

GE Predictivity Solutions Deliver Industrial Internet Benefits

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Summary

The Industrial Internet promises to improve performance by enabling physical assets and products to be connected with powerful new software systems. Anticipated benefits run the gamut from improvements in operat-

GE recently briefed ARC about its Predictivity Solutions and Predix platform for the Industrial Internet. This ARC View provides an overview and analysis for readers in the industrial space who want to learn more about existing solutions that can help them realize increased value from the Industrial Internet.

ing performance or asset uptime to complete transformation of existing business models. ARC Advisory Group believes that the Industrial Internet will have a major impact on industry in coming years. The needed technologies are available today and no substantial technological breakthroughs are required. Indeed, some solutions are already being used in industry. What's lacking is broad recognition of what is possible

with big data analytics. However, early adopters will reap first-mover competitive advantage.

GE recently briefed ARC about some of its technology and plans for the Industrial Internet. The company is creating a set of solutions based on a common underlying architecture, functionality for specific use cases, and existing products to help industrial companies take advantage of this new development. The company calls its common Industrial Internet platform *Predix*, and the industry-focused solutions *Predictivity Solutions*. These solutions include functionality to help optimize assets and operations across a wide range of industrial sectors.

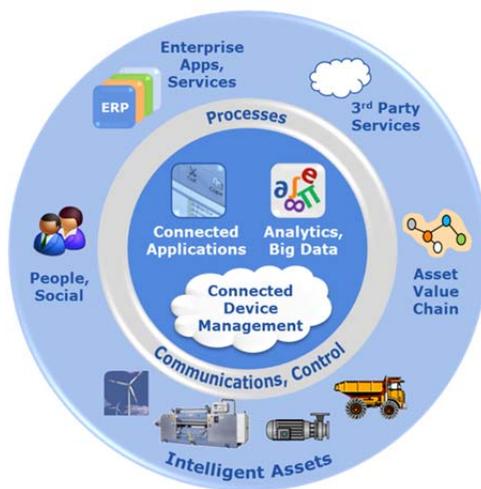


A Solid Footing

GE has a broad portfolio and large installed base in a number of vertical industries. These include solutions for the aviation, oil & gas, healthcare, wind, transportation/rail, power generation, power distribution, mining, food & beverage, and water & process technology sectors. GE has well-established solutions in each of these verticals, focused organizational coverage, and a solid customer base. The company has become a leading voice in evangelizing its vision for the “Industrial Internet,” which closely parallels ARC’s own vision for the industrial Internet of Things (IIoT). ARC has observed that this is driving substantial changes throughout GE’s organization and product portfolio. One observable change is the growth of GE Software, focused on developing building blocks for the Industrial Internet.

Architecting the Future

GE is revamping its portfolio of software solutions to help customers in key segments derive increased value from the Industrial Internet. These solutions,



Industrial Internet of Things

known as GE Predictivity Solutions, will take advantage of a common architecture for machine connectivity, analytics, and user experience. GE Software’s common Predix platform for the Industrial Internet will ultimately underpin Predictivity solutions offered by GE Aviation, GE Energy Management, GE Healthcare, GE Oil & Gas, GE Power & Water, and GE Transportation.

The Predix platform provides for distributed computing, big data analytics, asset data management, machine-to-machine communication, and mobility. It includes capabilities for machine-level intelligence and communications, private and public cloud based connectivity, asset data management and analytics, integration with legacy IT systems,

process execution, and a modern user interface for mobile and desktop use. The Predix platform is currently available exclusively through Predictivity solutions.

Predictivity Solutions

GE Predictivity solutions can help companies optimize their assets by enabling higher reliability, better asset performance, longer asset life, and enhanced safety. They can also help companies optimize operating per-

formance, reduce downtime, improve decision making, and manage risk. An increasing number of Predix-powered Predictivity solutions enable industrial companies to deploy large-scale analytics, connect machines, data, and people, and improve asset and operating performance.

Here is a sampling, by industry, of some currently available Predictivity solutions and potential associated benefits:

Oil & Gas Upstream

Health Monitoring of Blow-Out Preventer (BOP) Stacks

- Description: Real-time monitoring and analytics of BOP stacks; alert for immediate maintenance requirement.

- Benefit: Prevent costly environment- and brand-damaging spills.



Connecting machines, data and people

GE's Predix Powers Predictivity Solutions

Well Monitoring and Optimization

- Description: Real-time well analytics and remote controls.
- Benefit: Improve and optimize well production, reduce repair costs, and minimize lost production.

LNG Turbine Engine Condition Monitoring

- Description: Advanced sensors, predictive analytics, and expertise from diagnostics engineers drive

highly reliable turbine engines toward no unplanned downtime.

- Benefit: Avoid costly startup and shutdown, avoid unplanned outages.

Power Generation

Gas Turbine Monitoring

- Description: For HD F-Class and HD B/E-Class Turbines - 100 physical sensors and 300 virtual sensors. Physics-based algorithms provide early warning of more than 60 different failure mechanisms.
- Benefit: Early detection while decreasing false alarms; Root-cause analysis pinpoint issue with accuracy; Scheduled-only maintenance

supports continuous operation and efficient fuel usage; Ability to scale power on demand to meet peak requirements; Asset life extension with early warning for maintenance management.

Power Distribution

Meter Monitoring and Analysis

- Description: Theft analytics combine alert correlation and load analytics; Meter installation issues and meter malfunctions are identified.
- Benefit: Revenue protection.

Wind Power

Wind Farm Power Optimization

- Description: With data from all farm units, fine tune a wind turbine's operation and help enhance its energy production: speed, torque, pitch, yaw, aerodynamics, turbine controls.
- Benefit: Up to 5 percent increased annual energy output, resulting in higher return on investment.

Mining

Mine Performance Optimization

- Description: Monitor hundreds of thousands of sensors from thousands of assets. Generate actionable notifications to better control the entire process.
- Benefit: Avoid tens of millions of dollars in annual cost by improving efficiency and reducing equipment damage.

Manufacturing

Food Safety Assurance

- Description: Provides visualization of food safety key performance indicators (KPIs) based on common CCPs/CQPs; Provides critical alarm information on food safety KPIs. Prioritizes the most critical problems & allows users to take and document action; provides eSOPs for performing HACCP challenges and quality sampling with digitized reporting. Track & trace raw material lots; Integrates raw ingredient info into the production process in real-time. Reporting for retail/customer quality requirements. Single, unifying view into food safety, quality, and operational performance.
- Benefit: Greater resource allocation management; production done correctly and more efficiently; reduce sampling costs on processed goods;

decreased cost of goods sold; minimize recall costs; lower overall plant operations costs; better compliance and HACCP/HARPC management; reduced downtime to yield increased throughput; reduced rework and raw material consumption; minimized impact of equipment failures.

Water and Chemical Processing

Water & Process Insight

- Description: For municipal, utility, and desalinization plants; for industrial wastewater, ingredient water, and measurement solutions; and for process chemicals and separations: Provide 24/7 remote monitoring, alarming, visualization, diagnostics, prognostics, and reporting.
- Benefit: Improved safety and compliance, improved production operations, reduced interruptions in production, increased environmental effectiveness, improved plant performance.

Healthcare

Healthcare Mobile Assets and Patient Flow Management

- Description: Monitor and manage patient flow through the healthcare experience via sensors and location data collection. Improve operational use of healthcare mobile assets by tagging and tracking with machine sensors.
- Benefit: Improve patient experience with faster treatment and increased mobile asset availability; Reduce capital expenditures through improved knowledge of asset location and more efficient management.

Aviation

Fuel Management; Aircraft Engine Monitoring

- Description: Improve fuel efficiencies by examining collected aircraft performance and flight path performance data. Collect engine sensor data and apply analytics for early identification of component issues for proactive maintenance.
- Benefit: Improve fuel efficiencies up to 2 percent, creating competitive advantage for customers; Avoid unplanned equipment events by understanding when components are about to fail.

Transportation

Locomotive Maintenance, Trip Optimization

- Description: Manage locomotive maintenance to proactively identify potentially failing components toward no unplanned downtime. Use

sensors, load weight and analytics to guide locomotive movement for maximum fuel efficiencies and safety.

- Benefit: Improved network velocity and capacity; Greater fuel efficiencies; Reduced unplanned events to optimize locomotive uptime.

Conclusion

Industrial companies are just beginning to embrace the idea of connecting assets and products to powerful new software. They are learning how to use the emerging technology to transform their business. At the same time, they may hesitate because of concerns about choosing the right technology or future technology developments. GE Predictivity Solutions based on Predix can help jumpstart the process and deliver the benefits of the Industrial Internet, while putting companies on a solid technology roadmap.

ARC believes that the Industrial Internet will have a major impact on industry in coming years and has embarked on a series of research projects in this area. We often hear the question, "What other companies are already doing this?" As leading companies deploy Predictivity Solutions and other Industrial Internet of Things solutions, we think they will showcase the technology's possibilities and benefits, helping expand the market.

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