

An aerial photograph of a port area with a network overlay. The overlay consists of a grid of white lines connecting various nodes, with several circular icons representing different technologies: a satellite, a smartphone, a Wi-Fi signal, and a truck. The background shows a city skyline and a body of water.

The industrial IoT can monitor critical machinery

Measurement can change behavior, lead to new business models

By Dan Yarmoluk

For quite some time now, industrial engineers have leveraged connected computing advances to help manufacturing facilities run more efficiently. However, the industrial internet of things (IIoT) is expanding manufacturing automation even further by connecting industrial systems to make automation smarter. This will help ensure critical machinery is up and running and is reliable, minimizing costs, maximizing productivity and moving the enterprise toward predictive maintenance.

The main goal of every business is to provide a product or service to a customer. And if you can provide a better product or service, you can provide more value to your customer.

By adding connected capability, you can provide your workforce with alerts that tell employees to service, replace or repair equipment, preventing costly downtime or high maintenance costs for pumps, valves and filters. The internet of things (IoT) is not only up in the cloud, as the power of data and analytics can be delivered right to a smartphone in an operator's or owner's hand, changing how business is done forever.

Think big, start small

It's important to think big but start small. Identify the products or bad actors that are high enough in value or have high enough maintenance costs to warrant the costs of "connecting" them to inform the broader group of requisite people about their health and service schedule.

Consider pumps, water meters and industrial valves. These products may be remote or located on the shop floor or manufacturing plant. It is clear that connected remote products and assets provide optimized route schedules and reduce lengthy downtime, but products in the factory or shop floor can connect beyond the local operator to the supervisor or local maintenance technician.

For example, data could help manag-

ers assign tasks to drivers to ensure that they take the most efficient route. Sensors also allow managers to monitor the location of trucks to reduce congestion in the warehouse and prevent violation of safety rules, such as speed limits.

Focus on improving customer service through measurement or monitoring your product and acting on that data – you want to change behaviors, not conduct a science experiment. For example, sensors can alert you if there's a problem on a piece of equipment, giving you time to address it before it shuts down your entire operations for the day. The timely alert ensures that your customer order is completed on deadline.

Convince your leadership and employees that this is to improve customer retention and differentiation, not to replace field, service or factory employees. When you embrace change, it is not just noise, but exciting and meaningful.

The IoT technology stack historically has come from the global proliferation of smartphones. The billions of units have commoditized all the relevant components of this minicomputer in

your hand, from processors to cameras to sensors. These sensors have been repurposed and designed into "connected things."

IoT is further enabled by cheap computing power and storage through what we call cloud infrastructure. It has been stated that today an African chief has more computing power in his pocket than the entire White House during President Bill Clinton's two terms.

Sensors emit data to the cloud, and reporting, data analysis and applications are pulled to produce meaningful information. That information, in turn, should be used to influence human behavior (such as driving route optimization or maintenance scheduling) to optimize business performance. The enabling technology should create specific, measurable action, not conduct a science experiment. Figure 1 details a schematic of the IoT technology stack.

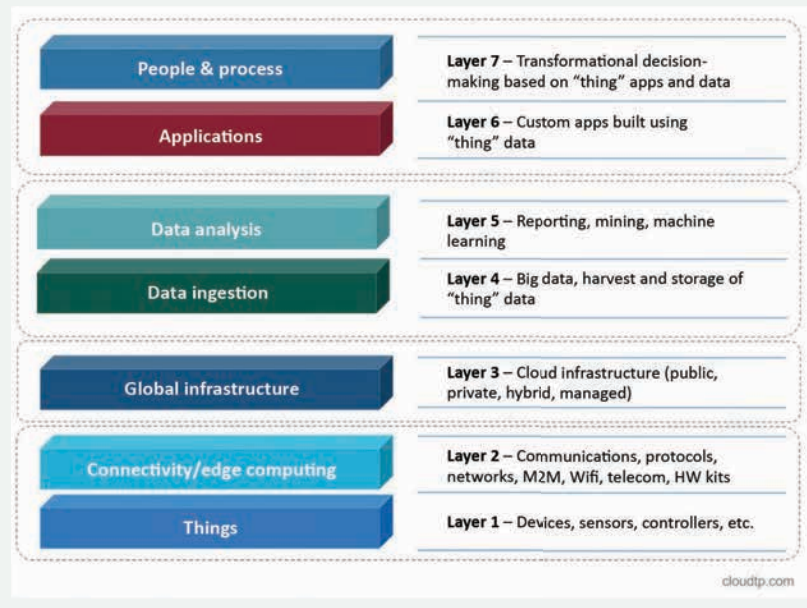
Taking advantage of the IIoT

Many systems within a manufacturing plant are intranet connected. However, much of the data collected from those

FIGURE 1

Building a technology stack

The seven layers of the internet of things



First, many different critical operations can be monitored to reduce downtime on a factory floor. Second, these critical operations generally are so big that the monitoring cannot be done efficiently by visual inspection only. By monitoring several machines all on one dashboard, all parts of a factory can be seen together on one screen.

Pumps are the lifeblood of many industrial processes. Without pumps operating at their peak, valuable production capacity is lost. Continued wear and tear can lead to unexpected downtime. Monitoring industrial pumps or smart pumping systems for cycles completed, unexpected vibration or high temperatures can indicate unusual operating conditions that could foretell a problem. This allows for a service technician to be sent before the operation is shut down completely.

Especially in motors and other manufacturing machinery, measuring vibration can be a strong indicator of an upcoming problem. As the vibration in devices continues to grow stronger, it can mean that a device is dangerously close to failure. Catching this change early enough in the process means that a service technician can be dispatched to the site to fix the problem before a complete breakdown.

Fluid and flow also are important to many industrial processes. A pressure drop across a valve could indicate a ruptured seal, while a pressure increase could signal a blocked filter. A higher temperature could mean a problem somewhere in the production process. Having these data points means that a problem can be solved before there is a loss of quality in your products or a shut-down on your factory floor.

Temperature and humidity can mean many different things for different applications. Perhaps food ingredient supplies will spoil if above a certain temperature. Maybe crops will grow mold if the environment gets too humid. A motor will stop functioning if it gets too hot. Throughout all of these scenarios, IIoT



assets can gather this data and alert your workforce to a problem through preset parameters.

New business models will abound

With the IIoT, there is an extension far greater from being a good partner or vendor to tying business value to measurable-based performance outcomes.

Theodore Levitt, an American economist and former professor at Harvard Business School, captures this concept in his quote, “People don’t want a quarter-inch drill. They want a quarter-inch hole.” As speaker, author and blogger Joseph Barkai wrote in his recent book *The Outcome Economy*, companies create value not just by selling products and services but by delivering complete solutions that produce quantifiable business outcomes for customers.

It’s important to note that the value of the IoT does not come from connected devices, but rather from the ability to extract, mine, organize and influence action from the information stemming from connected device data. The rubber

will hit the road for all the companies designing expensive technology solutions that don’t deliver concrete results. The ones that succeed will create new billion-dollar entities. Organizations will be able to argue their value statistically, offering data to back up previously empty slogans like “I guarantee it.”

New business models will emerge because of the outcome-based approach to doing business. We already see the subscription and membership economy becoming a dominant model and the Holy Grail in terms of recurring revenue with companies like Netflix. Software as a service (SaaS) is morphing into things like sensor as a service (SeaS).

For scrappy independent business owners, considering this shifting landscape and embracing it could lead to significant gains and huge disruptions in their industry. ❖

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