Reliability is a Business Strategy

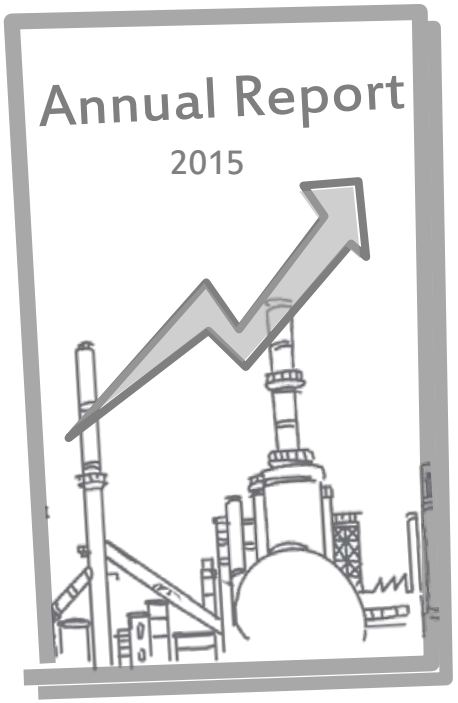
Will Goetz

VP – Business Development & Marketing, Reliability Consulting

April 8, 2016

EMERSON
Process Management

Reliability is a Business Strategy Because it Adds Shareholder Value



Availability

Shareholder Value

Safety Incidents

Maintenance Cost

EMERSON
Process Management

Reliability is a Business Strategy

Less Unplanned Downtime Means Better Safety Performance

Transient Conditions are Unsafe

Errors increase when operators are put in unfamiliar situations

A typical refining facility will spend less than 10% of its time in transient operations. However, 50% of all process safety incidents occur during this time.

-Tame Your Transient Operations, Chemical Processing June 2010.

Identify and Prioritize Failure Risks

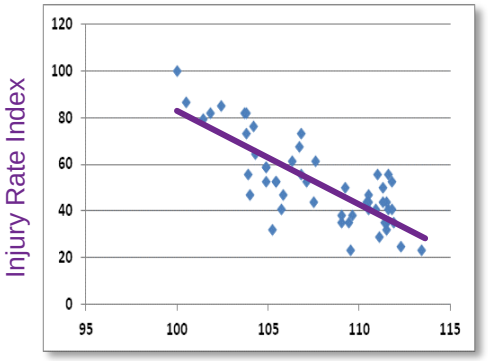
Apply Detection Methods and Define Actions to Mitigate Failure Risks

Reduce Unplanned Shutdowns

Predictive technologies provide insight into failure before a failure occurs

Availability

Reduction in Rate of Safety Incidents

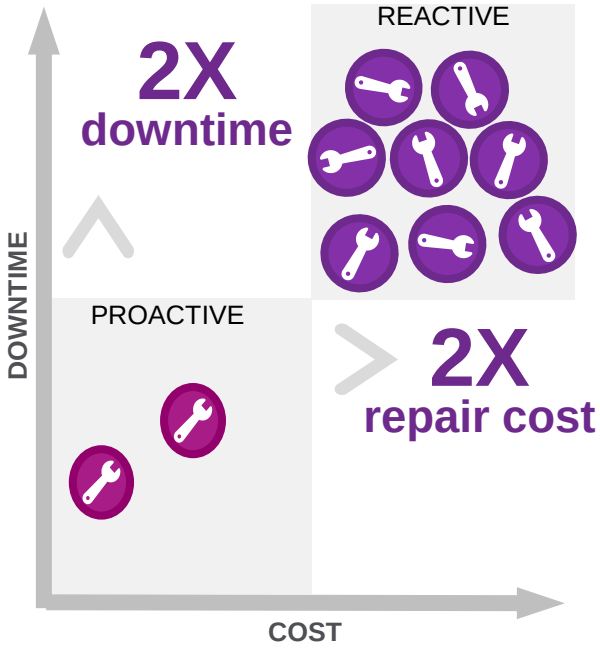


Reliability is a Business Strategy

Less Reactive Maintenance Means Less Downtime AND Maintenance Cost

Reactive Maintenance

Most Assets Run to Failure



80% REACTIVE MAINTENANCE

Use Condition Monitoring to Identify Early Indications of Failure

Determine Causes

Plan Corrective Actions

Return Assets to Service

Condition-Based, Planned Maintenance

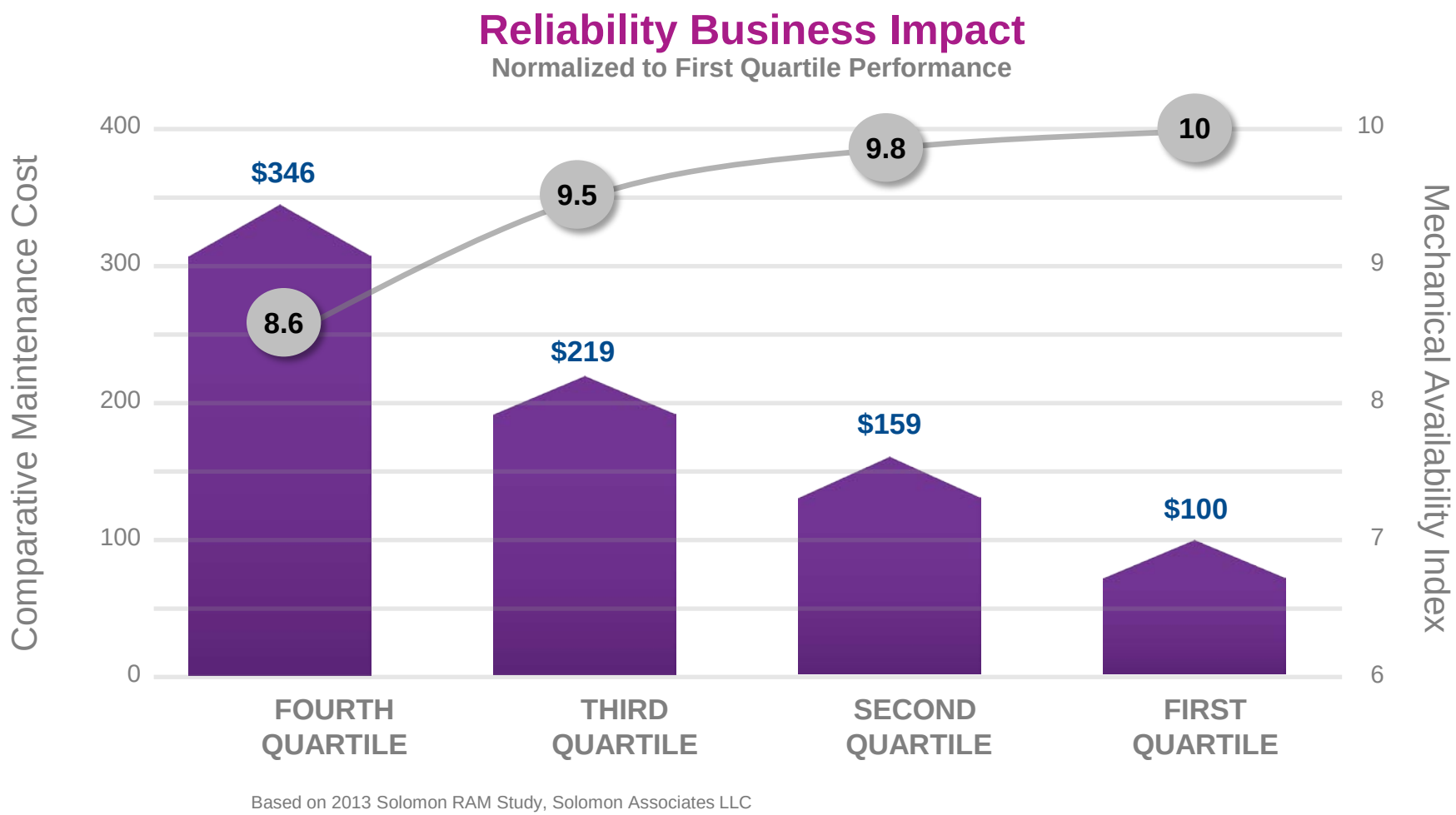
Absence of Emergencies

10%
reactive maintenance

81%
less downtime

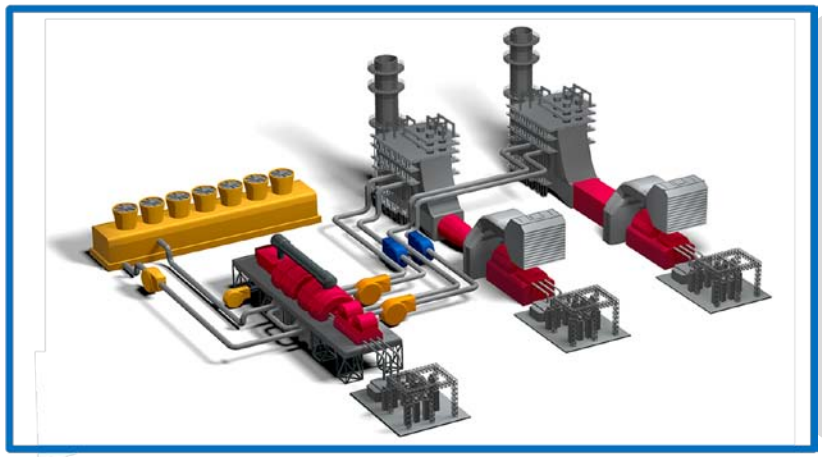
71%
less maintenance cost

Top Quartile Performers Hold a Huge Business Advantage



Based on 2013 Solomon RAM Study, Solomon Associates LLC

What Does the Top Quartile Do Differently?



Views the plant holistically.
Uses the proactive model.

EMERSON
Process Management

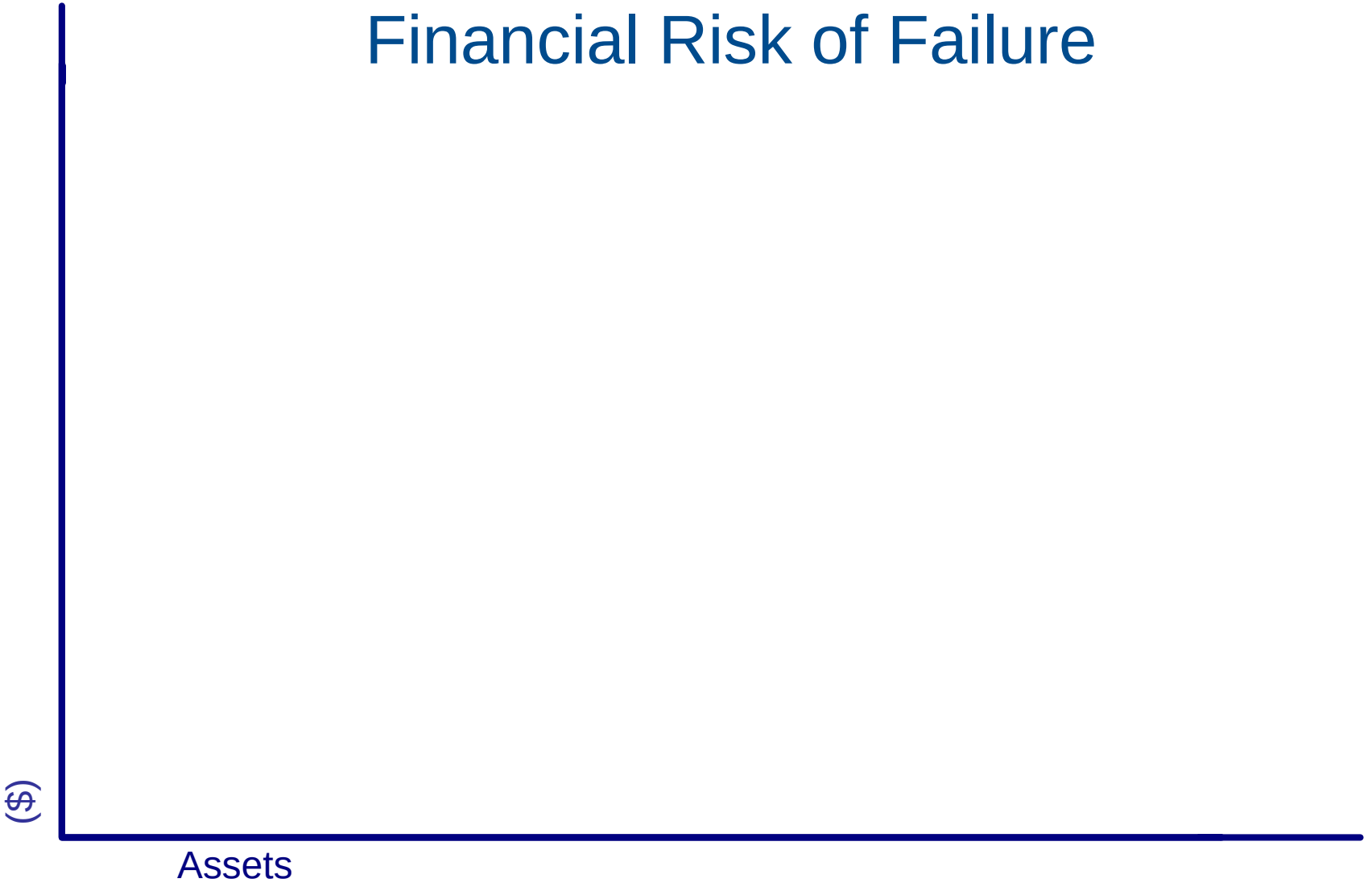
They Also Understand the Financial Risks of Functional Failures

- $ Safety
- $ Production
- $ Quality
- $ Environment
- $ Maintenance Cost

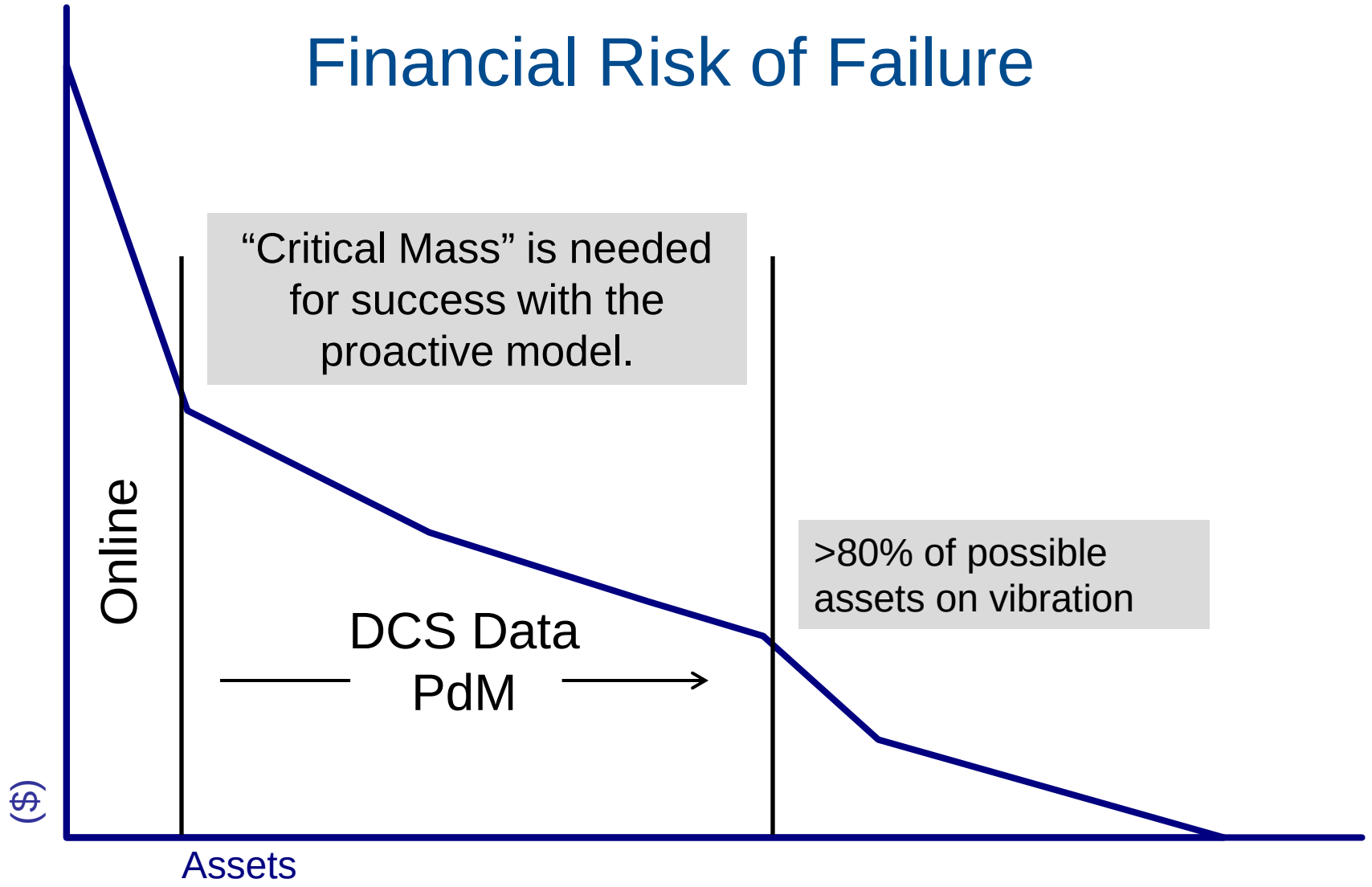
And align their resources to mitigate the failure risks.

EMERSON
Process Management

A Pareto of The Financial Risk of Failure Sets Their Priorities



Top Quartile Performers Cover Many Assets with Failure Detection Technology



Reliability is a Business Strategy

Large Middle East Refinery Rises to the Top

Case Study

GOALS:

Instill Reliability Culture to Achieve Economic Impact

0.35% ^

increased mechanical availability

$7.3M/yr

lost profit avoidance

$0.6M/yr v

reduction in rotating equipment maintenance costs

SOLUTION:

- Criticality and risk assessment
- Rotating equipment reliability improvement roadmap
- Evaluation of maintenance work processes and diagnostics technologies
- Change Management and work culture training

QUANTIFIED BUSINESS RESULTS

$1.3 Millions
RE MAINTENANCE COST

$6.57 Millions
LPO AVOIDANCE

$Adds-up
MECHANICAL AVAILABILITY

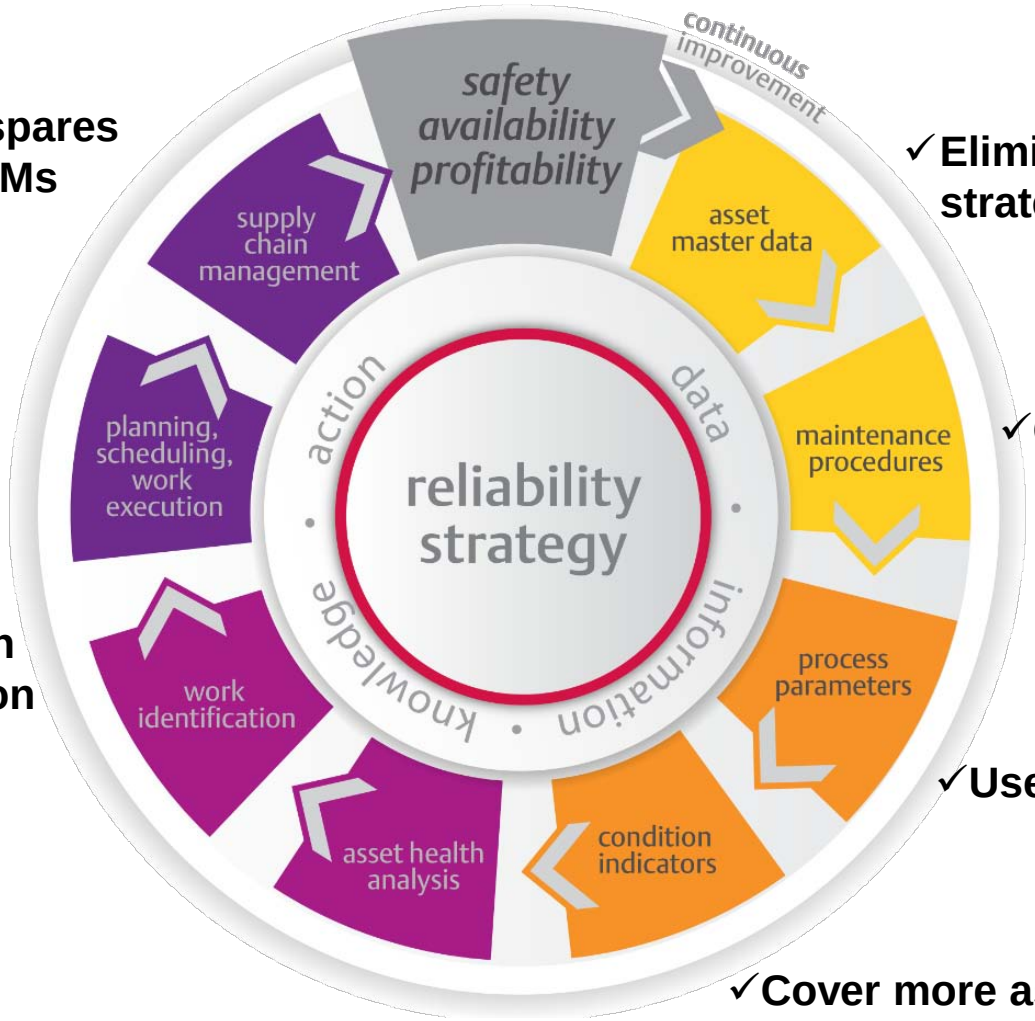
$3.8 Millions
PM M/HRS OPTIMIZATION

PROACTIVE CULTURE
180% ^
increase in defects finding (PM/PdM)

ENERGY FOCUS
20% ^
air system efficiency improvement ($0.85MM)

BEHAVIOR CHANGE
26% ^
steam turbines efficiency improvement ($7 Millions)

Second Quartile: The Fundamentals are in Place and Can be Strengthened Incrementally



✓Reduce spares
✓Build BOMs

✓Eliminate defects in strategies

✓Optimize PMs

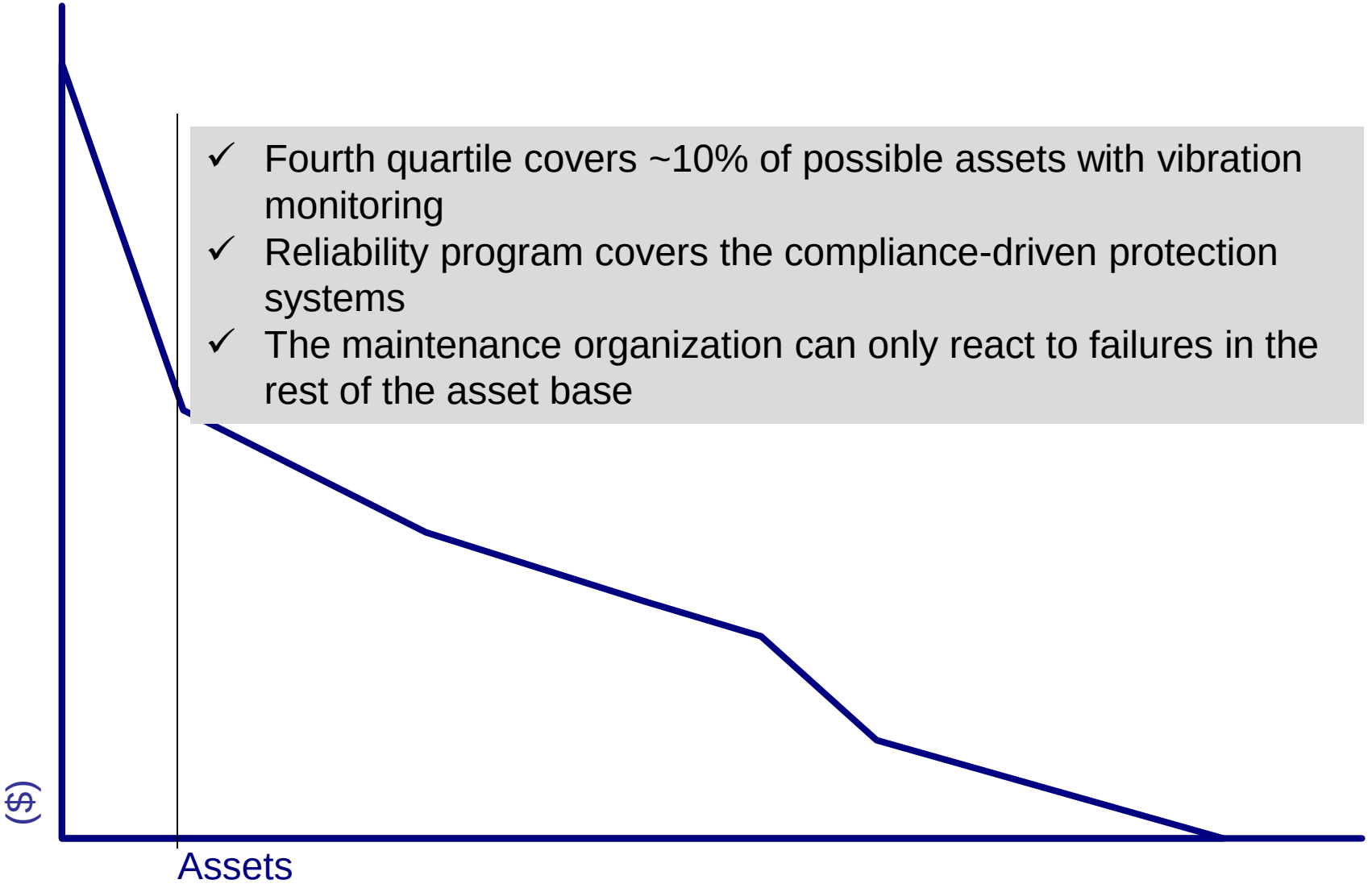
✓Increase use of health analysis in work identification

✓Use more process data

✓Cover more assets

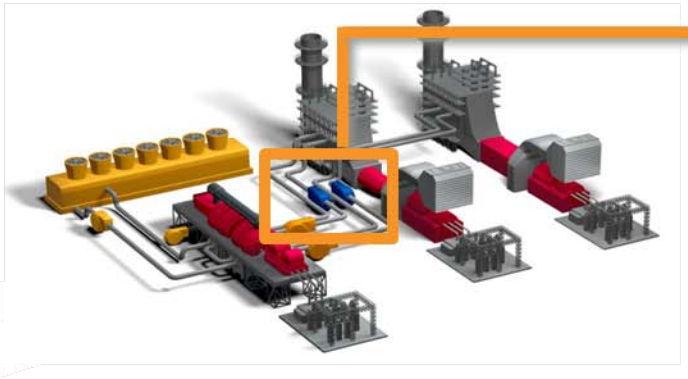
EMERSON
Process Management

Lower Quartiles Do Not Apply Prediction to Enough Assets to Use the Proactive Model



- ✓ Fourth quartile covers ~10% of possible assets with vibration monitoring
- ✓ Reliability program covers the compliance-driven protection systems
- ✓ The maintenance organization can only react to failures in the rest of the asset base

Disconnected Functions Are Typical in 3rd and 4th Quartile: reliability Is Not Strategic



reliability

supply chain management

condition indicators

work identification

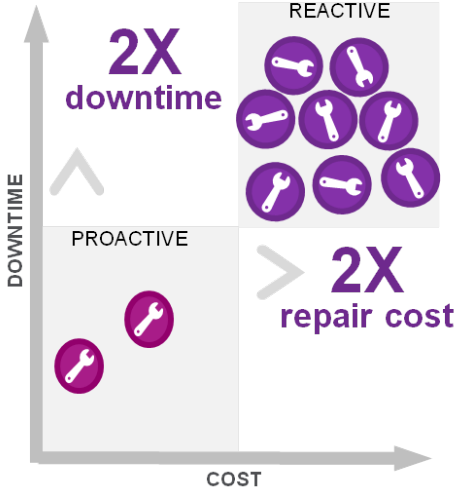
maintenance procedures

asset health analysis

asset master data

process parameters

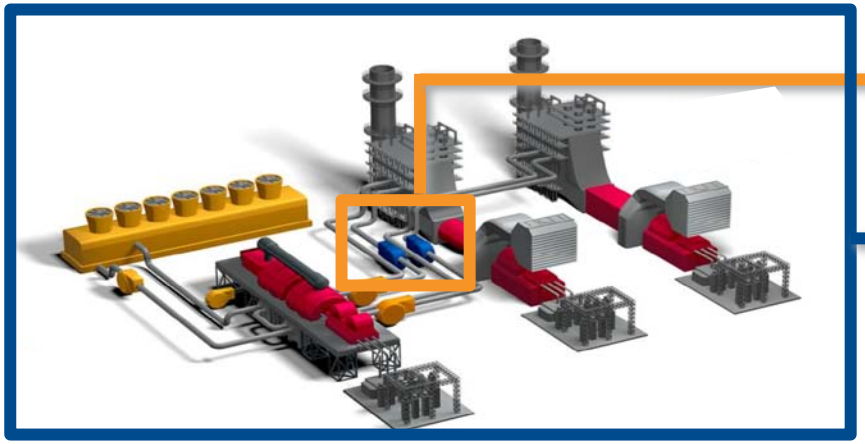
planning, scheduling, work execution



Activity dominated by reactive work.
Improvement efforts are isolated.

EMERSON
Process Management

Three Parts to Transforming to Top Quartile Performance



Optimize Reliability Strategies

Identify and mitigate failure risks and eliminate waste

Improve Maintenance Planning

Leverage technologies and work practices to move from reactive to proactive

Drive Sustainable Change

Ensure that the organization adopts the new ways of working

EMERSON
Process Management

Reliability is a Business Strategy

Planning for Reliability Early in Capital Projects Is the Least Cost Path to Top Quartile

18 DAYS

of additional annual production uptime

$40M

annual maintenance spend reduction*

effective SPARES stock

Average $22M overspend on capital projects*

increased personal SAFETY

A typical EPC-designed facility is designed for 3rd Quartile Performance

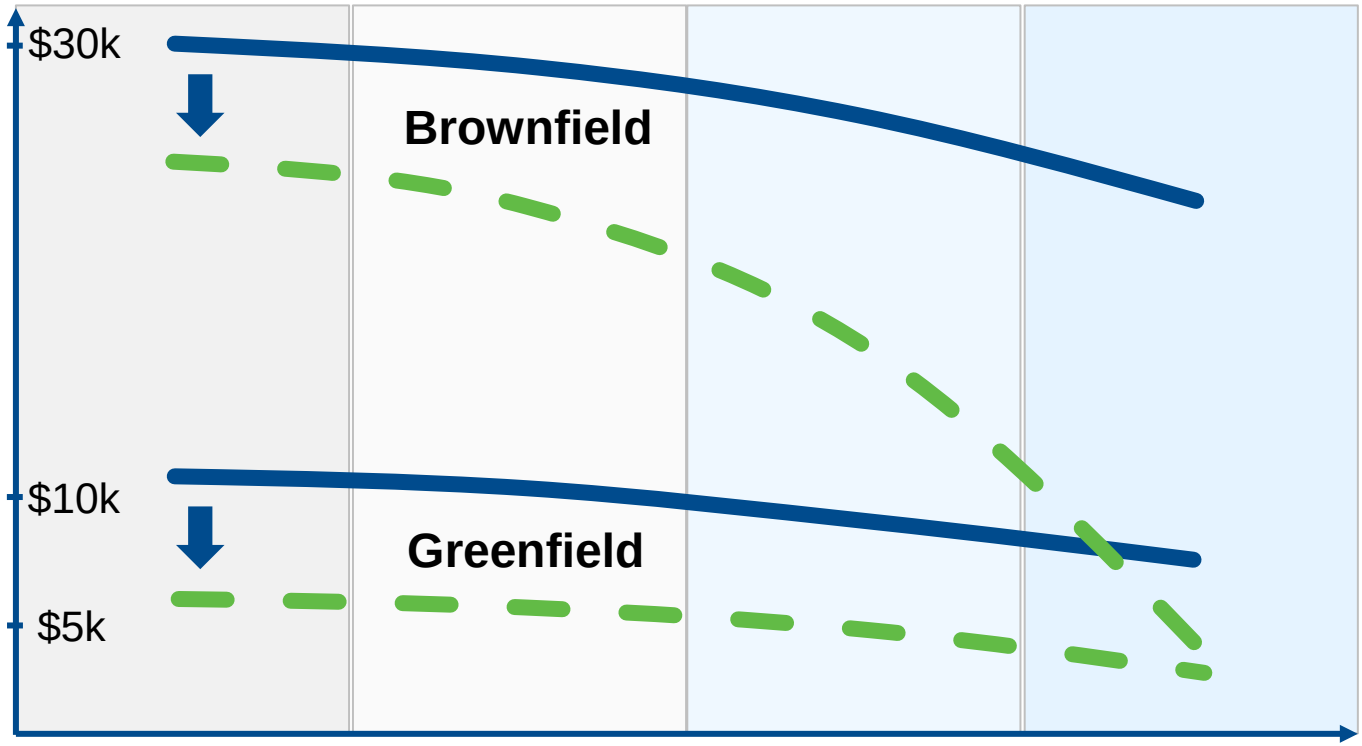
* Based on $1B Replacement Asset Value

EM
Proces

The Industrial Internet of Things (IIoT) Is Driving Down the Cost of Covering More Assets with Prediction

Total Installed Cost (TIC)* of I/O Expansion ($ per I/O)

*Costs:	Now	New
Wiring	$$	$
Map Data (thru DCS)	$	–
Paperwork	$$	$
Reviews	$$	$
Installation	$$$	$



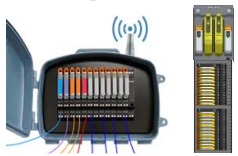
Conventional Costs

IIoT Platform-based Costs

Traditional Wired HART

Field-Wired Bus (FF)

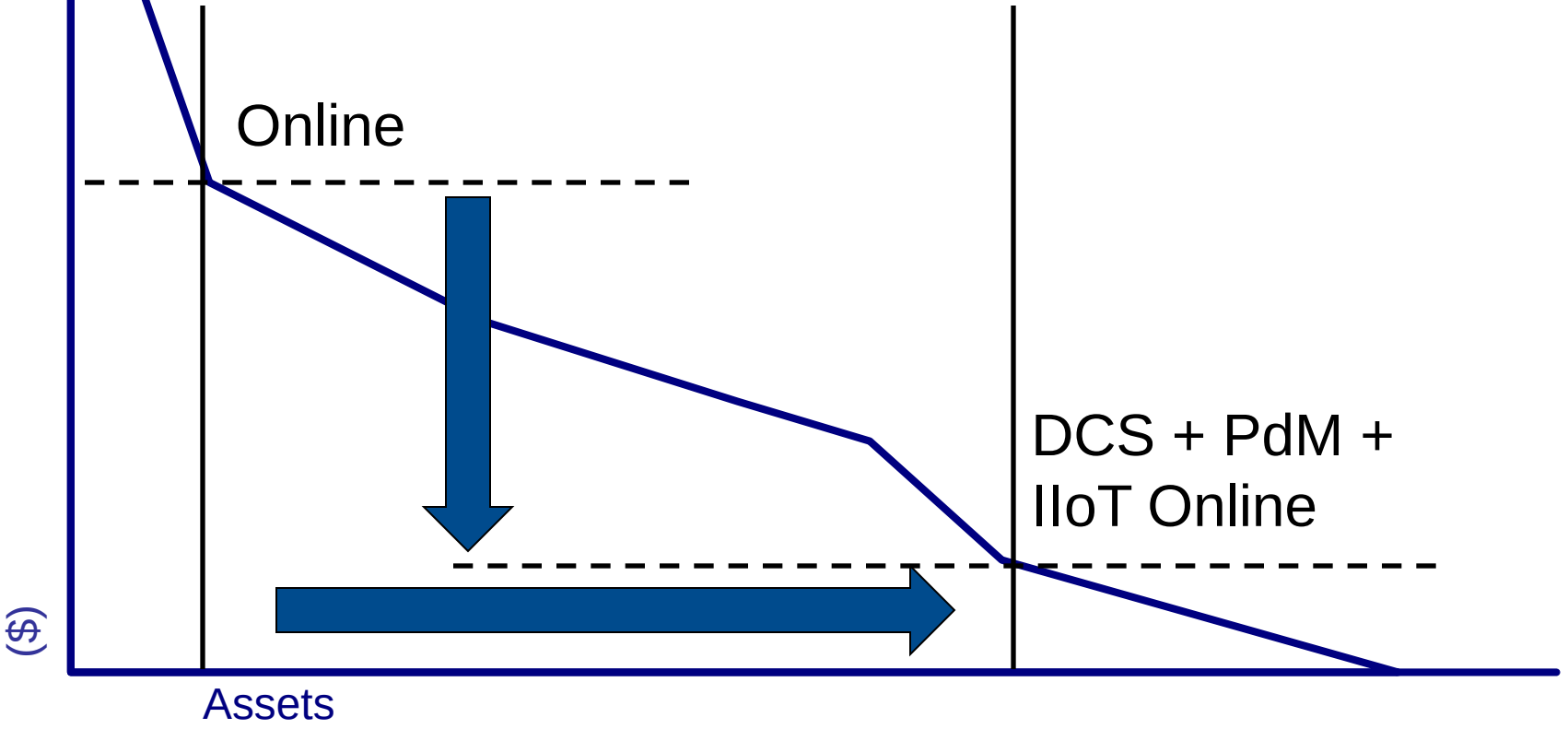
Field-Wired HART (CHARMs)



Wireless HART

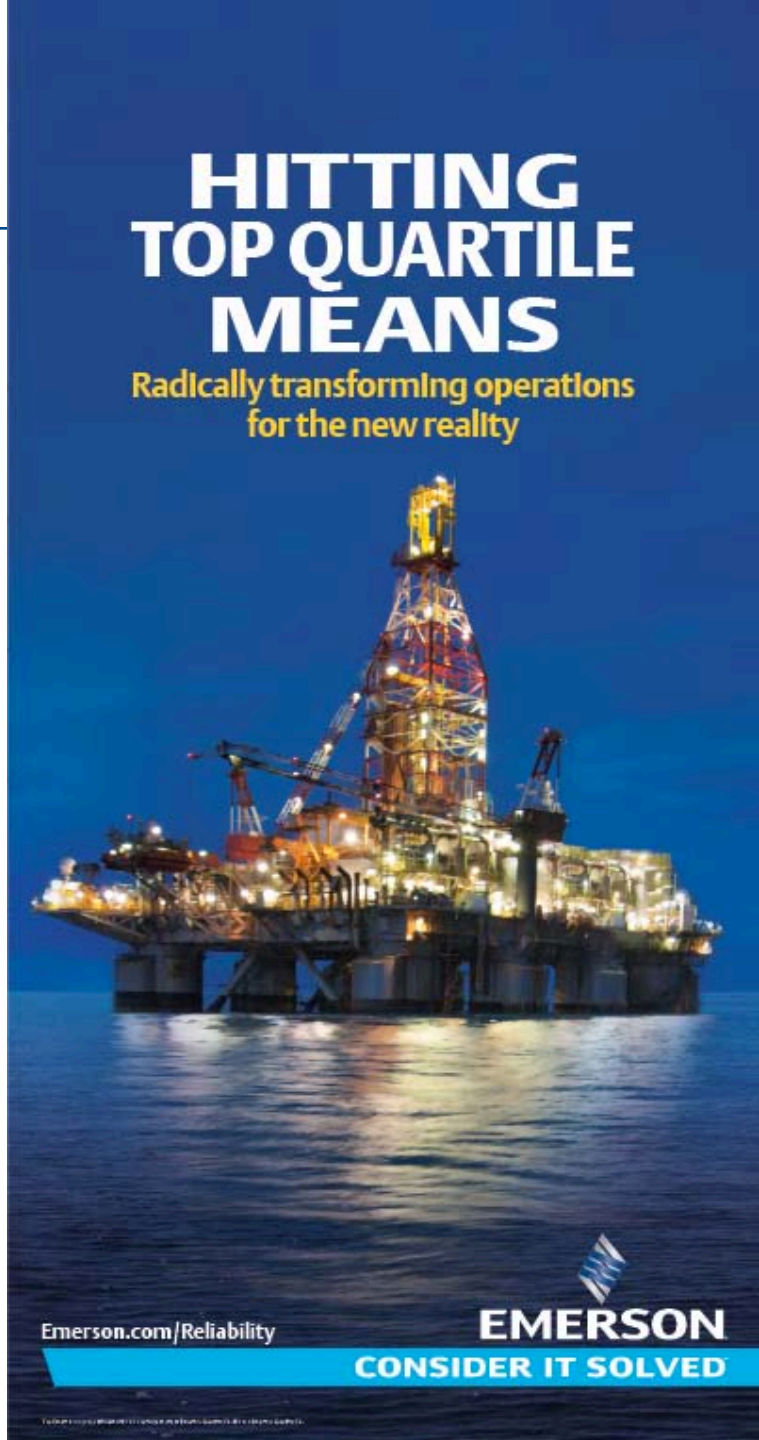
Falling Cost and Complexity Will Enhance the Proactive Model

- "We predominantly do walk-arounds because the cost of online monitoring is too expensive, except for the large pieces equipment."
  - *- Charles Aiken, former SVP of Manufacturing, Buckeye Technologies*



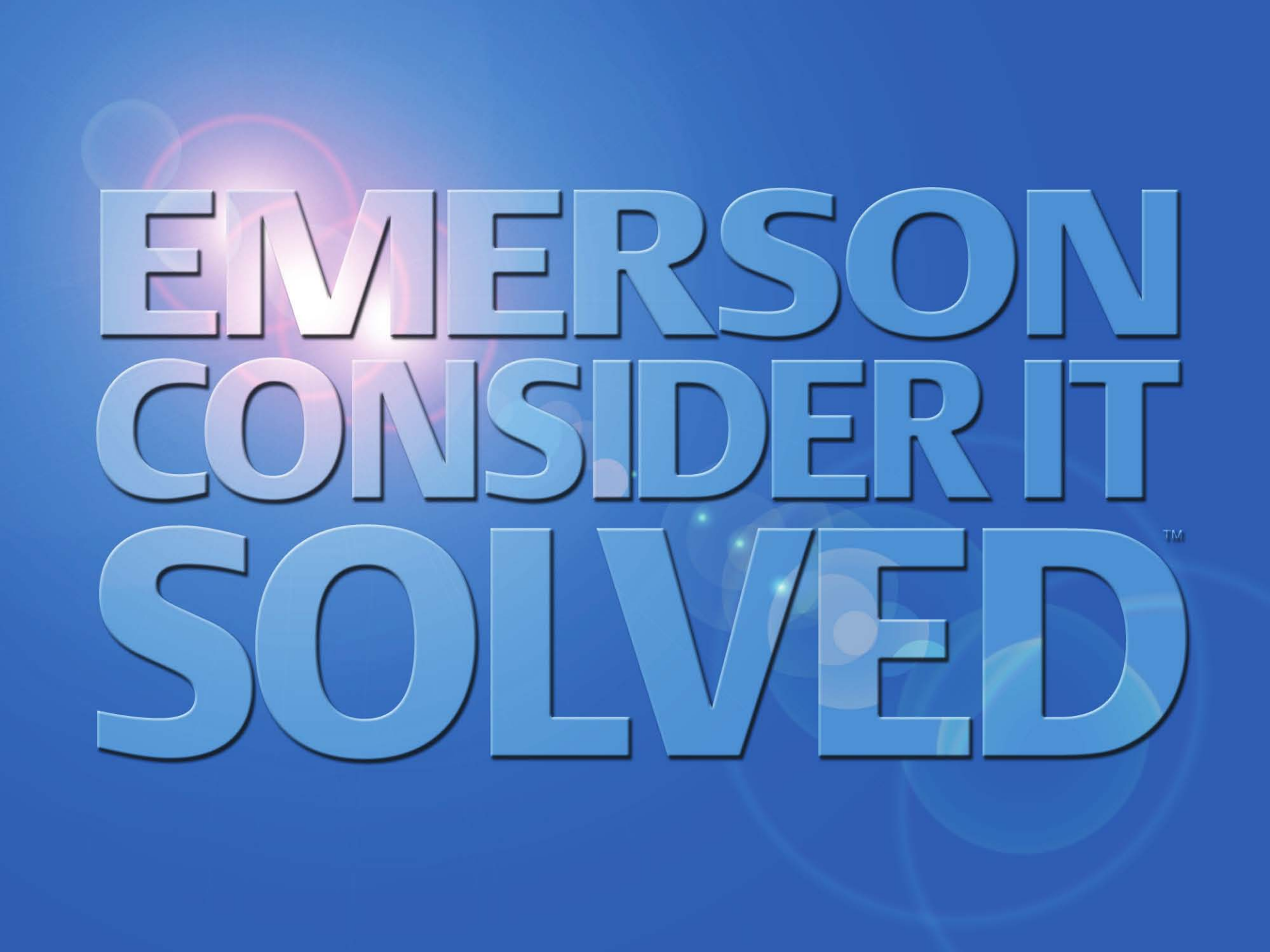
Summary & Conclusions

- Top Quartile performers use a proactive, condition-based model to create a big business advantage
- Moving to Top Quartile requires investment with a focus on optimizing availability
- As IIoT capabilities become more prevalent, the cost and risk of adopting the Top Quartile model will fall, allowing more sites and companies to elevate performance




EMERSON
Questions?


EMERSON
Thank You


EMERSON
CONSIDER IT
SOLVED™