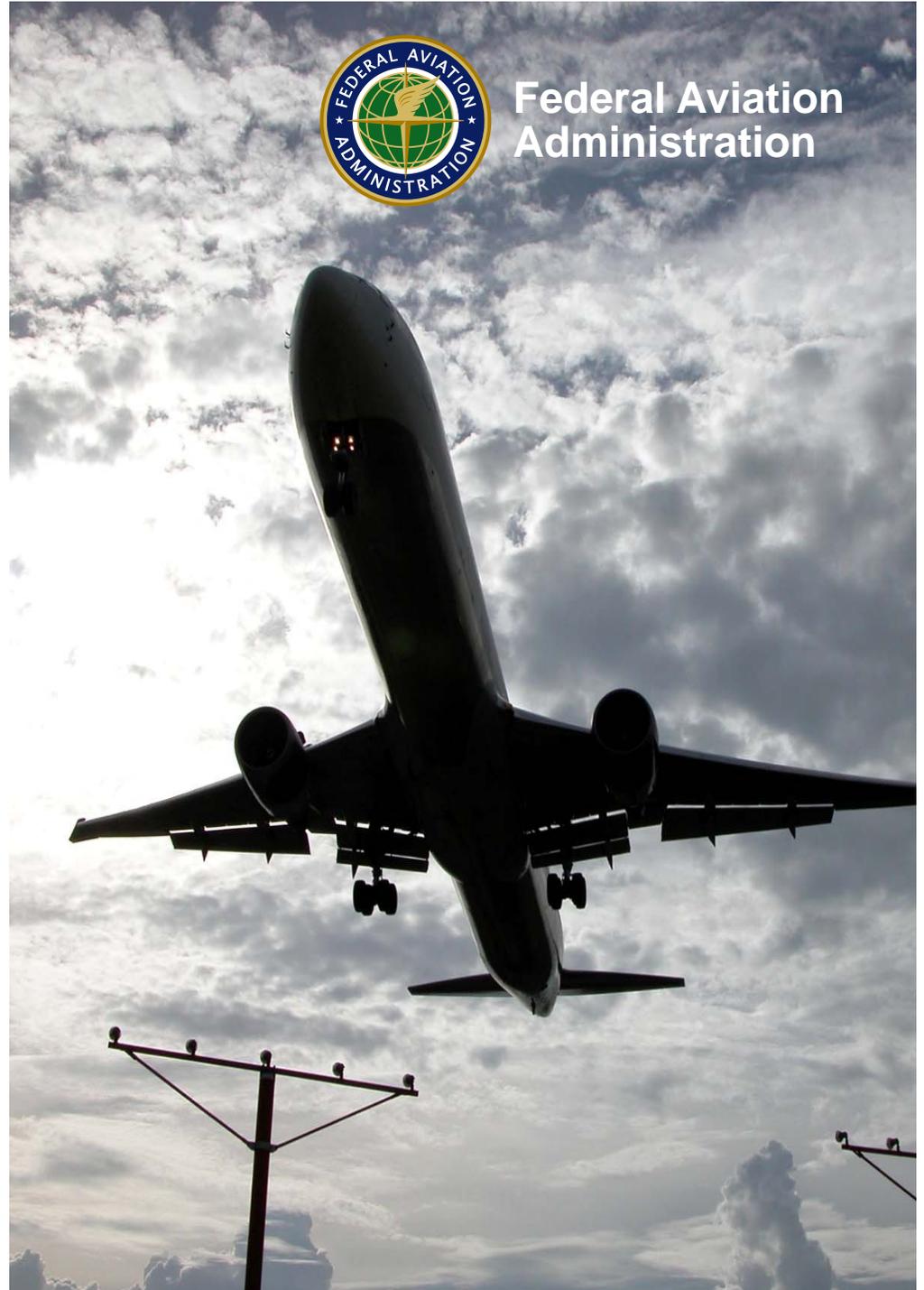


Performance Based Oversight (PBO)

Presented to: Global Manufacturing
Meeting

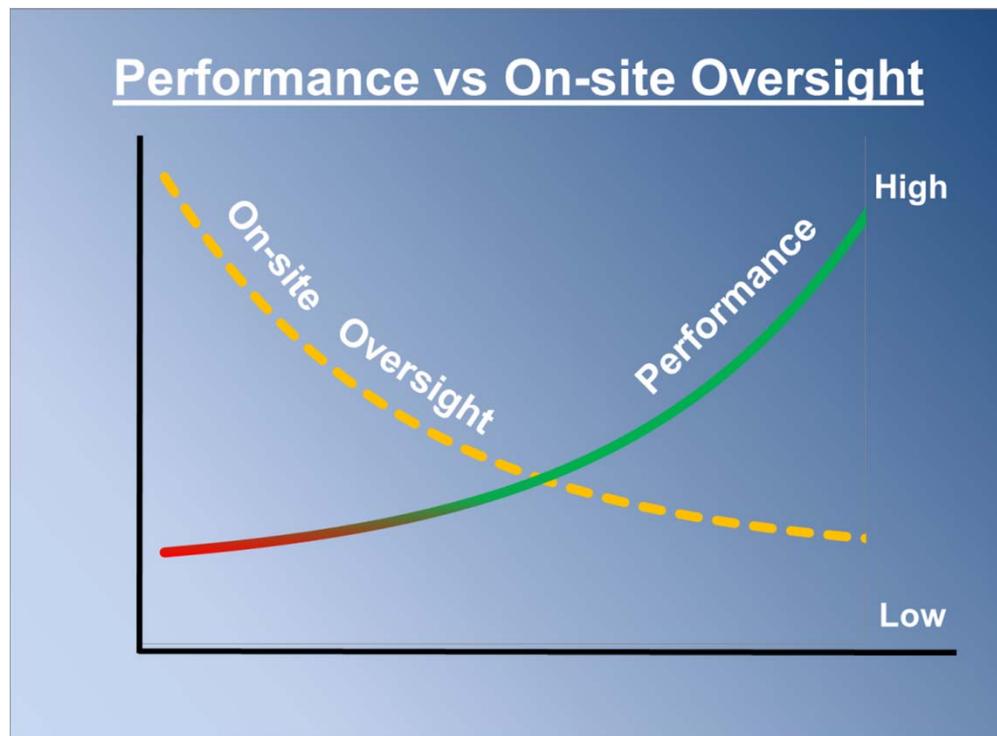
By: K. Nyce AIR-143

Date: 09/03/2015



Performance Based Oversight Concept

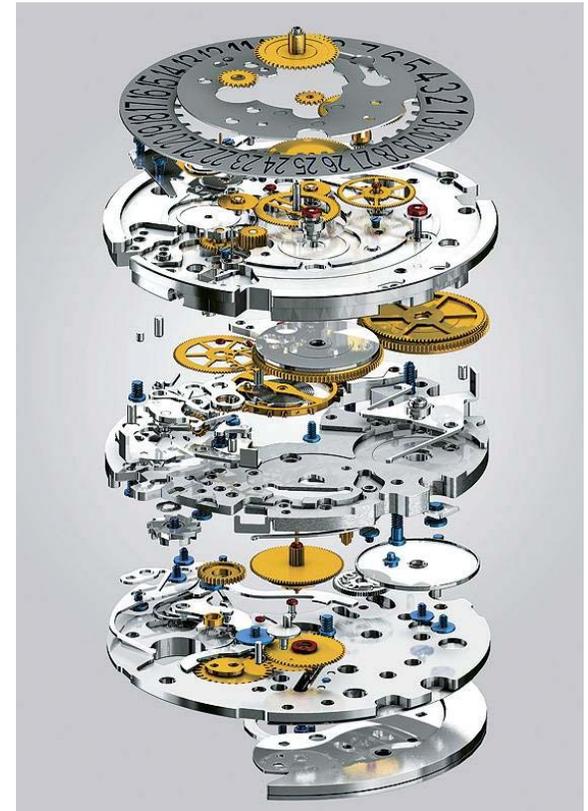
- When PAH Manufacturing and Quality Systems are based upon effective process controls producing high performance, oversight can be reduced.



Performance Based Oversight - Indicators

To Create an Indicator

- Understanding the measuring intent
- Defining the measurement boundary
- How will the metric help the FAA to assess point of manufacture performance and increase confidence in process control
- Defining the characteristics
- Setting the thresholds



Performance Indicators

PAH PBO
Facility



Data
Source(s)

Name	Quality Escapes
Risk/Impact:	Products with identified hazards can cause Alert service bulletin, ADs, and penalties. Products with no known hazards can cause penalties, customer dissatisfaction, AOG, etc
Reactive/Proactive response:	Reactive # 1: Company scraps the bad part and sends new part to customer. No root cause and remedial actions performed. (Same as Auto part warranty) Reactive # 2: Company repairs the part and returns it to the customer. No root cause and remedial actions performed. Reactive # 3: Company repairs only parts that present a safety risk and dispositions all other parts "acceptable as is." No root cause and remedial actions performed. Proactive: Company prioritizes corrective action for all parts based on safety risk and does a root cause analysis, repairs parts and implements remedial actions to prevent future occurrences. <i>Shows trending toward a lower number of quality escapes.</i>
Performance Indicator Definition	An average measure defined by number of products or articles that have been released from the quality system and that do not conform to the applicable design data or quality system requirements over the last 12 month period of time. Also stated in the definition is the measurement boundary. For example current quality escape value for the latest month represents only the escapes found from facility X or a certain manufacturing line within facility X. The PAH should define the data source for the quality escapes count and document it within this section Only quality escapes affecting safety, 21.3, SDR, AOG or unsafe conditions should be included in the dataset that support this performance measure.
Method	The indicator value is calculated by summing the number of quality escapes over the 24 month period and dividing by 24. A proactive measure can also be derived from this data. Using the 24 data points a regression line can be fitted to show whether an positive or negative trend is occurring. The regression line slope can be found using the following equation: $y = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})^2}$ (see details)
Interpretation	The indicator is the mean (or average) of quality escapes per month. The PAH trends this measure with the goal to reduce the values through continuous improvement efforts. A positive trend indicates increased escape activity and therefore provides an alert for the PAH to review the areas driving the rate higher. A negative trend indicates that the corrective actions implemented are being effective and quality control in the facility is improving.
Threshold	Defined by the PAH, this upper threshold has been set at a value of 18 quality escapes in a single month. The threshold may set a trigger policy. If the escapes value crosses the threshold more than 4 times in a 24 month period, the PAH may trigger a full quality management system review. The PAH may define other threshold criteria with other triggering criteria and actions. All trigger criteria should be documented in this section.

Indicator Definitions



Quality Escapes Performance Metric

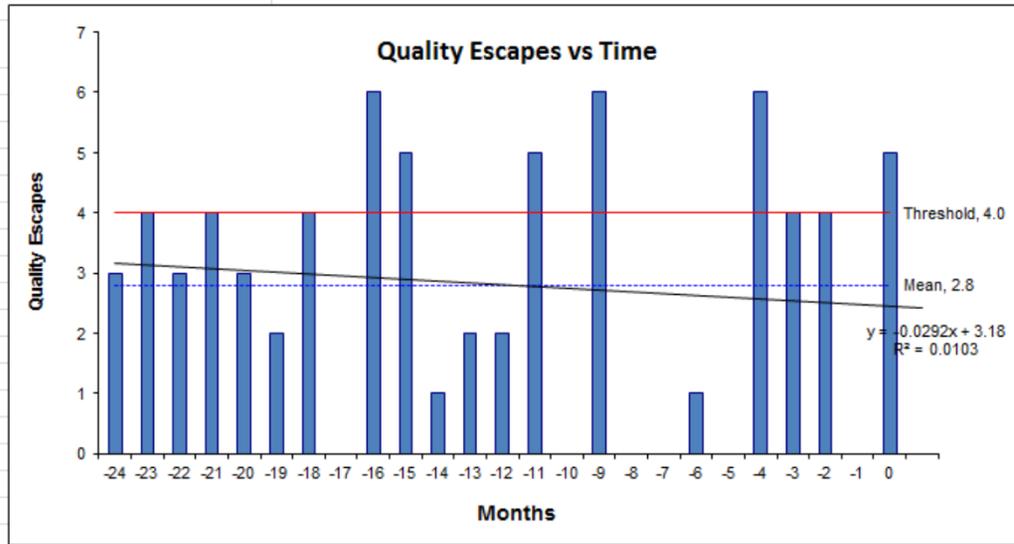
2.8
6
Trend
Positive Direction

Explanation of the Graph

1. Graph show the 24 month performance of quality escapes leading up to the latest month's performance indicated by the solid blue line
2. The dotted blue line is the mean or average all monthly performance values
3. The black represents the regression line through the 24 points and gives an indication of trend
4. The equation is the formula for the regression line. The value multiplied by 'x' is the slope. Negative slope means a decreasing trend which would be a positive indication. The positive number from the sample data reveals an increasing trend and questions about correcting this trend can be posed.
5. The red solid line is the set by the PAH and their management of continuous improvement.



Performance Indicator Presentation Concept



Easy to interpret colored metric showing performance level

Quality Escapes Performance Metric

2.8

Number of Times Above Threshold

6

Trend

Positive Direction

Explanation of the Graph

1. Graph show the 24 month performance of quality escapes leading up to the latest month's performance indicated by the solid blue line
2. The dotted blue line is the mean or average all monthly performance values
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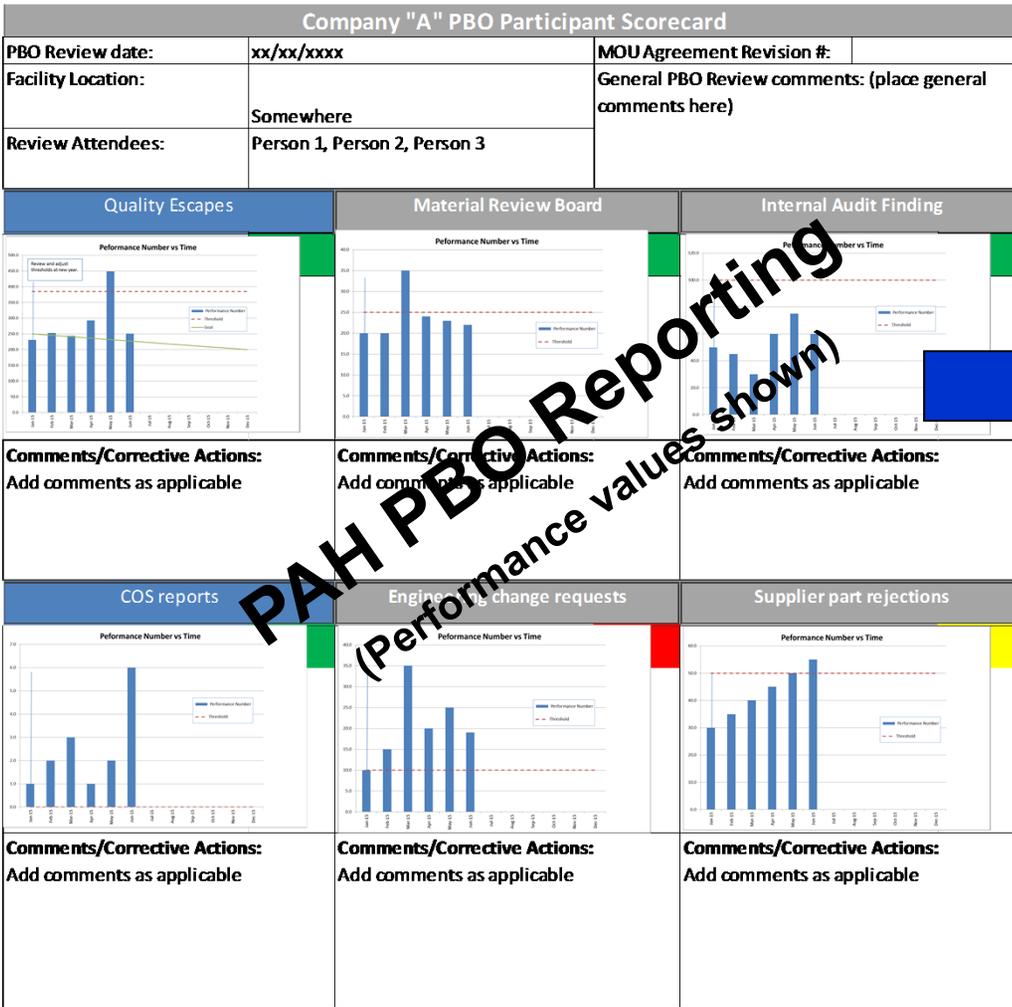
Other observations

Long term trending direction

Graphical analysis: raw data points plotted, trends, thresholds, explanation



PBO Reporting Dashboards



FAA PBO Review Notes

(Performance values removed)

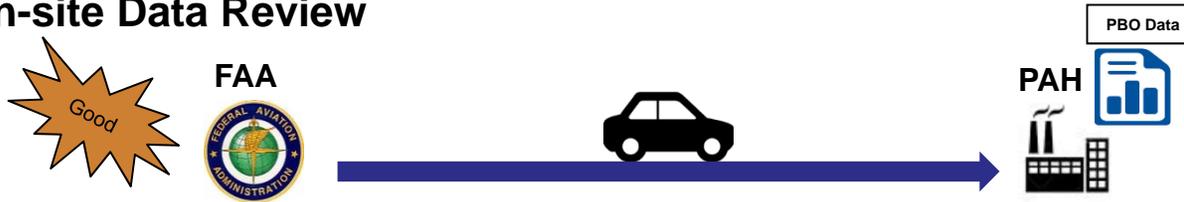
Company "A" PBO Participant Scorecard						
PBO Review date:	xx/xx/xxxx	MOU Agreement Revision #:				
Facility Location:	Somehere	General PBO Review comments: (place general comments here)				
Review Attendees:	Person 1, Person 2, Person 3					
Metrics Review		Current				
Standard Metrics	Comments/Corrective Actions	Trend	Mar 15	Jan 15	Nov 14	Sep 14
1. Quality Escapes		↑	Green	Green	Green	Green
2. Material Review Board		←	Green	Green	Green	Green
3. Internal Audit Finding		↓	Green	Green	Green	Green
4. COS reports		←	Green	Green	Green	Green
5. Engineering change requests		↑	Yellow	Green	Green	Green
6. Supplier part rejections		↑	Yellow	Green	Green	Green
% Indicators Performing			67%	83%	67%	50%

The FAA will not keep any performance data reviewed!!

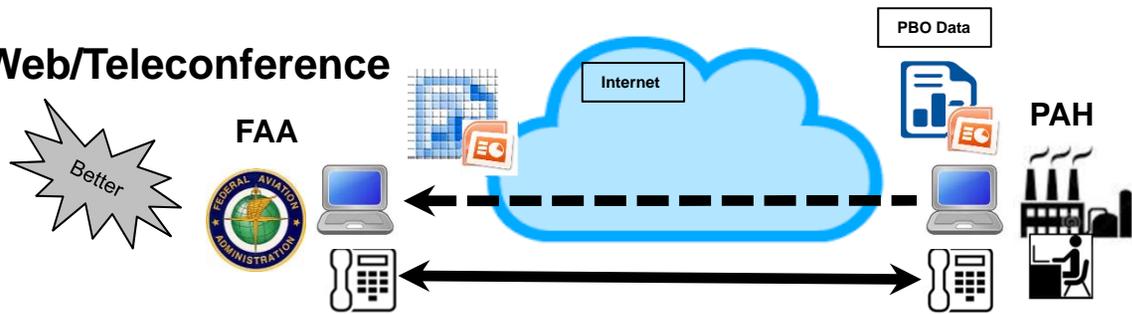


PBO Reviews

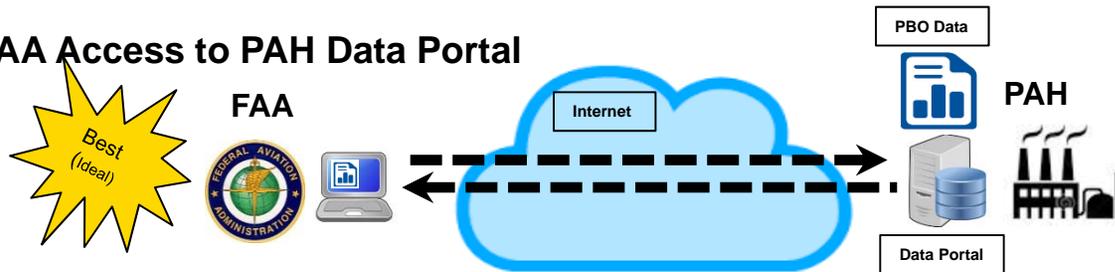
On-site Data Review



Web/Teleconference



FAA Access to PAH Data Portal



Oversight Level Adjustments



- Oversight decisions will be based on risk, performance and priority
- Time + Consistent Good Performance = CM reduction
 - Time frame 6 months to 8 months
 - Good performance for initial 6 performance indicators provides a start to CM reduction
 - Other high performance indicators reported can expand oversight confidence resulting with additional CM reduction
 - CM reduction occurs where PBO is measured
- Continuous improvement

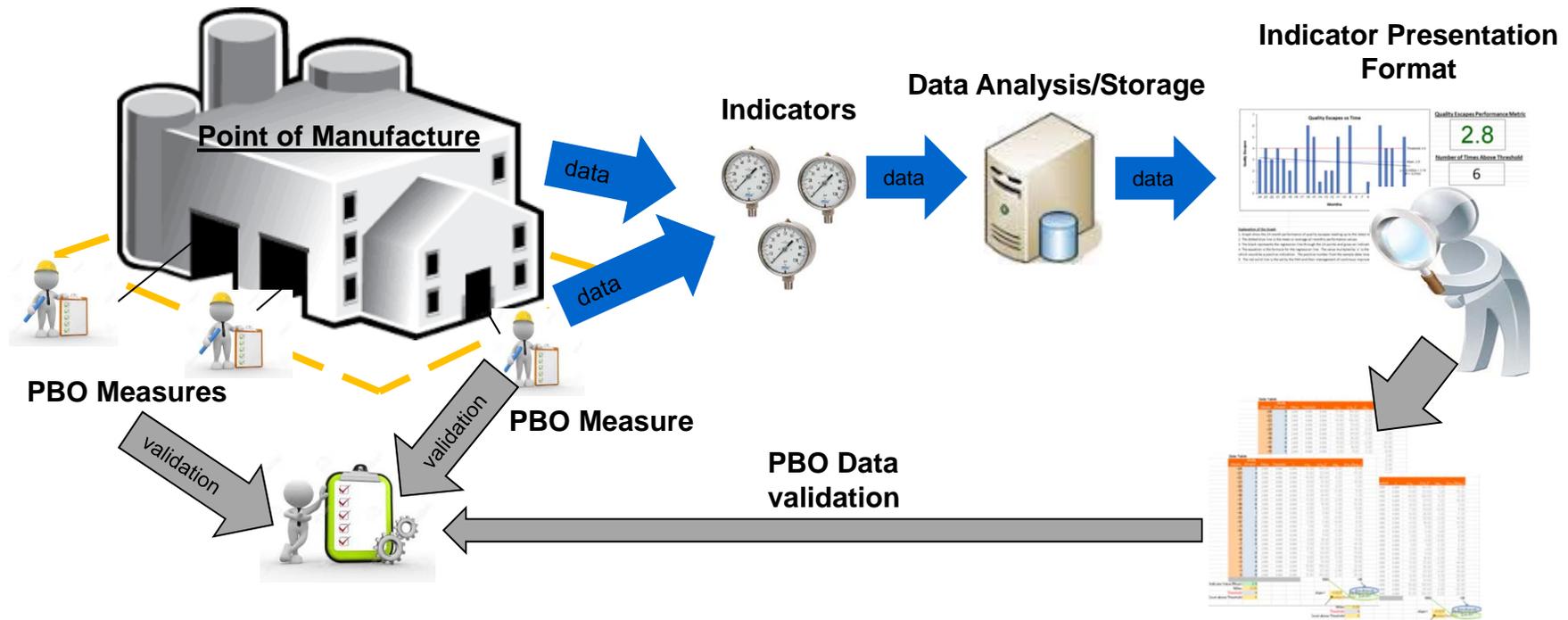


Performance Indicators

- Quality escapes
- COS reports – SDR 21.3 reports
- Supplier part rejections
- Materials Review Board
- Internal audit findings
- Engineering change requests
- Other PAH unique indicators



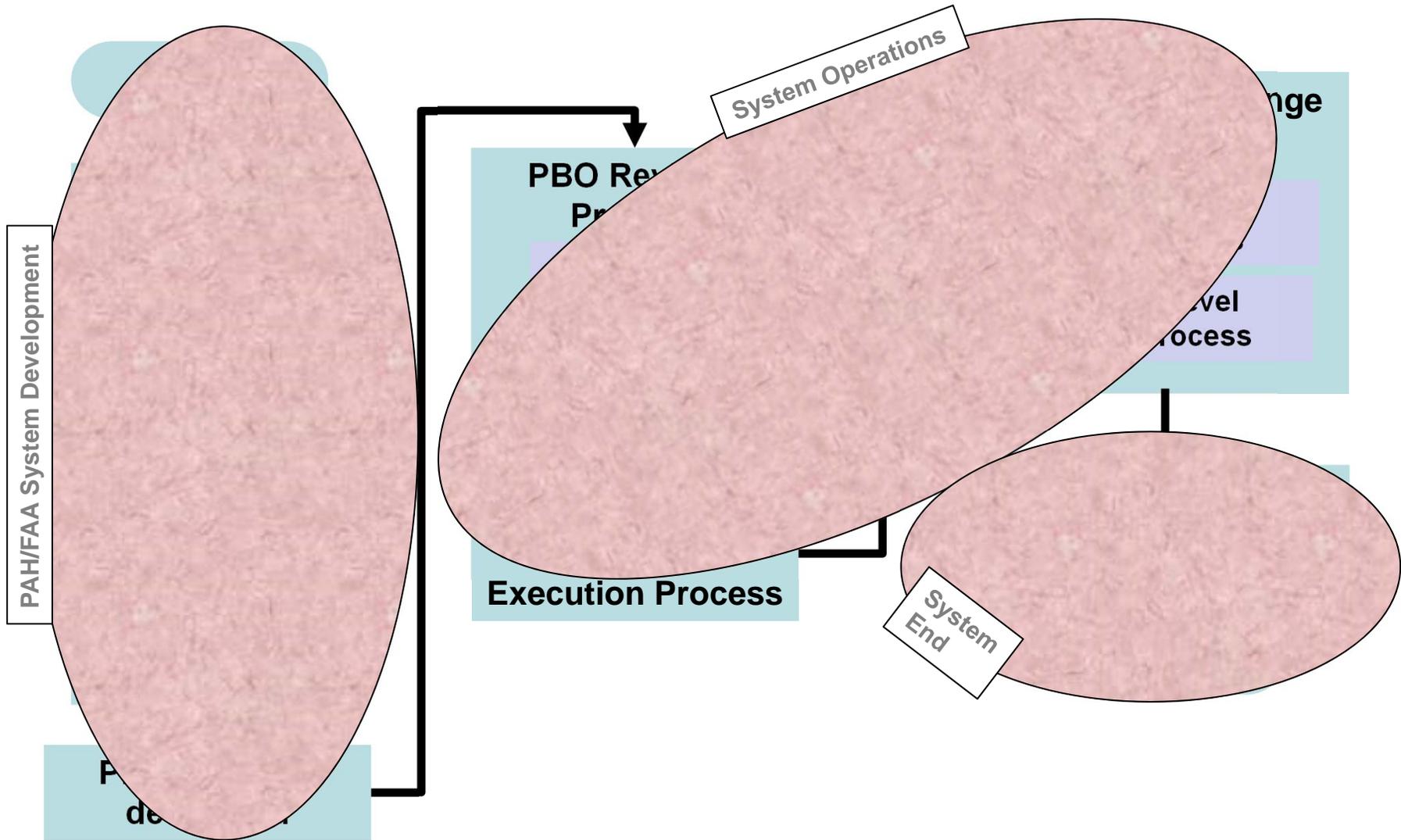
Data Validation



- ❑ Point of Manufacture data drives the indicators that eventually populate an indicator presentation that the inspector can interpret.
- ❑ Data validation includes a feedback loop to verify and validate the data stream from the data source and the analytical methods that drive the Indicator's Presentation Format.



High Level PBO System



What's Next?

- Working with 7 PBO Prototype PAHs to define and/or refine performance metrics. (Now)
- Assess the prototypes (Summer/Fall 2015)
- Make Final PBO recommendations based on prototype to FAA management (January 2016)
- Potential Advisory Circular and FAA Order language to follow in future.



Questions?



Backup Slides



Quality Escapes

- Looking for nonconformances that affect Fit, Form or Function
- Multiple quality escapes is an indicator of a quality system that is not being maintained.
- Multiple quality escapes by a direct ship supplier may be an indicator of inadequate source or delegated source inspections.
- Response to trends
 - Reactive - Repair parts and return to the customer. No root cause and remedial actions performed.
 - Proactive - prioritize corrective actions based on safety risk, perform root cause analysis, repair parts and implement remedial action(s) to prevent future occurrences.



Multiple drawing changes after design approval

Trend indicator example:

- Multiple drawing changes may indicate drawings that inadequately define the configuration, material, and or production processes necessary to produce each part in accordance with the certification basis of the product.
- or
- Multiple drawing changes may indicate inadequate drawing verification methods, inadequate or nonexistent FAI/conformity inspections to validate repeatability of the design in production.
-
- Response to trends
 - Reactive - Repair parts and return to the customer. No root cause and remedial actions performed.
 - Proactive - prioritize corrective actions based on safety risk, perform root cause analysis, repair parts and implement remedial action(s) to prevent future occurrences.



Internal audit findings

- High level of audit findings over a **short** period of time may indicate:
 - new audit system / criteria that is finding non-compliances and improving the quality system.
- High level of audit findings over a **long** period of time may indicate:
 - Quality system not maintained,
 - Trends not being addressed,
 - Corrective actions not fixing the root cause,
 - lack of commitment to quality and compliance, etc
- Repetitive audit findings in may indicate:
 - ineffective corrective actions,
 - failure to follow-up or determine the effectiveness of C/A,
 - lacking internal compliance mechanisms and not tracking repetitive findings.
- Frequency and severity of audit findings need to be considered



Materials Review Board

- Significant and or continued high numbers of nonconformances may indicate:
 - Unrepeatable manufacturing process(s);
 - Tooling problems
 - Inadequate training
 - lack of or unsuccessful FAI
 - Ineffective corrective action system
 - Unrealistic engineering (drawing/ specification) tolerances or inadequate drawing definition (ambiguous)
 - Turnover of people (training levels)
 - Too much variability in the process
- Repetitive “Use-as-is” dispositions may indicate:
 - De-facto changes to the type design
 - All the above



COS reports – 21.3b

- Increase levels of safety reported events may indicate potential or significant problems with design, quality or reliability systems.
- May also indicate effectiveness of the safety risk controls and or how risk controls are evaluated.
- A certain level of untimely responses to problem reports may indicate resources issues, system issues.



Supplier Part Rejections

- High level of rejections at receiving inspection may indicate:
 - Poor quality /design requirements flow down to supplier
 - Source delegation poorly implemented
 - Supplier not understanding flow down requirements
 - Poorly written supplier control system requirements
 - Supplier not capable to produce conforming parts
 - Lack of an FAI at the supplier
 - Poor root cause analysis / corrective action verification
- High level of quality escapes from supplier may indicate:
 - Direct shipment to users without a define requirement from the PAH on delegated source inspection
 - Lacking inspections of critical part and or critical characteristics
 - Improper oversight

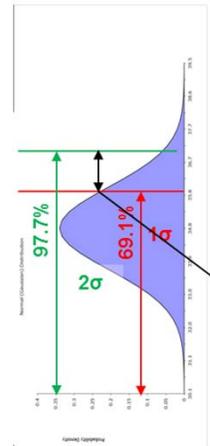
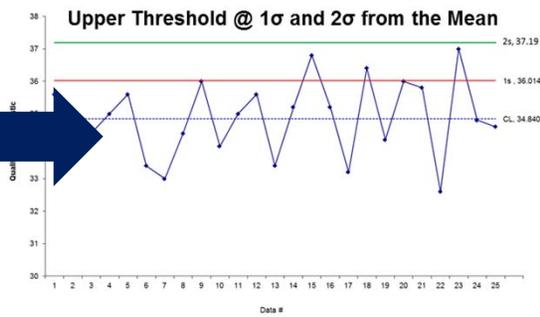


PBO Indicator Thresholds

- FAA & PAH agree what is an acceptable level of performance for the indicator
 - ❑ Acceptable threshold of performance may take time to study and analyze.
 - ❑ Threshold could be a range or limit (upper or lower)
- Thresholds do **NOT** replace compliance to regulations.
- Statistical methods can be used to generate a threshold

Sample	Data
1	35.6
2	33.8
3	34.4
4	35
5	35.6
6	33.4
7	33
8	34.4
9	34
10	34
11	35
12	34
13	33
14	35
15	36.8
16	35.2
17	33.2
18	36.4
19	34.2
20	36
21	35.8
22	32.6
23	37
24	34.8
25	34.6

DATA



At 1σ, a 30.9% probability of going above the threshold
 At 2σ, a 2.3% probability of going above the threshold

Flexibility to adjust probability



