



Predictive Maintenance

How to run a PdM project – the keys steps to success

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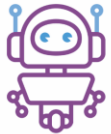
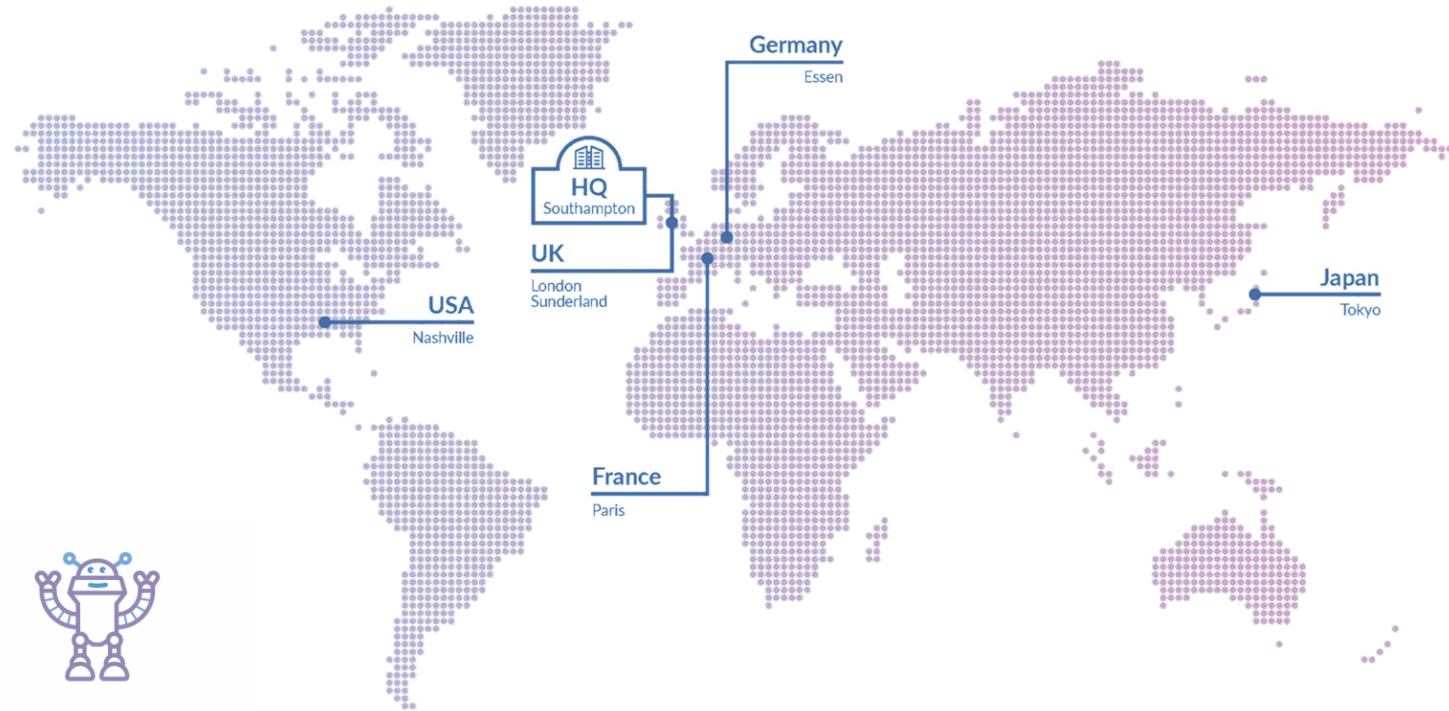
Agenda

1. What is Predictive Maintenance and what are the Benefits
2. Essential Prerequisites for carrying out a Successful PdM Project
3. Why PdM Projects Fail
4. Key phases for a Successful PdM Project
5. Success in the real world
6. Q & A

Who We Are

Our mission

Help machines help humans through AI



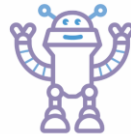
Clarity

of purpose, thought and communication



Respect

for ourselves, for each other,
for our customers and the community



Spirit,

flair and ambition in all we do

Select clients in a range of sectors



What is Predictive Maintenance (PdM)?

PREDICTIVE MAINTENANCE

- Uses on-line monitoring to establish the condition of machines
- Predicts failure by using previous failure patterns and maintenance actions
- Sources data during normal operations
- Minimizes disruption to operations for sampling or measuring
- Enables a proactive maintenance strategy of 1000s of machines

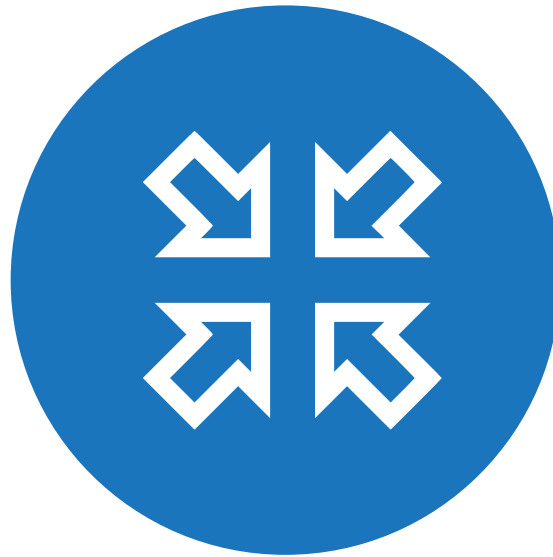


Benefits of Predictive Maintenance: Maintainers View

PdM extends a **Condition-Based Maintenance (CBM)** strategy to:



Cover a greater
number of machines
(*balance of plant*)



Reduce
preventative
maintenance burden

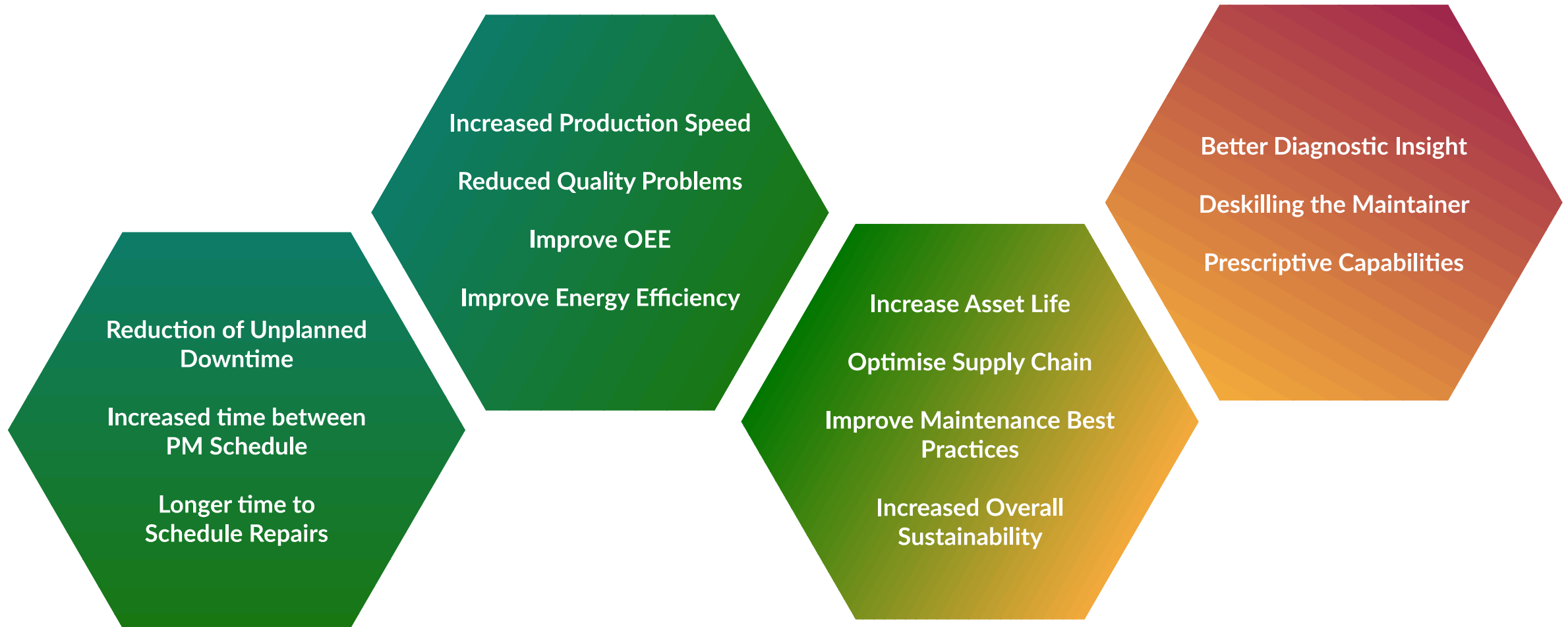


Enable the planning of
opportunistic corrective
maintenance



Prevent unexpected
failures

Targeting Benefits: Not all Benefits are Equal



Outcomes with Senseeye: Management View

Increased availability

Maintain ahead of time
No unplanned stoppages

Supporting mobile workers

Remote inspection & permits
Reduced risks

Precise & correct maintenance

Focus on things that matter
More efficient resource use

Reduced operational costs & risks

ROI Lock®
Reduced environmental risks

Increasing sustainability

Reduced waste
Reduced energy use
Increase asset lifetime

Essential Prerequisites for: Successful Predictive Maintenance

4 Factors



Assets



Data



Infrastructure



People

Everything else is a bonus

Why PdM Project Fail

4 Factors



Incorrect
Assets
Selection



Insufficient
Data



Lack of
Suitable
Infrastructure

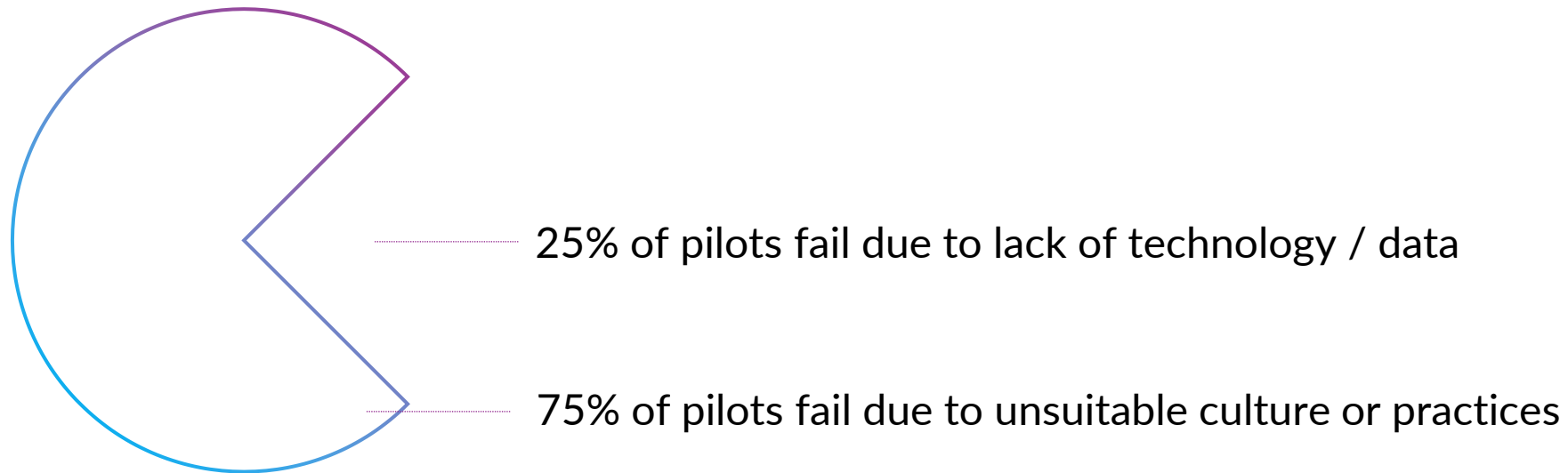


People

These 4 Factors can cripple even the best of solutions

Industry feedback suggests...

Of failed Industry 4.0 projects



Lack of interest is not the problem. *How to conduct successful PdM and take advantage is..*

PdM adoption is about People



MANAGEMENT



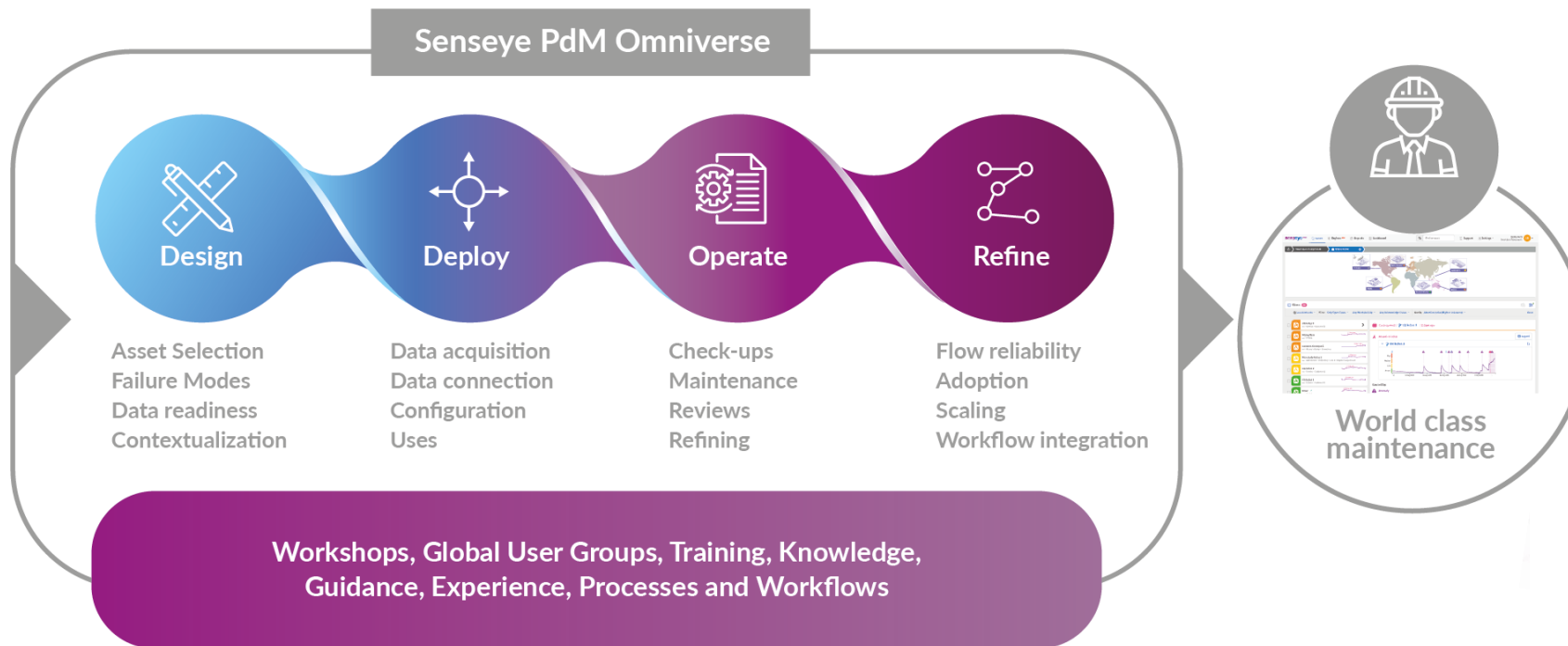
MAINTENANCE



IT DEPARTMENT

Guiding Your Way to PdM Success

Senseeye PdM Omniverse guides your Predictive Maintenance journey with expert tools, knowledge, support and community



DESIGN

Plan your PdM project

1

Asset selection

2

Failure mode and Data selection

3

Using PdM and operating context

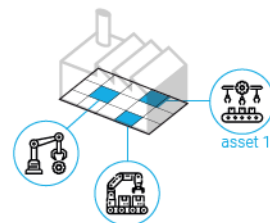
4

Data architecture & transformation

DESIGN

1

Asset
selection



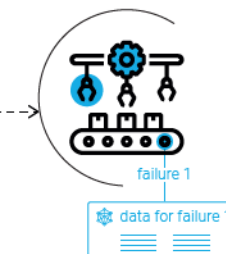
Preparation for workshop
Gather business, maintenance and operational data to define list of machines applicable for PdM based on impact and feasibility.

WORKSHOP #1

- Plant Manager or project sponsor
- Department Head
- Maintenance and/or Reliability
- Controls Engineers (OT)

2

Identify failure modes
and related data



Preparation for workshop
Prepare a list of possible failure modes and related condition monitoring data for applicable assets, including:

- Sensor types
- Placement
- Data collection
- Periodicity
- Format.

WORKSHOP #2

- Maintenance and/or Reliability
- Controls Engineer (OT)
- Machine experts

3

Using PdM and
operating context



Preparation for workshop

- Introduce users to Predictive Maintenance and Senseye PdM
- Review current maintenance practices.
- Discuss aspirations for maintenance cultural change and maturity with PdM. Define user types and responsibilities.

WORKSHOP #3

- Maintenance team
- Maintenance experts
- Project sponsor

4

Data architecture
and transformation



Preparation for workshop
Define how data moves to the cloud. Consider:

- Device connectivity
- Pre-processing requirements
- Factory to cloud IT/OT architecture
- Security constraints.

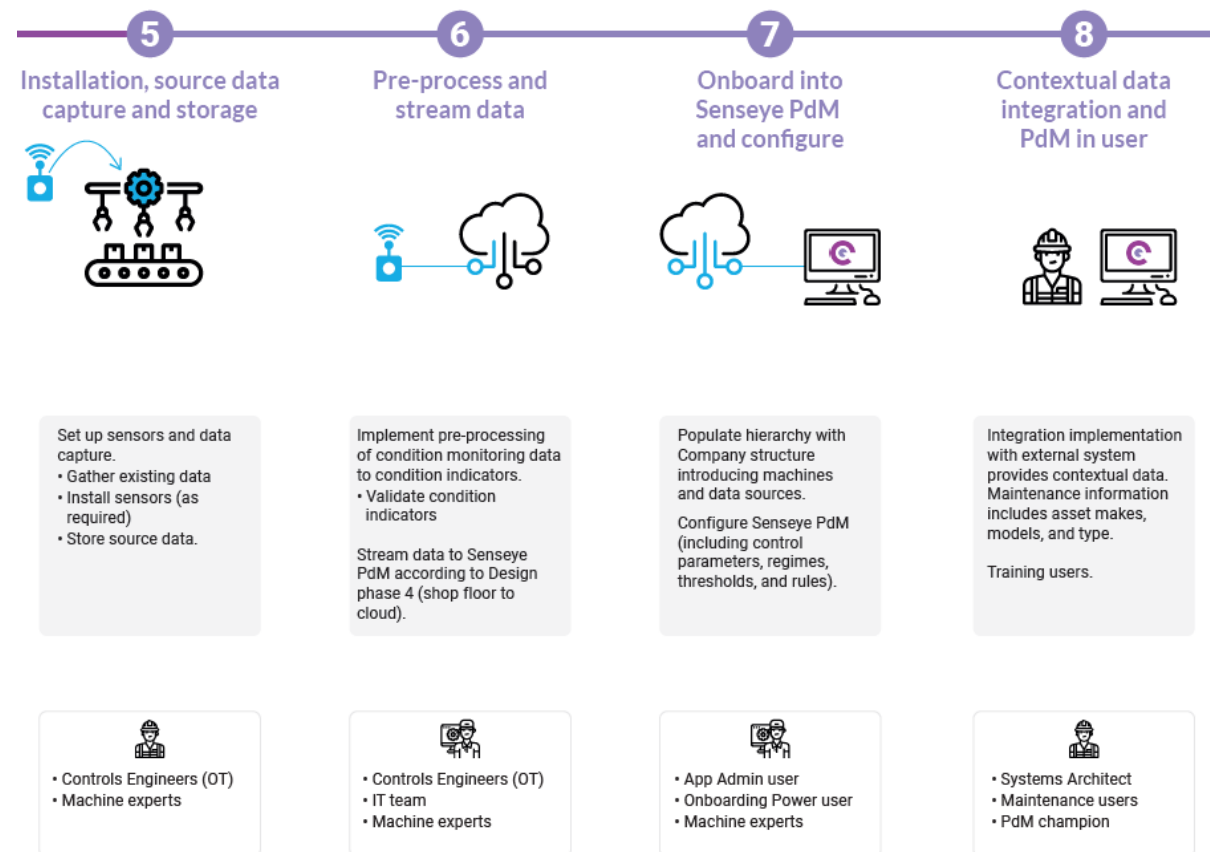
WORKSHOP #4

- Controls Engineers (OT)
- IT team (including IT security coverage)
- Data architects

DEPLOY

- **Implement the required technology**
- 5** Installation, source data capture & storage
- 6** Pre-process and stream data
- 7** Onboarding into Senseye PdM and configure
- 8** Contextual data integration and PdM in use

DEPLOY



OPERATE

● **Make sure you are operating for success**

9 Monitor Notifications

10 Maintenance events

11 Cases review

12 Periodic review

OPERATE

9

Monitor notifications



Be aware of the asset attention level and case generation to prevent downtime or failure.



- PdM champion
- Maintenance users

10

Maintenance events



Enter maintenance events as context to improve analysis.



- Maintenance users

11

Cases review



Review Cases for root cause.
Close Cases by providing feedback in the app, to improve the analysis.



- PdM champion
- Maintenance users

12

Periodic review



Review Cases and capture evidence of success.
Review project status (weekly to monthly).



- PdM steering committee

REFINE

Get ready to expand to new machines and sites

13

Data precision & integrity

14

Predictive Maintenance adoption

15

ROI and scaling

16

Workflow and integration

REFINE

13

Data precision & integrity



Prediction precision can be improved by the potential refinement of condition monitoring data and condition indicators.

Dataflow integrity is informed by stack robustness, troubleshooting connectivity break-ups, and flatline.



- PdM champion
- Maintenance users
- Controls engineers (OT)

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Predictive Maintenance adoption



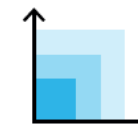
Review KPIs including adoption, ROI achieved, success across shops, facilities, and best practices.



- PdM steering committee
- PdM champion

15

ROI and scaling



Preparation for workshop
Collate evidence for ROI and scaling.

Define strategy for scaling and loop back to design phase as required for new plant and assets.



- WORKSHOP #5**
- PdM steering committee
 - Project sponsor
 - Maintenance and/or Reliability leaders

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Workflow and integration



Preparation for workshop
Discuss workflow and integration to others applications so changes from the users are reflected in all other associated applications.



- WORKSHOP #6**
- Maintenance team
 - Machine experts
 - Project sponsor

NISSAN has saved millions

GLOBALLY

Senseye has worked with Nissan since 2016, scaling from 30 assets in 2016 to 2500+ at the end of that year, to over 10,000 assets by February 2019 across 8 factories around the world.



Senseye Nissan project team:
2016: 3 people / **2020:** 3 people

Nissan # hired to enable scale: 0



Asset types: 100+



Unplanned downtime avoided: \$\$m++
ROI achieved in <3 months

2016

January – First meeting

Started a project to analyze data for 30 machines at the factory in Sunderland, UK

2017

January – Site expansion

400 assets being monitored

2018

Global expansion started. Europe, Japan and North America

2019

9 factories across the world, 10,000+ assets in one account with 450+ concurrent users

ALCOA achieved ROI in 3 months

Senseye has worked with Alcoa since winning a thorough competitive tender process in 2018 against 12 competitive solutions including Falconry, IBM, Microsoft, Uptake, MTell and SparkCognition. Over 1,000 highly complex assets are now being monitored at the original site, using process data already captured.



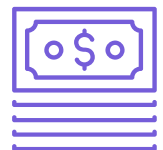
Alcoa # FTEs hired for the deployment: 0

Wanted PdM as a managed product.
Efficient implementation enabled quick results.



Additional sensors installed: 0

Leveraging existing machine & maintenance data feeds
Able to easily add more assets as Alcoa scales.



ROI in 2019: 10x

Achieved initial ROI in 3 months.
Reduced unplanned downtime by 20% - significant improvements in OEE

2018

Competitive tender

Senseye won against 12 competitors including industry standards and newcomers

2019

Fjarðaál - Iceland

50 assets initially brought in.
ROI achieved in 3 months

2020

1,000+ assets covered in Fjarðaál.
Global expansion in progress



THANK YOU

We run monthly webinars on predictive maintenance topics,
these can be found at www.senseye.io/events



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