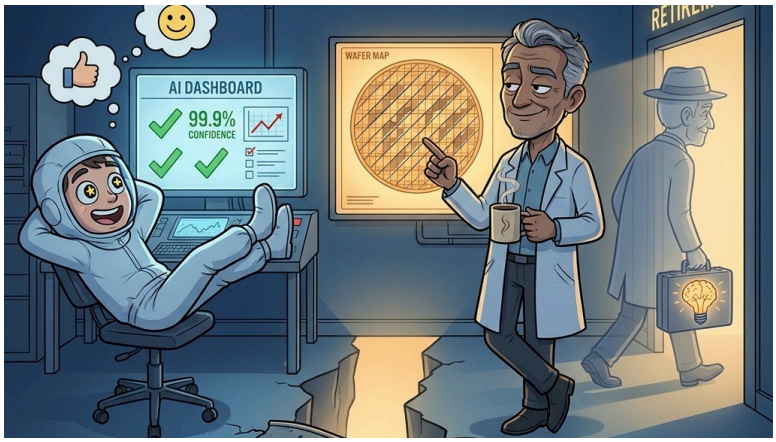


A junior engineer trusts an AI dashboard flashing 99.9 percent confidence, while a senior reads the real failure pattern on the wafer map.

Semiconductor Talent Gap: The AI Knowledge Cliff

Syed Umair Shoaiby
Technical Program Manager at Cirrus Logic | Leading Semiconductor Silicon NPI from Tape-out to Production | AI...

June 10, 2026

Three seconds.

That is how long it took a senior engineer on one of my programs to glance at a wafer map and say, that is the probe card, not the silicon.

He was right. We had been one decision away from burning a week chasing a failure that was never in the chip.

Ask him how he knew, and he would just shrug. Twenty years. You just see it after a while.

That shrug is the most expensive asset in the semiconductor industry right now. And almost nobody is putting it on a budget.

Here is the uncomfortable part. We keep telling ourselves that AI will close the talent gap. After watching it up close, I think it is doing the opposite. It is widening a knowledge cliff, and it is eating away at both edges at the same time.

The shortage itself is not a rumor. More than one million skilled workers short, globally, by 2030. In the United States alone, around 67,000 roles that simply go unfilled. Now look at which roles. Most of that gap is technicians and engineers, the hands-on seats where the judgment actually lives. New fabs by themselves need about 48,000 of them by the

end of the decade, and on the current path roughly 4,500 of those seats stay dark.

So start at the top of the cliff. Ask yourself a simple question. Where does a senior engineer actually keep what they know?

Not in a document. Much of it is tacit. It lives in the person, not the system. IDC once put the cost of knowledge that never gets shared at 31.5 billion dollars a year across the Fortune 500, and that is only the part we can measure. The wafer-map shrug is the part we cannot. So when that engineer retires, AI does not inherit the shrug. It inherits the documentation. And the documentation was never where the judgment lived.

Now the bottom of the cliff. This is the part that genuinely surprised me.

The obvious fix is to hire juniors and hand them AI copilots so they climb the curve faster. Reasonable. Except a randomized controlled trial published in February 2026 tested almost exactly that. Engineers who learned a new system with AI doing the heavy lifting scored 17 percent lower on a comprehension test than the ones who fought through it by hand. They got slower at debugging. Weaker at reading code. The work got finished. The engineer did not get built.

Sit with that for a second. The tool we are counting on to grow the next generation, when it is used as a shortcut, quietly thins the very skills the job runs on.

Put the two edges together and the real shape appears. The seniors who hold the judgment are walking out, taking the undocumented part with them. The juniors meant to replace them are learning less, faster. And the apprenticeship in the middle, the slow handoff where one becomes the other, is the bridge that snaps.

In most industries that is a painful staffing problem. In semiconductors it is something sharper. Senior judgment is the last gate before tapeout. Past that gate sits a mask set that costs millions and cannot be unmade. A weak judgment layer is not an HR gap. It is a reliability failure with an invoice attached.

So what do the teams who see this clearly do differently? They stop treating it as a tool they can buy and start treating it as a program they have to run.

They capture knowledge on purpose. Real shadowing on real failures, not a wiki nobody opens. Debrief libraries tied to actual silicon. Decisions written down with the reasoning, not just the outcome, because the reasoning is the part that transfers.

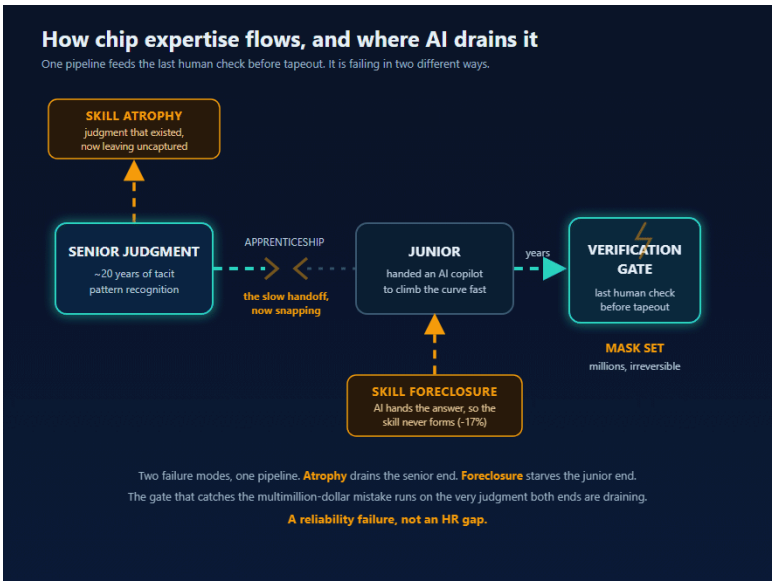
And they change how juniors use AI. Not as an oracle that hands over the answer, but as an apprentice that has to show its work and get checked. The same study that found the 17 percent drop also found that learners who stayed mentally in the loop kept their skill. The tool was never the villain. Full delegation was.

You cannot download twenty years of instinct. You can only pass it on, deliberately, while the person who has it is still in the room.

So let me ask you the question I keep asking myself. In your world, where have you actually seen that kind of judgment captured before it walked out the door, and where did you watch it vanish with a retirement and a goodbye lunch?

Disclaimer: The views shared here are my own and do not represent the positions of my employer or any organization I am affiliated with. Company and industry examples are drawn from public reporting and are used for illustration, not as commentary on any specific business. All figures come from the sources linked with this article and reflect the data available at the time of writing.

#Semiconductor #NPI #AI #ProgramManagement



A pipeline of chip expertise running from senior judgment through apprenticeship to the junior bench and on to the last verification gate before tapeout. AI drains it at two points as mentioned above

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REFERENCE GUIDE:

- **"More than one million additional skilled workers needed globally by 2030" and "about 67,000 US roles unfilled, most of them technician and engineer jobs"**

Tom's Hardware (Jan 2026). The global 1M+ figure is attributed to SEMI, and Deloitte separately projects roughly the same 1M shortfall by 2030. The about 67,000 unfilled US roles figure is SIA's. SIA and Oxford Economics break the US gap down as roughly 39 percent technicians and 35 percent engineers and computer scientists, so most of it sits in the hands-on technician and engineering seats, with the remaining quarter in master's and PhD roles.

https://www.tomshardware.com/tech-industry/semiconductors/semiconductor-industry-faces-critical-talent-crisis-one-million-additional-skilled-workers-needed-by-2030

- **"Europe short above 100,000 engineers, Asia-Pacific above 200,000; US needs ~100,000 new workers a year against a graduation rate less than half that"**

Deloitte, Global semiconductor talent shortage. Background context for the scale of the gap.

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- **"New fabs need ~48,000 technicians and engineers by 2030, only ~43,500 filled, leaving roughly 4,500 seats empty"**

McKinsey, Reimagining labor to close the expanding US semiconductor talent gap.

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- **"AI-assisted learners scored 17 percent lower on a comprehension test, and lost ground on debugging and code reading; engaged use preserved skill"**

Shen and Tamkin, How AI Impacts Skill Formation, arXiv, February 3 2026. Randomized controlled trial with software developers. Used here as a skill-formation analogy, not a chip-specific measurement.

https://arxiv.org/abs/2601.20245

- **"IDC put the cost of unshared knowledge at 31.5 billion dollars a year across the Fortune 500"**

IDC estimate, as reported by Nuclino. Attribution is IDC, not Deloitte.

https://blog.nuclino.com/not-sharing-knowledge-costs-fortune-500-companies-31-5-billion-a-year

- **"Most senior engineering knowledge is tacit and undocumented"**

Supported by the tacit-knowledge literature, e.g. Leveraging Large Language Models for Tacit Knowledge Discovery in Organizational Contexts, arXiv, July 2025. The widely cited MIT 20/80 split could not be traced to a primary MIT source and was deliberately not used.

https://arxiv.org/pdf/2507.03811

- **The wafer-map / probe-card opening and the tapeout-gate framing** are the author's own lived NPI experience, illustrative and not externally cited.

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Dr. Adrian Bratt • 2nd
Analog / Mixed-Signal Silicon Design Expert with 30+ years experience. Fre...
1w

Hi, the real problem with AI is how can you train it for chip design? I am a mixed signal guy and what I know has been acquired over decades of sitting at test benches, ESD results, scratching my head on why my new "brilliant" idea doesn't simulate over corners and so on. The cost to go around the loop of idea, simulation, layout, fab, test just once must be £1M minimum ...more

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Dr. Adrian Bratt • 2nd
Analog / Mixed-Signal Silicon Design Expert with 30+ years experienc...
6d

Syed Umair Shoaiby thanks for the reply.
To be 100% fair to AI, it can be useful for gathering papers on a subject. It has certainly read a heck of a lot and is good at tracking down that obscure reference that unlocks the problem. It is also a good time-saver for verilogA models and python, but it is vital that I can read wha ...more

Insightful · 1 | Reply

Joel Jensen • 2nd
EDA CAD Engineer | Customer-Facing Design Flow & Debug Expert | LSF, Lic...
3d

To test AI on big data, I decided to feed it old stock information and do transformations. Something simple which math and scripting would be able to do, but I wanted to test AI where the result would not cost me or the company money.

...more

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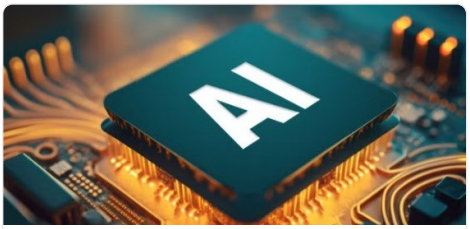

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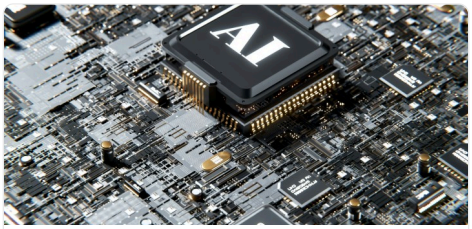

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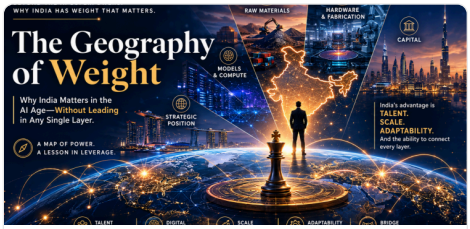

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