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Root Cause Analysis

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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
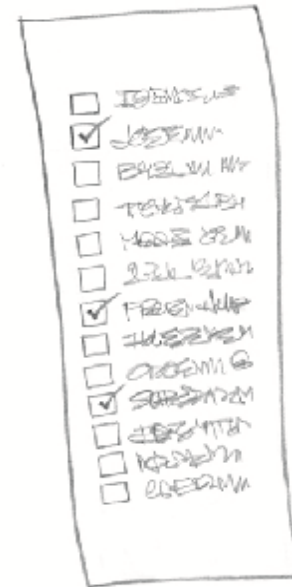
Process understanding

- 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)

Cause identification *(continued)*

- 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 <u>symptoms</u> to <u>system cause</u>

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?
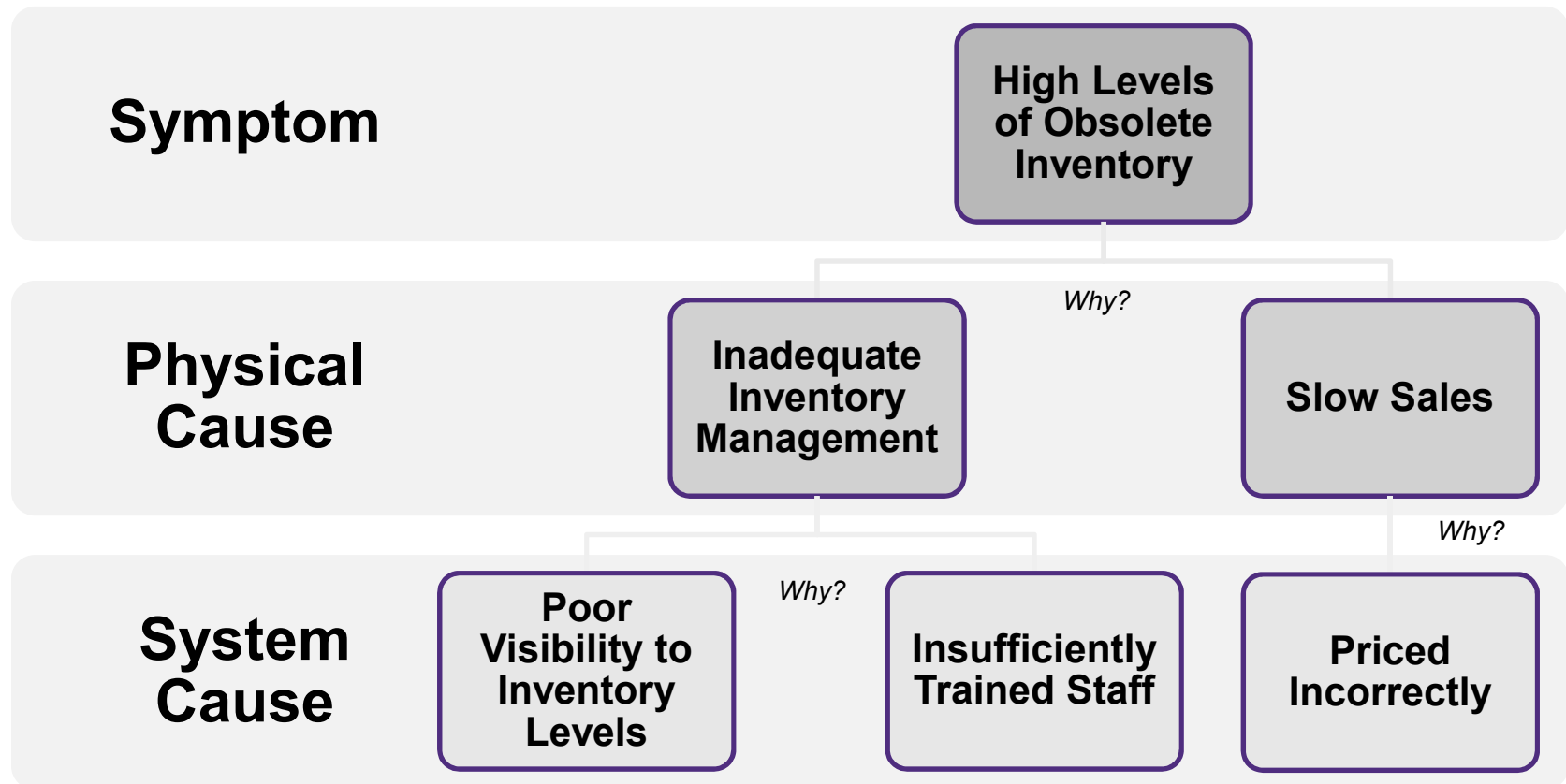 - Is it supported by the data?
  - Is it probable?

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
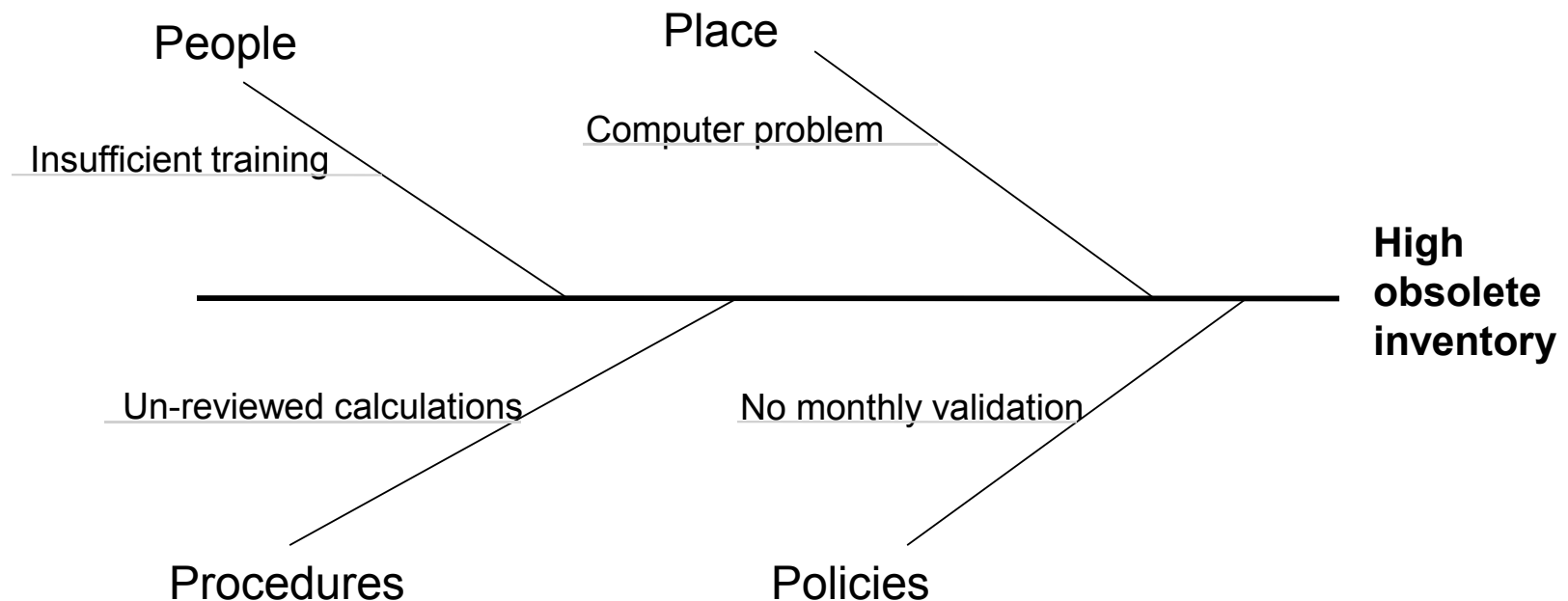
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Cause-and-effect analysis *(continued)*

Symptom — High Levels of Obsolete Inventory

Physical Cause — Inadequate Inventory Management | Slow Sales — *Why?*

System Cause — Poor Visibility to Inventory Levels | Insufficiently Trained Staff | Priced Incorrectly — *Why?*

Cause-and-effect analysis *(continued)*

- Drill down from symptoms to system cause *(cont'd)*
  - The "4 Ps" process

People   Place

Insufficient training   Computer problem

High obsolete inventory

Un-reviewed calculations   No monthly validation

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
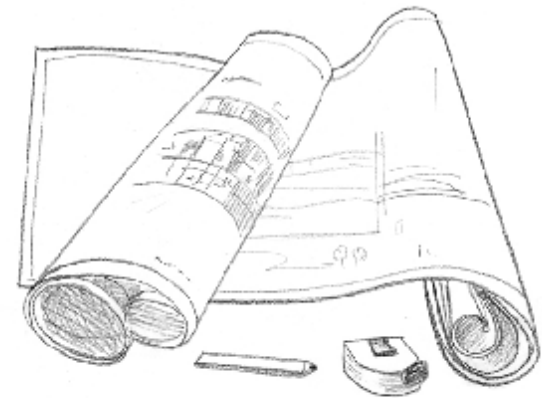
Data analysis

- 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