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Leadership for Reliability

# How Smart Connected Assets

Will Impact Your

## Uptime Elements



by Dan Miklovic



Smart connected assets are going to change the way people view asset performance management

Whether you call it the Internet of Things (IoT) or the Industrial Internet of Things (IIoT), the simple fact is everyone is talking about the technological shift taking place today that is creating previously unimagined connectivity between myriad of devices. Many say IIoT isn't actually new, as sensors have talked to controllers and other systems for decades and maintenance technicians have used tablets for at least 15 years. However, there is a different viewpoint, which this article explores.

It's true that manufacturing has long had connected devices and it's also true that there have been plant networks for just as long. Manufacturers and field service organizations, in particular, were early adopters of mobility solutions, though there are some fundamental differences today than in the past.

There is the simultaneous convergence of the aspects of connectivity, embedded computing, wireless technology, the Cloud, and big data and predictive analytics that presents something completely new. If you consider IIoT as representative of the convergence of wireless, universal connectivity and embedded computing, then when you add in the Cloud and big data with analytics, you end up with smart connected operations and the plant level equipment that supports that environment. This is referred to as smart connected assets.

Smart connected assets are going to change the way people view asset performance management (APM). As smart connected assets become more prevalent, you will see a whole new range of business models emerge, from selling reliability focused predictive analytics services to business processes and from outsourcing of maintenance activities to ultimately selling capacity instead of capital. These views are echoed by a number of industry luminaries, including GE CEO Jeff Immelt and Harvard Business School's Michael Porter.

## Framing APM and Reliability With the Uptime Elements Model

The Uptime Elements model of *Uptime* magazine and Reliabilityweb.com is one of the more widely accepted models of how to frame the activities associated with APM and reliability. If you want to understand where smart connected assets will impact your own operations, one assessment method is to use the Uptime Elements model and consider each activity and how smart connected assets play into that element.

At the center of the Uptime Elements model are asset condition management (ACM) and work execution management (WEM). Let's take a look at how smart connected assets will impact each.

## Asset Condition Management

Today, a large percentage of ACM activities are performed using off-line, batch type processes, such as oil analysis, thermography, ultrasound testing, vibration analysis and other non-destructive testing. Asset condition data collection can be either online and in real time or, like other tools in ACM, off-line and batch oriented. As smart connected assets start to proliferate, many of the

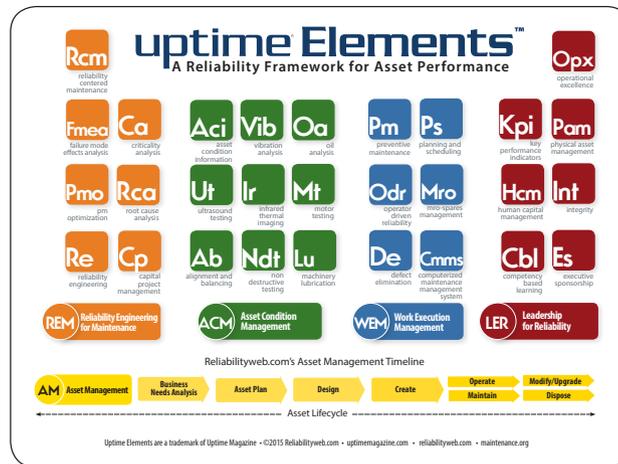
measurements taken today by operators or inspectors making rounds will be available in real time. Even when information is still collected by humans performing inspections, the capture of the data and its uploading into systems that make real-time use for predictive analytics will change the way the data is used.

When measurements are actually made instead of just moving on to the next device, a real-time predictive engine may return a request for further data collection to better define the reliability risk. It may make a recommendation of how to change the operational profile to reduce the risk or even suggest some remedial maintenance action on the spot to reduce failure risk. This type of predictive capability will depend extensively on real-time

data collected via the IIoT, as well as big data and predictive analytics delivered either locally or via a cloud service based on equipment class, location and access to communications.

## Work Execution Management

It may seem at first that smart connected assets will not have substantial impact on work execution management activities, but the opposite is actually true. Almost every element in the WEM area will see changes brought on by the growth of predictive analytics and greater mobility of the workers actually servicing the equipment.



## SMART CONNECTED ASSETS

Converged Sensors, Instrumentation, Controls, and Assets

### AWARE OF AND CAN REACT TO:

- Design and Configuration
- Internal and External Operating Conditions
- Past Performance
- Predicted Future Failure
- MRO Inventory (Internal and External)
- Raw Material
- Supplier Performance
- Customer Requirements
- Environmental Impact

REAL TIME → PREDICTIVE → AUTONOMOUS





Perhaps the greatest impact will be the advent of new maintenance services by original equipment manufacturers (OEMs), ranging from predictive analytics that notify end users when to schedule and perform maintenance to full business process outsourcing of the servicing of process equipment. This will change the scheduling and reporting functions to those of coordination and contract management. In this scenario, parts management also changes from owner to service provider managed.

Even in a scenario where the OEM is not providing enhanced services, smart connected assets will definitely change many of the WEM functions. Using the richer data, preventive maintenance will be more precise, spares can be better managed with more accurate service forecasts and defect elim-

ure mode and effects analysis (FMEA) and FMECA less of a human intensive, batch oriented process and more automation enabled. Even capital project management will change in a smart connected asset world as some OEMs opt to sell capacity instead of capital.

To draw an analogy to a different industry sector altogether, the manufacturing facility of the future may be more like the film industry today than the pre-World War II years of Hollywood. In that era, giant studios controlled every aspect of making a movie, whereas today, movies are made through loose and fluid associations of producers, directors and other specialists who all converge to accomplish a task and sell their services rather than being specific studio employees.

This model could well be the way factories of the future operate, where OEMs sell "holes" instead of drills and bits, adhesive applicator OEMs sell joints instead of machines, and so on. This will ultimately alter how we look at capital investment and, consequentially, change the whole project management paradigm.

## OPERATIONAL EXCELLENCE SUPPORT



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Fall short on any pillar and your OpEx platform becomes tippy

Fall short on two or more pillars and your OpEx platform becomes totally unstable

© LNS Research

ination will be enhanced with greater details on performance-related issues. Operator driven reliability will also change as operators gain greater visibility into actual machine performance with data instead of just their observations.

Looking beyond these core elements are the process and leadership aspects of reliability engineering for maintenance and the leadership for reliability activities. Much of APM has been focused on the technology, but the convergence of people, processes and technology is the way to truly reap the benefits from APM, and the Uptime Elements model does an excellent job of capturing this. Taking a look at each area, you will see smart connected assets as having a substantial impact.

### Reliability Engineering for Maintenance

In the REM arena, as with operator related reliability, smart connected assets enable engineers to have much better information to make RCM related decisions, particularly root cause analysis. Failure mode, effects and criticality analysis (FMECA) also will be enhanced in an environment that has smart connected assets, as these assets can provide information related to their configuration and position in a given process train in real time, making fail-

### Leadership for Reliability

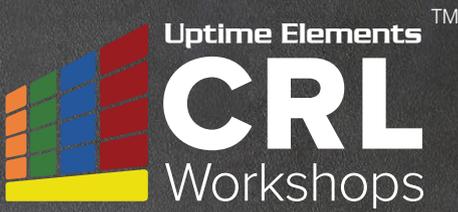
One might expect the least impact from smart connected assets in the LER sector of the Uptime Elements. While this might appear on the surface to be the case, as with WEM, nothing could be further from the truth. Starting with operational excellence (OE), smart connected assets will drive whole new levels of performance and set new definitions of what excellence actually is. Indeed, with smart connected assets ultimately capable of autonomous operation, you can expect a major upheaval in how operational excellence is defined and measured.

With APM being one of the five basic pillars of overall operational excellence, delivering on OE will be essential for organizational operational excellence. Essentially, every other area in the LER part of the Uptime Elements table will be directly impacted by smart connected assets, with the exception of executive sponsorship. Ironically, this will still remain a purely cultural issue, but the nature of that support will need to shift from just endorsing APM as a strategy to fully endorsing the investment in technology that makes APM a cornerstone of operational excellence. It requires a fundamental understanding that *healthy assets are the foundation of a healthy business* and that smart connected assets are the best path to achieving that reality.

Though there are some who contend that IIoT is merely an extension term to the connectivity that has existed in maintenance for more than a decade, others believe smart connected assets will have an impact unlike any to date in the APM space. An understanding of how this trend will affect your Uptime Elements will go a long way to helping you take advantage of what smart connected assets can offer.



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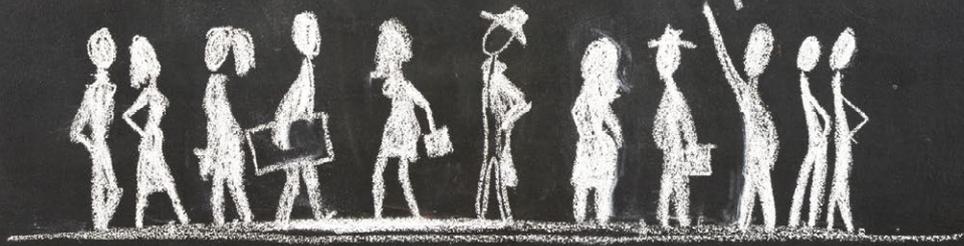


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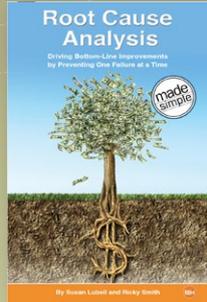
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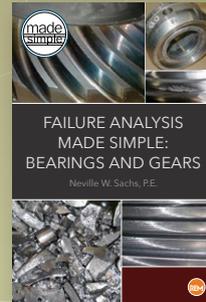
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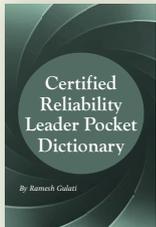


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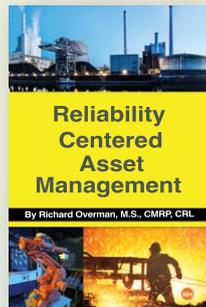
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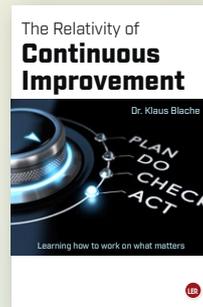
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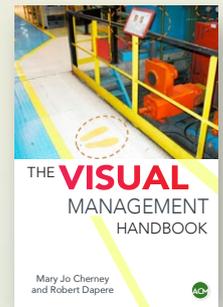
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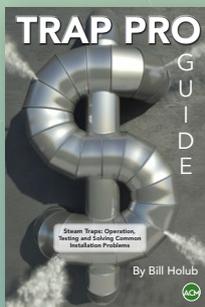


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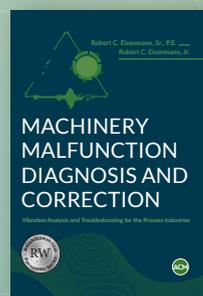


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