

GE

In search of a truly
connected world



Lennart Christensson GE Intelligent Platforms
Industrial Internet
OPC and MES Day Finland 2014

Introduction to the Industrial Internet... The Next Industrial Revolution:

[Watch YouTube Video](#)

Market dynamics

In the next five years ...

40%

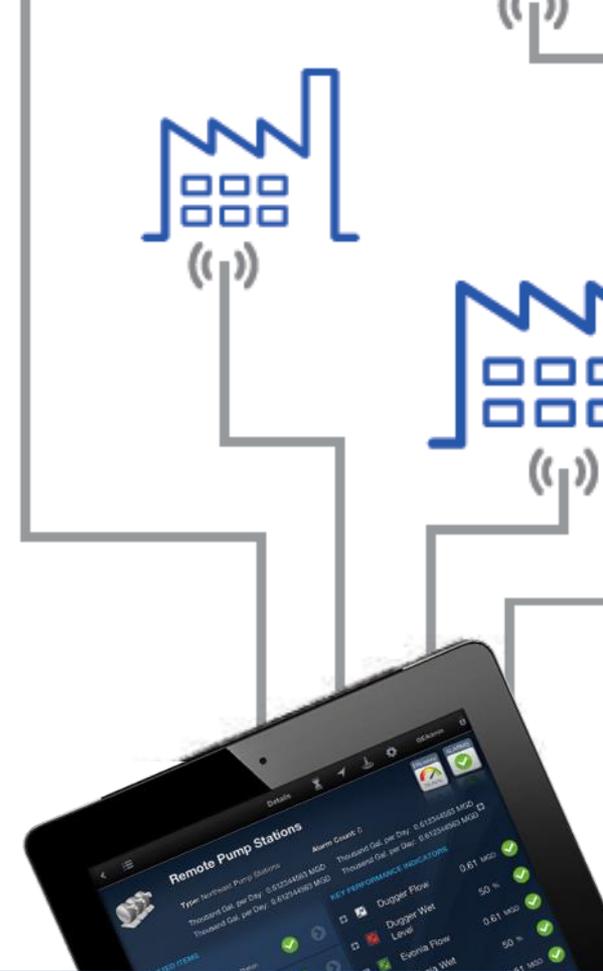
of skilled manufacturing workers will retire¹

50b

machines will connect to the Internet²

#1

priority of CIOs is to drive more business insight³



A new generation of workers expects answers at their fingertips



Sources: 1. Wall Street Journal, 11/2/11; 2. More than 50 billion connected devices, ERICSSON, 2011; 3. The Essential CIO, IBM, 2011

Enabling technologies

SOFTWARE

The integration of traditional industries and IT technology reshapes the competitive landscape ...

Examples
Amazon,
Trip Advisor



CONSUMER ELECTRONICS

New levels of computing power and networking enable solutions that are more accessible, simple, and powerful

Examples
Smartphones
Navigation systems
Home electronics



CONNECTIVITY

Secure, trusted and high-performance connectivity on public networks

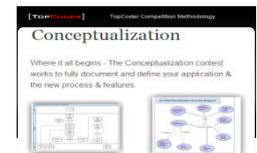
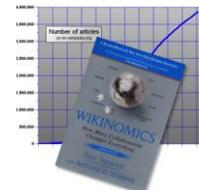
Examples
Skype,
CrashPlan



COLLABORATION FRAMEWORKS

Cloud-based platforms provide faster routes to solutions, higher quality content & better manageability than traditional equivalents ... with better financials for all

Examples: Wikipedia, Salesforce, Topcoder



GE's Industrial Internet vision

“I always think about what's next. The ability in our world to go man-to-machine, to marry real-time customer data with real-time performance data of our products... that is the holy grail.”

- *Jeffrey Immelt, GE*

CEO



The Industrial Internet at GE

>5,000

Using data to improve products

>3,000

field engineers using the data to solve problems

>1,000

Monitoring data

PEOPLE

>12PB

of data from every machine built or retrofitted since 1960

>5TB

of machine data collected every day

>800

new developers working on insights and visualization

DATA

>7000

GE gas turbines

>15,000

GE locomotives

>25,000

GE aircraft engines

MACHINES

The Industrial Internet

1



Brilliant Machines

Connect the world's machines, facilities, fleets and networks with advanced sensors, controls and software applications

2



Data + Analytics

Combines the power of physics-based analytics, noise reduction techniques, predictive algorithms, and deep domain expertise

3



People at Work

Connecting people at work, any place, any time & any for intelligent operations

Decreasing time to insight.....

GE Intelligent Platforms gets you connected



Connecte
d
Machines

**Digital
connection
at the
source**

Connecte
d
Data

**Islands of
information
aggregated**

Connecte
d
Insights

**Analytics
in real-
time**

Connecte
d
People

**Cloud-based,
Mobile
access,
Collaboration**

GE Intelligent Platforms Industrial M&D – Monitoring and Diagnostics Performance & Reliability Center

Improving the performance of critical assets

Our experienced equipment and software engineers monitor 4000+ assets,
7 days/week more than 70 sites globally in Mining, Oil & Gas, Power Generation, and Aviation

Each month:

3000 customer advisories

500 cases

200 catches



Air Heater

Blower

Chiller System

Compressor

Condenser

Cooling Tower

Engine

Fan

FCC

Feedwater Heater

Gas Turbine

Gearbox

Generator

Heat Exchanger

HRSG

Incinerator

Jet Engine

Level Control Valve

Mill

Motor

Pulverizer

Pump

Steam Turbine

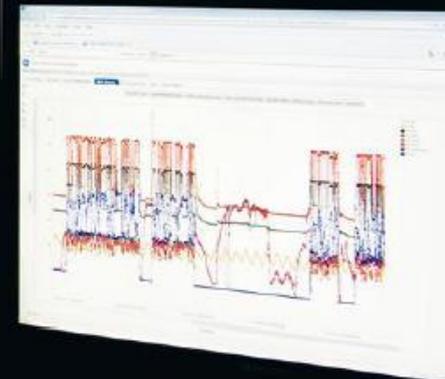
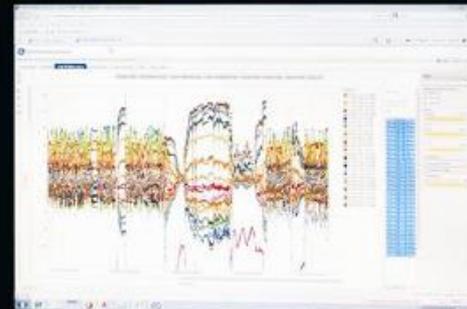
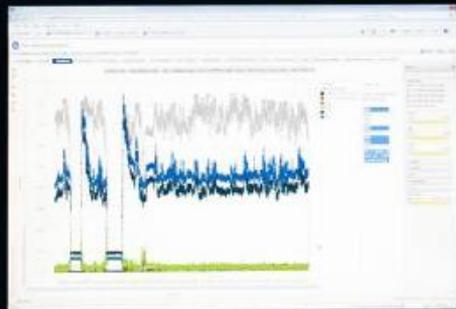
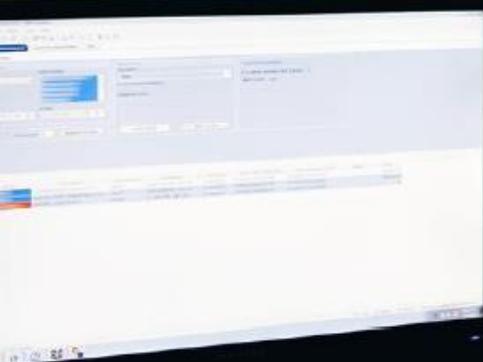
Tower

Transformer

TRVL Screen

GE M&D Center Big Data and Analytics

Turning fleet knowledge into action – 24x7 Global Operation



M&D is enabling the Industrial Internet

As one of the world's largest OEMs, we are actively applying Remote Monitoring & Diagnostics (RM&D) technology ourselves to better serve our end customers and deliver on the promises of the Industrial Internet.

Examples:



GE Oil & Gas FieldVantage

Provides visibility into status of electro submersible pumps for lifting and pumping, and monitors asset health information to enable predictive maintenance.



GE Aviation myEngines

Tracks engine parts and communicates real-time to GE and airlines to manage engine fleets and improve productivity



GE Digital Energy Grid IQ SaaS

Fee-for-service model enables utilities to monitor, manage and control their grid via a cloud-based system



The “Appliances Model”

Making the Industrial Internet REAL for our customers



An “appliance” is a pre-engineered and pre-built solution for a specific problem that dramatically reduces the engineering costs (NPI, requisition, commissioning) and risks for customers.

Bernie Anger, GM Intelligent Platforms



Equipment manufacturer challenges

OEMs need data to differentiate & improve profitability

Improving asset uptime



I need to improve visibility into installed equipment performance

How can I improve asset availability?

Can I leverage maintenance insight to optimize equipment?

Share information & Enhancing customer experience



How can I schedule downtime & improve time-to-serve?

How can I increase my share of retrofit/repeat business?

What else can I do to differentiate from my competition?

Growing services revenues



I need to sell new monitoring & preventative maintenance services contracts

I want to capture increased parts and repair revenue

How can I expand to cover my competitors' installed base?

Reducing cost-to-serve



I need to reduce compliance & warranty risk

How can I improve services capacity utilization and reduce "windshield time"?

I want to reduce software development & maintenance overhead costs



THE EQUIPMENT INSIGHT SOLUTION, FROM GE PREDICTIVITY™

**Your machines create millions of
data points ... every day.**

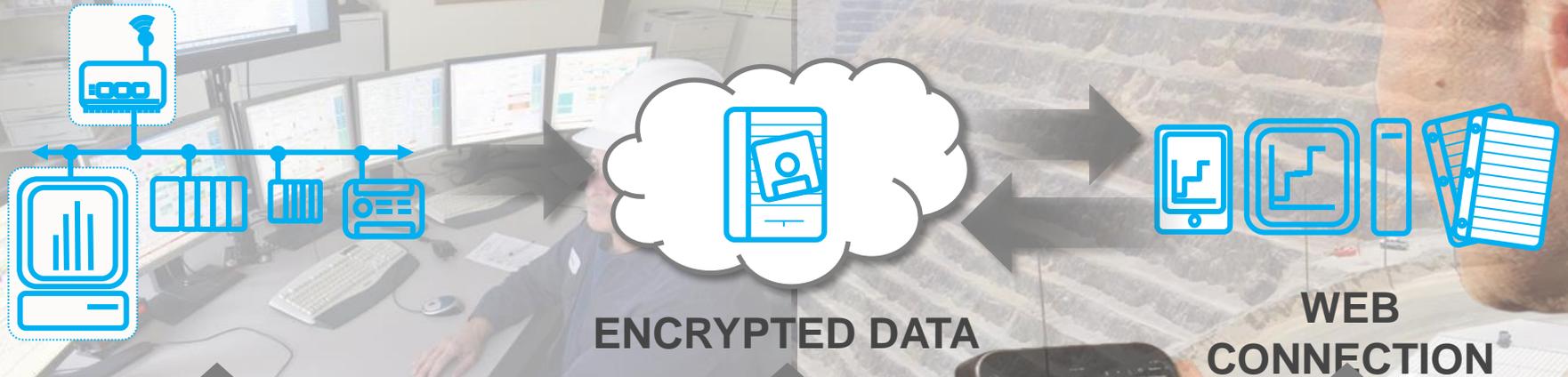
**Are you making the most of
them?**

Let GE's Equipment Insight solution help your
business grow.

Equipment Insight, from GE Predictivity™

Turn your data into actionable information

Powered by GE's leading Proficy* software and rugged RXi IPCs



Data collection

Machine data collection uses encryption and firewall friendly communications to send data to the Equipment Insight historian.



Data analytics

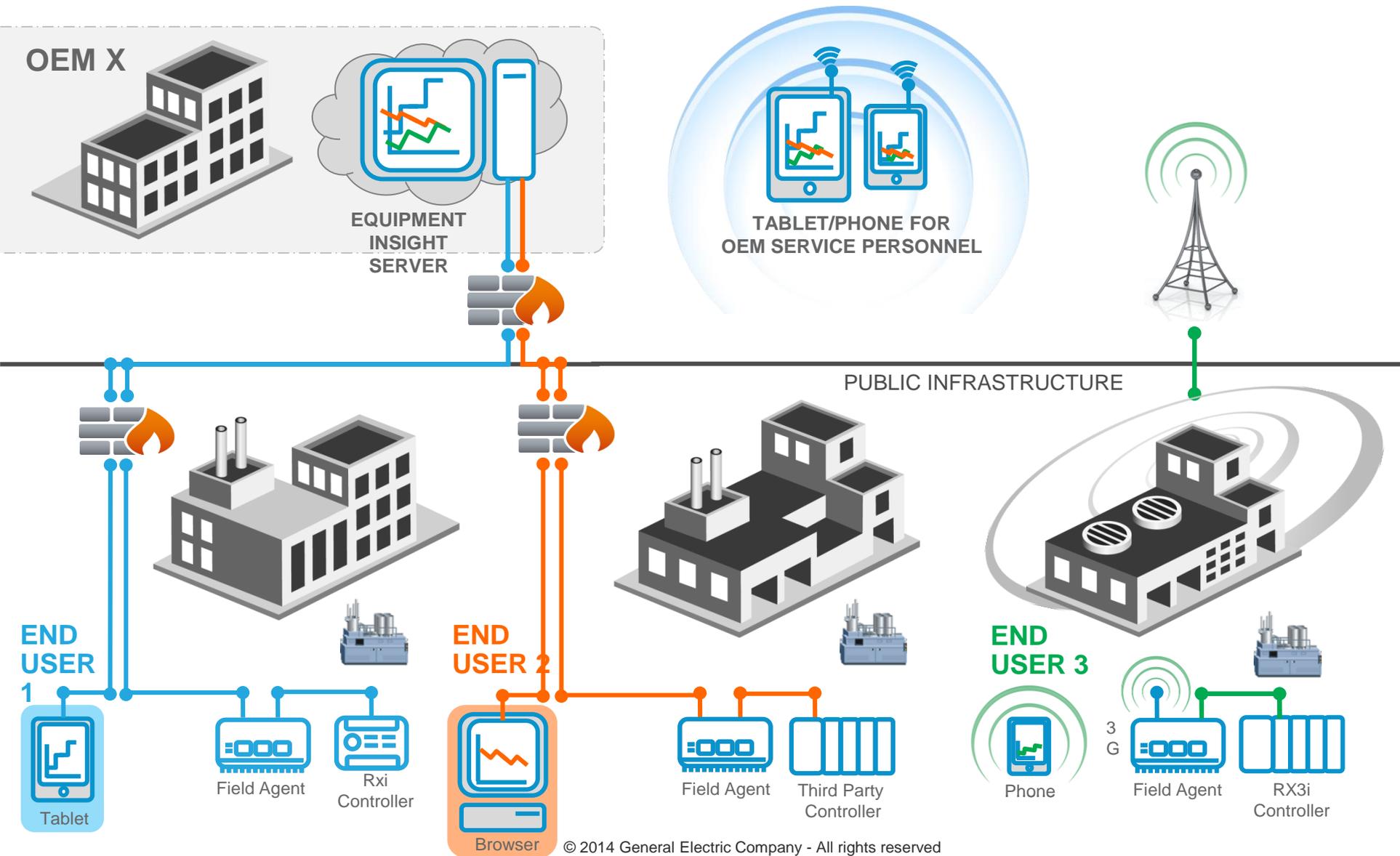
Data analytics enable prediction of downtime events so customers can be contacted before their process goes down.

Role-based geo intelligence

Get the right information to the right person, wherever they are, on any device.

How Equipment Insight works

Cloud-based mobility available anytime, anywhere



GE IP Monitoring Service for Predictive Maintenance

Optional add on to Equipment Insight Proficiency Smart Signal from GE IP

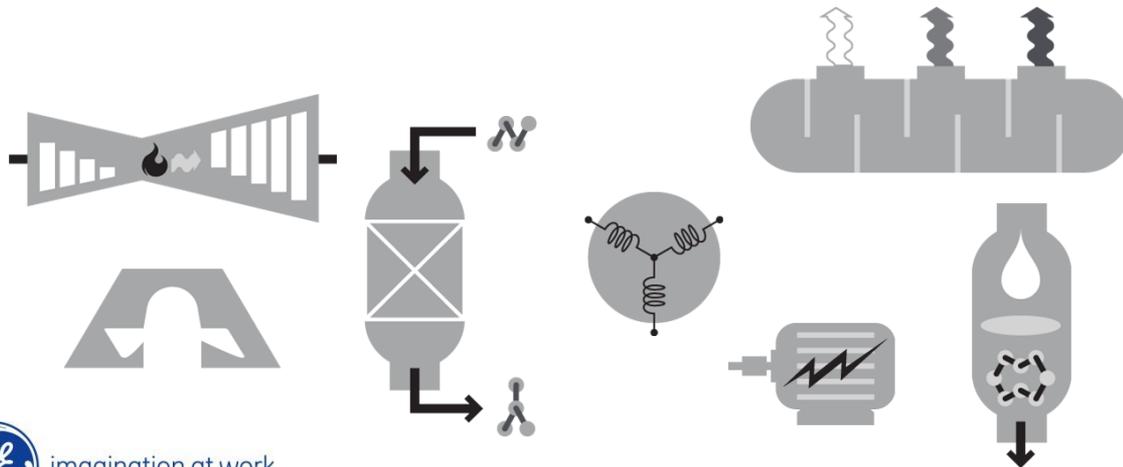
Any Equipment, Any OEM

The most comprehensive coverage of Assets.

Rotating Equipment. Processing Equipment.

Upstream Assets. Downstream Assets.

Any Equipment. Any OEM.

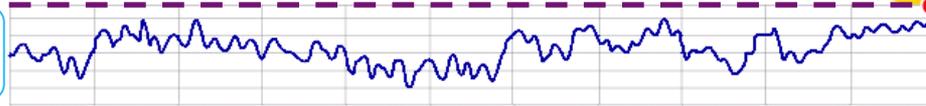


Similarity Based Modeling Solves Customer Problems

Stand-alone equipment protection

Machine Trip

Axial position



Alarm / Trip

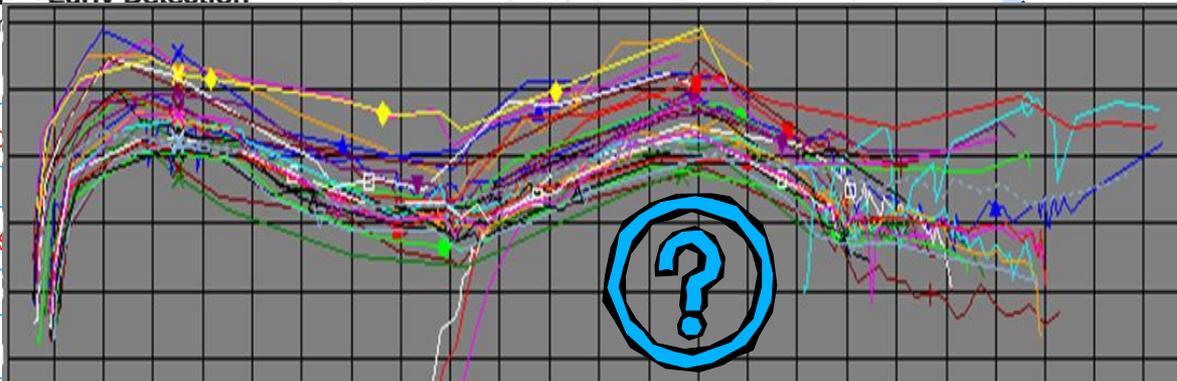
SmartSignal — Early Detection

Monitors all signals

Axial position

Gas pressure

Bearing Temp



Dynamic Bands
SmartSignal Alerts / Incidents

TempuTech

Changing a business model



Challenges:

- Needed to differentiate from competition
- Low revenue on home-grown software investments
- Disparate systems required manual intervention
- Technical limitations prompted need to modernize

Actions:

- Selected & installed GE's Equipment Insight solution, from GE Predictivity™
- Developed revenue-generating services strategy

Results:

"By deploying the solution at one of our customers grain facilities, we are able to access and provide actionable information about the health of their system and deliver it to them in real-time so they can avoid downtime and quality issues".

- Tom Herrera, Sr. Owner

"Virtually centralizing unlike applications, devices and sensors via a web-based remote monitoring & diagnostic solution is improving our ability to service this account, enhancing our value to them as a vendor, and reducing our overall costs-to-serve".

- Adrian Merrill, Vice President of Operations



Philadelphia Electrical Equipment Company

“Leapfrogging” the competition



Challenges:

- Customers requesting greater visibility into their systems
- PEECO looking to offer RM&D SW system to their customers that is available anywhere, anytime.

Actions:

- Selected & installed GE's Equipment Insight solution, from GE Predictivity™
- Implementing cloud-based portals for customers
- Creating revenue models for both monitoring and predictive maintenance service contracts

Results:

“Ultimately, because this is a cloud-based solution, it's going to allow us to leapfrog our competition. It an innovative, more forward thinking solution, helping us to monitor every parameter within a [customer's] system – allowing us to be more proactive than reactive on their maintenance.

Ultimately, we plan on saving our customers money – that's our #1 goal. Goal #2 is to make PEECO more profitable. At the end of the day, their success is our success”.

- Steven Chambers, VP of Business Development



[Watch the video](#)



The
**BRILLIANT MACHINES
ARE COMING**

with the technology, scale,
and ability to make the
world better.

Thank You