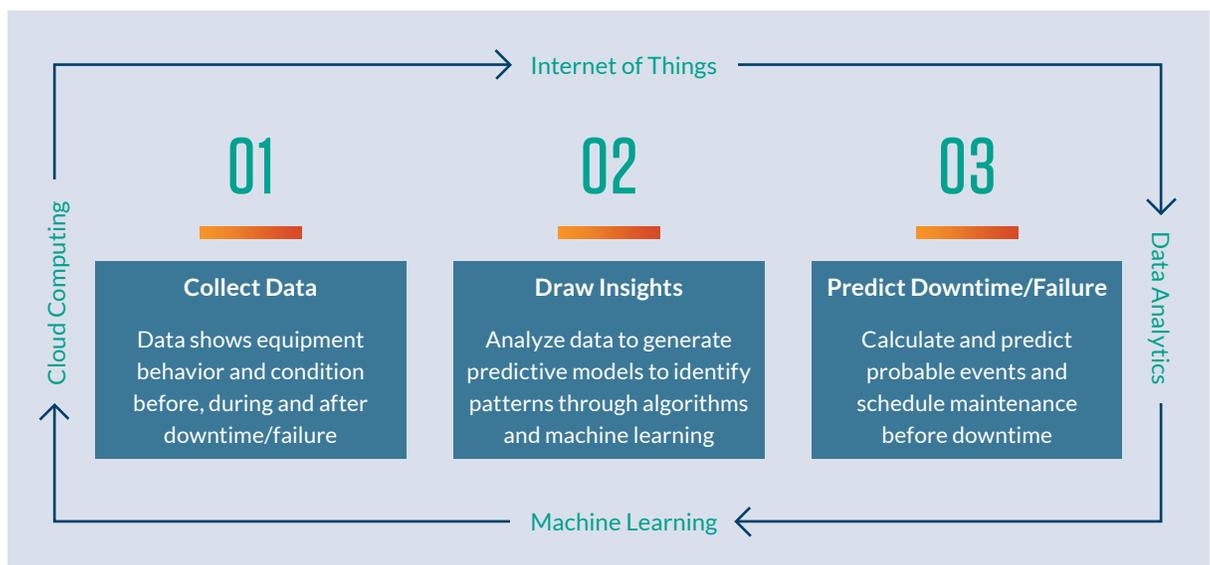


## Capitalizing on Predictive Maintenance (PdM) Benefits in Manufacturing

With the advent of Industry 4.0, new technologies — such as smart sensors, the Internet of Things (IoT), data analytics and machine learning — have emerged, enabling new approaches to equipment and plant maintenance for the manufacturing industry. Predictive maintenance (PdM) is one such approach that has grabbed the attention of manufacturers because it allows them to optimize their dollars spent on maintenance while maximizing productivity.

Manufacturing plants, based on the scale and complexity of their operations, produce an enormous amount of data every day. Connecting devices, such as smart sensors, allows for real-time collection of data on temperature changes, heat dissipation, sounds and vibrations produced

in machines, and more. PdM techniques extract insights from this data to identify patterns that could lead to downtime or failure. Through the use of PdM, manufacturers can take a more proactive approach to maintenance that will help them reduce equipment downtime or failures.



The above framework shows various digital technologies that allow a manufacturer to deploy a PdM solution effectively. The IoT provides the ability to collect data from several sensors and other objects, in real time, via a wireless industrial network. The data produced can then be analyzed and modeled using data analytics to draw meaningful insights and establish patterns to serve as the basis for PdM models. Machine learning algorithms bring the power to make predictions. And cloud computing can be utilized to receive, collect, process, display and store the data gathered from smart sensors.

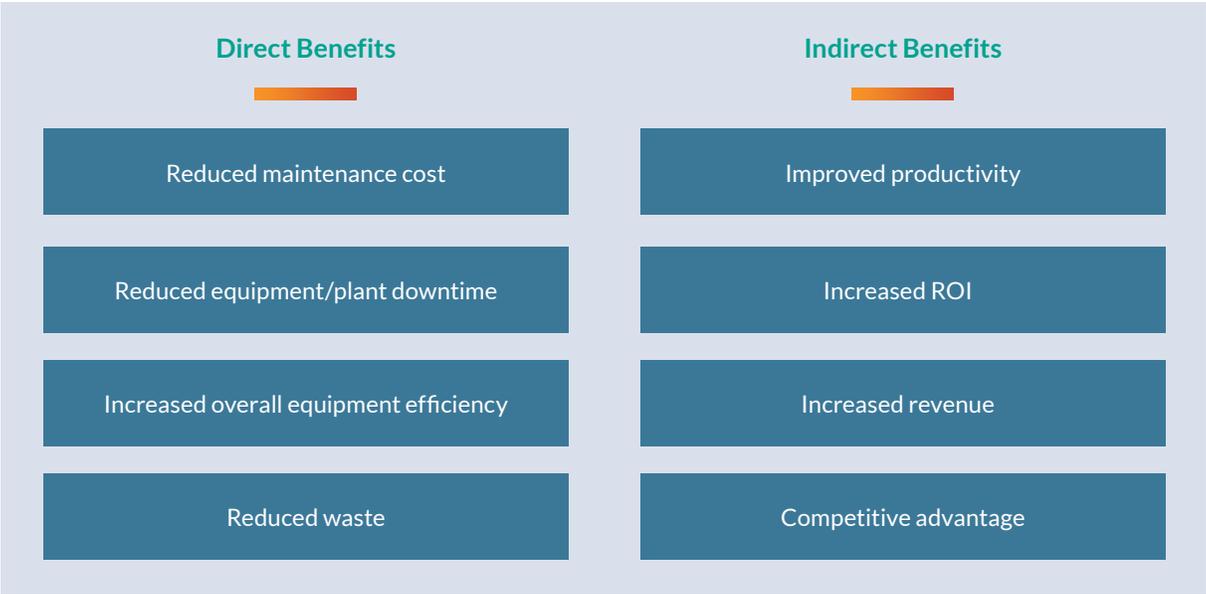
### The Embrace of Immersive Technologies

As important as predicting unplanned downtime is, it is equally important for manufacturers to perform required maintenance and repair services effectively. That's why many companies are deploying immersive technologies such as augmented reality (AR) and virtual reality (VR). These technologies bridge the gap between skilled and unskilled repair engineers by providing

them with livestreaming video, voice and real-time annotations, and insights into training manuals so that they have all the required information to perform required maintenance services at any point in time.

### Additional Benefits of Adopting a PdM Model

To appreciate the financial and operational benefits the PdM model can bring, organizations need to weigh the cost of unplanned downtime within their production facilities. Studies suggest that unplanned downtime as a percentage of scheduled runtime can be as high as 6%. A multimillion-dollar investment in new plants, facilities and equipment can create enormous pressure for a manufacturer to get it right in terms of cost, deadlines and return on investment (ROI). Unplanned downtime can drastically reduce ROI by causing disruptions in quality, cost and cycle time. So, it is increasingly important for companies to consider adopting a sound maintenance strategy for their plants and facilities.



PdM has numerous other benefits in addition to predicting machine downtime.

Every opportunity presents challenges; in the case of PdM, that challenge is IT infrastructure. Companies that want to deploy a PdM solution successfully must be prepared to address IT issues, such as the need for:

- 1. Appropriate IT infrastructure** — The results of a survey conducted by Protiviti in partnership with North Carolina State University's ERM Initiative show that many organizations in the manufacturing sector still operate on legacy IT infrastructure and lack technological innovation when it comes to factory operations.<sup>1</sup> Since the first step of any PdM strategy requires the collection of meaningful data through sensors, it is important for organizations to have appropriate IT infrastructure that supports the collection, processing and storage of large amounts of data.
- 2. Enterprise resource planning (ERP) system capabilities** — A sound ERP system allows manufacturers to monitor manufacturing processes, including equipment conditions, and analyze any non-business-as-usual changes. Manufacturers can also use an ERP system that is built for the digital era to facilitate the scheduling of maintenance services well in advance, so they can minimize unplanned downtime.

- 3. Data security** — A PdM model revolves around collecting and storing sensitive data, which needs to be shared with the management team involved in decision-making. That can create a risk to the security of strategic company information, such as details about a production process, quantity, methodology, and so on. The secure storage and sharing of this data are of prime importance in protecting the manufacturer's interests.

Despite these technological roadblocks, it is likely many manufacturers will find that the financial and operational benefits of PdM outweigh the challenges they may face in implementing a well-thought-out program.

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<sup>1</sup> *Executive Perspectives on Top Risks 2019 – Key Issues Being Discussed in the Boardroom and C-Suite*, the annual global survey of board members and executives conducted by North Carolina State University's ERM Initiative and Protiviti: [www.protiviti.com/toprisks](http://www.protiviti.com/toprisks).

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