Data driven machine inspections & results

- Get better results from the inspections you already do.

PEAK
RELIABILITY

www.getpeakreliability.com

Bottom line up front

1. Its fundamental to have an accurate list of Asset I.D.'s
    1. With asset criticalities assigned
2. You need data driven decision making processes
    1. Should be action oriented
    2. Drives towards the outcomes you want
3. Processes should incorporate the different types of data
4. Remove barriers that restrict access to data
5. Automate and use rules whenever possible
6. Use Pareto's rule – it will focus efforts
    1. Focus on the significant few that will return the most results

Questions? info@getpeakreliability.com

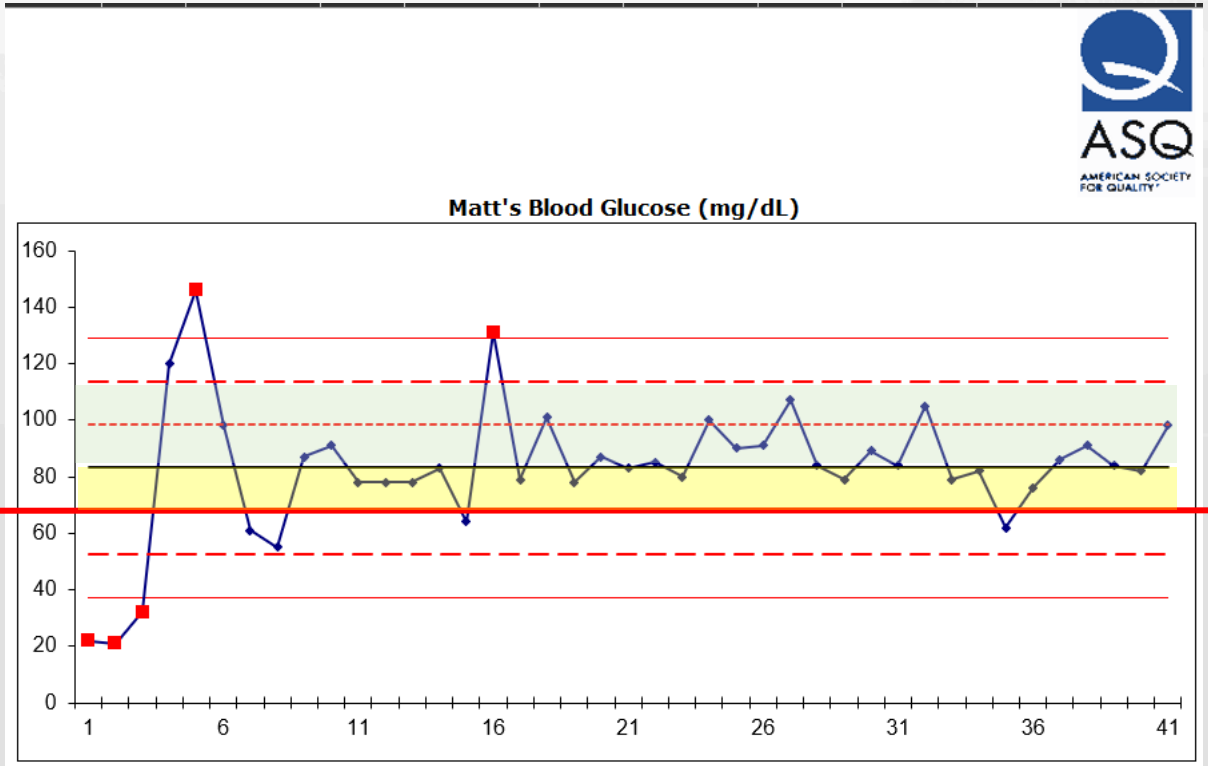
PEAK
RELIABILITY

Why?

Data should drive the decision making process

Questions? info@getpeakreliability.com

Follow a process



- A single point outside the control limits
- Two of three pts outside the two sigma limit
- Four of Five pts outside the one sigma limit
- Eight in a row on the same side of centerline

Do something!

- Three Sigma Limit
- Two Sigma Limit
- One Sigma Limit
- Average

Questions? info@getpeakreliability.com

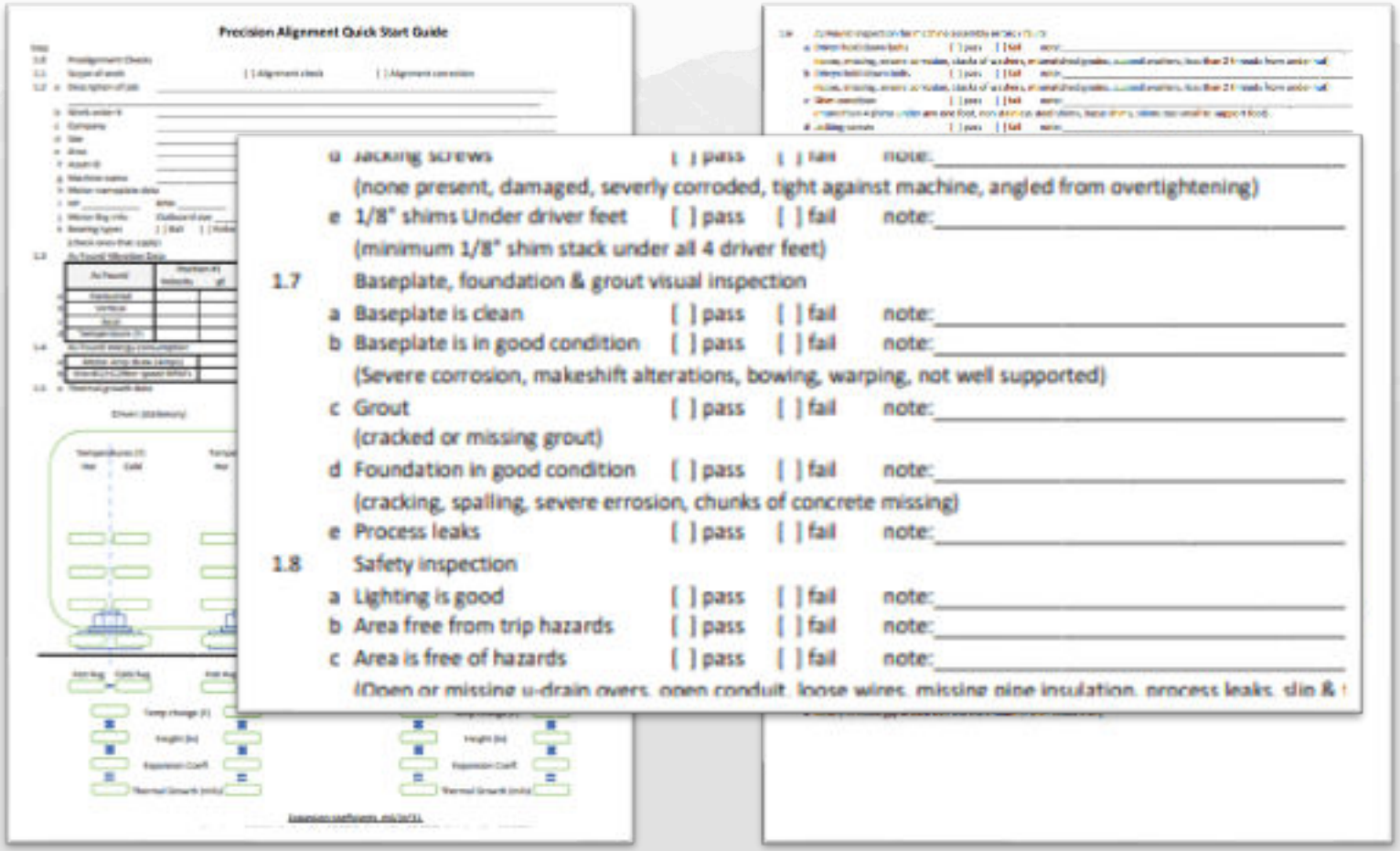
Results

- Invest the time to gather the data up front
- You'll never know the value of your data until later
- Notes are data too
- Observations are data

Data types

- Subjective
- Objective

- Numerical, textual, time series, spatial, binary, categorical, image data, audio data



Questions? info@getpeakreliability.com

What is the purpose of inspection?

PEAK RELIABILITY

Purpose of inspection is to identify the signs of failure

- Visual, audible & tactile inspections
- Instrument inspections
- done by mechanics, operators, specialists & managers

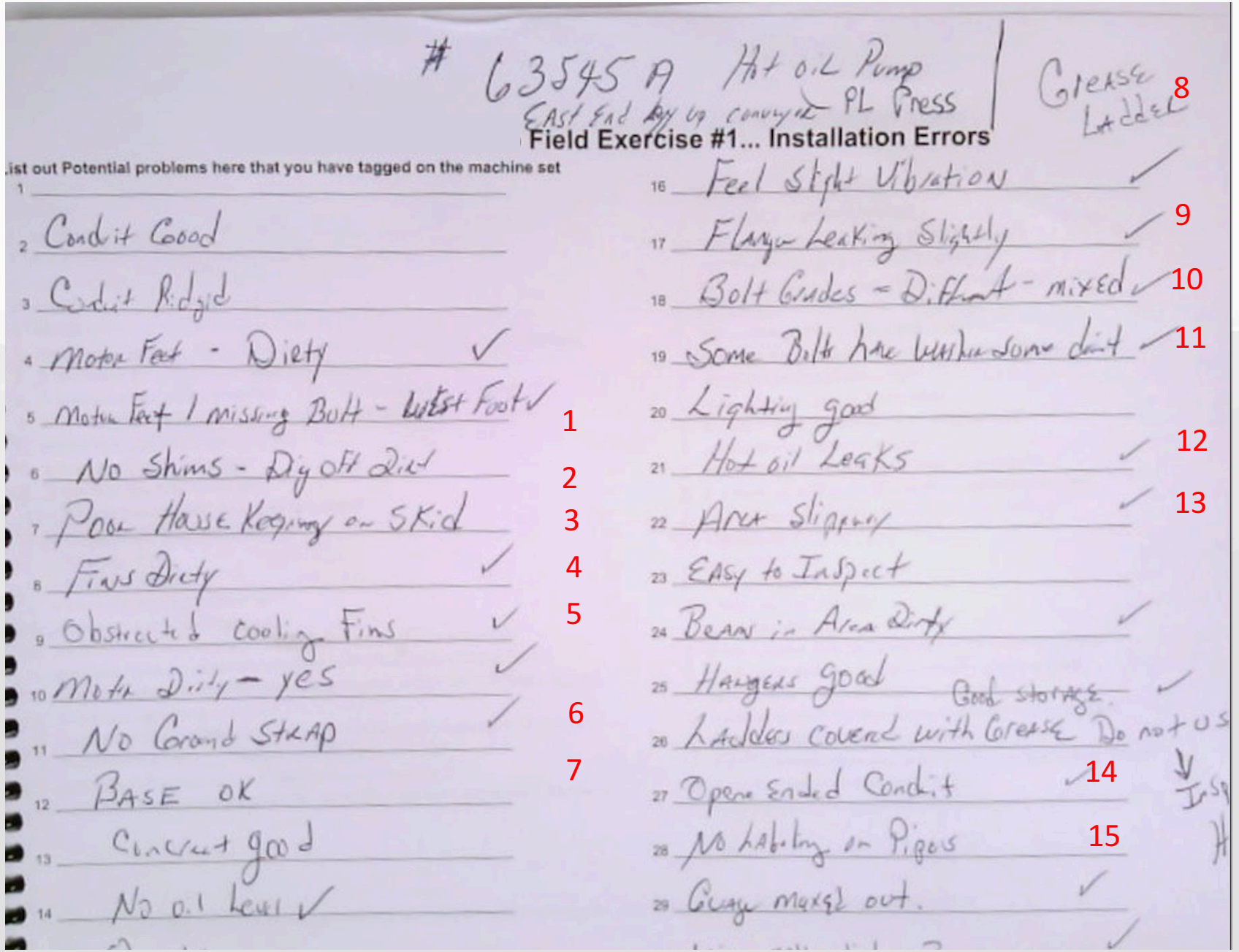
In order to

Get things fixed

Questions? info@getpeakreliability.com

Visual Inspection Results

Subjective inspection



63545 A Hot oil Pump
EAST End by ip conveyor PL Press

Field Exercise #1... Installation Errors

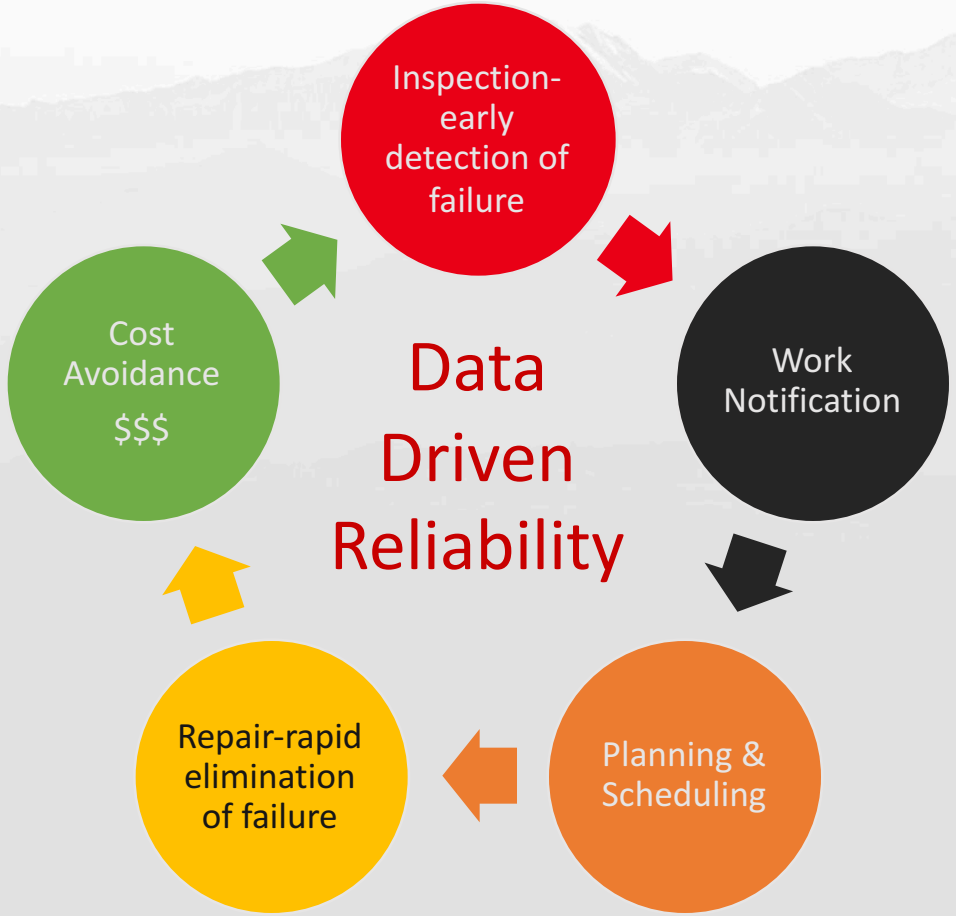
List out Potential problems here that you have tagged on the machine set

1
2 Condit Good
3 Condit Rigid
4 Motor Feet - Dirty ✓
5 Motor Feet / missing Bolt - Left Foot ✓ 1
6 No Shims - Dig off Dirt 2
7 Poor House Keeping on Skid 3
8 Fins Dirty ✓ 4
9 Obstructed cooling Fins ✓ 5
10 Motor Dirty - yes ✓
11 No Grand Strap ✓ 6
12 BASE OK 7
13 Circuit good
14 No oil Level ✓
15
16 Feel Slight Vibration ✓
17 Flange Leaking Slightly ✓ 9
18 Bolt Grades - Different - mixed ✓ 10
19 Some Bolts have washers some don't ✓ 11
20 Lighting good
21 Hot oil Leaks ✓ 12
22 Area Slippery ✓ 13
23 EASY to Inspect
24 Beam in Area Dirty ✓
25 Hangers good Good storage ✓
26 Ladders covered with Grease Do not use
27 Open Ended Condit ✓ 14
28 No Labeling on Pipes 15
29 Gauge maxed out. ✓

Grease Ladder 8

Questions? info@getpeakreliability.com

Inspection cycle



Questions? info@getpeakreliability.com

Accurate list of Assets

Fundamental to success

- Need an accurate list of assets with
  - Asset I.D.'s or functional locations
- Need a numerical equipment criticality attached to each asset
- Accurate bill of materials

- Equipment criticalities help us remove emotion
  - Can force us to narrow our focus to the critical few vs the emotional many
  - Accurate B.O.M.'s makes maintenance more effective

Questions? info@getpeakreliability.com

Asset I.D.'s incomplete?

Asset mapping

- Physical walkdown of the plant
  - Collect machine type(s)
  - Asset I.D.'s
  - Location
  - Lubrication types
  - Attach QR codes/bar codes

Equipment Criticalities

Each asset (or machine train)needs a business criticality

- Numerically rank its business significance
- Essential for focusing efforts
  - Data driven vs emotionally driven
  - Multiply equipment criticality by work order priority and sort
    - Most critical machines w/highest work order priority float to the top

Equipment criticalities missing?

- The most business critical (mission critical) assets are probably self evident (~20% of assets)
  - If not perform FMEA's to identify
- Perform a criticality review
  - For balance of plant (~80% of assets)
  - Cross functional team (ops, mtce., eng., pdm.)
  - Assign criticalities using consensus and FMEA guidelines

Bill of materials incomplete?

Data mine the equipment files to enhance or create accurate bills of materials

Or

Enact a continuous improvement process

- Use work order closing from technicians
  - To identify missing/wrong components from B.O.M.
  - Get corrections entered into the CMMS

Data silos

Data silo is a group of raw data accessible by one department but isolated from the rest of the organization

Separate team and departments naturally have their own goals and priorities and often operate separately

You might have data silos if …

1. You rely on loose excel spreadsheets
2. You are unable to access data quickly
3. Random software is used and shared selectively
4. You have to dig through your personal records upon request
5. Your unsure of the metrics your teams are using

Questions? info@getpeakreliability.com

You might have data silos if …

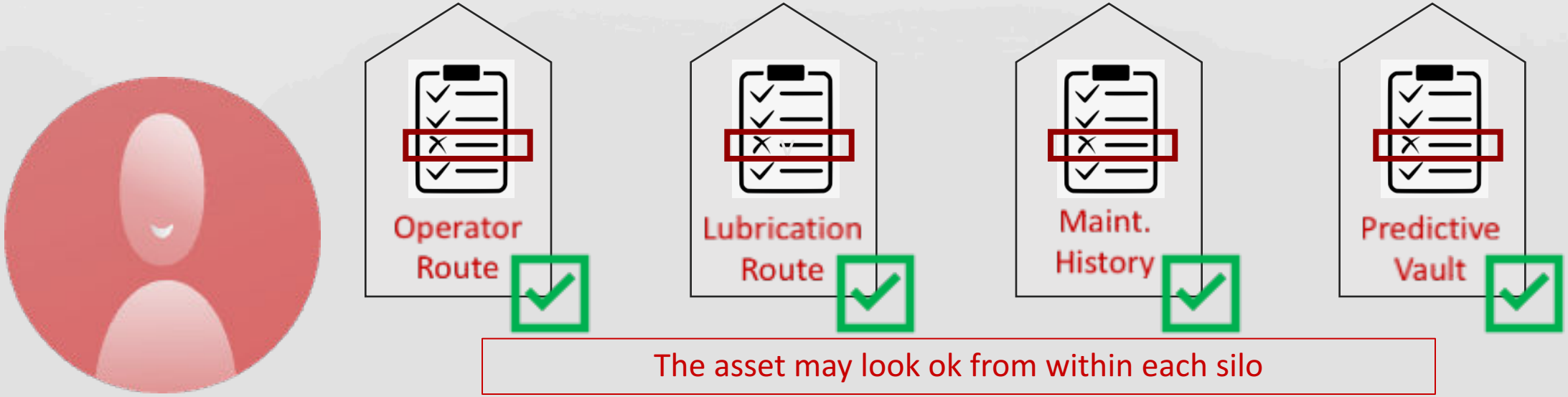
- Its hard to find data illustrating a big picture view of the business
- Departments report inconsistent data & errors go uncorrected
- You hear complaints about a lack of data for specific business initiatives

How are data silo's problematic?

PEAK RELIABILITY

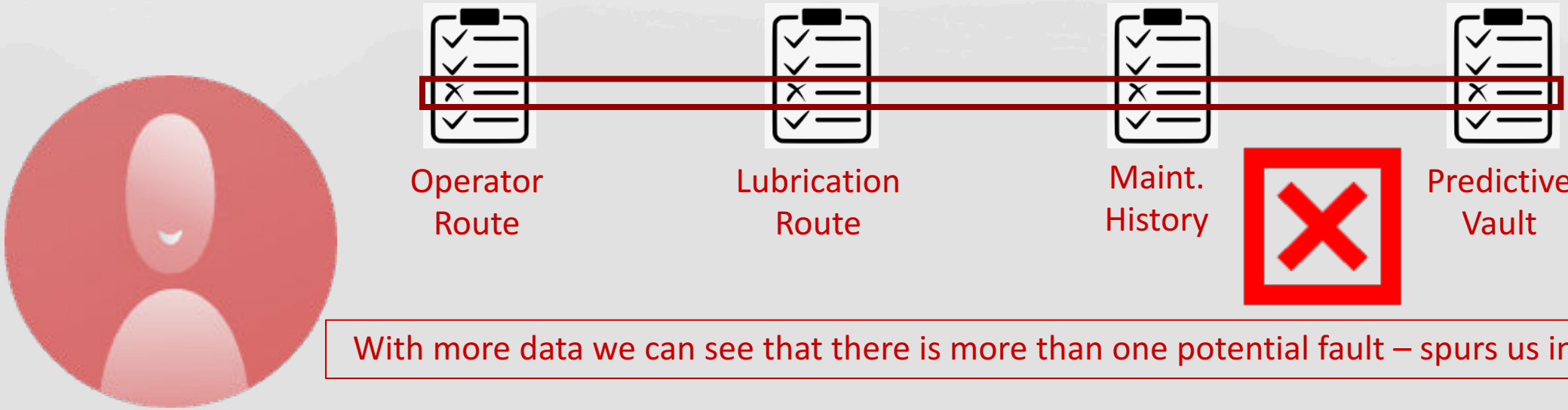
- Give an incomplete view of the business
- Create a less collaborative environment
- Slows the pace of an organization

View from within each silo



The asset may look ok from within each silo

View with silo's removed



With more data we can see that there is more than one potential fault – spurs us into action

Remove the silos

Data Integration

- Creation of a data warehouse or data lake

- Integration platforms as a service (iPaaS)
  - Allows you to:
    - Query
    - Dashboard
    - Create reports
    - Make data driven decisions

Remove the silos

All in one solution

- Use of a Single platform
  - Holds all the data
  - Removes the barriers to access
  - Transparent
  - Allows you to:
    - Query
    - Dashboard
    - Create reports
    - Make data driven decisions

Use Processes to drive decisions

1. Follow a processes to create data driven decisions
2. Get your data available to all who need it
3. Enact pass/fail on subjective data to spur action

List of processes

1. Planning and Scheduling processes
    1. Process for meetings, schedules, planned work, outages new requests
    2. Work order job steps
    3. Process for handling work order closing comments continuous improvements
2. Work request entry process
3. FMEA process for assigning equipment criticalities
4. Inspection processes
    1. Lubrication inspection
    2. Operator inspections
    3. Mechanical inspections
    4. PdM Inspections
5. Feedback process for work request status and work order results

Questions? info@getpeakreliability.com

What should your inspections consist of?

Process for what to inspect for

Inspect for those failures:

1. That have happened in the past
2. Are likely to happen in the future
3. Are subject to a pm
4. Are unlikely but have such severe consequences that we can't ignore them

Too much data is paralyzing. Resist the temptation to collect everything.

Questions? info@getpeakreliability.com

Process for failed inspections

Automate to curb the influence of human behavior

For Subjective data

- What is the behavior or outcome you want?
  - Use Pass/Fail and drive to the behavior you wish
    - Fixed it myself / handed off to shift / entered work request

For Objective data

- Set alarm levels
  - That trigger an action that you want

Questions? info@getpeakreliability.com

Feedback process

Communication back to the requestor

- Why work request was denied
- Work request was approved and is in backlog
- Results-what was fixed, what was corrected

Data driven machine inspections & results

- Get better results from the inspections you already do.

PEAK
RELIABILITY

www.getpeakreliability.com

The failures you wish to control

- Too much data is paralyzing

- Inspect for those failures:
  1. That have happened in the past
  2. Are likely to happen in the future
  3. Are subject to a pm
  4. Are unlikely but have such severe consequences that we can't ignore them

Data drive machine inspection & results

1. Fundamental to have an accurate list of Asset I.D.'s
    1. With asset criticalities assigned
2. You need data driven decision making processes
    1. Should be action oriented
    2. Drives towards the outcomes you want
3. Processes should incorporate the different types of data
4. Remove barriers that restrict access to data
5. Automate and use rules wherever possible
6. Use Pareto's rule to focus efforts
    1. Focus on the significant few that will return the most results

Questions? info@getpeakreliability.com

Have questions?
Reach out, we'd like to help.

info@getpeakreliability.com
or visit us @
www.getpeakreliability.com