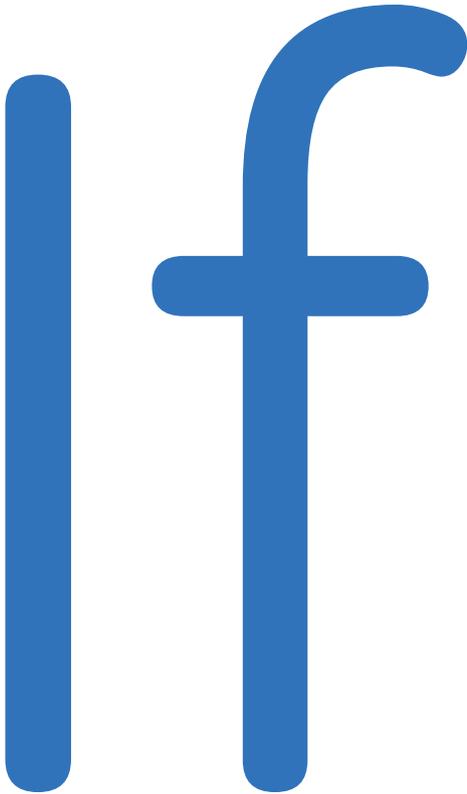# INDUSTRIAL INTERNET

Our feature story was contributed by our friends at the GE Software Center in San Ramon, California – who are dedicated to helping the Industrial Internet grow over the next decade and beyond. I look forward to publishing additional articles as the new paradigm evolves. — Editor

If

you recently picked up a copy of the *New York Times, Forbes*, the *Wall Street Journal* or any number of other publications, you've probably run across something called the Industrial Internet.

SO, WHAT IS IT?

The Industrial Internet connects machines, via embedded sensors, with advanced analytics and people at work to enable intelligent decision making. Every day, millions of machines critically important to daily life – from MRIs to gas turbines to aircraft engines – share vast amounts of information. Collecting and sifting through these bits of information unlocks new insights into how we can more efficiently and economically run our businesses, promote sustainability, and boost economies around the world.

GE is helping companies across industries tap into the powerful potential of the Industrial Internet. The GE Software Center uses agile development to create innovative next generation software-based solutions that deliver dramatically better outcomes for customers through the application of advanced analytics and machine intelligence.

With more than 30 percent of the world economy directly attributed to industrial activity, it is critically important that we can better understand and interpret the language of machines. Within the Industrial Internet, complex optimization algorithms decide tradeoffs between "the right repair at the right time," for example, and the need to avoid needless delays and cancellations.

Businesses can optimize decisions, and apply the lessons of all components to enhance performance and to react accordingly and automatically. With more than 3.2 million "big things that spin" operating in industries around the globe, the Industrial Internet is poised to dramatically increase enterprise profitability and productivity (Reference 1). Early projections for the Industrial Internet are promising.

✔ AVIATION: A reduction of 1% in jet fuel costs would save $30 billion over 5 years.

✔ ENERGY: At gas-fired power plants alone, efficiency gains driven by software and network optimization as well as more effective coordination of gas supply to meet power system load requirements would save $66 billion over 15 years.

✔ HEALTHCARE: Global healthcare systems waste at least $732 billion annually. GE Healthcare has identified $100 billion in annual savings driven by the Industrial Internet.

✔ RAIL: The Industrial Internet could reduce costs nearly 2.5%, or $5 billion a year, at rail system operations worldwide.

The GE Software Center is working with more than 10,000 software developers across GE's diverse divisions to create services and solutions for asset optimization and enterprise optimization under our GE Predictivity** Industrial Internet offerings. Think of software solutions that identify problems and issues BEFORE they occur. The goal is to increase efficiency. By predicting a machine's future through analytics, GE will help businesses eliminate downtime and reduce waste. The analytical data could even help develop better ways to use GE's industrial products.

Complex systems can generate vast quantities of data about themselves. But sheer data is a latent commodity. Organizations able to mine data, understand context, and get information to the right person at the right time can make intelligent decisions in real-time vs. after the fact. This creates a tremendous advantage in fiercely competitive markets. Doing so requires deep proficiency in the science of data analytics.

GE Software specializes in the creation of tools to analyze data generated by complex systems found in domains such as transportation, health sciences, and energy. These tools enable customers to maximize profits by minimizing operational costs and downtime for repair and maintenance. Airplanes only earn revenue when they fly, and they only fly when engines are in top shape. The same is true for railroads and their locomotives, health systems and their imaging and diagnostic equipment, and energy producers with their turbines.

GE Software's unique combination of industrial expertise, software experts, and historical perspective is delivering the next chapter of the Internet's evolution.

BENTLY NEVADA TRANSDUCERS AND MONITOR SYSTEMS HELP TO MAKE MACHINES "INTELLIGENT," SO THEY CAN SEND CONDITION MONITORING DATA TO BE ANALYZED.

Bently Nevada: At the Center of the Industrial Internet

The work being done and the data generated by Bently Nevada are "natural resources" that will power the Industrial Internet.

The Industrial Internet is bringing vibration data and diagnostics to the experts, instead of the experts going to the data. Historically, vibration data needed to be "reduced" and evaluated on-site by a diagnostic expert – first with oscilloscope cameras and later with FM tape recorders, vibration analyzers and x-y plotters.

As analog instrumentation was replaced with digital systems, the data facilitated the use of software analytics. And with the Industrial Internet, we are now able to take that vibration data to the experts who reside in Bently Nevada Remote Monitoring Centers or at our customers' own centralized locations.

But, how can System 1* data be mined and presented in an automated fashion that puts the intelligence directly in the hands of customers in a usable fashion to better serve their need to optimize plant production, and reduce maintenance costs?

Enter the Industrial Internet.

The mechanical vibration of gas turbines can be measured and analyzed to predict maintenance issues before a failure occurs. By collecting data across a significant population of machines, we can provide new insights that will enable condition-based maintenance and optimize outcomes. Software engineers can identify patterns and correlations in machine behavior through big data analysis, convert the data into actionable insight, and proactively alert customers when repairs need to be made – eliminating unscheduled maintenance, maximizing uptime, and preserving respect for the GE brand.

The Industrial Internet is changing the way we manage and maximize global economic output. For the first time in human history, vitally important machines across the globe are communicating their activities in real time. Combining these brilliant machines with best in class analytics delivers valuable new customer insights that were never before possible.

Fulfilling the promise of the Industrial Internet requires a robust ecosystem of software, hardware, and service providers. GE's Industrial Internet efforts are spearheaded by the GE Software Center but cannot be successful without visionary partners such as the Bently Nevada team. ■

References

1. Industrial Internet: Pushing the Boundaries of Minds and Machines white paper by Peter C Evans and Marco Annunziata. This paper is available online for viewing and download: **http://www.ge.com/ sites/default/files/Industrial_Internet.pdf**

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