

Problem solving and verified change

16 workplace cases and method lessons / 17 pages. Select a chapter or use PDF bookmarks. Online links open the related lesson.

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Problem solving and verified change

Protect people and customers when exposure requires an immediate response, while keeping containment distinct from permanent correction. Define the expected and actual condition before selecting a method. Different problems need different depth: an urgent restoration, a recurring gap, a target-condition experiment and open-ended innovation are not the same. Collect evidence using stable definitions and meaningful strata. Fishbone branches and why-chains organize hypotheses; they do not prove causes. Test alternatives, predict the effect of a countermeasure and verify relevant outcomes and unintended effects. Effective changes need ownership, learning and later review. An ineffective test should return the team to the evidence.

What this system is for

Understand how the methods relate before selecting a detailed lesson.

Use the chapter to

1. Connect protection, problem definition, evidence, causal testing and sustained change.
2. Connect useful data collection with hypotheses, alternatives and cause verification.
3. Distinguish containment, correction, corrective action and verified closure.

A route through the chapter

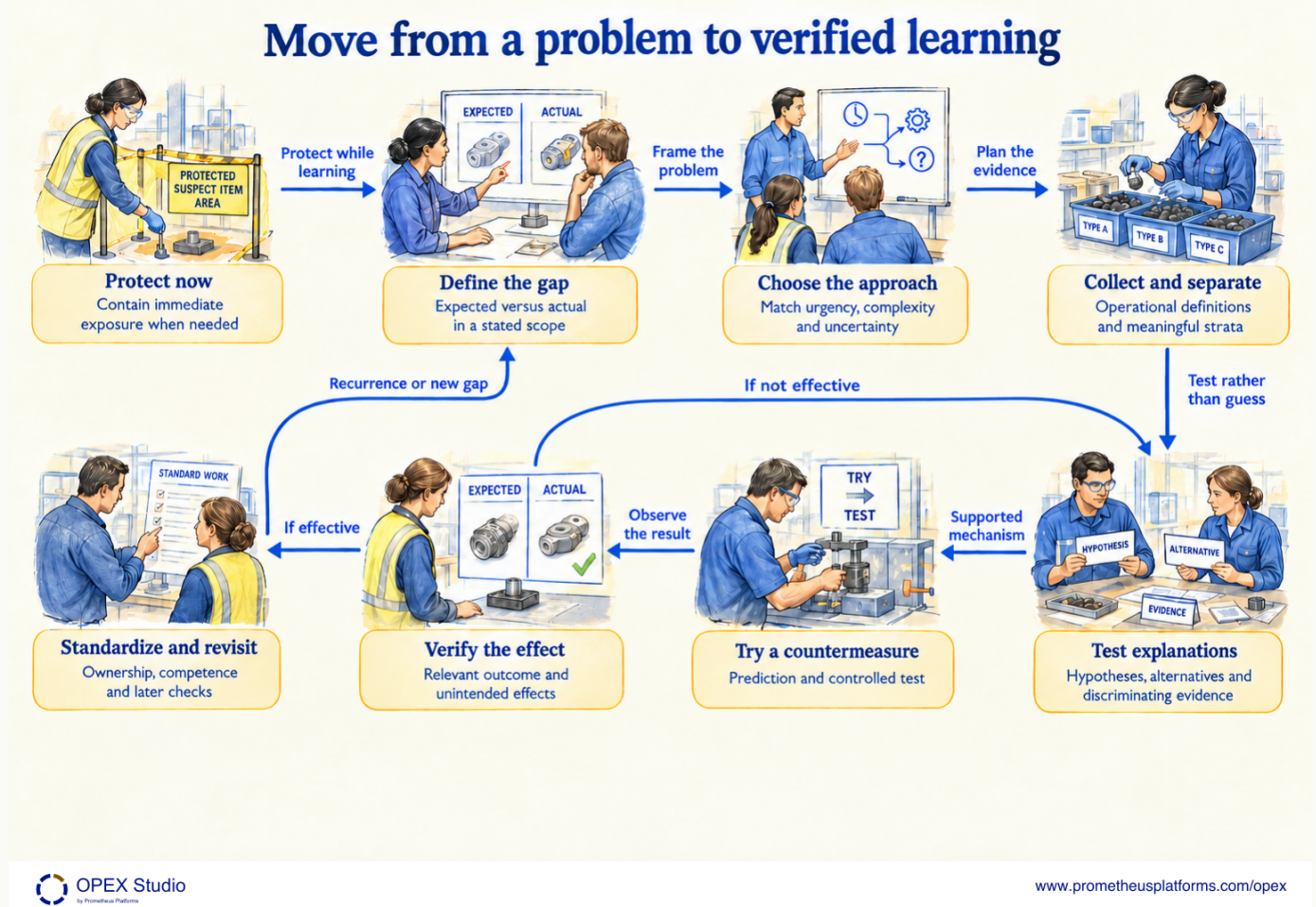
Begin with the three illustrated system maps. Read their connections and decisions, then use the original workplace teaching cards. The supporting lesson index links to the native method packs for worked inputs, practice, reasoned answers and facilitation.

16 mapped cases and method lessons. Illustrations teach the concepts; they are not records of achieved workplace results.

[Open this chapter online](#)

Move from a problem to verified learning

Connect protection, problem definition, evidence, causal testing and sustained change.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Protect people and customers when exposure requires an immediate response, while keeping containment distinct from permanent correction. Define the expected and actual condition before selecting a method. Different problems need different depth: an urgent restoration, a recurring gap, a target-condition experiment and open-ended innovation are not the same. Collect evidence using stable definitions and meaningful strata. Fishbone branches and why-chains organize hypotheses; they do not prove causes. Test alternatives, predict the effect of a countermeasure and verify relevant outcomes and unintended effects. Effective changes need ownership, learning and later review. An ineffective test should return the team to the evidence.

Check the boundaries

A hypothesis map is not proof of root cause.

Containment may continue while causal investigation and validation proceed.

The method choice depends on the problem; the map does not require every problem to use every tool.

Read and apply the system / continued

Try it / discuss

A team's fishbone contains many plausible causes. What makes it ready to choose a permanent action?

Check your reasoning

It is not ready from the diagram alone. Choose discriminating observations or tests, examine alternatives and connect any proposed action to supported causal evidence.

Method sources

LEI: Problem Solving Resource Guide

LEI LeanTech: Prompting for Problem Solving

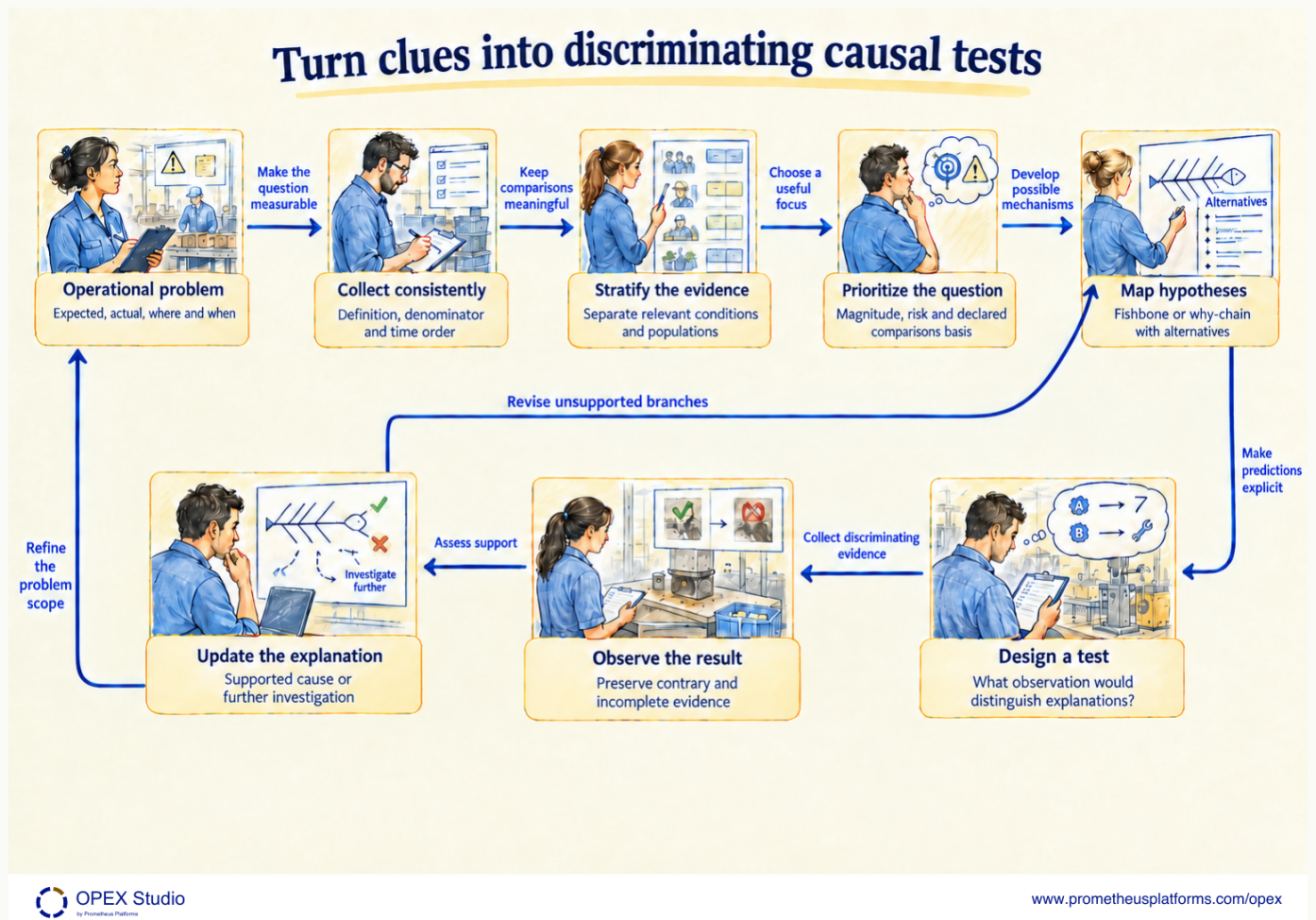
LEI: 5 Whys

ASQ: Fishbone diagram

PRI: Root cause corrective action

Turn clues into discriminating causal tests

Connect useful data collection with hypotheses, alternatives and cause verification.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Useful evidence begins with a clear problem and stable operational definitions. Preserve denominators and time order, and stratify where populations or conditions differ. A Pareto comparison can prioritize a question on a declared basis; it does not prove a cause. Fishbone diagrams and why-chains help organize possible mechanisms and alternative explanations. A scatter relationship is another clue, not proof of causation. Choose an observation or test that would distinguish the alternatives. Retain contrary and incomplete evidence instead of forcing a neat story. Update the explanation only to the strength supported, and refine the problem scope when the evidence requires it.

Check the boundaries

Raw counts can mislead when exposure denominators differ.

A ranked category, correlation or fishbone branch does not establish causation.

A why-chain may branch; stop where evidence stops instead of inventing a fifth answer.

Try it / discuss

One shift has more defects but produces ten times as many units. What should be checked before blaming that shift?

Read and apply the system / continued

Check your reasoning

Compare compatible defect definitions, exposure denominators, product mix, timing and measurement conditions. A higher count may coexist with a lower rate. Use the stratified evidence to choose a causal test, not a blame statement.

Method sources

ASQ: Check sheet

ASQ: Pareto chart

ASQ: Stratification

ASQ: Fishbone diagram

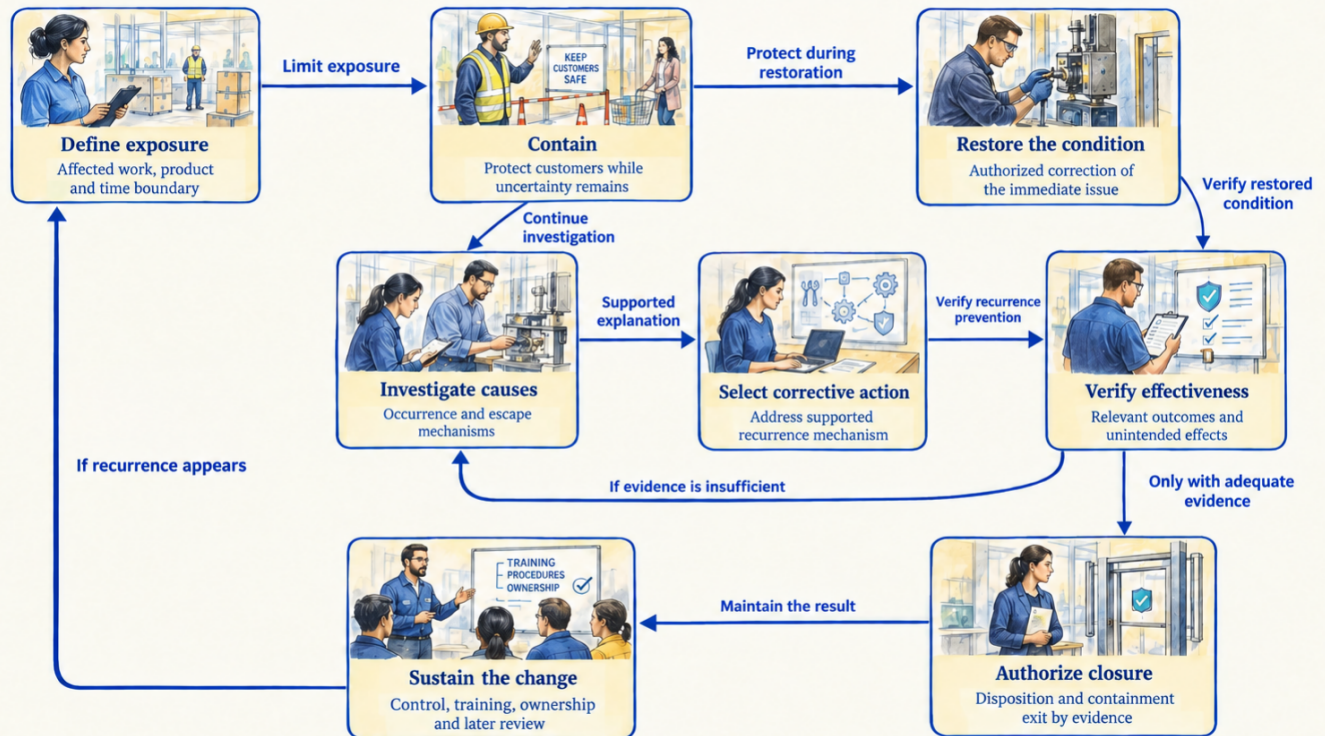
LEI: 5 Whys

ASQ: Scatter diagram

Keep protection active until change is verified

Distinguish containment, correction, corrective action and verified closure.

Keep protection active until change is verified



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Containment protects against current exposure; correction restores the immediate condition; corrective action addresses a supported cause of recurrence. These decisions can overlap in time but should not be confused. Investigate both occurrence and escape where relevant. A restored machine or a relabelled record does not alone establish that affected output is acceptable or that recurrence is prevented. Verify the appropriate condition and outcomes, keep containment active while evidence is inadequate, and use the designated authority for disposition and exit. Carry effective learning into controls, training and later review. This relationship map complements 8D and NCR routines without claiming that their formal gates are identical.

Check the boundaries

Containment does not prove a permanent cause has been removed.

Correction must restore the actual required condition, not merely change a label.

Containment exit and closure require defined authority and effectiveness evidence.

Read and apply the system / continued

Try it / discuss

An overdue gauge has received a new label, but no authorized calibration or verification record exists. Can the NCR be closed?

Check your reasoning

No. Remove the overdue gauge from service as required, complete authorized calibration or verification and restore correct status records. Assess suspect measurement/output exposure and verify the scheduling-system corrective action before closure.

Method sources

PRI: Root cause corrective action

Toyota Virtual Plant Tour: Production System

LEI: Andon

LEI: 5 Whys

AIAG/Plexus: APQP and control plan overview

Contain the leak; verify the cause

Stop the recurring leak



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01	02	03	04	05
D0-2: prepare, team, define	D3: contain exposure	D4: occurrence + escape	D5-6: choose, test, validate	D7-8: prevent recurrence, recognize

D0 prepares the work where used. D1 forms the team; D2 defines the problem; D3 contains exposure; D4 verifies occurrence and escape causes; D5 selects and tests permanent action; D6 implements and validates; D7 prevents recurrence; D8 recognizes the team.

The existing sample has 144 first-test failures in 2400 valves. Begin by defining the affected product, defect and observation period. Temporary containment limits exposure while the team investigates both why the leak occurred and why the process failed to prevent or detect it earlier. Keep possible causes separate from confirmed causes. The proposed 1.5% goal is not a result. Carry a verified corrective action into normal work and review recurrence before retiring containment.

TRY IT / DISCUSS

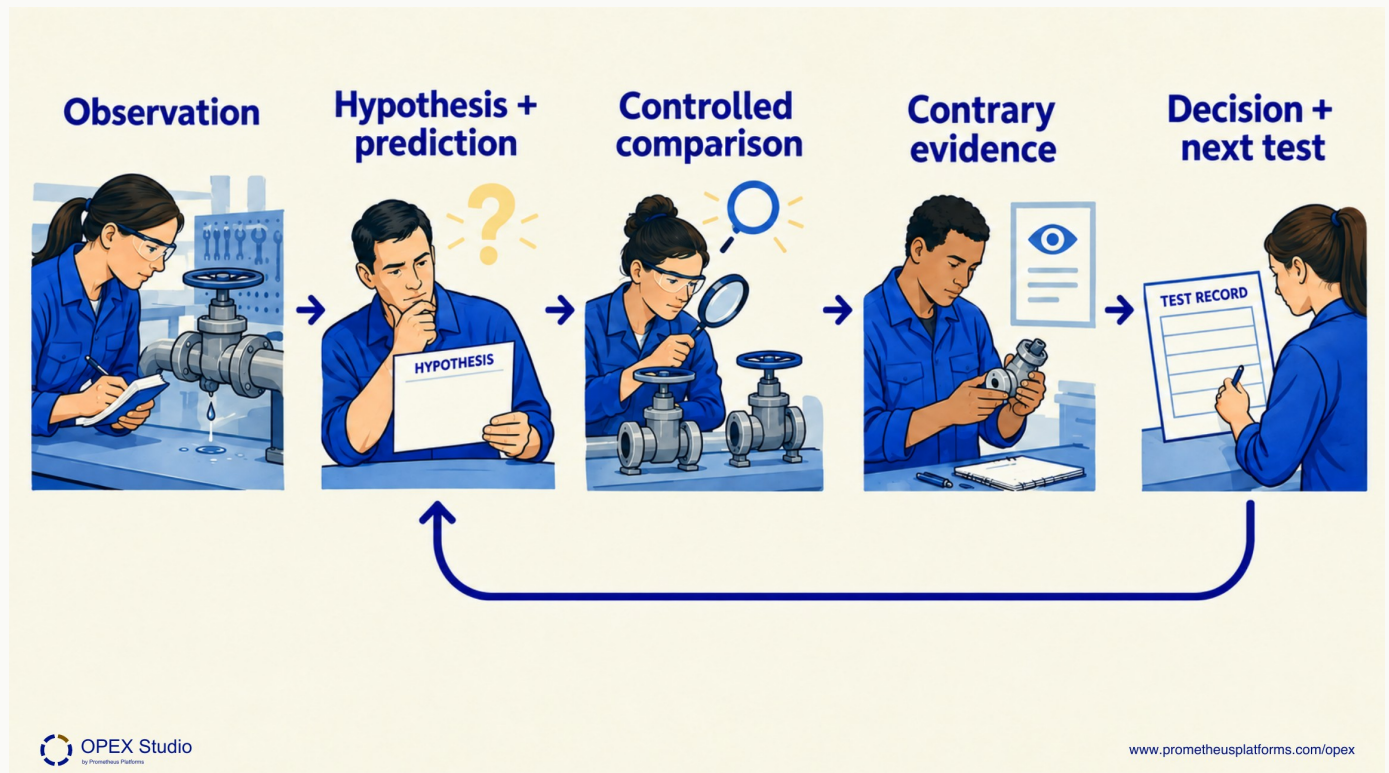
A fixture association is visible. Is that enough to select permanent corrective action?

Check your reasoning: No. Use it to select a discriminating test; preserve containment while checking the cause and the detection gap.

METHOD SOURCES / Q05: Eight Disciplines 8D | Q10: Fishbone Diagram | Q11: Handbook of Corrective and Preventive Action, Sample

Turn a plausible explanation into a cause test

Stop the recurring leak



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Failure mode at teardown / authored sample

FIXTURE ASSOCIATION ONLY

Rolled seal		82	A: $110/1200 = 9.17\%$
Low torque indication		34	B: $34/1200 = 2.83\%$
Other / undetermined		28	Cause-test result: not collected

Write the predicted result before running a controlled comparison. Specify what stays comparable, how failures will be measured, and what result would challenge the explanation. The retained pilot gate of no more than 4 first-test failures in 300 and later validation gate of no more than 36 in 2400 are separate planned checks, not proof already obtained. A small pass alone does not establish long-term performance.

TRY IT / DISCUSS

What is the difference between relabelling or repairing affected units and changing the cause?

Check your reasoning: The first corrects those units; corrective action changes a verified cause and requires an effectiveness check.

METHOD SOURCES / Q05: Eight Disciplines 8D | Q10: Fishbone Diagram | Q11: Handbook of Corrective and Preventive Action, Sample

Tell one connected problem-solving story

Make referrals ready



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01 Purpose + current condition	02 Target + gap	03 Analysis + unknowns	04 Countermeasure + trial	05 Follow-up + learning
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An A3 explains how the evidence leads to a proposed countermeasure. The current example has 62 of 100 referral packets ready first time, with a 90% goal. Its 4.8-business-day median and proposed 2-day goal are a second measure. Link missing-information observations to a testable change at intake; do not jump from a low score to a preferred solution. The owner uses the story to invite challenge and align the people who perform the work.

TRY IT / DISCUSS

Which A3 link is missing if the team proposes a new intake form without observing rework?

Check your reasoning: The evidence connecting the current condition and its causes to the countermeasure.

METHOD SOURCES / Q04: A3 Report | Q07: Gemba | Q03: Model for Improvement

Observe readiness, then test one channel

Make referrals ready



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Rework reasons in 38 packets / authored sample

Missing document		21
Duplicate clarification		11
Routing mismatch		6

Agree what a ready packet contains and where its route begins and ends. Observe the handoffs without collecting personal patient data. Test the proposed readiness check in one channel, then compare readiness and elapsed business time under comparable conditions. Track reopened cases against the existing 8% ceiling so fewer incomplete packets do not conceal more downstream rework. This teaches administration, not clinical decisions.

TRY IT / DISCUSS

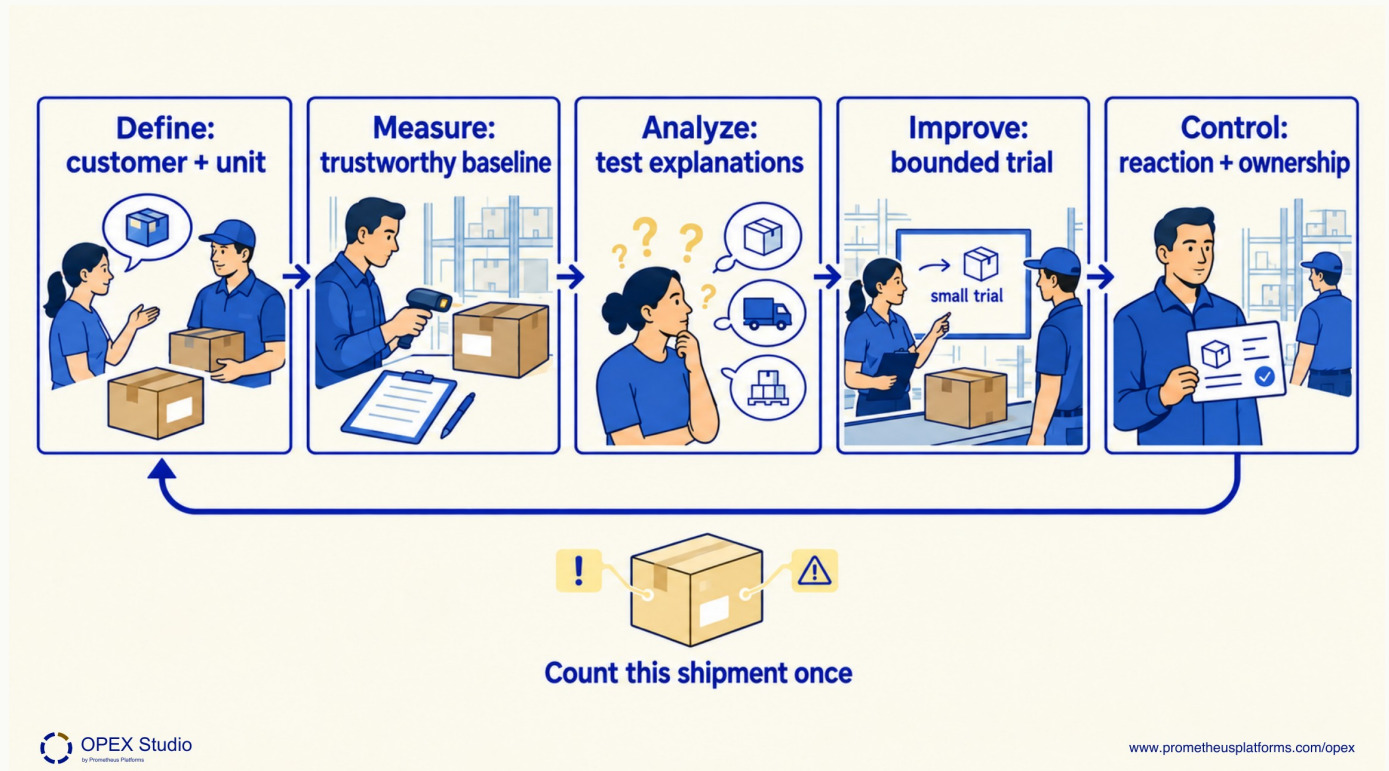
Why keep the reopened-case measure beside the readiness goal?

Check your reasoning: A local improvement can transfer work or errors downstream; the balancing measure helps expose that.

METHOD SOURCES / Q04: A3 Report | Q07: Gemba | Q03: Model for Improvement

Make each DMAIC phase produce evidence

Send the right shipment



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Primary error classification / authored sample

Wrong SKU	66
Short quantity	36
Wrong label	18

Define a shipment error consistently before counting. The retained baseline is 120 error-containing shipments from 3000 audited shipments, or 4%. Its 66 wrong-SKU, 36 short-quantity and 18 wrong-label counts are primary categories. Validate the recording method, use patterns to guide causal tests, trial a countermeasure, and specify how the process will be monitored afterwards. DMAIC is useful for an existing process whose performance needs improvement.

TRY IT / DISCUSS

If one shipment has two errors, can it be counted twice in the 4% shipment measure?

Check your reasoning: No. Count it once as an error-containing shipment; a separate defects measure would need its own definition.

METHOD SOURCES / Q06: DMAIC | Q10: Fishbone Diagram | S03: ASQ: Control Chart

Compare fairly and respond when performance slips

Send the right shipment



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Adjacent look-alike SKUs

90/1000 = 9%

Other locations

30/2000 = 1.5%

Association only; compare the order mix.

PILOT RUN CHART / NO RESULTS YET

Error rate (%)

Comparable observations in time order

Use the location difference to choose an investigation, not to declare cause. Preserve denominators and compare similar order mixes. Check the proposed error goal of 1% alongside throughput of at least 220 lines per labour-hour. A reaction plan names who checks a signal and what containment or investigation follows. Add a statistical control chart only after selecting a suitable chart and defensible data; a target line is not a control limit.

TRY IT / DISCUSS

Why is a Pareto bar not a root-cause conclusion?

Check your reasoning: It ranks recorded categories; it does not establish the mechanism causing them.

METHOD SOURCES / Q06: DMAIC | Q10: Fishbone Diagram | S03: ASQ: Control Chart

Test one shelf before changing the whole cafe

Make the morning easier



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01

Plan: define task + prediction

02

Do: try one shelf

03

Check: compare task + errors

04

Act: keep, adapt or abandon

Use the existing 6S case as a small Plan-Do-Check-Act experiment. The 95-second starting point and 45-second goal are authored summary values; no underlying historical sample is supplied. Define the same retrieval start and finish for each observation, then try a small change. Compare time with wrong selections and restocking effort. Decide what to keep, change or stop, and explain why. Do not fill future results from the after picture.

TRY IT / DISCUSS

The shelf looks better but no one timed the task. Which part of the cycle is still missing?

Check your reasoning: Checking the prediction against comparable observations and balancing measures.

METHOD SOURCES / Q01: Plan-Do-Check-Act Cycle | Q03: Model for Improvement | F10: Standardized Work | F16: Lean & Environment Toolkit, Chapter 5: 6S | S02: CDC: Quality Training Standards

Teach the reset and check it on another shift

Make the morning easier



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Task / same start-finish	Time (s)	Wrong selection	Restock issue
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Describe the reset in plain steps with the person who does it. Ask a colleague to demonstrate it and explain what to do when an item is missing or in the wrong home. Use the planned ten-task comparison as a learning exercise, not a promise of statistical sufficiency. Check another shift before treating the routine as dependable. Record actual observations and keep the 45-second goal visibly separate.

TRY IT / DISCUSS

What should be done if quicker retrieval creates more wrong selections?

Check your reasoning: Adapt the design and test again; speed alone is not the outcome.

METHOD SOURCES / Q01: Plan-Do-Check-Act Cycle | Q03: Model for Improvement | F10: Standardized Work | F16: Lean & Environment Toolkit, Chapter 5: 6S | S02: CDC: Quality Training Standards

Supporting lessons and worked methods

Choose a lesson to inspect a worked example, practise a changed case, check the reasoning or plan a facilitated session.

5 Whys with evidence and alternative branches

Choose a problem-solving approach

From broad complaint to a testable problem

Conflict cloud: challenge assumptions

Choose the quality tool for the question

Record defects without changing the denominator

Rank problems on one declared basis

See the distribution without losing the sequence

Test a relationship without declaring a cause

Unmix the data before blaming a shift

Turn fishbone branches into testable hypotheses

Close an NCR with verified action against recurrence

Stop the recurring leak

Make referrals ready

Send the right shipment

Make the morning easier

Open the complete learning library