

AI-04713 Event Tree Analysis New Employee Retention

#cmp

Perform a Event Tree Analysis of a new hire Samsung Employee lasting/surviving/thriving 1 year as CMP Equipment Technician 2.

Event Tree Analysis (ETA)

New Hire → Samsung Austin Semiconductor → CMP Equipment Technician 2 → 1-Year Survival & Thriving

Purpose: Model how a newly hired CMP Equipment Technician 2 can progress from the first day of employment to successfully completing—and thriving through—the first 12 months.

An **Event Tree Analysis** is a forward-looking, inductive risk-analysis method. It begins with an initiating event and follows the consequences of successive **success/failure decisions or conditions**. Unlike a Fault Tree Analysis, which asks “*What can cause failure?*”, an ETA asks:

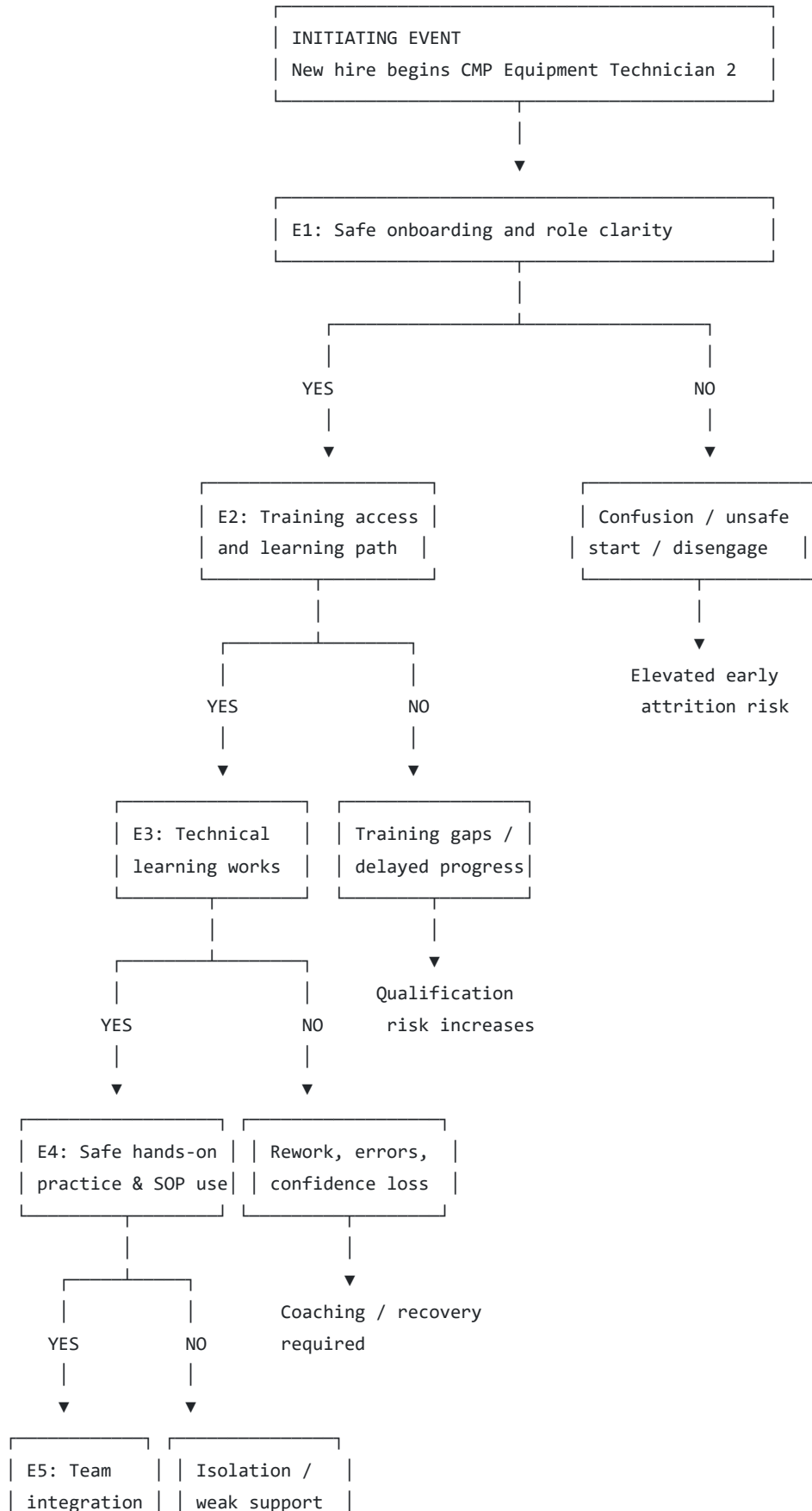
“Given that the employee starts, what conditions determine whether the employee survives, struggles, succeeds, or thrives after one year?”

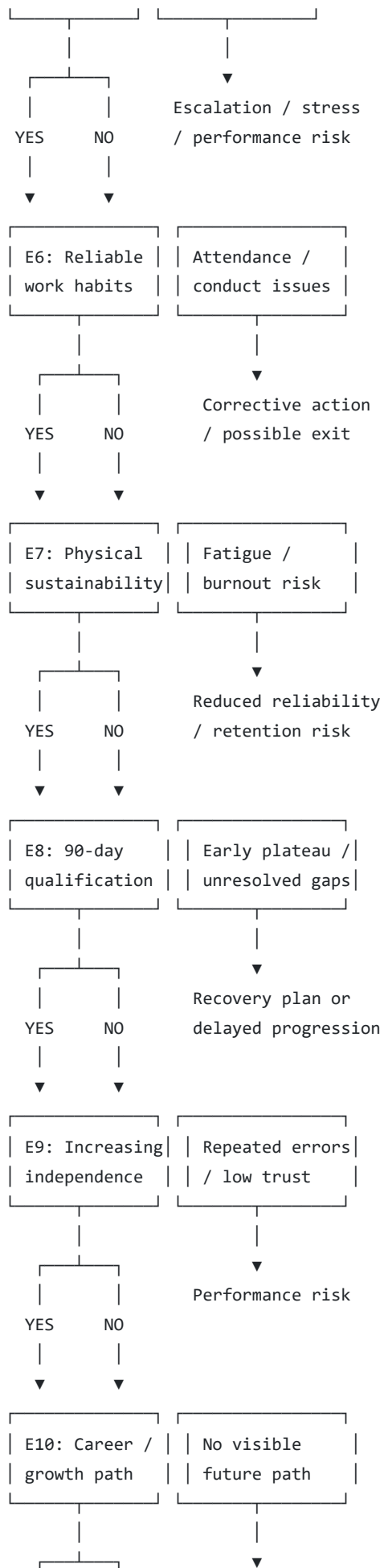
1. Scope and Objective

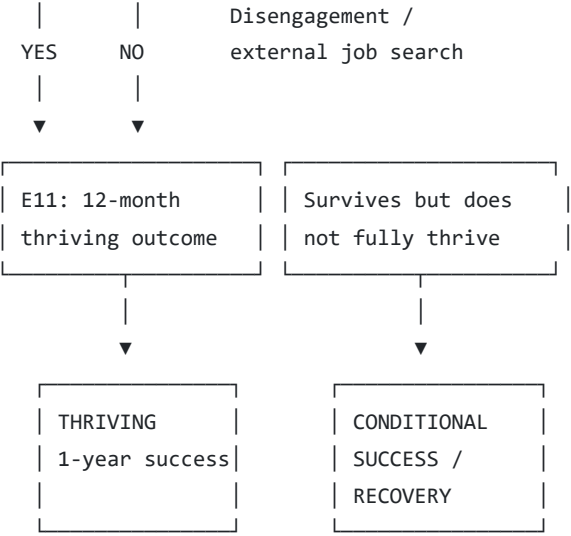
Element	Definition
Initiating event	New hire begins employment as Samsung Austin Semiconductor CMP Equipment Technician 2
Analysis horizon	First 12 months
System	Employee + training system + equipment + team + work environment + personal sustainability
Primary outcome	Completes 1 year competent, safe, reliable, and motivated
Success definition	Performs assigned CMP technician duties safely and independently within qualification limits, contributes to equipment availability, maintains professional reliability, and has a sustainable path to continued growth
Failure definition	Resignation, termination, extended inability to qualify, chronic unsafe behavior, severe disengagement, or inability to sustain the role
Analysis type	Qualitative, branching event tree
Important note	This is a structured risk model, not a prediction of Samsung's actual internal retention statistics or qualification policy.

2. Top-Level Event Tree

Initiating Event: New Hire Starts as CMP Equipment Technician 2







Interpretation: The tree is not strictly linear in real life. A technician can recover from a failed branch if coaching, retraining, workload adjustment, or support intervenes. The branches represent **conditions at decision points**, not irreversible destiny.

3. Detailed Event Tree

Event Definitions

Event	Critical question	YES means	NO means
E1	Is the employee safely onboarded and clear on expectations?	Knows role, safety boundaries, escalation channels, schedule, and performance expectations	Confusion, preventable errors, anxiety, unsafe assumptions
E2	Does the employee have access to structured training?	Assigned trainers, SOPs, systems, equipment exposure, qualification roadmap	Learning becomes informal, inconsistent, or delayed
E3	Is technical learning progressing?	Understands CMP fundamentals, equipment architecture, process interfaces, and troubleshooting logic	Memorization without understanding, slow qualification, repeated questions
E4	Can the employee practice safely under controlled conditions?	Uses PPE, LOTO, procedures, contamination controls, and proper escalation	Unsafe shortcuts, equipment damage, exposure, loss of trust
E5	Is the employee integrating with the team?	Communicates, asks questions, accepts feedback, supports shift handoffs	Isolation, poor handoffs, conflict, reluctance to ask for help
E6	Are work habits reliable?	Attendance, punctuality, documentation, ownership,	Absenteeism, missed tasks, poor records, inconsistent

		follow-through	execution
E7	Is the workload physically and mentally sustainable?	Manages shifts, fatigue, sleep, stress, and repetitive demands	Chronic fatigue, burnout, reduced alertness, injury risk
E8	Does the employee reach early qualification milestones?	Demonstrates required skills with appropriate supervision	Delayed qualification, performance plan, reassignment risk
E9	Does independence increase appropriately?	Troubleshoots within scope, prioritizes, escalates correctly, performs PM and corrective tasks	Dependency, repeated errors, inability to prioritize
E10	Is there a credible path for growth and recognition?	Feedback, development, expanded competencies, career visibility	Plateau, disengagement, perceived lack of future
E11	Is the employee still safe, competent, reliable, and engaged at 12 months?	Thriving / durable success	Survival with limitations, recovery required, or exit risk

4. Event Tree Branch Outcomes

The following branches show representative paths through the tree.

Legend

- **S** = Successful / favorable condition
- **F** = Unfavorable condition
- **R** = Recovery intervention
- **T** = Thriving outcome
- **C** = Conditional survival / continued employment
- **A** = Attrition or serious failure risk

Path	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	12-Month Outcome
P1 — Ideal development	S	S	S	S	S	S	S	S	S	S	T1: Thriving technician
P2 — Strong technician,	S	S	S	S	S	S	S	S	S	F	C1: Competent survivor ;

limited growth											retention risk
P3 — Training recovery	S	F	S	S	S	S	S	S	S	S	T2: Thrives after delayed start
P4 — Technical struggle, coached	S	S	F	S	S	S	S	F	S	S	C2/T3: Recovers and progresses
P5 — Team integration failure	S	S	S	S	F	S	S	S	S	S	C3: Competent but stressed / isolated
P6 — Reliability failure	S	S	S	S	S	F	S	F	F	S	A1: Corrective action / exit risk
P7 — Fatigue-driven decline	S	S	S	S	S	S	F	F	F	S	A2: Sustainability / retention risk
P8 — Safety failure	S	S	S	F	—	—	—	—	—	—	A3: Serious safety / employment risk
P9 — Early onboarding breakdown	F	F	—	—	—	—	—	—	—	—	A4: Early attrition risk
P10 — No structure	S	F	F	S	S	S	S	F	F	F	C4/A5: Stagnation or

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ed qualific ation											departu re
P11 — High perform er, unsustai nable workloa d	S	S	S	S	S	S	S	S	S	S	C5: Appears successf ul; burnout risk later
P12 — Resilien t self- directed learner	S	F	S	S	S	S	S	S	S	S	T4: Thrives through proactiv e learning

Important: These are **qualitative scenarios**, not statistical probabilities. No numerical probability should be assigned without actual HR, training, safety, and retention data.

5. Twelve-Month Timeline Event Tree

A new hire does not need to master everything immediately. The first year is better viewed as a sequence of developmental gates.











Phase 1 — Days 1–30: Entering the System

Primary question: *Can the employee enter the environment safely, understand expectations, and begin learning without avoidable confusion?*

Event Gate	Favorable condition	Failure condition	Protective action
Site and cleanroom onboarding	Understands access, PPE, contamination control, conduct	Access confusion, improper gowning, procedural violations	Checklist + supervised repetition
Safety fundamentals	Understands LOTO, chemical safety, emergency response, EHS escalation	Treats safety as paperwork	Demonstration-based qualification
Role clarity	Knows what Technician 2 can and cannot do	Performs beyond authorization	Clear scope-of-work matrix
Team introduction	Knows lead, trainer, supervisor, escalation contacts	Hesitates to ask for help	Assigned mentor / buddy
Shift expectations	Understands schedule, handoff, attendance, break, overtime norms	Surprises and resentment	Written shift expectations

Learning plan	Has a visible 30/60/90-day roadmap	No idea what "good" looks like	Qualification tracker
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30-Day Desired Outcome

Safe, oriented, connected, and learning—not yet expected to be fully independent.

Phase 2 — Days 31–90: Building Technical Competence

Primary question: *Can the employee convert instruction into repeatable, safe equipment work?*

Event Gate	Favorable condition	Failure condition	Protective action
CMP process understanding	Understands wafer flow, planarization purpose, slurry, pad, carrier, endpoint concepts	Treats equipment as isolated boxes	Process-to-equipment overview
Tool architecture	Identifies major subsystems and interfaces	Random part swapping	Equipment block diagrams
PM execution	Follows PM checklist and verification steps	Skips steps or documentation	Demonstration + sign-off
Troubleshooting	Uses symptoms → evidence → cause → corrective action	Guessing and repeated resets	Structured troubleshooting template
Contamination control	Understands why cleanliness and chemical control matter	Cross-contamination risk	Reinforced contamination controls
Documentation	Records symptoms, actions, parts, results	Incomplete or vague notes	Standardized work-order examples
Qualification	Passes required checks at the expected pace	Delayed progress	Individual recovery plan

90-Day Desired Outcome

Demonstrably useful under supervision, with a reliable foundation for independent work.

Phase 3 — Months 4–6: Becoming Dependable

Primary question: *Can the employee perform routine responsibilities reliably while handling variation and escalation?*

Event Gate	Favorable condition	Failure condition	Protective action
Routine PM	Consistent quality and completion	Inconsistent execution	Audits + refresher training
Corrective maintenance	Works methodically within scope	Overconfidence or avoidance	Escalation boundaries
Equipment uptime awareness	Understands impact of downtime and response time	Only sees isolated tasks	Downtime / availability context
Shift handoff	Transfers accurate information	Critical details lost	Handoff template

Parts and tools	Uses correct tools, torque, parts, and controls	Improvisation / misplaced parts	Tool and parts discipline
Team contribution	Helps without bypassing ownership	"Not my problem" behavior	Shared goals and feedback
Problem-solving	Identifies recurring issues and patterns	Repeats the same workaround	5-Why / cause-and-effect training

Six-Month Desired Outcome

A dependable technician who can be trusted with routine work and knows when to escalate.

Phase 4 — Months 7–9: Developing Independence

Primary question: *Can the employee think and act like a technician rather than merely follow instructions?*

Event Gate	Favorable condition	Failure condition	Protective action
Independent diagnosis	Uses data, symptoms, history, and procedure	"Parts cannon" troubleshooting	Diagnostic decision trees
Prioritization	Distinguishes urgent, important, and routine	Reacts randomly	Work-priority framework
Ownership	Closes the loop and verifies restoration	Leaves unresolved issues	Completion criteria
Communication	Concise, accurate technical updates	Vague or delayed reporting	SBAR-style technical communication
Cross-functional interaction	Works effectively with process, manufacturing, engineering, and EHS	Defensive silo behavior	Cross-functional exposure
Mentoring	Can explain routine tasks to newer personnel	Knowledge remains fragmented	Teach-back exercises

Nine-Month Desired Outcome

Increasingly independent, technically credible, and operationally trusted.

Phase 5 — Months 10–12: Consolidation and Thriving

Primary question: *Has the employee become a sustainable contributor with a future at the company?*

Event Gate	Favorable condition	Failure condition	Protective action
Technical breadth	Competent across assigned equipment scope	Narrow dependency on one task	Cross-training
Technical depth	Understands failure mechanisms, not just symptoms	Superficial fixes	Advanced troubleshooting
Reliability	Consistent attendance, documentation, and	Performance variability	Targeted coaching

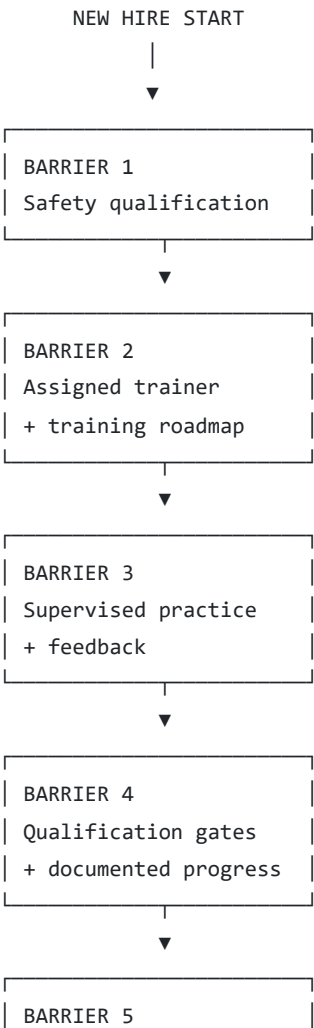
	execution		
Safety maturity	Anticipates hazards and stops unsafe work	Normalizes shortcuts	Safety leadership reinforcement
Professional reputation	Known as reliable, teachable, and calm	Known for avoidable problems	Feedback and coaching
Career direction	Identifies next skill or role target	Sees no future	Development discussion
Personal sustainability	Can maintain the schedule and recovery	Chronic exhaustion	Workload and wellness support
Year-end review	Evidence of growth and contribution	Unresolved gaps	Specific next-year plan

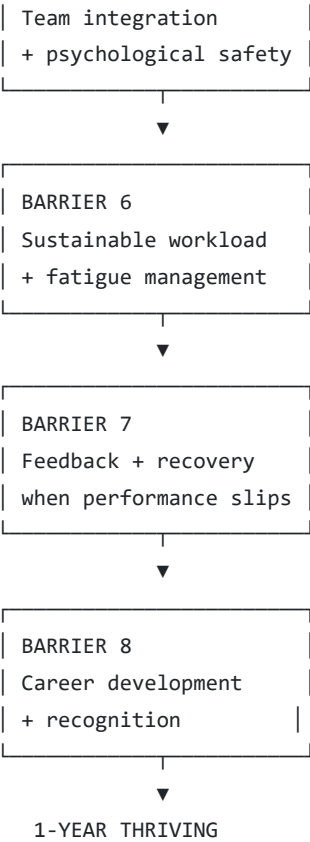
12-Month Desired Outcome

A safe, competent, reliable, respected, and motivated CMP Equipment Technician 2 who is positioned for continued development.

6. Critical Success Barriers

These barriers prevent a temporary difficulty from becoming a one-year failure.





7. Failure Modes and Recovery Branches

A good ETA includes **recovery paths**, because most employees encounter problems during the first year.

Failure condition	Immediate consequence	Escalating consequence	Recovery intervention	Desired result
Does not understand SOP	Incorrect or hesitant work	Repeated errors	Re-demonstration + teach-back	Competence restored
Afraid to ask questions	Hidden uncertainty	Unsafe assumptions	Mentor + no-blame escalation culture	Questions become normal
Fails a qualification	Delayed independence	Confidence loss	Targeted retraining + retest	Qualification achieved
Makes repeated documentation errors	Poor traceability	Loss of trust	Documentation coaching	Accurate records
Struggles with troubleshooting	Longer downtime	Dependency on others	Fault-isolation framework	Better diagnostic reasoning
Conflict with coworker	Poor communication	Isolation / shift friction	Supervisor mediation	Functional working relationship
Fatigue from shift work	Reduced attention	Safety / attendance risk	Schedule, rest, workload support	Sustainable performance
Feels overlooked	Reduced motivation	Job search	Feedback + career discussion	Re-engagement

Receives harsh or unclear feedback	Defensiveness	Avoidance / disengagement	Specific behavioral feedback	Corrective learning
Experiences equipment-related mistake	Anxiety / loss of confidence	Concealment or repetition	Immediate reporting, learning review	Safer future behavior
Lacks cross-training	Narrow capability	Limited growth	Planned skill expansion	Broader competence
Perceives no advancement path	Stagnation	Voluntary attrition	Development roadmap	Long-term retention

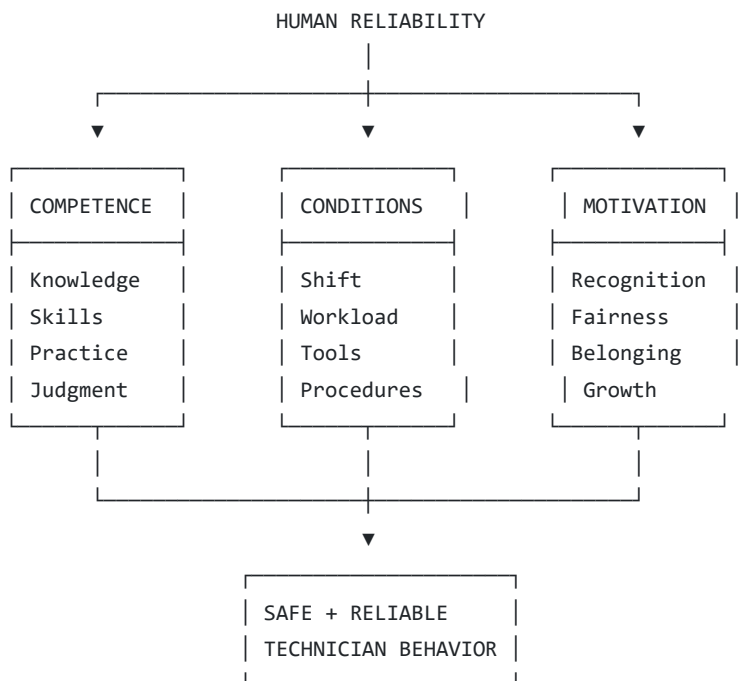
Core principle:

A recoverable performance problem becomes a retention problem when the employee receives neither clarity nor a credible path to improve.

8. Human Reliability Factors

The employee is part of a larger socio-technical system. Performance is not determined by motivation alone.

Human Reliability Model



Key Human Factors

- **Knowledge:** CMP fundamentals, equipment architecture, safety, and procedures.
- **Skill:** Ability to execute tasks correctly and repeatedly.
- **Judgment:** Knowing what to do, what not to do, and when to escalate.
- **Attention:** Maintaining focus in a complex, repetitive, high-consequence environment.
- **Communication:** Accurate handoffs, work-order notes, and escalation.
- **Fatigue management:** Shift work and overtime can affect attention and reliability.
- **Psychological safety:** Employees must be able to report uncertainty and mistakes without hiding them.

- **Belonging:** Team acceptance affects learning speed and willingness to seek help.
- **Recognition:** Visible progress reinforces productive behavior.
- **Growth:** A credible future helps convert short-term employment into long-term commitment.

9. CMP Equipment Technician 2: Technical Success Domains

The exact qualification matrix will depend on Samsung's internal training system, assigned toolsets, and authorization limits. A useful ETA should nevertheless track the following technical domains.

Domain	Year-1 success indicator	Evidence of progression
EHS / LOTO	Performs work within authorized safety procedures	Completed training, observed safe behaviors, correct escalation
Cleanroom discipline	Maintains contamination-control requirements	Consistent gowning, material handling, and procedural compliance
CMP fundamentals	Explains purpose and major variables of CMP	Can connect process outcomes to equipment conditions
Equipment architecture	Identifies major subsystems and interfaces	Can locate components and explain their function
Preventive maintenance	Performs assigned PM tasks correctly	Repeatable execution, correct verification, complete documentation
Corrective maintenance	Troubleshoots within scope	Uses evidence-based fault isolation
Slurry / chemical systems	Understands relevant safety and equipment interfaces	Correct handling, leak awareness, escalation
Wafer handling / mechanical systems	Understands relevant motion, carrier, pad, and wafer-handling interfaces	Avoids damage and follows procedures
Sensors / actuators	Understands basic feedback and control functions	Recognizes abnormal readings and escalates appropriately
Utilities / facilities interfaces	Understands required supporting services	Identifies abnormal utility conditions within scope
Documentation / CMMS	Records work accurately and completely	Traceable work history and clear handoffs
Troubleshooting logic	Moves from symptom to verified cause	Reduced trial-and-error behavior
Communication	Gives concise technical updates	Effective shift handoff and escalation
Continuous improvement	Identifies recurring problems or waste	Suggests practical improvements with evidence

10. Leading Indicators: Are We on Track Before Month 12?

The most useful event-tree controls are **leading indicators**, not merely the final outcome of "still employed."

Indicator	Healthy signal	Warning signal	Critical signal
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Training completion	On schedule	Repeated delays	No clear progress
Qualification progress	Meets planned gates	One or more gates slipping	Persistent inability to qualify
Safety behavior	Consistent procedural compliance	Coaching required	Deliberate shortcuts / concealment
Question-asking	Asks early and appropriately	Hesitates	Avoids escalation
Documentation quality	Accurate and complete	Minor recurring errors	Missing or unreliable records
Attendance	Dependable	Occasional issues	Chronic unreliability
Team integration	Participates and communicates	Withdrawn	Persistent conflict or isolation
Technical independence	Increasing	Flat	Declining
Feedback response	Applies coaching	Slow improvement	Defensive / nonresponsive
Fatigue / sustainability	Recovers adequately	Persistent tiredness	Safety or attendance impact
Career engagement	Identifies next skills	Uncertain	Expressed disengagement / active exit intent
Supervisor confidence	Trust increasing	Closely monitored	Work cannot be assigned safely without excessive oversight

11. Practical 30–60–90–180–365-Day Control Plan

This converts the event tree into an operational plan.

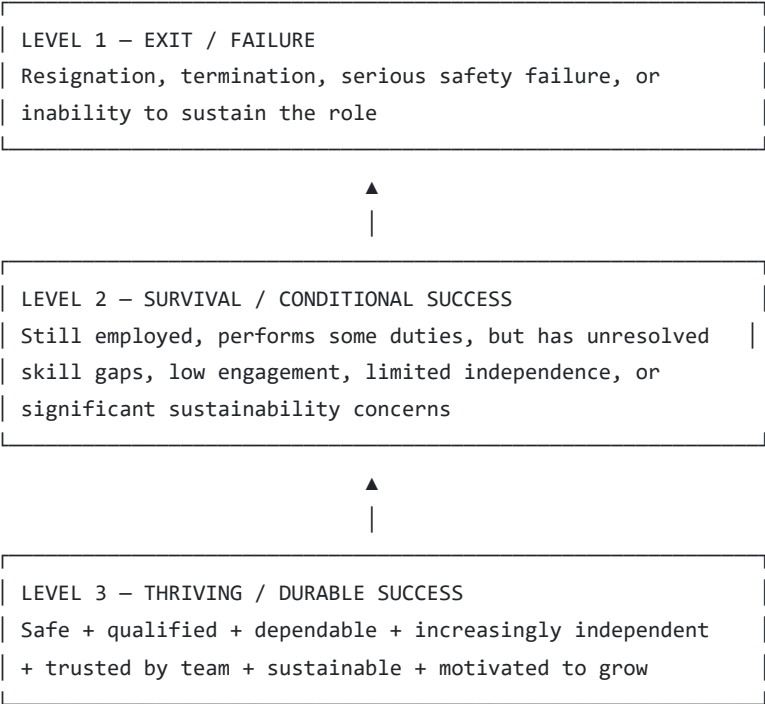
Time	Employee actions	Trainer / supervisor actions	Exit criteria
Day 1–7	Learn site rules, ask questions, understand role boundaries	Assign trainer, explain expectations, verify safety onboarding	Employee knows who to contact and how to work safely
Day 8–30	Study equipment, observe, practice documentation, learn terminology	Provide structured exposure and feedback	Basic orientation and learning plan complete
Day 31–60	Perform supervised tasks, explain procedures, practice troubleshooting	Observe, correct, and document progress	Demonstrates repeatable basic skills
Day 61–90	Complete early qualification requirements	Review progress and remove training barriers	Safe, useful, supervised technician
Month 4–6	Build consistency, improve troubleshooting, own routine tasks	Increase responsibility gradually	Dependable execution within scope
Month 7–9	Expand equipment knowledge, improve prioritization, communicate clearly	Provide cross-training and developmental feedback	Increasing independence and trust

Month 10–12	Demonstrate sustained performance, identify next skill target	Conduct career and development review	Safe, competent, reliable, engaged one-year technician
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12. The “Thriving” Outcome Is More Than Survival

A technician who remains employed for one year may have **survived**, but thriving requires a stronger outcome.

Three Outcome Levels



Thriving Scorecard

A qualitative assessment can use these seven dimensions:

Dimension	Thriving condition
Safety	Consistently follows procedures and demonstrates hazard awareness
Technical competence	Performs assigned work correctly within authorization
Reliability	Dependable attendance, execution, and documentation
Independence	Diagnoses and resolves appropriate problems without unnecessary dependence
Team trust	Communicates clearly and contributes constructively
Sustainability	Can maintain the role without chronic fatigue or burnout
Growth orientation	Actively develops skills and sees a future in the organization

Thriving = all seven are reasonably healthy—not perfection in every category.

13. Management Interpretation: What Actually Retains the Employee?

The event tree suggests that first-year retention is not controlled by one variable. It is the result of multiple interacting pathways.

High-Leverage Retention Controls

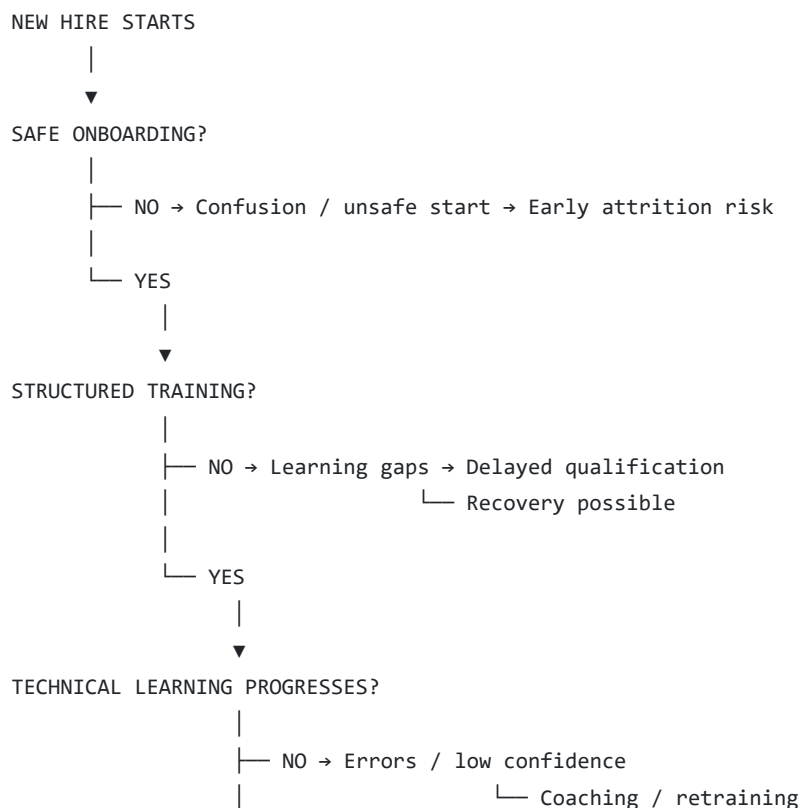
1. **Make expectations explicit.**
2. **Provide a real training roadmap.**
3. **Assign accessible technical support.**
4. **Allow safe questions and early escalation.**
5. **Give frequent, specific feedback.**
6. **Measure qualification progress—not just attendance.**
7. **Avoid confusing “independence” with abandonment.**
8. **Recognize improvement and dependable execution.**
9. **Manage fatigue and workload realistically.**
10. **Show the employee what the next 1–3 years could look like.**

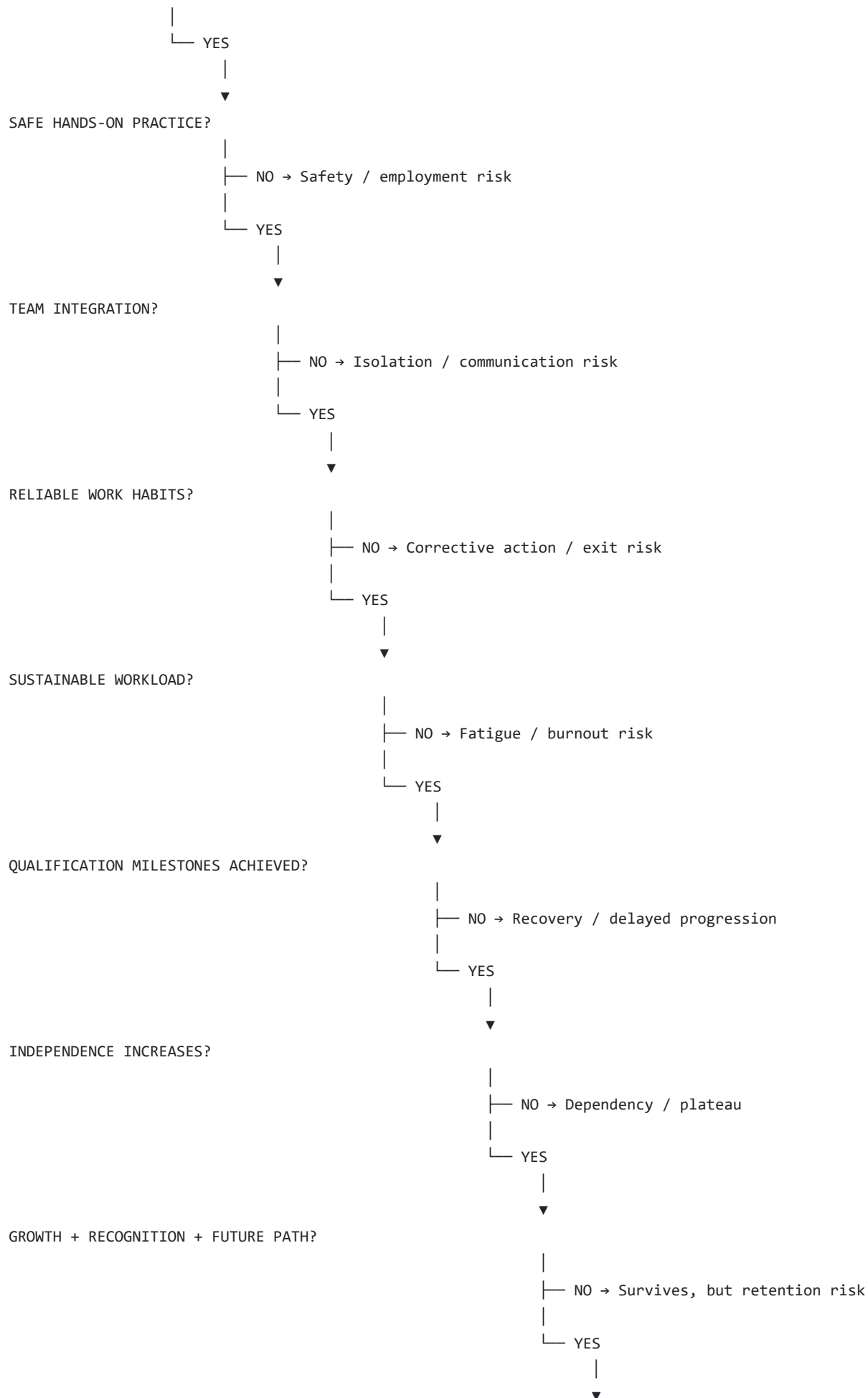
The Central Retention Mechanism

Clarity → Competence → Confidence → Contribution → Recognition → Growth → Retention

If one link breaks, the employee may still recover. If several links break simultaneously, the probability of attrition rises.

14. Final Event Tree Summary





	1-YEAR THRIVING	
	CMP TECHNICIAN 2	
	SAFE	
	QUALIFIED	
	RELIABLE	
	TRUSTED	
	SUSTAINABLE	
	GROWING	

Bottom Line

A new Samsung CMP Equipment Technician 2 is most likely to survive and thrive for one year when the organization and employee jointly maintain a chain of successful conditions:

Safe entry → structured learning → supervised practice → qualification → team trust → reliable habits → sustainable workload → increasing independence → visible growth.

The most important insight from the ETA is that **retention is usually an outcome of a functioning development system**. A technician does not merely need to endure the first year; the technician needs repeated evidence that *“I can do this safely, I am getting better, my team trusts me, and I have a future here.”*