

# Welcome to the Age of Smart Iron

How technology innovation is driving change in the marine industry



Presented by **Rob Bradenham**  
Global Sales & Business Development Manager  
Caterpillar Marine Asset Intelligence

**CATERPILLAR**<sup>®</sup>

# WELCOME TO THE AGE OF SMART IRON

HOW TECHNOLOGY INNOVATION IS DRIVING CHANGE IN THE MARINE INDUSTRY

OSIsoft Users Conference 2017

Rob Bradenham  
Global Sales & Business Development Manager  
Caterpillar Marine Asset Intelligence  
Caterpillar Inc  
[bradenham\\_rob\\_e@cat.com](mailto:bradenham_rob_e@cat.com)





# THE GLOBAL MARKET IS CHANGING

World's largest taxi company

**UBER**

...owns no taxis

Huge accommodation provider

**Airbnb**

...owns no real estate

Retailer more valuable than Walmart

**Alibaba**

...has no inventory

Mega communication companies

Skype, WeChat  
& Whatsapp  
...own no telecom infrastructure

World's largest movie house

**NETFLIX**

...owns no cinemas

Fastest growing lenders

LendingClub &  
SocietyOne  
...have no actual money

# INDUSTRIAL AND MARINE SECTORS ARE ALSO CHANGING



**MARINE SECTORS ARE ALSO CHANGING**

# WHO IS CATERPILLAR

WHERE WE ARE COMING FROM



**3 MILLION**  
MACHINES & ENGINES  
OPERATING GLOBALLY

WHERE ARE WE GOING



**CAT CONNECT**  
TO OUR CUSTOMERS ASSETS  
CAT AND NON-CAT



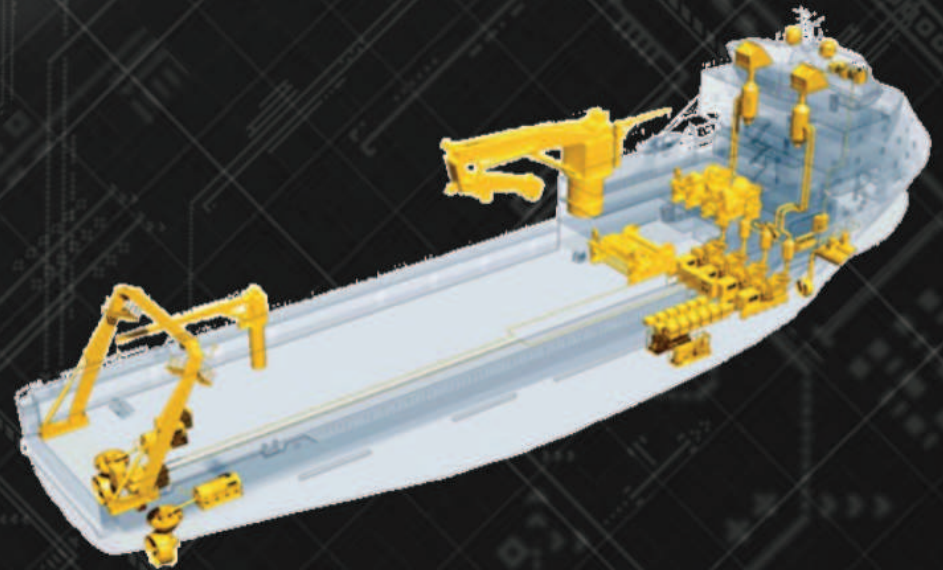
# WHAT IS THE AGE OF SMART IRON

Machines & Sensors



Expert Advisors

Intelligent analytics





# HOW SHIPOWNERS AND OPERATORS WILL BENEFIT



Reduce operating & maintenance costs



Optimize performance & efficiency



Reduce safety & compliance risk





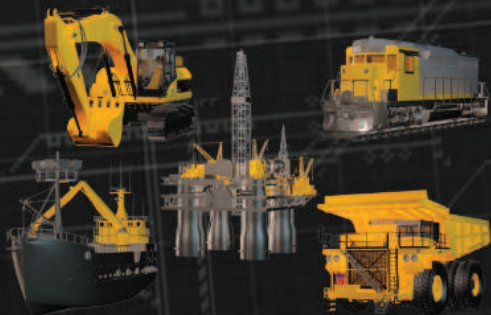
# COMMITTED TO THE **DIGITAL REVOLUTION**

We will move quickly to make sure we – not our competitors – are best positioned to provide solutions for our customers and dealers.

**" THIS IS GOING TO BE A GAME CHANGER FOR US. "**

– Doug Oberhelman speaking to *Fortune*

# HOW CATERPILLAR IS GOING DIGITAL



Leveraging learnings  
across industries



UPTAKE



FlexGen

IronPlanet

Looking outside of our  
traditional business



Bring solutions to our  
customers today

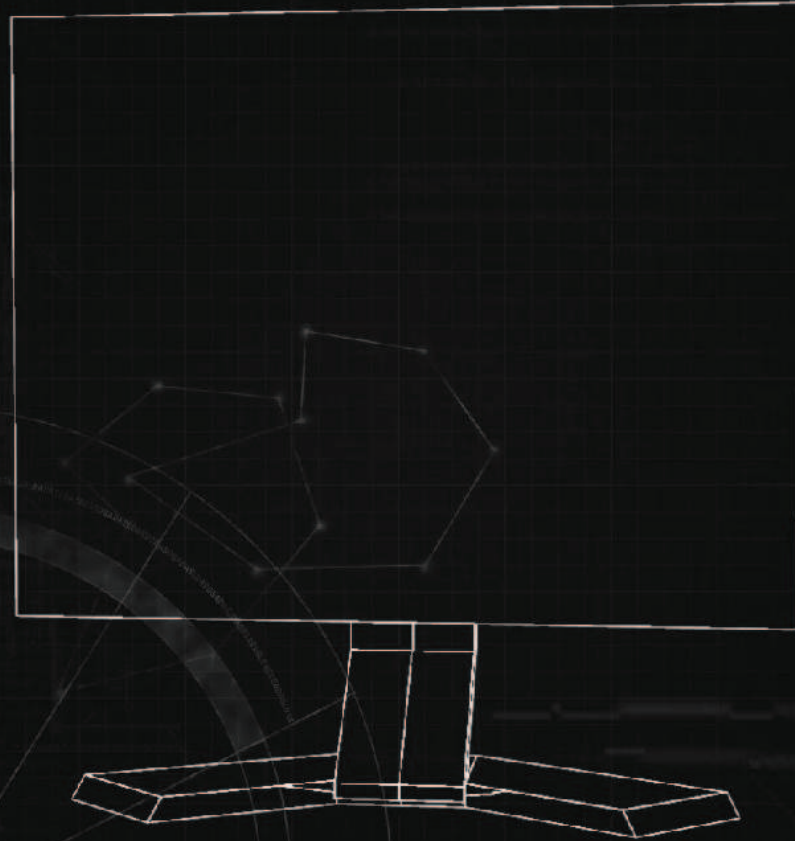


**CONNECTED INSIGHT:**  
**CAT<sup>®</sup> ASSET INTELLIGENCE**



CAT ASSET INTELLIGENCE

# AUTOMATED ANALYTICS

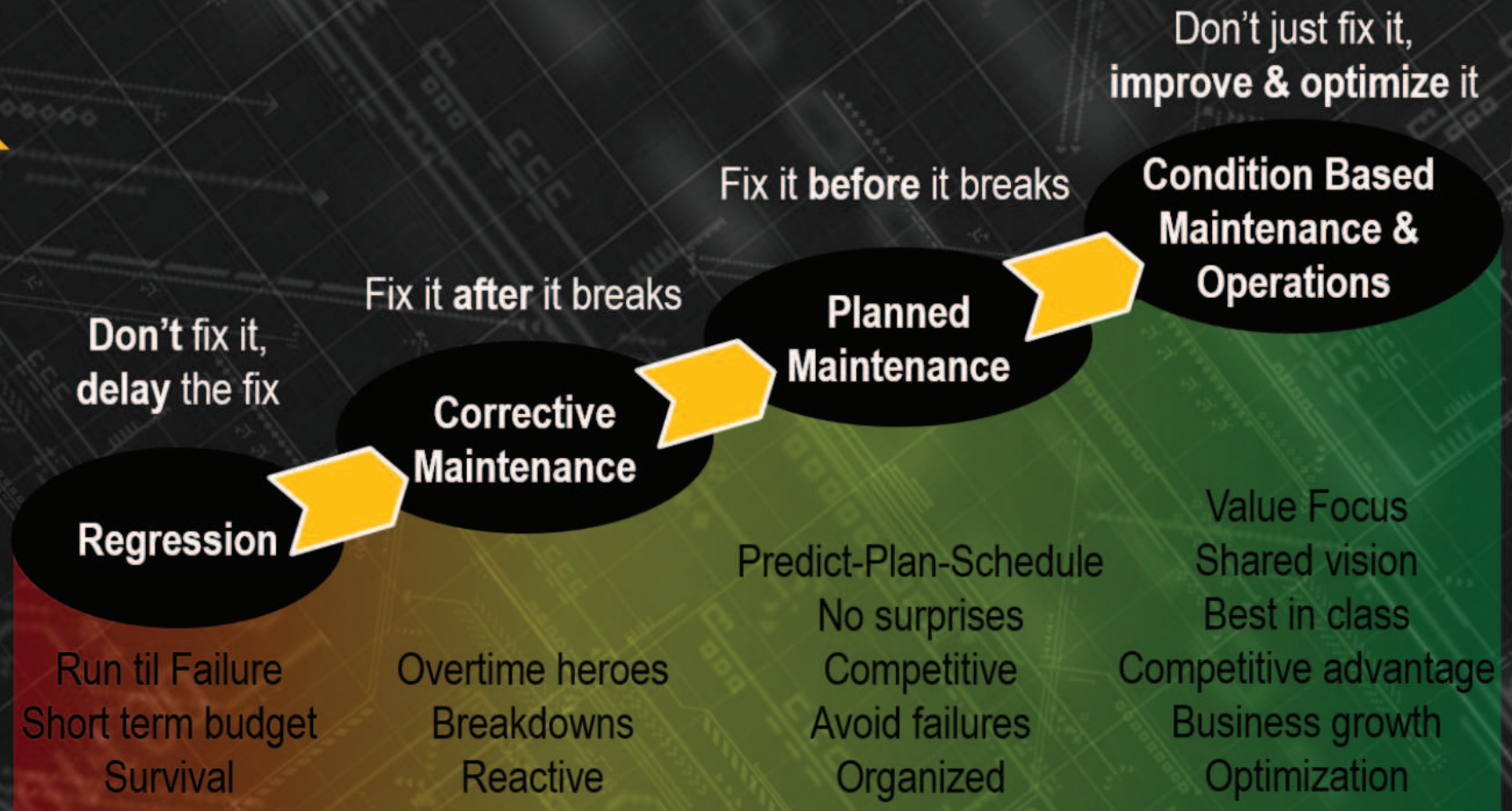




# INCREASED OVERALL PERFORMANCE

More knowledge, higher visibility, wider perspective, seeking excellence, improving quality, using remote monitoring

Performance ↑



Most organizations fall within this range



**REAL EXAMPLES**

# **CUSTOMER VALUE**



**AVOID FAILURES &  
OPTIMIZE RELIABILITY**



**INCREASE VESSEL &  
EQUIPMENT EFFICIENCY**



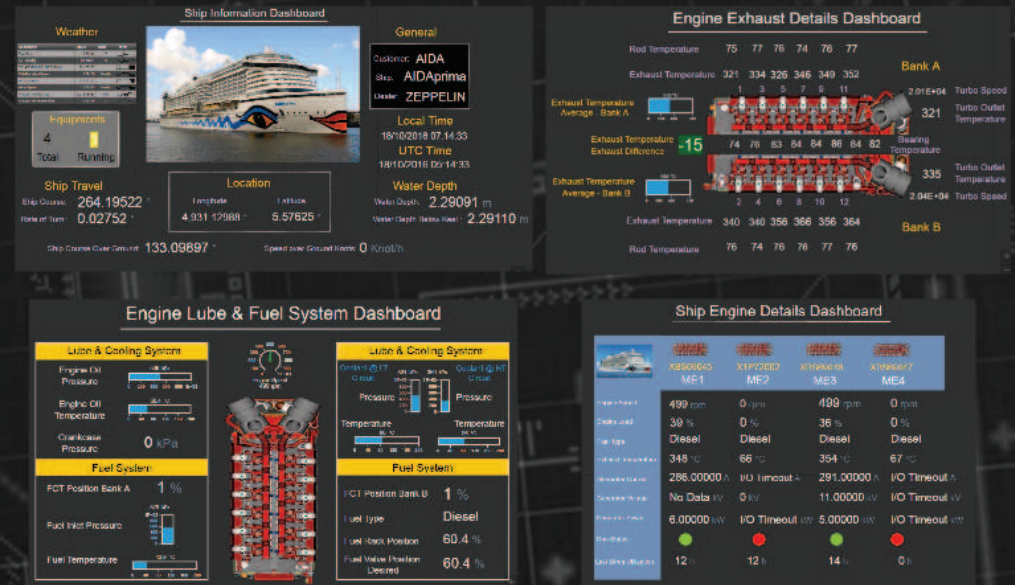
# CRUISE SHIP EXAMPLE



Cruise ship with large diesel engines  
5000+ sensors onboard

# CAT AI & PI

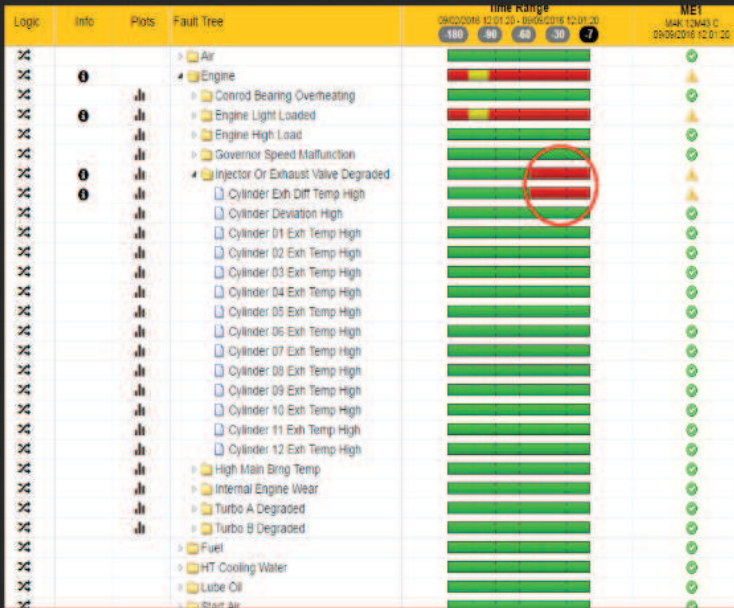
Onboard PI server integrated with automation system (PI Connectors)  
Cat Asset Intelligence integrated with onboard PI server  
Shore PI server at Caterpillar  
Coresight used for visualizations





# CASE STUDY

## PREDICT FUEL LINKAGE FAILURE



Analytics identifies a cylinder with temperatures increasing at a much greater rate than other cylinders.

Visual inspection confirmed problem: Fuel rack linkage damaged, causing abnormal vibrations and cylinder temperature variations.



Future failure avoided: \$10,000 cost  
Avoid unscheduled maintenance



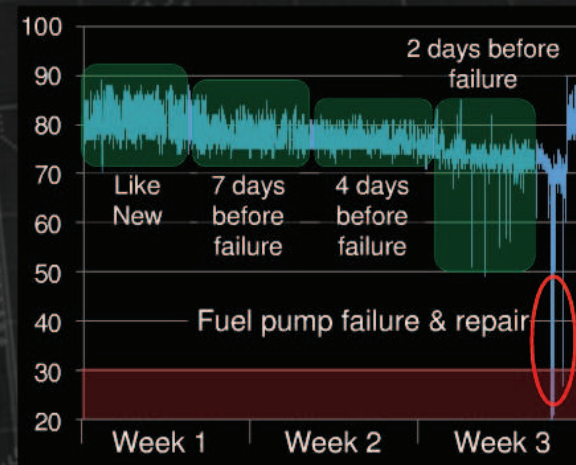
# INLAND RIVER TUG



## CASE STUDY PREDICTED ENGINE FAILURE

Cat Asset Intelligence analytics identified potential fuel pump failure

Raw data typically available



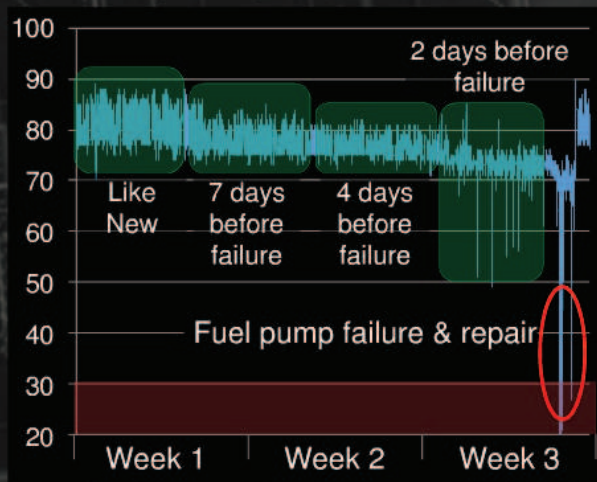


## CASE STUDY

# PREDICTED ENGINE FAILURE

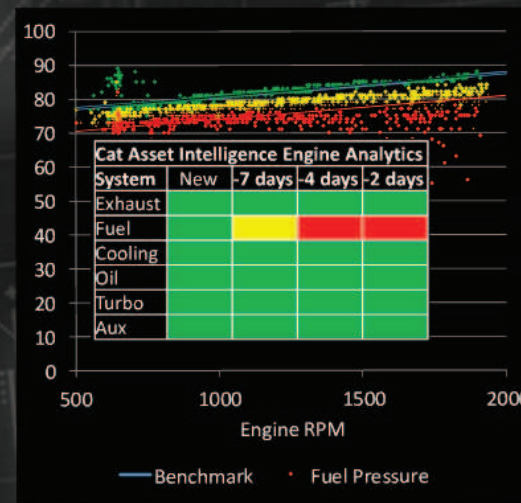
Cat Asset Intelligence analytics identified potential fuel pump failure

Raw data typically available



Potential problem not addressed by onboard crew - failure still occurred, resulting in repair costs and downtime.

CAT ASSET INTELLIGENCE ANALYTICS



**Avoiding failure: \$35K savings**  
**Minimized downtime & reduced repair costs**



**REAL EXAMPLES**  
**CUSTOMER VALUE**



**AVOID FAILURES &  
OPTIMIZE RELIABILITY**



**INCREASE VESSEL &  
EQUIPMENT EFFICIENCY**



## CASE STUDY

# OPTIMIZE HULL CLEANING



**RoRo vessels, Fuel is 70%+ of costs**

Marine growth increases hull resistance, significant fuel cost driver

Environmentals make analysis difficult - typically practice is time based scheduling

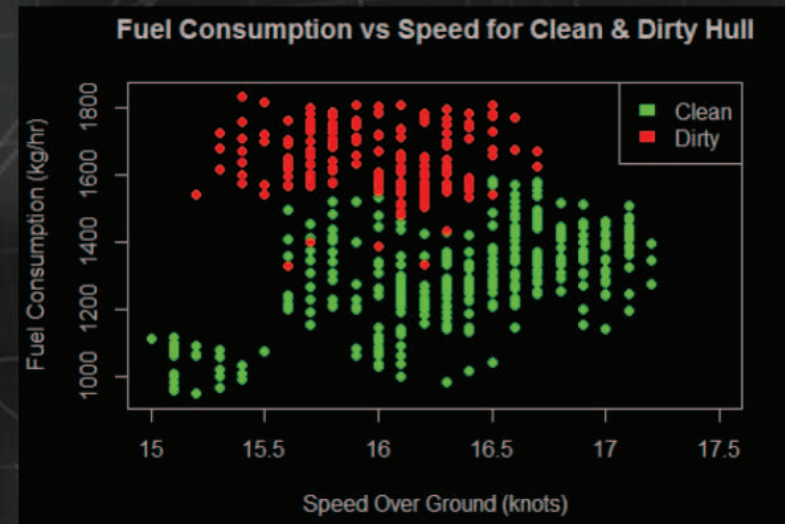


## CASE STUDY **OPTIMIZE HULL CLEANING**

Marine growth increases hull resistance, significant fuel cost driver

Environmentals make analysis difficult - typically practice is time based scheduling

Used R & weka to account isolate for hull condition impact  
Configured Asset Intelligence for continuous analysis



Using data analytics to shift to optimal / condition based cleaning:

**\$450K+**  
per vessel



# APPLYING ANALYTICS ACROSS THE VESSEL





# INTEGRATING WITH EXISTING ENTERPRISE SYSTEMS



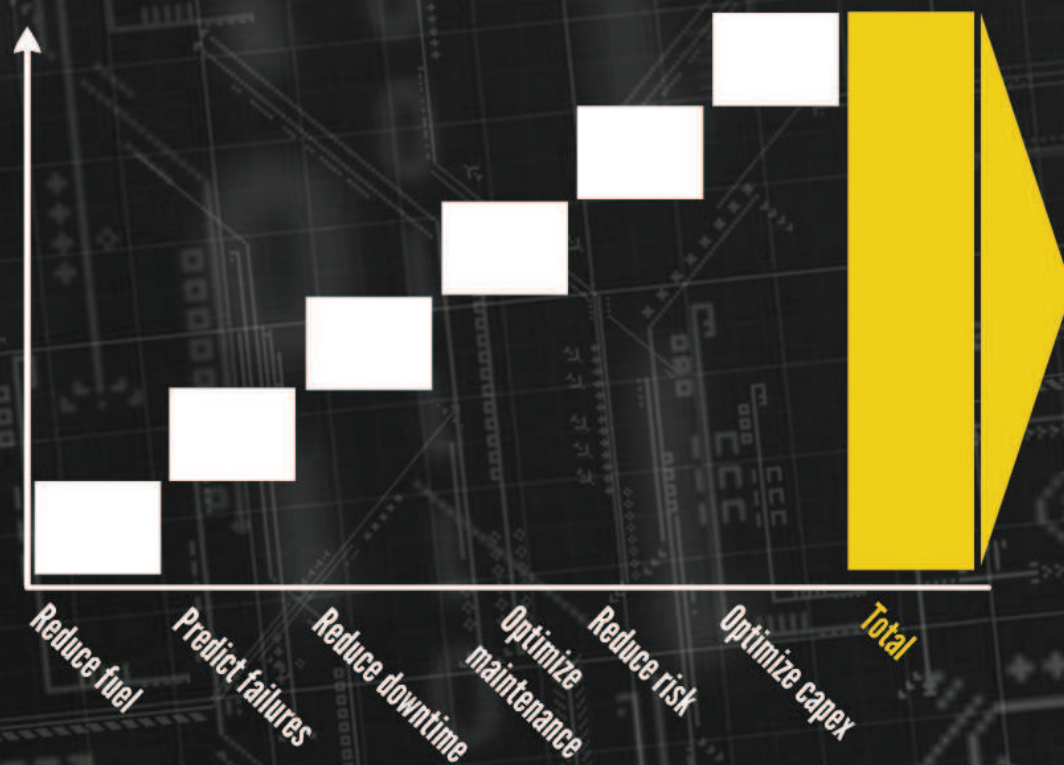
**Raw Data from  
Sensors & Machines**

**Cat Asset Intelligence  
analytics applied to  
create usable information**

**Seamless integration with systems  
such as Computerized Maintenance  
Management Systems (CMMS)**



# SMART IRON BRINGS SIGNIFICANT VALUE TO CUSTOMERS



Examples of Value  
Annual

Harbor Tug **\$230K**

Container RoRo **\$400K**

Cruise **\$1.5M**



# Caterpillar Inc

## Cat Asset Intelligence

### COMPANY and GOAL

Caterpillar is bringing value-add digital solutions and services to our customers globally, by using data & analytics to avoid failures, reduce operating costs, be more efficient and reduce risk.



### CHALLENGE

Ship owners and operators are looking for how they can use technology to reduce cost, fuel and risk

- Different & legacy data sources, Cat & 3<sup>rd</sup> party, many OEMs
- Wide range of data uses cases
- Remote operating environments
- Limited technical expertise onboard

### SOLUTION

Apply automated analytics from Cat Asset Intelligence to provide actionable advisory services

- PI Servers, PI Connectors, PI Coresight
- Variety of ship types: Cruise, Defense, Ferry, Cargo, Tug
- Onboard & Shore Analytics
- Asset & Enterprise use cases

### RESULTS

\$200K - \$1.5M+ in value from analytics & expert advisory services through avoided failures, less downtime & reduced fuel burn

- 1-10% reduction in fuel burn, sometimes equating to \$100K+ annual savings
- Failures avoided with potential costs of \$10-100K per incident
- Unplanned downtime reduced



## Contact Information

**Rob Bradenham**

[bradenham\\_rob\\_e@cat.com](mailto:bradenham_rob_e@cat.com)

Global Sales & Business  
Development

Cat Asset Intelligence  
Caterpillar Inc





## Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

## Please remember to...

Complete the Online Survey for this session



**Download the Conference App for OSISOFT Users Conference 2017**

- View the latest agenda and create your own
- Meet and connect with other attendees



search OSISOFT in the app store

<http://bit.ly/uc2017-app>



The Caterpillar logo is centered on the page. It features the word "CATERPILLAR" in a bold, white, sans-serif font. A yellow triangle is positioned at the bottom left of the letter "A". A registered trademark symbol (®) is located at the top right of the word. The background is a dark, textured grid with faint technical drawings and binary code.

**CATERPILLAR®**

CAT, CATERPILLAR, their respective logos, "Caterpillar Yellow," the "Power Edge" trade dress as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission. VisionLink™ is a trademark of Trimble Navigation Limited, registered in the United States and in other countries.

© 2016 Caterpillar All Rights Reserved.