Root Cause Analysis

Presented by:
Priya Sarjoo
Director, Business Advisory Services

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Agenda

- Definition
- Methodologies
- Problem identification
- Process understanding
- Cause identification
- Data collection & analysis
- Corrective action
Definition

• Root Cause Analysis:
  – Component of a corrective action process whereby failures or non-conformances are identified, causes are diagnosed and actions are taken to prevent recurrence
  – Focuses on identifying possible causes, collecting and analyzing data and determining actual cause(s)
  – A generic skill that can be applied to nearly any type of problem
Methodologies

• Various methodologies for conducting root cause analysis
  – Events and causal factor analysis
  – Change analysis
  – Barrier analysis
  – Risk tree analysis
  – Six Sigma (DMAIC)
Problem identification

• Effective root cause analysis requires deductive or logical thinking about cause-and-effect relationships

• Example:
  – Effect: Increase in number of cancer diagnoses
  – Possible Causes: ??
Problem identification (continued)

• Example:
  – Effect: Increase in number of cancer diagnoses
  – Possible Causes:
    • Increase in number of individuals tested
    • More precise testing techniques
    • Increased incidences of cancer
    • Others…
Problem identification (continued)

- Root cause analysis can be ineffective when you only focus on what is most visible, or most convenient

- Example:
  - Assuming errors are one time events which will not occur again
Problem identification (continued)

• Develop a thorough, succinct description which includes the following:
  – What?
  – Where?
  – Who?
  – When?
  – How much?

• Do not include or imply a cause
Process understanding

• Develop a process flowchart
  – Process flowcharts typically include inputs, processes and outputs
  – The flowchart should be prepared using both the current state as well as the standard (or correct) process
  – A flowchart helps identify where something has gone wrong in a process
  – The flowchart can also help identify data collection points
Process understanding *(continued)*

- Analyze each step within the flowchart for possible weaknesses
  - Lack of defined standards, incomplete process, broken process, non-compliance with process
- Focus on process failures instead of operator failure
Cause identification

- Develop theories about what is causing the problem
  - Examine the flowchart
  - Compare to standards
  - Compare to expected procedures
  - Use a logic tree (5 whys)
  - Use a cause-and-effect diagram (4 Ps)
• Differentiate between symptoms and causes
  – Symptoms are the *signals* that something is wrong
  – Causes are the *underlying reasons* which result in the symptom(s)

• Drill down from symptoms to system cause
Cause identification *(continued)*

**Symptoms**
- High levels of obsolete inventory

**Obvious (physical) cause**
- Inventory reserve analysis worksheets are incorrect

**Underlying (system) cause**
- “Virtual” warehouse locations are not pulled into the inventory aging report
Cause identification (continued)

• Analyze to identify possible causes
• Narrow causes down by identifying the ones most likely to have caused the error
  – Conduct a sanity check
  – Is it logical?
  – Is it supported by the data?
  – Is it probable?
Cause-and-effect analysis

• Drill down from symptoms to system cause
  – The “5 whys” process
    • Keep asking why something happened, until you get to a point where you can take action to correct the underlying system cause
Cause-and-effect analysis (continued)

Symptom: High Levels of Obsolete Inventory

Physical Cause:
- Inadequate Inventory Management
- Slow Sales

System Cause:
- Poor Visibility to Inventory Levels
- Insufficiently Trained Staff
- Priced Incorrectly
• Drill down from symptoms to system cause (*cont’d*)
  – The “4 Ps” process

- Insufficient training
- Un-reviewed calculations
- Computer problem
- No monthly validation

*People*

*Place*

*High obsolete inventory*

*Procedures*

*Policies*
Data collection

• Understand cause-and-effect
• Understand the process variables and how they can be measured
• Understand the data and how it can be gathered
• Decide on analysis methods
• Gather the data
Data collection methods

• Interview
• Observation
• Data review
• Scientific techniques
Data analysis

• Ensure the correct data is collected (i.e. data is pertinent to the issue under review)
• Determine the expected outcome
• Analyze the data
• Compare to expected outcome
Data analysis (continued)

• Obsolete inventory example:
  – Understand standards or established procedures for inventory management
  – Develop process flowchart showing inventory inputs, processes and outputs
  – Identify data to be collected and analyzed
  – Collect inventory aging by SKU, dollars and quantity
  – Re-perform inventory reserve calculation
  – Compare to existing reserve calculation
  – Identify inconsistencies
Corrective action

• Focus resources on where they would be best spent
  – Identify one problem/reason/cause which may have the largest impact (e.g. dollars, time, re-work, exposure, etc.)
  – Focus efforts on resolving the cause with the largest impact
Questions