

Illustrated systems atlas

81 workplace cases and method lessons / 69 pages. Select a chapter or use PDF bookmarks. Online links open the related lesson.

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Lean flow and system performance

Begin with required good output and the route that delivers it. A fast local step can still create waiting or excess WIP elsewhere. Relate demand to available working time, then choose how adjacent processes connect. Reliable methods and quality support this connection. In parallel, test what limits the system goal; a large queue alone does not prove the constraint. Align release and supporting work to that evidence. Check delivery, quality, WIP and workload together before expanding a change. Lean flow questions and TOC constraint questions can support the same investigation while retaining their distinct controls.

What this system is for

Understand how the methods relate before selecting a detailed lesson.

Use the chapter to

1. Explain how customer need, reliable work and release decisions form one delivery system.
2. Distinguish work movement from the signals that authorize withdrawal and replenishment.
3. Connect constraint evidence, useful capacity, protected commitments and release discipline.

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.

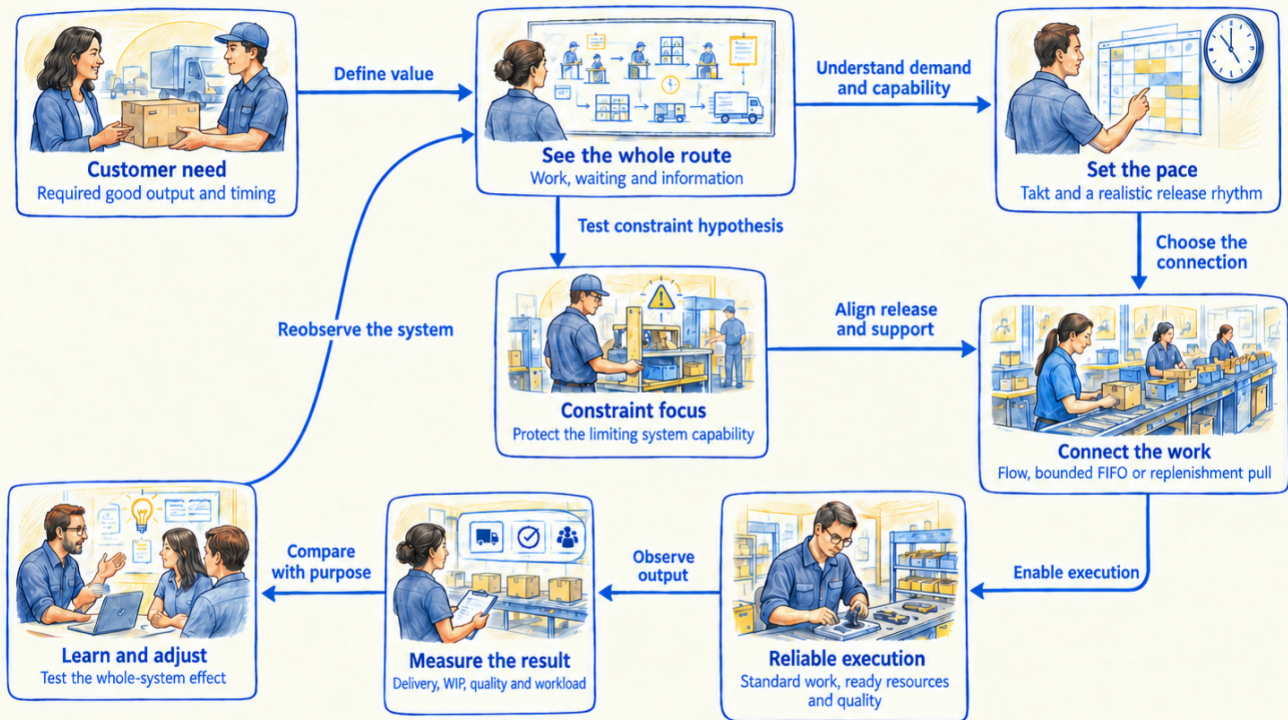
25 mapped cases and method lessons. Illustrations teach the concepts; they are not records of achieved workplace results.

[Open this chapter online](#)

Connect demand, flow and the system constraint

Explain how customer need, reliable work and release decisions form one delivery system.

Connect demand, flow and the system constraint



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Begin with required good output and the route that delivers it. A fast local step can still create waiting or excess WIP elsewhere. Relate demand to available working time, then choose how adjacent processes connect. Reliable methods and quality support this connection. In parallel, test what limits the system goal; a large queue alone does not prove the constraint. Align release and supporting work to that evidence. Check delivery, quality, WIP and workload together before expanding a change. Lean flow questions and TOC constraint questions can support the same investigation while retaining their distinct controls.

Check the boundaries

Takt is a demand reference; it is not a measured cycle time.

Flow, FIFO and supermarket pull require different operating conditions.

The constraint hypothesis requires route and operating-state evidence, not queue size alone.

Read and apply the system / continued

Try it / discuss

A team proposes speeding an upstream step while downstream work waits for missing information. Where does the map send the team first?

Check your reasoning

Observe the complete route and the cause of downstream waiting. Test the constraint hypothesis and information readiness before assuming that upstream speed will improve delivery.

Method sources

Toyota Production System

LEI: Supplement to Learning to See

LEI: Supermarket

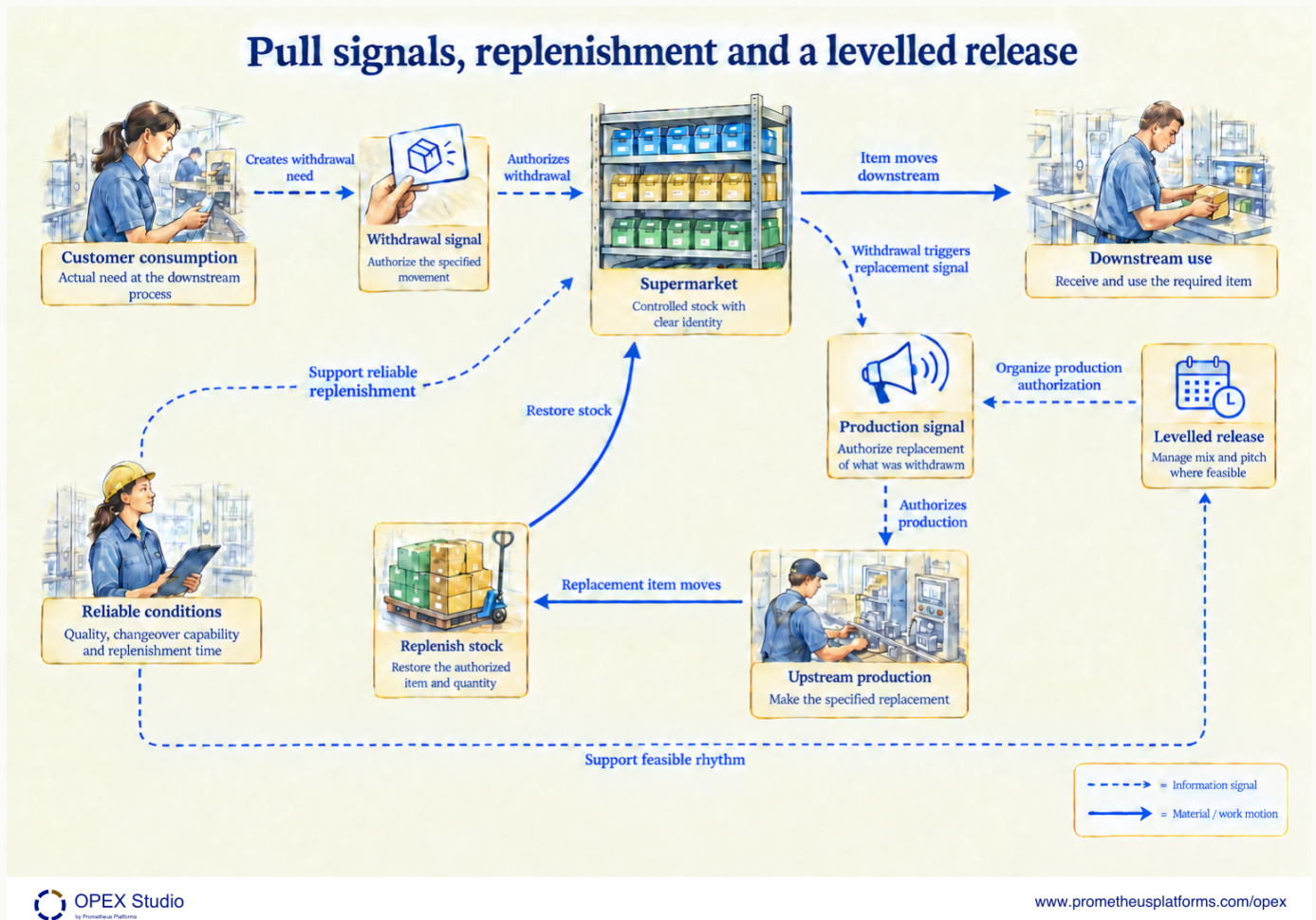
LEI: Takt Time

TOCICO: Introduction to TOC

TOCICO: Process of Ongoing Improvement

Pull signals, replenishment and a levelled release

Distinguish work movement from the signals that authorize withdrawal and replenishment.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Two kanban signals authorize different actions. A withdrawal signal permits movement of the specified item; a production signal permits its replacement. Keep the physical item route visually separate from the information route. Replenishment stock and signal quantities depend on actual demand, replenishment time, variation and policy; this overview prescribes no count. A levelled production release can organize mix and pitch where the process has the necessary capability. It does not mean every arriving order is produced immediately or that changeovers disappear. Quality at source, reliable replenishment and safe changeover improvement make smaller controlled releases more practical. Investigate missing or late signals rather than silently producing extra stock.

Check the boundaries

Withdrawal authorizes movement; production kanban authorizes replacement production.

Pitch combines takt with a chosen pack quantity; a levelled mix requires feasibility checks.

Stock and signal quantities need local evidence; the drawing prescribes no universal number.

Read and apply the system / continued

Try it / discuss

A downstream team needs material and sends a withdrawal signal. Does that signal alone authorize an upstream operator to produce any convenient batch?

Check your reasoning

No. The withdrawal signal authorizes the specified movement. Upstream production follows the appropriate production authorization, identity and quantity. Investigate a missing signal instead of substituting an unapproved batch.

Method sources

LEI: Kanban

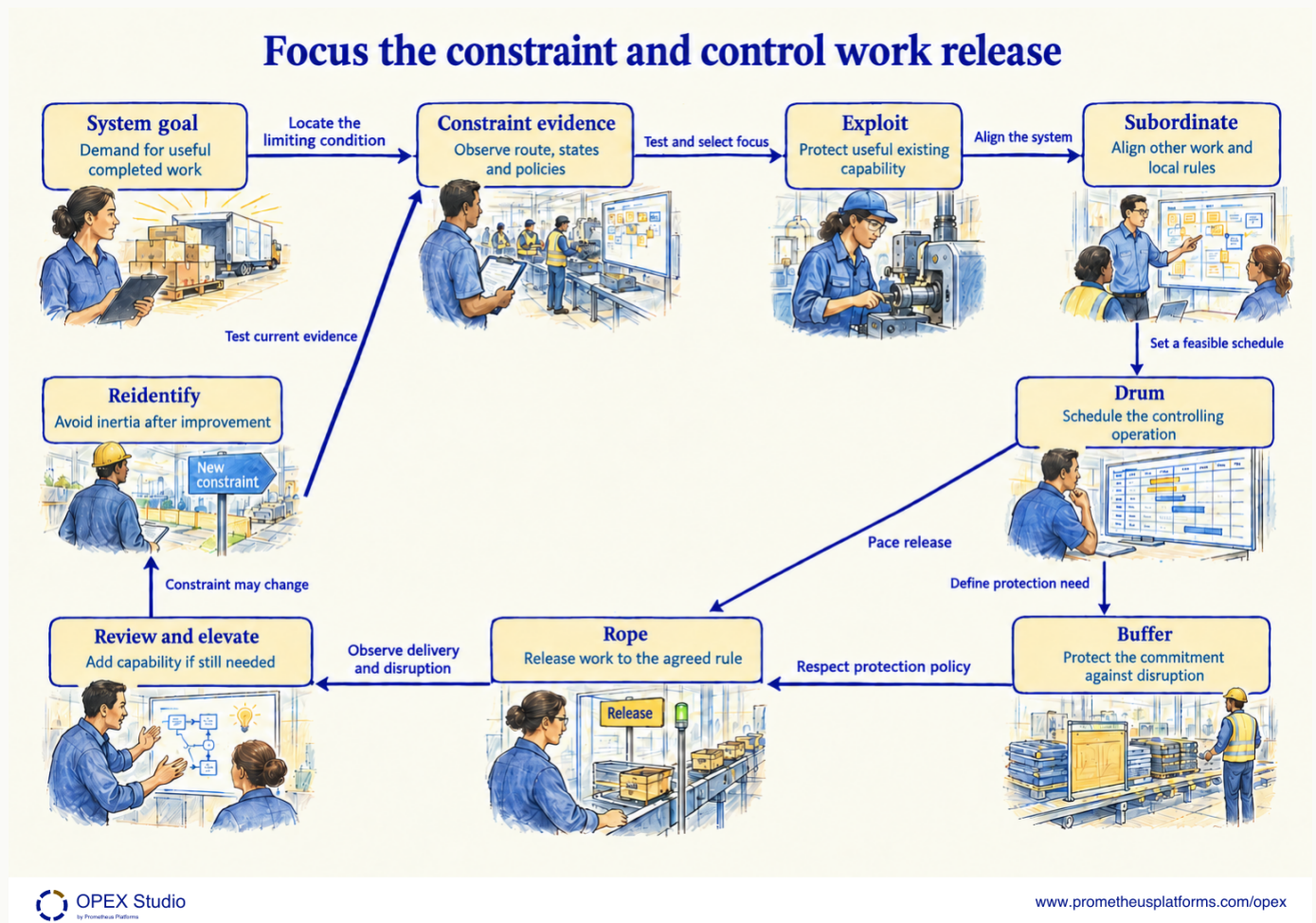
LEI: Heijunka Box

LEI: Supermarket

LEI: Single Minute Exchange of Die

Focus the constraint and control work release

Connect constraint evidence, useful capacity, protected commitments and release discipline.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Begin with the system goal and test what limits it. Protect useful existing capacity before assuming that investment is the first answer. Align upstream release, supporting work and local rules with that decision. In a drum-buffer-rope design, the drum provides the controlling schedule, the buffer protects a commitment and the rope controls release. Buffers do not justify arbitrary excess WIP or unsafe acceleration. Review actual disruption and delivery evidence to improve reliability. If further capacity remains necessary, evaluate elevation with the whole-system effect in view. Reidentify the current constraint after change; the previously slowest operation may no longer deserve the same priority.

Check the boundaries

DBR elements serve distinct functions: schedule, protection and release.

Buffer response requires a declared local policy; no universal color thresholds are supplied.

Exploitation and subordination may change the constraint before investment is needed.

Read and apply the system / continued

Try it / discuss

An upstream machine is idle while the controlling operation is fully supplied. A supervisor wants to release more work to improve local utilization. What should be checked?

Check your reasoning

Check the drum schedule, authorized release rule, buffer condition and actual system demand. Extra upstream work may add WIP without improving delivery. Local utilization alone does not establish a valid release.

Method sources

TOCICO: Five Focusing Steps, 2013

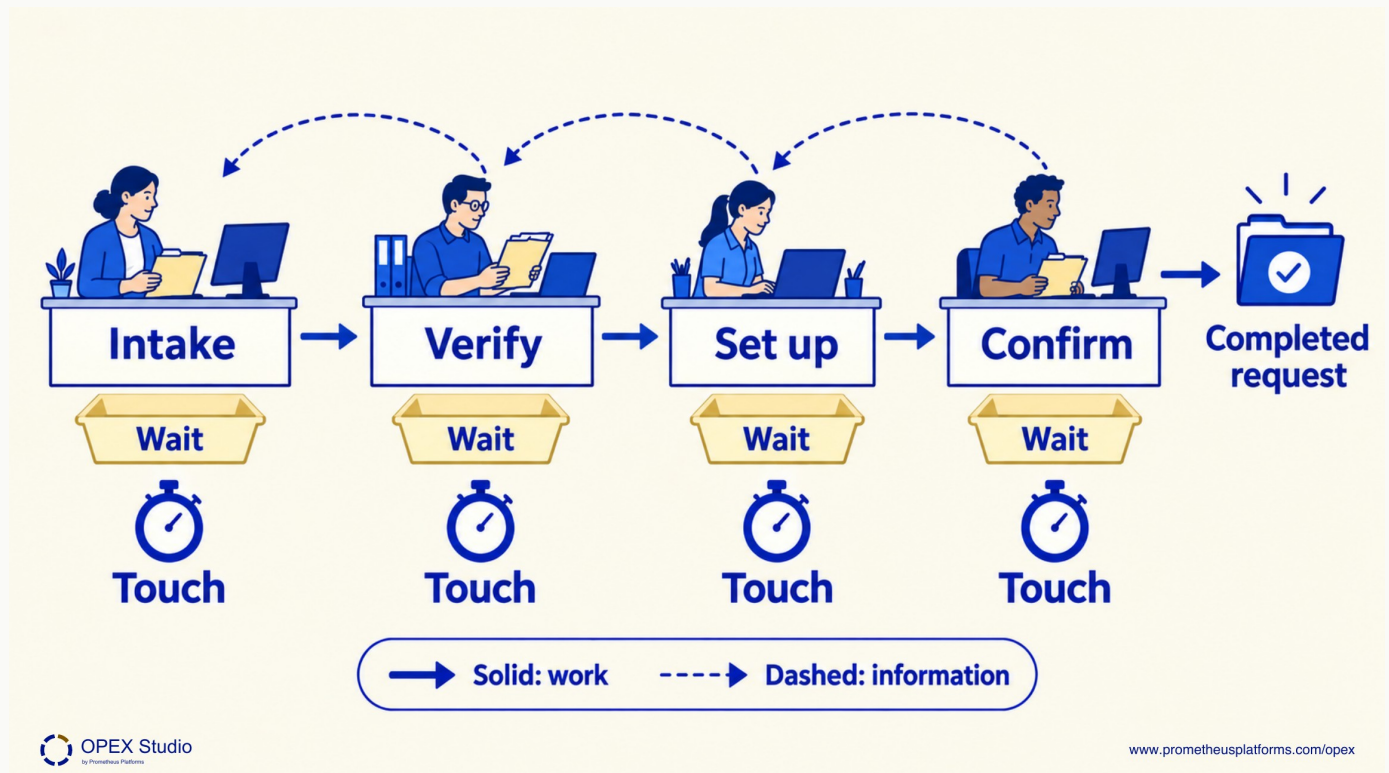
TOCICO: Introduction to TOC

Goldratt Japan: Drum Buffer Rope

TOCICO: Buffer Management

Show the waiting as well as the work

Shorten the handoffs



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Intake	Verify	Set up	Confirm
Wait 6.4 h	Wait 13.6 h	Wait 11.2 h	Wait 8.8 h
Touch 8 min	Touch 12 min	Touch 10 min	Touch 6 min

AUTHORED MAP ESTIMATE: 40 h waiting + 36 min touch = 40.6 business h

Processing share is $0.6 / 40.6 = 1.48\%$ (rounded); processing does not automatically mean customer value.

Follow one request family from arrival to completion. The authored current-state estimate is 40 hours waiting plus 36 minutes processing: 40.6 business hours in all. Show information returns as well as the forward route. Processing is not automatically value-adding; ask what serves the customer, what is required and what can change. An end-to-end map helps prevent a faster local step from simply moving the queue elsewhere.

TRY IT / DISCUSS

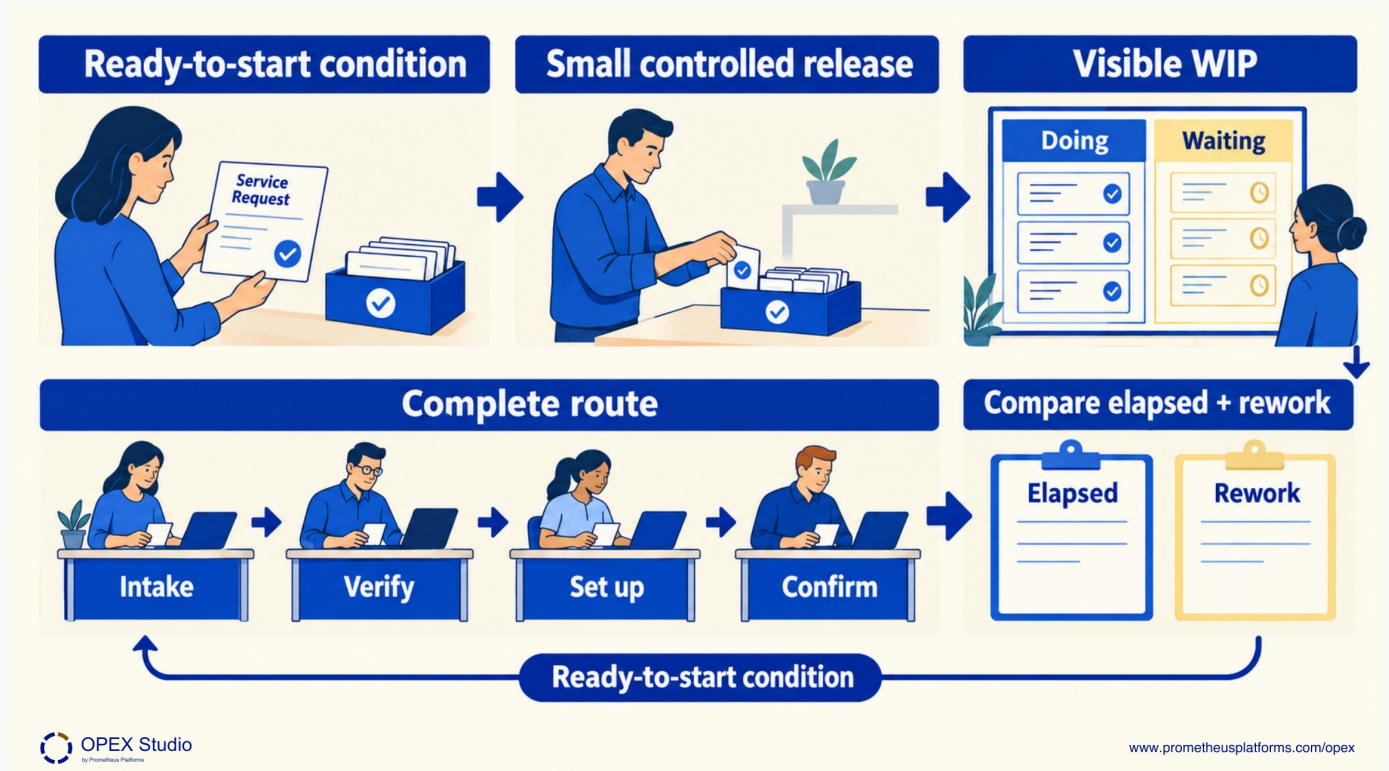
Does 36 minutes of touch time mean 36 minutes of customer value?

Check your reasoning: No. Touch time describes work duration; value requires a separate assessment of the activity.

METHOD SOURCES / F07: Value Stream Mapping | F08: Practicing Lean Fundamentals in an Office Environment | S01: LEI: Lean Thinking and Practice

Make a future-state hypothesis testable

Shorten the handoffs



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Authored current		40.60 h
Proposed / untested		15.58 h

Actual after-trial lead time: not measured. Same route, clock and case definition required.

Proposed queue targets: 2, 4, 5 and 4 hours, totaling 15 hours. Proposed touch times: 8, 11, 10 and 6 minutes, totaling 35 minutes.

The retained future-state design has 15 hours of queues plus 35 minutes of processing, about 15.58 hours. It is a hypothesis below the 16-hour goal, not observed performance. Record arrival, work start, completion and clarification returns in the pilot. A visible work-in-process rule should serve reliable flow; check that waiting has not moved outside the map. Review completeness and rework with elapsed time.

TRY IT / DISCUSS

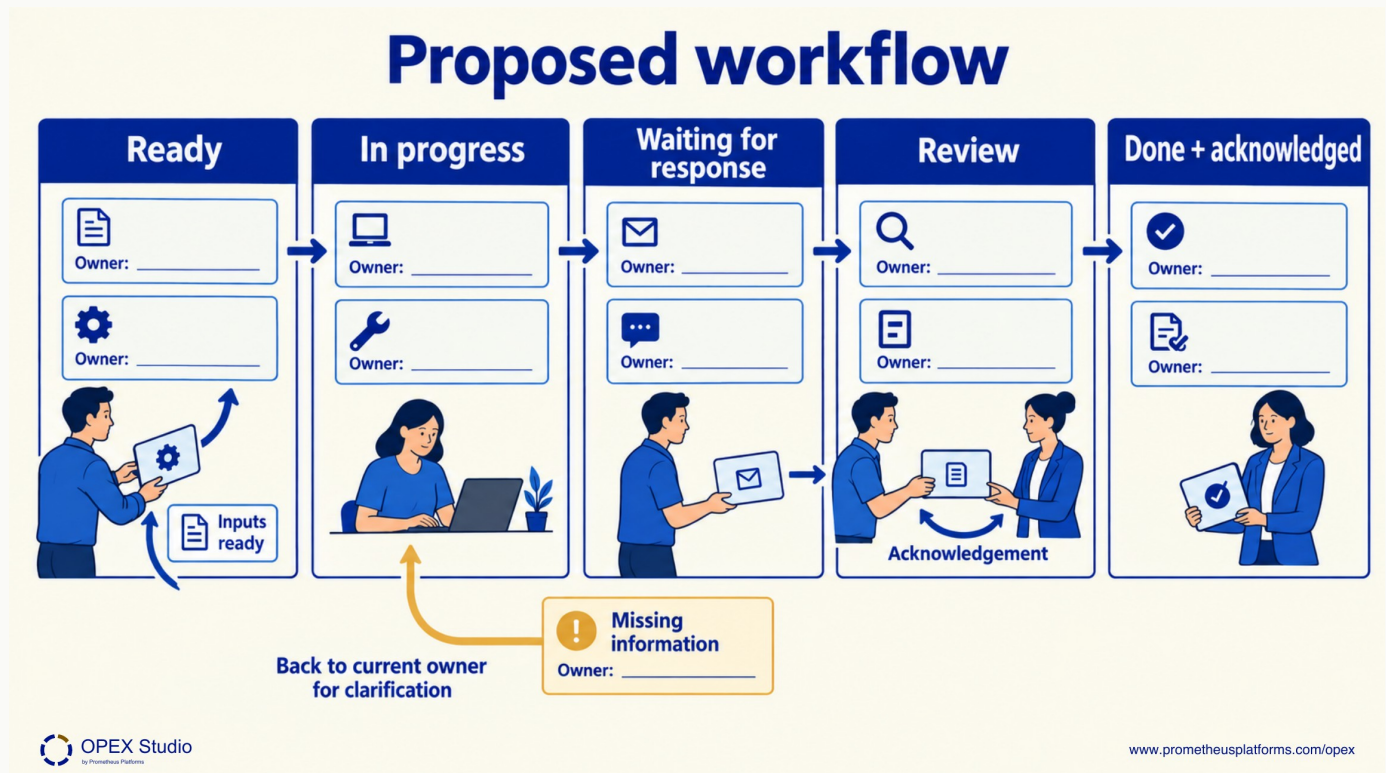
What must be recorded before claiming the future-state map worked?

Check your reasoning: Comparable actual end-to-end observations and balancing evidence, not only the proposed shorter route.

METHOD SOURCES / F07: Value Stream Mapping | F08: Practicing Lean Fundamentals in an Office Environment | S01: LEI: Lean Thinking and Practice

Give each request one visible next owner

Give the request a clear next step



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01 Ready	02 In progress	03 Waiting for response	04 Review	05 Done + acknowledged
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Ready, In progress, Waiting, Review and Done are proposed board states, not the seven historical handoffs. Define which ownership transfers count.

The current case describes seven handoffs and a proposed three; it does not contain a measured seven-step route. Teach readers to trace the actual request and define which transfers count. A board makes readiness, ownership, blocked work and completion visible. Pull new work when agreed capacity is available, preserve necessary approvals and acknowledge receipt at every required transfer. A tidy desk is not evidence that the request route improved.

TRY IT / DISCUSS

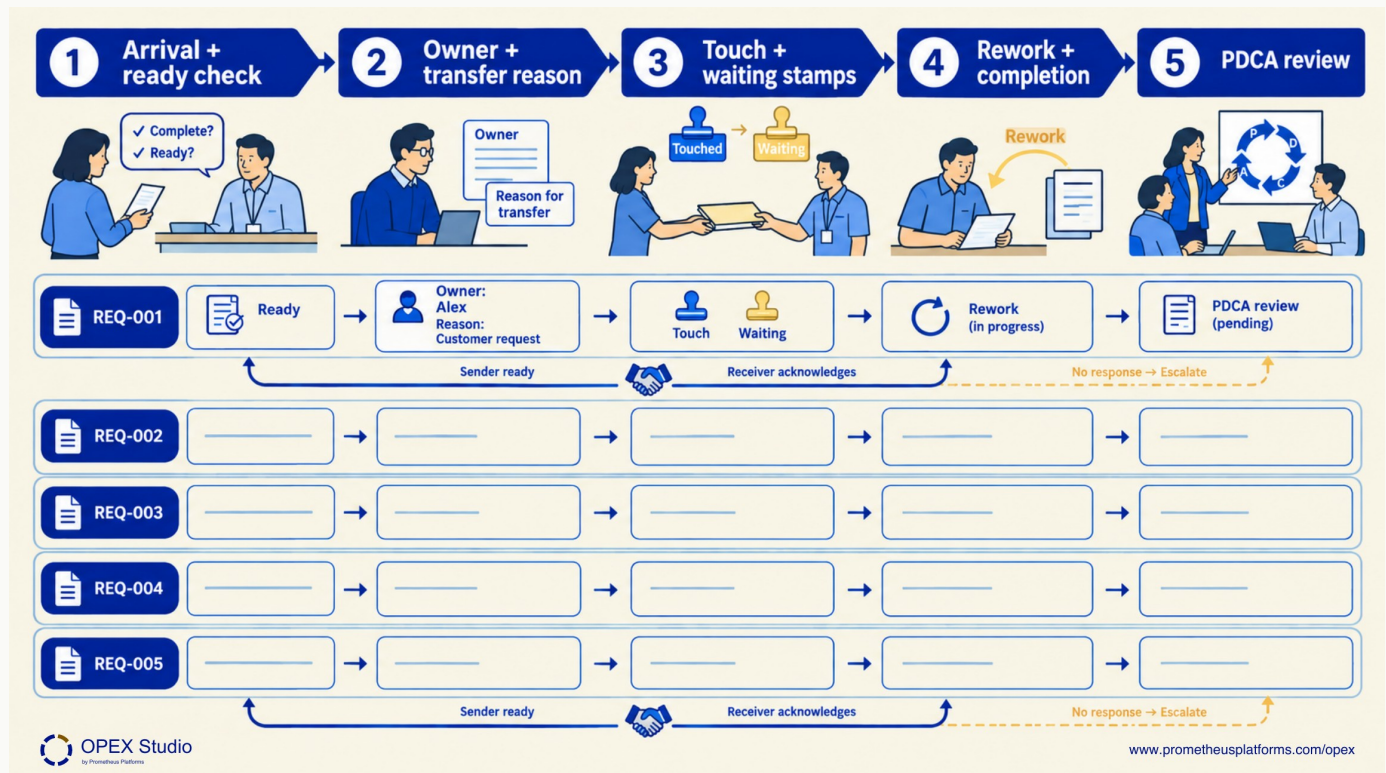
Does putting every incoming request into In progress create flow?

Check your reasoning: No. It can hide overload; make capacity, ageing and blocked work visible and use an explicit pull rule.

METHOD SOURCES / F08: Practicing Lean Fundamentals in an Office Environment | Q07: Gemba | Q01: Plan-Do-Check-Act Cycle

Trace five requests from arrival to acceptance

Give the request a clear next step



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Request	Owner / reason	Touch / waiting	Rework / accepted
1			
2			
3			
4			
5			

Use the planned five-request trace to discover the real route. Record who owns each next step, why the transfer occurs, when the request waits and what causes rework. Compare the whole request experience before removing a handoff. The aim is clear ownership and useful work, not bypassing controls. Review the trace with the people on both sides of the transfer and choose one small test.

TRY IT / DISCUSS

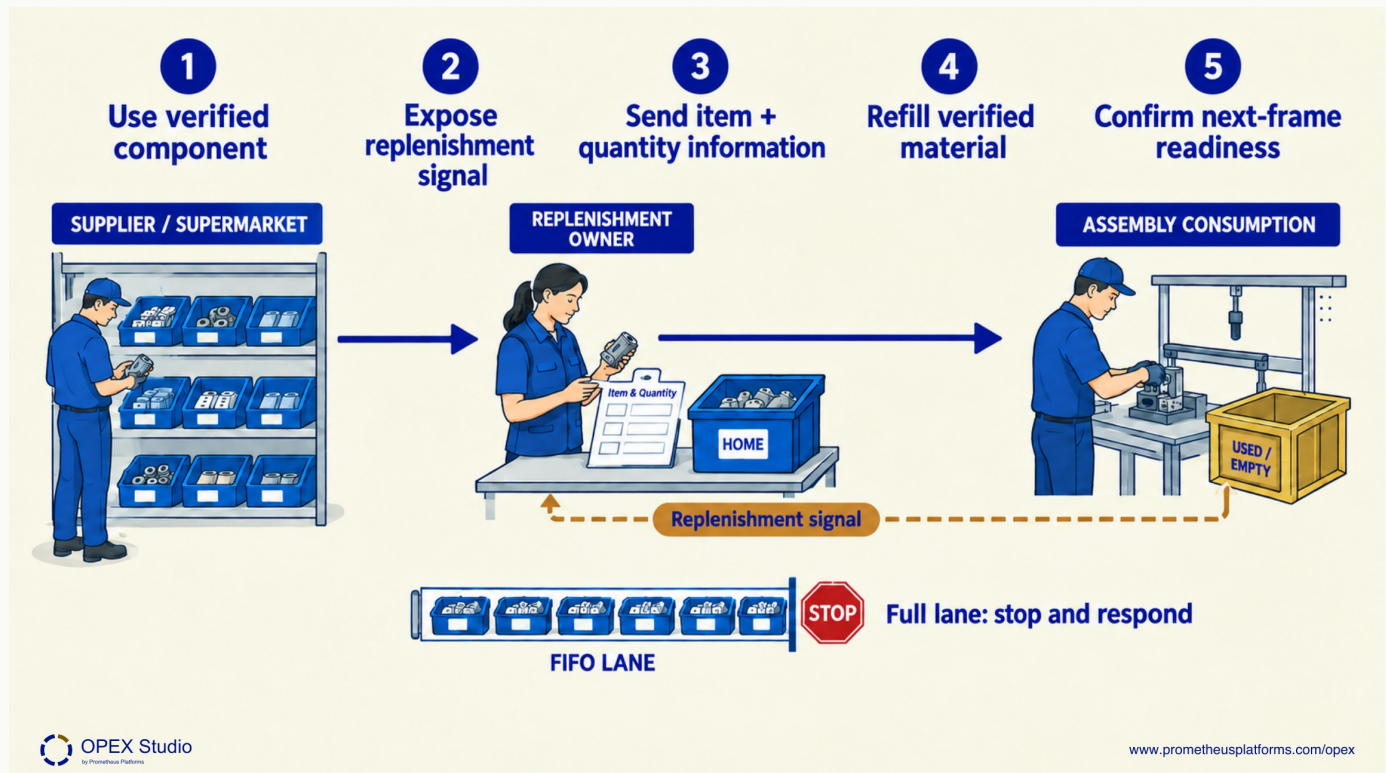
Can removing four handoffs be called an improvement without checking completion and rework?

Check your reasoning: No. Necessary decisions may have been lost or work transferred; verify the customer outcome.

METHOD SOURCES / F08: Practicing Lean Fundamentals in an Office Environment | Q07: Gemba | Q01: Plan-Do-Check-Act Cycle

Refill the right component for the next frame

Keep the assembly line ready for the next frame



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01

Use verified component

02

Expose replenishment signal

03

Send item + quantity information

04

Refill verified material

05

Confirm next-frame readiness

Material travels toward the using process; replenishment information returns upstream. Preserve part and lot identity and define the finite-lane response. A refill signal specifies item, quantity and responsible role. Synchronized flow requires an agreed demand and release rule, not independent pushing at every step.

The current case measures component search: twenty observations, 3.4-minute median, 1.5-minute goal. A replenishment loop connects consumption to the right refill and preserves identity. Make the signal, pack quantity, responsible person and full-lane response explicit. Level release to agreed customer demand and mix; do not schedule every upstream point independently. Search-time improvement alone cannot establish synchronized flow or line balance.

TRY IT / DISCUSS

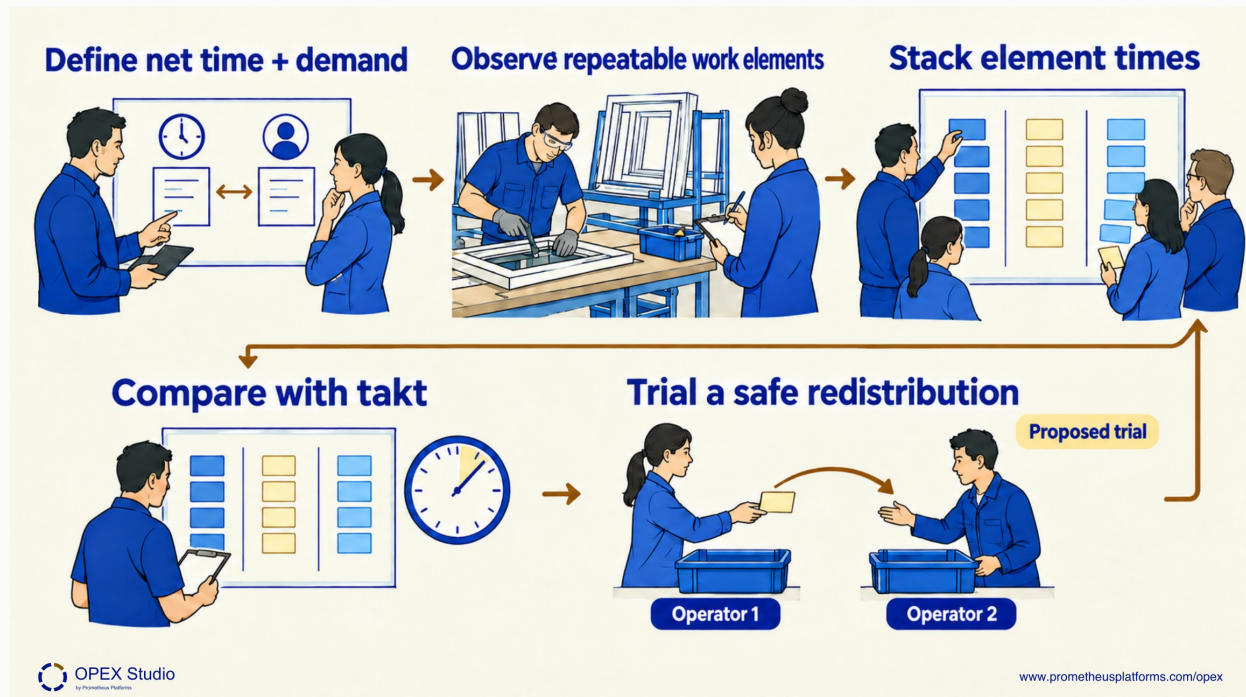
Which arrow carries the request to replenish, and which carries the parts?

Check your reasoning: Information travels back from consumption; replenished material travels toward the using process.

METHOD SOURCES / F05: Toyota Production System | F06: First In, First Out (FIFO) | F09: Lean Manufacturing: Don't Leave Home Without It! | F11: Operator Balance Chart | F13: Takt Time | F14: Heijunka | F17: Pull Production | F19: Heijunka Box

Balance work to demand using a yamazumi

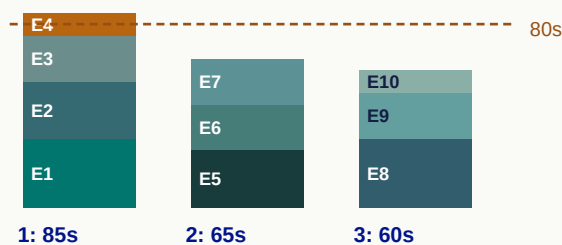
Keep the assembly line ready for the next frame



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

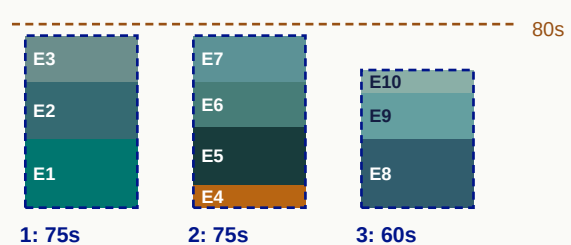
NEW FICTIONAL EXERCISE / 400 min / 300 units = 80 s takt

Before



E1 Position frame (30s)
 E2 Prepare corner kit (25s)
 E3 Confirm fixings (20s)
 E4 Return empty tote (10s)
 E5 Prepare seal kit (25s)

Proposed / unverified



E6 Check component identity (20s)
 E7 Record job reference (20s)
 E8 Check frame readiness (30s)
 E9 Confirm kit identity (20s)
 E10 Acknowledge handoff (10s)

Yamazumi makes work elements and uneven loading visible. This new exercise is separate from the photo case. An 85-second station exceeds the 80-second demand rhythm; equal averages would hide it. Moving one transferable 10-second element gives a theoretical 75/75/60 balance, but precedence, skill, walking, ergonomics, variability and machine time must be checked. A theoretical balance does not demonstrate a stable method. Test the method with the team; do not turn the chart into a headcount target.

TRY IT / DISCUSS

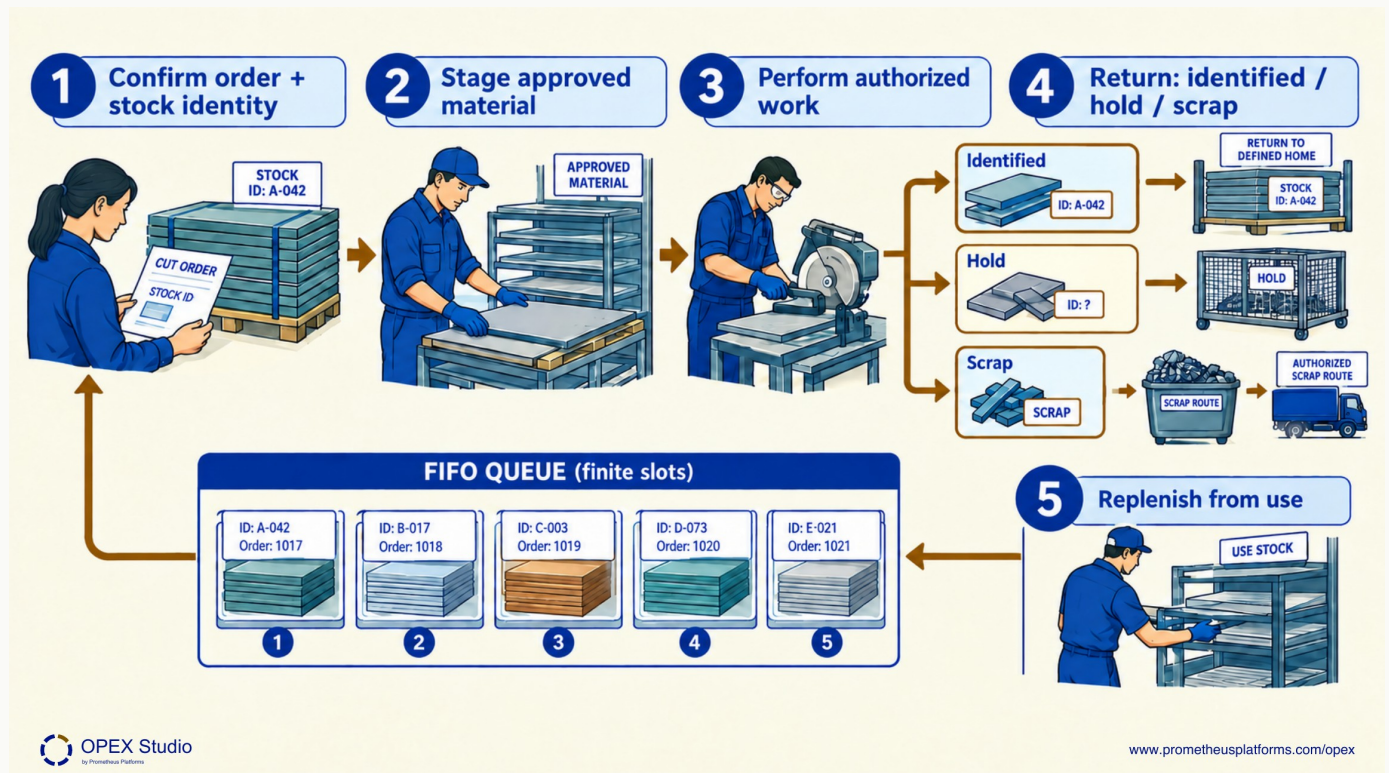
What remains to be checked after the bars fit below the takt line?

Check your reasoning: Safe feasible sequence, task transfer, variability, machine overlap, quality and actual end-to-end performance.

METHOD SOURCES / F05: Toyota Production System | F06: First In, First Out (FIFO) | F09: Lean Manufacturing: Don't Leave Home Without It! | F11: Operator Balance Chart | F13: Takt Time | F14: Heijunka | F17: Pull Production | F19: Heijunka Box

Keep stock identity through the whole route

A clearer start for every cut order



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01 Confirm order + stock identity	02 Stage approved material	03 Perform authorized work	04 Return: identified / hold / scrap	05 Replenish from use
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Retained order-preparation search: 15 observations, median 4.8 minutes; proposed goal 2 minutes. It runs from released order to readiness of identified stock and verified preparation items.

The retained fifteen order-preparation search observations have a 4.8-minute median and 2-minute goal. Preserve grade, identity and traceability through preparation and return. A FIFO lane controls sequence only when entry, exit, capacity and exception rules are defined. Unknown material must not be made usable by a new label alone. The clean floor and stock layout cannot prove coolant source correction or a safe cutting method.

TRY IT / DISCUSS

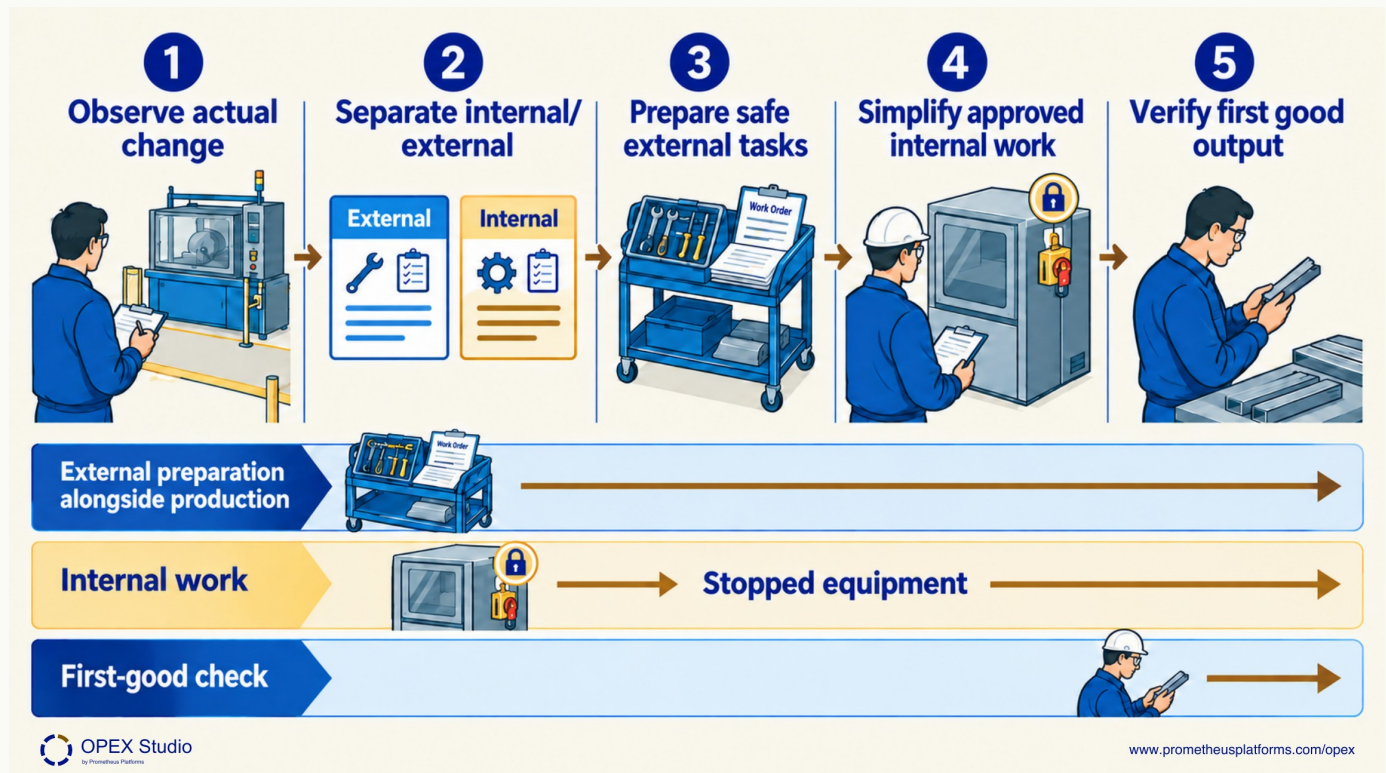
What happens when the FIFO lane is full?

Check your reasoning: Use the agreed stop/escalation rule; do not add an untracked overflow pile.

METHOD SOURCES / F06: First In, First Out (FIFO) | F12: Single Minute Exchange of Die | S04: OSHA: Control of Hazardous Energy

Prepare externally; protect the controlled change

A clearer start for every cut order



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01 Observe actual change	02 Separate internal/external	03 Prepare safe external tasks	04 Simplify approved internal work	05 Verify first good output
------------------------------------	---	--	--	---------------------------------------

SMED studies changeover so suitable preparation can happen outside the machine-stopped period and necessary internal work can be simplified safely. It does not mean every setup must take one minute. Observe the actual change from last good output to first good output using a consistent definition. The saw case has no measured changeover dataset, so this page is an introductory teaching extension. Never reclassify a task as external if it needs isolation or another controlled state.

TRY IT / DISCUSS

Can all cleaning or adjustment be moved to while the machine runs to shorten downtime?

Check your reasoning: No. Follow task-specific authorization and energy controls; only genuinely safe, approved external preparation can move.

METHOD SOURCES / F06: First In, First Out (FIFO) | F12: Single Minute Exchange of Die | S04: OSHA: Control of Hazardous Energy

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.

TPS: people, quality and synchronized flow

Muda, mura and muri reinforce each other

Takt, cycle time and lead time are different

Batch transfer versus one-piece flow

Production and withdrawal kanban

Office pull: capacity, blocked work and aging

Heijunka mix and pitch release

Connect processes: flow, bounded FIFO or supermarket

Standardized work: sequence, takt and standard WIP

Manual, walking and machine time

Yamazumi: movable elements and constraints

SMED: externalize safely, verify first good output

Replenishment stock: lead time and uncertainty

PFEP to point-of-use replenishment

TOC five focusing steps

Find the constraint: evidence, not the biggest queue

Drum-buffer-rope: schedule, protect, release

Buffer management: priorities and recurring causes

Throughput versus local utilization

Critical chain: dependencies, resources and buffers

Lean and TOC: complementary questions, distinct controls

Shorten the handoffs

Give the request a clear next step

Supporting lessons / continued

Keep the assembly line ready for the next frame

A clearer start for every cut order

Open the complete learning library

Quality control and dependable evidence

Quality control connects a requirement to an executable routine. Define the characteristic and risk, then establish whether the measurement method can support the intended decision. A control plan names how evidence is collected and who reacts. Time-ordered data may support statistical monitoring, but chart limits do not replace engineering or customer specifications. A signal requires the agreed response, containment where appropriate and verification of restoration. Feed learning into the risk analysis, control plan and training. The map is an introductory relationship model, not a licensed control-plan form or authority to approve product.

What this system is for

Understand how the methods relate before selecting a detailed lesson.

Use the chapter to

1. Connect requirements, measurement, process controls and verified response.
2. Choose trustworthy data and a suitable monitoring method before interpreting signals.
3. Trace a failure risk into prevention, detection, reaction and verified effectiveness.

A route through the chapter

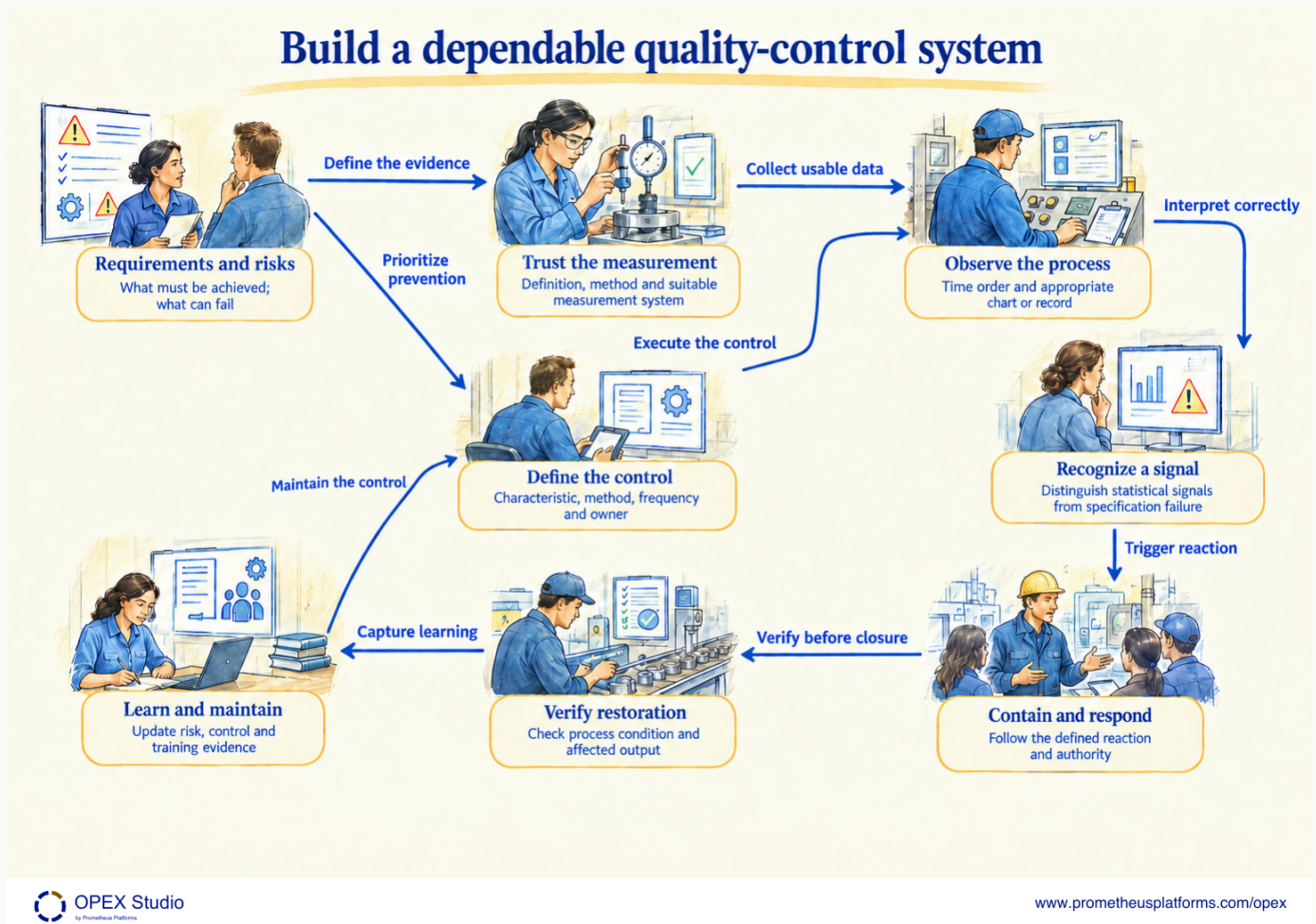
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25 mapped cases and method lessons. Illustrations teach the concepts; they are not records of achieved workplace results.

[Open this chapter online](#)

Build a dependable quality-control system

Connect requirements, measurement, process controls and verified response.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Quality control connects a requirement to an executable routine. Define the characteristic and risk, then establish whether the measurement method can support the intended decision. A control plan names how evidence is collected and who reacts. Time-ordered data may support statistical monitoring, but chart limits do not replace engineering or customer specifications. A signal requires the agreed response, containment where appropriate and verification of restoration. Feed learning into the risk analysis, control plan and training. The map is an introductory relationship model, not a licensed control-plan form or authority to approve product.

Check the boundaries

Control limits describe process behavior; specification limits express requirements.

Choose a chart from data type and sampling structure.

Containment, correction and verified recurrence prevention are different decisions.

Read and apply the system / continued

Try it / discuss

A chart is stable but measurements exceed a specification. Can the team release the product because the chart is in control?

Check your reasoning

No. Statistical stability and conformity answer different questions. Follow product disposition and the control-plan reaction while investigating capability and relevant causes.

Method sources

AIAG/Plexus: APQP and control plan overview

NIST: Control chart families

NIST: Attributes charts

NIST: What are control charts?

NIST: Stable but unacceptable processes

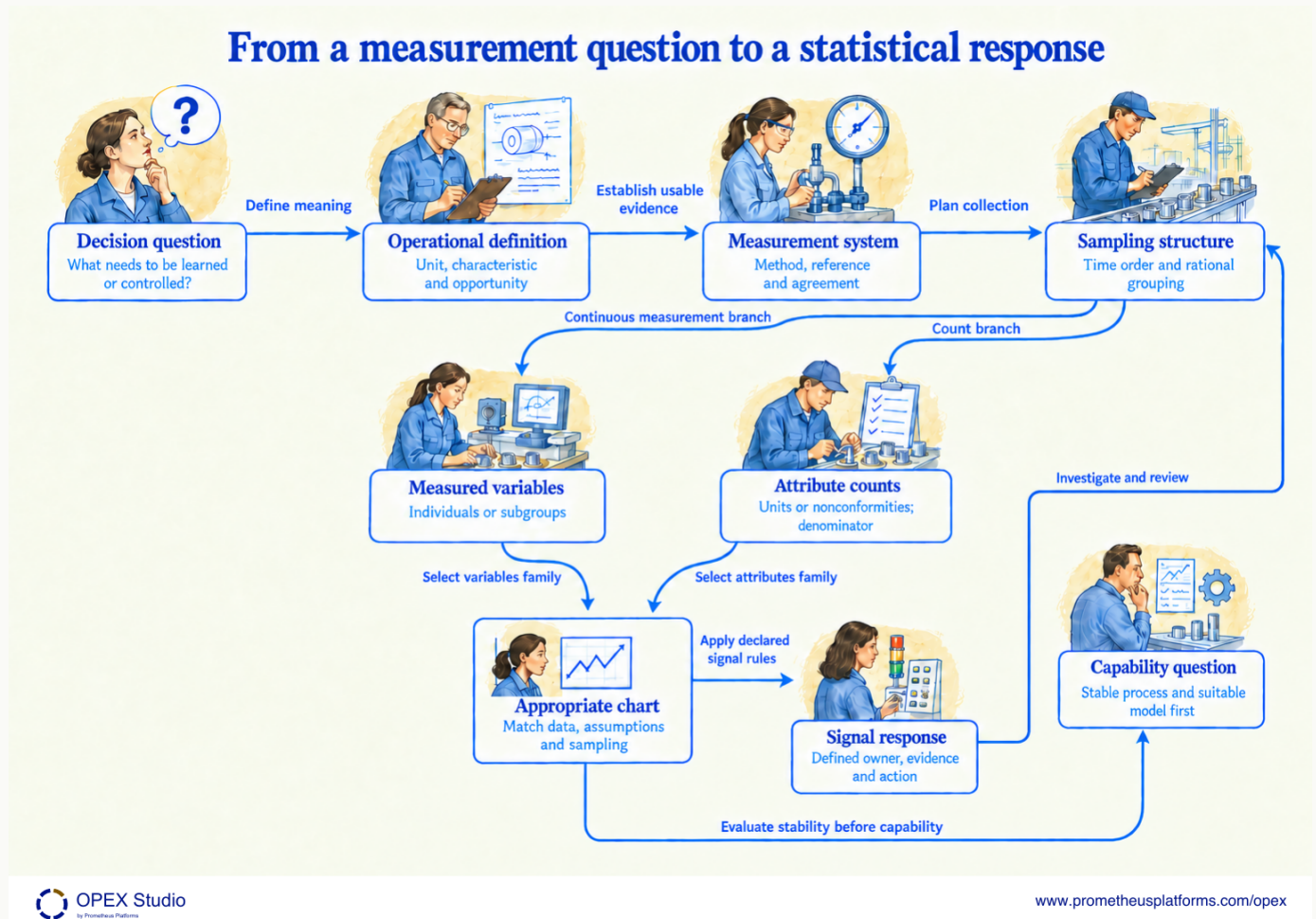
NIST: Out-of-control response

NIST: Gauge R&R

NIST: Gauge study design

From a measurement question to a statistical response

Choose trustworthy data and a suitable monitoring method before interpreting signals.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

A statistical routine starts with a decision question, not with a favorite chart. Define what is measured, what constitutes a unit or defect and which denominator is relevant. Check the measurement system and preserve collection order and sampling structure. Measured variables and attribute counts require different chart families; even within counts, nonconforming units and nonconformities are different data. Match the chart to these definitions and its assumptions. Agree the signal rules and reaction owner before using it. Capability asks whether a stable process can meet requirements under a suitable model. A chart does not establish conformity, capability or a cause merely by being drawn.

Check the boundaries

Nonconforming units differ from numbers of nonconformities.

Subgroup structure and time order matter to interpretation.

Capability interpretation requires stability and an appropriate distribution/model; a histogram alone is insufficient.

Read and apply the system / continued

Try it / discuss

The same unit can contain several scratches, and inspected surface area varies. Why is a fixed-size defective-unit chart not automatically appropriate?

Check your reasoning

Clarify whether the decision counts scratched units or individual scratches. For nonconformities, preserve the exposure denominator and evaluate a suitable rate chart and assumptions. Do not select a chart from the word defect alone.

Method sources

NIST: Control chart families

NIST: Attributes charts

NIST: Gauge R&R

NIST: Gauge study design

ASQ: Attribute agreement analysis scope

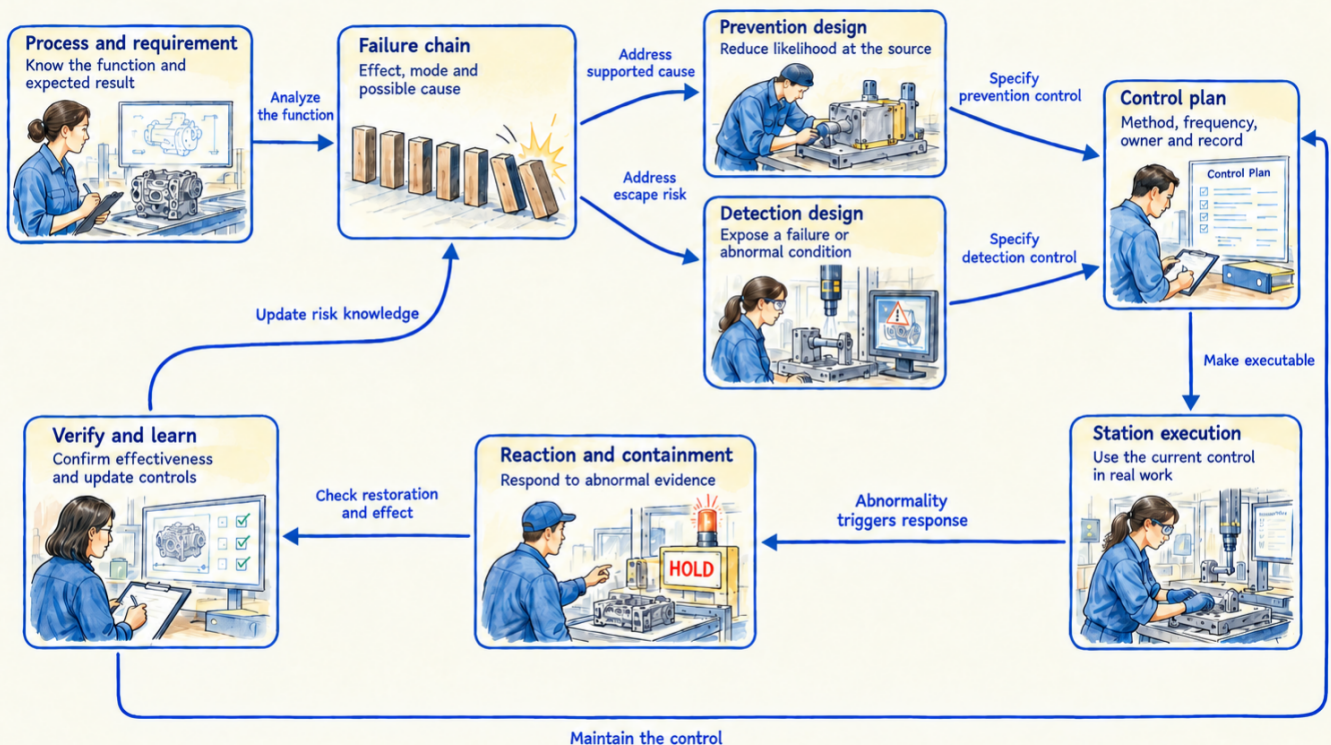
NIST: Process capability

NIST: Out-of-control response

Connect risk analysis to a working station control

Trace a failure risk into prevention, detection, reaction and verified effectiveness.

Connect risk analysis to a working station control



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Risk analysis should connect the process function to plausible failure modes, effects and causes. Prevention and detection have different roles: preventing incorrect assembly differs from detecting it and stopping release. Translate the selected controls into an executable plan with a method, frequency, owner, record and reaction. Then observe whether the station actually uses the current control. A layered process audit checks execution of critical controls; it does not replace product verification. When an abnormality occurs, protect affected output, restore the process under the defined authority and verify the effect. Feed evidence back to both the risk analysis and the control plan.

Check the boundaries

A detection-and-stop device is not the same as error prevention.

FMEA prioritization depends on the required method; no rating or Action Priority tables are reproduced.

An audit completion mark is not product-release evidence.

Read and apply the system / continued

Try it / discuss

A sensor detects reversed parts but the line continues and no owner handles the alert. Which link is missing?

Check your reasoning

The detection is not connected to an effective reaction and release boundary. Define the stop or hold response, responsible owner, restoration verification and record; then test the complete control, not only the sensor.

Method sources

AIAG/VDA FMEA release

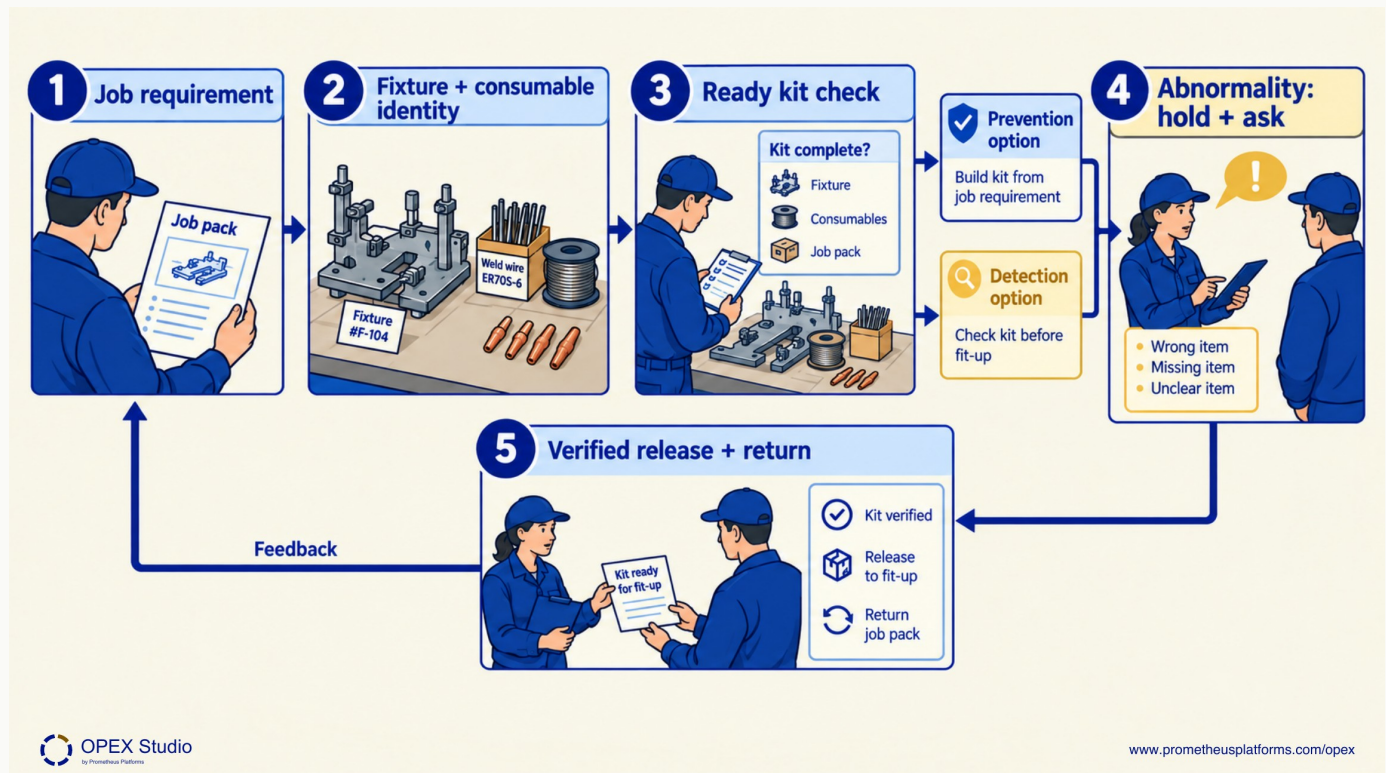
AIAG/Plexus: APQP and control plan overview

LEI: Error-Proofing

AIAG: Layered process audits CQI-8

Build the correct kit before fit-up

Make the welding bay ready to work



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01	02	03	04	05
Job requirement	Fixture + consumable identity	Ready kit check	Abnormality: hold + ask	Verified release + return

Retained kit-preparation search: 12 observations, median 8 minutes; proposed goal 3 minutes. Start with the approved job pack and finish with correct verified fixtures and consumables at fit-up.

The retained twelve preparation-search observations have an 8-minute median and 3-minute goal. A kit standard must make the right item easier to select, not merely make all items look organized. Teach quality at source through visible identity, readiness and abnormality response. A proposed physical cue may prevent selection error; a check may detect one. Each needs verification. Welding parameters, extraction and other technical controls remain with approved practice.

TRY IT / DISCUSS

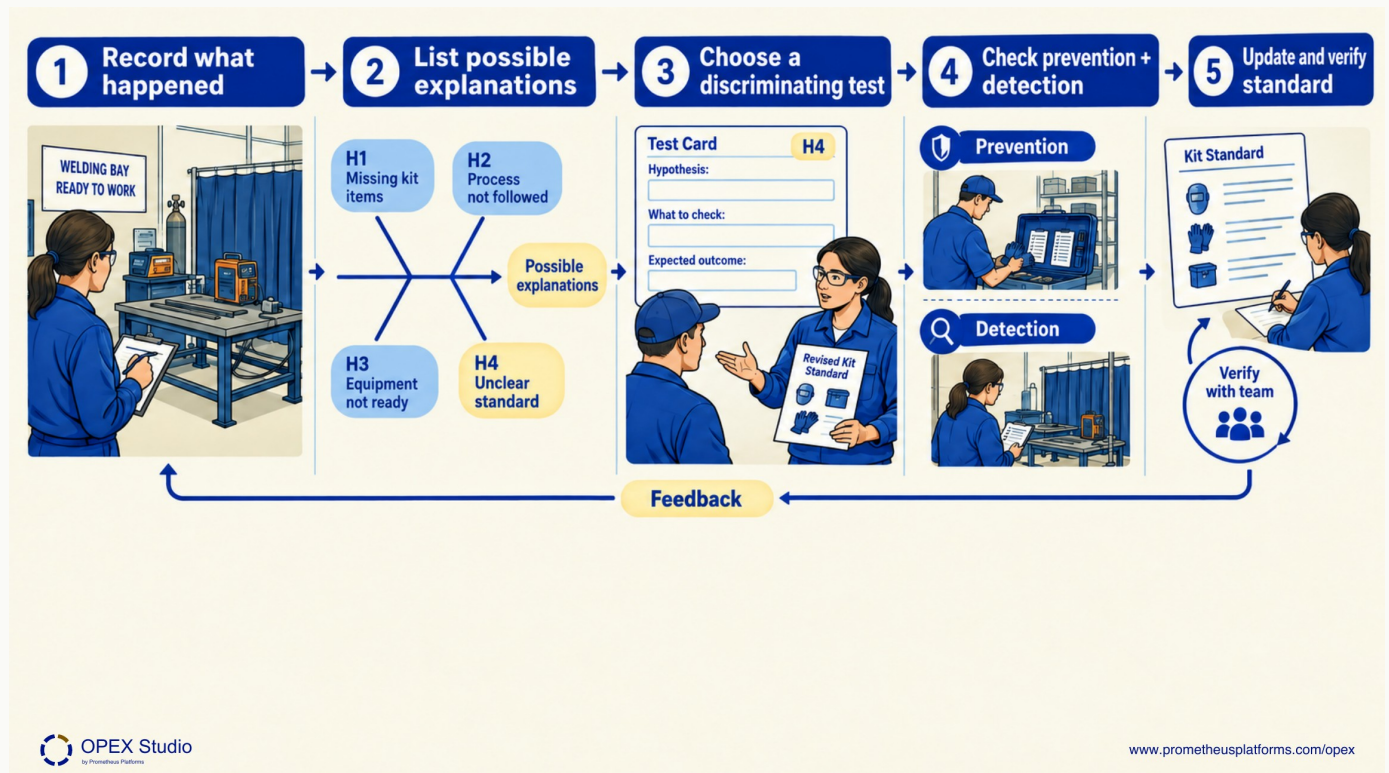
How does a shaped fixture location differ from a final visual inspection?

Check your reasoning: It may prevent an incorrect selection; inspection detects a condition. Neither should be claimed effective without a test.

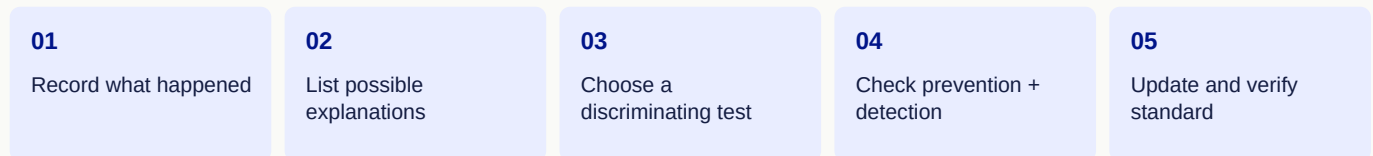
METHOD SOURCES / Q09: Jidoka | Q10: Fishbone Diagram | Q07: Gemba | F10: Standardized Work

Observe the condition before choosing the fix

Make the welding bay ready to work



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE



Record the exact wrong or missing item, job context and consequence. Ask the people doing the work how the kit is prepared. Use a cause diagram to organize possible explanations, then test the useful ones. Check both whether the proposed change prevents the error and whether remaining errors are detected. Repeated exposure after implementation is needed before claiming recurrence prevention.

TRY IT / DISCUSS

Is Operator careless an adequate causal statement?

Check your reasoning: No. Investigate the conditions, information, standard and system that shaped the action.

METHOD SOURCES / Q09: Jidoka | Q10: Fishbone Diagram | Q07: Gemba | F10: Standardized Work

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.

Jidoka and andon: detect, respond, verify restart

Poka-yoke: prevention versus detection

Select a chart from the data and sampling plan

Separate control limits from specifications

Read spread before the subgroup average

Monitor one reading at a time

Chart nonconforming units with the right denominator

Chart nonconformities per exposure

Respond to a signal with a defined owner

Check stability before capability

Separate part variation from measurement variation

Check inspection agreement and escape risk

Link a process risk to an executable control plan

Make the station check and reaction inseparable

Build PFMEA from a failure chain to verified action

Use APQP gates to expose launch risk early

Distinguish PPAP evidence from production authorization

Trace one suspect lot through split, merge and rework

Audit whether critical controls are actually followed

Control special processes through qualified conditions and records

Prepare a Nadcap audit with scope-linked evidence

Locate the applicable automotive requirements

Distinguish a feedback controller from statistical monitoring

Supporting lessons / continued

Connect calibration to a defensible measurement result

Make the welding bay ready to work

Open the complete learning library

Leadership and daily learning

Direction becomes useful through discussion of actual capability and resources. Catchball links organizational intent with local feasibility rather than cascading unsupported targets. A daily board then exposes the gap between the agreed plan and observed work. Leaders go to the work, ask what is understood and remove obstacles while developing the team's problem-solving ability. A small experiment records its prediction and observed result. Job instruction supports the competence required to execute safely and consistently. Review checks evidence of effect, not merely completed actions or attendance, and carries learning back to both local targets and the wider plan.

What this system is for

Understand how the methods relate before selecting a detailed lesson.

Use the chapter to

1. Show how direction, local evidence, coaching and follow-through reinforce each other.
2. Turn an organizational challenge into feasible contributions and two-way learning.
3. Connect direct observation, a learning conversation, deliberate practice and follow-through.

A route through the chapter

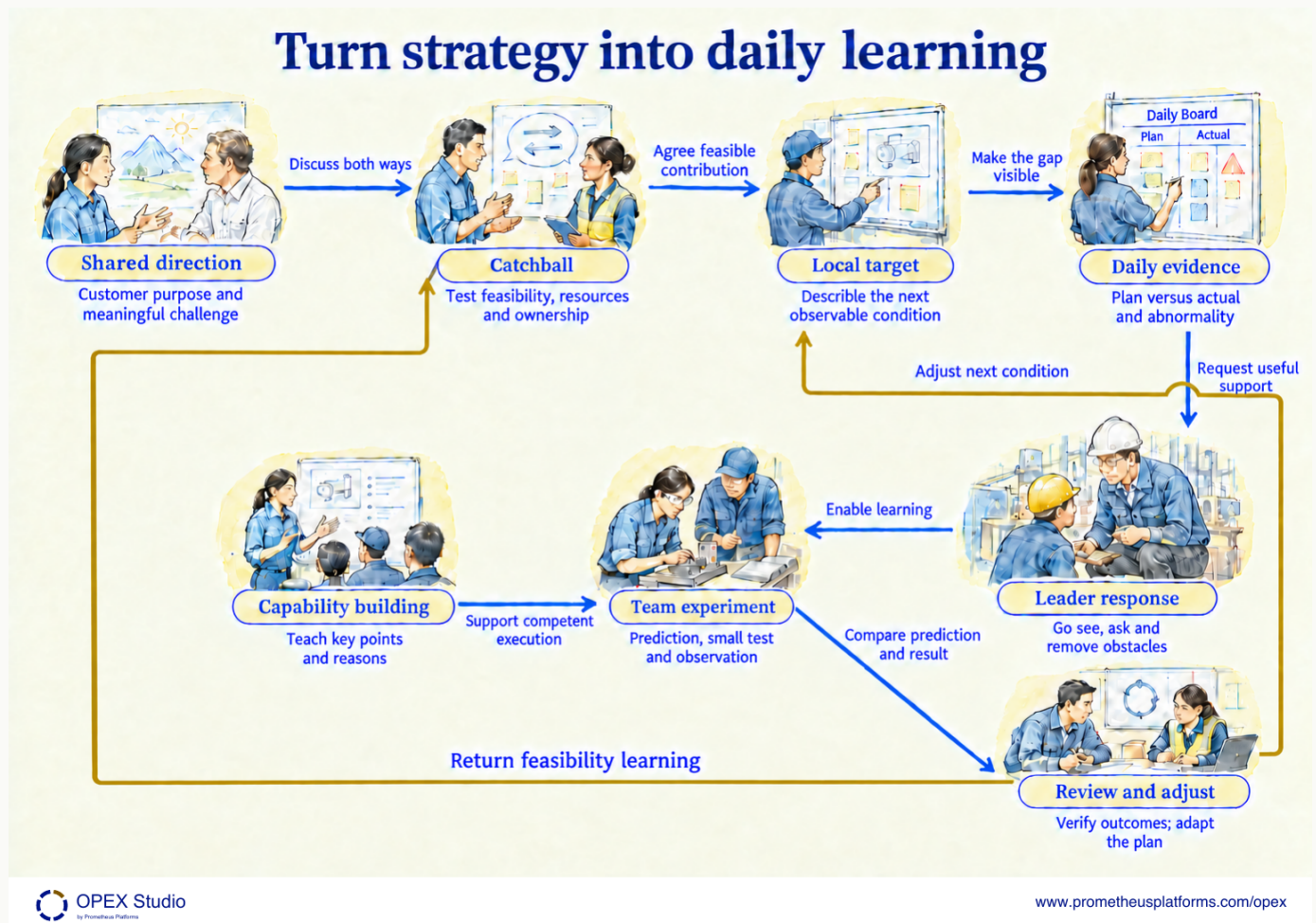
Begin with the three illustrated system maps. Read their connections and decisions, then use the original workplace teaching cards. The supporting lesson index links to the native method packs for worked inputs, practice, reasoned answers and facilitation.

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

[Open this chapter online](#)

Turn strategy into daily learning

Show how direction, local evidence, coaching and follow-through reinforce each other.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Direction becomes useful through discussion of actual capability and resources. Catchball links organizational intent with local feasibility rather than cascading unsupported targets. A daily board then exposes the gap between the agreed plan and observed work. Leaders go to the work, ask what is understood and remove obstacles while developing the team's problem-solving ability. A small experiment records its prediction and observed result. Job instruction supports the competence required to execute safely and consistently. Review checks evidence of effect, not merely completed actions or attendance, and carries learning back to both local targets and the wider plan.

Check the boundaries

Daily management supports response and learning; a board alone is not the system.

Catchball includes feasibility and horizontal resource conflicts.

A completed action is not proof of an improved or sustained result.

Try it / discuss

A board lists all actions complete, but no later condition check exists. What should the leader ask next?

Read and apply the system / continued

Check your reasoning

Ask what changed in the work, where it was observed and when it will be checked again. Keep effectiveness pending until evidence is available.

Method sources

LEI: Hoshin Kanri

LEI: Daily Management and Hoshin Kanri

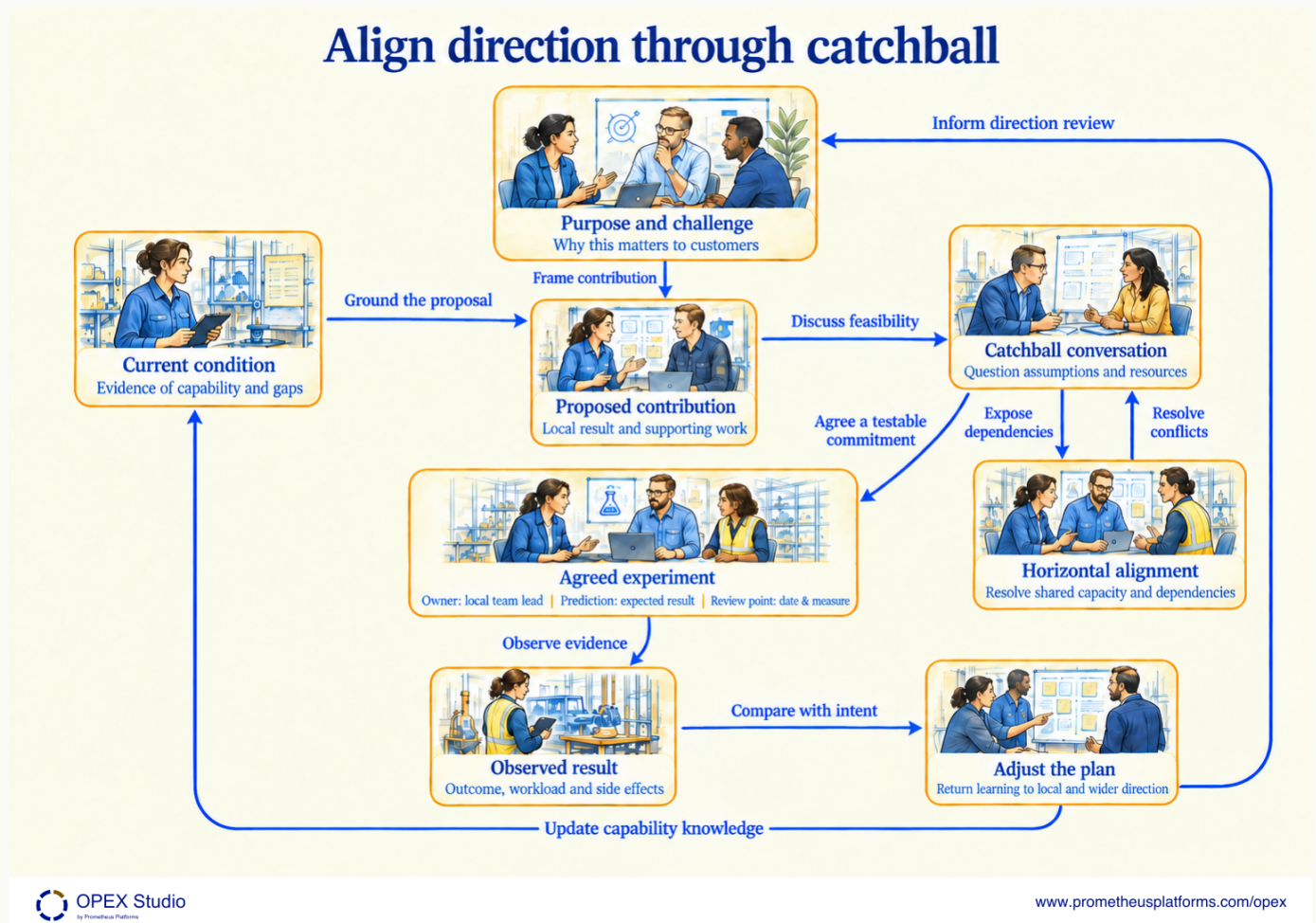
LEI: Leader Standard Work

LEI: Kata

LEI: Training Within Industry

Align direction through catchball

Turn an organizational challenge into feasible contributions and two-way learning.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Catchball is a dialogue about purpose, contribution and feasibility. Begin with current evidence, then propose how a local team can contribute. Make resource needs and cross-team dependencies visible; the same specialist cannot be promised to incompatible work at the same time. Agree a bounded experiment or commitment with an owner, prediction and review point. Observe the result and its effect on workload and neighboring processes. Bring that learning back to both local plans and wider direction. The system depends on honest negotiation and learning; a cascade of targets without discussion does not provide the same mechanism.

Check the boundaries

Catchball is two-way discussion, including horizontal dependencies.

A proposed target is not an achieved outcome.

A shared resource needs an explicit feasible allocation.

Read and apply the system / continued

Try it / discuss

Two teams each promise daily support from the same specialist, whose capacity allows only one team per day. What should the catchball conversation produce?

Check your reasoning

Expose the conflict and agree priorities, timing, scope or another feasible support arrangement. Record the resulting commitment and review evidence; do not approve both promises merely to preserve the target cascade.

Method sources

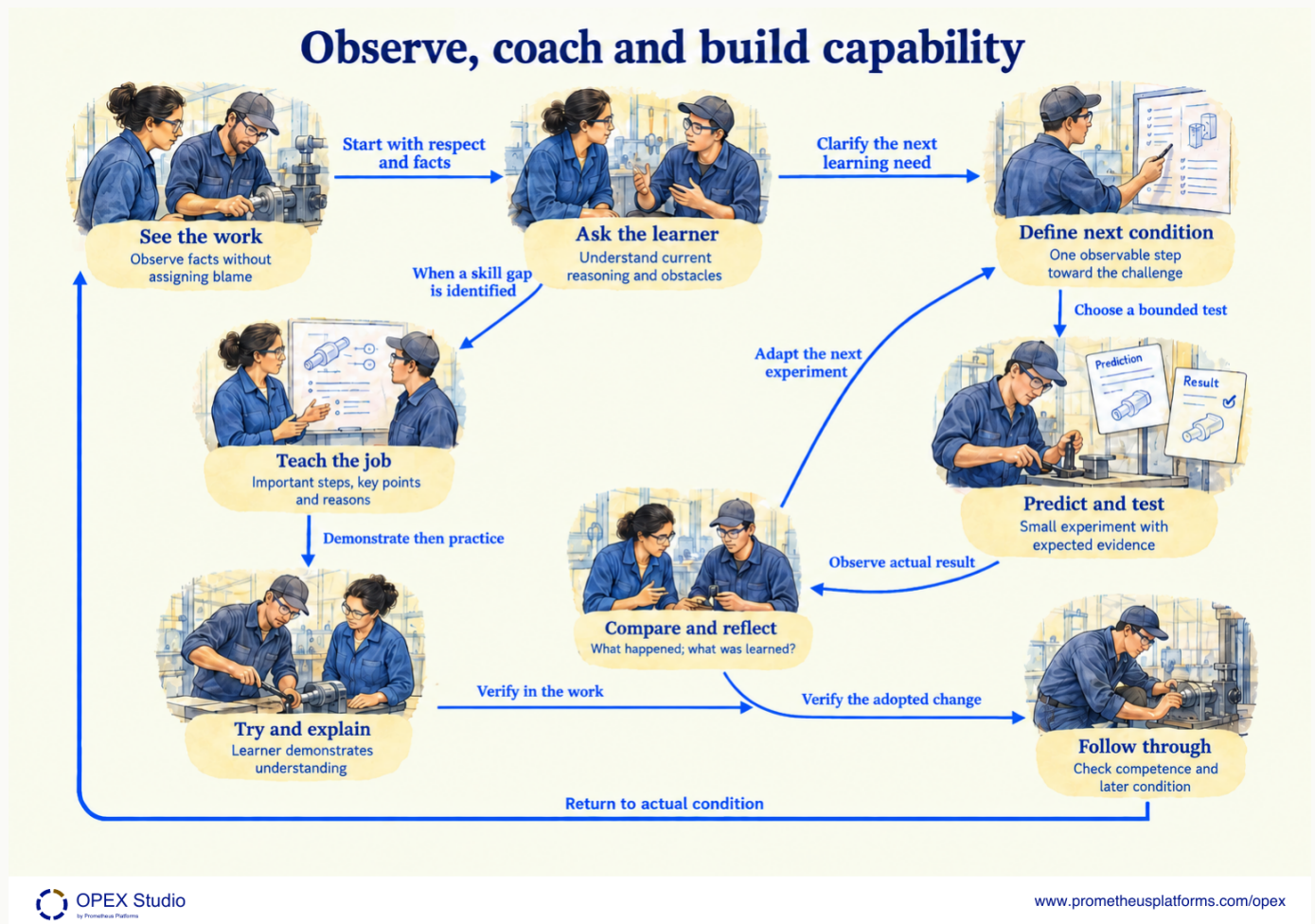
LEI: Hoshin Kanri

LEI: Kata

LEI: Daily Management and Hoshin Kanri

Observe, coach and build capability

Connect direct observation, a learning conversation, deliberate practice and follow-through.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Observe what actually happens and separate facts from interpretations. Ask the learner how the work is understood and what obstructs the next condition. Where uncertainty calls for learning, use a small experiment with a prediction and compare the observation with that prediction. Where the need is competence in an established job, use job instruction: prepare, present the important steps with key points and reasons, let the learner try and explain, then follow up. These are related but distinct routes. Leader standard work creates time and responsibility for this support. Attendance, a coaching conversation or a completed demonstration alone does not establish sustained competence.

Check the boundaries

Gemba observation does not justify conclusions about unseen events.

Coaching an experiment differs from teaching an established job.

Follow-up should verify understanding and performance, not attendance alone.

Try it / discuss

A learner repeats a step correctly once but cannot explain the identity check. Is the instruction complete?

Read and apply the system / continued

Check your reasoning

Not yet. Revisit the key point and reason, let the learner explain and demonstrate the full method, then follow up under appropriate supervision until competence is evidenced.

Method sources

LEI: Standard Work for Lean Leaders

LEI: Kata

LEI: Training Within Industry

LEI: Leader Standard Work

Make tomorrow ready before promising it

Make tomorrow ready



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01 Review yesterday	02 Check today at the work	03 Remove tomorrow constraints	04 Commit with owner + due	05 Escalate and verify response
-------------------------------	--------------------------------------	--	--------------------------------------	---

A daily meeting is useful when it changes what happens next. The sample has 82 of 120 commitments completed by their agreed time; the next 120 have a goal of at least 102. Review missed promises, confirm current conditions, expose tomorrow's prerequisites and assign a response. State when an unresolved constraint must be escalated and who verifies the response. A board entry does not authorize work or prove a task is safe.

TRY IT / DISCUSS

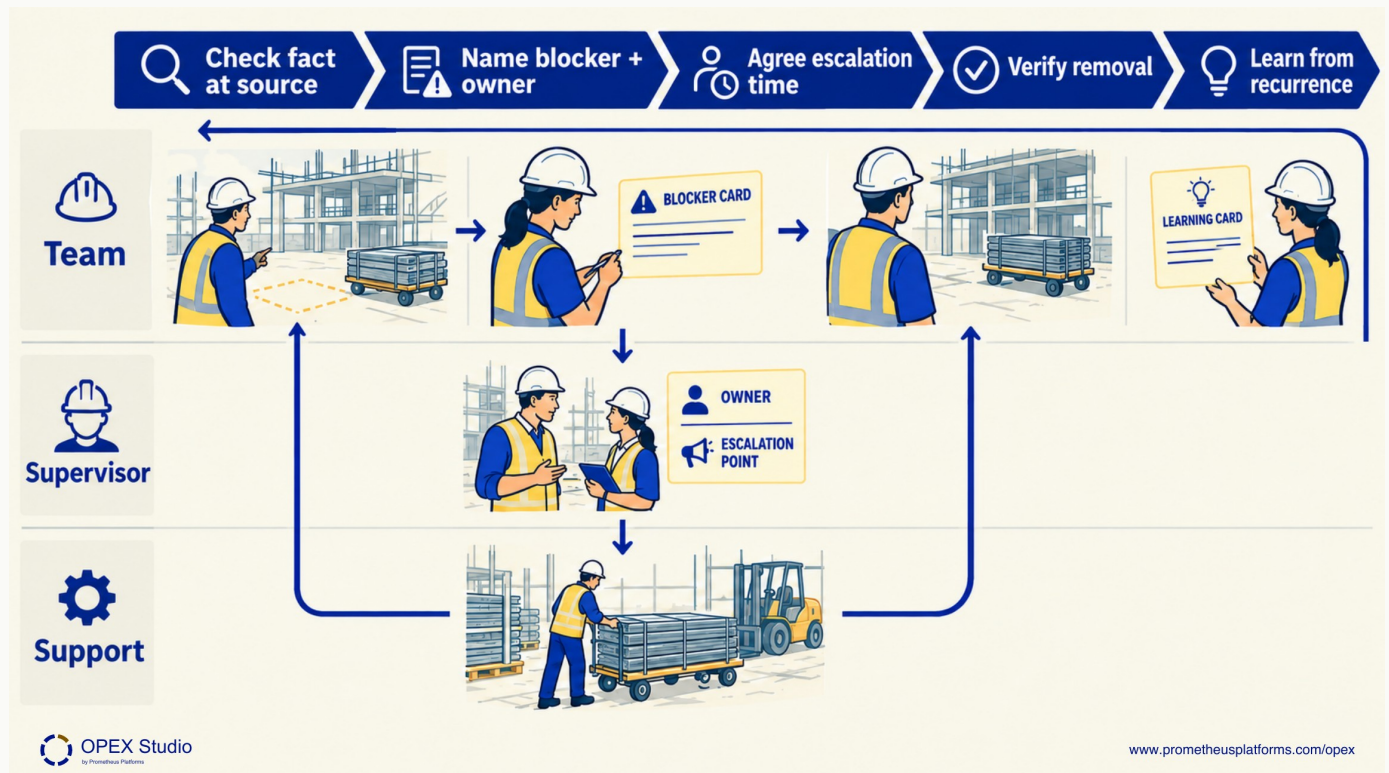
When is an issue closed: when an owner is assigned, or when the response is verified?

Check your reasoning: When the defined response and its effect are verified; assignment is only a commitment.

METHOD SOURCES / Q08: Reinforcing Lean Behavior Through Visual Management | Q07: Gemba | Q01: Plan-Do-Check-Act Cycle

Close the loop from huddle to gemba

Make tomorrow ready



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Primary reasons for 38 misses / authored sample

Permit / release	12
Material unavailable	10
Preceding work incomplete	9
Crew availability	7

Use a proposed ten-minute huddle cadence as a starting design, not a universal Lean rule: review outcomes, check current readiness, agree the next response and confirm follow-up. Leaders then go to the work to understand unresolved conditions. Record recurring blockers for structured problem solving. Keep urgent hazards on the existing immediate response route rather than waiting for tomorrow's meeting.

TRY IT / DISCUSS

What should the leader ask at the work?

Check your reasoning: What is the expected condition, what is happening now, what is stopping progress, and what support or next test is needed?

METHOD SOURCES / Q08: Reinforcing Lean Behavior Through Visual Management | Q07: Gemba | Q01: Plan-Do-Check-Act Cycle

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.

Gemba: observe work, ask, follow through

Leader standard work supports problem solvers

Daily board: measure, respond, learn

Hoshin: align strategy through catchball

Improvement and coaching kata

Job instruction: steps, key points and reasons

Make tomorrow ready

Open the complete learning library

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

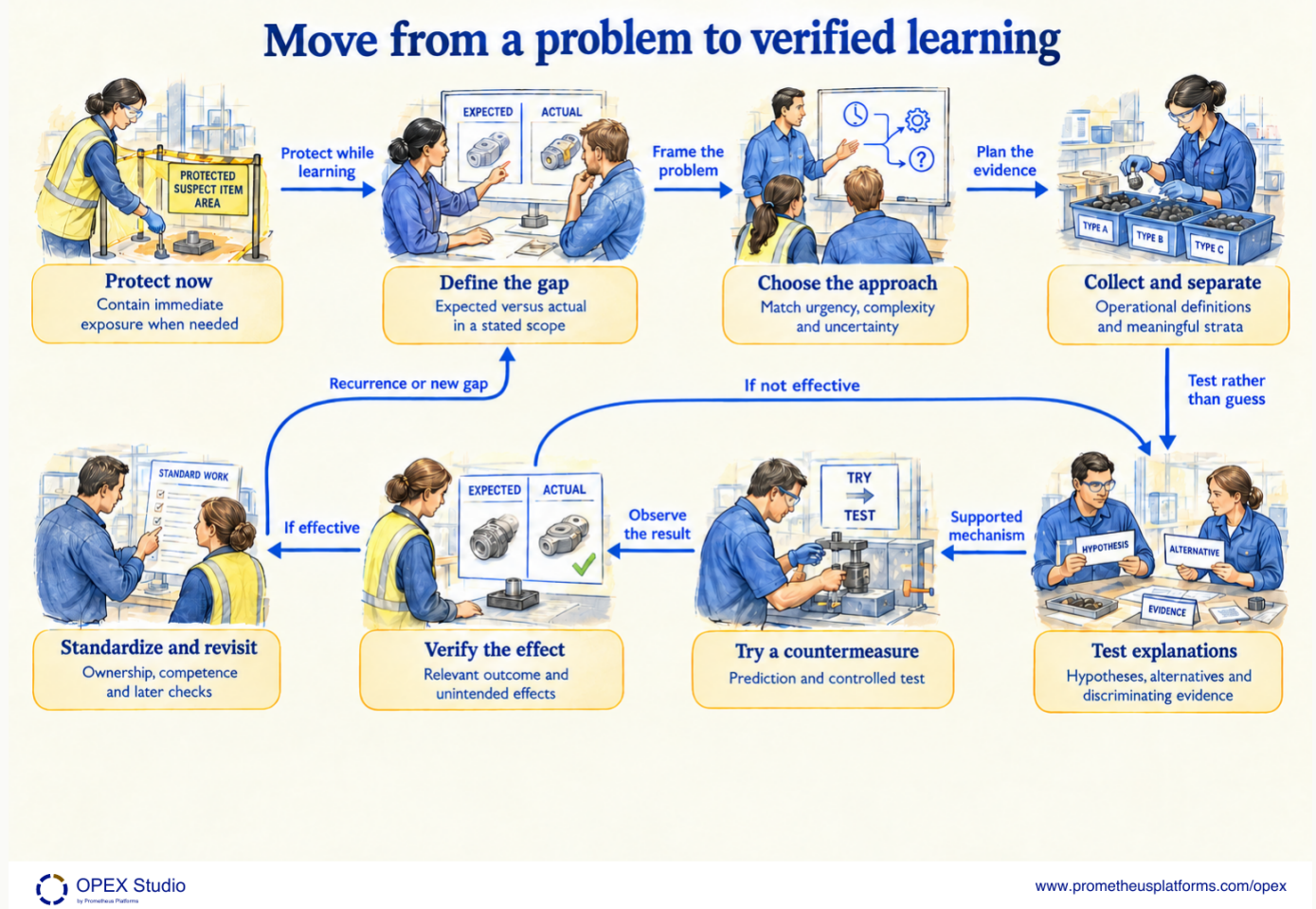
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16 mapped cases and method lessons. Illustrations teach the concepts; they are not records of achieved workplace results.

[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

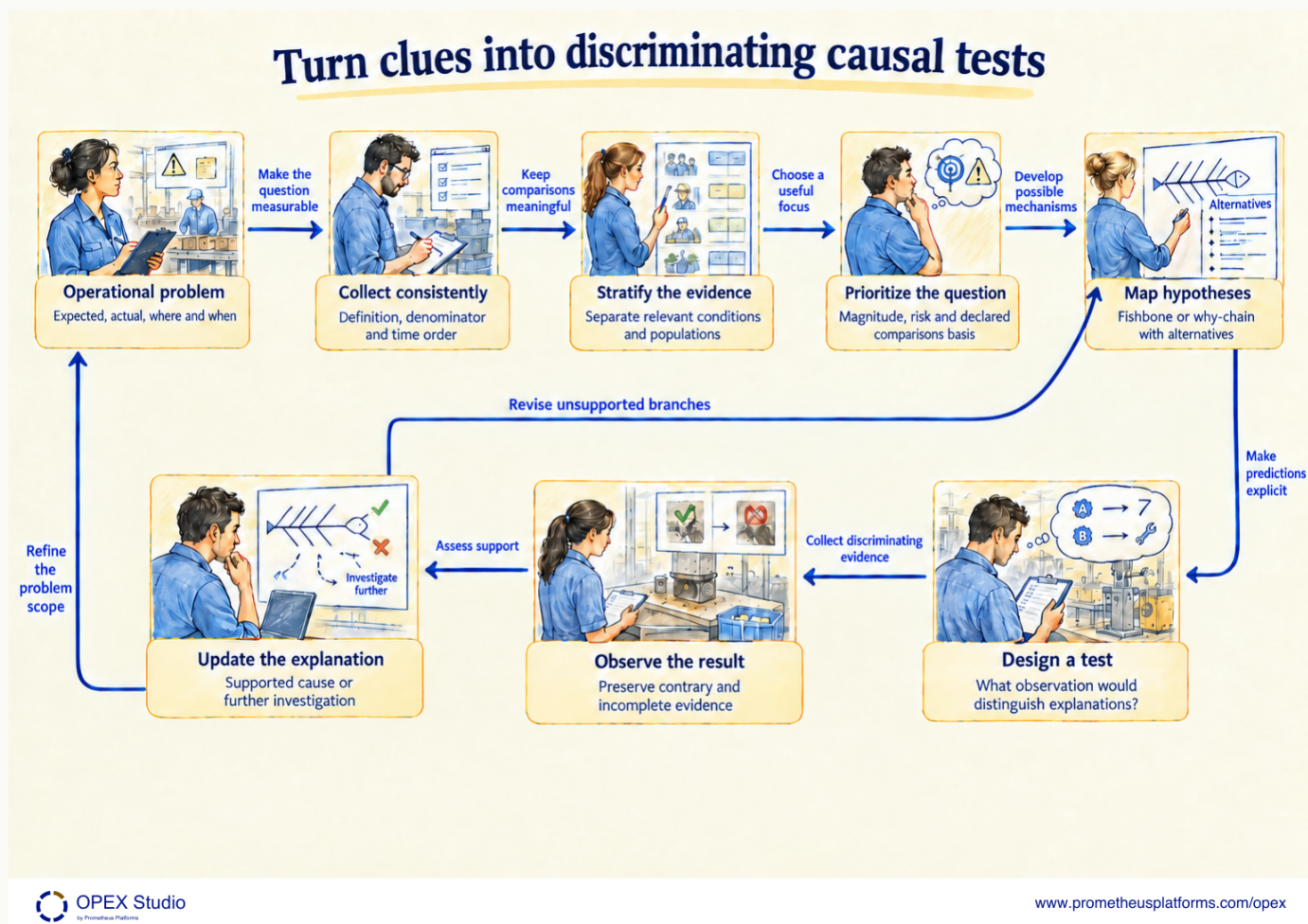
LEI: 5 Whys

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

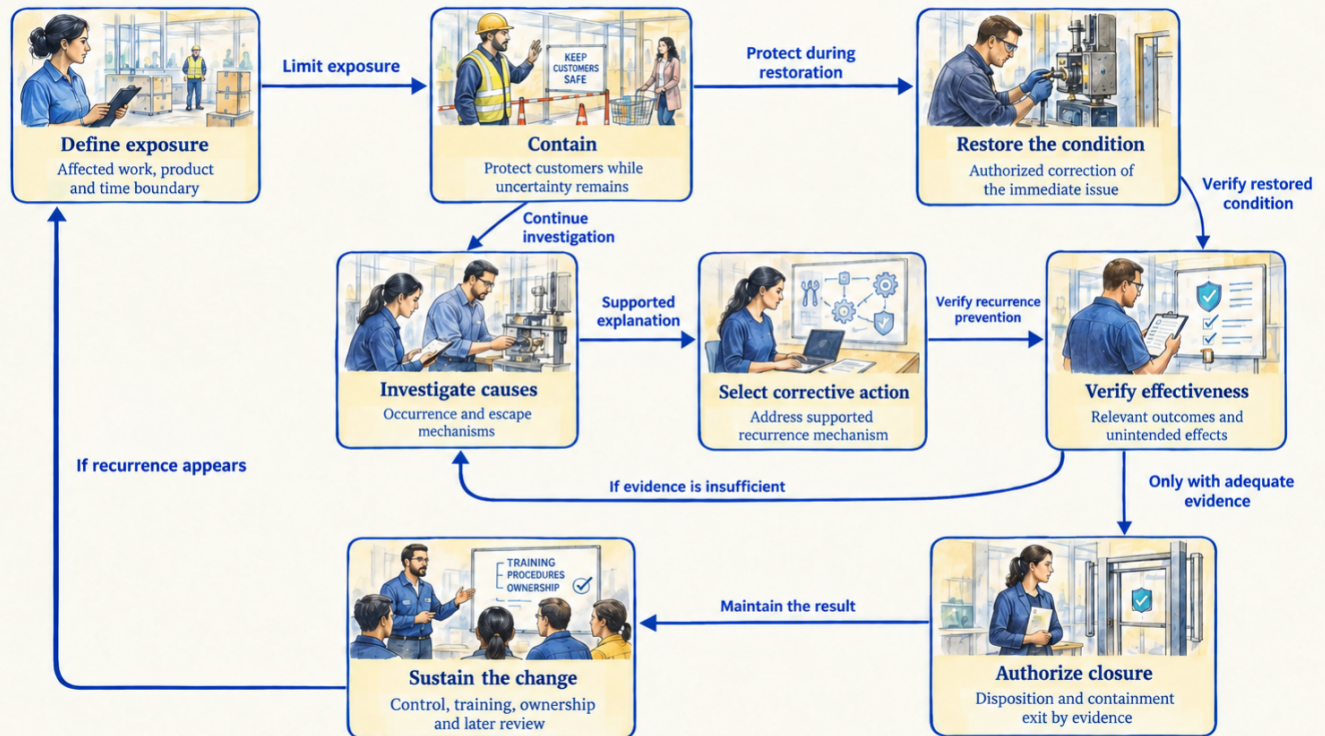
LEI: 5 Whys

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

D0-2: prepare, team, define

02

D3: contain exposure

03

D4: occurrence + escape

04

D5-6: choose, test, validate

05

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

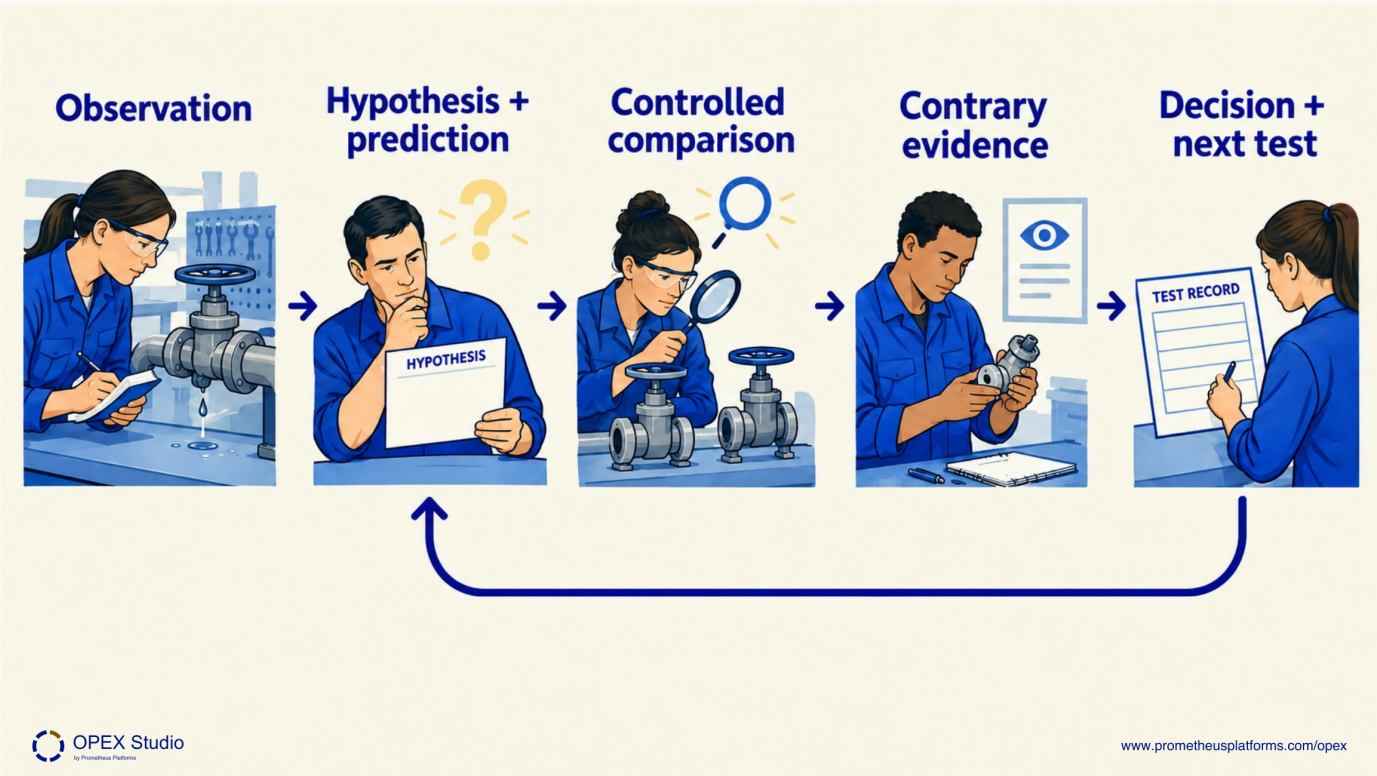
A fixture association is visible. Is that enough to select permanent corrective action?

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
--	---------------------------	----------------------------------	-------------------------------------	-----------------------------------

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

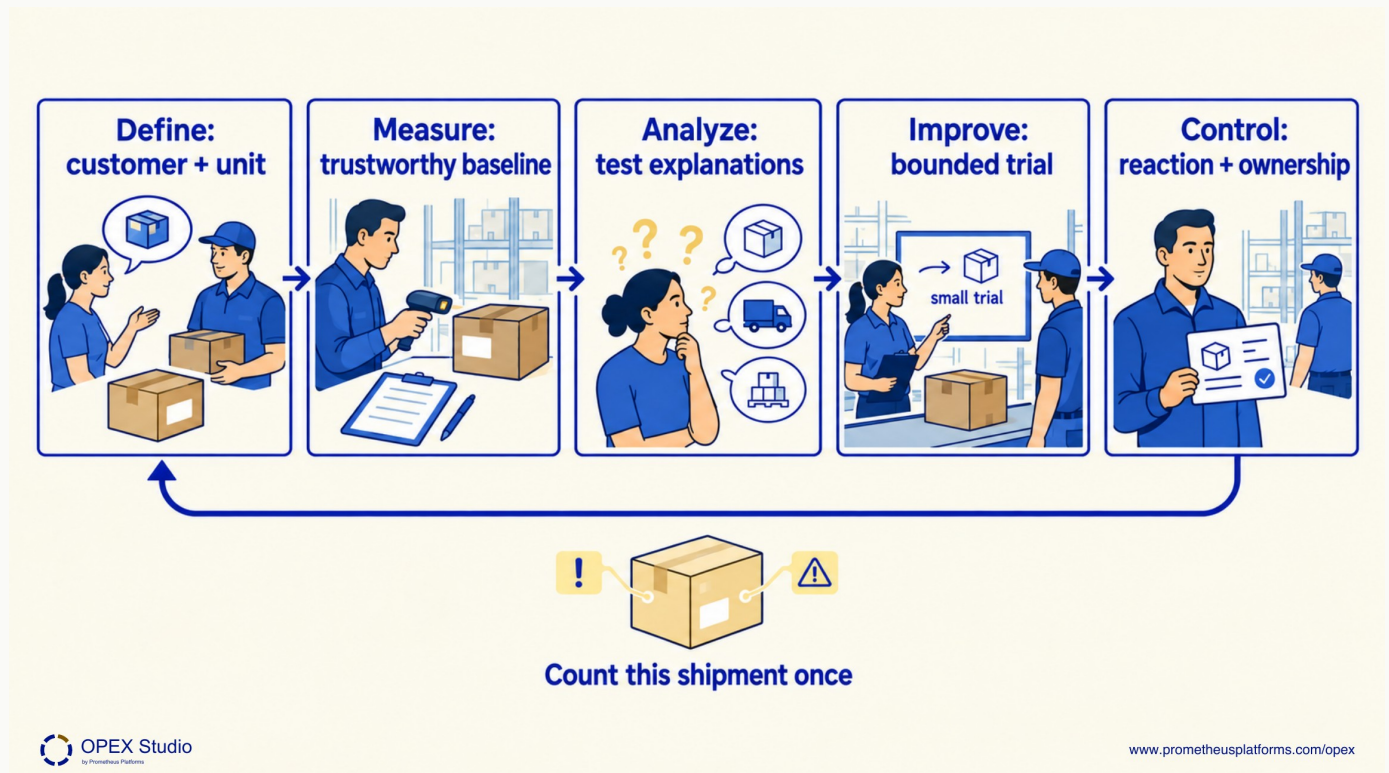
Why keep the reopened-case measure beside the readiness goal?

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

Equipment wellness and OEE

Equipment wellness starts with the function the equipment must perform and a clear reference for normal condition. Approved operator care can expose leaks, looseness or contamination, but technical intervention remains with competent authorized people. Record the condition and route it to the appropriate response. Planned work should address supported failure mechanisms and include verification of return, not only a completion tick. OEE helps reconcile categories of lost planned time with first-pass good output; it should guide useful investigation rather than encourage excess production. Later checks establish whether the condition is maintained and whether the care or maintenance plan needs revision.

What this system is for

Understand how the methods relate before selecting a detailed lesson.

Use the chapter to

1. Connect basic care, specialist maintenance, loss evidence and verified return to service.
2. Keep condition discovery, authorized intervention and verified return distinct.
3. Relate the three OEE factors to loss evidence, targeted work and useful system outcomes.

A route through the chapter

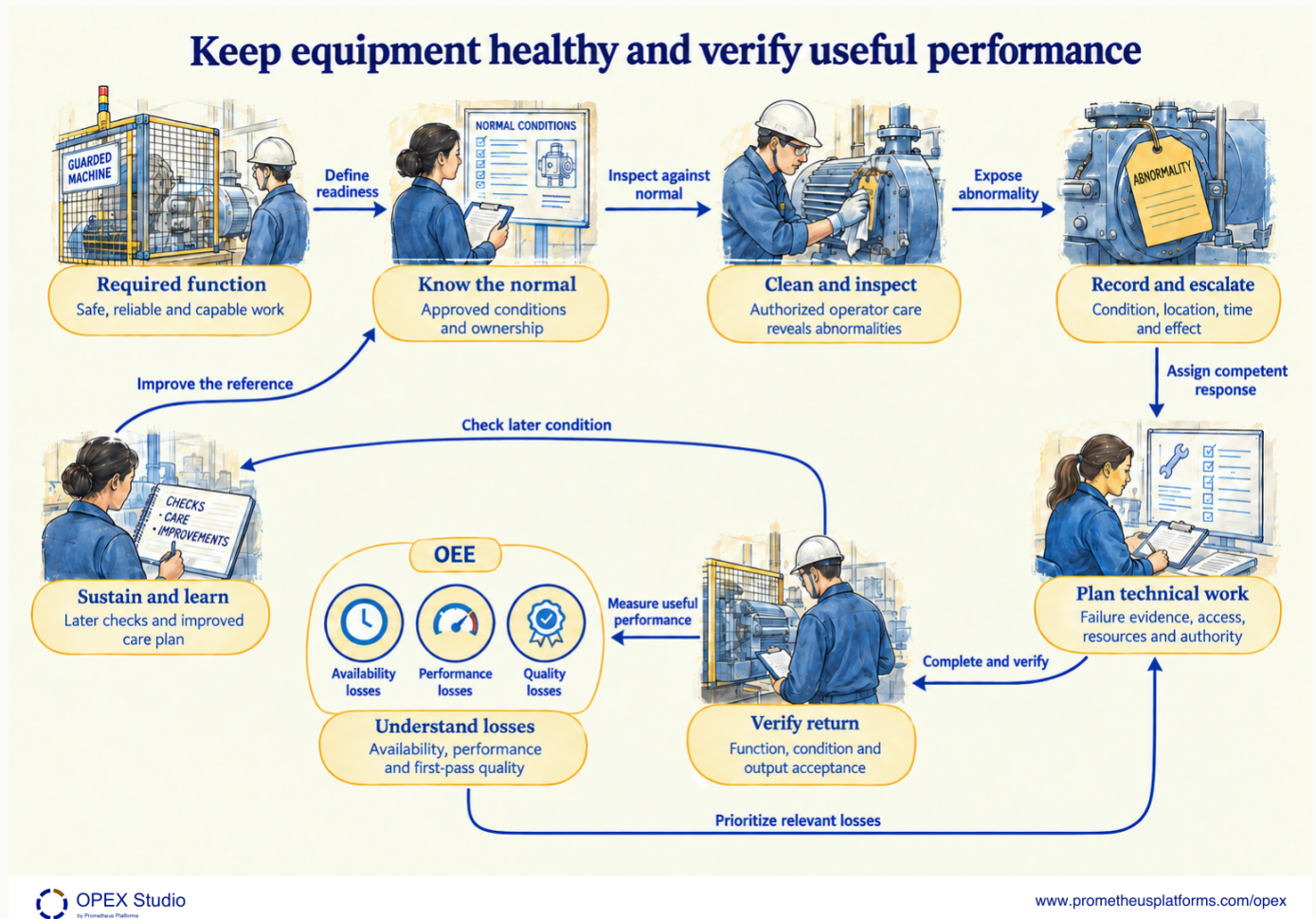
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8 mapped cases and method lessons. Illustrations teach the concepts; they are not records of achieved workplace results.

[Open this chapter online](#)

Keep equipment healthy and verify useful performance

Connect basic care, specialist maintenance, loss evidence and verified return to service.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

Equipment wellness starts with the function the equipment must perform and a clear reference for normal condition. Approved operator care can expose leaks, looseness or contamination, but technical intervention remains with competent authorized people. Record the condition and route it to the appropriate response. Planned work should address supported failure mechanisms and include verification of return, not only a completion tick. OEE helps reconcile categories of lost planned time with first-pass good output; it should guide useful investigation rather than encourage excess production. Later checks establish whether the condition is maintained and whether the care or maintenance plan needs revision.

Check the boundaries

Cleaning is an opportunity to inspect, not proof that a defect has been repaired.

Operator care does not authorize specialist adjustment or bypass of controls.

OEE combines availability, performance and first-pass quality; it is not a universal target or demand measure.

Read and apply the system / continued

Try it / discuss

A machine is clean and the maintenance task is signed off, but the same residue returns on the next shift. Is the issue sustained?

Check your reasoning

No. Record recurrence, retain unresolved status and review the technical response and verification. Appearance and task completion do not establish maintained condition.

Method sources

JIPM: About TPM

JIPM: 2020 Assessment Preparation

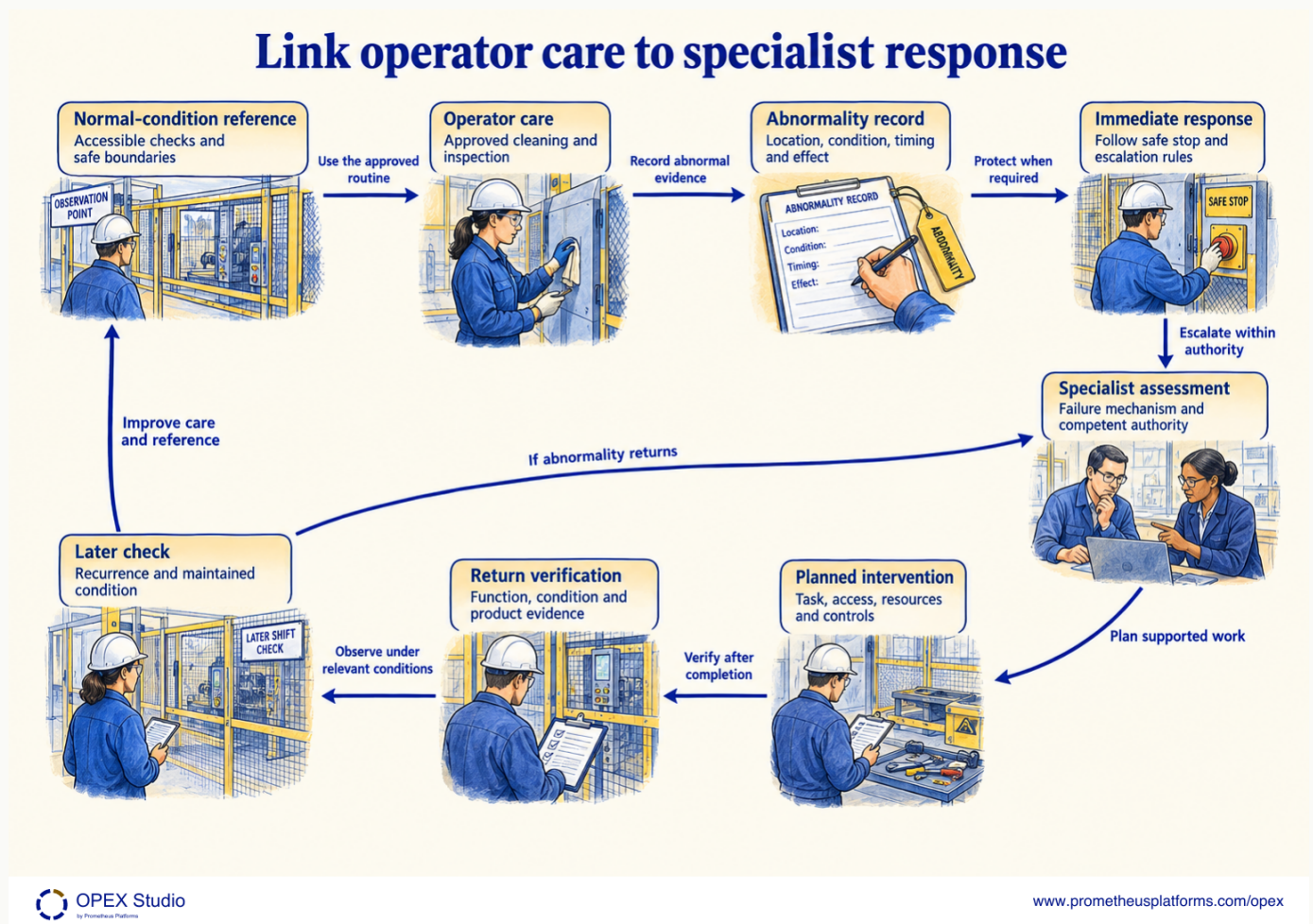
JIPM: 2024 TPM Awards Outline

LEI: Overall Equipment Effectiveness

LEI: 5S

Link operator care to specialist response

Keep condition discovery, authorized intervention and verified return distinct.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

An operator's approved cleaning and inspection routine helps discover changes from normal condition. Record what was observed and follow the defined immediate response and escalation boundaries. Discovery does not authorize technical adjustment, guard bypass or unplanned work. A competent specialist assesses the failure evidence and plans the appropriate intervention, access and controls. Return verification should check the required function, the maintained condition and relevant product evidence. Later observation under comparable conditions is needed to distinguish a completed task from sustained improvement. If the abnormality returns, retain it as unresolved and revisit the technical explanation rather than simply adding another cleaning tick.

Check the boundaries

Clean-to-inspect makes abnormalities visible; it is not a substitute for repair.

Operator care and specialist maintenance have different authority boundaries.

A later check must observe relevant operating conditions; a fresh clean photograph is insufficient.

Read and apply the system / continued

Try it / discuss

An operator repeatedly wipes oil from the same external point, and each shift signs the cleaning sheet. What should change in the response?

Check your reasoning

Record the repeated condition, follow local safe response rules and escalate for competent assessment. Keep the recurrence visible and plan verification after an authorized intervention. More signatures do not establish that the leak mechanism is controlled.

Method sources

JIPM: About TPM

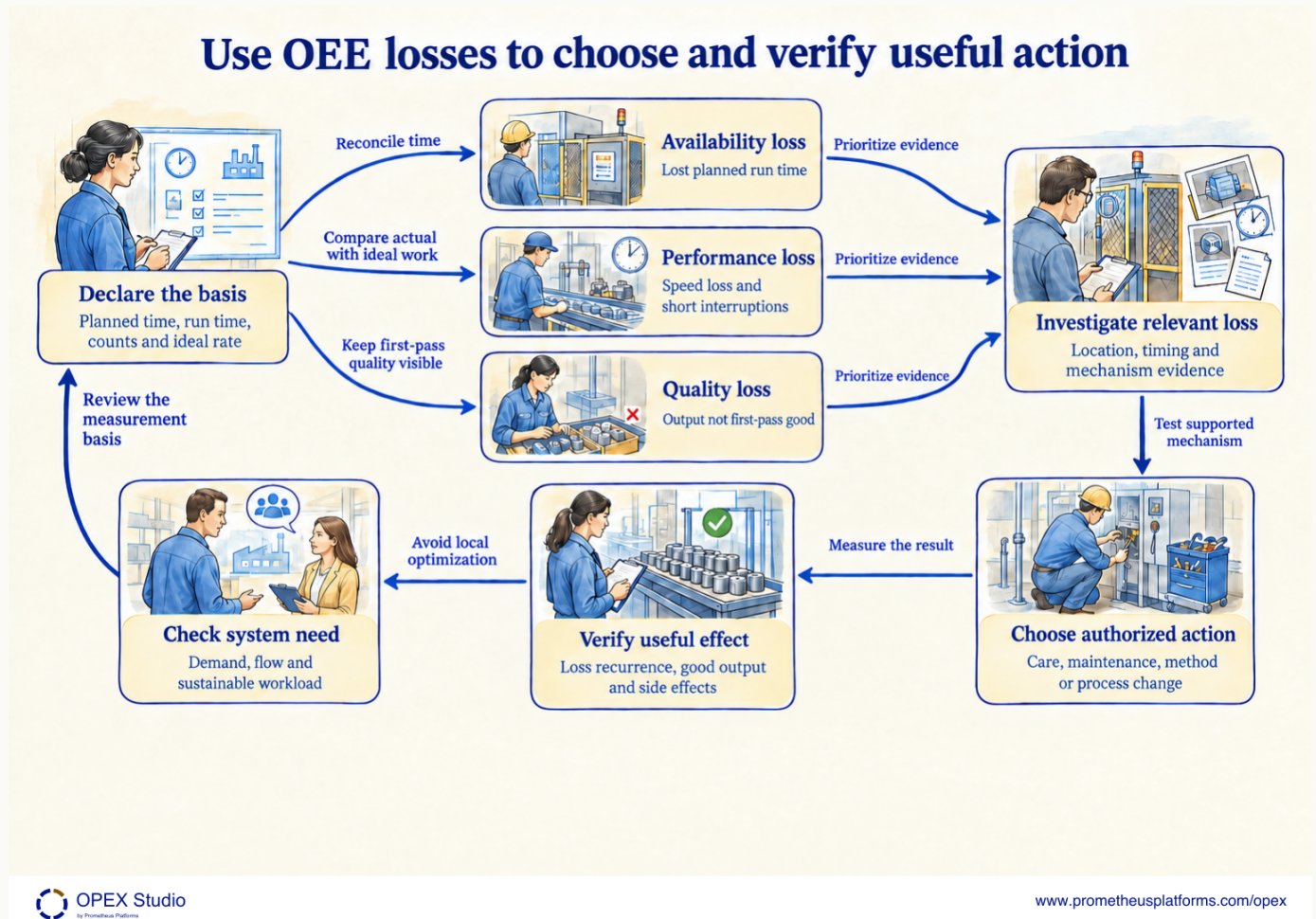
JIPM: 2020 Assessment Preparation

JIPM: 2024 TPM Awards Outline

LEI: 5S

Use OEE losses to choose and verify useful action

Relate the three OEE factors to loss evidence, targeted work and useful system outcomes.



GENERATED CONCEPT ILLUSTRATION / FICTIONAL WORKPLACE

Read the connections

OEE is useful when its measurement basis is clear. Declare planned time, run time, total output, first-pass good output and the ideal rate before calculating the factors. Availability, performance and quality represent different loss lenses and should lead to evidence about where and how loss occurs. The largest category is a starting question, not a proven cause. Choose an authorized intervention supported by the mechanism, then verify recurrence, good output and unintended effects. Finally check the system need: higher local output can create inventory or workload without improving customer delivery. Use the detailed OEE lesson for the exact numerical reconciliation.

Check the boundaries

OEE equals availability multiplied by performance multiplied by first-pass quality.

Keep planned-time and ideal-rate assumptions visible; do not improve the score by silently changing the denominator.

OEE is not a command to produce beyond demand or maximize every machine's utilization.

Read and apply the system / continued

Try it / discuss

A team increases reported OEE by excluding recurring stoppages from planned time while the customer receives no more good output. What should the review question?

Check your reasoning

Check whether the measurement basis changed legitimately and transparently. Reconcile the omitted time, examine actual losses and compare useful good output with customer need. A higher percentage alone is not evidence of operational improvement.

Method sources

LEI: Overall Equipment Effectiveness

JIPM: 2020 Assessment Preparation

JIPM: 2024 TPM Awards Outline

TOCICO: Process of Ongoing Improvement

Make Find, Use, Return a dependable routine

Find it. Use it. Reset it.



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

01 Sort unnecessary items	02 Set clear homes	03 Shine + inspect	04 Standardize the reset	05 Sustain checks; safety throughout
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The 20 illustrative retrieval times have middle values 124 and 128 seconds: median $(124 + 128) / 2 = 126$ seconds. The 60-second goal is not a measured result. 8 / 40 stock misses and 3 / 40 wrong selections may overlap; do not add them into an overall defect rate. Sustain evidence remains unknown.

The pantry example starts with a 126-second median retrieval time across 20 tasks and a 60-second goal. A clear home makes an item easier to find; Shine also exposes conditions that need attention. Standardize describes the reset, owner and response. Sustain requires repeated evidence that the routine works across shifts. The proposed after image cannot supply that evidence. Keep stock identity, access and required hygiene controls part of the routine.

TRY IT / DISCUSS

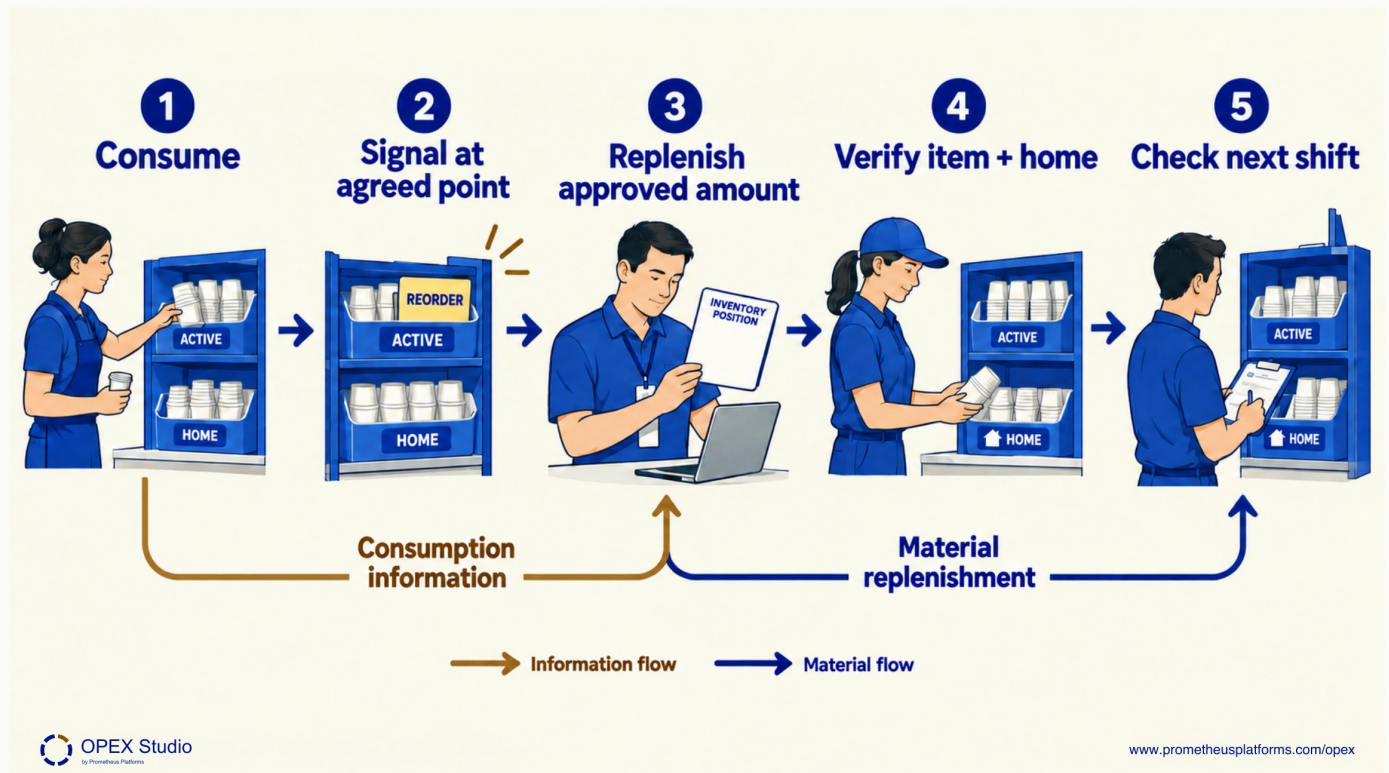
What would distinguish a completed tidy-up from evidence of Sustain?

Check your reasoning: Repeated comparable checks, response to misses and verified follow-through across operating conditions.

METHOD SOURCES / F16: Lean & Environment Toolkit, Chapter 5: 6S | F09: Lean Manufacturing: Don't Leave Home Without It! | F05: Toyota Production System | Q08: Reinforcing Lean Behavior Through Visual Management

Replenish from a signal, then verify the reset

Find it. Use it. Reset it.



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

NEW FICTIONAL EXERCISE / CONTINUOUS REVIEW / NO PACK CONSTRAINT

34 usable + 6 on-order - 0 backlog = 40 position

Minimum 40 | Target maximum 70 | New order 30

Pending stock is already counted. Refill identity and local sizing still need verification.

A replenishment rule connects use to action. In this separate fictional exercise, the agreed minimum is 40 units and target maximum 70. Inventory position is 34 usable on-hand plus 6 already on-order, with no backlog:40. At the trigger, order 30 additional units to restore position to 70; do not order the pending six twice. These are teaching settings, not measured pantry stock needs. Real settings require item, demand, lead time, pack size and uncertainty definitions. Exclude unusable stock, then verify refill identity and the next reset.

TRY IT / DISCUSS

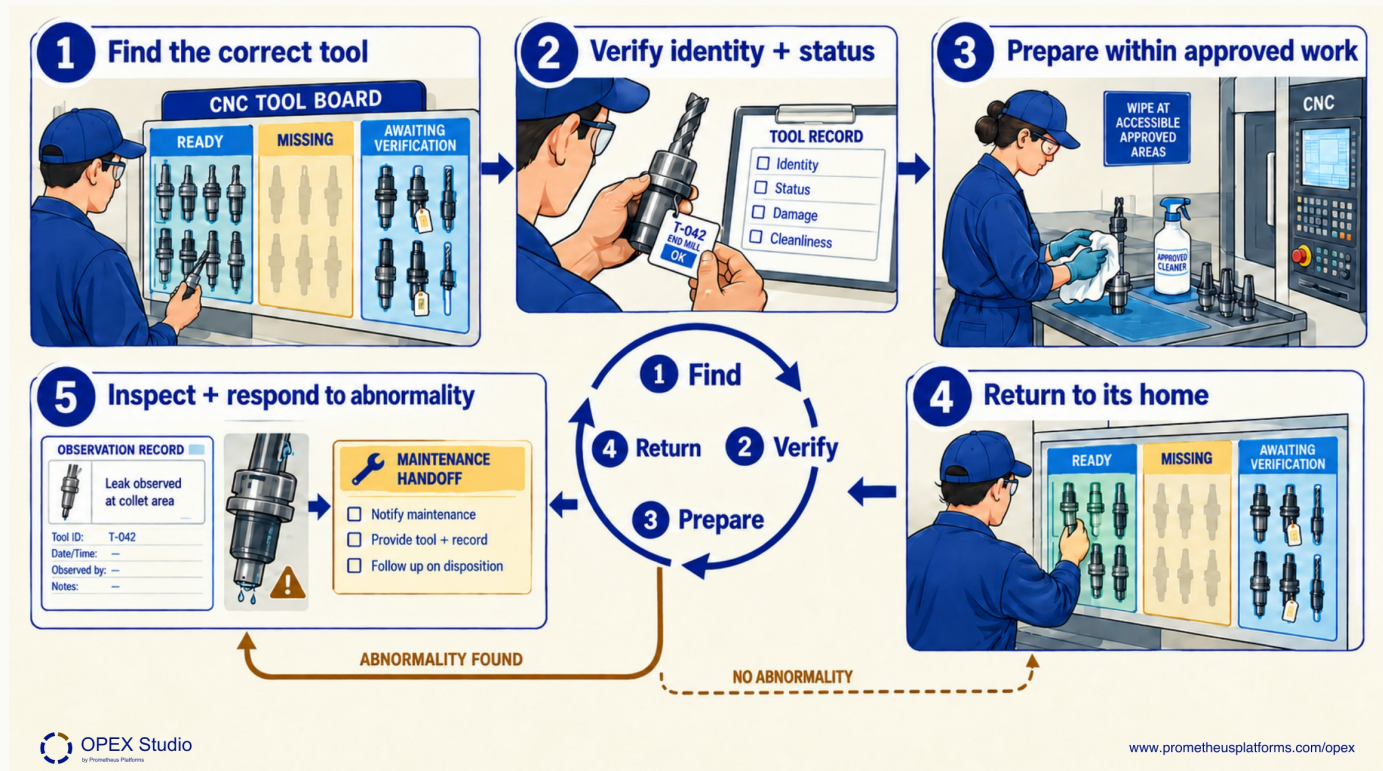
Can a tidy shelf photograph establish the right replenishment minimum?

Check your reasoning: No. Demand, replenishment timing, usable inventory and local constraints are needed.

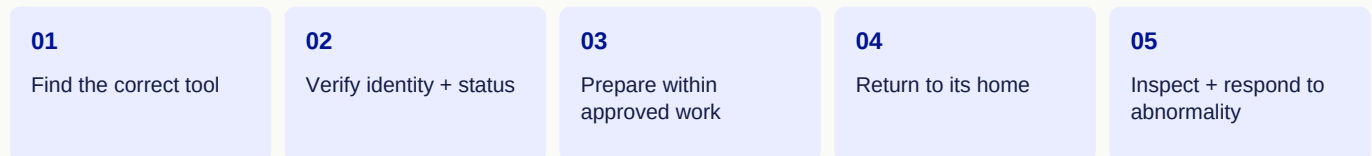
METHOD SOURCES / F16: Lean & Environment Toolkit, Chapter 5: 6S | F09: Lean Manufacturing: Don't Leave Home Without It! | F05: Toyota Production System | Q08: Reinforcing Lean Behavior Through Visual Management

Make the next-job tool kit obvious

A tool room ready for the next job



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE



Retained tool-search sample: 12 observations, median 6.5 minutes; proposed goal 2 minutes. Start when the next-job tool list opens and finish when the complete correct set reaches presetting.

Clear homes reduce searching only when the correct tool and its status remain clear. The retained twelve observations have a 6.5-minute median search time and a 2-minute goal. Separate ready tools from those awaiting verification. Cleaning accessible areas can reveal recurring residue; record the condition and route it to the responsible person. Do not return a suspect tool to use merely because its storage position is tidy.

TRY IT / DISCUSS

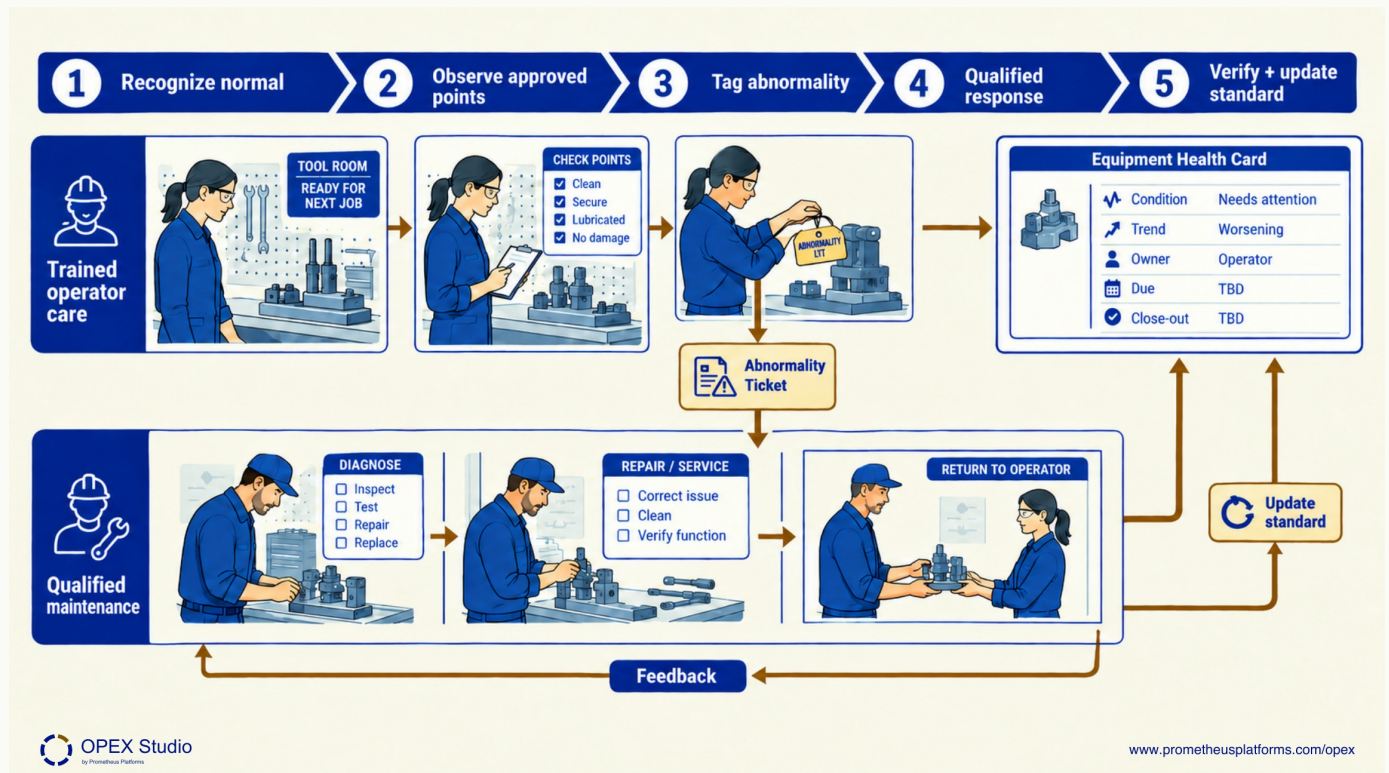
Where should a tool go if its identity is known but its verification status is uncertain?

Check your reasoning: The defined hold or awaiting-verification route, with an owner, rather than the ready-tool home.

METHOD SOURCES / F01: Total Productive Maintenance | F02: 2023 TPM Award Outline, autonomous maintenance example | F03: Asset Condition Management: A Framework for Smart,... | S04: OSHA: Control of Hazardous Energy

Link operator care to maintenance response

A tool room ready for the next job



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

Point / condition	Trend / abnormality	Owner / due	Verified close-out

A useful condition record includes the asset, observed condition, trend, owner, due date, response and comparable recurrence check. This is not a calculated equipment-health score.

Introduce TPM as coordinated equipment care and loss prevention, not simply a cleaning rota. Operators perform only trained, authorized checks; qualified maintenance owns work outside that boundary. Define what normal looks like, record an abnormal condition and verify the response under the approved procedure. The photo and 6S rubric cannot establish reliability, lubrication adequacy or technical equipment condition. Use the existing search-time data separately from any new equipment-health measures.

TRY IT / DISCUSS

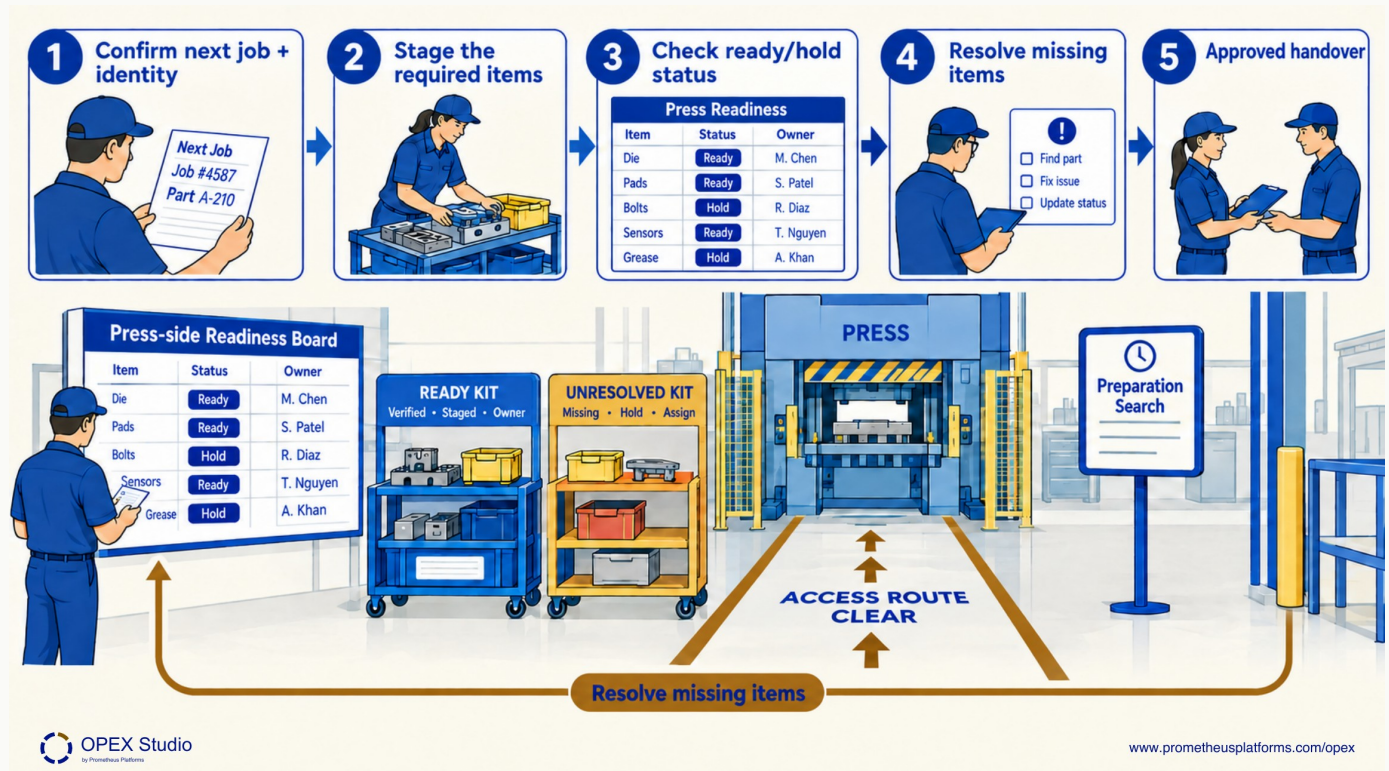
What evidence would show the residue problem was addressed beyond wiping it up?

Check your reasoning: An authorized response to its source and a comparable recurrence check, with conditions and observation window recorded.

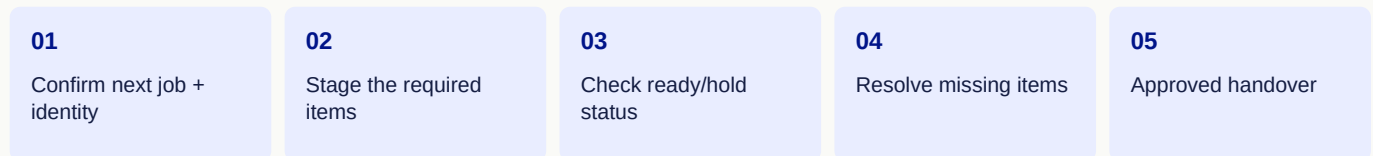
METHOD SOURCES / F01: Total Productive Maintenance | F02: 2023 TPM Award Outline, autonomous maintenance example | F03: Asset Condition Management: A Framework for Smart,... | S04: OSHA: Control of Hazardous Energy

Separate searching from a ready change kit

Give the press area a clear reset



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE



Retained preparation-search sample: 10 observations, median 9 minutes; proposed goal 4 minutes. It measures approved-list opening to verified-item readiness in the authorized staging area.

The existing measure is preparation search: ten observations, 9-minute median, 4-minute goal. Make required die-change equipment and identities visible before the authorized handover. Record missing or unverified items and assign a response. The organization trial does not change press settings or prove a faster technical changeover. Keep the boundary between external preparation and work requiring a controlled machine state explicit.

TRY IT / DISCUSS

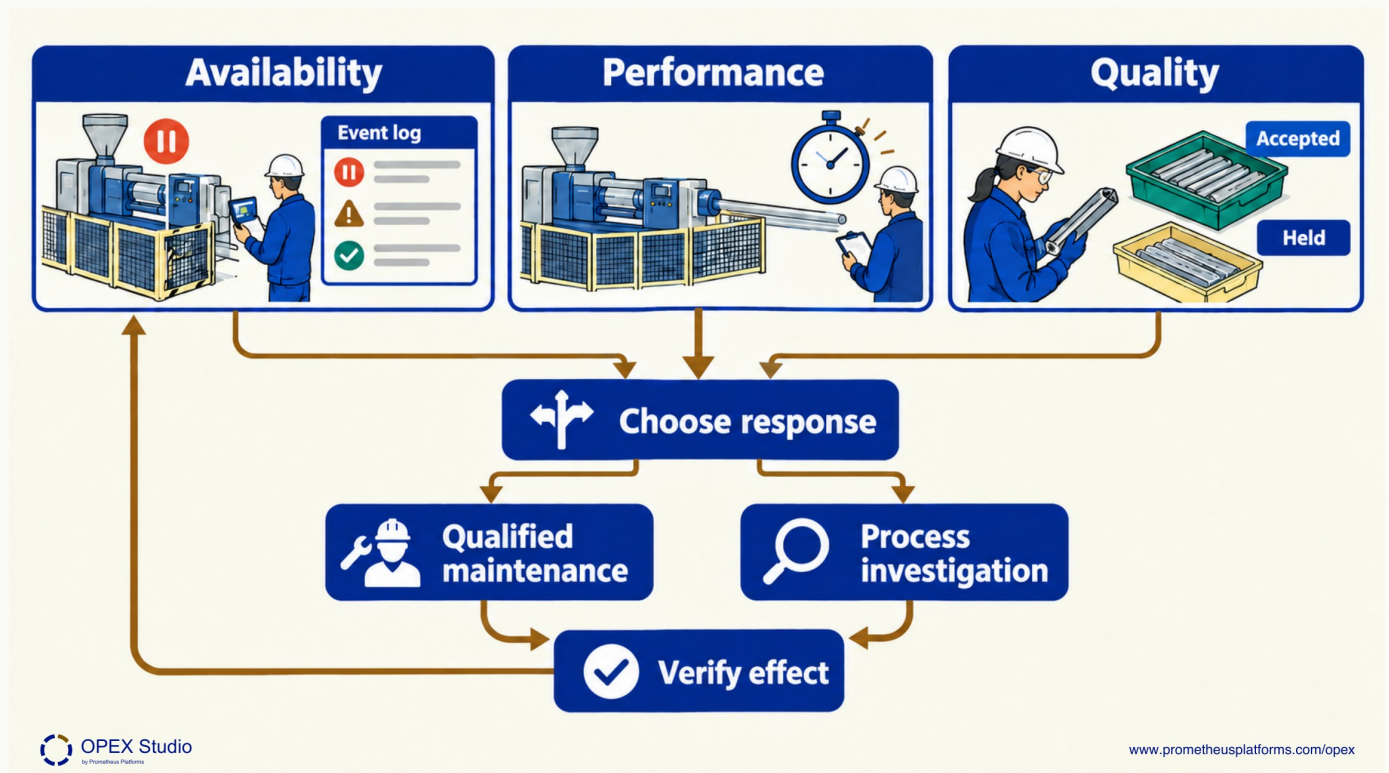
Does meeting the 4-minute search goal prove a 4-minute changeover?

Check your reasoning: No. Search is only one component; technical changeover has a different start/finish and controls.

METHOD SOURCES / F01: Total Productive Maintenance | F03: Asset Condition Management: A Framework for Smart,... | F04: OEE Implementation Guide | F15: Research Suggests Significant Benefits to Investing... | F18: Quality Glossary: Overall Equipment Effectiveness

Read equipment losses without hiding them

Give the press area a clear reset



GENERATED TEACHING ILLUSTRATION / FICTIONAL WORKPLACE

450 min

Planned

360 min

Running

300 min

Ideal-equivalent

285 min

Good-equivalent

NEW FICTIONAL EXERCISE: A 80% x P 83.33% x Q 95% = OEE 63.33%

New fictional OEE exercise: 450 planned production minutes, 360 running minutes, ideal cycle 0.5 minutes/unit, 600 total units and 570 first-pass good units. Equivalent-time waterfall: 450 > 360 > 300 > 285 minutes. Losses: 90 downtime, 60 speed and 15 quality minutes. These are time equivalents, not three independent stopwatch readings.

OEE combines availability, performance and quality within a declared boundary. In the new teaching exercise, $A=360/450$, $P=(600 \times 0.5)/360$ and $Q=570/600$; $OEE=63.33\%$. This is not the press case's measured OEE. Inspect the loss components before choosing a response. A high OEE alone does not prove customer flow, safety or equipment health, and changing the denominator does not remove a loss.

TRY IT / DISCUSS

If the team removes planned downtime from the denominator after the event, is that improvement?

Check your reasoning: No. Definitions must remain consistent; investigate the underlying loss and report boundary changes transparently.

METHOD SOURCES / F01: Total Productive Maintenance | F03: Asset Condition Management: A Framework for Smart,... | F04: OEE Implementation Guide | F15: Research Suggests Significant Benefits to Investing... | F18: Quality Glossary: Overall Equipment Effectiveness

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.

Shine and sustain: evidence over time

Operator care and specialist maintenance

Planned maintenance: criticality to verified return

OEE loss waterfall with denominator discipline

Quality maintenance: control conditions, not just inspect output

Find it. Use it. Reset it.

A tool room ready for the next job

Give the press area a clear reset

Open the complete learning library