Celebrating 125 years

• GE has 300,000+ employees
• GE is in 180+ Countries
• GE has 11 Businesses
• GE remains the only original DJIA company still on the list.
• GE is both valued and admired, this year ranking #7 on Fortune’s “World’s Most Admired” list.
Being Digital Industrial
Software is impacting every industry

- **airbnb**
  - 20BN Hotel Service
  - Owns no real-estate

- **Apple**
  - 18BN Consumer App Economy
  - Creates a few apps

- **UBER**
  - 50BN Taxi Service
  - Owns no vehicles

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**Make Assets more Productive**

- **100+BN Industrial Conglomerate**
GE: the digital industrial company

**GE for GE**
- Productivity
  - Digital thread
  - Predix + data
  - Digital twin

**GE for Customers**
- Apps
  - GE’s software business
  - “Inside-out” strategy
  - Outcomes for customers

**GE for World**
- Platform
  - Predix
  - Secure
  - Cloud for industry

$15B software business by 2020
Implementing the Digital Thread

**Engineering design** | Design for productivity/cost
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**Our Experience**

H Turbine (544 MW) ... 2X faster, lower launch cost

**Manufacture** | Optimized manufacturing
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100 brilliant factories ... driving yield, cycle, downtime, additive manufacturing (3D)

**Services** | Condition-based services
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30,000 field engineers ... sensor based, onboard algorithms, mobile, robotics

GE: best example of the Industrial Internet at work
Being Digital Industrial in Power
GE + Alstom = Electricity for the World

Reliable  Affordable  Sustainable

120+ MILLION HOURS OF GE OPERATING DATA ANALYTICS

GLOBAL INSTALLED BASE OF 28,000 ASSETS

Future of Electricity is Digital
“In the Industrial Internet we see the next great wave of productivity — both for our company and for the customers we serve. We are a company that invests in broad industrial transitions, and they don’t come much bigger than the full application of data and analytics to machines and systems.”

Jeffrey R. Immelt,
Letter to Shareholders, 2015 Annual Report
Digital Transformation of Energy

DIGITAL TRANSFORMATION OF ENERGY VALUE CHAIN

- Generation
- Market Operational Trading
- Transmission
- Distribution
- Residential
- Commercial & Industrial

- Asset Performance Management
- Grid Optimization & Aggregation
- Integrated Customer Services
  - Beyond the Electron

$1.3T Industry Value
$387B Asset Performance
$2+T Societal Impact

GE’s Digital Power Plant

GE’s Digital Power Plant Portfolio

- Fuel
- Output
- Unplanned Downtime
- O&M Costs
- Savings on Stars

Business Optimization
- Deeper Insights
- Profitability

Operations Optimization
- Better, Faster Decisions
- Productivity

Asset Performance
- Real-Time Actions
- Reliability

Predix

Savings

$230MM
for new plant

$50MM
for existing plant

*Value of digital power plant over life
Predix is Technically:
- A Platform
- A PaaS, not IaaS
- A managed cloud
- A way of developing

Predix is Business-wise:
- A managed cloud
- An ecosystem play
- A business model

The core innovation behind GE's digital solutions. Animated with real-world data, the Digital Twin is a virtual replica of any asset, designed to help predict and respond to any customer problem.
Asset Productivity

Connect - Analyze - Optimize

Increased Output | Availability | Reliability
Efficiency    | Flexibility  | Emissions Reduction
Being Digital Industrial in Greece
AoG Digital Smelter

- Enhance Performance Standards
- Achieve Process Optimization
- Push Productivity Levels

- GE and AoG, (largest vertically integrated bauxite, alumina and aluminium production and trading unit in the EU), signed a 10-year agreement to implement global first-of-its-kind digital smelter solution, to enhance its aluminium smelting process and contribute to increased operational efficiency and productivity.

- With GE’s digital smelter solutions, AoG is setting a global first for the aluminium industry that will contribute to AoG operational efficiency and set new benchmarks in the sector, by charting the next generation of smelting operations globally.
AoG Digital Smelter

WHAT

• The digital smelter twin will be a digital model of an actual smelter created using artificial intelligence and physics-based models
• Digital Twin is a digital model of a specific pot that allows us to stream of data to deliver significant business outcome.
• It will exist in the cloud, powered by GE Predix in proven PaaS (Platform as a Service) model

WHY

Pot Operations Optimization through:

• Chemical Model: Optimal bath composition and alumina concentration
• Electrical Model: Optimal combination of base resistance and voltage
• Thermal Model: Optimal operating temperature, superheat, etc.

HOW

• Virtual Sensors: Temperature, Chemistry etc. are not taken regularly but at periodic intervals. Through Digital Twin, we can have an estimate of these parameters at any point of time.
• Predictability: Digital Twin is also able to predict the health / condition of the pot over different time intervals
• Recommendation: Based on the evaluation of all parameters, the Digital twin will recommend the optimal values
AoG Smelter Digital Twin

**INPUT**
- Periodic
  - Sensory Data
  - Manual Input Data
  - Events Data

**POT DIGITAL TWIN**
- PREDIX – Cloud - PaaS
- Data
  - Physics + Al
  - Material Balance Model
  - Thermal Model
  - Electrical Model
  - Analytics

**OUTPUT**
- Continuous
  - Virtual Sensor
  - Pot Health Predictability
  - Recommendations

18 Months Project Implementation
Q&A