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Reliability

How to get the best ROI for digitalizing your asset maintenance

Kevin Clark and Brian Harrison

Accelix™

Webinar Series

Meet the speakers

Kevin Clark, CMRP

Vice President, Fluke Reliability

- A Fluke leader since 2016

- More than 25 years of experience in operations leadership focusing on engineering, asset management, IT, supply, manufacturing automation, and safety systems

- Previously held positions at Perficient, Caterpillar, Johnson & Johnson

- Longstanding member of the Society of Maintenance & Reliability Professionals

- Certified Maintenance & Reliability Professional since 2004

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Meet the speakers

Brian Harrison, CRL

Industry Lead for IIoT, Fluke Reliability

- More than 10 years in EAM leveraging best-of-breed solutions and best practices.

- Deployment of EAM, Mobile and IIoT solutions across the industries including: Aviation, Life Sciences, Manufacturing, Public Sector & Utilities

- Focus on high value deliverables leveraging Reliability Centered Maintenance in support of ISO55001, CBM and ICM.

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POLL QUESTION No. 1

? Has COVID-19 changed how your organization views remote asset monitoring? (Click only one answer)
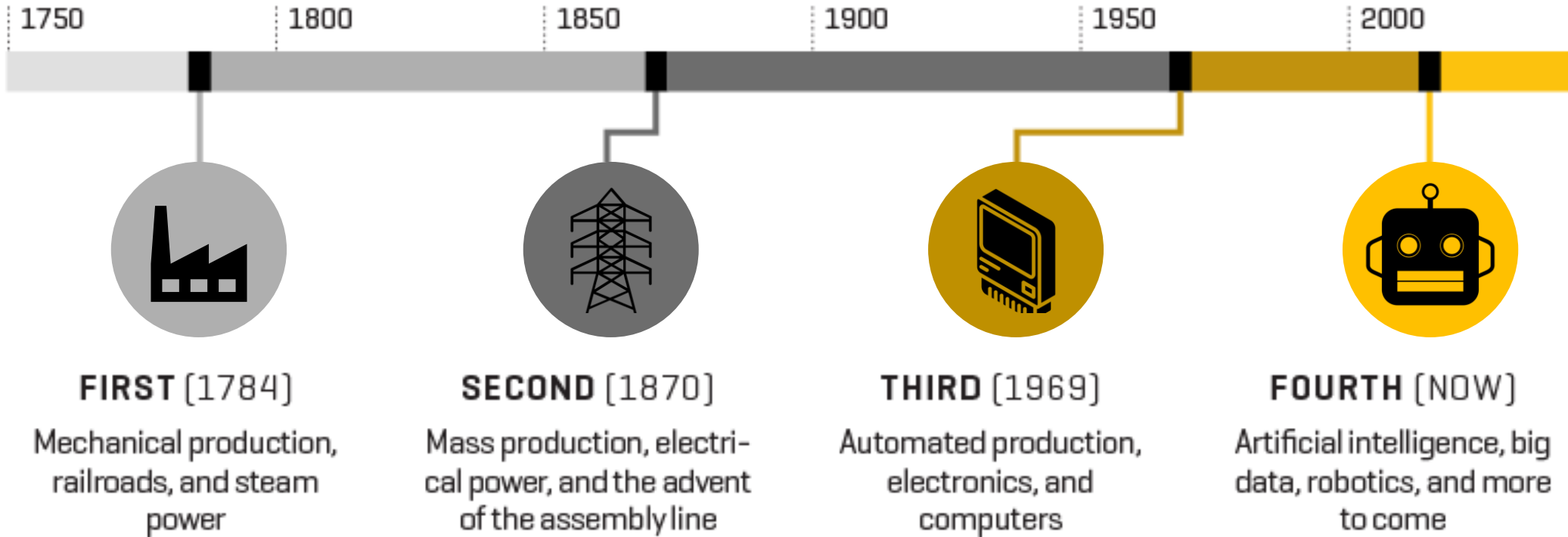
- Yes; remote monitoring is something we're actively pursuing

- Yes; we are considering a remote strategy for the future

- Yes, but financial difficulties will delay us

- No; we were already pursuing it anyway

- No; we have little or no interest at this time

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How did we get here?

Timeline of the Industrial Revolutions

THE FOUR INDUSTRIAL REVOLUTIONS

1750 · 1800 · 1850 · 1900 · 1950 · 2000

FIRST [1784]
Mechanical production, railroads, and steam power

SECOND [1870]
Mass production, electrical power, and the advent of the assembly line

THIRD [1969]
Automated production, electronics, and computers

FOURTH [NOW]
Artificial intelligence, big data, robotics, and more to come

Industry 5.0 is in the works....

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History of automation technology... by the years

1980-1994
- Computer-integrated manufacturing methodologies
  - European: Open System Architecture for CIM (CIMOSA) and GIM — GRAI Integrated Methodology, A Methodology for Designing CIM Systems
  - US (Purdue University): Purdue Enterprise Reference Architecture (PERA) (Theodore J. Williams, 1994)
  - Unified Model: The result was Generalized Enterprise Reference Architecture and Methodology or GERAM, supposed to aid the integration of the various parts of an enterprise like products, processes, development, and management
  - Challenge: Complex proprietary systems were created that were difficult to reconfigure and combine with other systems

1995-2010
- ISA-95 was developed (1995) from the CIM frameworks
- Human machine interfaces, SCADA, OPC
- including processes, activities and information types that are required for business and manufacturing operations (ANSI/ISA, 1999)
- Challenge: during this era were to align the semantics over the different layers by applying standards and middleware

2011-now
- Service-oriented architecture (SOA) approach is considered crucial for the success of highly complex ERP systems of the future and has many advantages for integration, extensibility, agility, and reusability
- Openness increasing (e.g., OPC-UA platform)
- IoT technology is becoming an alternative to interconnect e.g. smart sensors
- Cellular networks and Wi-Fi networks are becoming a serious alternative for industrial connectivity
- Future 5G networks are commonly discussed as a promising technology to enable ubiquitous and scalable connectivity for the shop floor
- Big Data, Edge, Robotics, Artificial Intelligence (AI), Machine Learning, APIs, Augmented/Virtual Reality, etc.
- Challenge: moving fast enough...

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Everything starts as a "want," some things become a "need"

A **Want** is something that will help you be more competitive. A **Need** is something you must have to be competitive.

The adoption of some technologies takes time. It took 20 years for cellphones to reach a tipping point.

Likewise, the phrase "IoT" was first coined in 1999 and it is now seeing mainstream adoption.

A tipping point requires the population to embrace a need and trust the solution will do what is supposed to.

In a transition period, it is difficult to get funding and support.

2020 has shown many organizations that what they once viewed as optional or "down-the-road" initiatives, are in fact essential to the near term.
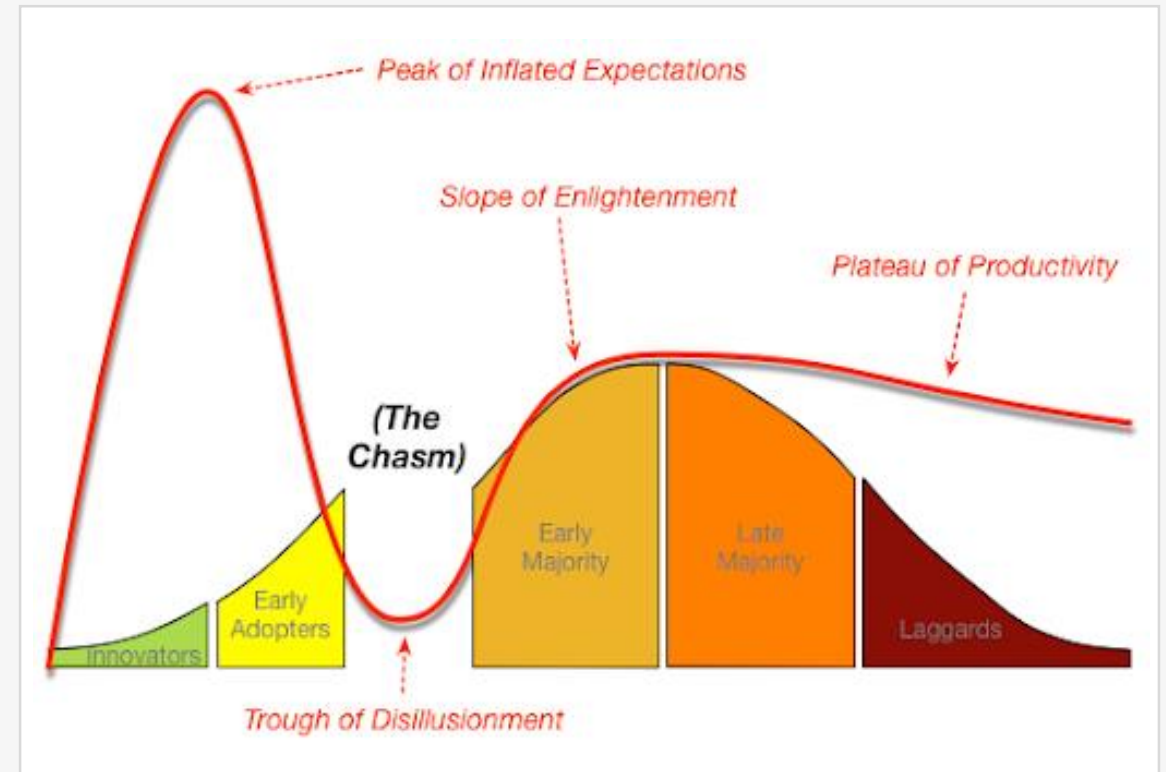
Pre-COVID, Discrete Manufacturing has largely viewed Seamless-Integrated Automation as a "want."
In 2020, it is becoming a need. This has been a need for the Process Industry.

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The impact of 2020

- **82%** of organizations are considering how to add/increase digitalization technologies
- **35+%** of organizations have seen at least a quarter drop in production
- Only **15%** of organizations are operating as **"normal"**
- **80%** of organizations are actively determining how, where, and when to use remote monitoring to drive maintenance activity

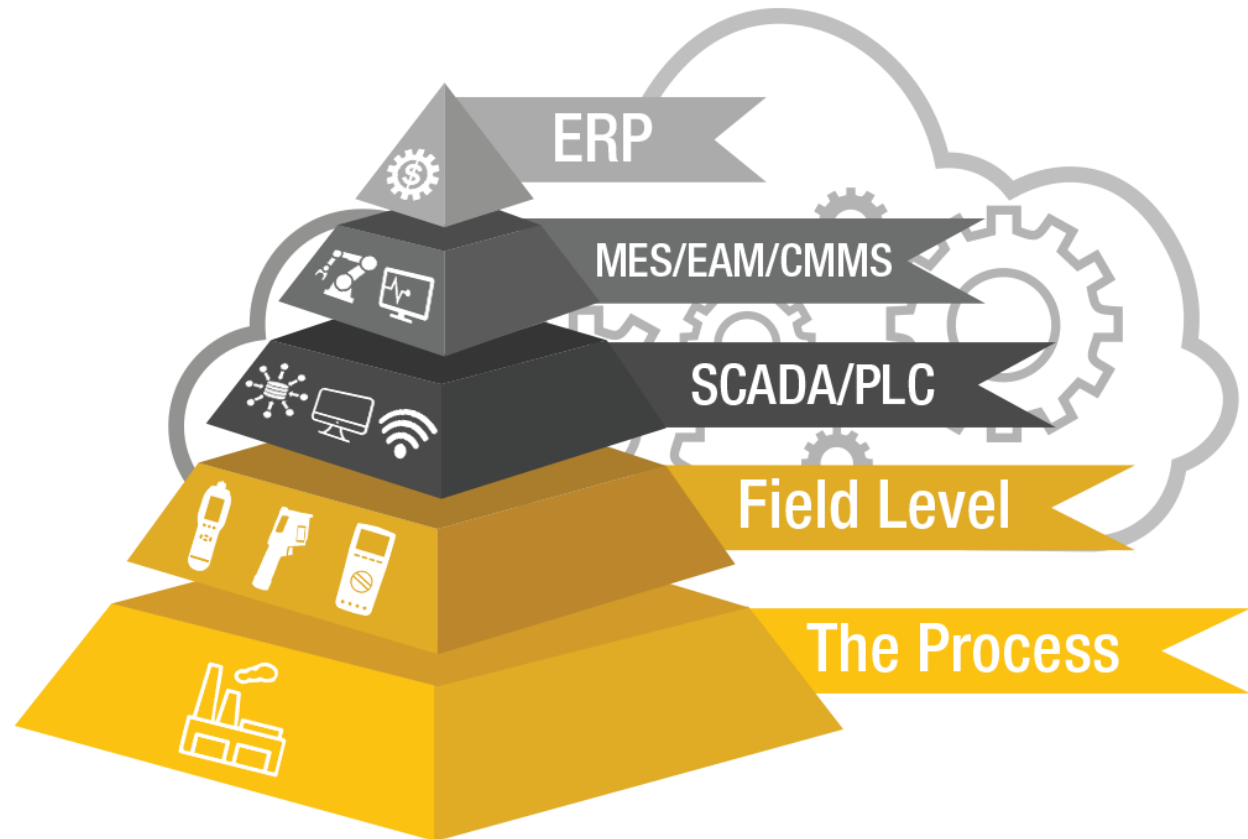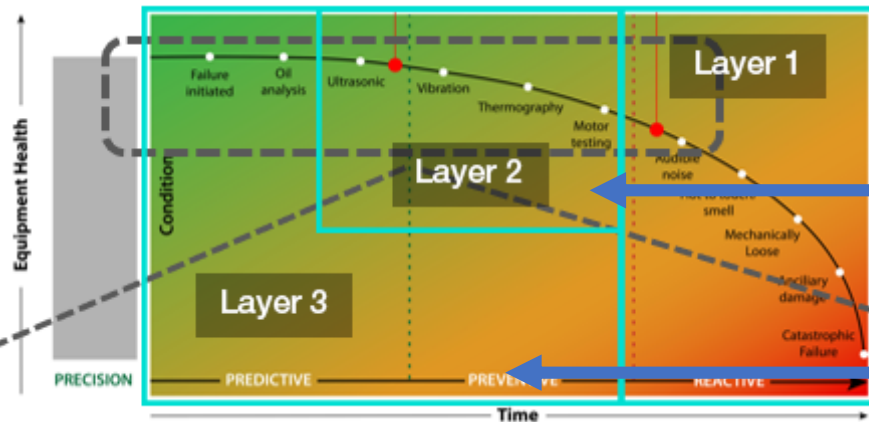**FLUKE.**
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The Automation Pyramid

The Automation Pyramid, from a maintenance perspective

Built on ISA95

This proven framework helps maintenance professionals understand where they fit in with Automation Technology

ERP

MES/EAM/CMMS

SCADA/PLC

Field Level

The Process

Automation and the P&F Curve
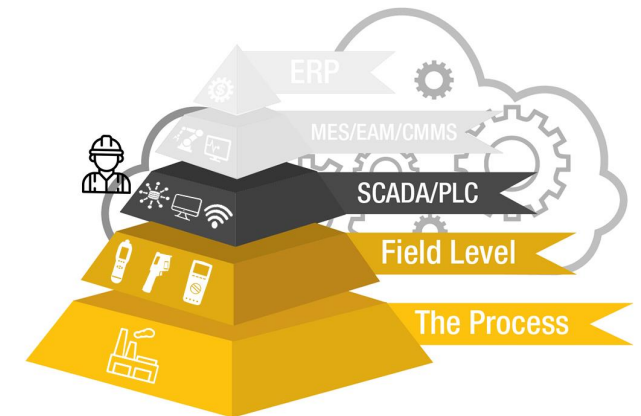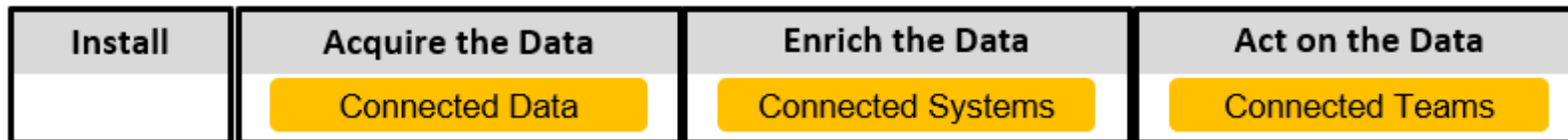

Layer 1 – The Process
The senses- See, Smell, Hear, Feel

Layer 2 – Field Tools
Ultrasound, Thermography, Vibration, Testing

Layer 3 – SCADA/PLC/DCS/OPC
Real-Time Asset Monitoring, Performance Deviation, Degradation

| Install	Acquire the Data	Enrich the Data	Act on the Data
	Connected Data	Connected Systems	Connected Teams

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Level 1: The Process

Maintenance & Reliability teams at the Process layer are the foundation of the pyramid.

They care for the physical assets. They see, smell and touch the equipment that is critical to their organization.

The subject-matter experts who care for the process are critical while technology connects M&R professionals in ways not otherwise possible.
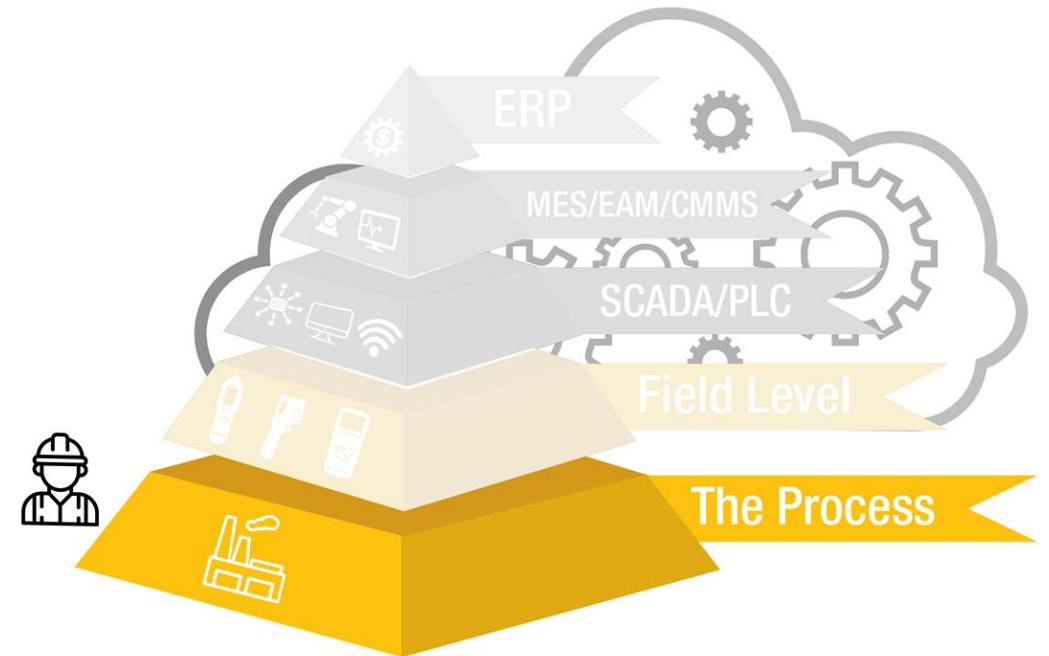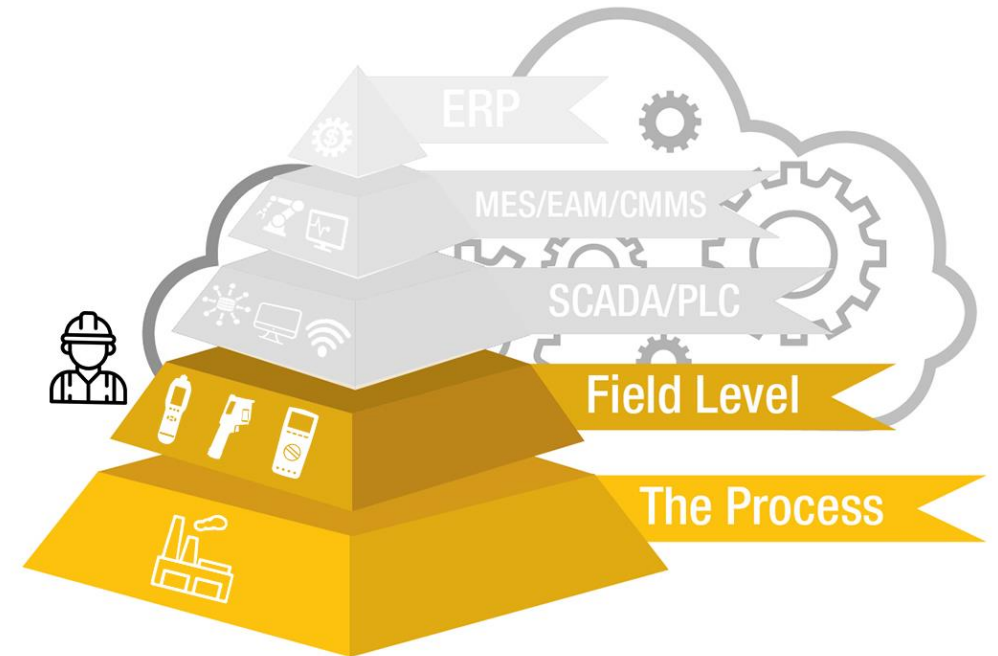
Level 2: Field-level tools and sensors

Equipment level tools and sensors are valuable data sources for M&R teams.

They augment our abilities with route readings and diagnosis, as well as remote monitoring.

While assets are getting smarter, tools and sensors fill a major role both in maintaining this new generation of equipment but also in giving a voice for the first time to our legacy equipment and facilities.

Level 2: Field-level tools and sensors

Enriching the technicians' experience

- Keep technicians safe
- Eliminate the risk of data entry errors
- Save technicians from duplicate work
- Ensure data integrity
- Help technicians focus on what they do best
- Making newer technologies attainable and usable

Readings that are important at the moment the data point is taken, can be even more important **later.**
Later-Data has the added benefit of context, objective eyes, analysis and prescriptive strategies.

What data is worth capturing?   *What data is worth keeping?*

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Level 3: Supervisory Control and Data Acquisition (SCADA)

Virtually every company is generating some degree of SCADA/PLC data.

70+% are trying to figure out how to use this information for asset management.

Most early AI applications are based on idle data that has been collected but was relatively untouched. These use cases are confirming or denying what we always believed.
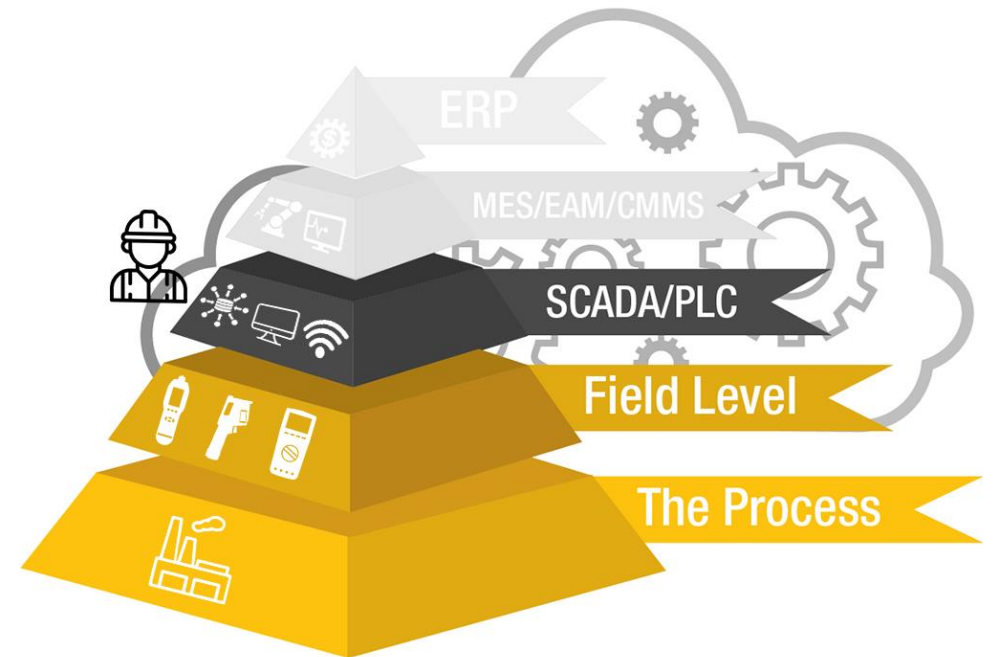
Level 3: Supervisory Control and Data Acquisition (SCADA)


Experience + Data = Surety

Driving tasks through data as opposed to relying solely on anecdotal experience, eliminates the risk of missing the trees from the forest.

Real-time systems hold meaningful data. In addition to early detection, these systems can help improve KPIs such as OEE, MTTR, and downtime.

When used properly, real-time data can fill the skill gap for some technicians and help SMEs be even more effective through automated prioritization.
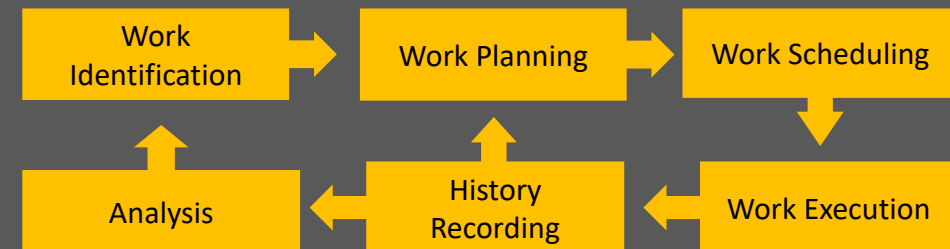
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Level 4: Enterprise Asset Management (EAM)

- The EAM or CMMS should be the system of record for a maintenance group

- Calendar vs. condition-based PMs

- Prioritization of work based on actual asset status

- Tying meaningful data to the asset management system is a step change in the quantity and quality of data that informs day-to-day decisions

ERP

MES/EAM/CMMS

SCADA/PLC

Field Level
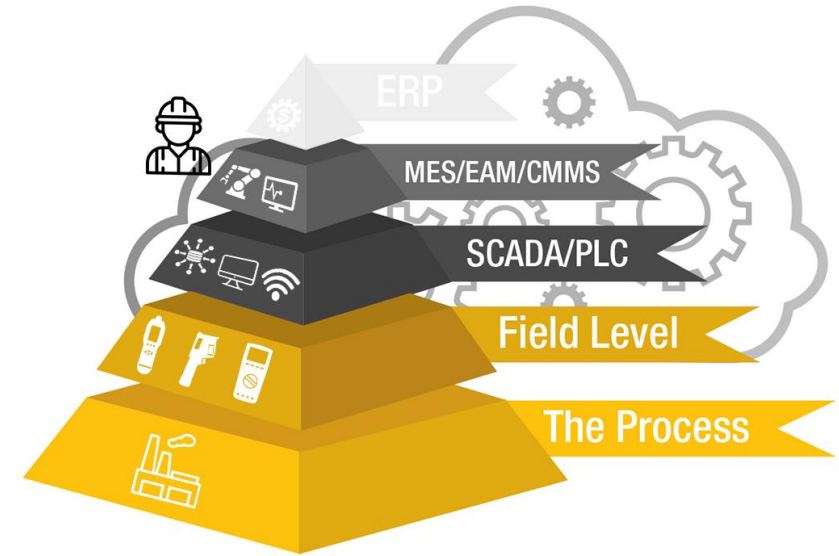
The Process

Work identification:
What changes isn't the process, it's when the process begins.

Work Identification → Work Planning → Work Scheduling

Work Scheduling ↓ Work Execution

Analysis ← History Recording ← Work Execution

Analysis ↑ History Recording ↑

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Level 5: Enterprise Resource Planning (ERP)

All roads lead to enterprise resource planning

For the majority of organizations, the ERP is the primary system of importance. The ability to feed accurate data for financial accounting and reporting helps the rest of the business see and understand the importance of what M&R teams do.

- What is the Total Cost of Ownership for an asset?

- What are we spending on PMs vs CMs?

- Are we budgeting enough for M&R?

- What is our cost avoidance from CBM?

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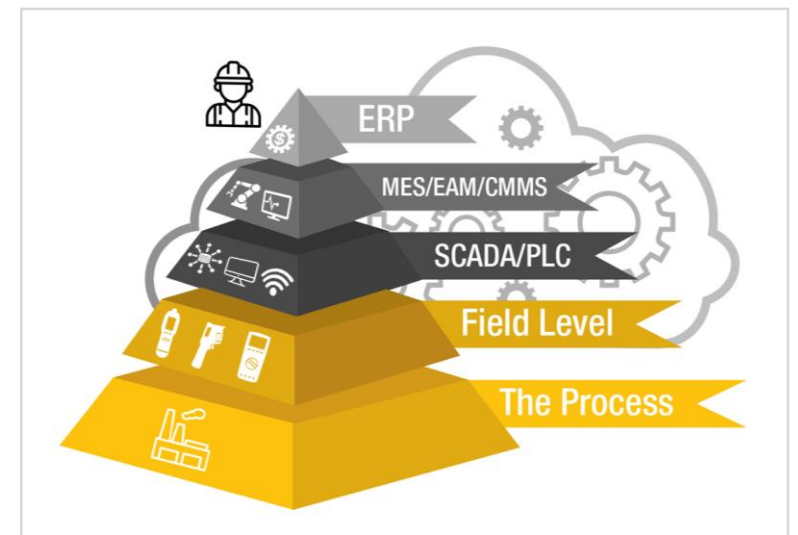
ROI, when and where

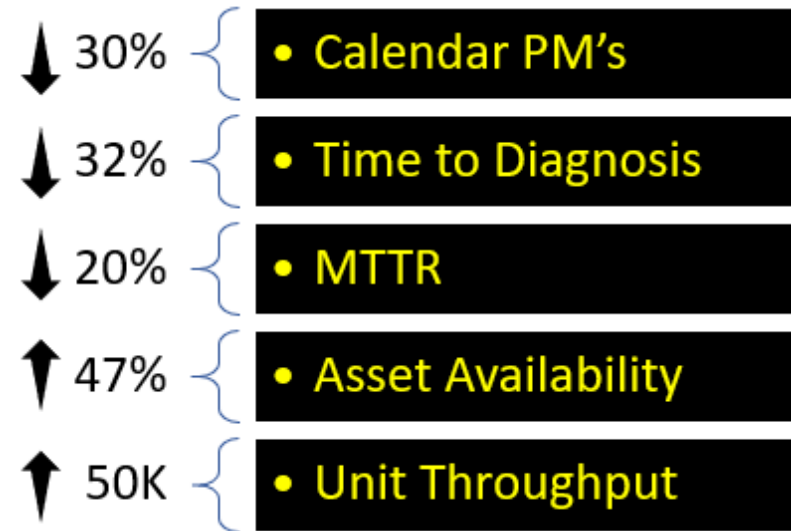# Short-term automation goals and ROI

- Automation should help M&R teams focus on what they do best by allowing them to focus on the critical and essential nature of their jobs

- Prioritize work

- Detect and notify technicians of asset events within seconds

↓ 30% — • Calendar PM's

↓ 32% — • Time to Diagnosis

↓ 20% — • MTTR

↑ 47% — • Asset Availability

↑ 50K — • Unit Throughput

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Short-term automation goals and ROI

Calendar-based PMs come with preventable costs

- The cost to carry and consume parts

- Wrench time

- Health, safety, and environment considerations

- Downtime

- Risk of damage

Long-term automation goals and benefits

- Automation data is a vital part of any predictive BI or AI technology. You must have usable and accurate data before you can pursue insights.

- Cultivate YOUR Library

- Big Data vs. Actionable Data

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Where do I start?

Where can remote asset monitoring benefit the organization, the technician, and the customer?
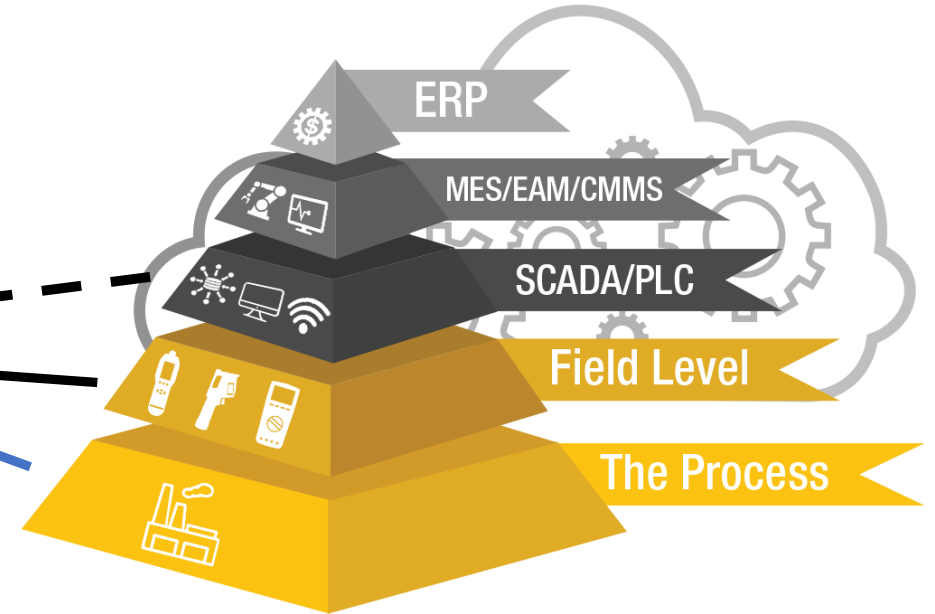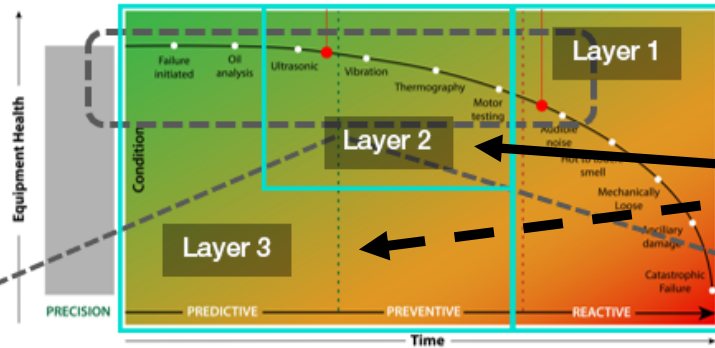
Install	Acquire the Data	Enrich the Data	Act on the Data
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Flight School

The post-COVID pilot

- 2020 has caused many to view pilots differently.

- Across the industries, M&R teams are focused on what to do for this day, this week, this month.

- Most recognize there is a need for technology to help, so as organizations get back to work, they are figuring out needs and possible solutions.

- Most are working in a reduced budget environment, so pilots need to be light on costs.

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What a pilot should and should not be

- IIoT strategy is often formed from the results of a pilot.

- A pilot is an experiment, an agreement to TRY IIoT together, to test against expectations.

- Not all individuals are "equally" experienced, in fact:

  - 82% of ALL manufacturing jobs will soon require medium to high digital skills level

  - 1 in 6 working Americans don't know how to use email, internet, or have basic digital skills

    - **Private industry training investment is down 30% in the last 10 years.**

  - 1 in 5 executives believe digital transformation projects are a waste of time!

- A pilot must possess transparency, including weaknesses!

- Not all is solved, there is plenty of opportunity.

- Clear expectations drive success.

- All involved are on a journey. The IIoT is young and we have much to learn and even more to create.

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Your goals make you unique, not your challenges

No **Connected Reliability** plan is identical. Each location, team, system, asset set, etc., will require a unique path.
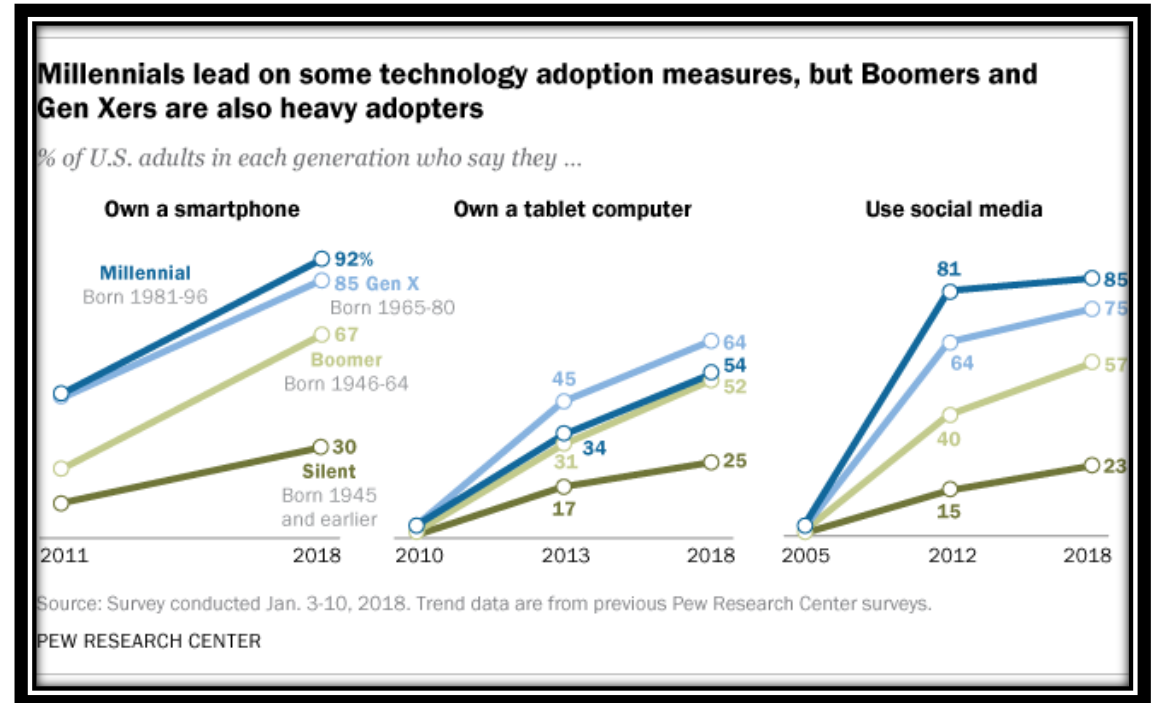
But 80% of 2019 IIoT pilots failed.

We can be our own barriers

- I already tried that (20 years ago, maybe longer)
- I understand the needs of the next generation (NOT!)
- I understand all my options in the IIoT
- I'm looking for a "mature" IIoT solution
- Cultural behaviors
- I got this....

Millennials lead on some technology adoption measures, but Boomers and Gen Xers are also heavy adopters

% of U.S. adults in each generation who say they ...

Own a smartphone

- Millennial Born 1981-96 — 92%
- 85 Gen X Born 1965-80
- 67 Boomer Born 1946-64
- 30 Silent Born 1945 and earlier

2011 — 2018

Own a tablet computer

- 64
- 54
- 52
- 45
- 34
- 31
- 25
- 17

2010 — 2013 — 2018

Use social media

- 81 — 85
- 75
- 64
- 57
- 40
- 23
- 15

2005 — 2012 — 2018

Source: Survey conducted Jan. 3-10, 2018. Trend data are from previous Pew Research Center surveys.

PEW RESEARCH CENTER

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Communication informs expectations

More than half of those surveyed stress the need for communication in IIoT pilots and programs. Specifically, they underestimated the need for communication across multiple departments.

- IIoT Automation isn't the "answer" to ALL my asset management issues
- The IIoT is the future, I have to do this!
- All of sudden, software doesn't fail (or hardware)
- Preventive maintenance is a thing of the past
- Predictive maintenance is now easy, just turn it on
- Flawless execution

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Too many options can be daunting
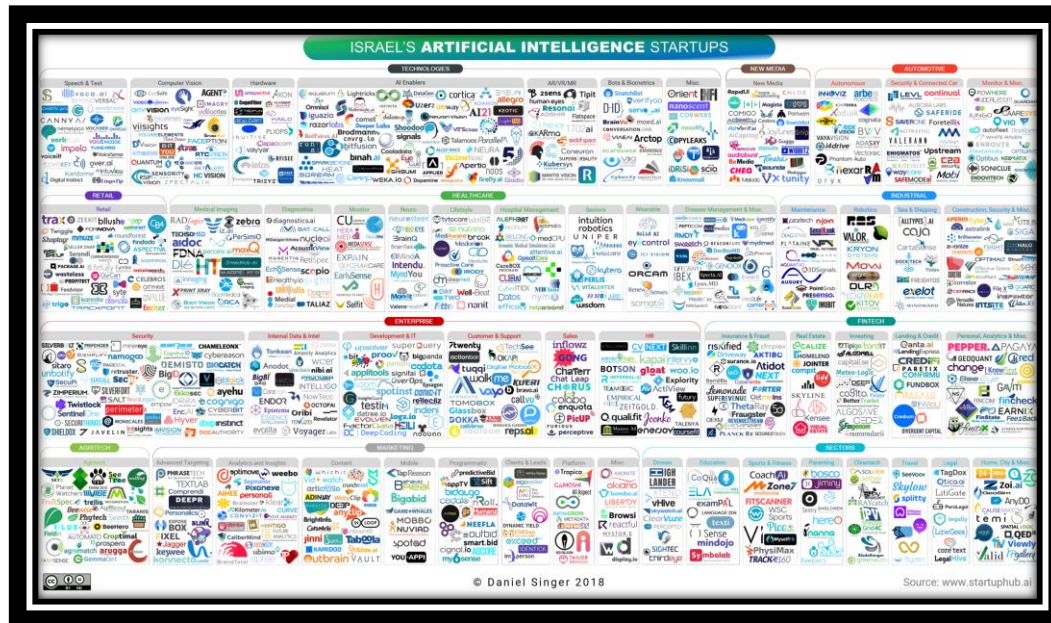
- Analytics, AI, machine learning, and cloud startups count like ant colonies…
- Differentiation is generally subtle
- Landscape changes frequently (i.e., acquisitions, closures, and new players)
- All claiming:
  - End-to-end solution
  - Smart
  - High adoption rate
  - Cost effective, ROI

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Choosing a technology partner

- **Vendor** – as we've discussed, think about your pilots as experiments that accelerate your product development initiatives.

- **Client** – your pilot should also be an experiment that accelerates your continuous improvement initiatives.

- **Vendor** – be selective. Pilots cannot be unlimited, its an investment.

- **Client** – do your homework. Not all vendor solutions are a good fit, so you need to spend quality time defining your specific needs prior to any pilot.

- **Vendor** – don't let the temptation of "HUGE potential" drive your budget for pilots. We are all in a learning curve, so your vision of HUGE can most certainly be skewed…

- **Client** – same goes for you. Avoid the temptation of overstating the opportunity. Sometimes, the simplest of pilots is all you need for impact.

New technology can be viewed skeptically, and organizations cannot afford to invest in failure

Today's solutions need to keep up with tomorrow

Adaptable - Scalable - Tailorable

Choose a partners who have:

Vision	**Longevity**	**Roadmap**

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POLL QUESTION No. 2

?

How do you fit in with today's technology?

(Click only one answer)

- Technology makes me better at my job

- Technology has its pros and cons

- Technology is competing for my job

- I support Sarah Connor (of *Terminator* fame)

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QUESTIONS?

?

Thank you!

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Next webinar July 22: Are you letting your machines control you?

BEST PRACTICE WEBINAR
Wednesday, July 22, 11 a.m. ET

Are you letting your machines control you?

Reliability is designed—literally and figuratively. Literally speaking, the inherent reliability of our equipment is governed by its design. But as equipment custodians, what we do (or don't do) affects a machine's reliability more than we may think—and it goes way beyond maintenance. In this webinar, **RCM expert Nancy Regan** details the winning reliability philosophy that empowers equipment custodians to achieve their reliability goals. (And it may be simpler than you think!)

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