


SHINY NEW TOOL IN YOUR ANALYTICAL TOOLKIT

The idea of analytics playing a pivotal role in the process of identifying problems or pain points and the approach for responding to them (root cause analysis anyone?) is nothing new for manufacturers with continuous improvement methodologies in place. However, as manufacturing becomes more complex and dynamic, data-driven approaches to find highly complex and non-linear patterns in data, while also narrowing the window between identifying a problem and arriving at a solution, are becoming ever more critical. As a result, growing demand for advanced analytics and machine learning tools has continued to gain momentum.

ADVANCED CONCEPT WITH FAMILIAR ROOTS

Machine learning is based on a number of earlier building blocks, starting with classical statistics such as clustering, classification and regression; with the advent of computer science automating the model building process.



Digging a bit deeper, machine learning can be classified in two major categories, either unsupervised learning or supervised learning.

Supervised learning, in the broadest sense, develops predictive models with both input and output data. It is called supervised learning because the process of learning an algorithm from the training dataset can be thought of as a teacher supervising the learning process. The correct answer is known, so the algorithm iteratively makes predictions on the training data and is corrected by the teacher.

Supervised learning can be further grouped into regression and classification problems. Classification is when the output is a category, like "red" or "green" or "disease" and "no disease." A regression problem is when the output variable is a real value, such as "dollars" or "distance" or "weight".

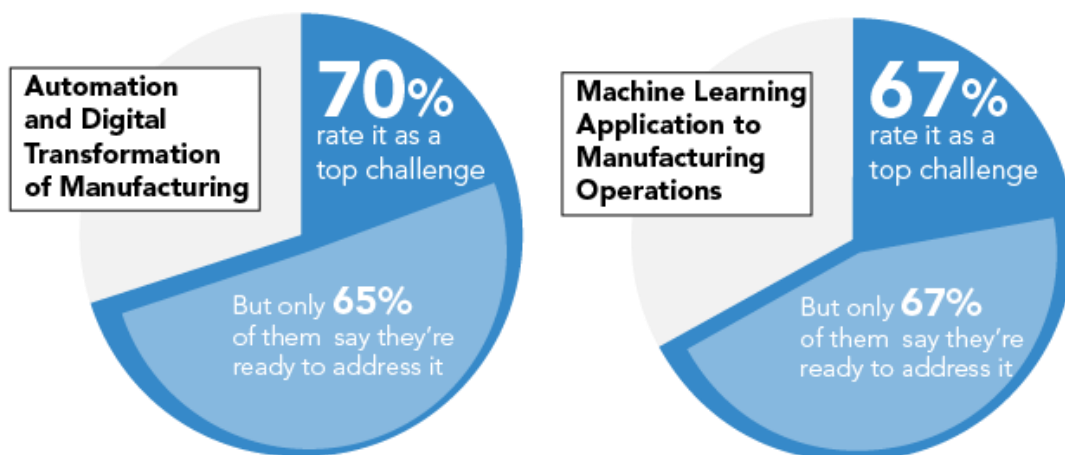
Unsupervised learning, on the other hand, is where only input data and no corresponding output variables are needed. The goal for unsupervised learning is to model the underlying structure or distribution in the data in

order to learn more about the data. Unsupervised learning provides the capability to solve for clustering problems, where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior.

COMPETING IN A DATA-DRIVEN WORLD

To go beyond the hype, leaders need to understand the challenges machine learning can help address, to leverage ways they can successfully implement analytical tools and their data to deliver real value. Using machine learning, manufacturers will be able to attain much greater manufacturing intelligence that can contribute to the on-going success of their current Continuous Improvement framework.

In the US, Continuous Improvement (CI) directors identified the importance of addressing challenges related to Smart Manufacturing, but also did not feel prepared to address them.

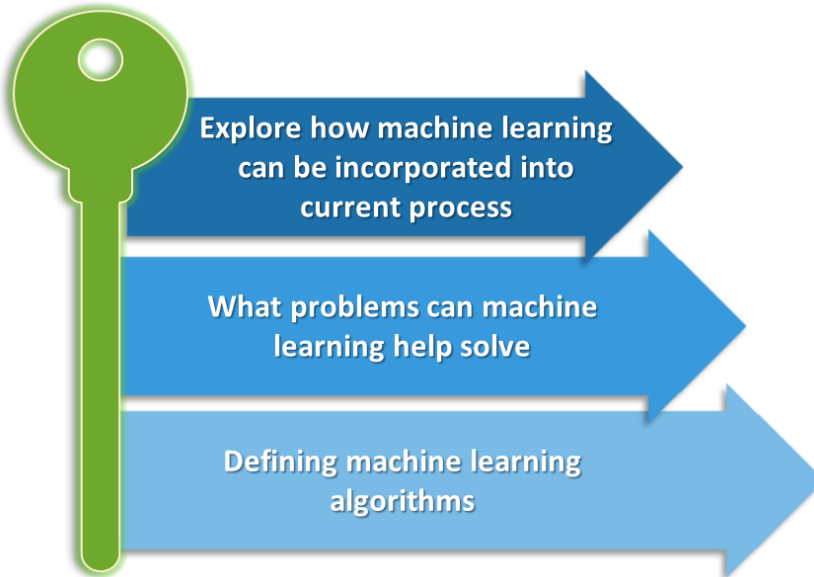


Source: Minitab Proprietary Research

The key to driving value are the insights hidden in your data— data which often lives across multiple relational and non-relational systems. If the journey toward 4.0 sounds complex, you are not alone in this sentiment. Over half of the companies we have spoken to globally rate machine learning as one of their top challenges impacting their business in the next 2-3 years, and many are not sure where to start.

VENTURING INTO MACHINE LEARNING

The first step to learning is understanding. Unlocking the benefits of machine learning does not have to start with a significant investment on



the plant floor.

Understanding the algorithms, reviewing applicable use cases that demonstrate their benefits in addressing challenges, and ultimately exploring their potential fit into your current continuous improvement process will help drive

strategic investments in infrastructure, emerging technologies and skilled resources.

Start exploring the concept of machine learning with our webinar [Machine Learning: The Next Step in Manufacturing.](#)