FLUKE®
Reliability

Proactive Maintenance Strategies to Extend the Life of Your Assets

Accelix™
Webinar Series

Meet the Speakers

John Bernet, CMRP

Mechanical Reliability Application Specialist at Fluke Corp. (8 years)

- Previously worked at Azima DLI for 18 years
- Served 12 years in U.S. Navy on cruiser & aircraft carrier as electrical technician
- Has 30+ years of experience in preventive and predictive maintenance
- Written many technical articles for global trade publications and recently completed a 240-page vibration training program

Certified Maintenance & Reliability Professional (CMRP)

Thermal/Infrared Thermography Level I certified

Vibration Analysis Level 2 certified

Meet the Speakers

Dries Van Loon

Sales and Project Manager, Online Condition Monitoring, at Fluke Corp.

- 10 years of experience in predictive maintenance
- Joined PRUFTECHNIK (acquired by Fluke) as an Application Engineer in 2012
- Established PRUFTECHNIK Inc.'s Condition Monitoring Department in 2014
- Certified as an ISO CAT 4 analyst since 2017

Certified Reliability Leader (CRL)

Ultrasound Level I certified

Vibration Analysis Level 4 certified

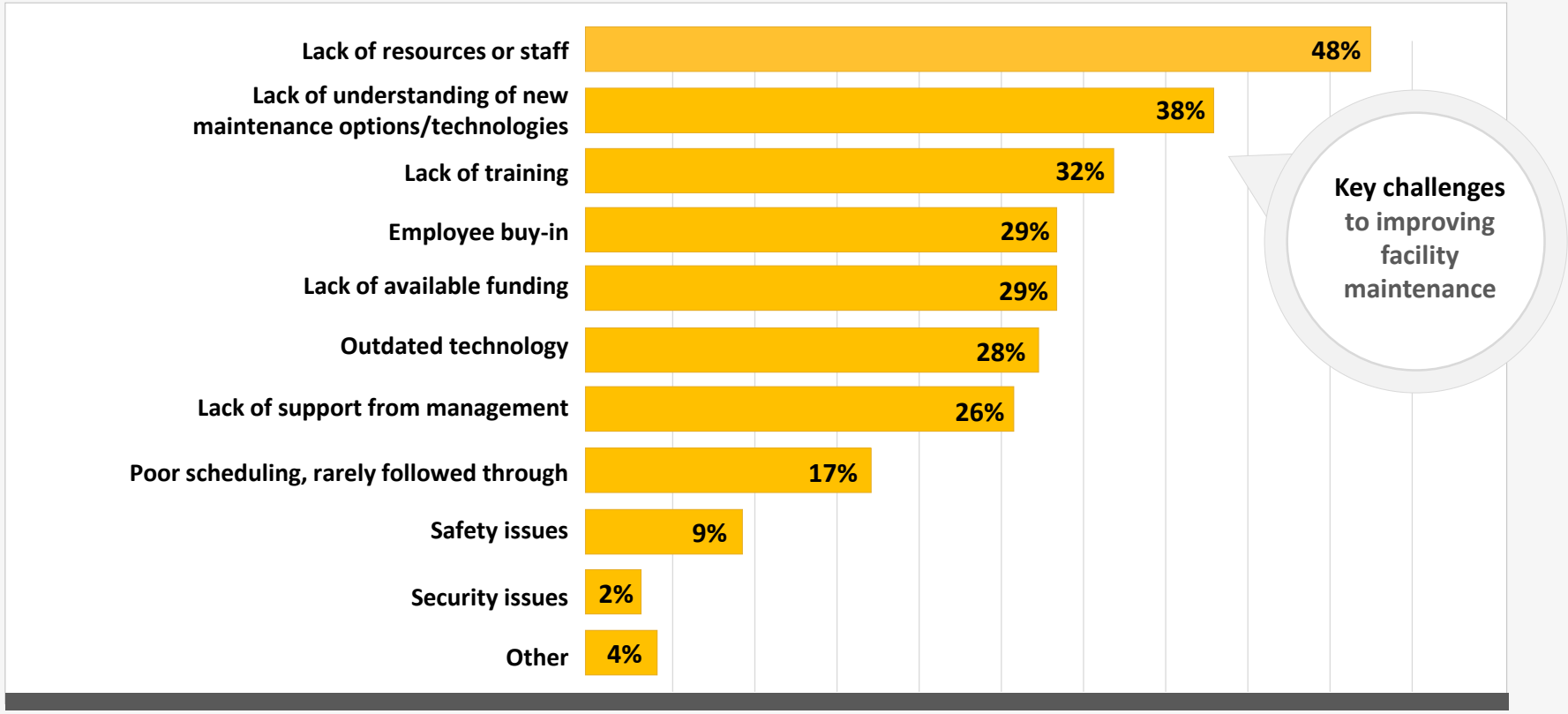
Today’s maintenance landscape

Challenges / Solutions

Today’s maintenance landscape

Maintenance teams in nearly every industry are faced with one common problem:

DOING MORE WITH LESS



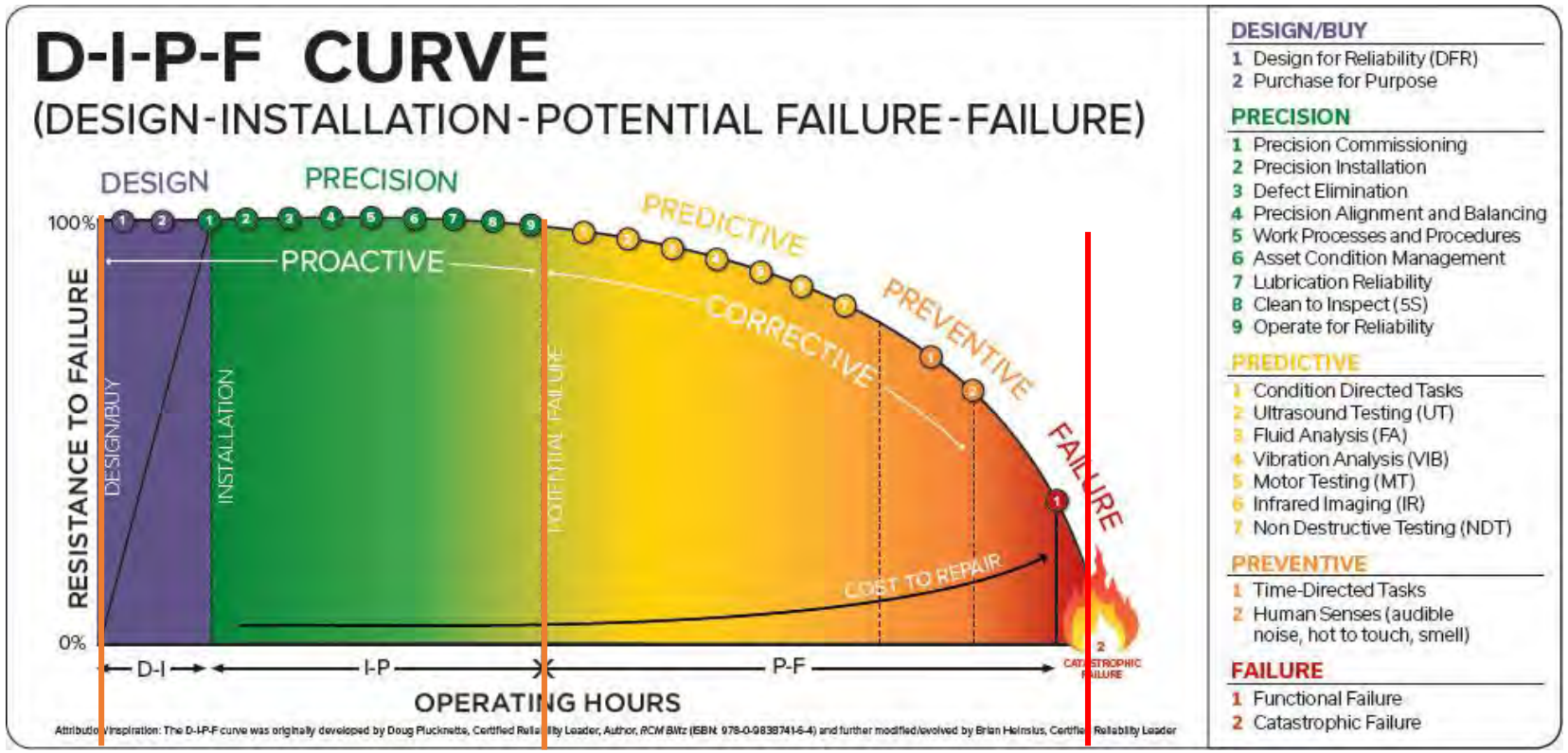
Source: 2019 Facilities Maintenance Survey, Plant Engineering

Every organization is somewhere on this journey …

Reactive	Preventive	Predictive/CBM
Corrective work orders after failure	**Calendar & meter based scheduling**	**Work orders from real-time asset data**
☒ Can be expensive	☑ Increased efficiency	☑ Increased uptime
☒ Shorter asset life	☑ Less downtime	☑ More productivity
☑ Appropriate for some assets	☒ Can perform too much / too little maintenance	☑ Data-driven maintenance decisions

Maintenance-centric → **Asset Health-centric**

Capacity assurance introduction



People – process – technology

People

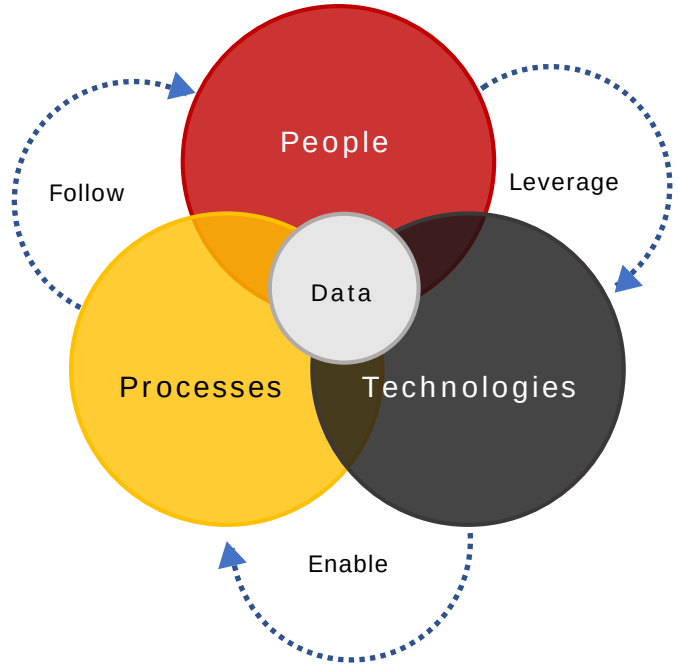
- Roles and responsibilities
- Value-based decision-making
- Competent and accountable resources
- Front line ownership of equipment and process
- Fostering a culture of reliability

Process

- Asset lifecycle management
- Integrated organizational processes and workflows
- Best practices to be embedded into standardized processes
- Aligned KPIs and metrics
- Internal and external benchmarking
- Risk-based equipment and spare parts strategies
- Strategy-based budgeting and alliances with key suppliers

Technology

- Ease of access to integrated data
- Systems configuration and functionality aligned with processes
- Ability to input and capture source data simplified by technology
- Integrated and linked documentation to equipment
- Managed KPIs through automated dashboards
- Effective control of lifecycle asset information



POLL QUESTION No. 1

Where are you in your reliability journey?

(Click only one answer)

- Predictive maintenance on most of our critical assets
- Mostly planned maintenance, with some predictive inspections
- A mix of planned and reactive maintenance
- Mostly reactive maintenance

Top questions
that maintenance teams ask

3 challenges confronting today’s maintenance leaders

- How do we grow a reliability program when we are 100% busy?
- How do we monitor all critical assets with limited resources?
- How do we balance time and resources between our critical assets and all other assets we maintain?

The asset criticality dilemma: 4 approaches

Binary
"If it isn't a critical asset, don't bother me about it"

Force-rank assets by criticality
"If I have time for 20 assets, I'll do the first 20; if I have time for 50 assets, I'll do the first 50"

Creative scheduling
"If I can schedule out far enough, I can maintain every asset … I hope"

Resignation
"Without more staff and a full budget, it's not even worth trying to keep up"

All of these approaches are unsustainable and miss the deeper root cause: more assets than team capacity

So what do we do?

Ideal world - sounds good:

All maintenance is done before downtime, proactively

- **Predictability increases**
- **Safer workplaces**
- **Increased maintenance intervals**
- **Reliability**
- **Boost to peace of mind**

3 real world choices:

Reactive (RM): No repair action until failure

- Increased cost due to last minute fixes
- Unplanned downtime: longer lost production and time to get parts
- Stressful work environment
- More severe failures affecting other parts or machines

Preventive (PM): Repair before failure (based on the calendar / history)

- Failures are random 85% of the time
- Fault-free machines are overhauled unnecessarily because they're "due"

Predictive (PdM): Trend machine condition and repair only when needed

- Limited budget and time for creating history and measurement condition reports
- Difficult to implement – hard to change company culture
- Data is everywhere
- Already busy with PMs/repairs

Do we have to choose? No.
Here are some solutions that teams have found to be successful to overcome the challenges that they face . . .

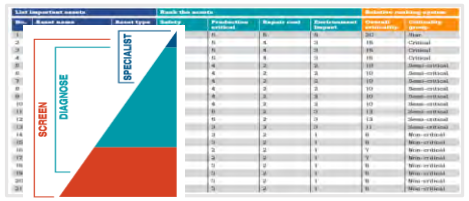
How to start/grow a reliability program when 100% busy?

Follow the 3 pillars to program success:

1 New PM program setup

#1 Problem:
start too big → no success → canceled

Solution:
Start small & simple → grow → funding



Criticality survey

2 Technology selection

#1 Problem:
Use one tool to measure everything

Solution:
Match right tools to likely failure modes

Expected failure modes

3 Data management

#1 Problem:
Data overload - What to do with data?

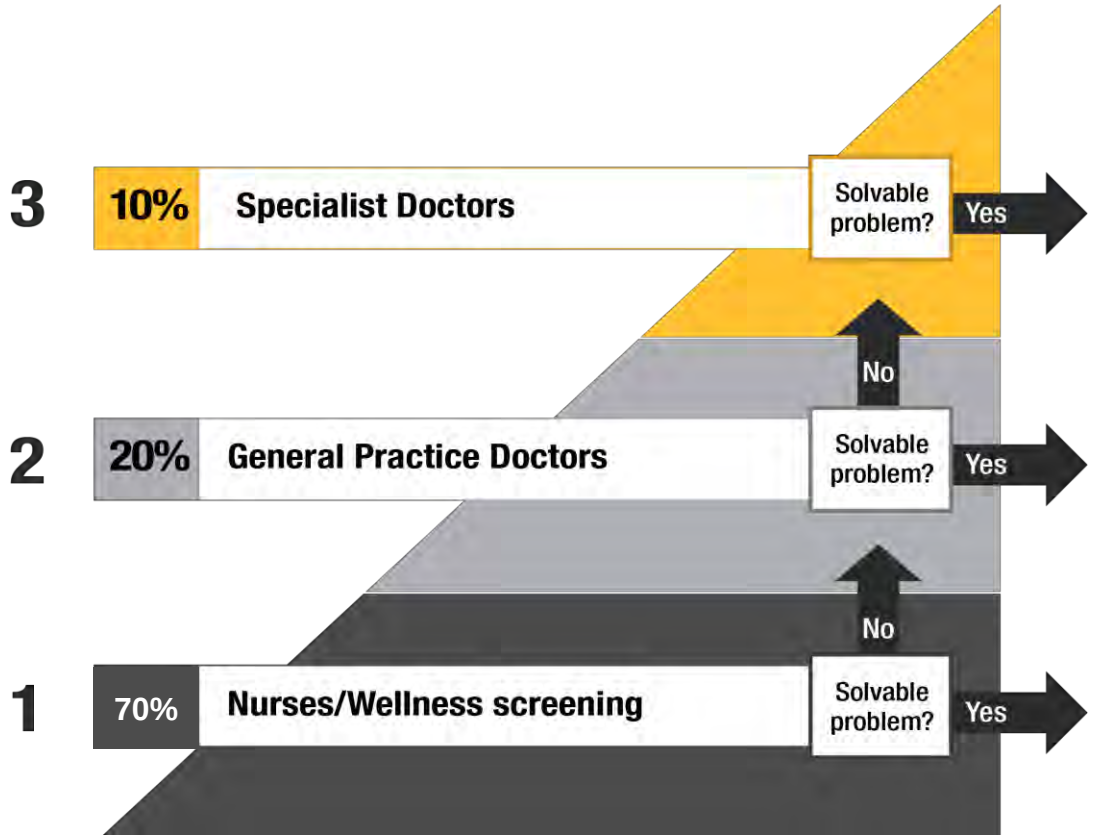
Solution:
Need answers from the data!

Data program review

The criticality dilemma – a healthcare parallel

Everyone is **EQUALLY** important **AND** resources are limited. What to do?

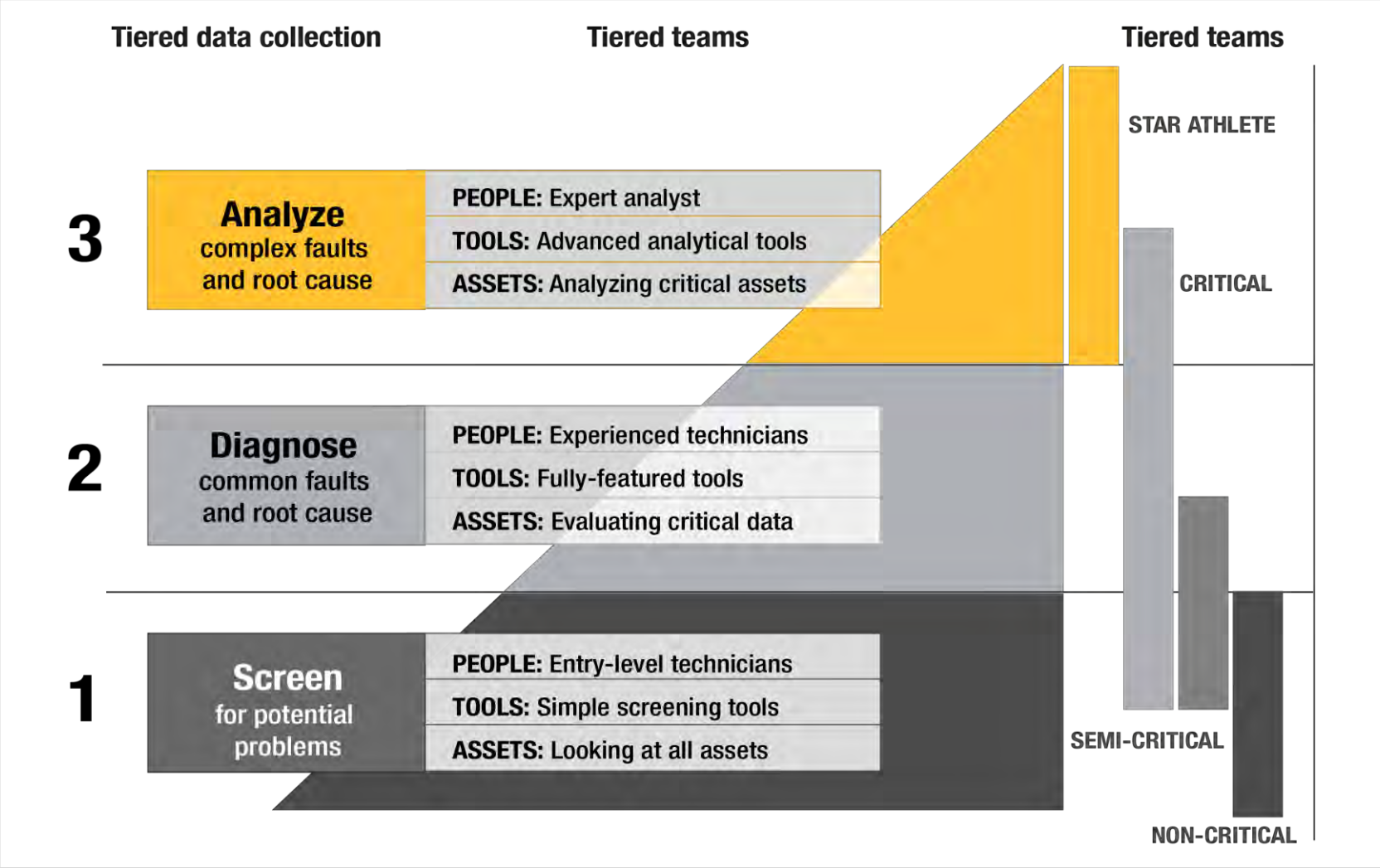
1) Create a cut-line and only serve the critical people? → *UNACCEPTABLE*
2) Build-up the vast resources needed to give everyone 100% care? → *UNSUSTAINABLE*



- Tiered levels of training and certification
- Tiered levels of workers
- Tiered volume of visits / inspections
- Tiered amount of time spent on each person

Condition-based screening helps relieve workload at each level of care

Managing asset criticality with a tiered approach



How to bridge the skills gap?

First, classify rotating equipment into 3 major categories

Top 10% Production Critical

- Top Tier Machines
- Fewer in Number
- Main Turbine
- Paper Machine
- Machining Tools

Middle 60% Vital/Important

- Middle Tier Machines
- Hundreds/thousands
- Vital motors, pumps, fans, blowers, compressors, etc.

Bottom 30% Less Critical

- Bottom Tier Machines
- Hundreds/thousands
- Non-vital motors, pumps, fans, blowers, compressors, etc.

Portable	Permanent
	
	
	

Next, create a simple workflow based on these classifications

Refer the few complex faults and variable machines to consultant or **SPECIALIST** to analyze with advanced analytical tool

Validate all repairs (100%)

Easy repair (90%)

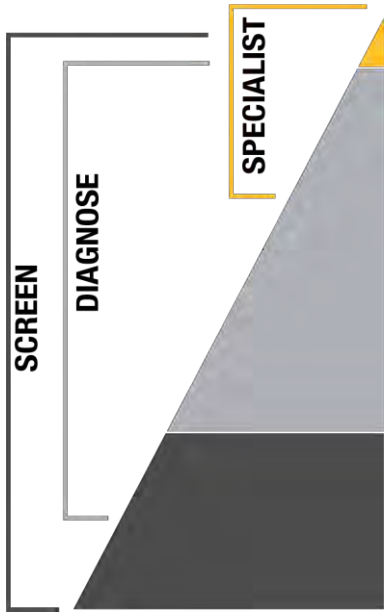
The problem is too complex (10%)

DIAGNOSE critical assets for common faults and root cause

Healthy – no action (80%)

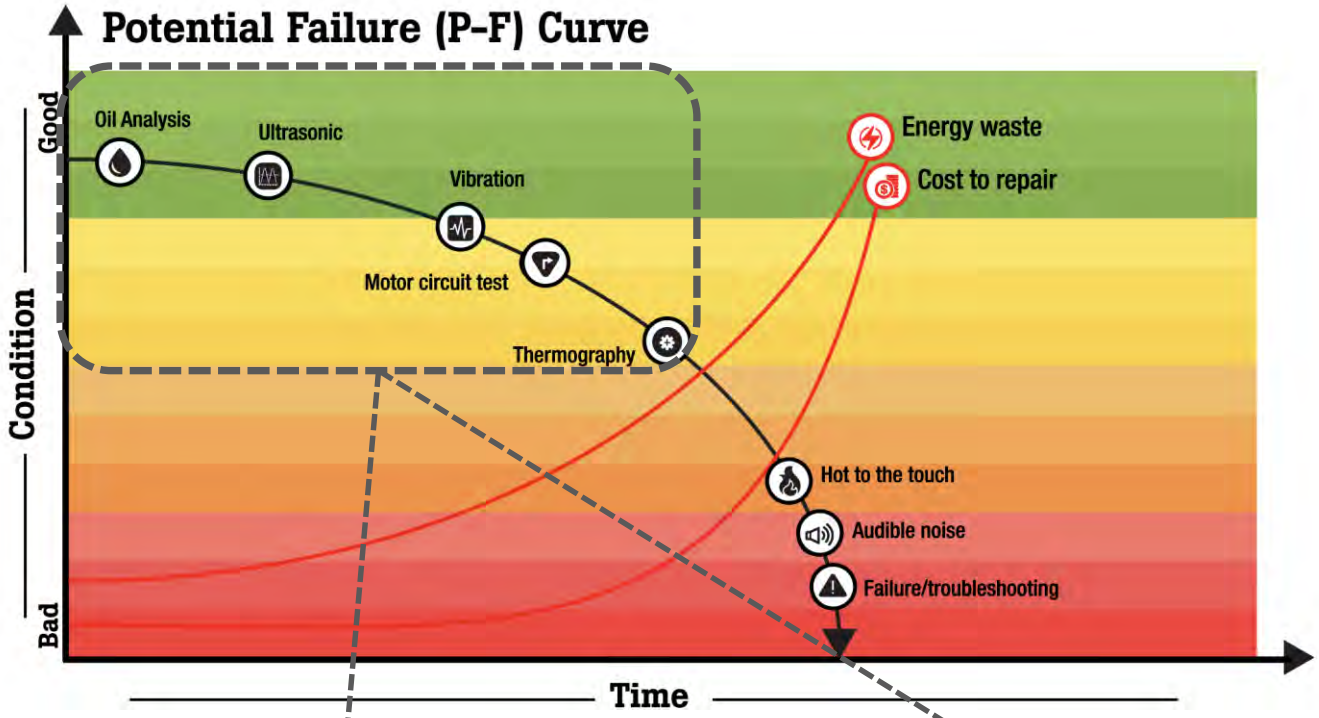
Bad - find problem (20%)

SCREEN all assets for potential problems during each work flow for early warning signs and immediate problems

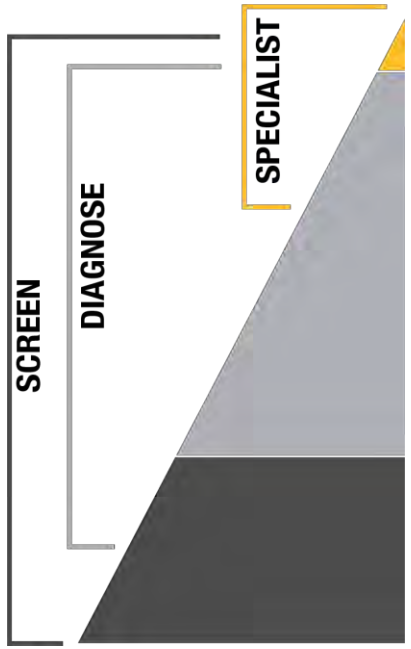


FLUKE Reliability

Key enabler: a connected ecosystem of tools, software, and services



- Cover all major failure modes
- Support all 3 asset criticality tiers
- Condition-based screening
- Integrated tools ranging from simple to advanced task support
- Wrapped with expert services



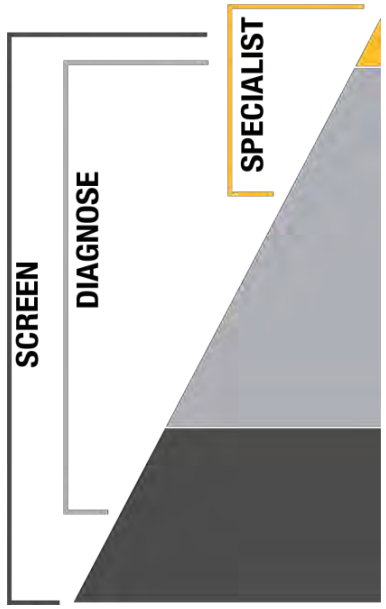
Failure *Pre*vention – (Find It)		Failure *Inter*vention – (Fix It)	
Condition-Based Maintenance	**Data Aggregation & SW Analytics**	**Work Management & Program Organization**	**Precision Maintenance**

Connected Reliability: foundation for top-to-bottom asset health

CONNECTED DATA | CONNECTED SYSTEMS | CONNECTED TEAMS

Extends reliability to all plant assets, not just top tier

- Simple tools for simple tasks
- Advanced tools for more complex applications
- Aggregated asset health repository that grows in value
- Intelligent software for analytics and decision-support
- End-to-end connectivity for information sharing
- Deep expertise for knowledge transfer & active help



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- Bottom Tier Machines
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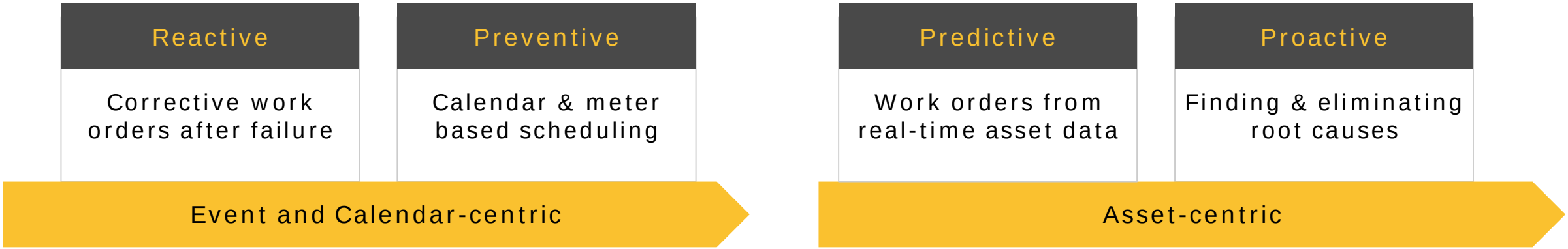
POLL QUESTION No. 2

Which of the following predictive maintenance technologies are you using? (Click all that apply)

- Vibration monitoring/analysis
- Ultrasound
- Infrared/thermal
- Oil analysis
- Electrical testing

Fluke Reliability

Why work with Fluke Reliability?



- We support teams of all sizes and expertise across the entire reliability journey
- We have the most comprehensive and precise asset data capture systems
- We built an open IIoT software platform that aggregates data and drives insights
- We include applications that aid diagnosis and optimize workflows
- We offer breadth of services for training, consultation, and onsite assistance

The Fluke Reliability portfolio

FLUKE Reliability

FLUKE CONNECT

Condition-based Maintenance

Products
FC Vibration Sensors
FC Electrical Monitoring
FC Connected Tools

Software
Connect2Assets
Connected Reliability Suite for Maximo
- Fluke Mobile
- Connect2Assets
- Fluke Connect Adapter
- Integrated Condition Monitoring

Services
Connected Reliability Assessment

PRÜFTECHNIK

Production Reliability & Non-Destructive Testing Solutions

Products
ROTALIGN, OPTALIGN
SHAFTALIGN, PULLALIGN
VIBGUARD
VIBEXPERT
VIBSCANNER
SONOCHEK
OMNITREND Center
EDDYCHEK
NOVAFLUX

Services
PARALIGN
TELEDIAGNOSIS
Alignment, Calibration

eMaint

Asset Management Solutions

Products
CMMS Software
- Teams
- Professional
- Enterprise

Connected Reliability Suite for eMaint
- Fluke Mobile
- Connect2Assets
- Integrated Condition Monitoring

Enhanced Workflows

Services
Consulting
eMaint University
Experience Center

Accelix™

IIoT software platform supporting a suite of apps

Data Aggregation
System Integration

Predictive Analytics
Machine Learning

FLUKE Reliability

Solutions

Fluke Reliability offers a complete set of tools from simple to complete, to cover all the machines in the plant, get answers to the right people, and keep the plant up and running

Simple tools to those with limited training/experience | **Advanced tools** to those with more complex applications

Alignment tools

SHAFTALIGN

830 Alignment Tool

OPTALIGN Touch

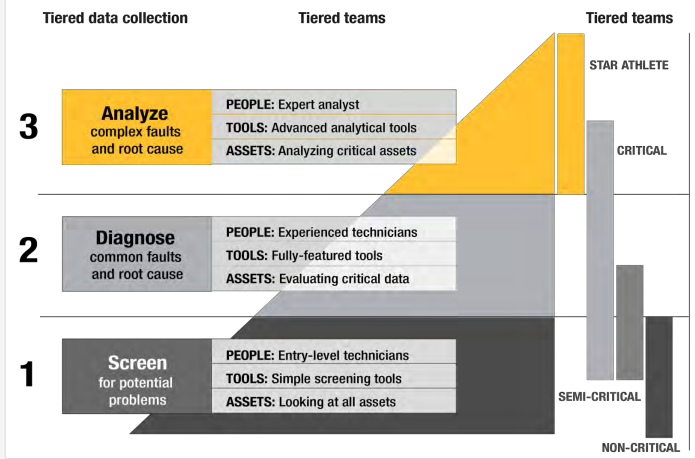
ROTALIGN Touch

Other tools

820-2 LED Stroboscope

TiS60- IR Thermal Camera

SONOCHECK



Vibration tools

805 FC Vibration Meter

810 Vibration Tester

VIBSCANNER 2

VIBXPERT II

VIBGUARD

Wireless sensors

3561 FC

3540 FC

FLUKE Reliability

Solutions

“Get answers to the right people”

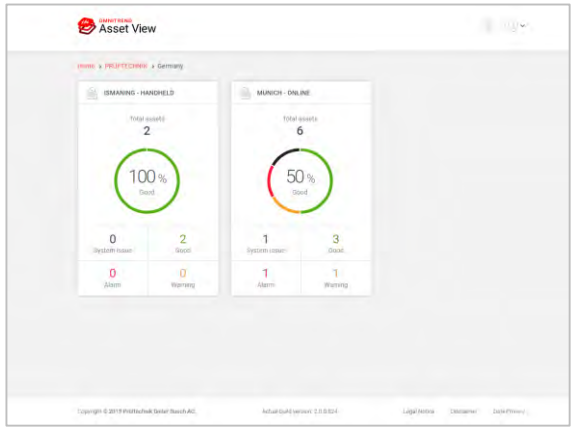
Data collected with Advanced Vibration Analyzer

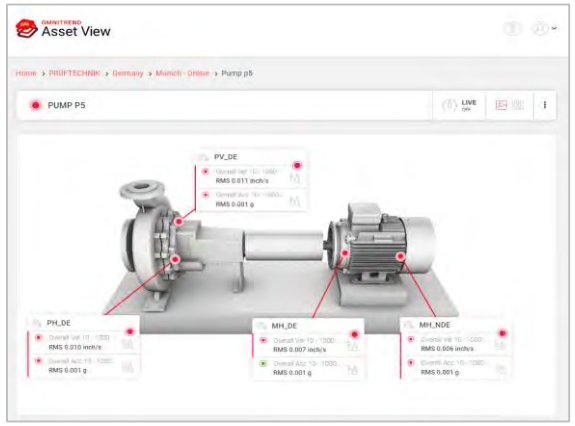
- Portable instrument
  and/or
- Permanent installed

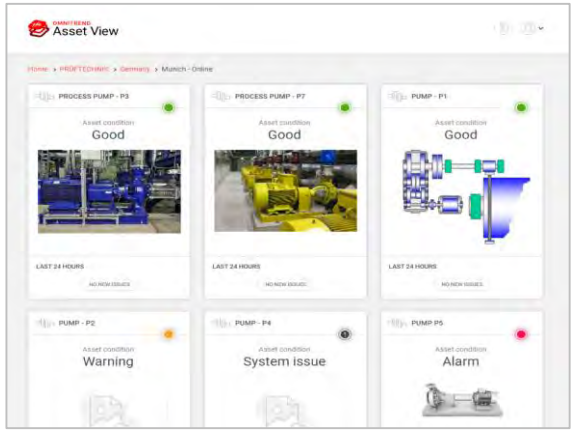
Direct to easy to navigate HMI

- Overview of Asset Park Condition (alarm/warning)
- Drill down to machine level
- Real-time data
- Historical data

Make data available to who needs it to create value







Solutions

“Get answers to the right people”

Alignment job to send to device

- Machine is created in ARC 4.0
- ALI job is uploaded to cloud
- Work order created for technician

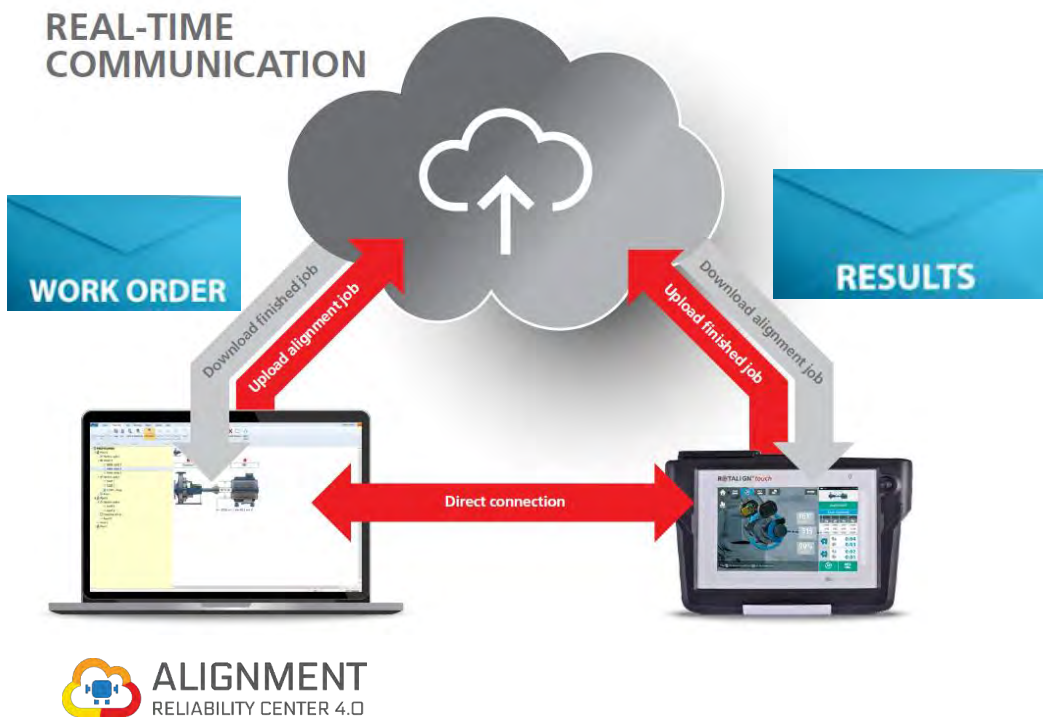
In the field

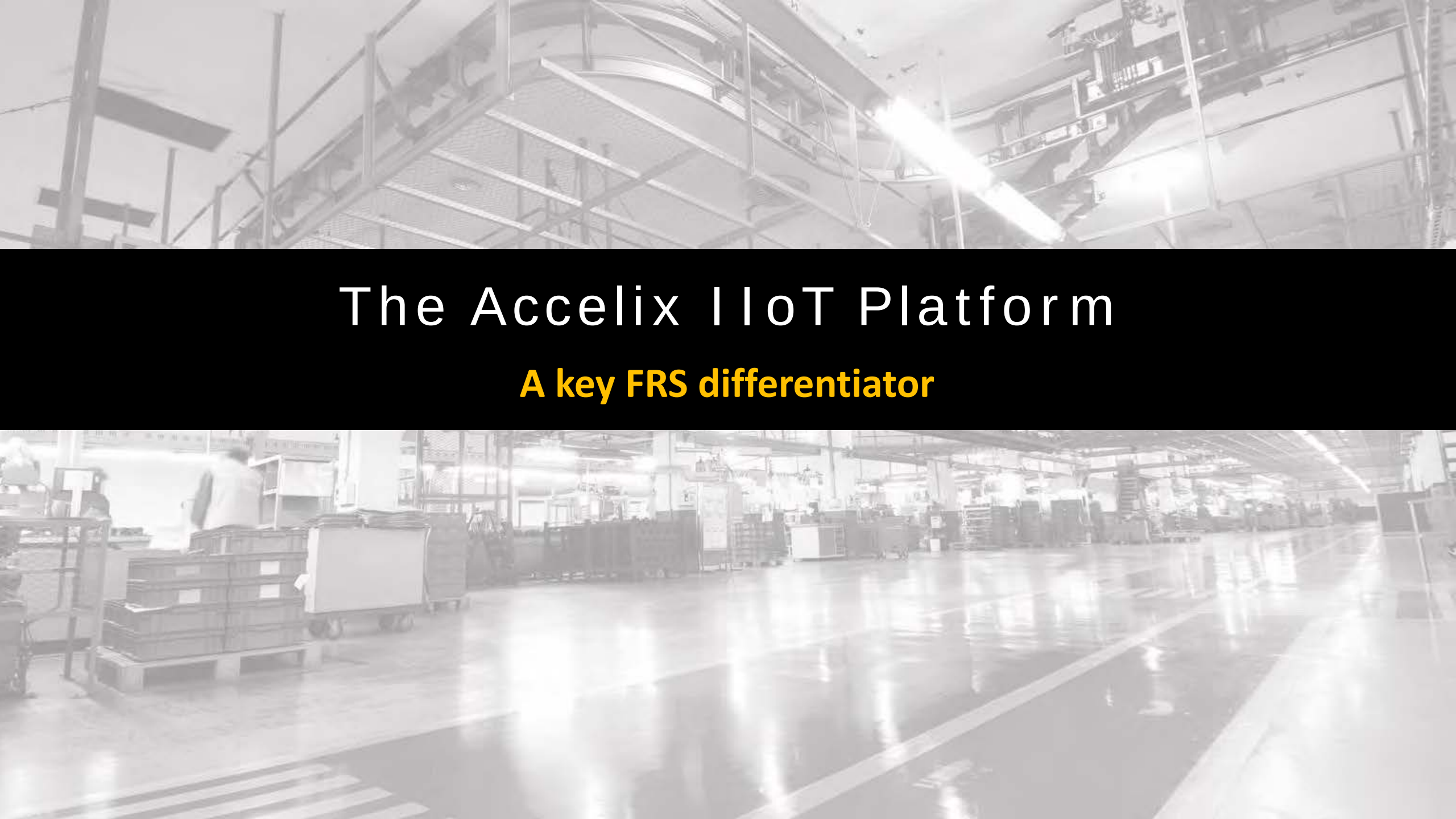
- Technician downloads Alignment Job to ROTALIGN
- Alignment is done as specified
- Results are uploaded back to cloud server

Alignment data available in ARC 4.0

- Report can be easily created and tracked in CMMS
- Supervisor can track alignment history per Asset

Make data available to who needs it to create value

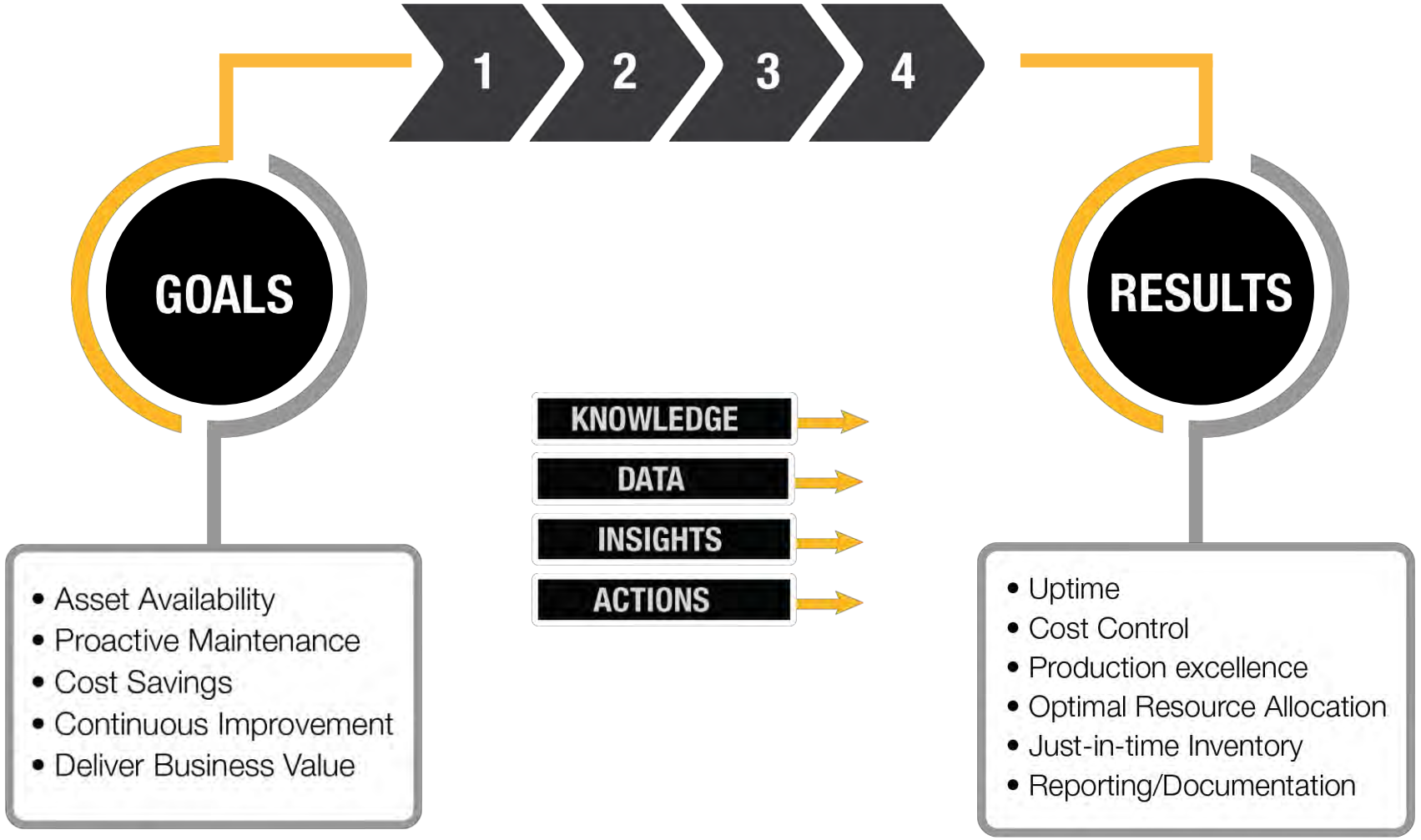




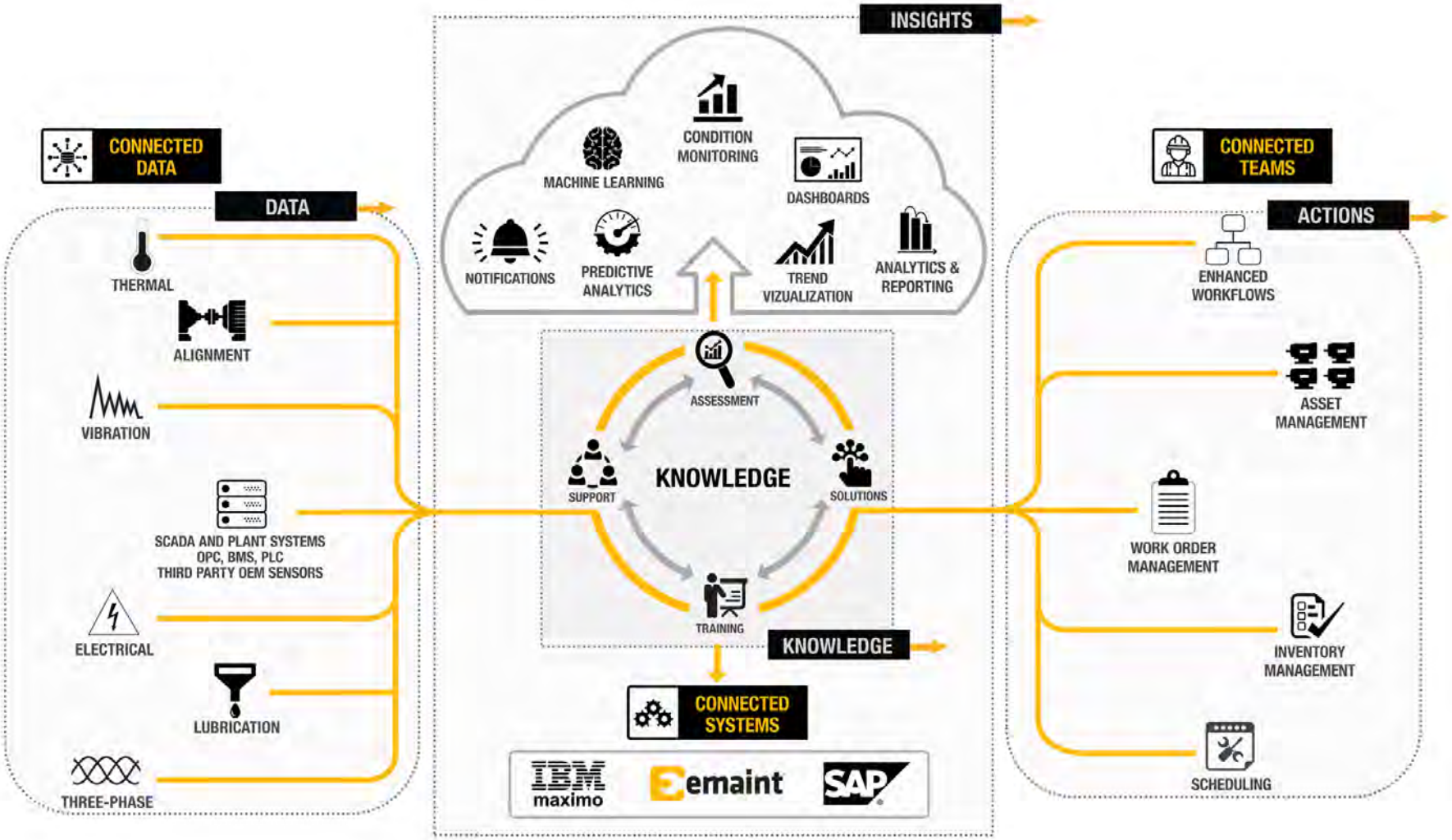
The Accelix IIoT Platform

A key FRS differentiator

Solutions across the Four Dimensions of Reliability Success



Our Connected Reliability ecosystem



Enabling the Right Actions on the Right Assets at the Right Time

FLUKE Reliability

Connected data

(a sample from our dozens of data capture products)

Ii900 Sonic Imager

FLUKE

db PRÜFTECHNIK

FLUKE CONNECT

3561 Vibration Sensor

OPTALIGN Touch

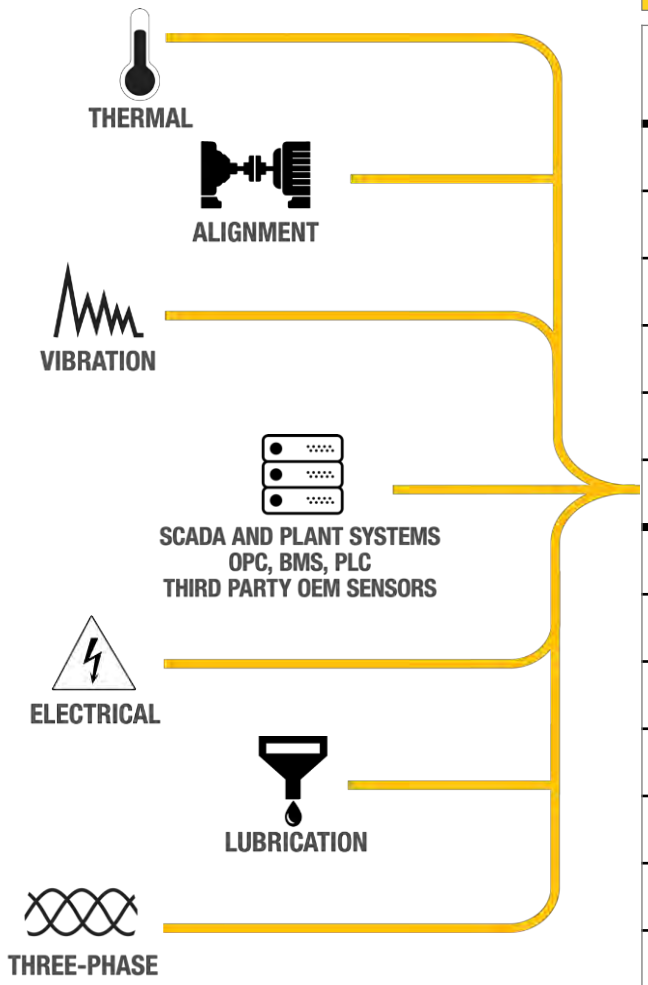
VIBSCANNER II

VIBGUARD

805 FC Vibration Meter

810 Vibration Tester

3540 FC Three-Phase Power

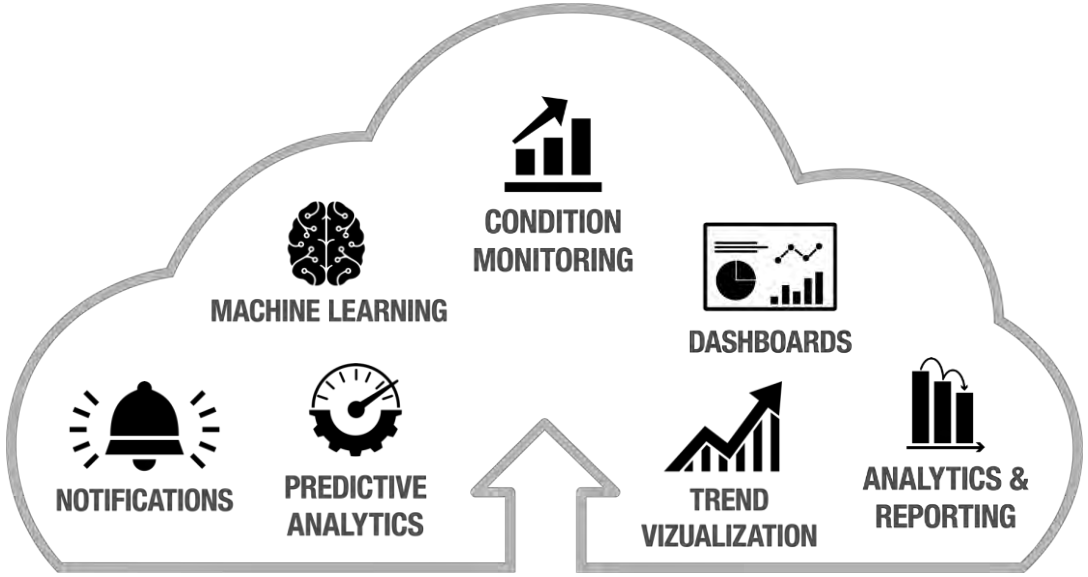


Condition-Based Maintenance

	Route-Based	Sensor-Based
Complex Measurement Modalities:		
Vibration		
Thermography		
Ultrasound		
Oil Analysis		
Motor Circuit Test		
Simple Measurement Modalities:		
Temperature		
Voltage		
Current		
Humidity		
Light		
Tank Level		

FLUKE Reliability

Connected systems



Accelix™

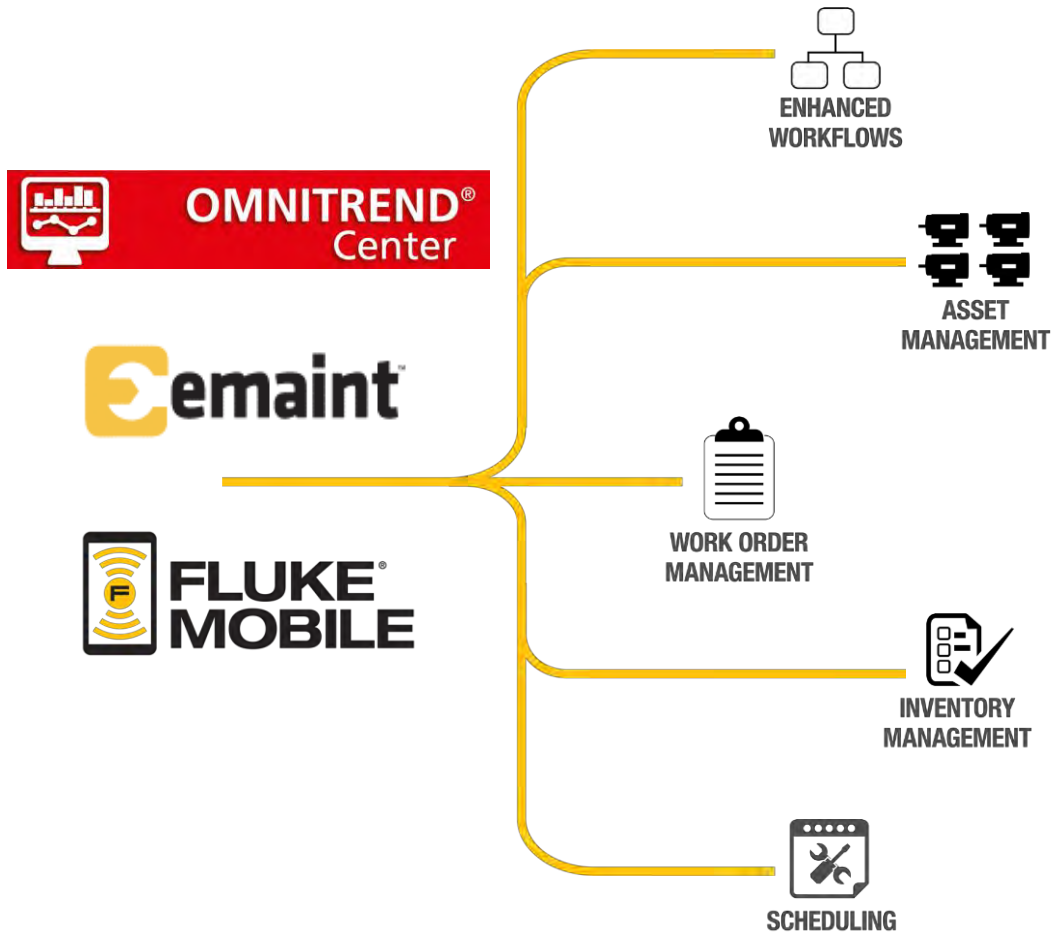
IIoT software platform supporting a suite of apps

IBM maximo emaint SAP

Data Aggregation & SW Analytics
Large, Clean, Contextual Data Lake:
Sensor Data
Machine Configuration Data
Operational Data
Other Contextual Data
Interconnectivity with Other Enterprise Systems of Record:
Computerized Maintenance Mgmt.
Automation Control Systems
Asset Performance Mgmt
ERP & EAM
Analytics:
General Analytical Engines & Pattern Recognition
Domain-Specific Analytics
Data Visualization & Dashboarding

FLUKE Reliability

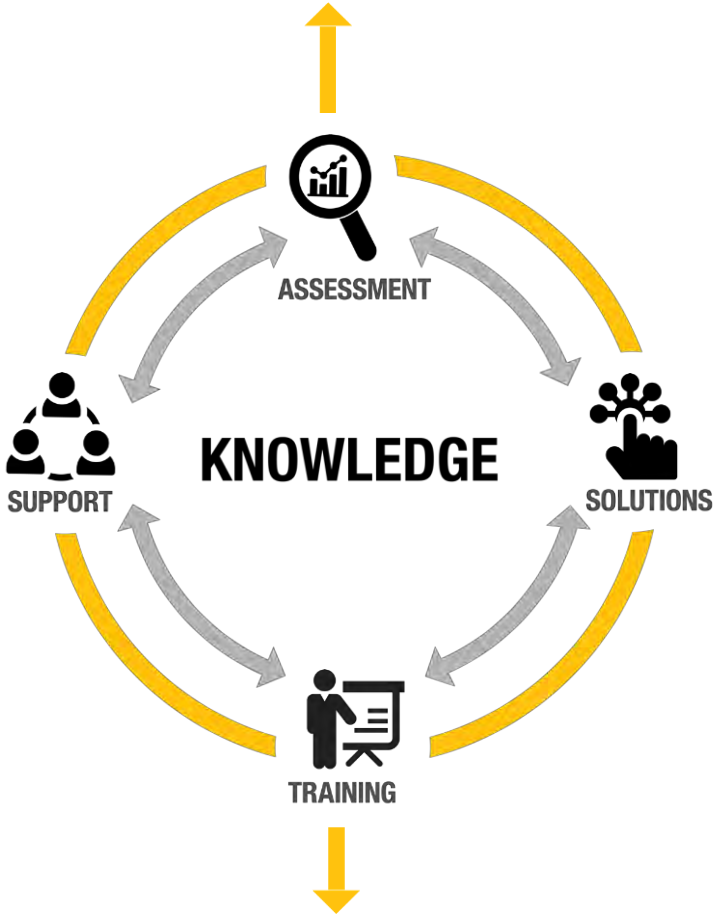
Connected teams



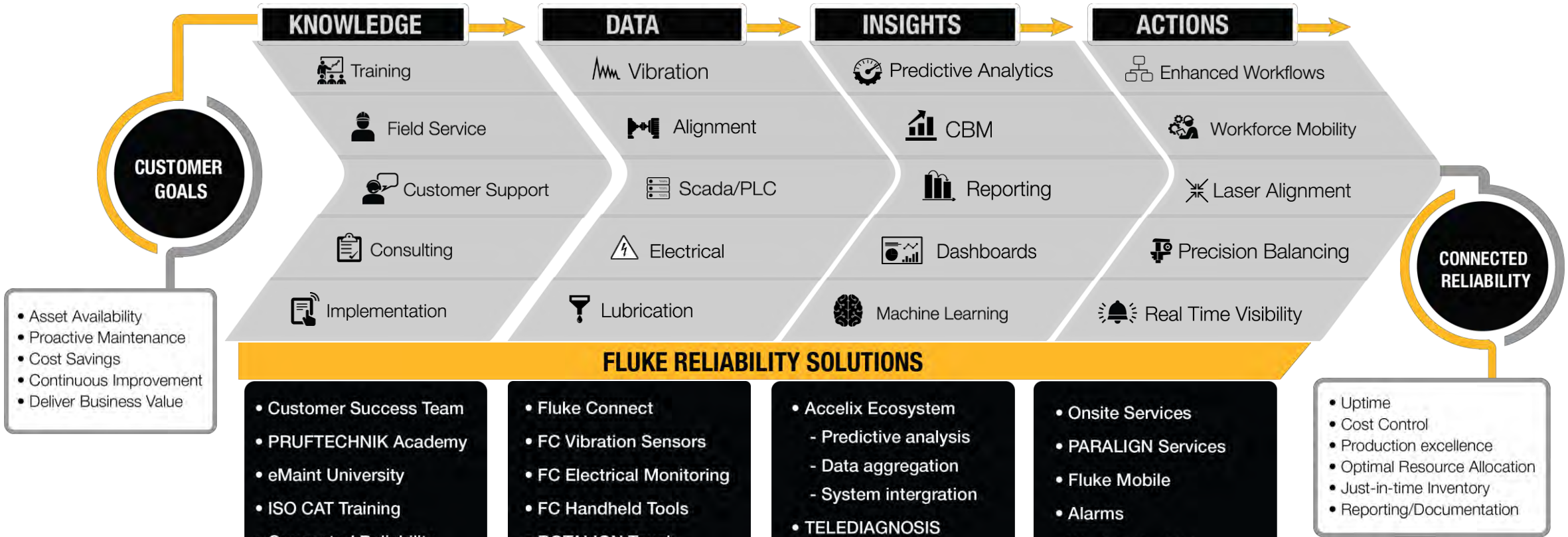
Work Management & Program Organization
Work Execution:
Work Orders
Scheduling & Prioritizing
Routes
Work Instructions
Inventory & Spares Management
Standard Work & Work Strategy:
Criticality Analysis
FMEA
Root-Cause Analysis
Asset Lifecycle Management

Precision Maintenance Actions
Tool-Based Maint. Procedures:
Precision Alignment
Balancing
Precision Lubrication
Precision Torque
Visual Inspection

Connected knowledge



Knowledge Transfer & Customer Success Enablement
Training & Consulting:
Connected Reliability Assessment
Project Scoping & Consultation
ISO CAT Training
PRUFTECHNIK Academy
eMaint University
Active Assistance with Complex Tasks:
Field Services
PARALIGN Service
TELEDIAGNOSIS
24/7 Customer Support



FLUKE RELIABILITY SOLUTIONS

- Customer Success Team
- PRUFTECHNIK Academy
- eMaint University
- ISO CAT Training
- Connected Reliability Assessment
- Project Consultation
- 24/7 Support

- Fluke Connect
- FC Vibration Sensors
- FC Electrical Monitoring
- FC Handheld Tools
- ROTALIGN Touch
- OPTALIGN Touch
- VIBGUARD IIoT
- VIBEXPERT II
- Connect2Assets

- Accelix Ecosystem
  - Predictive analysis
  - Data aggregation
  - System intergration
- TELEDIAGNOSIS
- eMaint CMMS
  - Asset Management
  - Historical views
- OMNITREND Center
  - Asset View
  - Trend Visualization

- Onsite Services
- PARALIGN Services
- Fluke Mobile
- Alarms
- Work Order Mgt
- Inventory
- Inspections
- Scheduling
- Certified Work

POLL QUESTION No. 3

Are you integrating your asset condition data with your workflow data (such as in a CMMS/EAM)? **(click only one answer)**

- Asset data is fully integrated into our system of record and used for analytics
- Our pilot program is underway to sync data and systems
- We're researching and planning a data integration pilot
- It's on our list; assessing and organizing our existing data
- Not on our radar at this time

QUESTIONS?

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FLUKE® Reliability

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DEMO

Visit Accelix.com for a free demo of our Connected Reliability Framework.

FLUKE Reliability

FLUKE®
Reliability

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