GE Digital

June 23, 2016

Digital Industrial

Digital Industrial

Built on:
- ✓ Leading technology
- ✓ Service franchise
- ✓ GE Store

Part of the GE Store

- ↑ Productivity and margins
- ↑ Services topline growth rate
- ↑ Customer value ... products & services

+

Potential for new business

- + Predix operating system for the Industrial Internet
- + New industries ... new GE customers
- + Global partner framework

Committed to success

Digital revenue

$5B — '15
$6B+ — '16E
~$15B — '20F
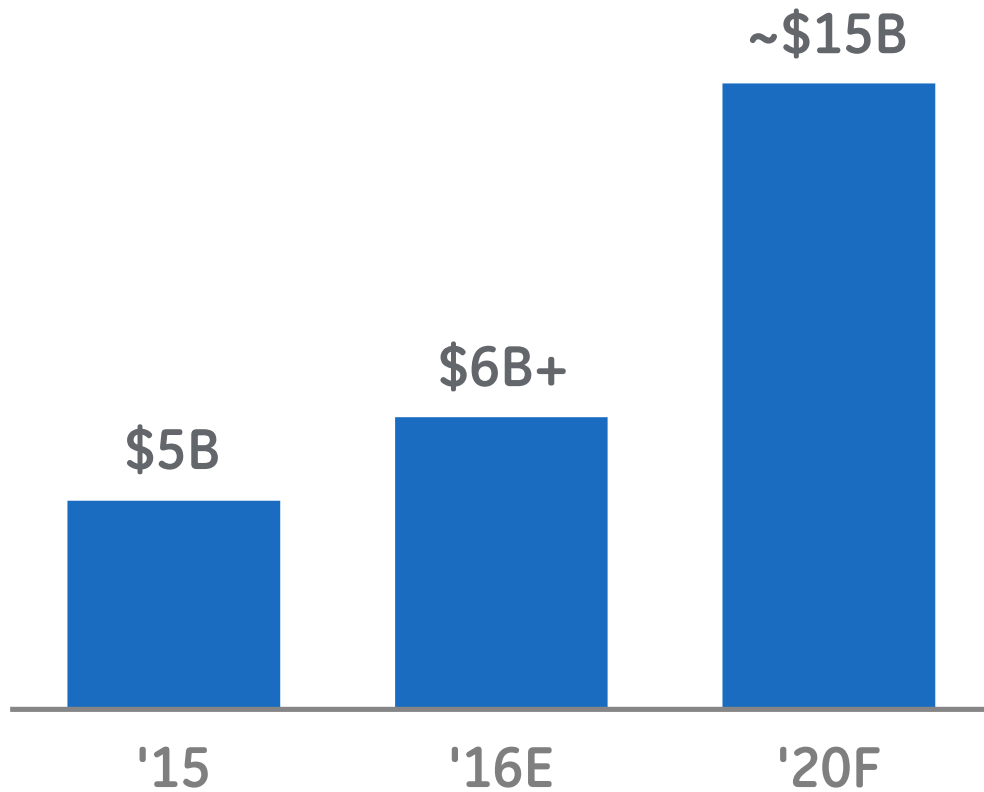
1 Customer outcomes → service growth

2 Incremental productivity

3 Launch "killer" applications

4 Predix as the operating system in the Industrial Internet ecosystem

Services evolution

Digital Industrial

Backlog $226B

Contractual Services

Repair Technology

Big Iron

Customer Outcomes

Today
+ Analytics-enabled uptime
+ Software-enhanced output/performance
+ Remote inspections

'00s
+ Risk sharing
+ Monitoring & diagnostics

'90s
+ Advanced repairs
+ Part upgrades

'80s
+ Partners
+ Field engineers

Technology Application
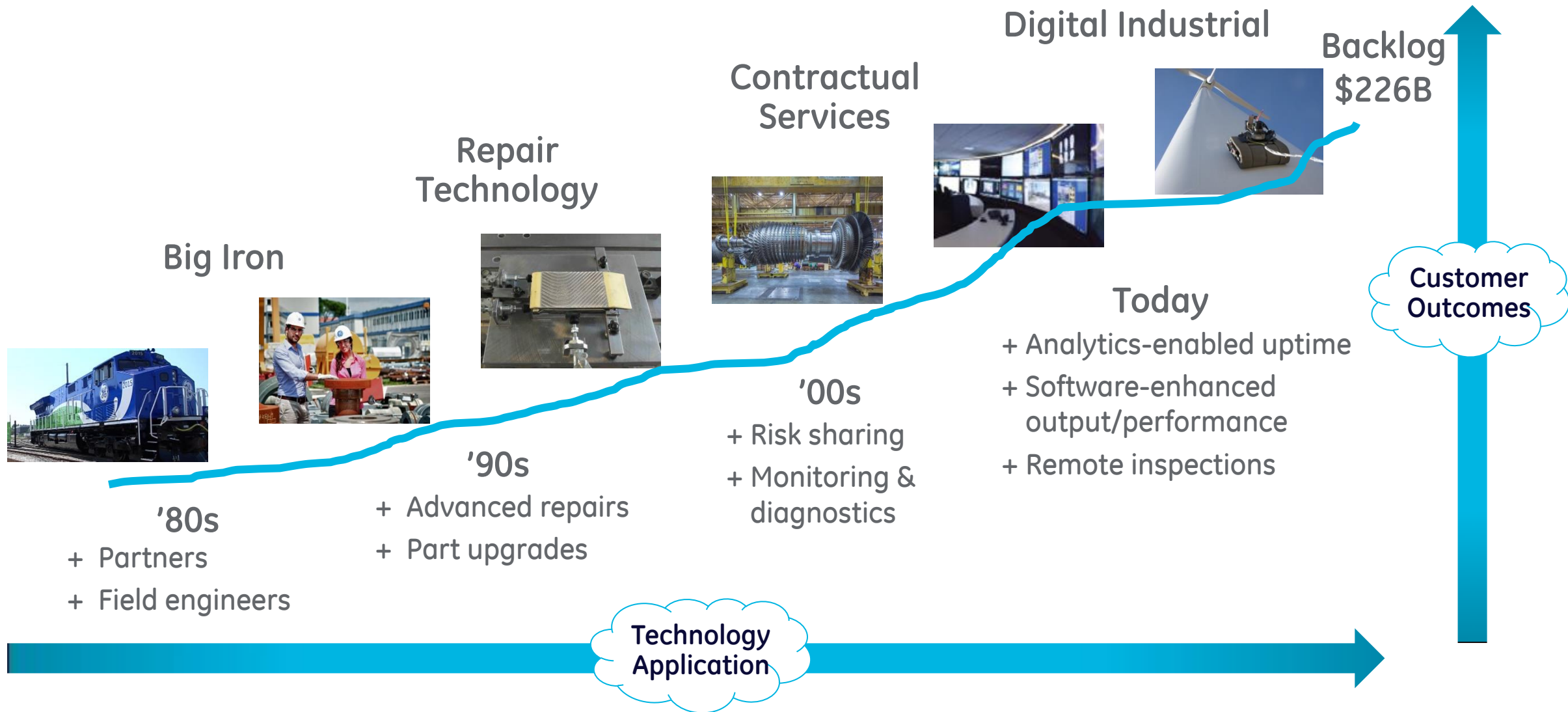
Services growth engine

($ in billions)

Services financials

■ Revenue ■ Op profit

7% op profit CAGR

2000: Revenue $18, Op profit $6
2005: Revenue $27, Op profit $7
2010: Revenue $37, Op profit $10
2015: Revenue $48, Op profit $15
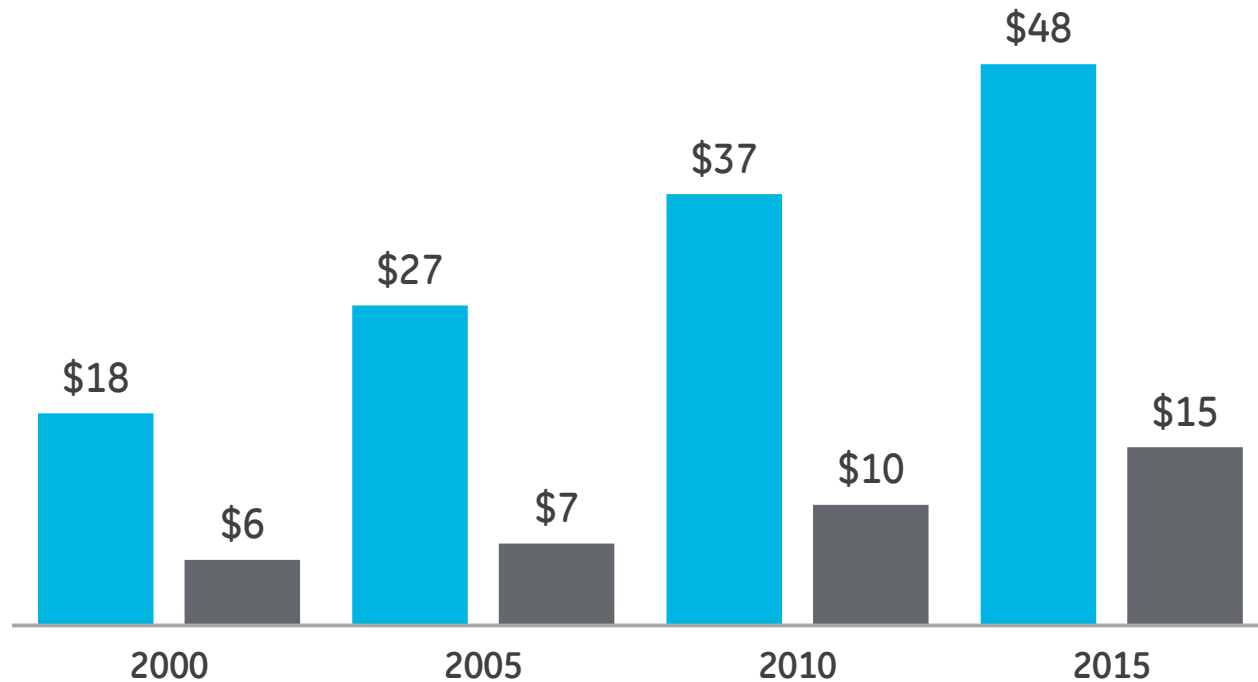
Future growth

✓ Growing installed base and $/installed base
✓ Going after every asset … mature & competition
✓ Digital opens new value
✓ Big pipeline of upgrades

Proven services track record … next generation services growth enabled by digital

GE view of the Industrial Internet

Why it's important

- Big market … ~$225B in 2020 … could be bigger
  + Industrial world needs platform
- Real value creation for customers
  + Will drive next wave of Industrial productivity
- Significant opportunity to drive internal productivity
- Further differentiates competitiveness with customers

GE uniquely positioned

- Started initiative in 2011 … have invested heavily
- $226 backlog, domain/physics, access to data
  + Product redesign capability
- First mover advantage … partnerships and hiring key talent
- Complete platform … delivering edge to cloud processing, security, data governance

Overview of Industrial Internet & GE Digital

Bill Ruh – CEO, GE Digital & CDO, GE

34 years experience (5 years GE)

Digital transformation

The Idea

Industrial productivity

4%

1%

1991 – 2010   2011 – 2015
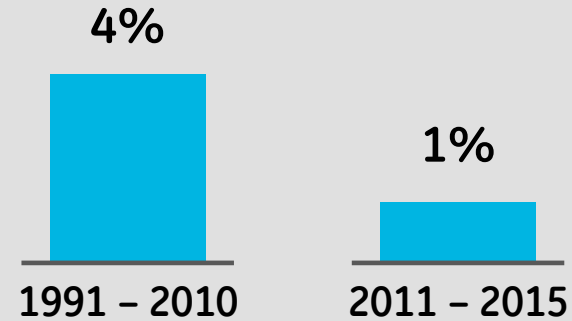
Meets the Digital Twin

Physics + Analytics

The Principles

- Deliver outcomes
- Consumer ≠ industrial
- Talent follows ideas
- Assets + devices matter

- Build digital content
- Reform IT
- Simplify culture
- Industrials trust each other

GE delivers the winning formula

Advanced data science + **Physics-based** + **Applied engineering**

Data
Continuous, accessible

+

Statistics & Machine learning
Identify trends & anomalies

+

Physics
Apply asset & domain expertise

=

Industrial outcomes
One platform for OT & IT teams to collaborate and innovate

Market opportunity
Digital industrial revolution by 2020

	Consumer ~$170B	Enterprise [IT] ~$200B	Industrial [OT] ~$225B
Applications	$80B	$130B	$125B
Platform	$90B	$70B	$100B

Source: Harbor Research, IDC, TCG Analysis
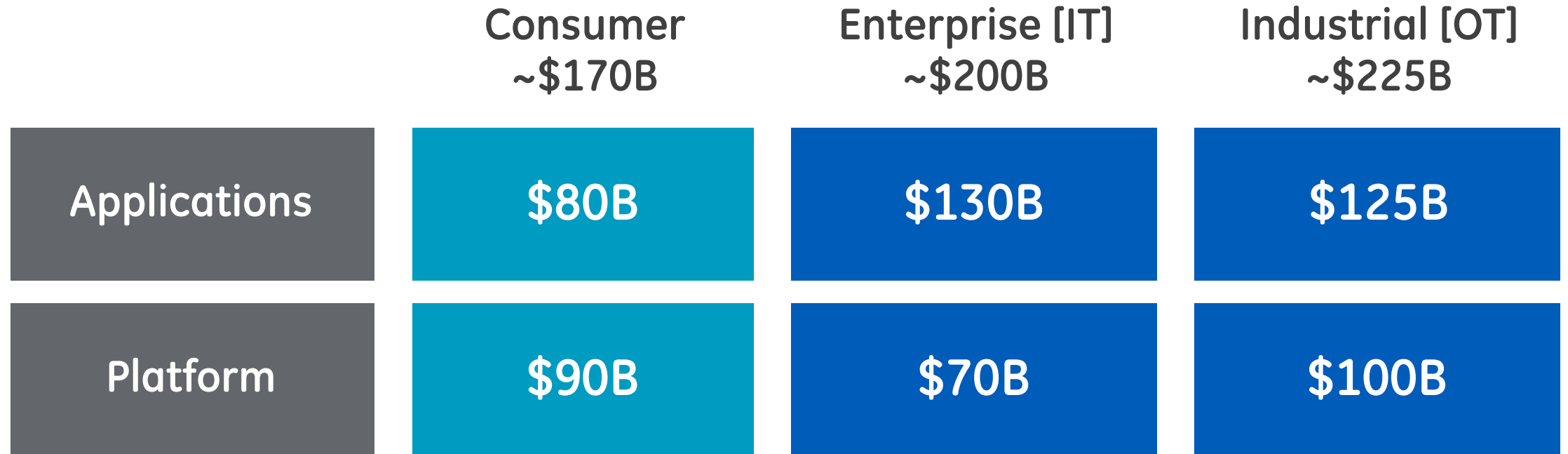
Consumer ≠ industrial

Consumer

- Superficial asset impact

- Data volume in terabytes per day

- User managed security

- Regionalized data storage

- Compute in the cloud: reactive
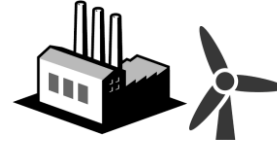
Industrial

- Mission critical asset value

- Data volume in PB per day

- Multi-layer security

- Customer-focused storage

- Compute at the edge: proactive

Industrial internet building blocks

	"As a service" model			
Outcomes	Asset Performance Management (APM)	Enterprise	**+**	Partner ecosystem
+				
Technology	Operating system & Cloud (Predix)	**+** Digital Twin / Digital Thread / Edge devices **+**		Cyber-security
+				
Talent & culture	Domain knowledge	Tech skills	**+**	FastWorks

✓ Delivering customer outcomes

✓ Materials science
✓ Analytical strength
✓ Edge + cloud

✓ New team and capabilities in place

✓ Very different capability set than consumer internet
✓ GE investing in capability that's necessary to win

Landscape sample

Established tech companies, telcos, industrials, and niche players all vying for success in the industrial internet either on a standalone basis or with partners

How we view the technology competitive landscape
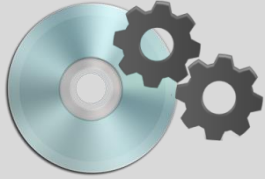
Automation only
- Product lifecycle management
- Manufacturing execution systems

Cloud platform
- One-size-fits-all
- General purpose
- Standard tools and apps

Systems of record
- Standard ERP
- Not connected
- Transaction-based SW

Analytics only
- Not industrial strength
- Not multi-modal

PREDIX
- Industrial requirements built in
- Integration from edge to cloud
- Industry vertical and horizontal applications built in
- Deep domain & engineering knowledge augment Digital capabilities

What does it take to win?

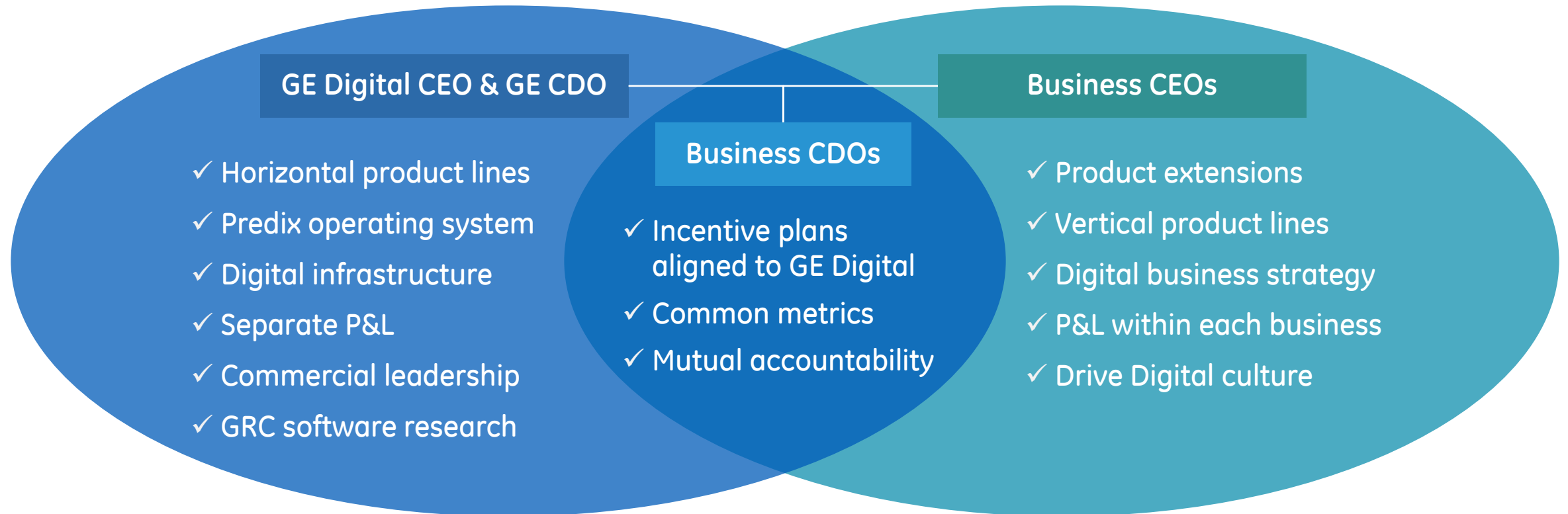|	Domain & scale	Digital Industrial Platform	Commercial ecosystem
What we need	▪ Deep industry domain & operational insights ▪ Ability to win in services ▪ Each GE business with its own digital industry app strategy & integrated digital portfolio ▪ Global scale, depth & reach	▪ Predix as dominant digital platform, both inside & outside GE ▪ APM as the 1st "killer app" ▪ "All in" with Ops Optimization, Digital Thread, Digital Twin, Intelligent Environments & Cyber-security	▪ GE platform which creates the industrial app economy ▪ Global partner ecosystem of developers, integrators & key technology companies ▪ Digital commercial capabilities in GE Digital & GE businesses
What it takes to win	▪ 100s of GE Digital industrial apps across our businesses	▪ 1,000s of GE & partner apps on Predix	▪ 100,000s of app developers in the Predix ecosystem
Defend against	*Smaller competitors attacking our Industrial markets*	*Larger competitors attacking our Industrial markets*	*Larger competitors attacking our Platform*

GE Digital organizational structure

GE Digital (horizontal)　　　　**GE Businesses (vertical)**

GE Digital CEO & GE CDO　　　　**Business CEOs**

Business CDOs

- ✓ Horizontal product lines
- ✓ Predix operating system
- ✓ Digital infrastructure
- ✓ Separate P&L
- ✓ Commercial leadership
- ✓ GRC software research

- ✓ Incentive plans aligned to GE Digital
- ✓ Common metrics
- ✓ Mutual accountability

- ✓ Product extensions
- ✓ Vertical product lines
- ✓ Digital business strategy
- ✓ P&L within each business
- ✓ Drive Digital culture

One GE Digital team. Connected today ... ability to quickly scale & adapt to business needs.

Today's agenda

Building the horizontal

Defining success	Khozema Shipchandler
Technology leadership	Harel Kodesh
Commercial approach	Kate Johnson
Digital Thread	Jim Fowler
Organization	Jen Waldo

Building the vertical

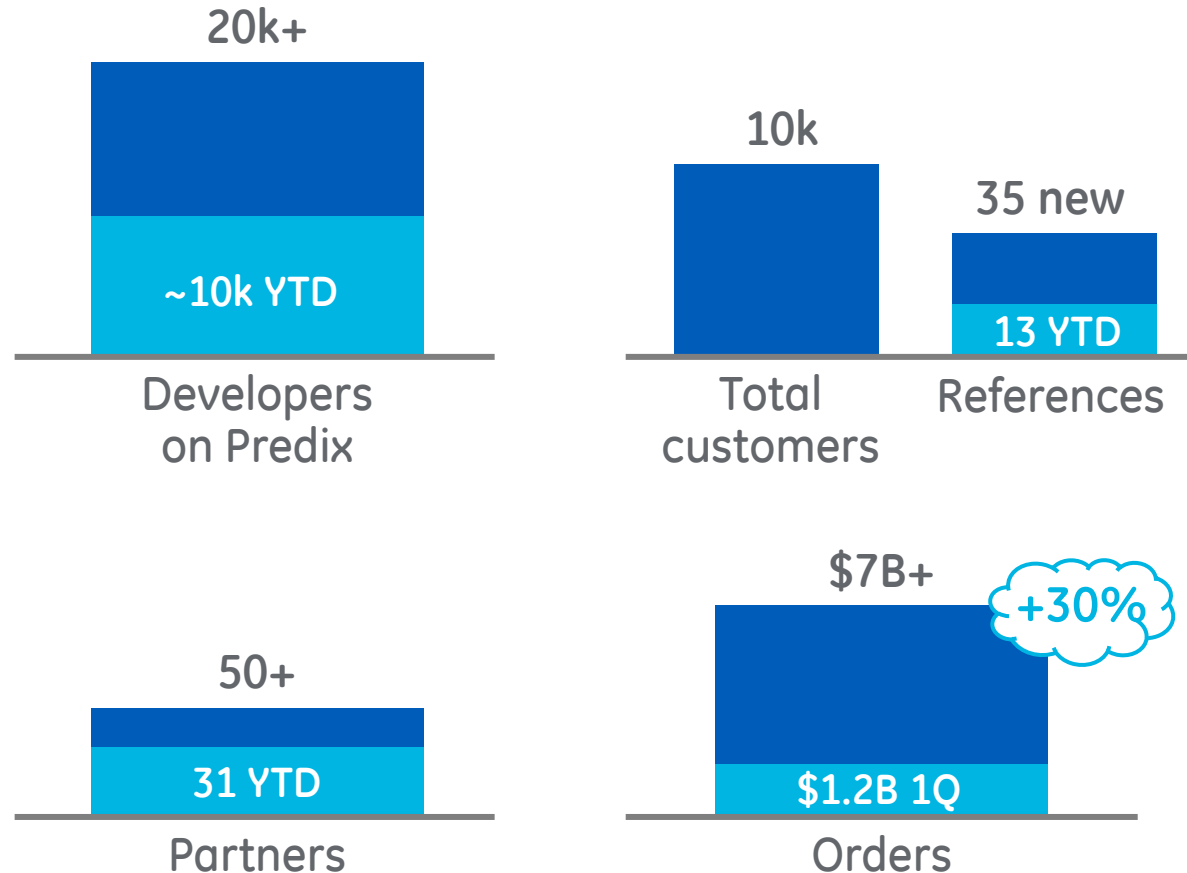|	
Power Digital	Ganesh Bell
Executing with customers	Azeez Mohammed
Healthcare Digital	Charles Koontz
Transportation Digital	Seth Bodnar
Services	Kevin McAllister
Engineering/Manufacturing	Jeff Connelly
Current	Maryrose Sylvester

Defining Success

Khozema Shipchandler, VP & CFO, GE Digital

20 years experience (all GE)

Leading success indicators – 2016 targets

20k+

~10k YTD

Developers
on Predix

10k

Total
customers

35 new

13 YTD

References

50+

31 YTD

Partners

$7B+

+30%

$1.2B 1Q

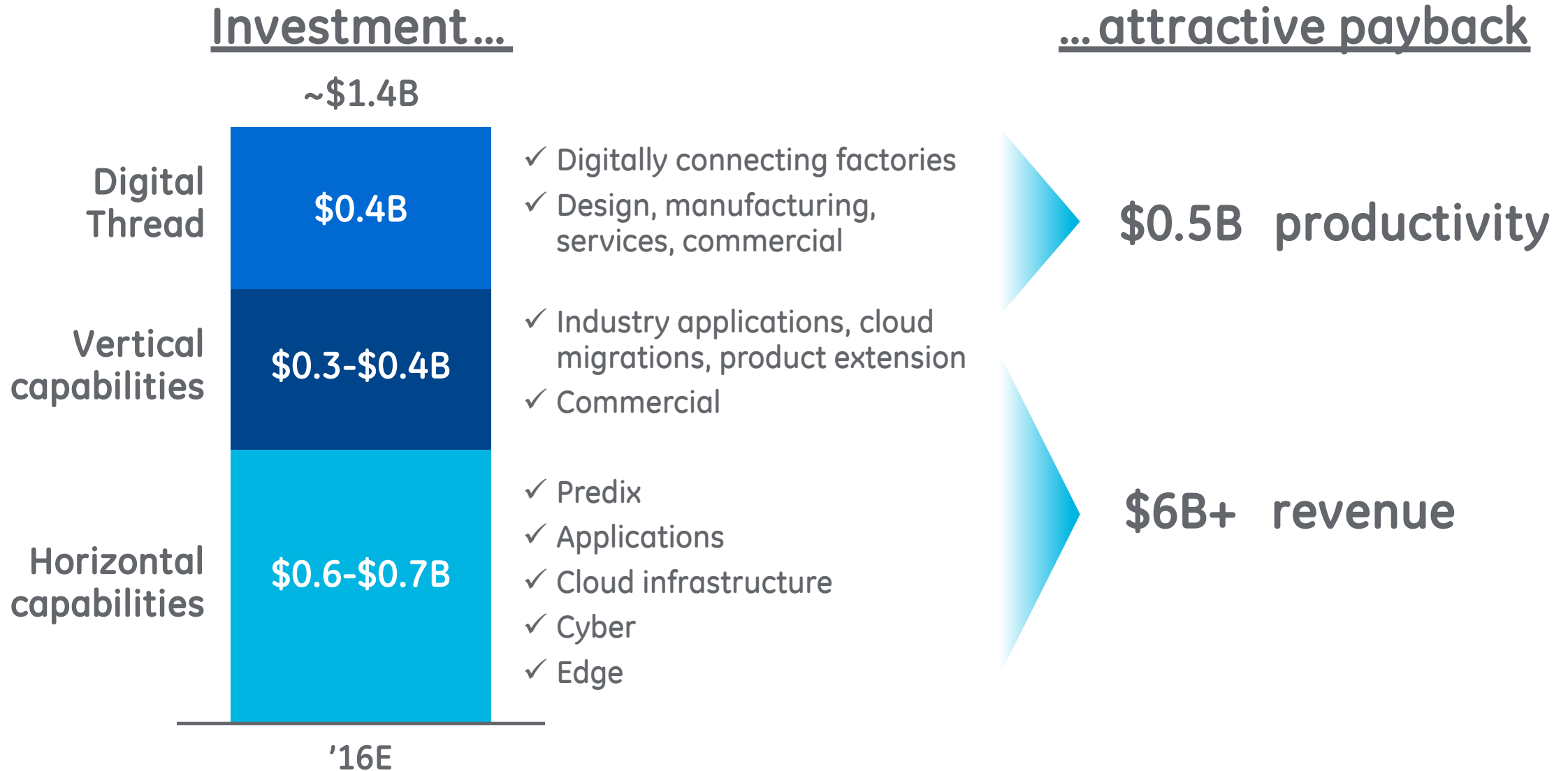Orders

- ✓ Additional developers drive innovations, interest & stickiness of platform

- ✓ Customer proof points of new digital solutions confirm customer value

- ✓ Ecosystem drives exponential growth

- ✓ Industrial applications deliver the outcomes & efficiencies customers want

**Goal: create a broad industrial internet ecosystem
to lead digitization of the industrial economy**

Investing at scale

Investment...

...attractive payback

~$1.4B

Digital Thread	**$0.4B**

✓ Digitally connecting factories
✓ Design, manufacturing, services, commercial

$0.5B productivity

Vertical capabilities	**$0.3-$0.4B**

✓ Industry applications, cloud migrations, product extension
✓ Commercial

Horizontal capabilities	**$0.6-$0.7B**

✓ Predix
✓ Applications
✓ Cloud infrastructure
✓ Cyber
✓ Edge

$6B+ revenue

'16E

Portfolio

Orders of $7B+

Business	'16 V%
Power	>30%
Oil & Gas	>30%
Renewables	>40%
Aviation	>30%
Energy Connections	>100%
Transportation	>30%
Healthcare	<10%
Current	F
Digital core	>100%

- ✓ Broad-based contribution across every business

- ✓ Re-building Healthcare portfolio, target 10%+ growth rate in 2017

- ✓ Significant expansion into new verticals

- ✓ Growing globally … partners / ecosystem expand reach

Strong foundation to build from … working on a path to $1B+ for every business
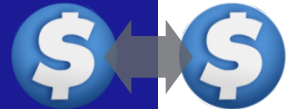
How we generate revenue

Through services

Standalone

Upgrades … ↑ value to existing deals

Revenue share … share of apps sold

Licenses or subscription … GE, 3rd party or partner developed
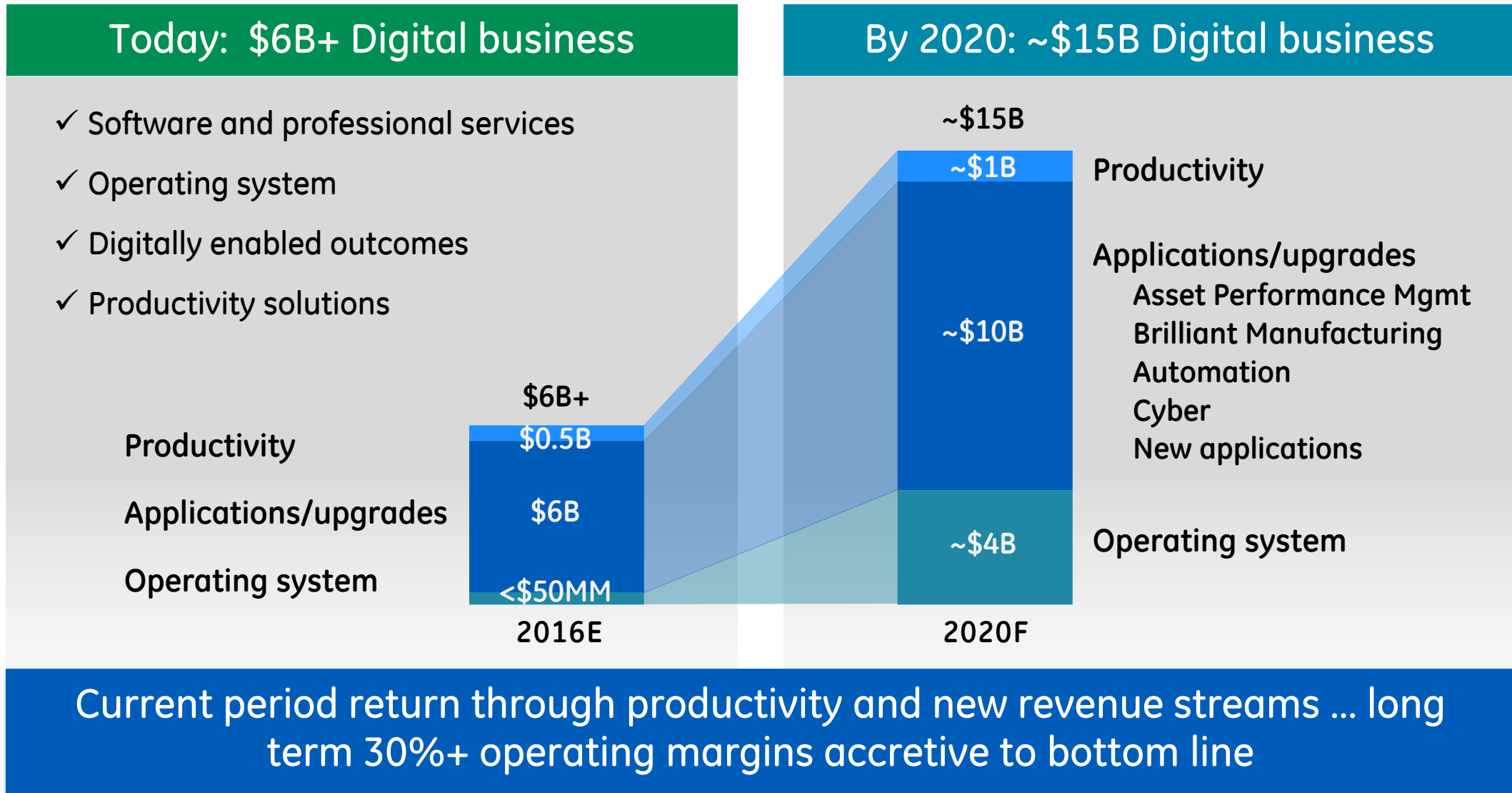
Outcome-based … asset specific offering; GE/customer share the benefits

Platform-as-a-service … Predix operating system; price per micro-service

Incremental value from each revenue stream

Future value creation

Today: $6B+ Digital business

- ✓ Software and professional services
- ✓ Operating system
- ✓ Digitally enabled outcomes
- ✓ Productivity solutions

$6B+
$0.5B — Productivity
$6B — Applications/upgrades
<$50MM — Operating system

2016E

By 2020: ~$15B Digital business

~$15B
~$1B — Productivity
~$10B — Applications/upgrades
- Asset Performance Mgmt
- Brilliant Manufacturing
- Automation
- Cyber
- New applications
~$4B — Operating system

2020F

Current period return through productivity and new revenue streams … long term 30%+ operating margins accretive to bottom line

Strategic investments & accelerators

Pivotal
- Components needed for Predix architecture model
- Greater influence over op. system for Ind. Internet

serviceMAX
- Leader in cloud based field service management
- Enabler of Digital Thread strategy

DaintreeNetworks
- Critical accelerant for smart building strategy
- Enables faster monetization for Current

NeuCo
- Improve fossil-fuel-fired power plants
- Accelerate & enhance value-proposition

wurldtech
- Assess & protect GE's & customers' infrastructure
- Added protection to industrial internet offerings

Future considerations
- ✓ Accelerate platform services & capabilities
- ✓ Rapid market entry
- ✓ Enhance tech stack
- ✓ Build vertical adjacencies

Will deploy capital to expand technology capabilities & commercial offering

Cultural change

- **Energizes entire company ... Digital Thread and Predix demand internal & commercial transformations**

- **Strengthens strategic customer relationships & enables delivery of unprecedented outcomes**

- **Hired external talent & paired with internal GE executors. CDOs bring expanded view of market, fresh ideas, new models ... attracting the best. Repositioned CIO.**

- **Operating with renewed urgency and intensity, investing at rate required, unafraid to experiment, fail fast & pivot**

- **GE uniquely positioned to do this. Domain + analytics our "killer app" ... very few have capital and knowledge required.**

Technology Leadership

Harel Kodesh – VP & CTO, GE Digital

32 years experience (2 years GE)

Industrial requires a whole new operating system
Predix, the operating system for industry

Machine connectivity

Industry insight

massive-volume data edge-compute	machine level security	data sovereignty protection	in-stack security	multi-modal machine learning	regulatory processes	global hybrid cloud	extensible by customers, partners

Built for industry + **Over 100 years of domain expertise** + **Applications & analytics for IoT use cases** = **GE's competitive advantage**

What it takes to run a digital cloud-based industrial business

Industrial-focus semantics	- System of asset abstractions - In-stack security
Industrial-focus operations	- Right scaling the data centers - Critical infrastructure security - Distributed compute from cloud to edge
Industrial-focus intelligence	- Multimodal machine learning stack - Combining unsupervised and model-based machine learning algorithms

Predix edge capability

Edge
Controller

Gateway

Predix
Box

Predix
Cloud
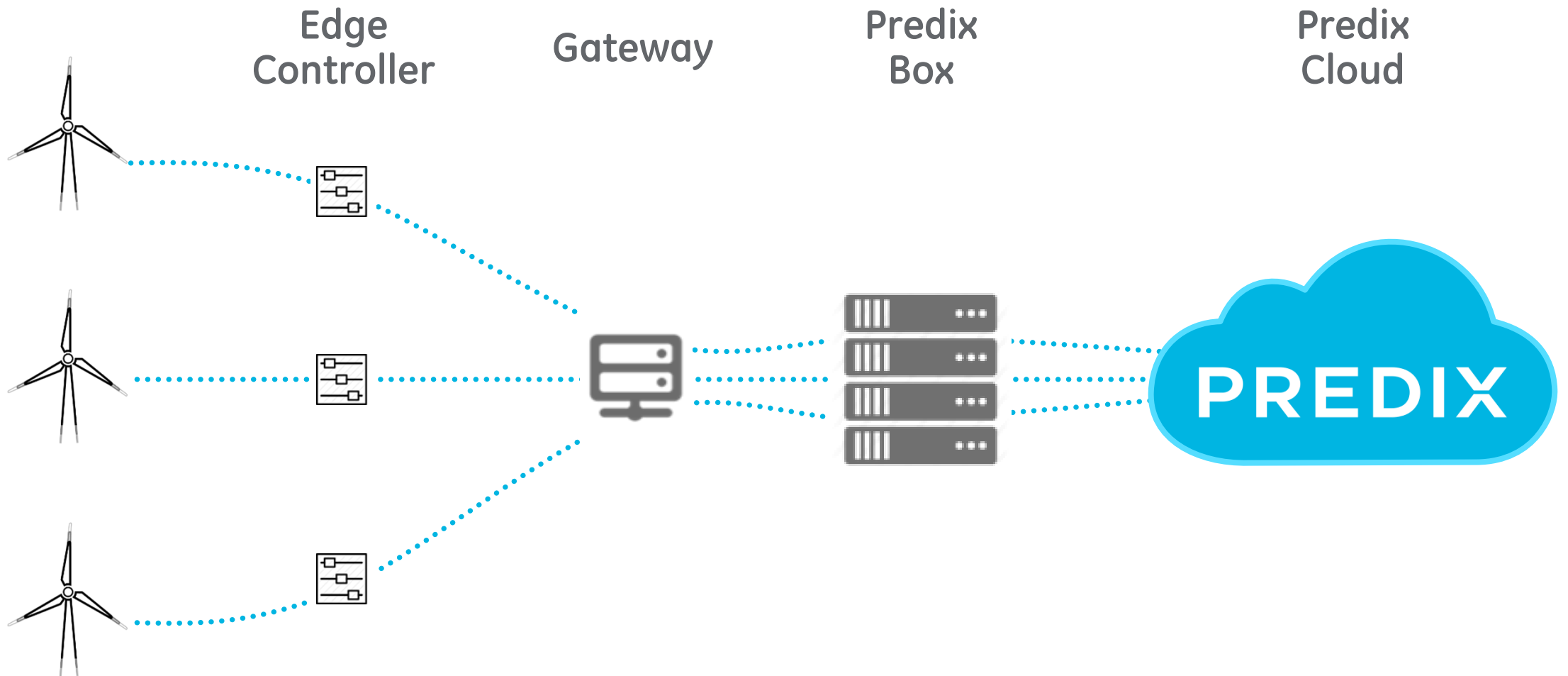
Built by industry for industry

Digital Twin

Physics & analytics

New language of productivity

- No unplanned downtime
- Asset optimization
- Machine learning/pattern recognition
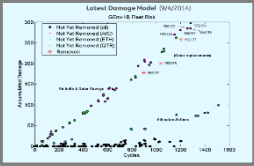- Continuous tuning
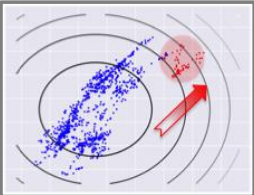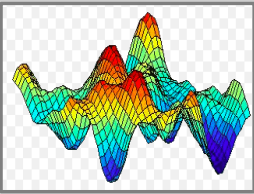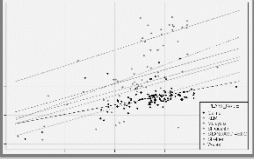- Condition-based repair
- Analytics based lifing
- Per asset models
- As-a-service models
- Ecosystem benefits

Physics and analytics – a portfolio approach

Business Problem	ML Technology	Physics Model	Business Outcome
Fleet Segmentation	**Learning from a low number of events** Bayesian estimation, similarity search, clustering.	**Integration with Lifting Models** Spallation, and Metal Fatigue models	**Increased uptime,** optimize maintenance schedule for aircraft engines
Early Warning	**Unsupervised and Supervised Learning of the Asset Operational Model** Gaussian Mixture Model, Similarity Based Model	**Integration with Performance Model** Using Thermal model to produce virtual sensors	**Move unplanned** downtime to scheduled downtime in Aviation and locomotives
Performance Optimization	**Supervised Learning of Asset performance** Neural Network, Active Learning	**Systems Performance Models** Gate Cycle model of Power Plant, real time control of Power Plant	**Reduce fuel consumption** while maintaining production MW target
Services Optimization	**Learning from a low number of Shop Events** Ridge Regression, Similarity Search	**Integration with Selected Domain Knowledge.** Survival analysis, domain features	**Decrease service** turnaround time for engines in shop

Asset Performance Management (APM)

Get Connected	**MACHINE & EQUIPMENT HEALTH**	🔒 Securely Connect Equipment	⚠ High Probability of Detection	📈 Data-Rich Actionable Insights

✓ No unplanned downtime

Get Insights	**RELIABILITY MANAGEMENT**	📊 Confidence Around Best Outcomes	🔍 Identify Emerging Problems	👥 Collaboration

✓ ↓ operating costs & risk

✓ Longer asset life

Get Optimized	**MAINTENANCE OPTIMIZATION**	⚖ Balance Performance & Reliability	⚙ Optimize Maintenance	✔ Maintenance Strategy

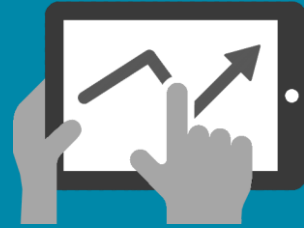✓ Value-based pricing … win/win for GE & customers

Foundational application for industrial asset productivity

Predix cyber security design

Secure and certify operational infrastructure

... app users to operational

Bring operational availability and governance with "IT"

... at every connection and layer

Protect OT/ IT in an app factory delivery model

... automated secure apps

Establish user-based world for industrial apps

... end-to-end visibility

**End-to-end cyber, information and operational security**

Why Predix

- An operating system, built by GE, to deal with the key abstractions, performance & cyber security requirements of industrial assets

- Defines a standard ontology & abstraction that allows complex industrial asset models to be queried & processed in a standard way, removing an obstacle for entry & innovation

- Provides a standard way to connect machines, data & people while delivering analytical insights in real-time to optimize industrial infrastructure & operations

- Distributed edge computing … build & run high fidelity digital twins of industrial machines in the cloud or at the edge

- Machine learning capabilities … optimized for the industrial internet to build, run & train analytics models

Commercial Approach

Kate Johnson - VP & CCO, GE Digital

23 years experience (3 years GE)
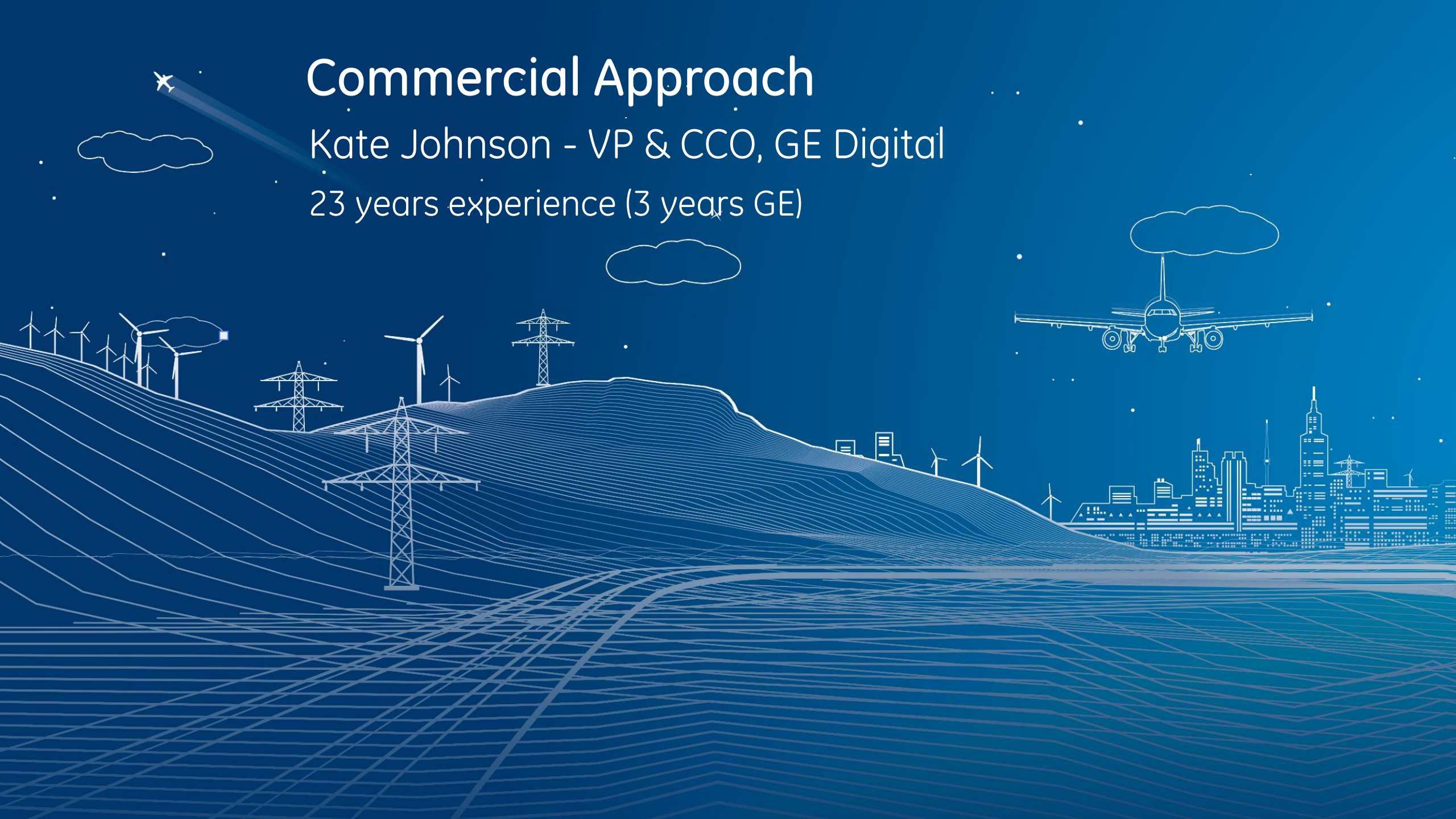
Commercial approach

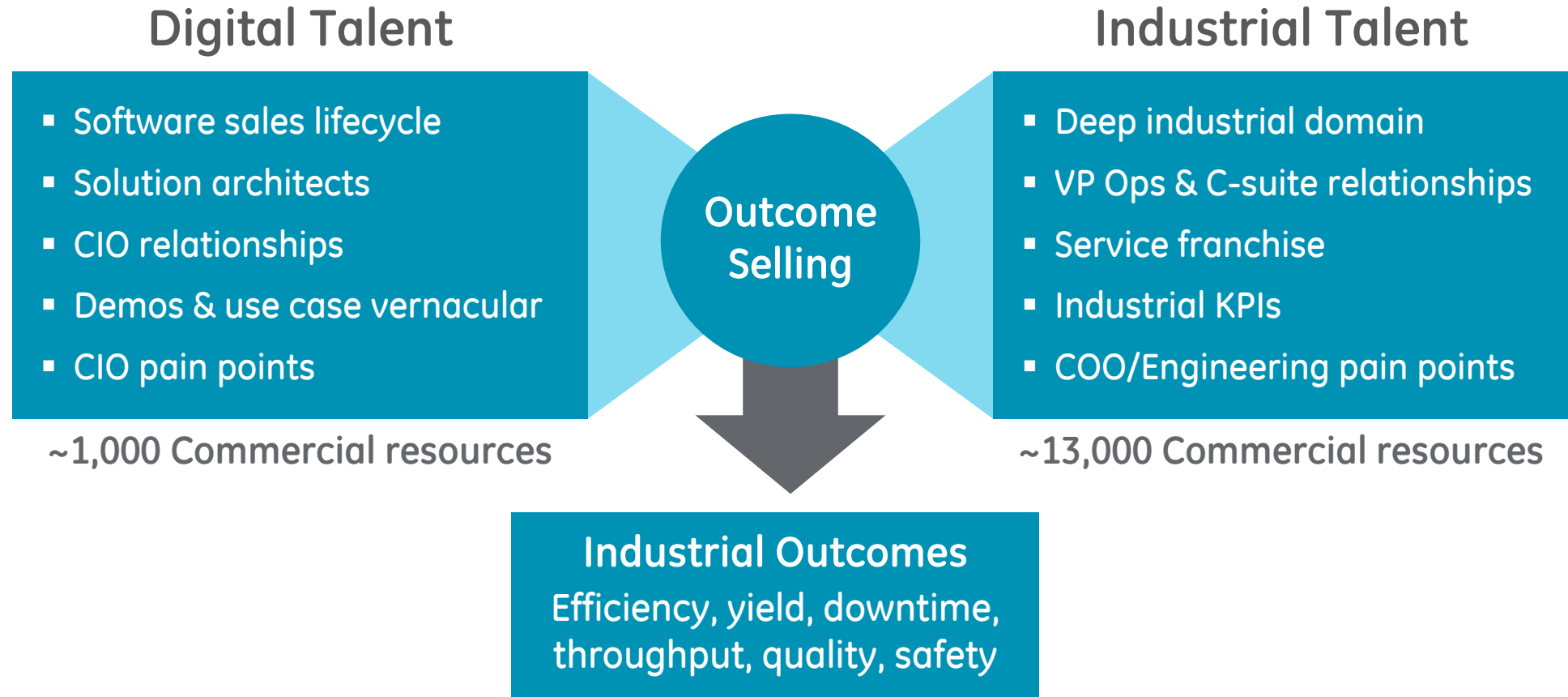Close big Predix-powered deals ... marquee customer references

Build digital commercial engine ... digital thread for efficiency & scale

Establish GE as a reference ... tap into adjacencies

Develop strategic partnerships ... build out a rich ecosystem

Dedicated team of Digital experts working horizontally & vertically to drive adoption

Commercial talent: the winning combination

Digital Talent

- Software sales lifecycle
- Solution architects
- CIO relationships
- Demos & use case vernacular
- CIO pain points

~1,000 Commercial resources

Industrial Talent

- Deep industrial domain
- VP Ops & C-suite relationships
- Service franchise
- Industrial KPIs
- COO/Engineering pain points

~13,000 Commercial resources

Outcome Selling

Industrial Outcomes
Efficiency, yield, downtime, throughput, quality, safety

Combining digital and industrial talent to drive meaningful customer outcomes

Predix wins – APM as the killer app

	bp	SRP	RG
Solution	▪ APM software and Predix	▪ Enterprise-wide APM	▪ APM ▪ 1,000+ GE & non-GE equipment connected to Predix
Outcome	▪ Provide analytical insights at enterprise scale through knowledge sharing on demand ▪ Eliminate disruptions by being proactive and analyze problems more efficiently	▪ Shift from unplanned outages to planned outages ▪ Significantly reduced maintenance costs ▪ Optimized asset life	▪ Increasing reliability by 1% ▪ Reduce volumetric downtime ▪ Decrease excess flash gas ▪ Manage maintenance costs

Predix wins – beyond the asset for enterprise health

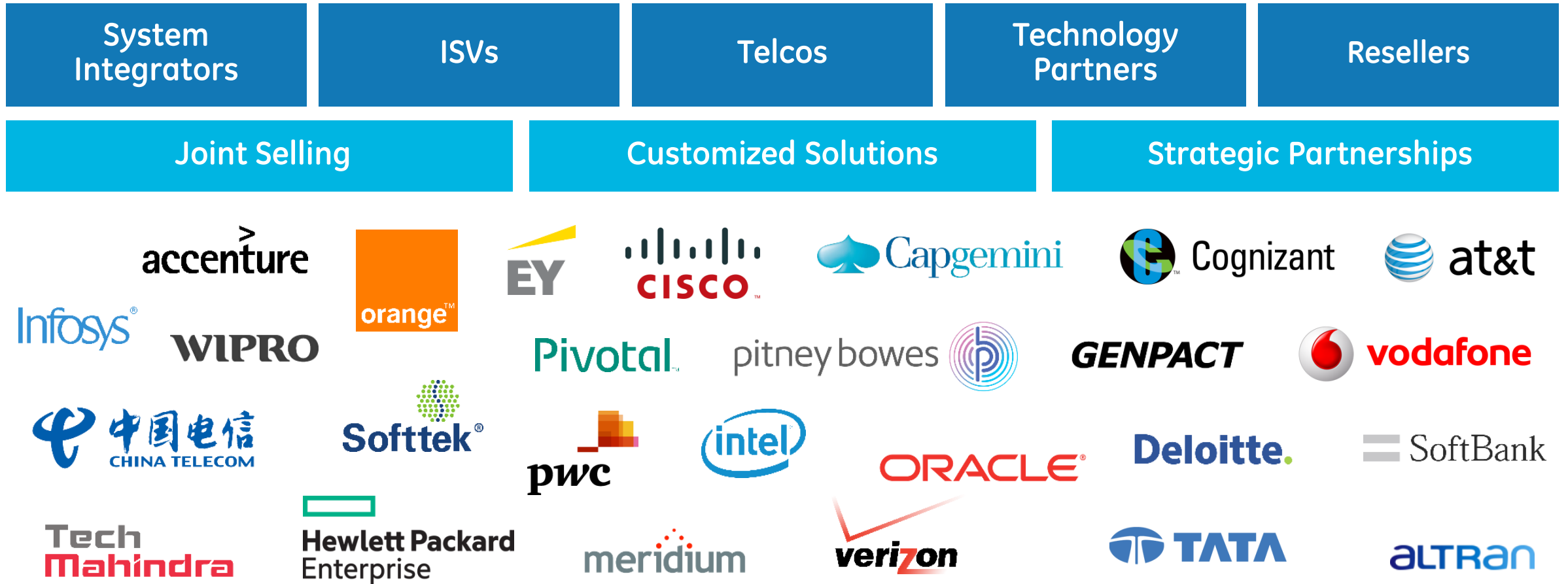|	**P&G**	**engro**	**Exelon**
Solution	▪ Smart automation and digitized manufacturing platform	▪ Operations Optimization (OO)	▪ APM software and Predix ▪ Operations Optimization (OO) ▪ Business Optimization (BO) ▪ Predix (across Gas, Wind, Nuclear)
Outcome	▪ Increasing manufacturing productivity, facilitating speed of innovation	▪ Increasing operational efficiency, and reducing fuel consumption	▪ Increased analytics velocity as part of digital transformation ▪ Improved reliability with APM ▪ Reduced SCRAMS and improved plant performance with OO ▪ Better power forecasting with BO

Predix wins – making new markets

|	**LIXIL**	**TOSHIBA**	**pitney bowes**
Solution	▪ Predix + scheduler application	▪ Predix + application for predictive maintenance and service scheduling	▪ Predix + asset health application
Outcome	▪ Reducing cost and project delays ▪ Improving controller productivity ▪ Enhancing customer satisfaction	▪ Predix is the architecture platform supporting Toshiba IOT solutions & services	▪ Up to 10% machine efficiency ▪ Up to 20% increases in machine yield ▪ Up to 15% savings on parts replacement ▪ Up to 10% tech support time-savings

The partner ecosystem is our force multiplier

System Integrators	ISVs	Telcos	Technology Partners	Resellers

Joint Selling	Customized Solutions	Strategic Partnerships

275+ target accounts across 30+ partners ... 1,000s of certifications drive share and help build the app economy ... 10x multiplier

# Portfolio of services offerings aligned to customer journey

Buyer's Journey

IIOT Strategy → Design → Deliver → Support → Grow
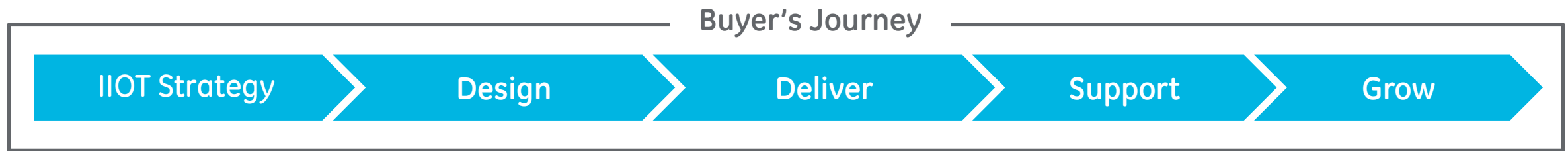
| Advisory services	Rapid start services	Implementation services	Managed services	Support services
▪ IIOT workshop ▪ Design thinking ▪ Data science	▪ Cyber ▪ APM ▪ Brilliant Manufacturing ▪ Predix ▪ Operations Optimization	▪ Architecture ▪ Migration ▪ Blueprint	▪ Remote monitoring and diagnostics ▪ Security ops center	▪ Certification programs ▪ Services

Digital Thread

Jim Fowler – VP & CIO, GE

22 years experience (16 years GE)
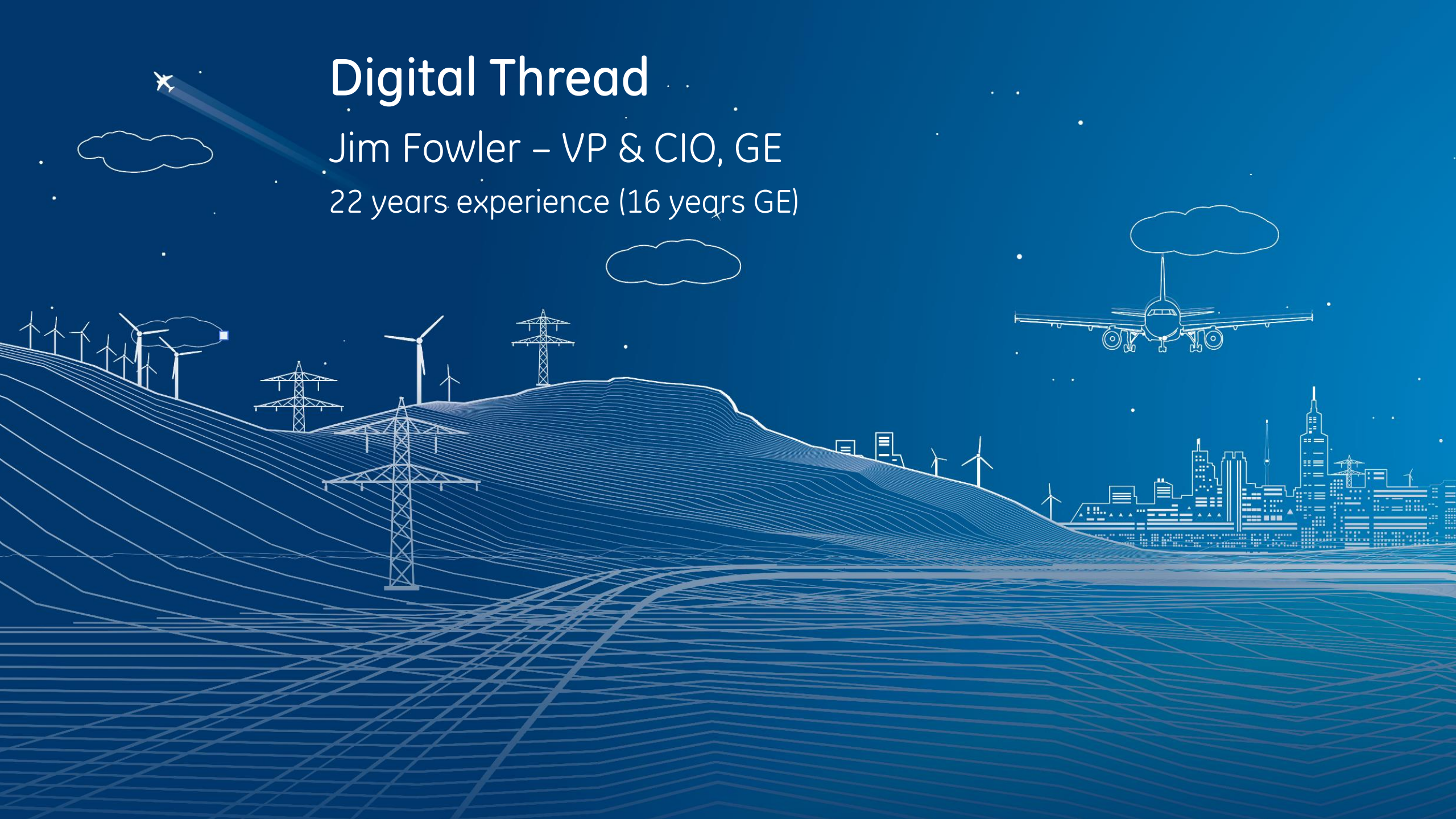
What is the Digital Thread?

Connecting people, machines & data throughout the value chain to drive previously unattainable outcomes by changing the way we sell, manufacture, design & service

machines

Driving outcomes

people

data
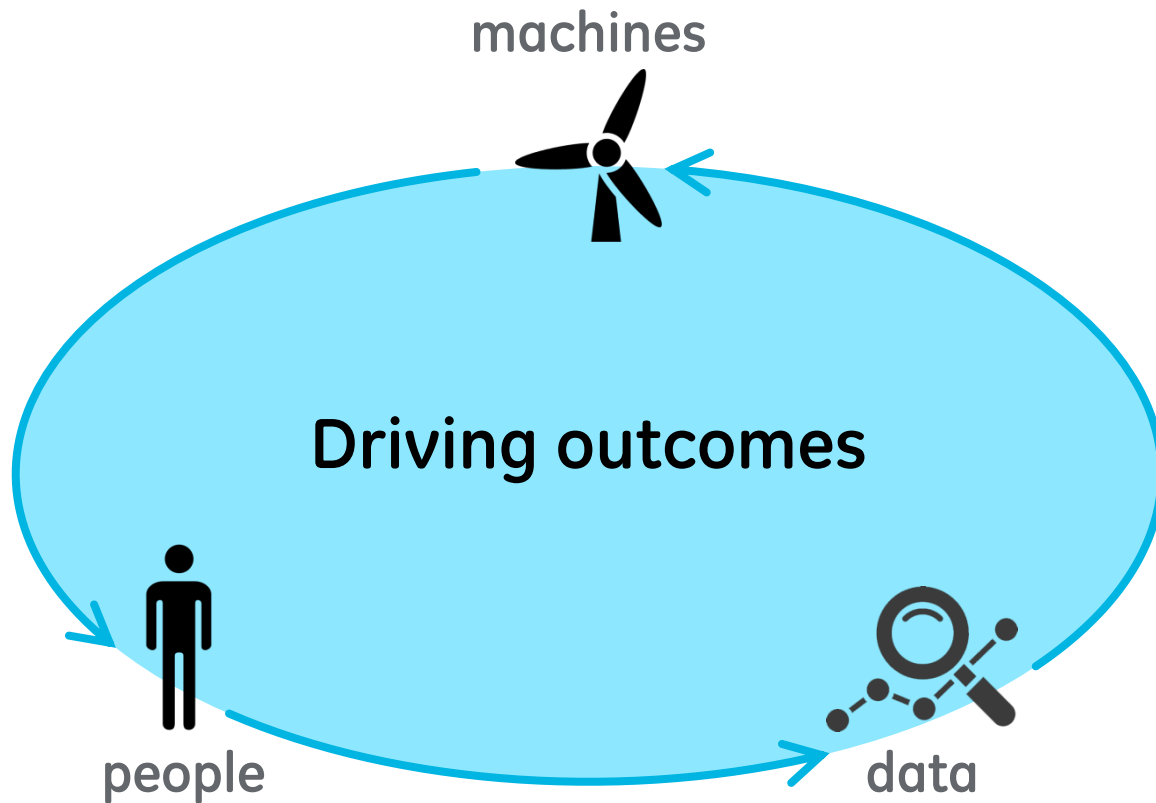
How?

✓ Using Predix, advanced analytics, talent & the Digital Twin to create speed

✓ Scaling reusable solutions to solve GE wide problems / pain points

Why?

✓ Driving $500MM of internal productivity in 2016 & $1B by 2020

✓ World class user experience to make GE the workplace of the future

Digital Thread strategy

What
- Make GE the BEST example of Digital Industrial ... Lean + Digital
- Deliver $500MM of productivity in '16 and $1B by 2020

How
- Horizontal solutions for optimizing value chain
- Optimized for products/machines
- Delivered with persona based applications

ITO	NPI	OTR	Services

Digital Twin   **Predix**   *APM*

Commercial
~$28MM
15 Live Solutions
10 Pipelined

Engineering
~$76MM
24 Live Solutions
35 Pipelined

OTR
~$86MM
30 Live Solutions
20 Pipelined

Services
~$310MM
32 Live Solutions
30 Pipelined

'16 goals ... enable $500MM+ in cost out and connect 75 factories

Services at GE – horizontal solution

Persona-based apps

Field Vision   **Smart Repair**

Horizontal solutions

APM	Inspection as-a-Service	Resource scheduling & Mgmt	Contract Mgmt	Repair & scoping

Platform

PREDIX

Across GE

✓ Personal based applications driving services productivity

✓ Built on reusable services that are tied to Digital Twin models

✓ Eliminates low value manual work

✓ Analytics drive the work scope

✓ Optimizes the services value chain

Enterprise data + machine data driving ~$250MM in productivity
Internal reference site … services tools key for Predix customers

Services repair facility at GE – Grove City (Transportation)

	Yesterday	Today	Tomorrow
Machines connected	0	98	110+
Conditional	0	20%	70%
Auto routing	0	15%	60%+
3D drawing conversion	0	3,700	10,000+

Early identification enabling conditional remanufacturing … controlled through Auto-Routing

✓ Auto-fed conditional work scopes
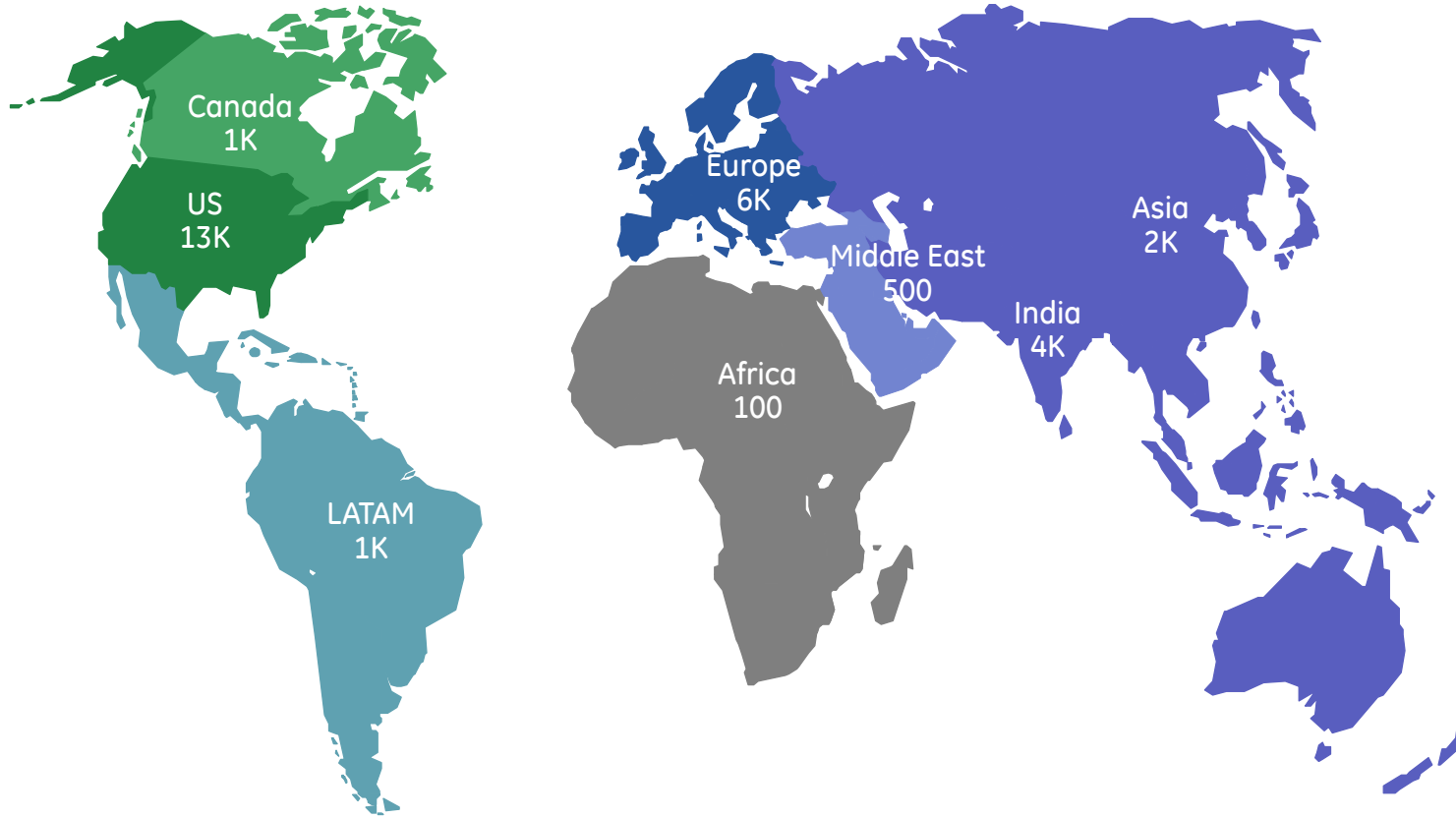✓ Real time repair status

$25MM productivity in '16

Organization

Jen Waldo – Senior HR Manager, GE Digital
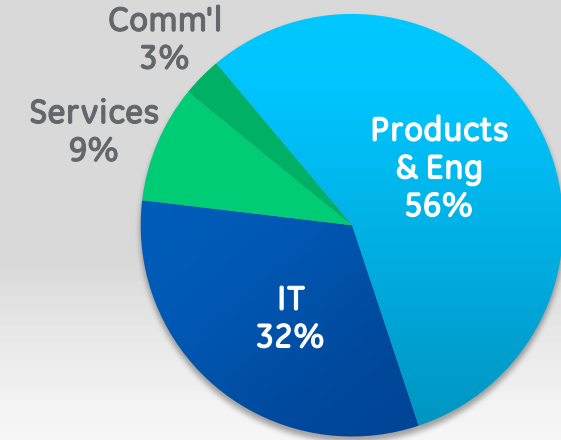
14 years experience (all GE)

GE's Digital Workforce …~28K employees globally

Canada 1K
US 13K
LATAM 1K
Europe 6K
Middle East 500
Africa 100
India 4K
Asia 2K

Tech industry external hires into GE
5,500 through 2015 … +2,000 more by YE 2016

Function

Comm'l 3%
Services 9%
Products & Eng 56%
IT 32%

Attrition

Tech Industry 22%
GE Digital 5.5%
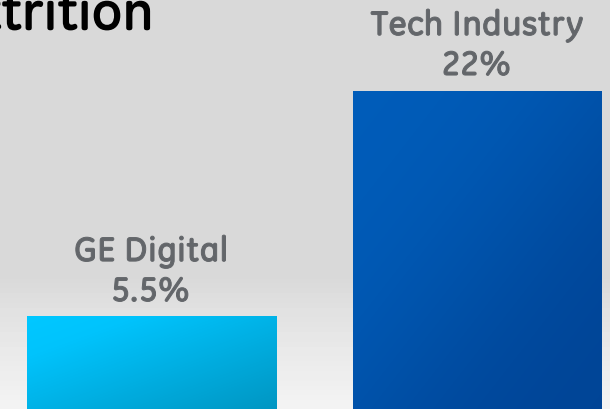
Building the GE Digital talent pool

Strategy & Talent Sources

Platform & Cloud

Applications

POC Projects

2012/2013   2014/2015   2016+
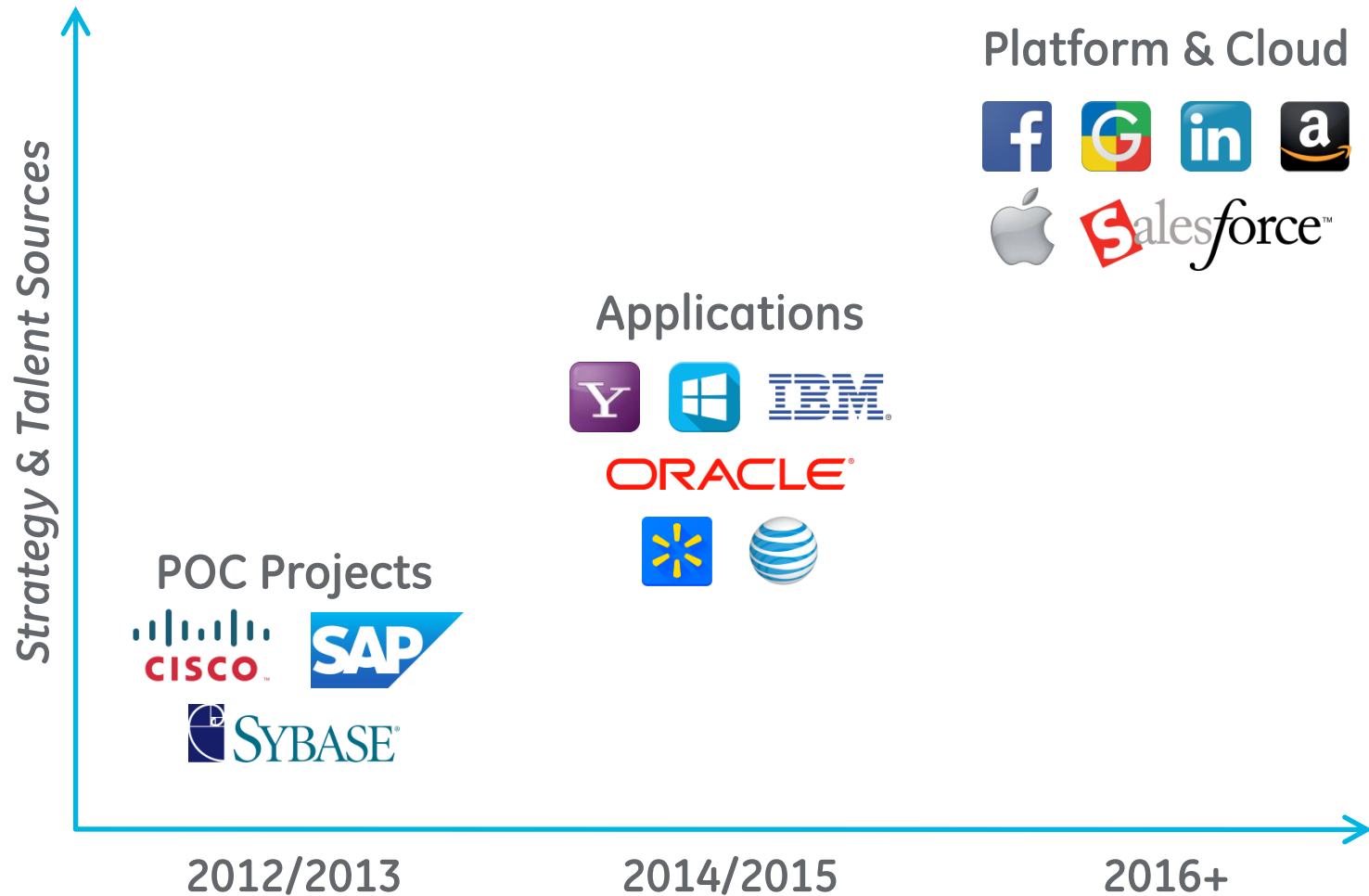
Developer Profile

Development Experience
full stack, platforms for applications, frontend/backend, dev ops

Skills
REST API, JavaScript, Java, node.js, React, Hibernate, Python, Jenkins

Education
Degrees: CS, electrical engineering
Schools: UC Berkeley, Stanford, MIT, Cornell, Carnegie Mellon, UT Austin, USC

Transforming our approach to digital talent

Recruiting

Model: Outsourced → Insourced
Candidates: Active → Passive
Brand: Limited → Growing

Compensation

Market: Industrial → Tech
Structure: Base →
Base + Bonus + Equity

Learning

Delivery: Classroom → Online
Focus: Leadership →
Technical

Career Development

Leaders: Managerial →
Technical
Careers: Band climb →
Capability growth

Culture & Community

Community: Unknown →
Connected
Culture: Industrial →
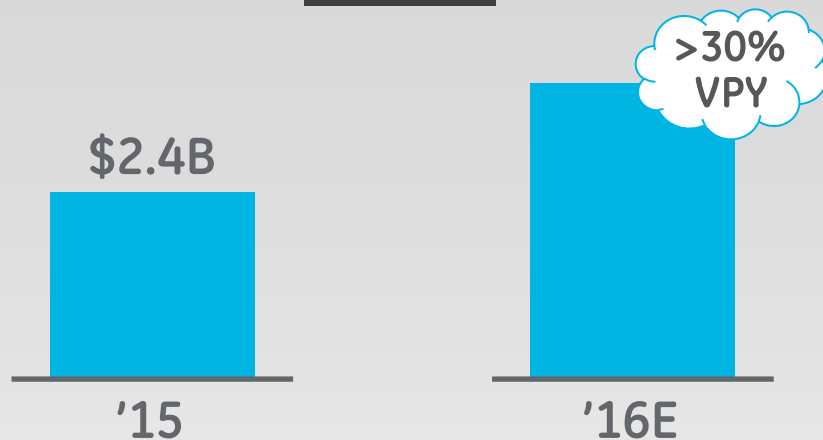Digital industrial

Power Digital

Ganesh Bell – CDO, GE Power

22 years experience (2 years GE)

Power Digital Solutions

Orders

$2.4B

'15

>30% VPY

'16E

Market environment

- Digital agenda becoming a top priority for Power & Utility CxO's
- Electricity Value Network (EVN) is an emerging opportunity: $95B by 2020

Priorities

- Category defining portfolio from sensor to cloud (AGP to APM)
- Leverage Alstom + GE installed base
- Grow new portfolio +80% VPY ... 20+ DPP customers since launch
- Drive customer adoption & success
- Lead with enterprise digital transformation
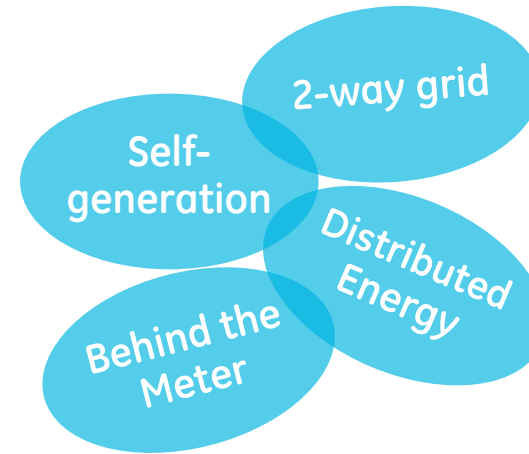- Innovate new business models (e.g. outcome-as-a-service)

Digital Transformation of Electricity

WORLD ECONOMIC FORUM

World Economic Forum White Paper
Digital Transformation of Industries:

~$1.3T
Industry value

$2T+
Societal impact

$387B
APM

Self-generation

2-way grid

Distributed Energy

Behind the Meter

Business models under threat

Customers investing "innovation dollars" into software companies

$500MM+

e·on   Exelon

RWE   ENGIE

SOUTHERN COMPANY

Digital is a Board priority

Digital transformation market opportunity

Value Chain	**Generation**	⟷	**Grid**	⟷	**Prosumers**

Opportunity

$40B · 2020 $50B · 2020   TBD / $5B · 2020

$95B opportunity across the EVN by 2020

Current Categories

Business Optimization	Outage Management	Energy Efficiency as a Service
Plant Operations Optimization	Wide Area & Congestion	Energy Intelligence
	Energy Management System	

Asset Performance Management

Emerging Categories

Renewable Integration Management	Micro-Grid, Demand Response, Virtual Power Plant
Distributed Energy Resource Management	Integrated Customer Services
Digital Field Worker	
Cyber Security	
Platform for Supply Flexibility	Platform for Demand Flexibility

Portfolio solution map

BUSINESS OPTIMIZATION (BO)	Market Intelligence & Forecasting	Portfolio Optimization	Fuel Nominations	Financial Settlement

OPERATIONS OPTIMIZATION (OO)	Performance Metrics	Plant Optimization	Outage Management	Fuel Supply Management	Financial Planning	Regulatory Compliance

ASSET PERFORMANCE MANAGEMENT (APM)	Machine & Equipment Health	Reliability Management	Maintenance Optimization

PREDIX   **EDGE & ADVANCED CONTROLS**   **CYBER**

Machines to cloud – story of digital outcomes

AGPs

- Outcomes delivered via analytical applications close to "edge"

- Customer journey of analytics and digital twin

- Sold alongside hardware retrofit

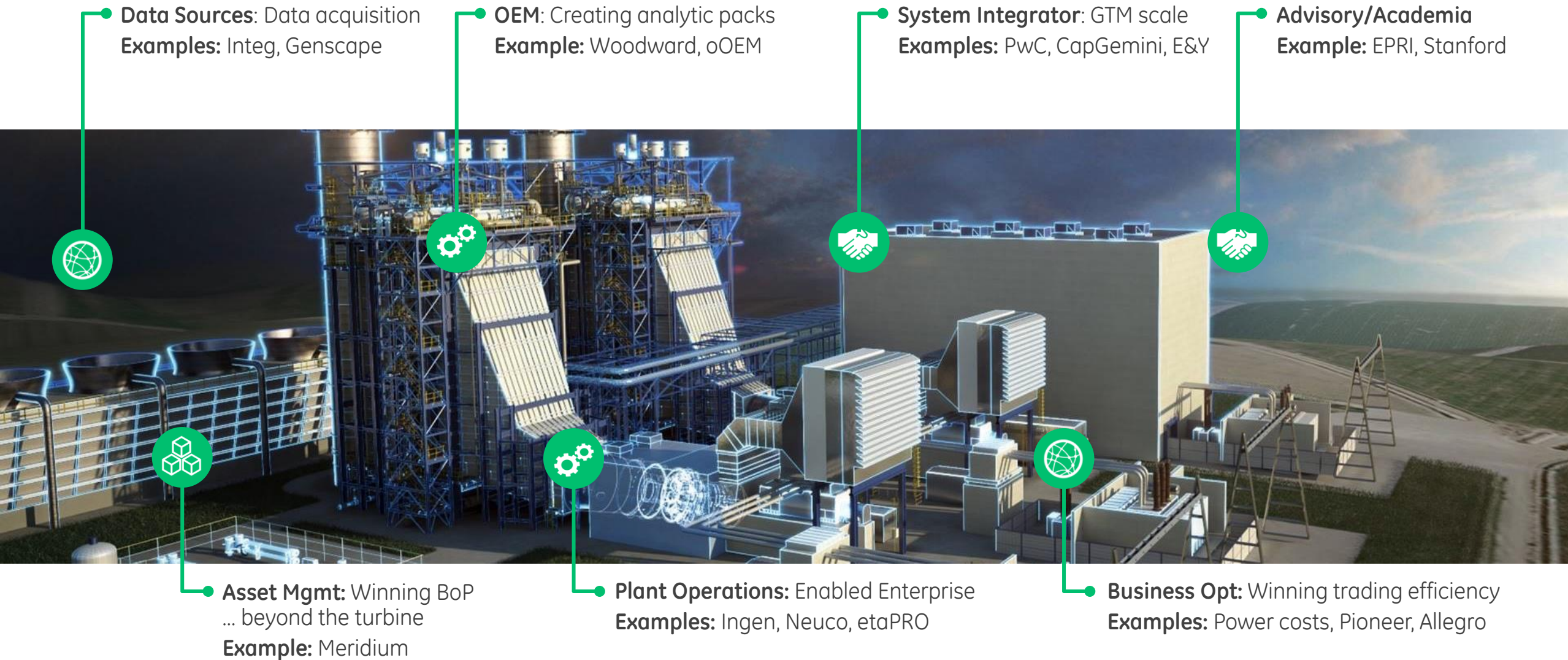Software Defined Machines + Digital Twin + FlexEfficiency App

Edge

- Next gen "AGP" expanding to rest of fleet

- Evolution to Predix Edge Platform + Edge Apps (e.g: Virtual Battery, Ancillary Response, Smart Start)

- Digital twin from sensor to cloud

Virtual Battery · Ancillary Response · Smart Start · Dispatch Optimization

Suite of apps

PREDIX EDGE

Power & utilities: winning with the ecosystem

Data Sources: Data acquisition
Examples: Integ, Genscape

OEM: Creating analytic packs
Example: Woodward, oOEM

System Integrator: GTM scale
Examples: PwC, CapGemini, E&Y

Advisory/Academia
Example: EPRI, Stanford

Asset Mgmt: Winning BoP
... beyond the turbine
Example: Meridium

Plant Operations: Enabled Enterprise
Examples: Ingen, Neuco, etaPRO

Business Opt: Winning trading efficiency
Examples: Power costs, Pioneer, Allegro

Innovating with new business models

1 **Software as a Service (SaaS)**
- ✓ Connect assets
- ✓ APM, OO, BO

2 **SaaS within multi-year agreement**
- ✓ Underwrite outcomes, ↑ return
- ✓ Include SW in every reneg

3 **Outcome-as-a-service (OaaS)**
- ✓ New offering to TX customers
- ✓ Next generation CSA offering

Expanding TAM & wallet share

Executing with Customers

Azeez Mohammed – VP, Services MEA, GE Power
17 years experience (all GE)

Digital solutions capturing needs of MEA power customers

Large installed base 300GW+

South Africa | Saudi Arabia | Egypt | UAE

Customers pursuing efficiency & reliability

✓ Efficiency improvement

✓ Better reliability

Emerging demand for power

Pakistan | Libya | Iraq | Angola

Customers building out infrastructure

✓ Real-time visibility

✓ CAPEX → OPEX

Case study 1: APM improves reliability of LNG complex

Improve volumetric down time (VDT) ... 1 day VDT multi-million savings for an LNG complex

7 LNG Train ~1.5KM long with mechanical & electrical assets

Cooling tower   Cooling cycle   Compressor train   Power plant

Customer dynamics

✓ RAS Gas ... 2nd largest LNG producer & 45% of Qatar's GDP

✓ GE's APM to reduce volumetric downtime, decrease excess flash gas & manage maintenance costs

  • Significant value in flash gas/train per annum

GE solutions for a typical LNG processing plant

✓ Power APM + LNG extensions + Predix

✓ 1,000+ GE & non GE equipment connected to Predix

✓ Estimated savings @ 2 days of down time multi $MM

✓ Long term commitment ~25 year recurring revenue

Expand to other power intensive industries e.g. smelter, water, etc

Case study 2: Saudi Electric Co. (SEC) – Generation Optimization

Single source of truth aligned to SEC's KPIs ... phase I solution for a mixed fleet of 500+ units
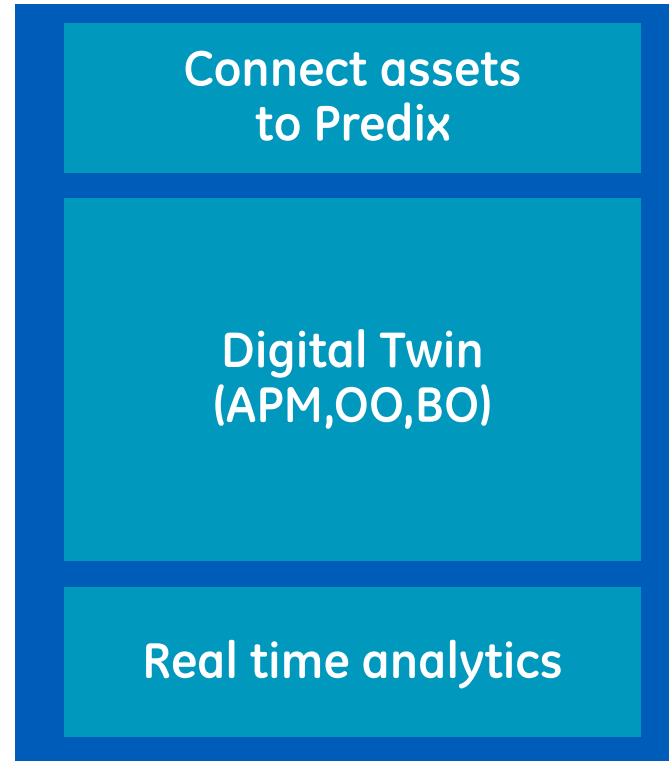
Operational Inputs

- 40 GW
- 500+ units
- GE + non–GE
- Gas & steam turbines
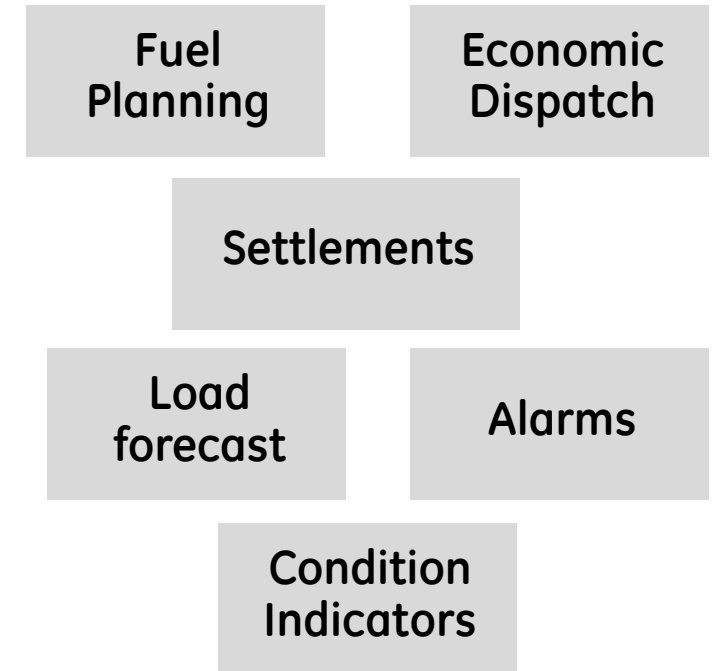- 16 large power plants

Financial metrics

- Fuel delivery
- Dispatch schedule
- IPP data
- Dispatch actuals
- Balancing requests

Predix Cloud

Connect assets to Predix

Digital Twin (APM,OO,BO)

Real time analytics

SEC Business Value

Fuel Planning

Economic Dispatch

Settlements

Load forecast

Alarms

Condition Indicators

Apps for specific use cases

SEC viewed as fleet leader ... 30+ asset managers in MEA need similar solution

Case study 3: HUBCO – selling outcome as a service

Up to 4% efficiency driven by Digital Twin … optimizing process & hardware at plant level

HUBCO
- 1.3GW
- Ansaldo Turbines
- Fuel = expensive furnace oil


```
Process          Digital         Optimal
engineering  →   Power Plant  →  setting
```

✓ GE advantage … bringing physics based expertise & data analytics to deliver value for customer

✓ How we are executing … typical financials:

Product	Efficiency	10 year value
APM	1%	$50MM
Neuco … OO	1%	$50MM
OO (Gas)	1.5%	$75MM
Hardware/svc	0.5%	$25MM

✓ ~$200MM of additional value from existing installed base with minimum hardware changes

✓ Gain share model

Improving life & performance of aging installed base … global opportunity

Healthcare Digital

Charles Koontz – CDO, GE Healthcare

28 years experience (<1 year GE)

GE Healthcare Digital

Revenues

~$2B

'16+

Cloud: ++

Existing: =

'15
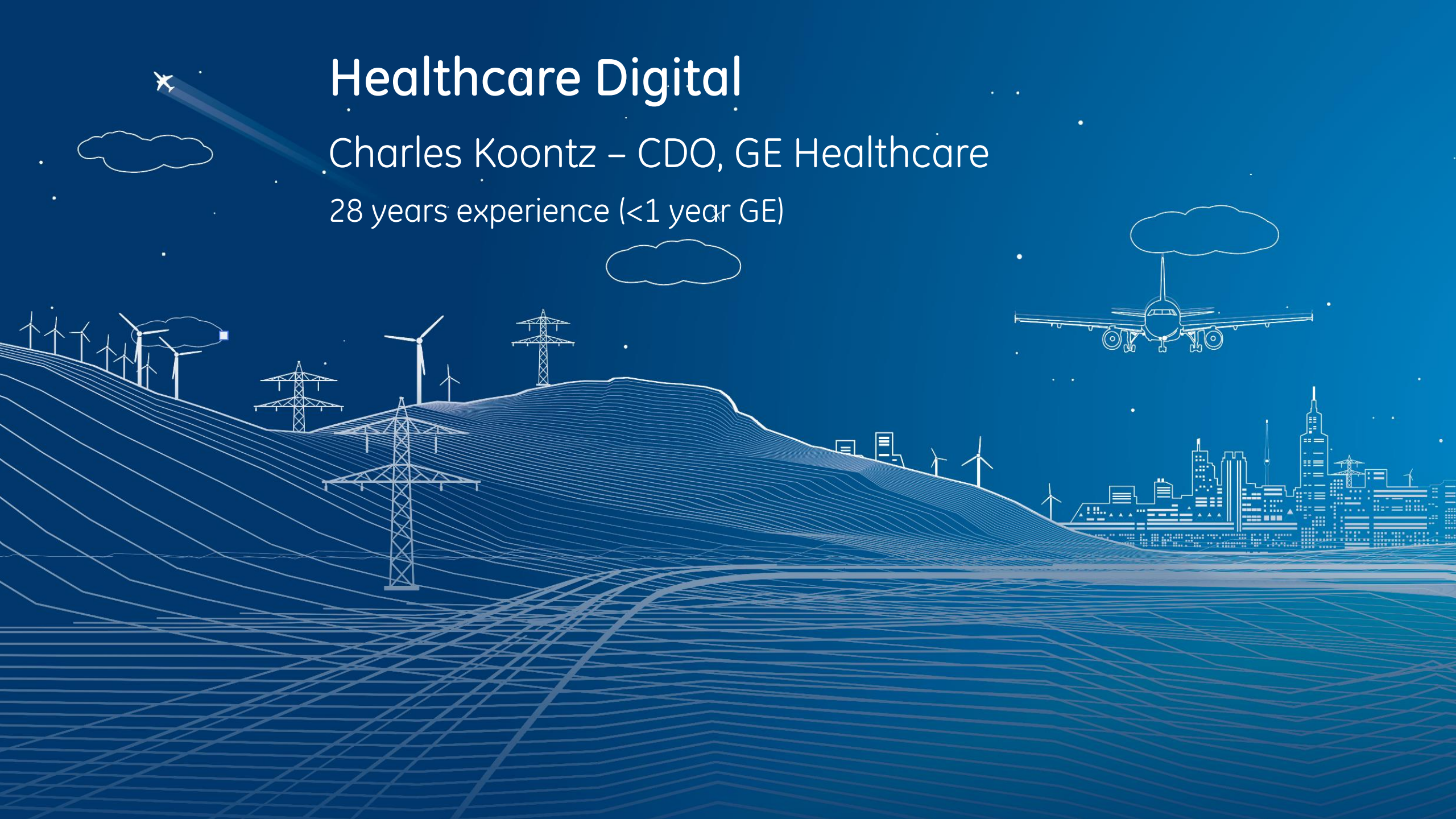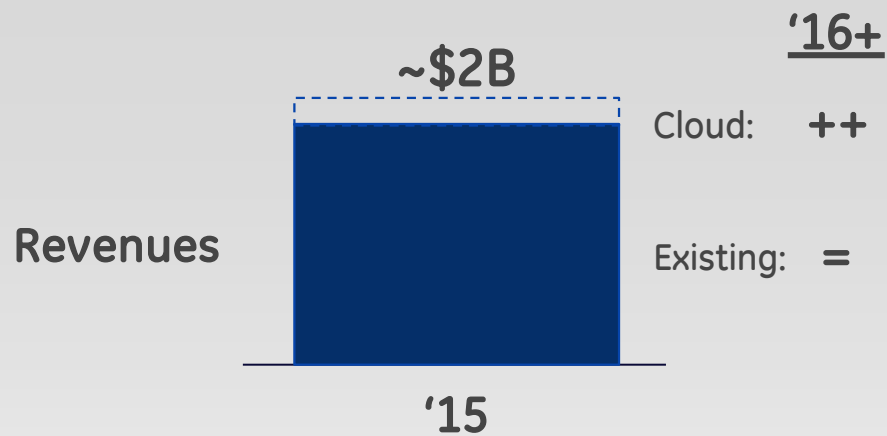
+ Deep installed base/customer relationships

+ Leader in Radiology imaging

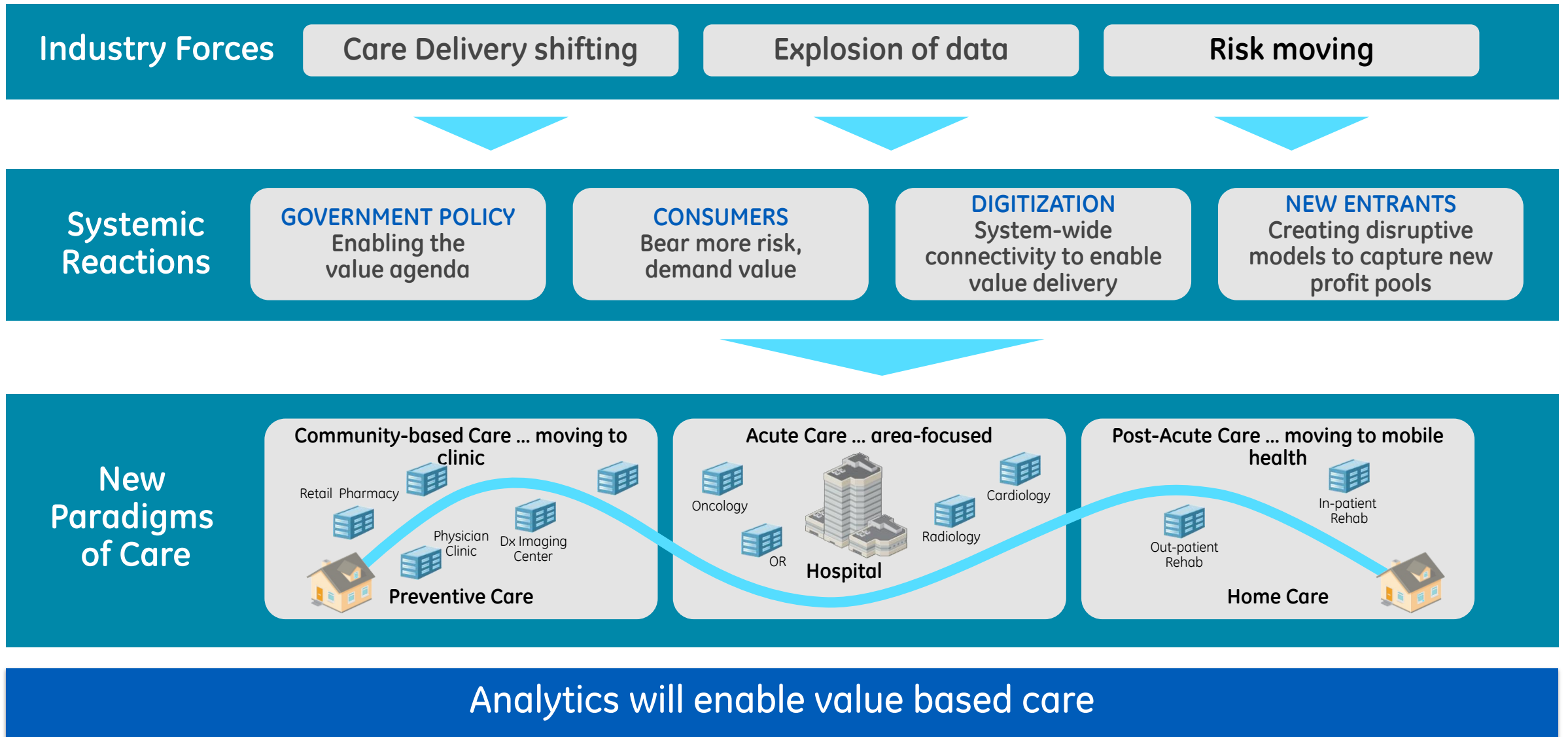+ Gaining share in enterprise imaging & financial management

– Multiple platforms

Dynamic healthcare marketplace

- Shift to pay-for-performance & value-based care
- Care delivery moving outside the hospital
- Transition to cloud to handle large volumes of data
- Providers looking for new business models to monetize their data to improve patient outcomes

GEHC investment priorities

- Own the digital layer that sits above the GEHC hardware install base – connectivity, analytics, and applications
- Stand up the GE Health Cloud as a platform and establish a 3rd-party ecosystem
- Build out a robust solutions organization in conjunction with ecosystem of partners
- Develop differentiated applications to enable collaborative care that improves clinical outcomes

Accelerating shift towards value-based healthcare

Industry Forces

Care Delivery shifting	Explosion of data	Risk moving

Systemic Reactions

GOVERNMENT POLICY
Enabling the value agenda

CONSUMERS
Bear more risk, demand value

DIGITIZATION
System-wide connectivity to enable value delivery

NEW ENTRANTS
Creating disruptive models to capture new profit pools

New Paradigms of Care

Community-based Care ... moving to clinic

Retail Pharmacy
Physician Clinic
Dx Imaging Center
Preventive Care

Acute Care ... area-focused

Oncology
Cardiology
Radiology
OR
Hospital

Post-Acute Care ... moving to mobile health

In-patient Rehab
Out-patient Rehab
Home Care

Analytics will enable value based care

GE Healthcare Digital portfolio

APPLICATIONS

GE Healthcare

Enterprise Imaging	Care Delivery Workflows	Diagnostic Imagine	Asset Performance	Cellular Diagnosis
Financial Management	Workforce Management	Ultrasound	Dose Management	
Population Health (Caradigm)		Monitoring	Analytic Apps & Dashboards	Drug Development

3rd Party

Applications built by Customers and Independent Software Vendors

Analytics Layer

PLATFORM

GE Health Cloud Services

Health Data & Content Management	Multi Modality Viewing	Core Pathway Modeling	Core Coordination	Data Science & Decision Support	Healthcare Inter-operability Tools & Standards
	Mobility Support	Guidelines & Protocol	Core Navigation	Analytic Model Development	
	Visualization	*Workflow*	*Collaboration*	*Analytics*	

Predix Cloud Services

| Security & Privacy | Identity Management | Cloud Partner Services | Infrastructure as a Service | Connectivity as a Service | Platform as a Service |

- ✓ Data management
- ✓ Consistent user experience
- ✓ Security and privacy
- ✓ Deployment and service models
- ✓ Industry compliant
- ✓ Interoperability
- ✓ Analytics services
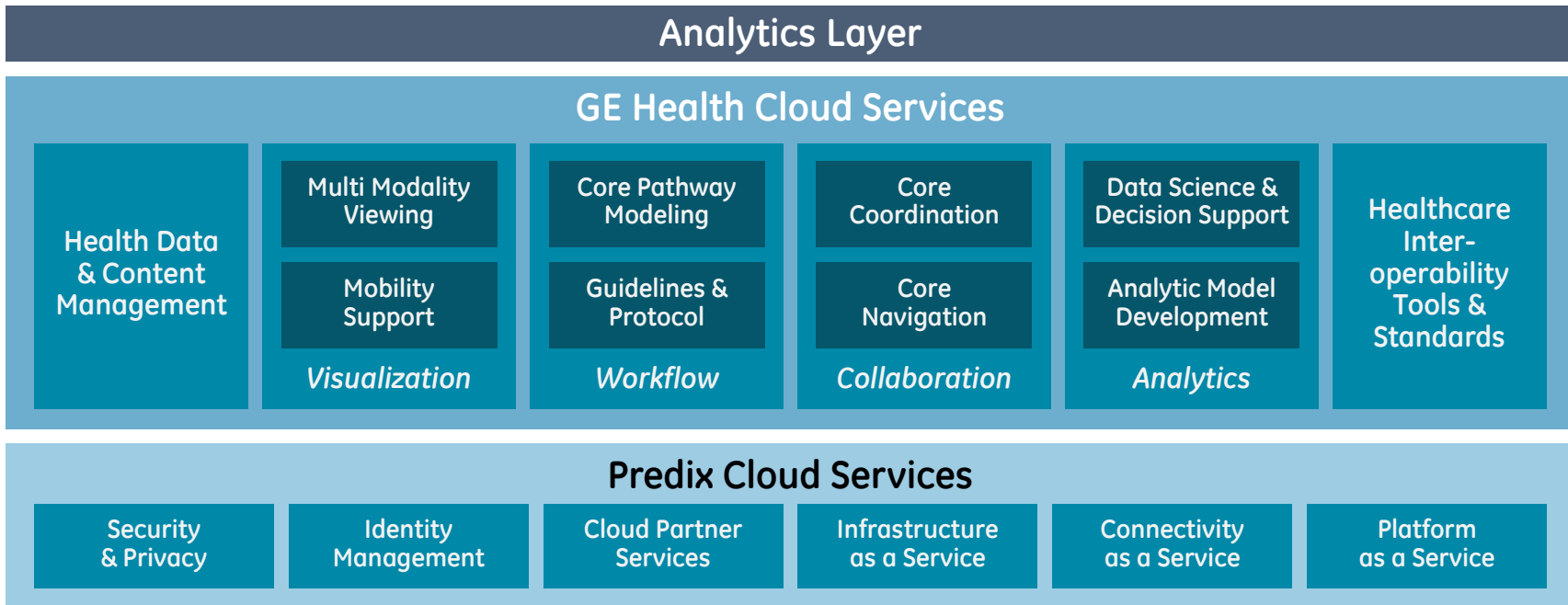
HW & SW installed base creates competitive advantage

Hardware

- 1MM imaging & ultrasound machines installed
- 16K scans every minute on a GE machine
- 124K machines under "active management"

Software

- 69B images under management
- 73MM medical records in quality reporting database
- $220B in financial transactions processed annually

Why GE Healthcare wins

- Utilize deep clinical domain to properly apply insight to caregiver workflow
- Connect clinical + financial + operational data to generate insights
- Wing-to-wing view of imaging value chain
- Continuous pipeline of new imaging data
- Leverage Predix platform for security, user experience, analytics engine

Become the partner of choice to help providers move to the digital future

GE Health Cloud is a differentiator for large enterprise wins

East Midlands Radiology Consortium (EMRAD)

- 6MM patient population across diverse regions

- 2.5MM exams/year ... 50K clinicians ... 7 NHS trusts

- Severe radiology resource constraints → led to outsourcing significant # of exams/year

Contract details

- New cloud apps (collaboration, image sharing)

- Termed "Vanguard innovation project" ... NHS will use EMRAD as model for follow-on trusts

- Scheduled to go live in 2H'16

Advanced Visualization | MDT Virtual Meetings | Case Exchange | Image Portal

GE Health Cloud

Centricity Solutions for Enterprise Imaging
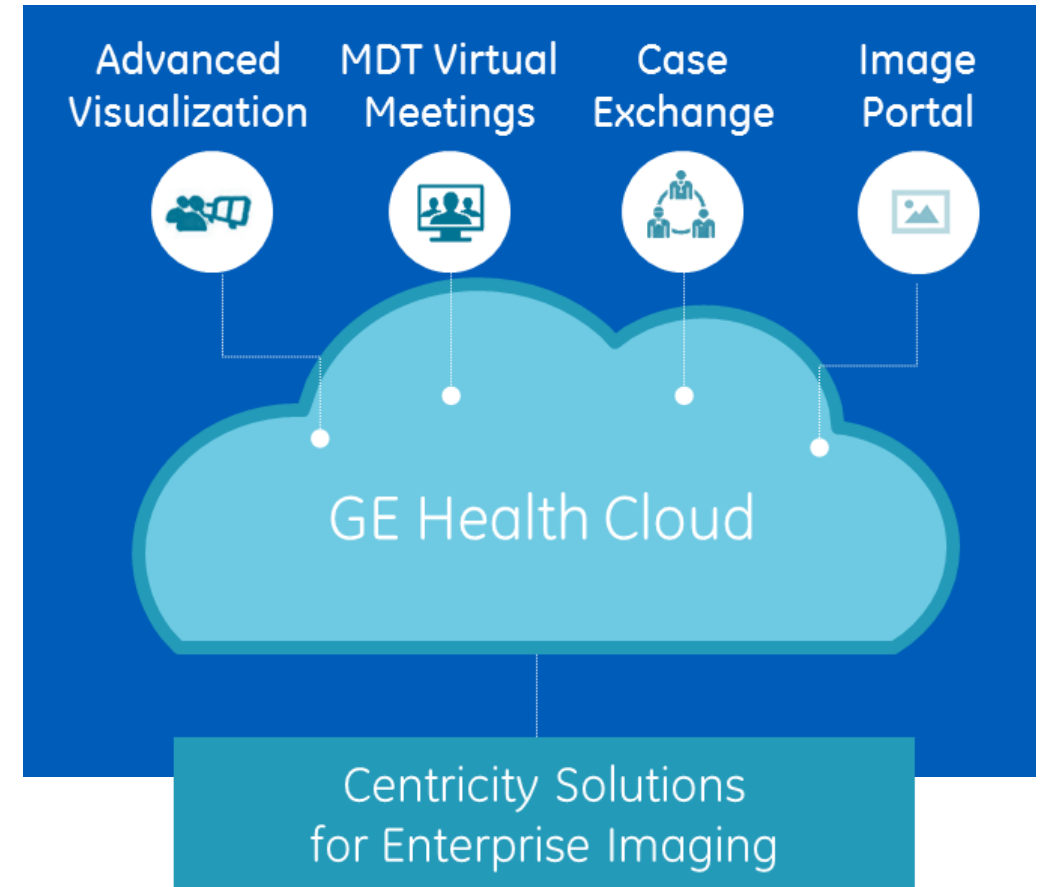
Create clinical collaboration network to provide timely radiology care

Asset Performance Management in Healthcare

Expanding capacity through data-driven workflow optimization

Houston Methodist

- Not-for-profit health system serving the greater Houston area with a fleet of GE systems

- Robust demand for outpatient scans & high volume of inpatient studies causing operational bottlenecks

- Utilized GE machine data and advisory services to drill down to actionable operational improvements
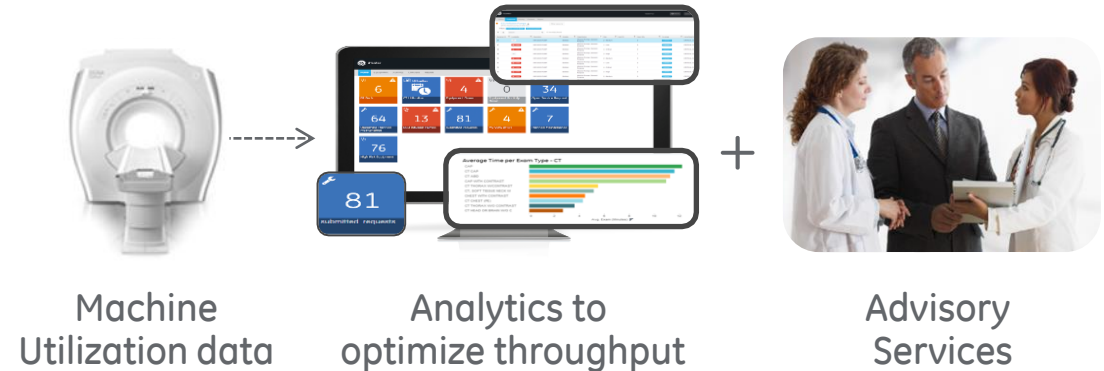
Impact

- Methodist: 10-30% shorter MR exams → 3,250 additional cases/year ($4MM additional revenue)

- GE: commercialize APM offering across GE IB

Machine Utilization data

Analytics to optimize throughput

+

Advisory Services

↓ exam times and ↑ throughput

↑ fleet asset utilization

Analytics as a service ... ↑ service renewals, ↑ price

Transportation Digital

Seth Bodnar – CDO, GE Transportation

15 years experience (5 years GE)

Transportation Digital

Orders

$0.4B — '15

>30% VPY — '16E
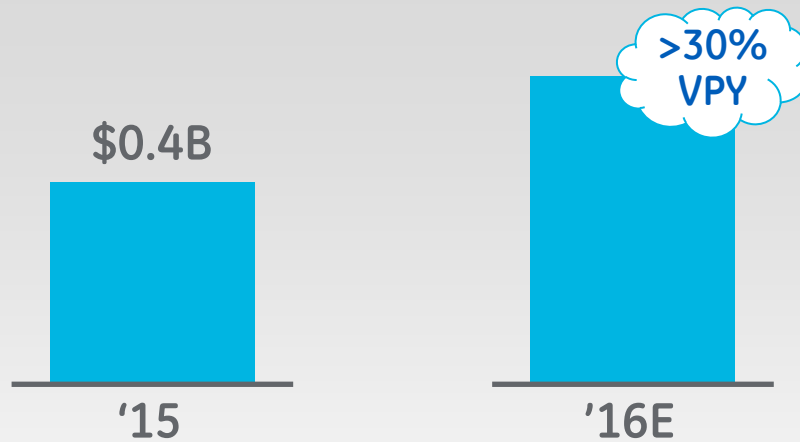
Market environment

- Carload volumes down … shift away from coal
- Intermodal key… industry growth driver
- Focus on supply chain sensitive volumes … opportunity for end-to-end solutions

Priorities

- Grow from our core & drive customer productivity … enable locomotive as "mobile data center"
- Build-out Rail Operating System (rOS) & leverage Predix … cohesive, connected suite of offerings
- Enable integration of rail supply chain … first mile/last mile connectivity
- Expand ecosystem partners for adjacent growth … integrated inspection, analytics
- Enhance customer engagement … outcome selling & strategic engagement

Leveraging Predix & innovating with customers to create digital solutions to deliver key outcomes

Transportation Digital value chain

PREDIX

6000+ rail shippers

500+ short lines

1.5MM railcars

450K wayside assets

25,000 locomotives

250 rail yards
....
100 Terminals

Shipper

First Mile

Train / Main Line

Locomotive

Yards / Terminals

Last Mile

Receiver
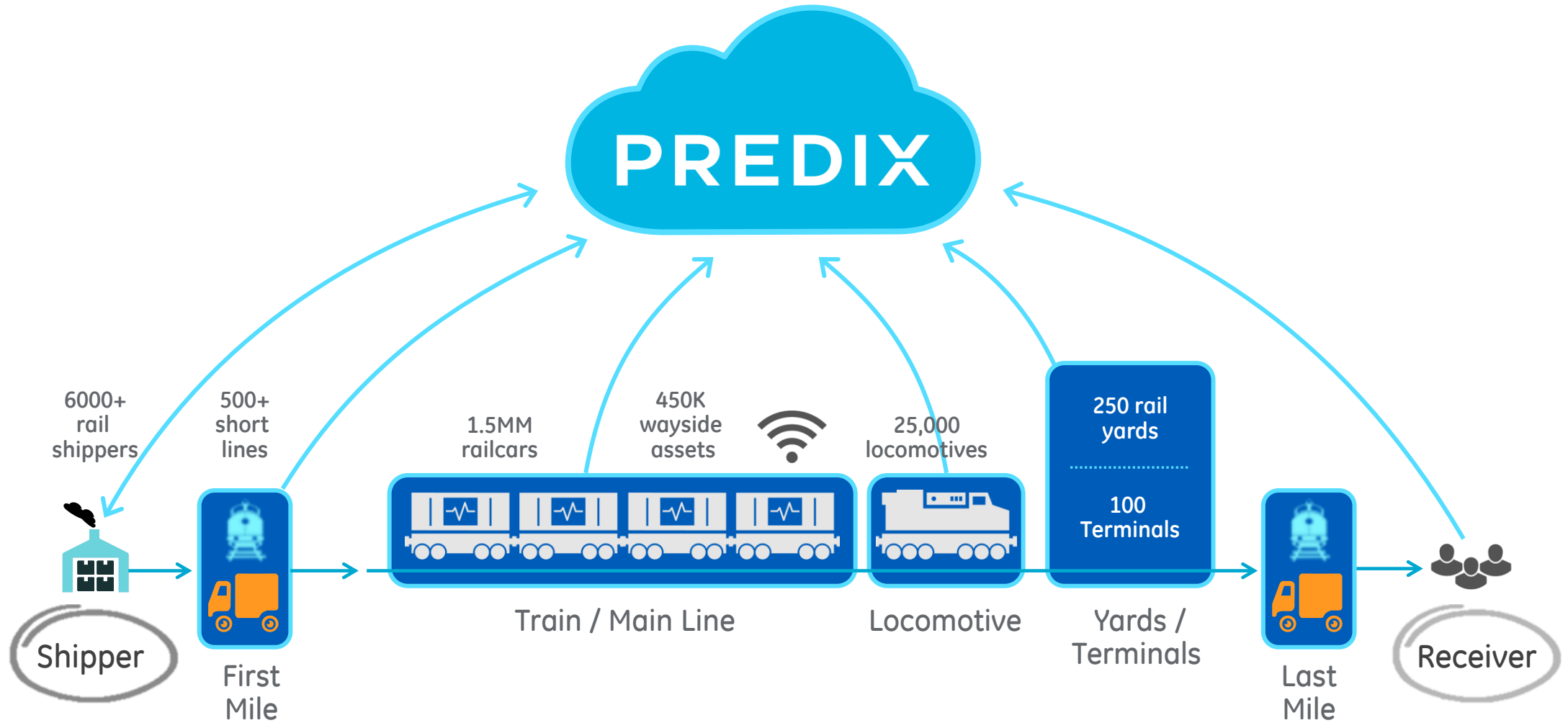
Delivering for our customers

Railroad outcomes

1% ASSET UTILIZATION IMPROVEMENT = $800 MILLION

1% CAR DWELL IMPROVEMENT = $2.2 BILLION

1 MPH NETWORK VELOCITY IMPROVEMENT = $2.5 BILLION

1% FUEL EFFICIENCY IMPROVEMENT = $140 MILLION

rOS Powered by Predix™

Asset — Loco AM, Wayside AM, Railcar AM

Network — Resource Planning, Yard Planning, Movement Planning

Supply Chain — Shipper Mgmt., Inventory Mgmt., Fleet Mgmt.

Operations — Fuel Mgmt., Dispatch Mgmt., Rail Mgmt.

API's, Analytics, Architecture, Mobile

Train performance

Productivity
LocoVISION

Reliability
RM&D
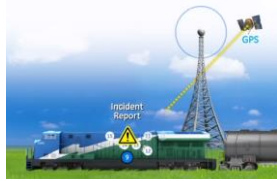
Mission Success
Power Advisor

GoLINC

Carloads
Locotrol DP

Fuel eff
Trip Optimizer

Rail health
Rail Integrity
Monitor

GoLINC

- Network, comm, processing platform
- Predix-edge enabled; >6,000 in service
- Locomotive mobile data center

Trip Optimizer

- EPA-certified Energy Mgmt. Solution
- 10% ↑ in fuel efficiency
- >90MM gallons saved, 125MM auto miles

LocoVISION

- High def. digital video recording system
- Enables onboard video analytics
- Detects rail flaws – wide gauges, etc.

Network performance

Shipper Mgmt.

Terminal Planning

Yard Planning

Transportation Management

Railcar Asset Management

Wayside Asset Management

Network Planning
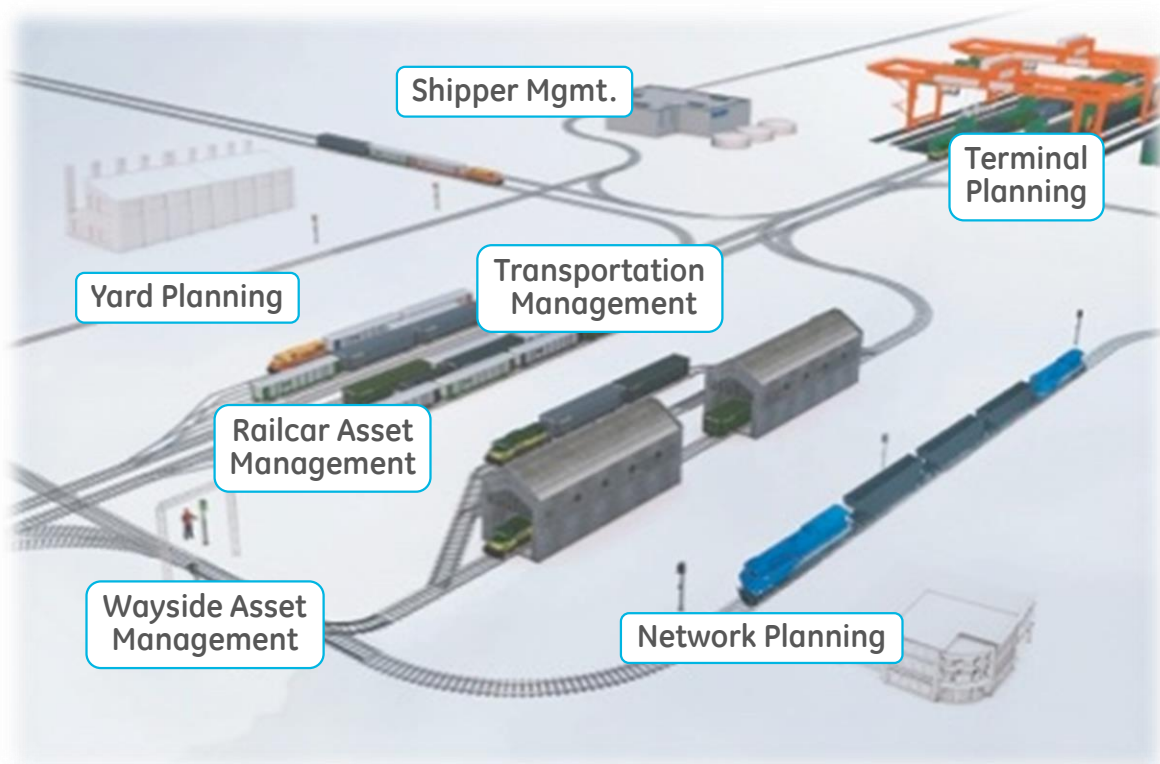
Movement Planner

- Real-time network optimization
- 2 N.A. installs covering 1/2 of traffic
- 10% ↑ in network velocity

Smart Intermodal Terminal
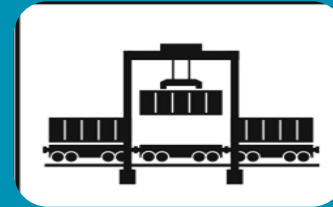
- Next gen Terminal Operating System
- Architected on Predix
- 100+ terminals, 30MM containers/yr

Transportation Management

- Automates train, switching ops
- SaaS solution serving ~500 short lines
- ~8MM carloads handled per year

Predix: powering the portfolio

Predix apps

rOS core apps

Customer apps

3rd party apps

PREDIX

network
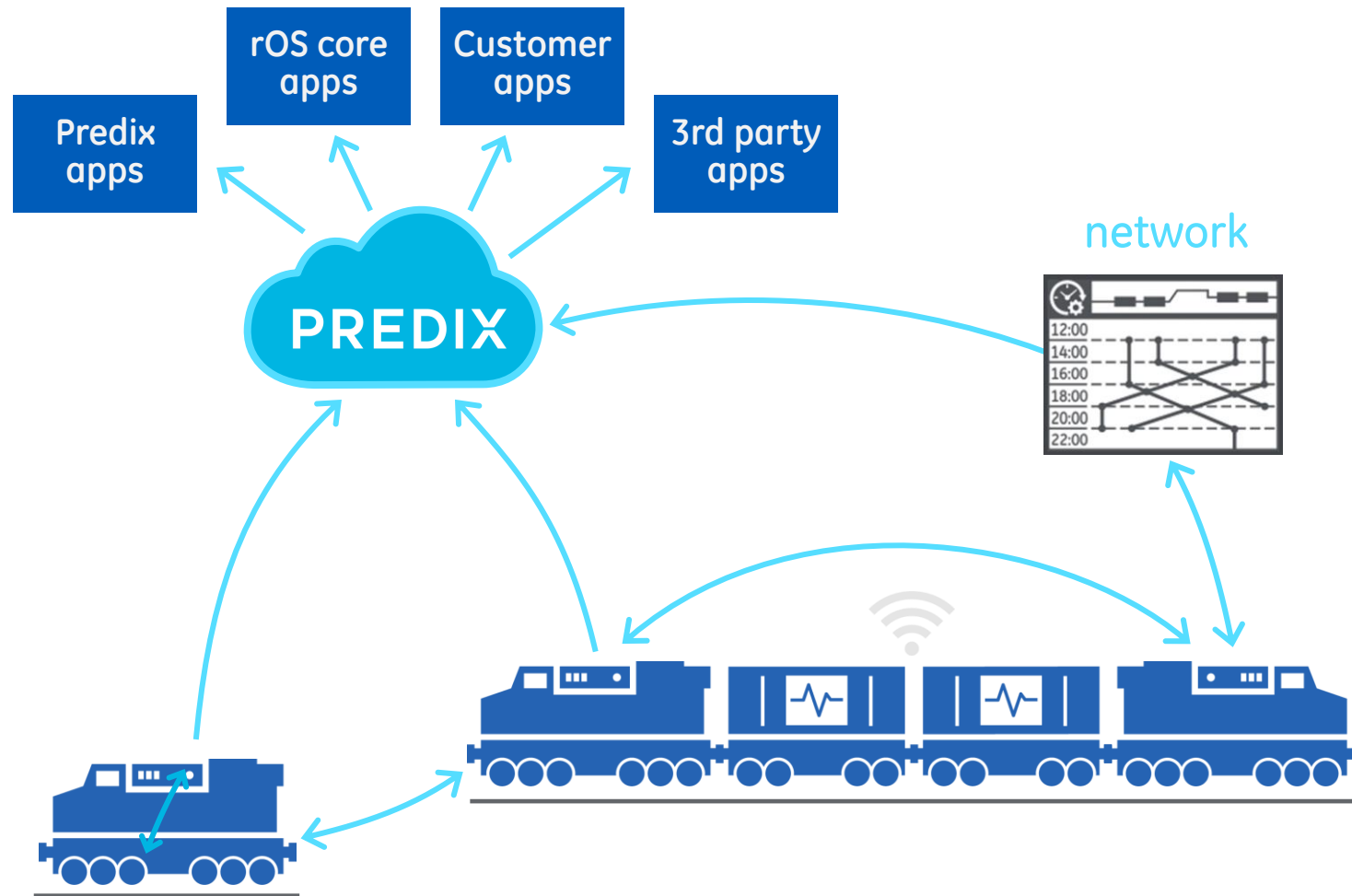
Predix

- Operating system that connects our apps

- Leverages data across disparate system & drives productivity

- Performance analytics – driving data-driven outcomes

Transforming services

Kevin McAllister – VP, Services, GE Aviation

29 years experience (27 years GE)

A growing installed base

Departures

(# millions)
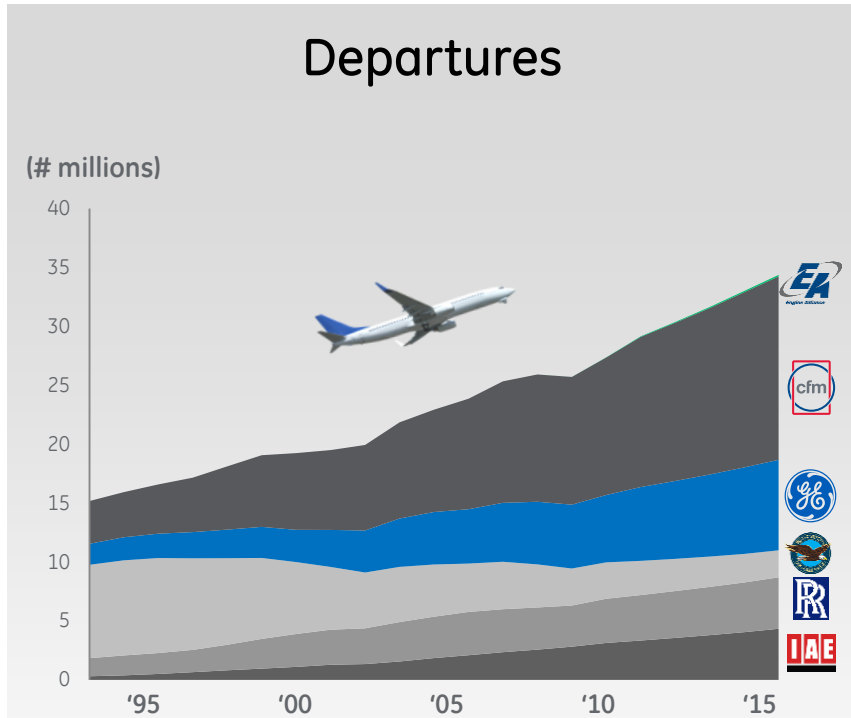
2 of 3
Daily flights powered by GE or GE JV's

Young fleet

Shop visit status per engine

61%

39%

1 or less   >1

Growing demand

Total fleet shop visits

5,200

4,300

'15   '20F
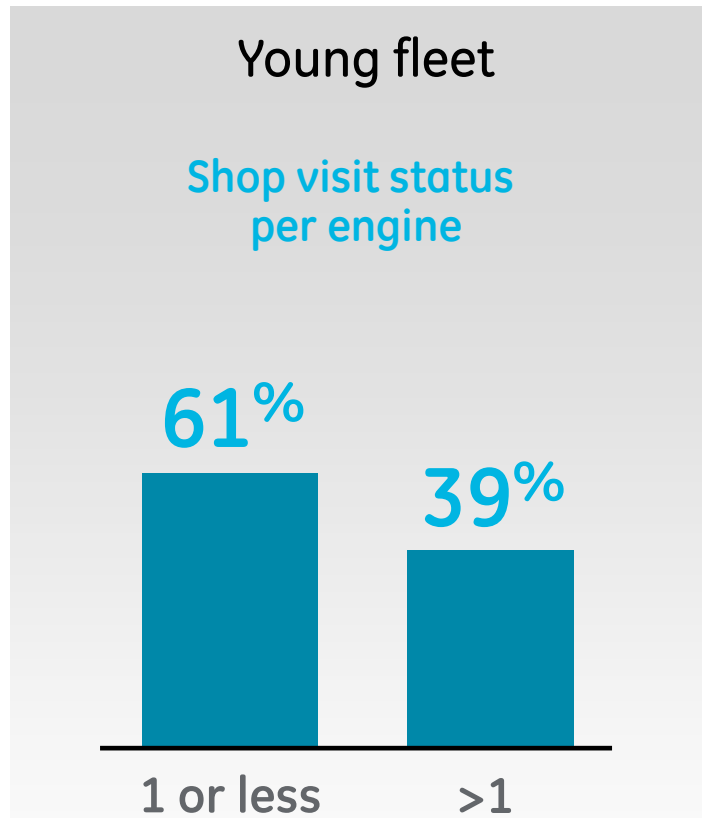
Sustainable growth

Our Services value proposition

Backlog $115B

		Services ($B)
CF34		$7
CF6		$10
CFM / LEAP		$29
GE90 / GE9x		$44
GP7000		$4
GEnx		$21

TrueChoice Flight Hour
Optimizes lifecycle cost with flexible risk transfer options

TrueChoice Material
Provides material options for new, used parts and repair for MROs and operators

TrueChoice Overhaul
Optimizes cost per shop visit

TrueChoice Transitions
Tailored to changing ownership horizons

Technology upgrades into the installed base

Enabling technologies ...
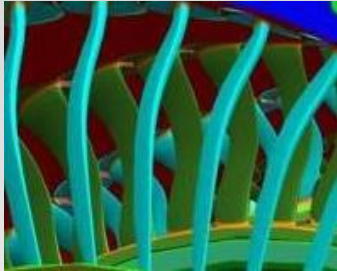
Aerodynamics
Efficiency
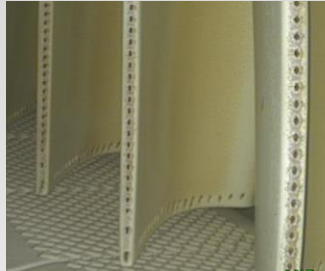
Materials
Durability, efficiency

Cooling
Durability
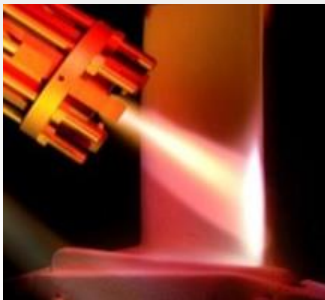
Coatings
Durability

Time-on-wing improvement
(Since service entry)

GE90-115B	GE90-94B	CFM56-7	CF6-80C
15%	15%	20%	30%
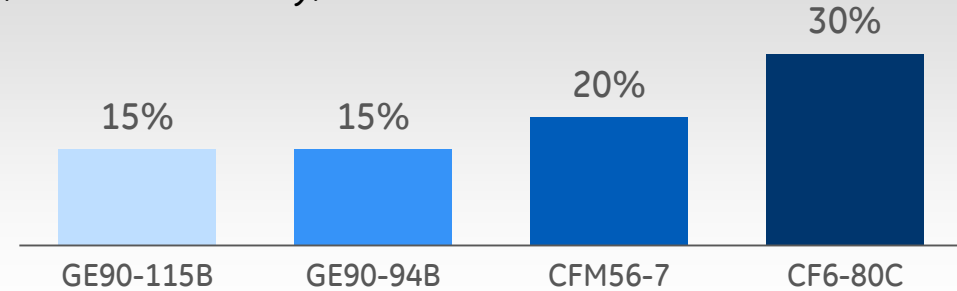
Fuel efficiency improvement (SFC)
(Since service entry)

GE90-115B	GE90-94B	CFM56-7	CF6-80C
-1.3%	-1.6%	-2%	-2.5%
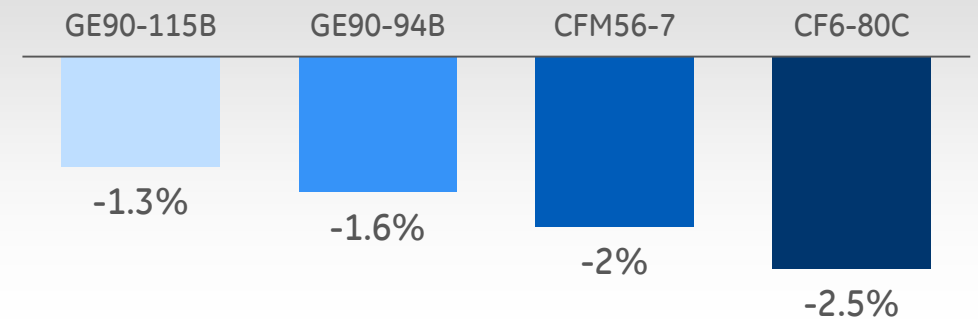
Customer value through the lifecycle

35,000 engines monitored via Predix

100MM flight records per year

Fidelity	↑ 30%
Detection	↑ 25%
Accuracy	↑ 12 pts

35,000 installed engines ... in a world of variation

A GE or CFM powered aircraft takes off every 2 seconds

Predix + analytics ... a powerful toolkit to create and convert learnings across operations and environments into actions

Analytics … better tools to segment fleet variation

Variation across environments
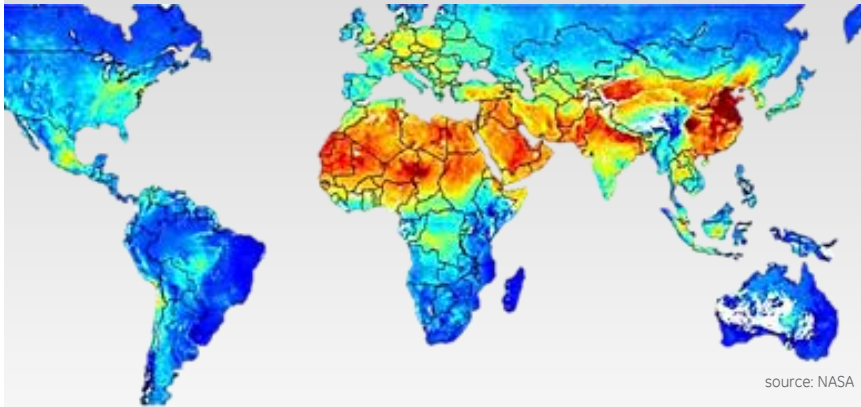
Mapping airborne particulates

source: NASA

Variation across fleets

Ambient Temperature

Takeoff thrust (similar mission)

- Operator A
- Rest of fleet
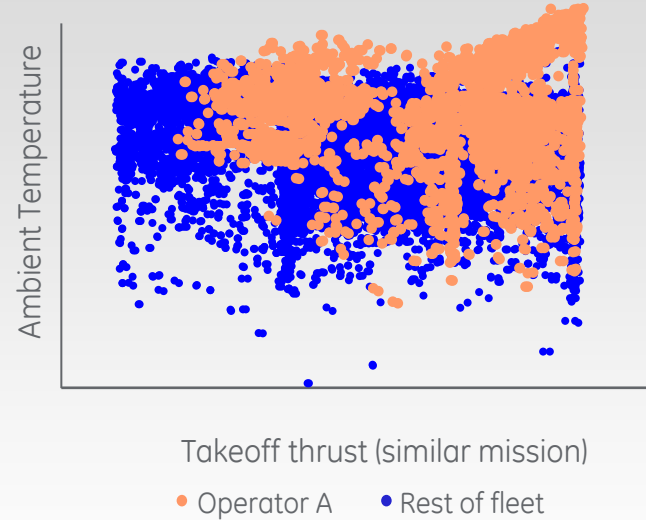
Variation within customer

Climb duration

Climb power

- Flight >6 hours
- Flight <= 6 hours
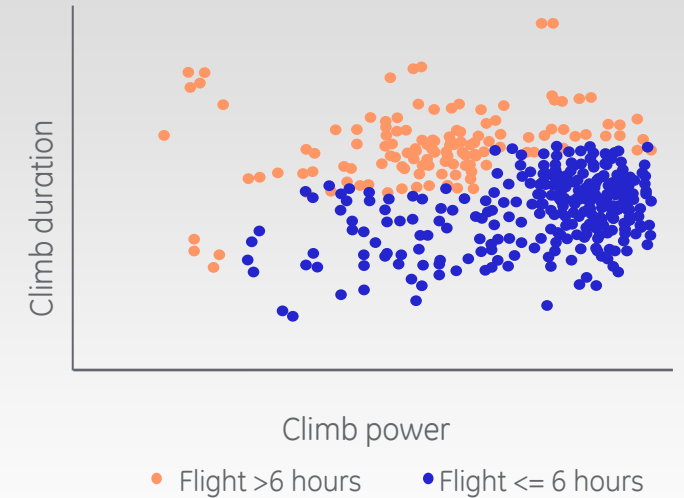
Marrying physics to analytics

CFM56 HPT blade

High altitude takeoffs

Core speed distribution

- CFM fleet
- Carrier A

CF34 combustor baffle

Short-haul, low cruise altitude

Number of flights

Baffle metal temperature (^{0}F)

- Long flights
- Short flights
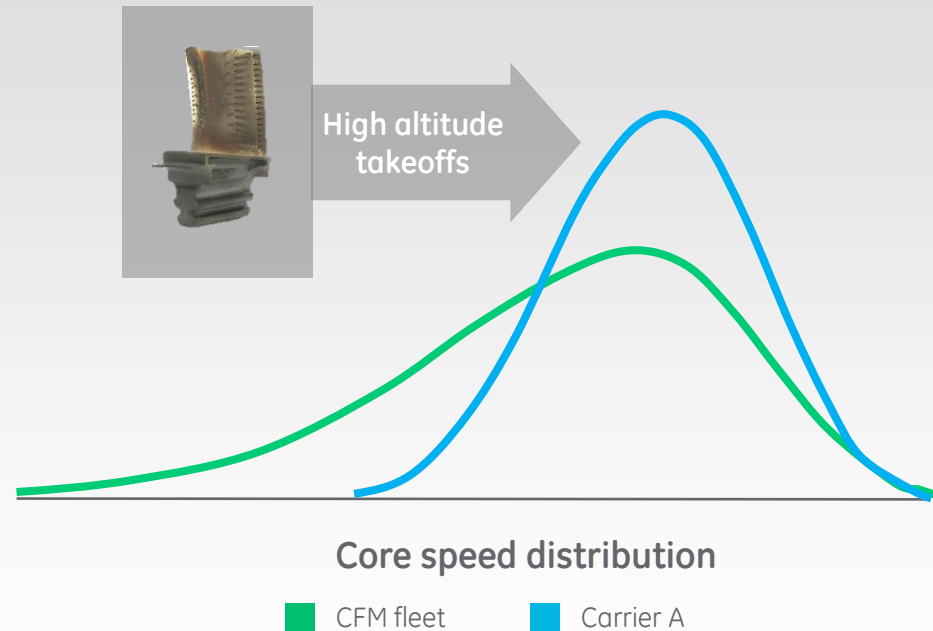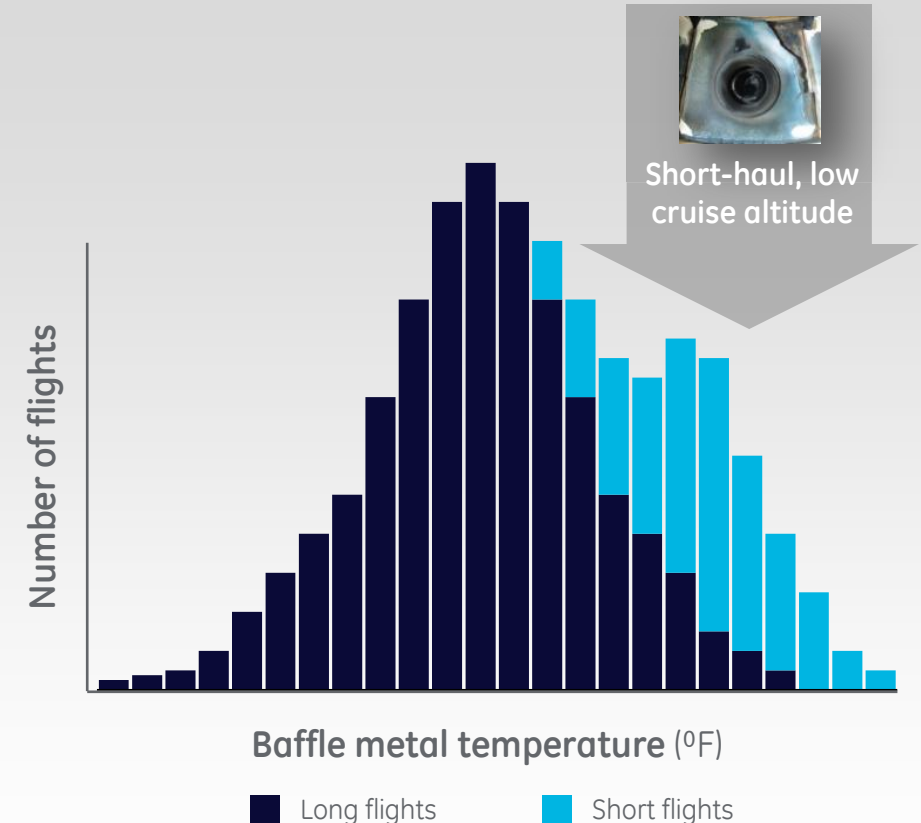
Speed and effectivity of learnings ... creates opportunities to target actions

Analytics driving predictive intervention

GE90 High pressure turbine shroud

Harsh environment

Nominal environment

ABATE

Cumulative distress

Cycles
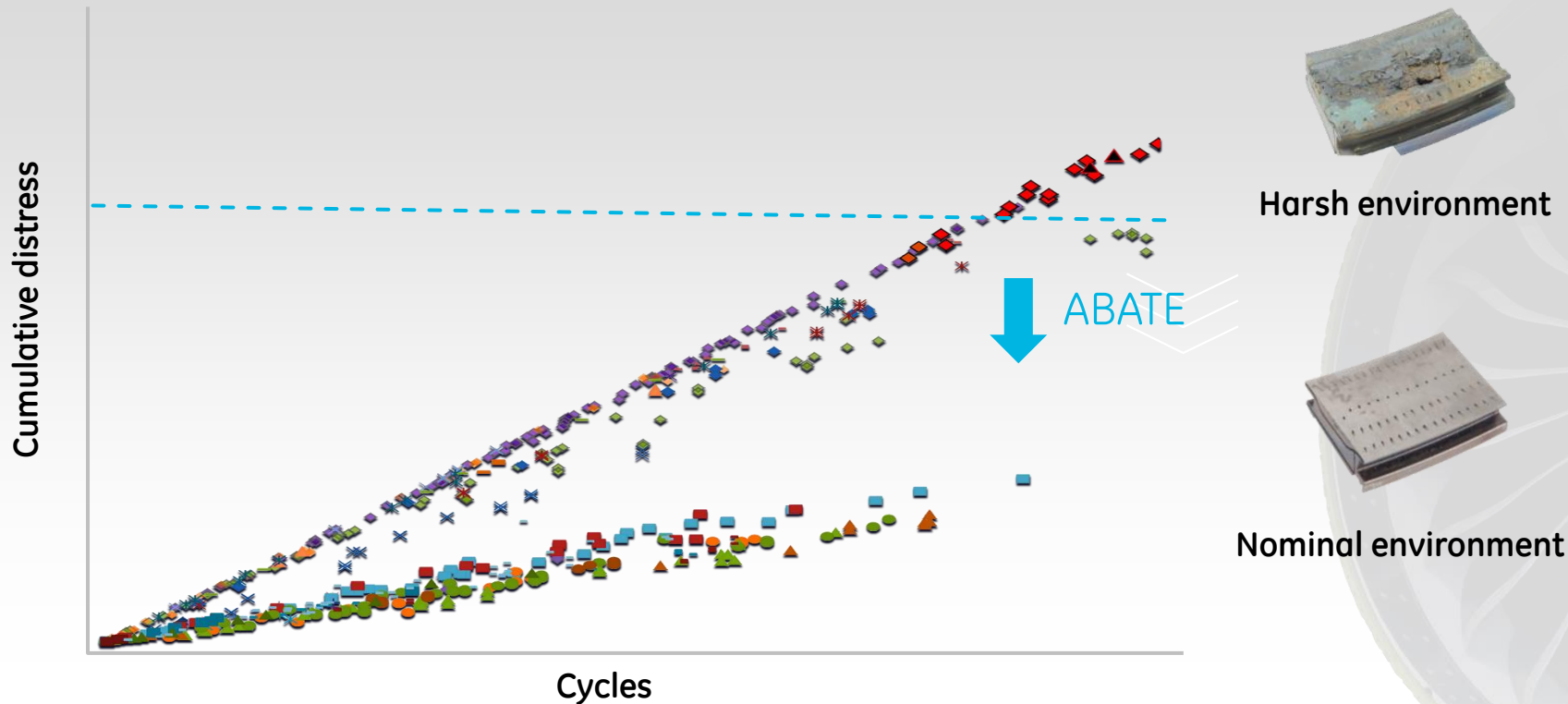
Reduced maintenance burden   =   removals ↓ disruptions ↓ inspections ↓

Predictive on-wing workscopes through analytics

Distress ranking (y-axis) vs Cycles (x-axis)

More distress

Less distress

Higher repair cost

Lower repair cost
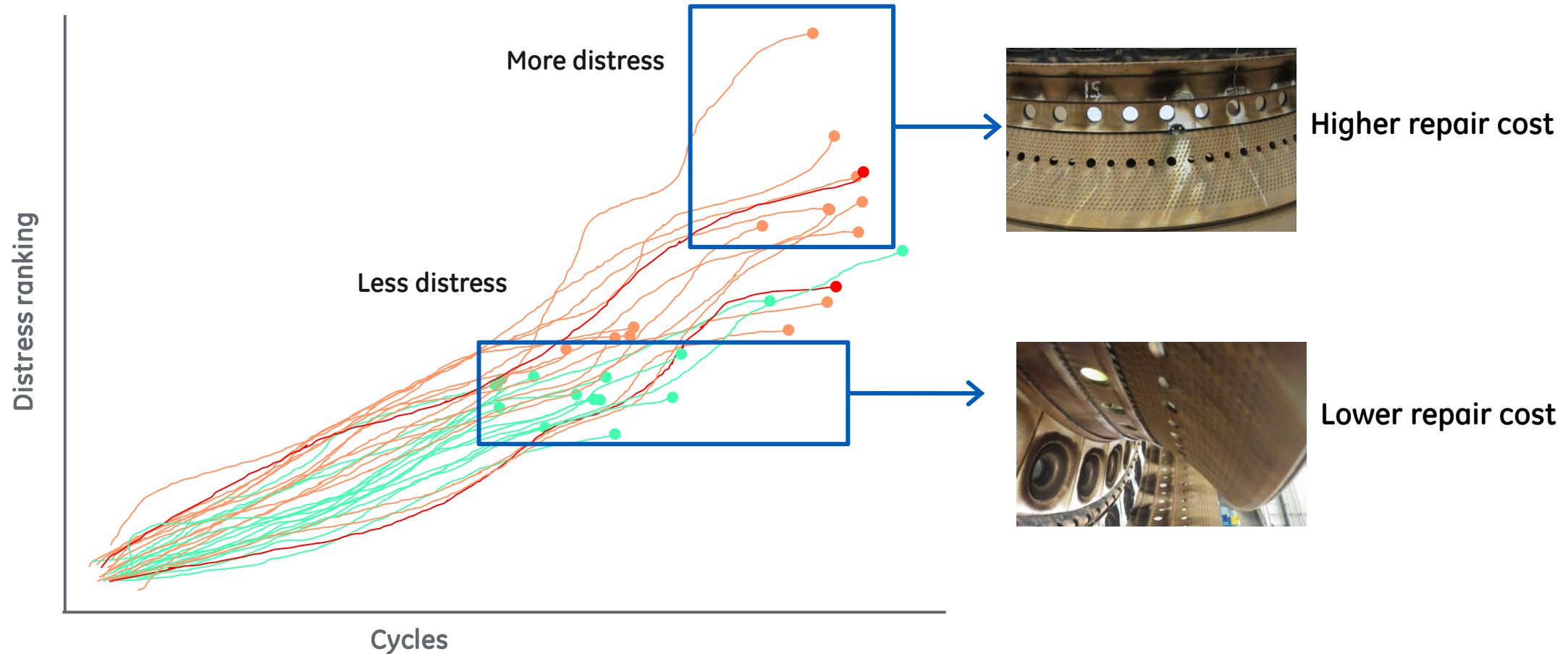
Better planning and prioritization ... on-time delivery ↑ and turn-around time ↓

Retooling our Services team

- ✓ Reduced maintenance burden and disruptions

- ✓ More differentiated, customized TrueChoice offerings

- ✓ Better cost management … emerging productivity tools

- ✓ Faster, simpler decisions

- ✓ A huge shift in how we learn and collaborate

Growth and productivity opportunities for our customers and GE

Transforming engineering & manufacturing

Jeff Connelly – VP, Global Supply Chain, GE Power

37 years experience (27 years GE)

Total GE

Supply chain opportunity

- 450+ factories, 45 countries

- ~20K suppliers

- ~$50B direct material

- $20B+ conversion costs

- $2B+ cost of quality

Digital Thread

Model Based Enterprise

Virtual validation – finding & fixing issues digitally
⬇ 80% reduction in first time build defects

Intelligent models – automating & connecting designs
⬇ 50% reduction in cycle & cost, plus improved FTQ

Brilliant Manufacturing Suite

Machine performance – preventing unplanned outages
⬆ 7% productivity from machine availability

Quality – linking product to process
⬆ 10% yield improvement from part/unit traceability

Digitally connecting & transforming global supply chain

Creating a digital model based enterprise

		BEFORE	AFTER
Engineering	Integrated and collaborative system, 3D product definition	2D blueprints up to 8 weeks	1 hour 3D PDF
Manufacturing & sourcing	Rapid & seamless production of products	Manual design of tools and fixtures	Design re-use, automate fixture designs
Services	Single source of truth, revision history, and instantaneous updates	Design changes identified via red-line	Design changes directly in model

MBE + ERP + Predix = Digital Enterprise

Model-based transformation (Greenville, SC)

Results

Design system integration

Single toolset for aero, heat transfer, stress, vibration analyses

Design productivity

Automation delivers 20% labor reduction

12K digital designs since inception

Results

$103MM across 3 years

✓ 60 of 200 steps automated/eliminated

✓ 530K hours saved across system

✓ 30% NPI cycle reduction

✓ 40% fewer manual inspection points
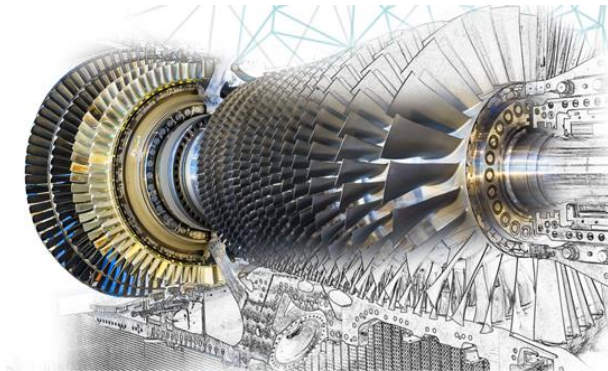
Integrated digital ecosystem

e-Design models
- Enables digital twin
- Lower cycle time

Design validation
- Innovation speed
- ↑ Reliability

METEM

$15MM per GT

$12MM per GT

$10MM per GT

Robust testing
- 6,000+ sensors
- 5TB data/200hrs

Advanced mfg.
- New design spaces
- Tighter tolerances

Flow
Pressure
Test
Field

Performance mapping
- Services upgrades
- Higher plant output
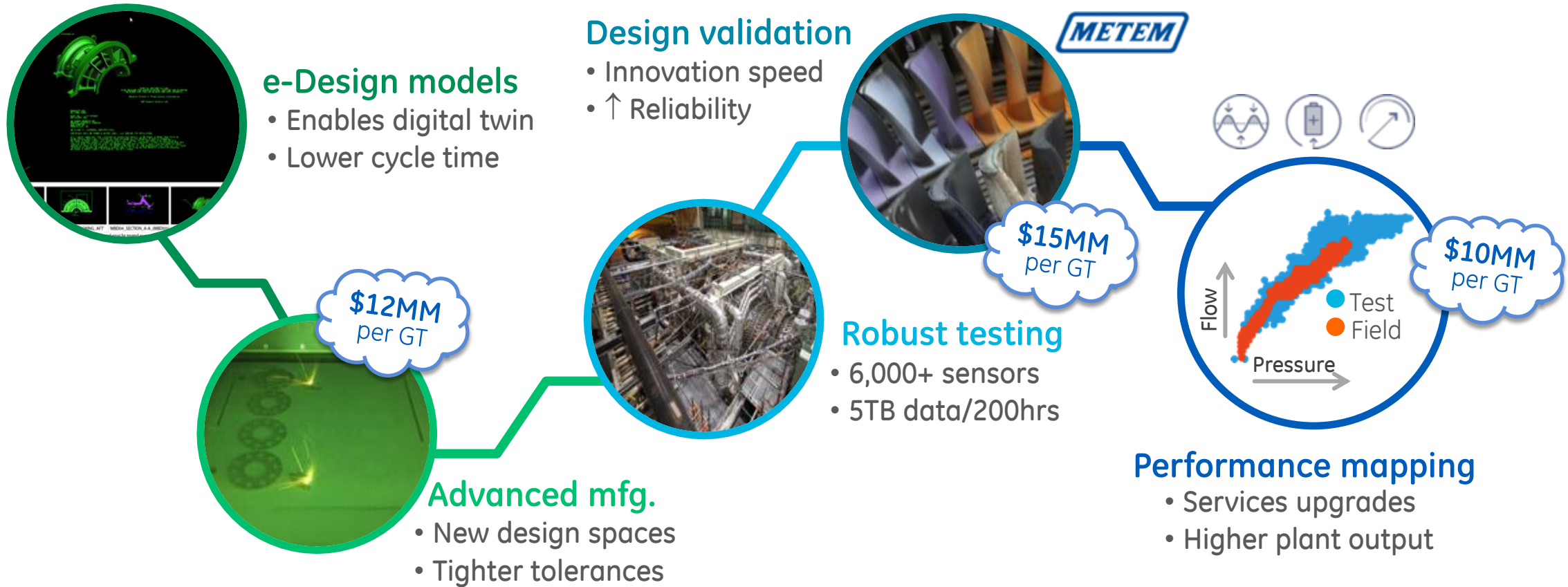
Continuous innovation delivering differentiated performance …~$30MM per GT

F vs. H gas turbine

Speed to market

~5x faster H vs F

Number of units

140
120
100
80
60
40
20
0

H's

F's

4 years earlier

1st COD for both

- - - F units
—— H units

0 1 2 3 4 5 6 7 8 9 10

Years from 1st unit selection
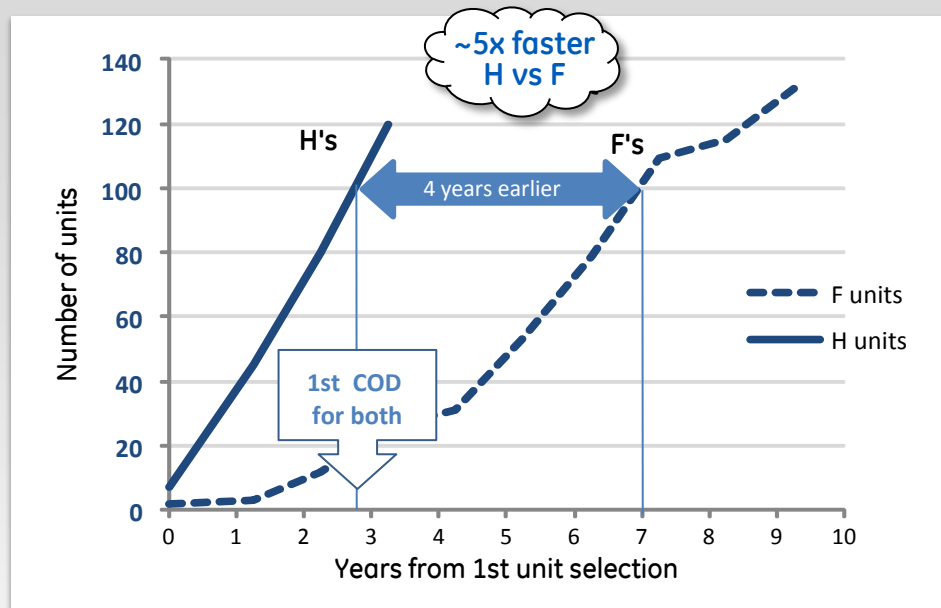
~5X unit selections vs. F at first COD

H cost program

30% 1st year

■ Hot Gas Path
■ Rest of Turbine

2015 Bid

2016 Ship
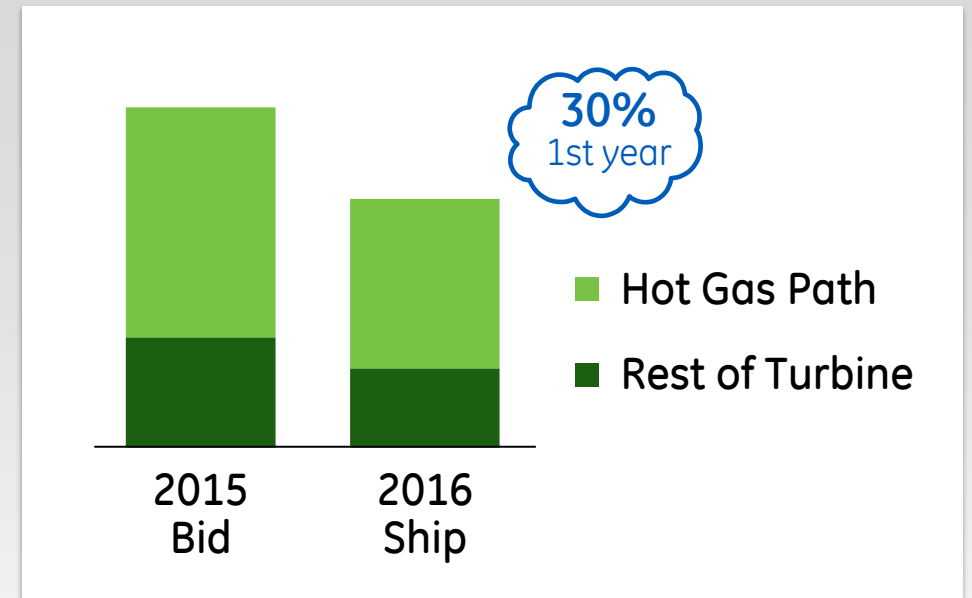
$/kw … 10th H = 1,000th F

Applying additive technology

Tooling
Both metal & polymer tooling applications

Design prototypes
NPI applications
Low rate initial production
Complex geometries
Lighter weight parts/ efficiency

Product offering differentiation
Unique concepts that leverage non-traditional solutions for customers

Identify

Develop

Industrialize

Globalize

Production parts
LEAP fuel nozzle

Repairs & Services
Crankshaft repair

Industrialization
Machine change-over reduction In process monitoring

Current

Maryrose Sylvester – CEO, Current

28 years experience (all GE)
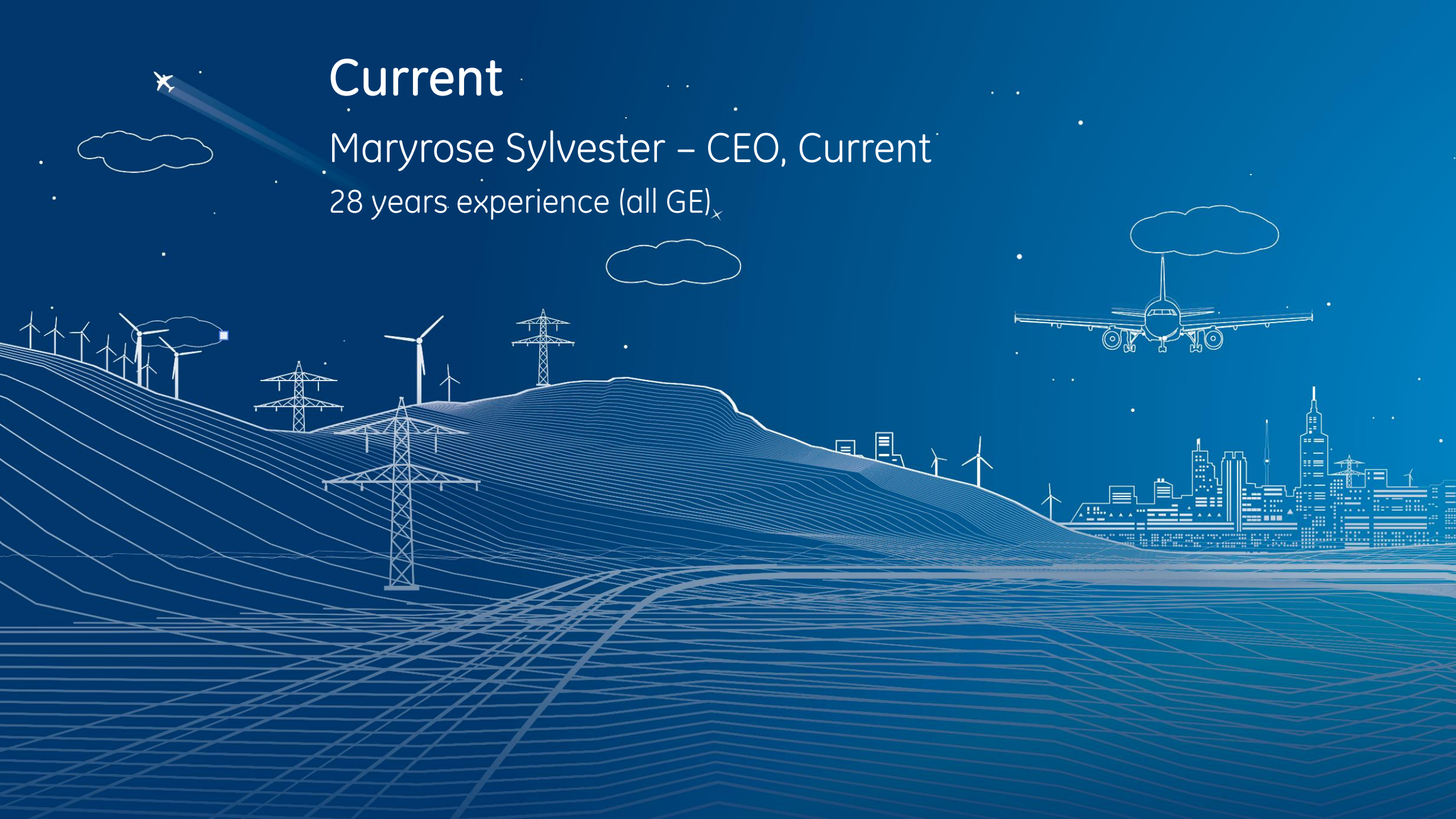
Exploring new business models

GE Store	Digital Industrial	New Models	Commercial Capabilities
LED **Solar** **EV** **Storage**	**Predix** Sensor enablement	**Energy-as-a-Service** Power purchase agreements	**Outcomes** Sellers
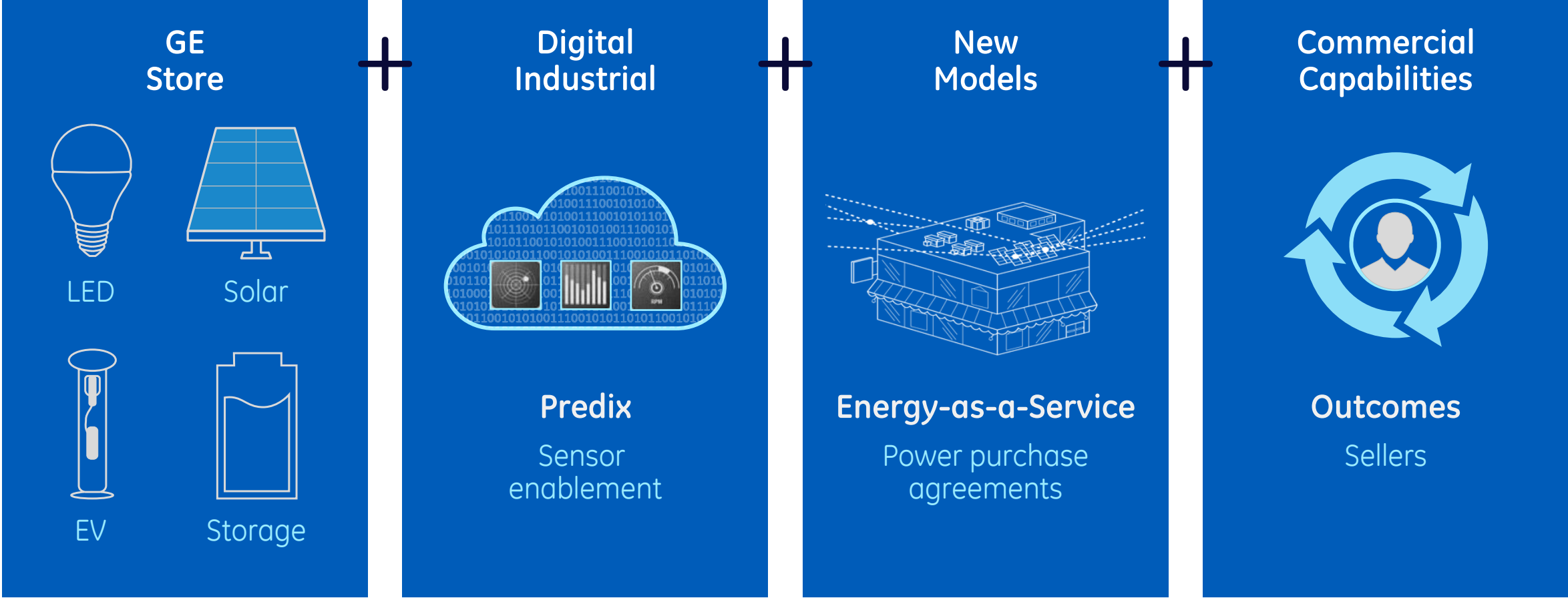
Focused on customer outcomes … reduce, produce, shift, optimize

Energy-as-a-service

Wave strategy

WAVE 3
Create a marketplace to monetize controlled assets in energy/grid service markets

WAVE 2
Deliver energy savings, optimization and productivity through sensor-enabled cloud solutions

WAVE 1
Build and operate largest network of connected, controlled, distributed energy assets

Technology stack

Distributed grid assets — Utility
- Demand response
- Frequency regulation
- Volt control

Energy optimization

Analytics

Predix platform

Equipment communication

Equipment controllers

| LED | Solar | CHP |
| Battery | EV | HVAC |

Unleashing energy-as-a-service

Integration from edge to cloud

Current Energy Management App

Predix

Ecosystem Partner Industry App

Site Gateway Controller

Wireless Area Controllers (WAC)

Wireless Adapters

Zigbee

HVAC 1   HVAC 2

Lights

Solar Panels
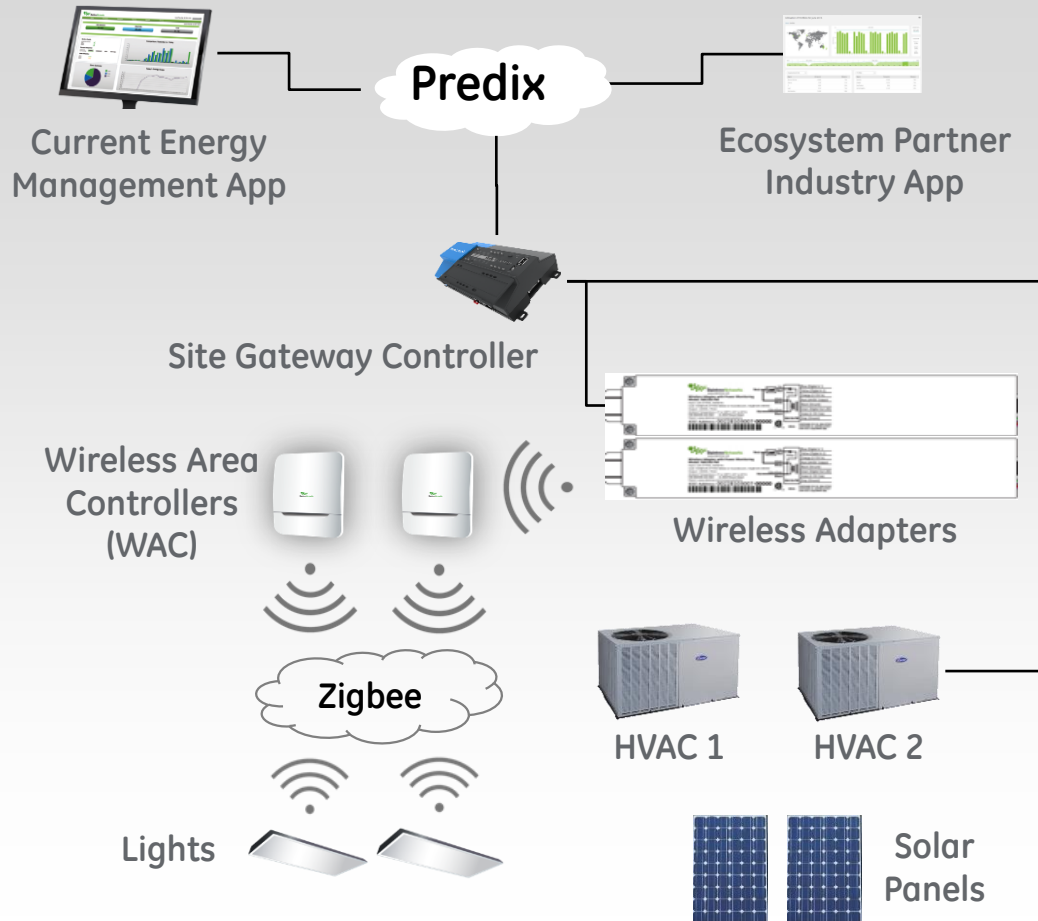
Large multi-site enterprise example
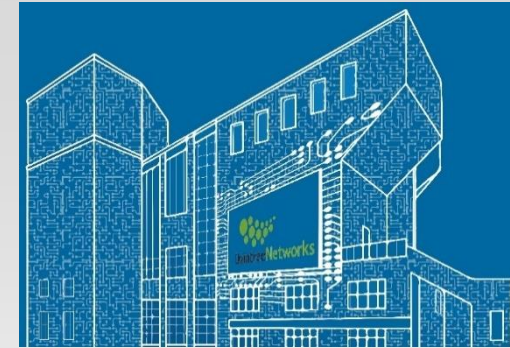
50% LIGHTING ENERGY REDUCTION THROUGH LEDs

10% PEAK DEMAND REDUCTION

20% PRODUCTION THROUGH ONSITE SOLAR GENERATION

10% OPTIMIZATION ENERGY MANAGEMENT & CONTROLS

Reduced energy costs & CO_2 + additional industry app value

Customer application

Need	The path forward	Projected outcomes

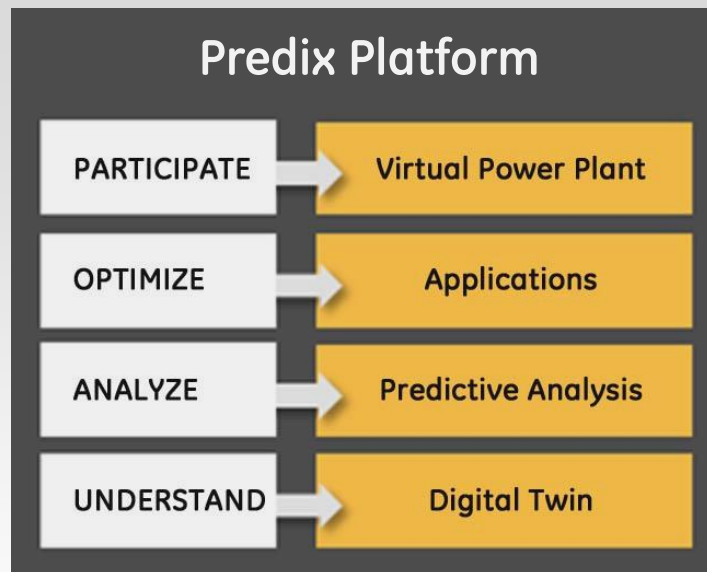**Energy management solution for multi-site clients**

Distributed hardware + software + service from multiple vendors + financing into secure single source platform

Operational savings & value added insights

Predix Platform

PARTICIPATE	→	Virtual Power Plant
OPTIMIZE	→	Applications
ANALYZE	→	Predictive Analysis
UNDERSTAND	→	Digital Twin

Example:
Large Box retailer annual savings (~1,700 stores)

Electricity savings	$130MM
LED replacements	$25MM
LED utility rebates	$20MM
Tax incentives	$40MM

3 year payback
~ $215MM year 1 savings

Working ~$3B pipeline across 3 waves … targeting $5B total revenue by 2020

Wrap

2016 operating framework

1 Operating EPS[a] $1.45-1.55

- Organic growth of 2-4%
- Core margin expansion
- O&G ↓ ~30% offset by Aviation, Healthcare, Renewables, Power
- Corporate @ $2.0-2.2B
- Alstom ~$.05; Appliances gain ~$.20[c]
- Restructuring = gains
- Total FX impact ~$(.02) at today's rates

2 Free cash flow + dispositions   ~~$28-31B~~ $29-32B

- CFOA of $30-32B[b]; ~$18B Capital dividend[c]   ~~$2-3B[b]~~ $3-4B[b]
- Dispositions of ~~$2-3B[b]~~
- Net P&E of ~$4B

3 Cash returned to investors   ~$26B

- Dividend of ~$8B
- Buyback of ~$18B

Portfolio update

Appliances

Haier

- ✓ Deal closed June 6th
- ✓ $5.6B cash proceeds
- ✓ $3.1B pre-tax gain … $.20 EPS impact
- ✓ 2Q restructuring ~$(.10)

Good deal for GE and investors

GE Capital

$171B	$156B	~$35B	~$50B
Signings	Closings	Signings	Closings
Completed		*To go*	

- ✓ To go signings … France, Italy, Korea, run-off
- ✓ Returned $32B in dividends/split … $23B to go
- ✓ Focused on remaining sales, SIFI rescission and exit of European banking licenses

GE Capital exit plan 80%+ complete

Financial outlook

GE Operating EPS[-a)]

+ Leverage opportunity

$1.31

~$.32
Ending shares ~8.3B

~$.15-.20
Yr. 5 cost synergies ~$3B

~5%
↑ Organic growth
↑ Margins/returns
↑ Free cash flow
↓ Corporate cost

$2.00+

2015	Buyback impact	Alstom	Industrial growth	2018F Outlook

Competitive company

✓ GE Store + leadership franchises
✓ Organic revenue growth > peers
✓ Resilience in cycles
✓ Strong EPS growth, margin expansion, and high returns

✓ $30B of capital to allocate
✓ Valuable Industrial Finance company
✓ Attractive dividend
✓ Predix platform upside

(a- Industrial + Verticals

Aspirations of a Digital Industrial

2020F Digital revenue

✓ More value to customers and partners

✓ Significant productivity gains

✓ Predix as the #1 industrial platform

- **$10B Applications**
  - ✓ 30%+ margins
  - ✓ Enhanced CSA value & upgrades

- **$1B Productivity**
  - ✓ Digital thread deployment
  - ✓ Commercialization opportunity

- **$4B Platform**
  - ✓ GE a market leader
  - ✓ 100k+ developers

On path to $15B … with bigger aspirations

imagination at work