SKILL DYNAMICS

Semiconductor Supply Chain Resilience

An Executive Guide to Challenging Critical Supply Dependencies.



SUPPLY CHAIN ACADEMY

V 13.10.26

Test the Decision, Not the Plan

Your resilience plan relies on assumptions. This guide provides a practical way to identify those decision-critical assumptions, determine the point at which they change the decision, and focus attention on the uncertainties that matter.

This guide does not replace quantitative network modelling, risk platforms or existing resilience processes.

It asks a simpler question:

What has to be true for us to trust the decision we have already made?

Start with the Decision

1. Define the Scenario

Start with a specific disruption.

- What capability is lost or constrained?
  - For how long?
- Which products, customers or operations are affected?

Then ask:

- Is this the scenario our mitigation was actually designed to protect against?

An alternative source might protect against a site-specific incident while providing little protection against a regional event, common sub-tier failure, infrastructure disruption or trade restriction.

Test the break scenario. Don't only test the scenario the mitigation was designed to manage.

Ask:

- What plausible variation of this scenario would cause the mitigation to fail?

2. State the Current Decision

Be explicit about the management position.

For example:

"We do not require another source because our qualified alternative plus existing strategic inventory provides adequate continuity. "

Then answer two questions:

- What are we relying upon?
- What have we decided not to do as a consequence?

That second question matters. Resilience decisions frequently justify not holding more inventory, reserving more capacity, qualifying another source or investing elsewhere.

3. Identify the Assumptions that Matter

Ask:

- What must remain true for our current decision to remain valid?

Depending on the dependency and mitigation, assumptions might concern:

- technical and customer qualification;
- genuinely available capacity;
- process or technology compatibility;
- ramp time and achievable yield;
- material availability;
- equipment or critical subsystem availability;
- packaging and test capacity;
- independence from common upstream, geographic or infrastructure dependencies.

Only retain assumptions whose failure could change the current decision.

Three Semiconductor Traps

- Approved does not necessarily mean available.
- Capacity does not necessarily mean compatible capacity.
- A different source does not necessarily mean an independent supply chain.

Decision-critical Assumptions

What must remain true?	Why does the decision depend on it?

Find Where the Decision Changes

Statements such as these are reassuring but insufficient:

- The alternative source has sufficient capacity.
- We have enough strategic inventory.
- Qualification can be completed quickly.
- Recovery should occur before inventory is exhausted.

Ask instead:

How much?

By when?

At what point would we make a different decision?

That point is the decision threshold.

Simplified Illustrative Example

Scenario
Primary manufacturing capacity for a critical product family is unavailable for 12 weeks.

Current Decision
Rely on strategic inventory and qualified alternative capacity rather than qualify a third source.

Decision-critical Assumption
The alternative source can provide sufficient qualified output before strategic inventory is exhausted.

Decision Threshold
The strategy remains adequate only if the alternative source can provide at least: **18,000 qualified units per week by week 7.**

The threshold should be derived from the organisation's own demand, inventory, capacity, service and recovery analysis — not selected through judgement alone.

If validated available capacity is comfortably above the threshold, the current decision may be robust.

If the credible range crosses the threshold, relatively small changes in capacity availability, demand, yield or ramp time could change the decision.

If available capacity is below the threshold, management has a different decision to make.

Test the Evidence

For each decision-critical assumption, ask:

- What is the decision threshold?
- What is our best current evidence?
- What credible uncertainty surrounds it?
- Could that uncertainty take us across the threshold?
- What is the consequence if we are wrong?

Critical Assumption	Decision Threshold	Best Evidence / Credible Range	Could the range cross the threshold?	Consequence If Wrong

Where appropriate, established resilience measures such as Time to Survive, Time to Recover and Performance Impact can help establish these thresholds.

Use existing network, inventory, demand and capacity analysis. Do not substitute unsupported estimates simply to complete the exercise.

Bring the Evidence Together

A decision-critical assumption may span several functions.

Procurement may understand the commercial commitment. Engineering may own qualification. Manufacturing may understand achievable yield and ramp. Planning may hold the inventory and demand assumptions. Customer teams may understand approval constraints and service consequences.

Test the combined evidence behind the decision — not simply the confidence of the function presenting the mitigation.

Where Should Management Focus

Prioritise assumptions where uncertainty could change the decision and the consequence of being wrong is material.

Try to Break the Mitigation

The purpose is not to create another exhaustive risk checklist.

Take the protection the organisation is already relying upon and challenge whether it would still work under the scenario being tested.

If you rely on...	Try to break it by asking...
Alternative source or route	Is it technically deployable, sufficiently available and genuinely independent under this disruption?
Strategic inventory	Does it protect required demand until usable supply is restored, including lead-time, ramp and yield effects?
Reserved capacity	Is it compatible, genuinely protected and actually available under the disruption being tested?
Geographic diversification	Have we diversified the underlying dependency or merely its location?
Recovery capability	Are we measuring restoration of usable supply or simply restart of the affected operation?

Look Below the Apparent Alternative

Apparently independent sources or capabilities may still share exposure to:

- critical upstream materials;
- specialist manufacturing equipment or subsystems;
- utilities or infrastructure;
- logistics corridors;
- ownership or control;
- export restrictions;
- critical sub-tier dependencies.

The relevant question is not simply:

"Do we have another source?"

It should be:

"Would the alternative remain available under the same event?"

Be Precise About Recovery

"Recovered" can mean very different things:



These points may be separated by significant time.

Do not allow 'factory restarted' to become synonymous with 'risk removed'.

Where material, analysis should also consider downstream inventory depletion and the time required for the wider supply network to recover after the original node restarts.

Challenge the Opposite Assumption

Resilience has a cost.

Once under-protection has been challenged, ask:

- Where are we paying for protection that no longer changes the outcome?

Robust analysis should identify both insufficient and disproportionate protection.

Executive Review - Worksheet

1. Scenario

- What specific disruption are we testing?
- What plausible variation would be most likely to break the mitigation?

2. Current Decision

- What are we relying upon?
- What have we chosen not to do as a consequence?

3. Decision-critical Assumptions

What must remain true?

1. _____
2. _____
3. _____

4. Decision Thresholds

At what point would each assumption change the decision?

1. _____
2. _____
3. _____

5. Evidence & Uncertainty

- Which assumption has a credible range that could cross its decision threshold?
- What is the material consequence if we are wrong?
- Does the evidence come together across the functions that own different parts of the assumption?

6. Correlated Exposure

- Which supposedly independent protection could fail under the same event?

7. Next Decision

- What single uncertainty is most worth resolving now?
- What evidence would resolve it?
- What decision could that evidence change?

The Final Test

Your organisation probably already has a resilience plan.

The more useful question is:

What has to be true for us to trust it?

Basis for the Guide

This guide draws on established supply chain resilience principles and published research into the structure, dependencies and vulnerabilities of semiconductor supply networks.

It applies these findings to a practical management challenge: determining whether the assumptions underpinning existing resilience decisions are sufficiently robust to withstand disruption.

References

1. Supply chain resilience methodology
Simchi-Levi, D. et al. (2015). Identifying Risks and Mitigating Disruptions in the Automotive Supply Chain. Interfaces, 45(5), 375–390.
Read the research

2. Semiconductor supply chain resilience and multi-tier dependencies
SEMI. Supply Chain Management Working Groups. Industry initiatives addressing multi-tier supply chain mapping, critical supplier identification, geographic concentration and resilience metrics.
SEMI Supply Chain Management Working Groups

3. Semiconductor value chain structure and vulnerabilities
OECD (2025). Mapping the Semiconductor Value Chain: Working Towards Identifying Dependencies and Vulnerabilities. OECD Science, Technology and Industry Policy Papers, No. 182.
Read the OECD report

4. Manufacturing capacity and substitutability
OECD (2025). The Chip Landscape: Geographical Distribution of Wafer Fabrication Capacity. OECD Science, Technology and Industry Policy Papers, No. 188.
Read the OECD report

5. Semiconductor disruption and supply chain recovery
MIT Data Science Lab (2021–2022). The Resiliency of the Global Semiconductor Supply Chain. Research undertaken in collaboration with DENSO, examining disruption propagation and introducing Time-to-Recover Inventory (TTRInv).
MIT Data Science Lab – Research and Industry Applications

The decision-review approach presented in this guide is an application of established resilience and decision-analysis principles, not a proprietary risk assessment methodology. The worked example is simplified, and all figures are illustrative.