# The Future of Machine Learning in Manufacturing

Final Report

Team 5:

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# Executive Summary

This report provides a brief background and case study in the application of machine learning in the manufacturing industry. In addition, a comprehensive overview of the current state-of-the-art in machine learning technology serves as a basis for recommendations to modern businesses in applying these techniques in industry.

Central to modern developments in artificial intelligence (AI), machine learning refers specifically to algorithms designed to generate and measure data, analyse it, and feedback optimized parameters to functions within the algorithm itself. This is done autonomously through the use of advanced sensory input, increasingly cloud-based processing and storage power and modern analytical techniques developed for the specific application in question. In the context of manufacturing, a brief history of technological development in the industry shows that low-level production line processes have become increasingly streamlined and automated throughout the 20$^{th}$ century, leaving industrial engineers primarily responsible for design and analysis of data being generated from systems on the shop floor.

It is these processes which machine learning now hopes to automate by embracing what is known as "Industry 4.0", an integrated model of the future of manufacturing focused around an industrial Internet of Things. By examining General Electric's "Brilliant Factory" model and their proprietary "Predix" technology, this report maintains that in order to fully benefit from the application of machine learning in manufacturing, businesses must focus on increasing the capability of their operations in three major areas: effective capture and storage of data including availability, quality and composition of information; full cross-functional integration of

processes between all subsystems and levels of the production operation; and transforming the culture and core competencies of their human capital to focus on improvement and development of the business as a whole. In order to survive manufacturing firms must be increasingly able to manage innovation and development of technology in their operations. Machine learning can provide a basis for which companies can build this capability.

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