



# Plant Asset Reliability – An Integrated Approach

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Manager

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## Performance Without Compromise



**EMERSON**  
Process Management

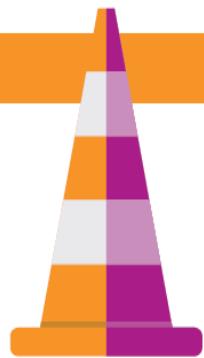
# Industry challenges

## SAFETY

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.*

1/2



**ACCIDENTS**  
DURING TRANSIENT TIME

## PROFITABILITY

**50%  
MORE**  
REPAIR COSTS

It costs approximately 50% more to repair a failed asset than if the problem had been addressed prior to failure.

*- U.S. National Response Center*



**\$8.4 Million  
PER YEAR**

Every 1% gain in availability is worth \$8.4 million of additional margin capture per year in a typical 200,000 bpd refinery.

*- Doug White, Emerson Industry Expert – Based on Current Refinery Economics.*

## AVAILABILITY



**5%**  
**PRODUCTION  
CAPACITY LOST**

Production capacity is lost to as much as 5% every year as a result of unplanned shutdowns.

*- Asdza Nadleeh, "Engineering & Maintenance: Prevention Is Better Than Cure," Oil & Gas IQ, October 2011.*



**43%**  
**DOWNTIME**

As much as 43% of unplanned downtime is caused by equipment failure.

*- Large Property Damage Losses in the Hydrocarbon-Chemical Industries, 17th Edition.*

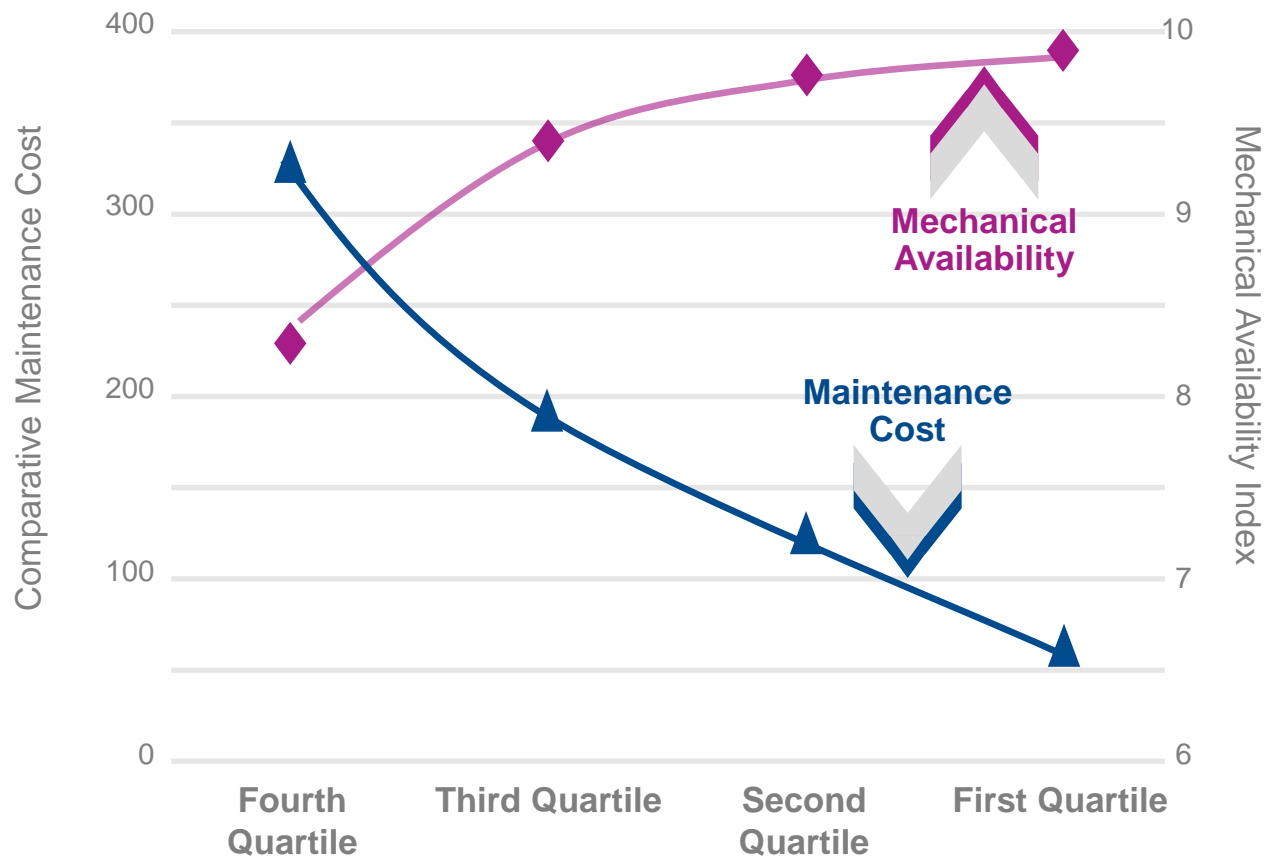


**EMERSON**  
Process Management

# Why reliability matters?

## Reliability Business Impact

Normalized to First Quartile Performance



*What do top quartile performers have in common?*

- A reliability culture
- Reliability centered business processes
- Good mix of predictive and preventive maintenance work processes
- Appropriate use of reliability technologies
- Strong reliability engineering capabilities

*Average Uptime Comparison*

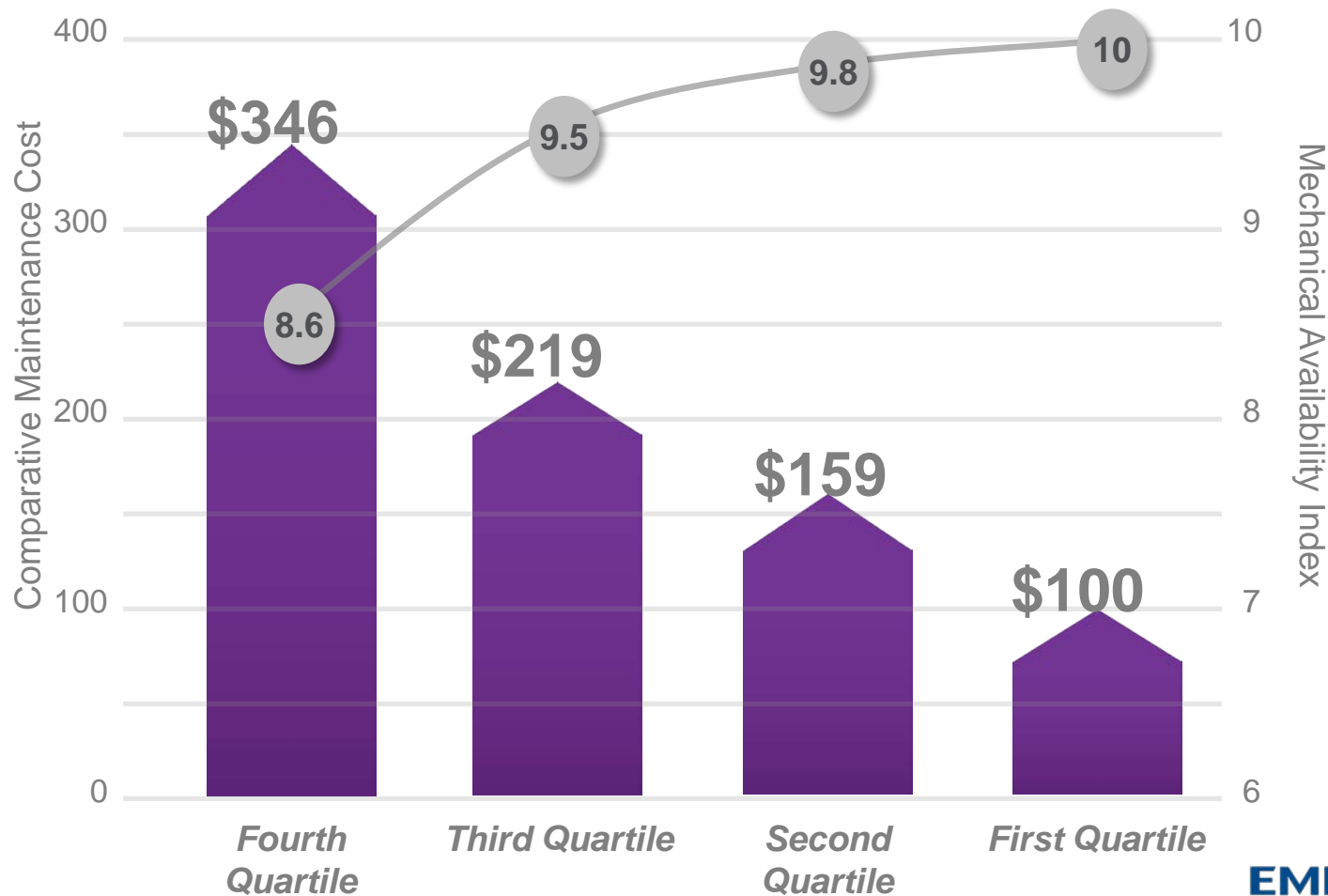
- First Quartile: 353 days per year
- Third Quartile: 335 days per year

**Top performers hold a huge business advantage**

# Top performers hold a huge business advantage

## Reliability Business Impact

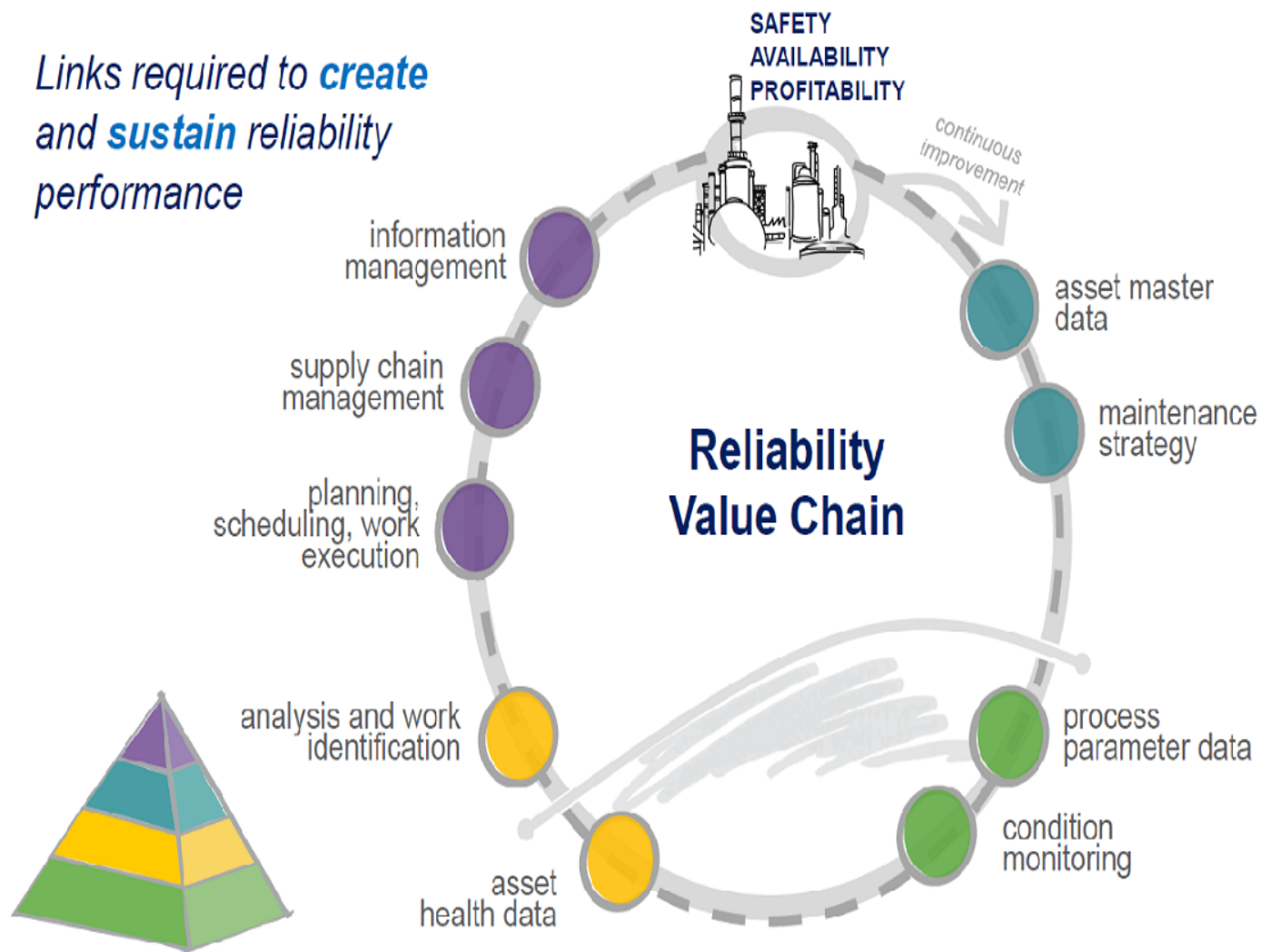
Normalized to First Quartile Performance



Based on 2013 Solomon RAM Study, Solomon Associates LLC

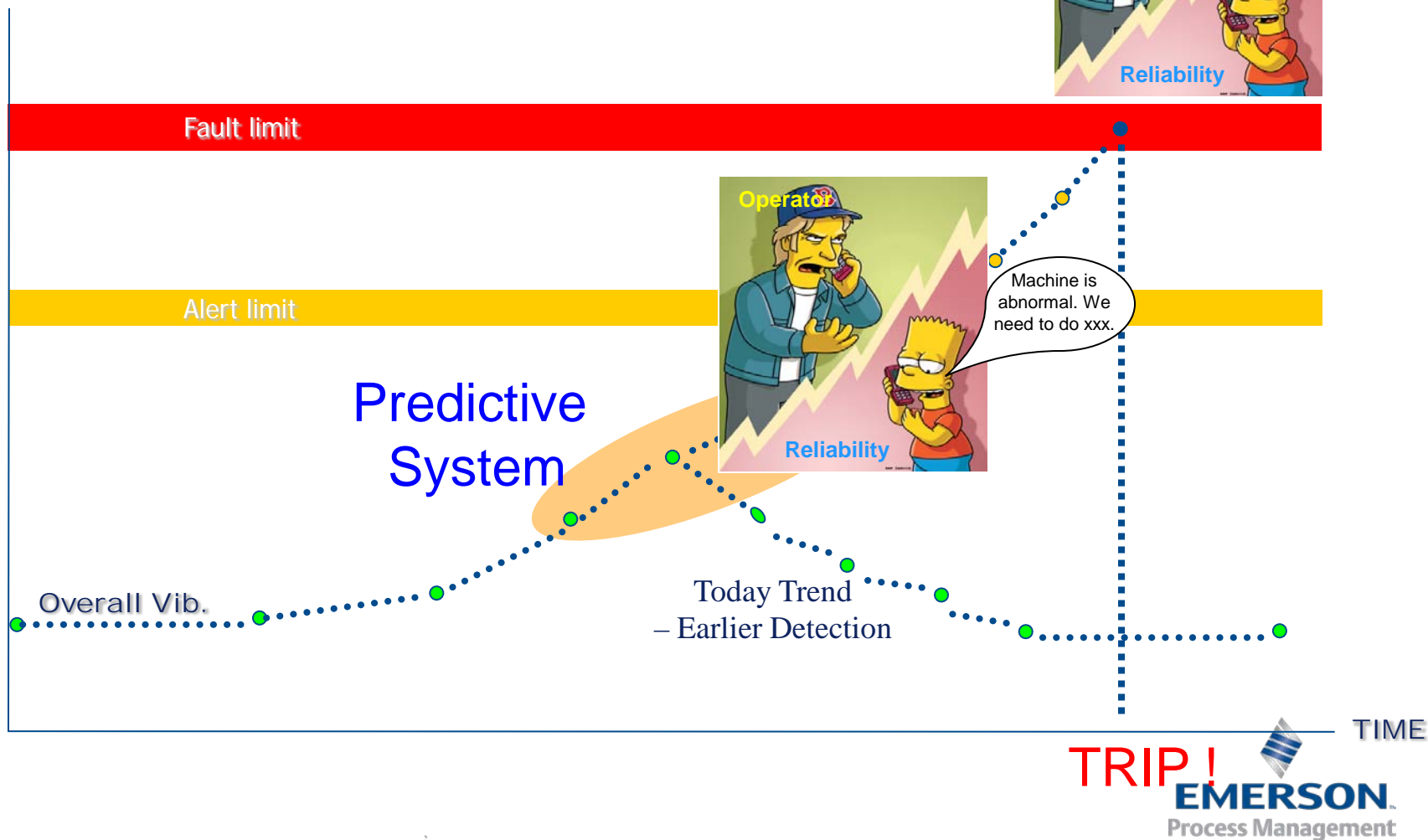
# Reliability value chain

*Links required to **create**  
and **sustain** reliability  
performance*



# Reducing maintenance cost

- Current practice





# Where's the Subject Matter Expert?

Prediction software  
available here →



Ian's route stops

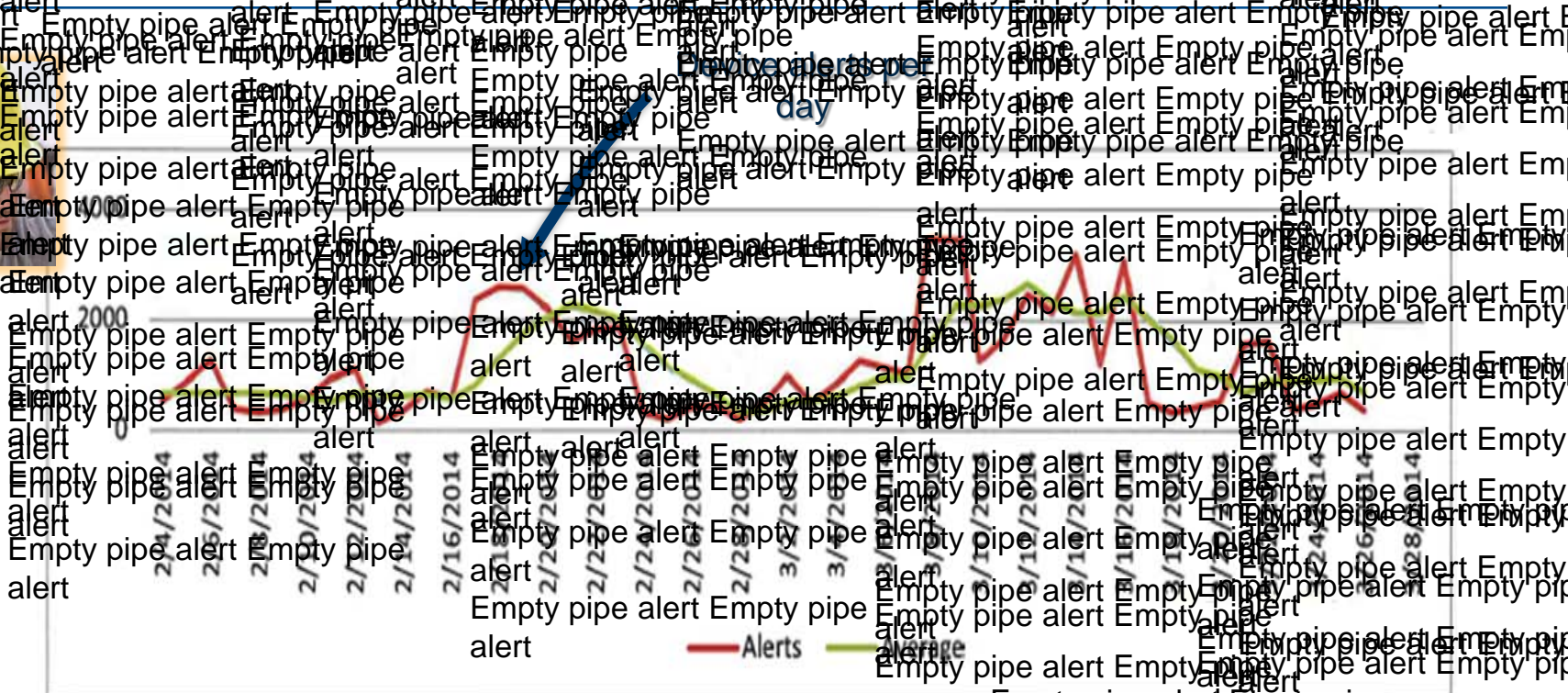


# Goes on and on ..... and on





**Empty pipe alert**



## Completely revamp Alert Monitor...

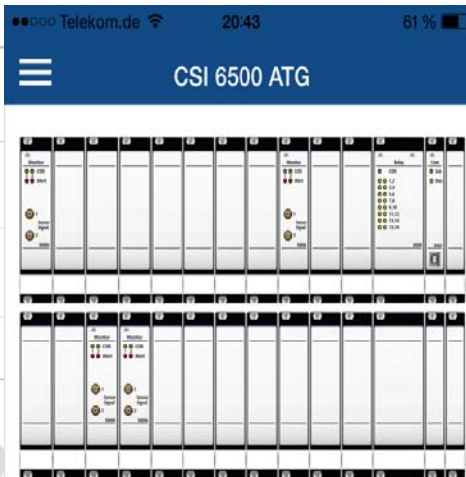
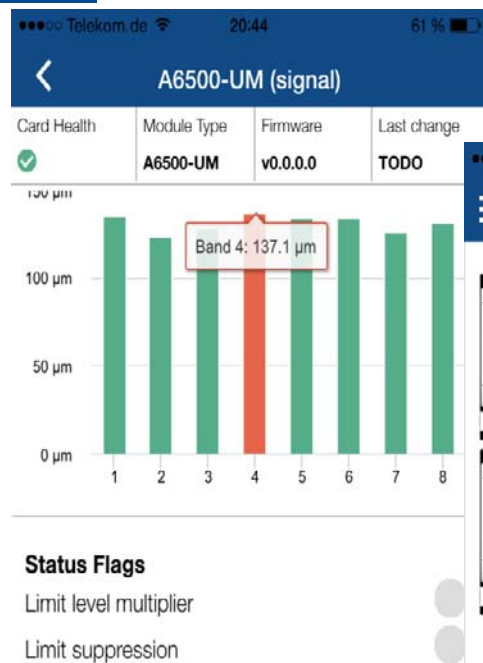
pipe alert Empty pipe  
Empty pipe  
pipe alert Empty pipe  
Empty pipe  
EMERSON  
pipe management

# CSI 6500 Advanced Turbo Guard

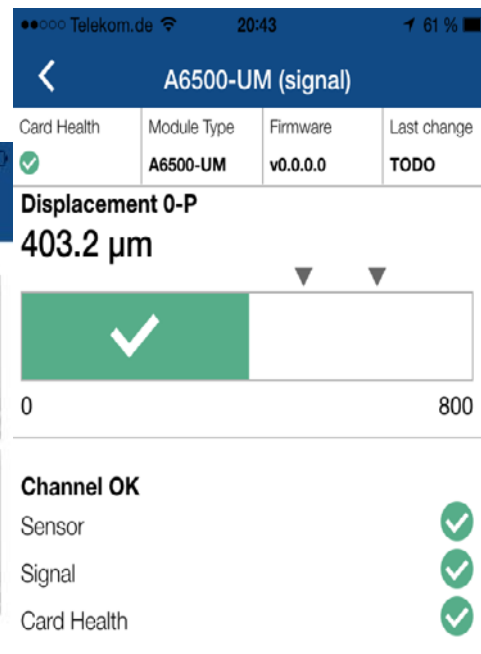
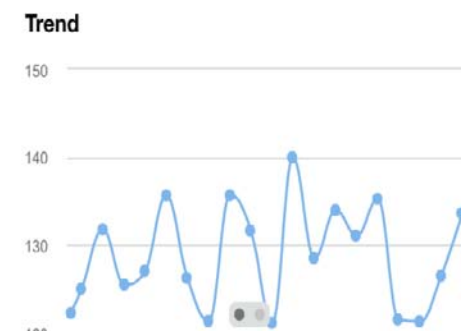


# ATG View - brings Prediction to Operations

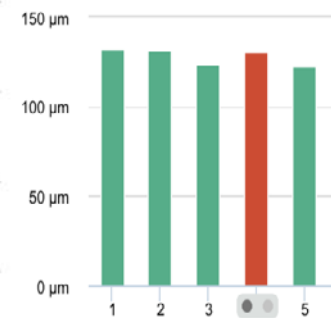
- **PeakVue** – gearbox defects, valve leak detection, etc
- **Order Analysis** – bearing rubs, imbalance, etc
- **Band Analysis** – fluid induced instability, etc



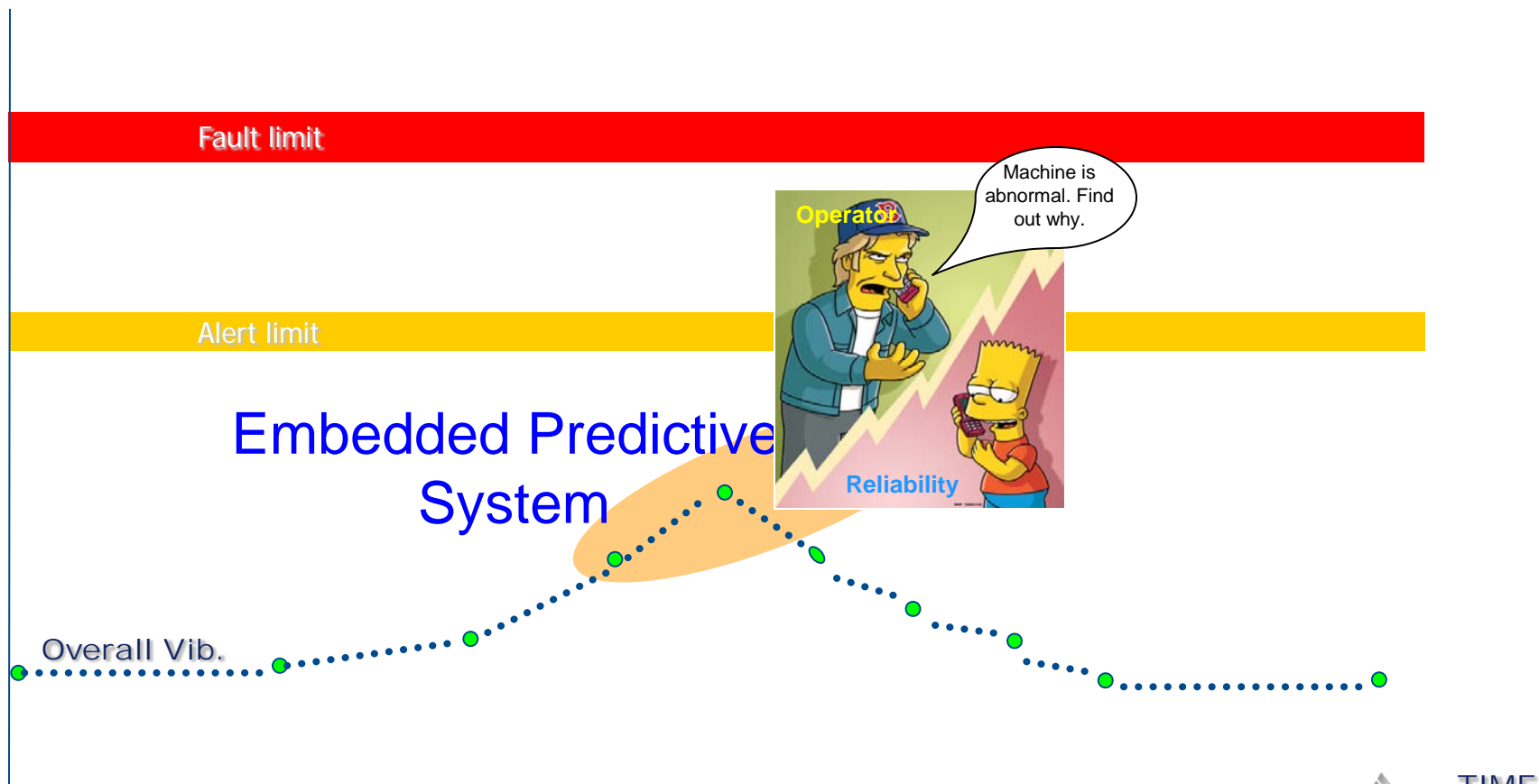
- ✓ A6500-UM (signal) (R1 S00)  
SN: 324455513
- ✓ A6500-UM (signal) (R1 S01)  
SN: 64324455513
- ✓ A6500-UM (signal) (R1 S09)  
SN: 897324455513
- ✓ A6500-UM (signal) (R1 S12)  
SN: 458324455513
- ✓ A6500-UM (signal) (R1 S13)  
SN: 82324324455513
- ✓ A6500-UM (signal) (R2 S03)  
SN: 9833324455513



## Bands



# Reducing maintenance cost





# Information at your finger tip



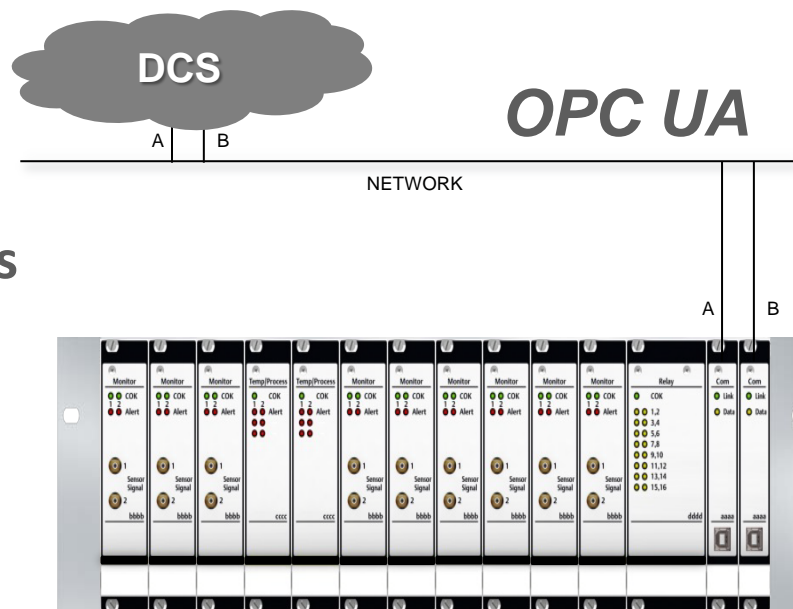
Supports iOS and Android  
devices

# Integration with today's business demands

- 1<sup>st</sup> API 670 with OPC UA 'out of the box'



- Modern connection to DCS



- Historians, “big data”, “IoT”, HMI's

**OPC Unified Architecture (OPC UA)** is an Industrial M2M communication protocol for interoperability developed by the OPC Foundation . Differs significantly from its predecessor.

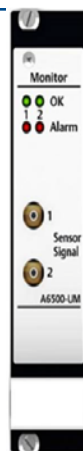
# Flexible I/O



**SINGLE RACK**  
6500-SR



1



**UNIVERSAL MEASUREMENT**  
6500-UM



Shaft Relative Vib  
Case Vib  
Case Vib Piezo  
Shaft Absolute Vib  
Hydro Dynamic  
Hydro Static

Thrust / Rod Drop  
Eccentricity  
Speed  
Keypulse  
Case Exp  
Diff Exp

2

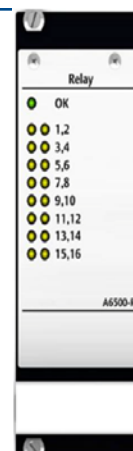


**TEMP PROCESS**  
6500-TP



Process/Temperature

3



**RELAY CARD**  
6500-RC



Programmable Relays

4



**COM CARD**  
6500-CC



Modbus RTU  
Modbus TCP  
OPC UA

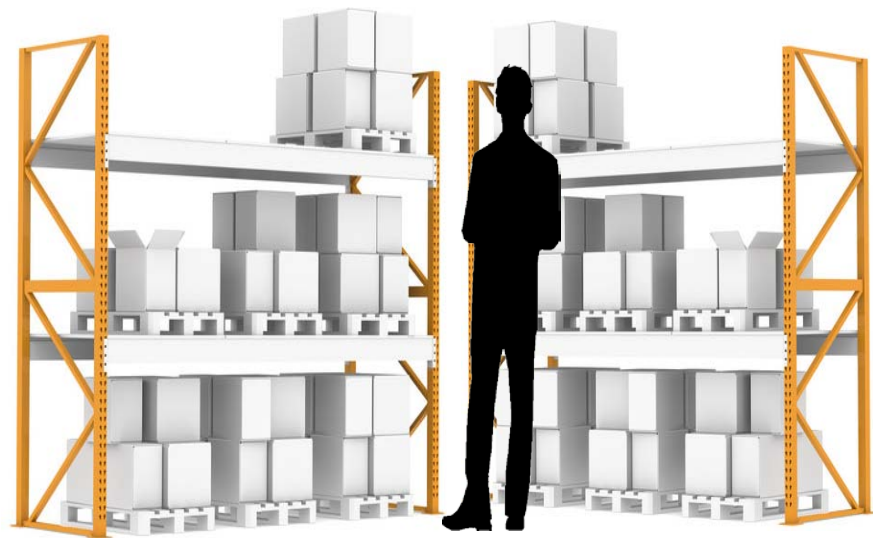


**EMERSON**  
Process Management



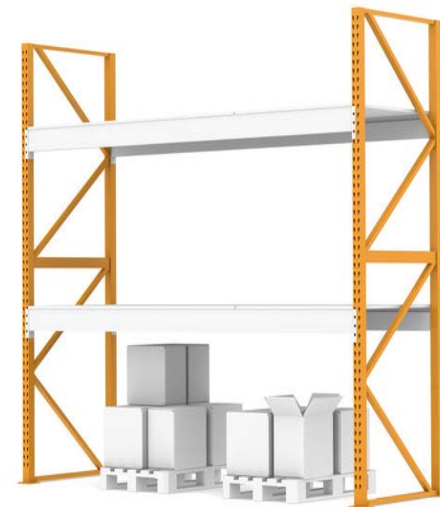
# CSI 6500 ATG – *Advanced Turbo Guard* Spare Part Battle

CURRENT



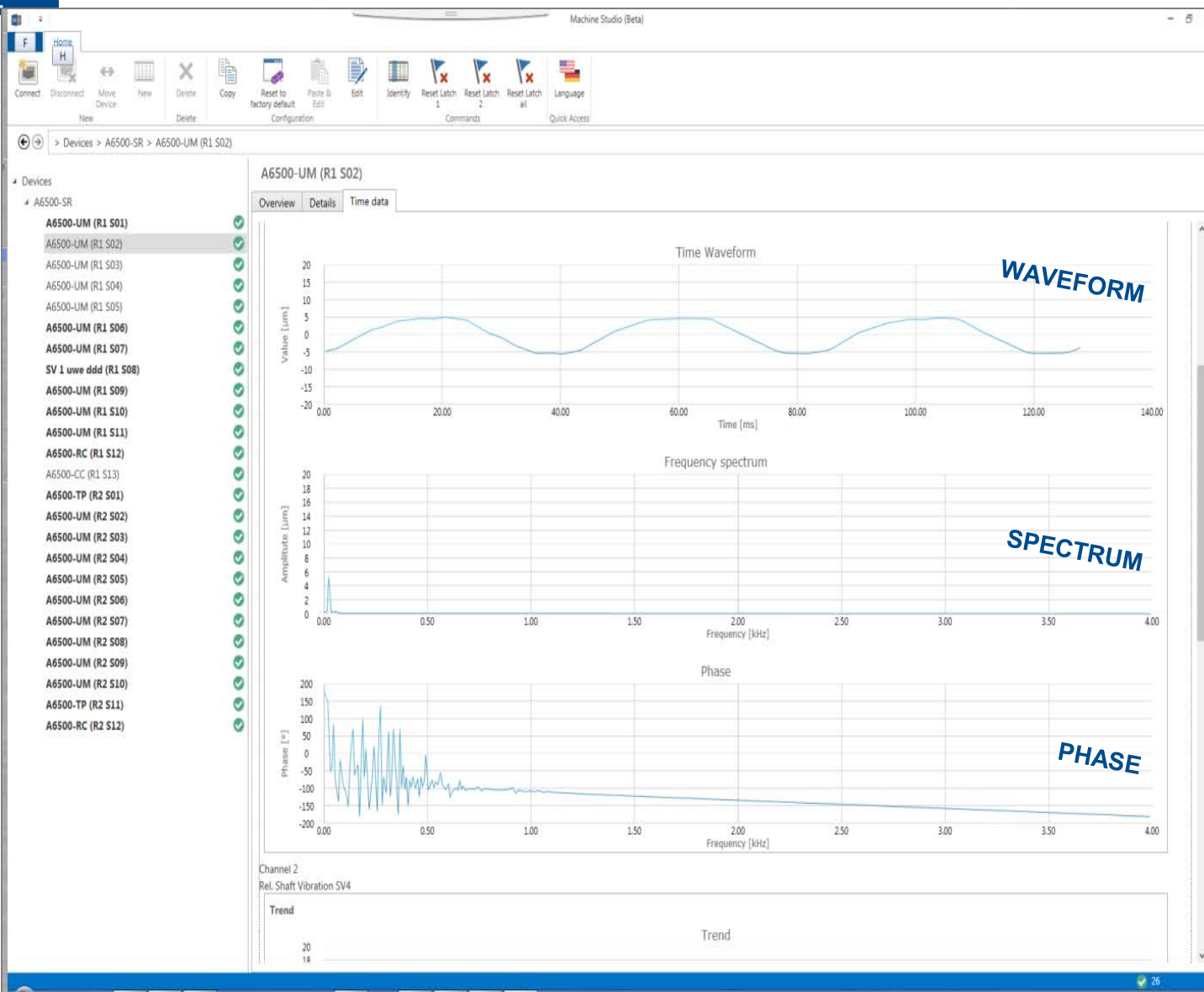
+20 Monitors / Parts

Enhanced



4 Monitors / Parts

# Built-in prediction without complicated software



Monitor cards store

- Last Run Up
- Last Coast Down
- Speed / Time
- Bode

*Software packaged with  
CSI 6500 ATG! !*

# Next Generation Machinery Health Platform

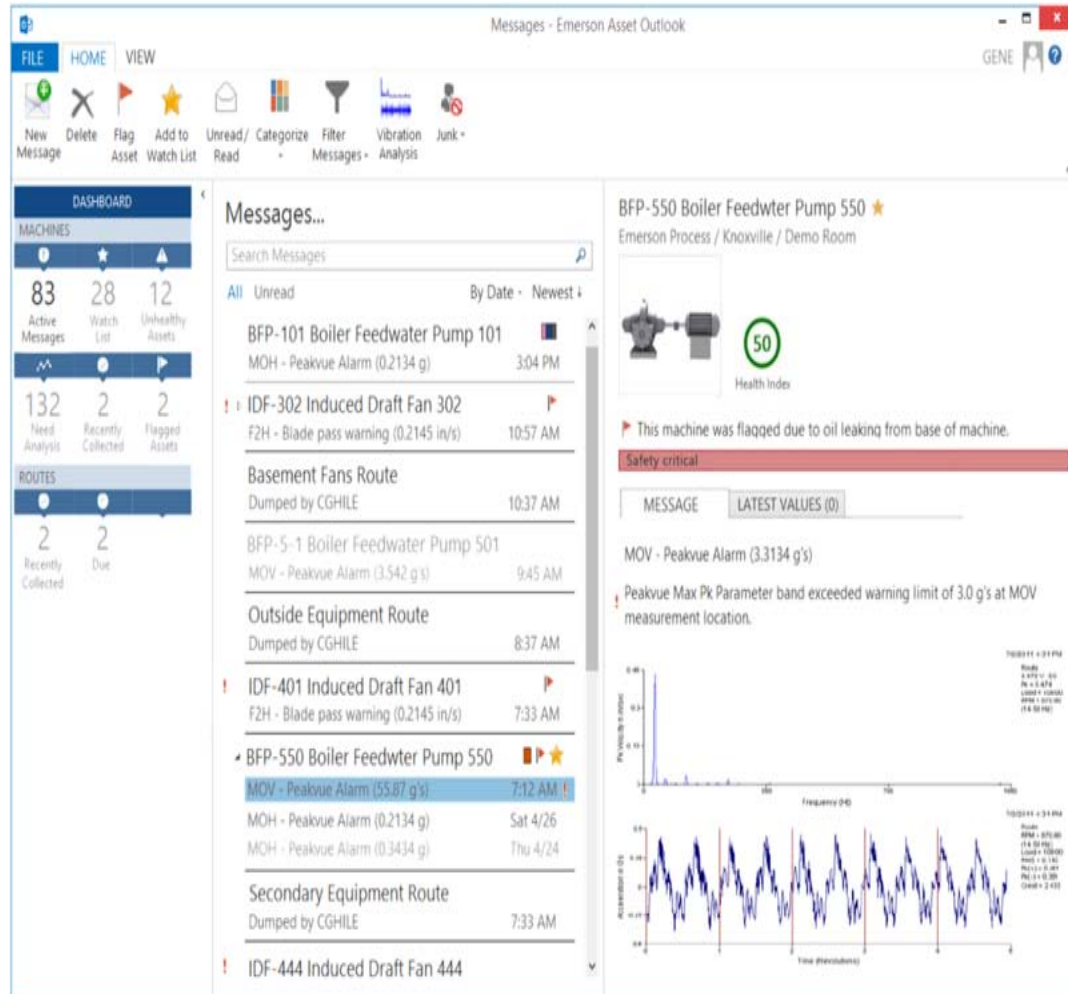


Introducing our new *curiously  
easy* asset management  
software...

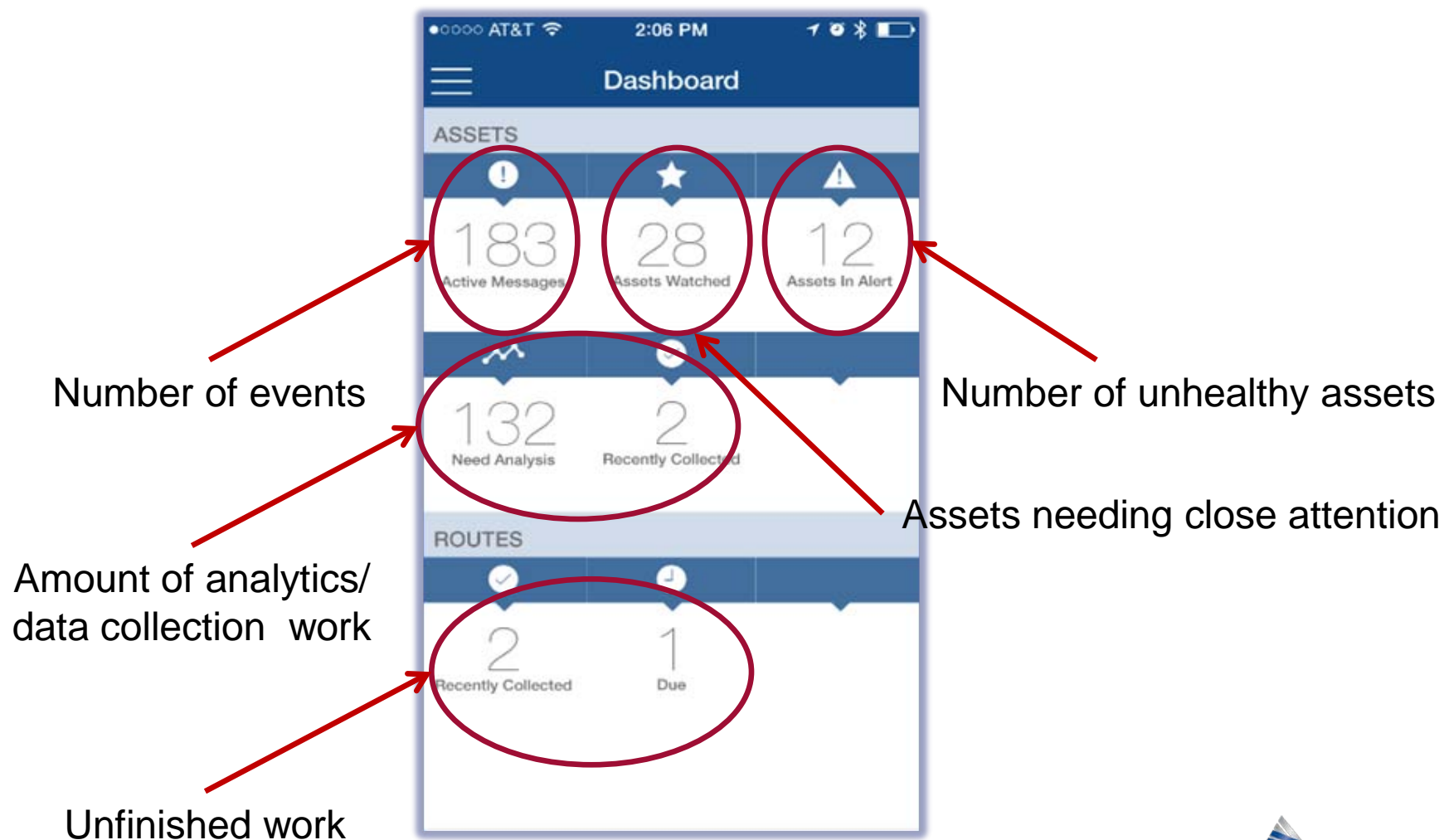
“ARES”

*Asset  
Reliability  
Expert  
System*

# Asset condition at a glance



# How are the plant assets doing today?

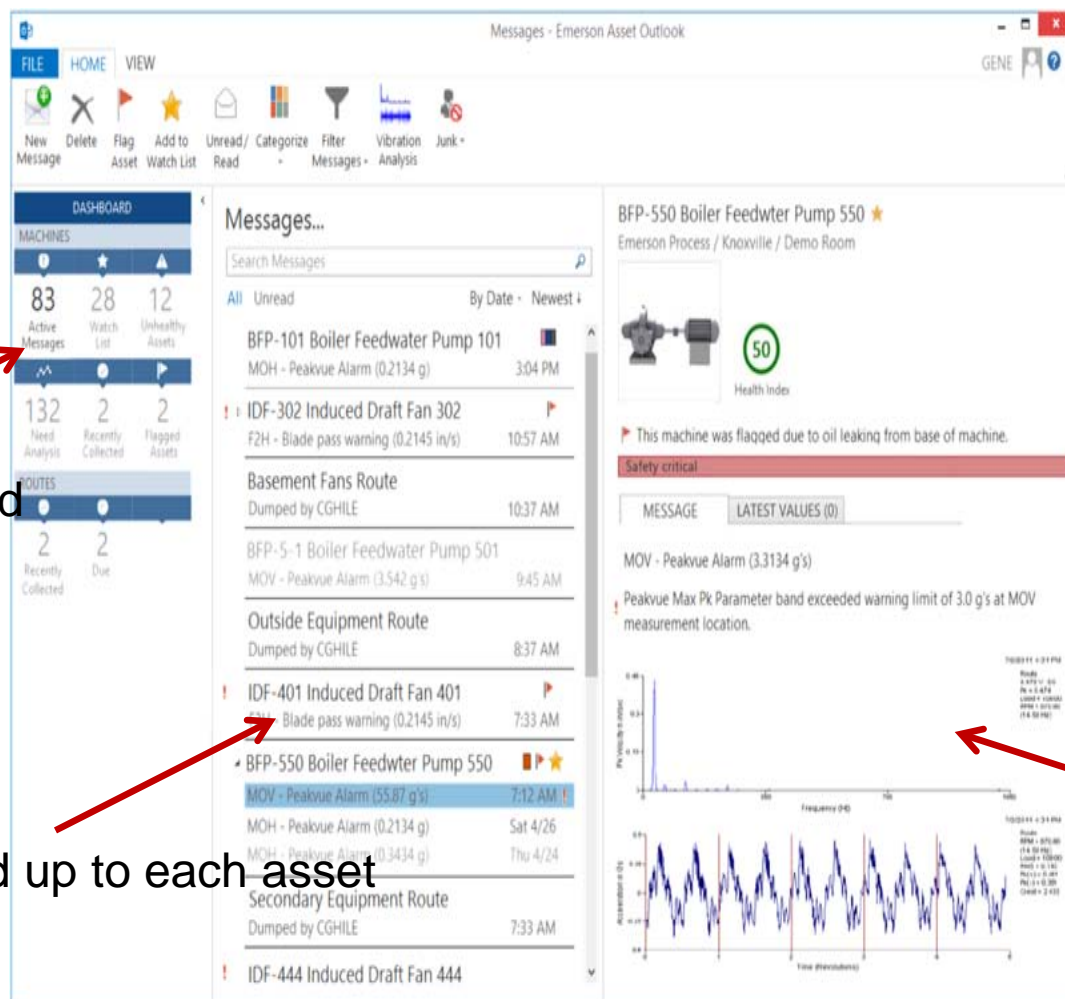


# What has happened to this asset?

Overview dashboard

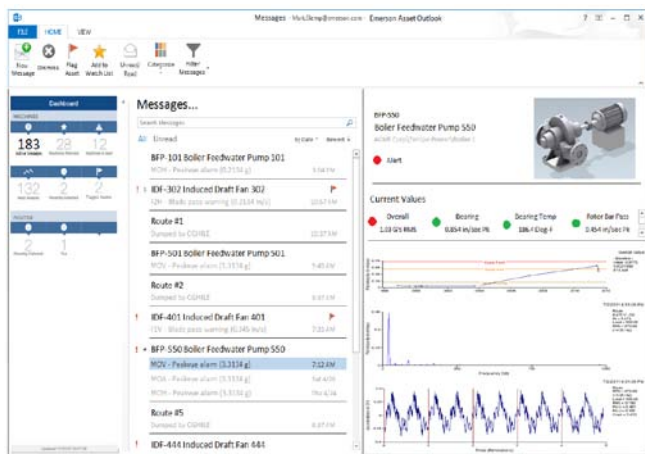
Events rolled up to each asset

Event details



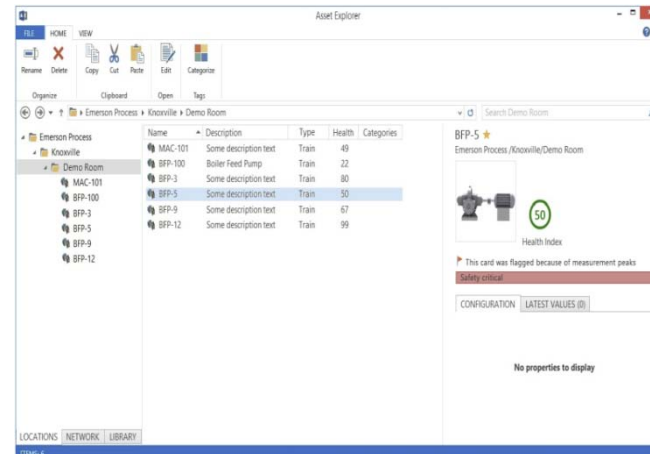


# Easily accessible



Asset View

Asset View shows a rolled up Alert status in conversation view that allows for progressive disclosure of more detailed analysis and overall weighted asset health.



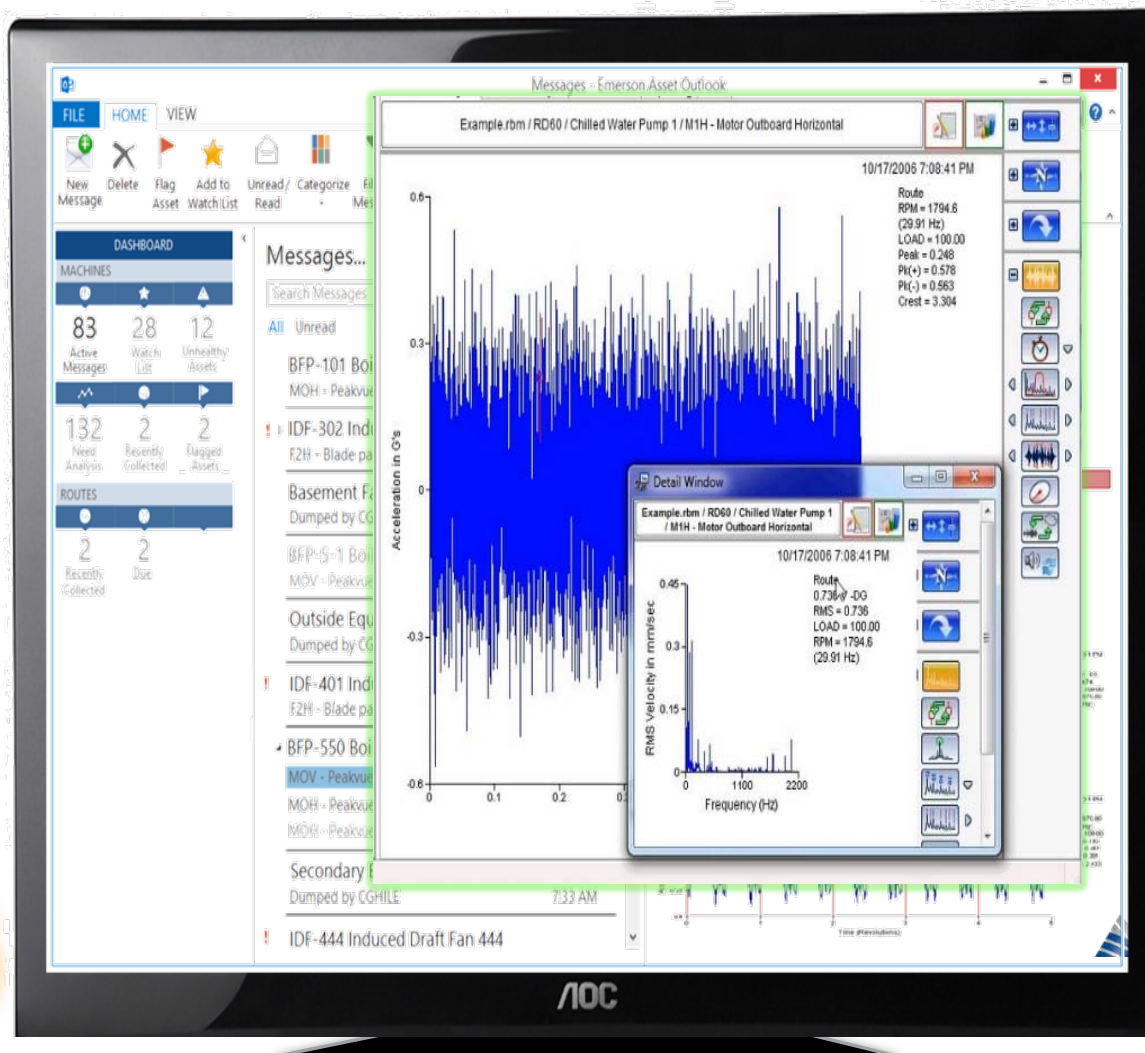
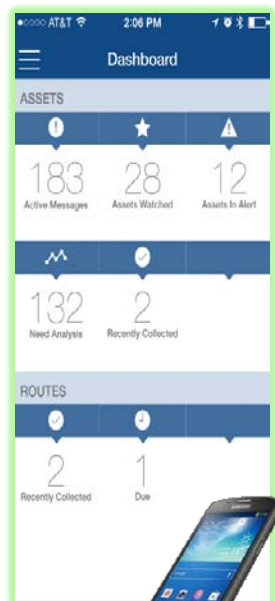
Asset Explorer

Asset Explorer allows for intuitive configuration of the asset health database. Wireless HART devices attached to the Emerson Wireless Gateway are automatically discovered and added to the database.



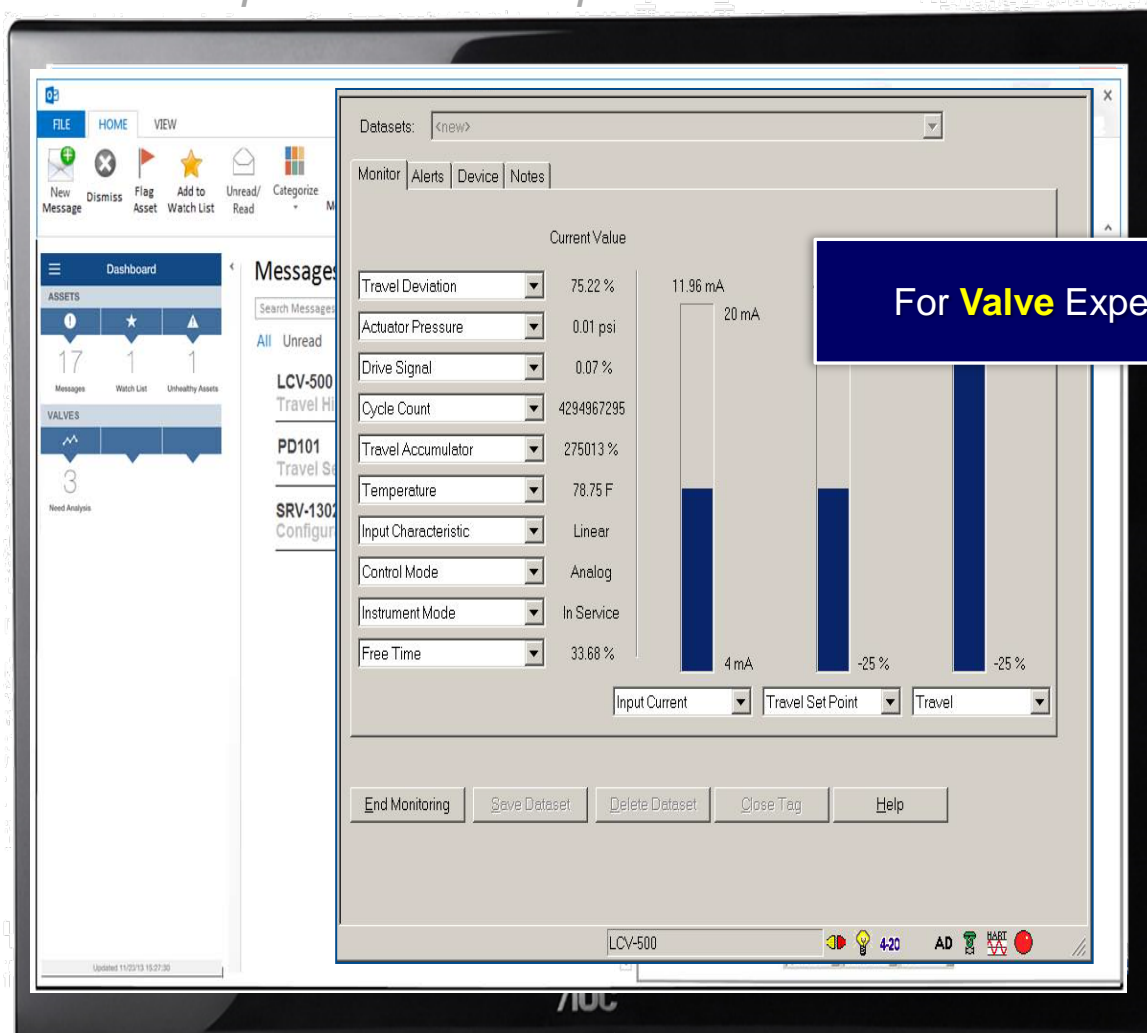
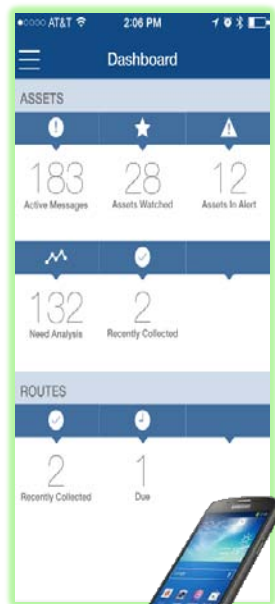
# Mike's Power Tools

*Tablets phablets desktop. Zero maintenance*

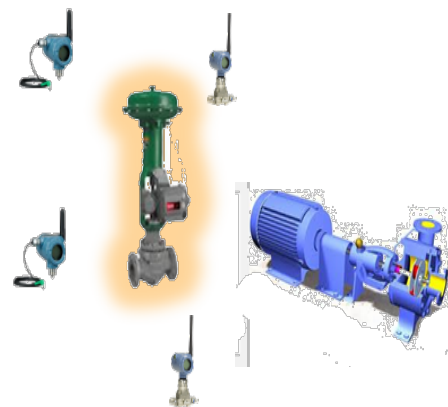


# Todd's Power Tools

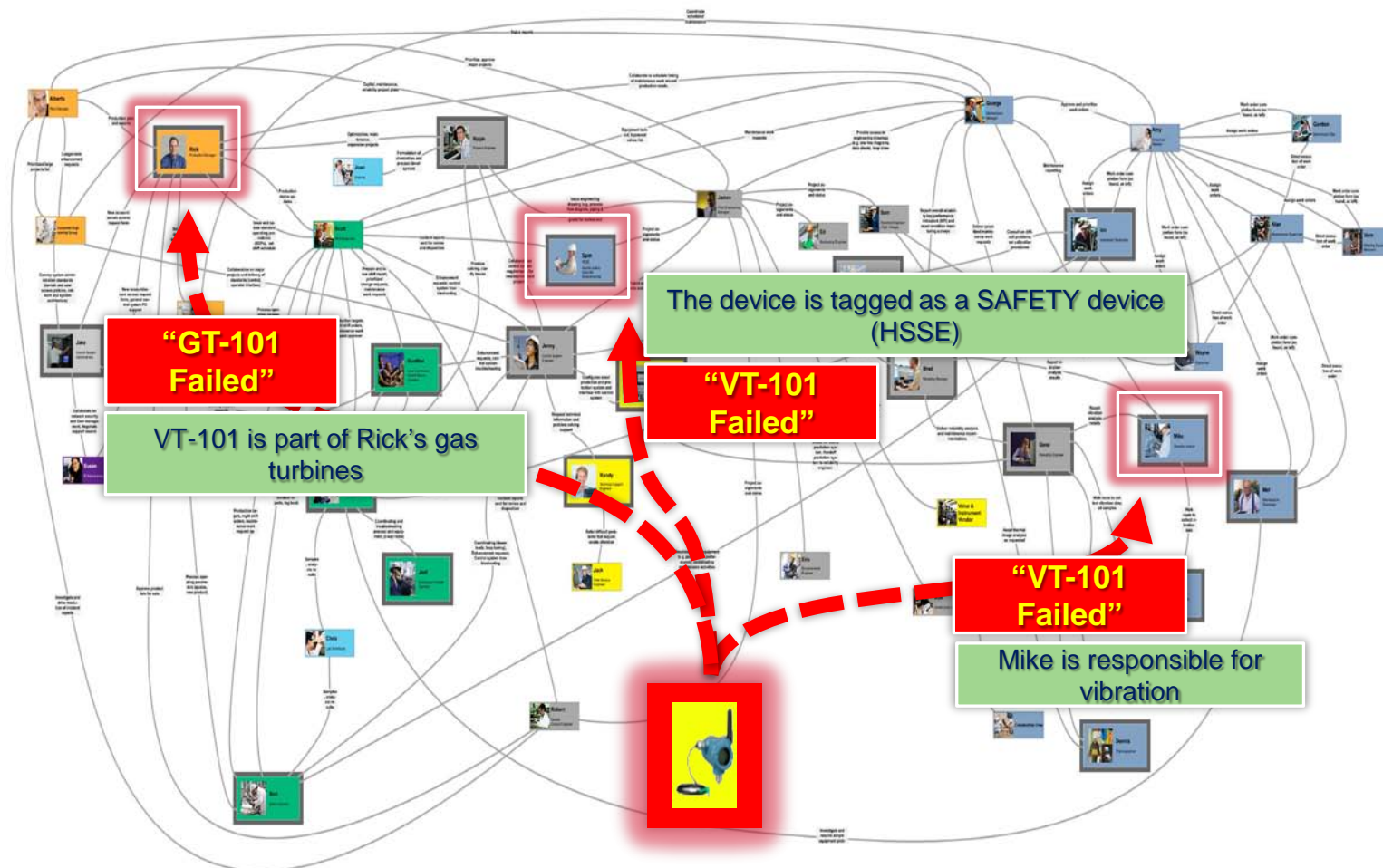
*Tablets phablets desktop. Zero maintenance*



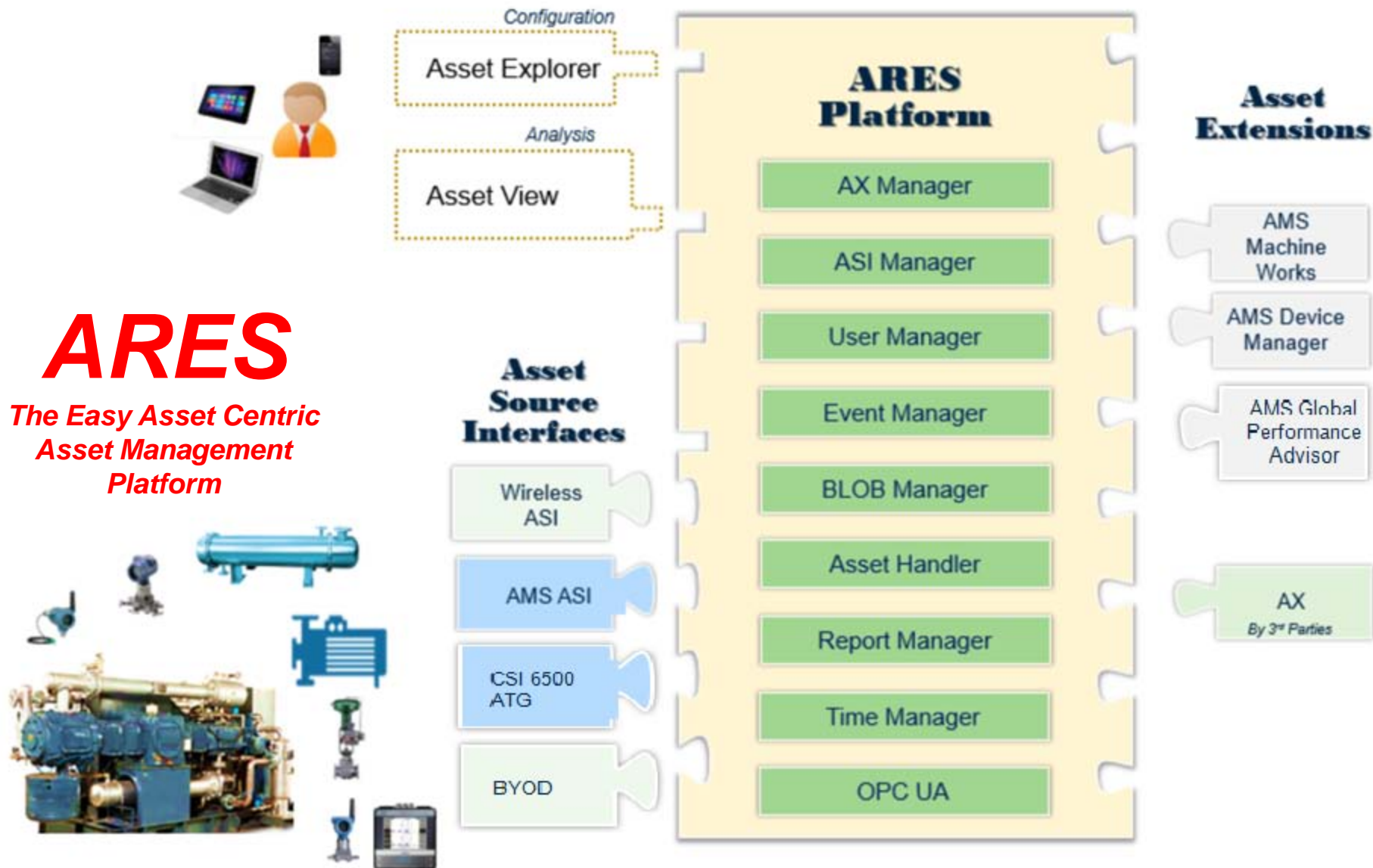
For **Valve** Experts



# Flow Of Data Upon High Vibration on Critical Equipment



# System Architecture



# The Next Generation Machinery Health Platform





# Summary

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- Asset health information for all stakeholders
- Easy accessibility to actionable information
- Meeting today's business demands

EMERSON  
CONSIDER IT  
SOLVED™