Bridging the gap

Navigating the talent shortage in the semiconductor industry

accenture

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"The long-term talent gap in the global semiconductor industry is an ongoing and increasingly complex challenge. Leaders in the industry are dedicating significant resources to design comprehensive workforce development solutions to address this growing problem."

Ajit Manocha
SEMI President and CEO

Introduction:

Talent challenges: Navigating today’s landscape

The race to cultivate a self-sufficient domestic semiconductor ecosystem is on.

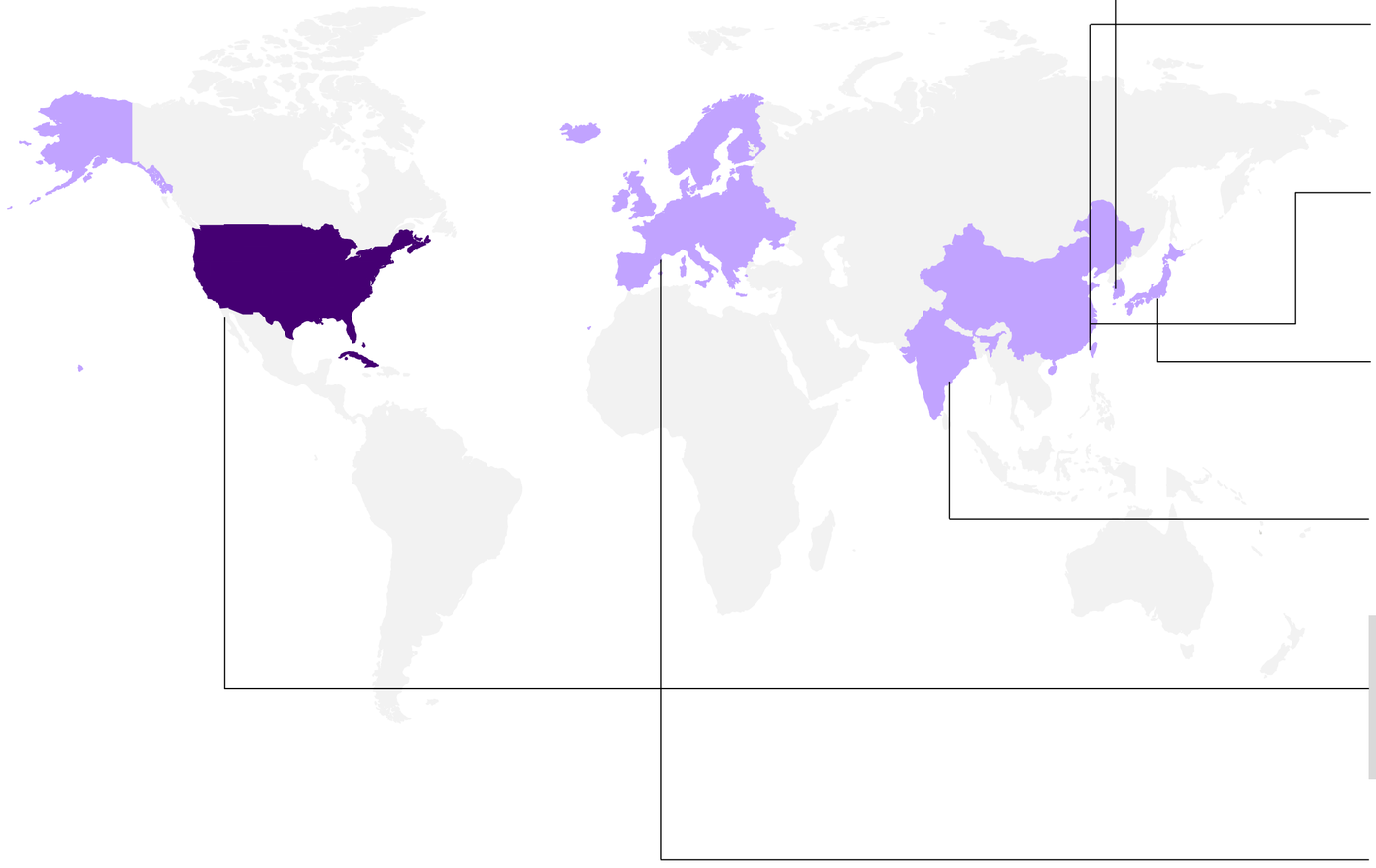
Governments and private companies in the United States are racing to expand domestic semiconductor manufacturing capacity—aiming to boost local production, mitigate supply chain risks and offset the shifting tariffs landscape and other uncertainties. Ensuring the self-sufficiency and resilience of the industry has become a national security imperative, given the chips' essential role in artificial intelligence (AI) and military operations.

However, while investing in fabs and research and development (R&D) centers will be core to achieving the industry's goals, long-term success will also hinge on cultivating a sustainable talent ecosystem. In some areas, this will mean building a talent pipeline from the ground up.

Leaders should address this challenge by focusing on three key initiatives, Accenture research has found. These are: (1) engaging in strategic workforce planning to grow their talent pipeline; (2) cutting through the complexity of reskilling needs; and (3) seizing the opportunities offered by automation and AI.

This report will explore each initiative in detail and provide five ways to kickstart their own talent transformations. First, though, it's useful to put things in context by considering global trends in the industry (Figure 1, next page), and by examining the talent challenges and opportunities in this industry in the US.

Drive for self-sufficiency by country



South Korea

Self-sufficiency in essential materials, parts and equipment by 2030[1]

$470B investment to build the world's largest semiconductor cluster; government's plan includes private sector investment to 2047, led by Samsung & SK Hynix.

Taiwan

Taiwan's Chips Act to protect its process technology[2]

25% tax deduction towards R&D expenditure and 5% deduction on expenses for new machinery used in advanced processes.

China

Big Fund III, focused on closing lithography and EDA tool gaps[3]

$47.5B fund, launched in May 2024, represents the third phase of China's Integrated Circuit Industry Investment Fund.

Japan

Japanese companies' semiconductor investments[4]

~$30B investment made by eight companies, including Sony and Mitsubishi, in semiconductors to address the growing opportunities in AI, EV and the carbon reduction market.

India

Diversify and deepen India's semiconductor footprint[5]

$15B in approved funding for India Semiconductor Mission for establishment of semiconductor manufacturing units in India.

United States

Ramp up domestic semiconductor manufacturing in America[6]

$53B US CHIPS and Science Act funds to strengthen domestic chip manufacturing, design and research to boost the economy, create jobs and bolster national security.

Europe

Double the EU's share of global semiconductor market to 20% by 2030[7]

$43B EU Chips Act to reinforce the chip ecosystem, ensure supply chain resiliency and reduce external dependencies along with doubling its global market share in chips to 20% by 2030.

Figure 1:
Global economies catching up with semiconductor industry investments to attain self-sufficiency and achieve chip sovereignty

Opportunities and challenges in the US, 2025

CHIPS Act funds add a level of complexity to workforce planning for US semiconductor companies. Policy guidance associated with the CHIPS Act, for example, is clear that recipients of public funding must design workforce strategies that encompass facility, construction and childcare workforce needs.[8]

The CHIPS Act is not the only challenge. Enterprises have had trouble keeping foreign STEM talent, for example, because of the H-1B visa system. This year won't be any easier. U.S. Citizenship and Immigration Services reported in December of 2024 that the agency received enough petitions to reach the congressionally mandated 65,000 H-1B visa regular cap and the 20,000 H-1B visa US advanced degree exemption for FY 2025.[9] This is hurting the US semiconductor workforce and making it harder to make things on-site. Mitigating this could begin with reforms to our immigration system, in addition to investing in STEM education and enhancing workforce training in the US.

Tariffs also change the landscape for domestic and international workforce needs. Cost fluctuations, for example, may constrain future hiring plans for the fabs. Leaders will need a plan in place to cover potential fluctuations in the US and global market.

Every possible action has a potential reaction

Levers Impacting Industry Talent

Tariffs

Future impact is TBC as companies implement hedging scenarios

- ▲ New / expanding manufacturing capacity increasing local workforce needs.
- ▲ Section 232 public comments, including inputs on the workforce shortage and talent gap.
- ▼ Complexity of establishing domestic production facilities slows short-term hiring.
- ▼ Passing increased costs to customers may decrease revenue and constrain hiring plans.

Immigration

Potential H-1B visa reform and an end to birthright citizenship

- ▲ America's manufacturing renaissance is a key selling point of ongoing recruitment efforts.
- ▲ Training programs implemented years ago are starting to grow the current talent pipeline.
- ▼ Intensifying efforts to recruit and retain talent from a potentially smaller pool increases expenses.
- ▼ Visa caps and travel bans decrease the pool of available international talent at all levels.

Federal Fund Awards

Budget cuts likely as programs like The CHIPS Act are under scrutiny

- ▲ CHIPS Act raises the industry's profile, attracting talent at all career levels and regions.
- ▲ New projects modify the current workforce planning approach as projects grow.
- ▼ Renegotiating finalized contracts slows down project timelines and hiring plans.
- ▼ Disbursement delays puts more pressure on employees to meet project milestones.

Supply Chain Renetworking

The US's ambition to lead the world in AI and achieve chip sovereignty

- ▲ Hyperscaler data center investment places a premium on skilled chip engineering talent.
- ▲ Proliferation of a broad, deep and competitive ecosystem creates new skills and talent profiles.
- ▼ Lack of details and ROI pushes a narrative that questions infrastructure and talent demand.
- ▼ New facilities constrict construction worker, engineer and technicians' talent pools.

Figure 2:
Talent Levers and their impact on the semiconductor industry workforce

Source: Accenture Analysis

Semiconductor industry talent pool to grow 20-25% by 2035

The US administration has promised new initiatives that affect the semiconductor industry and efforts at self-sufficiency and resilience, tariffs chief among them. Accenture examined the potential effects of these tariffs and created a model to visualize their effect on the talent gap.[10] We modelled our data based on three scenarios from Oxford Economics:

- **Baseline Reindustrialization** follows the assessment that US tariffs trigger a global slowdown in the short term (not a recession) with a truce with major trading partners.
- **Moderate Reindustrialization** scenario assumes that the effective tariff rate falls lower than expected, resulting in higher overall growth.
- **Full Reindustrialization** scenario assumes increased domestic demand and production with minimal-to-zero cost pressure impact.

Our research found the push to reindustrialize has the potential to create an additional 100K+ direct jobs in the semiconductor industry over the next 10 years. Yet this growth will not necessarily be enough to bridge the talent gap.

20-25%

Increase in the talent pool

Added employment in US semiconductors across scenarios 2035

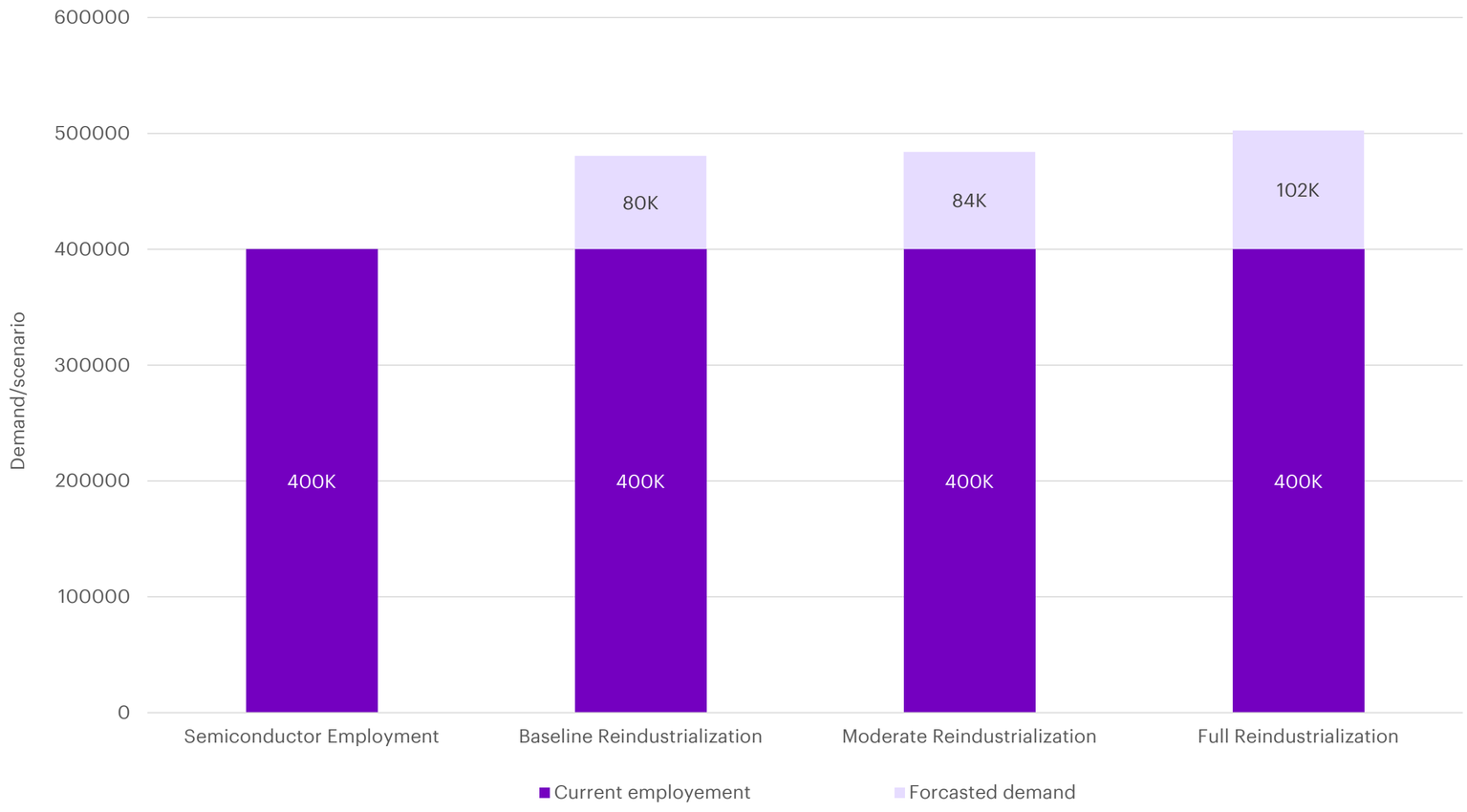


Figure 2:
The talent shortage today and tomorrow

Source: Accenture Analysis

The doubling labor gap

The talent gap, from fab labor to skilled engineers, is critical as new fabs come on-line. It requires more investment in rebranding, training, upskilling and policy advocacy. Our analysis found the industry's current labor gap is approximately 76K jobs.

This gap would grow by 102% and reach as high as 153K required roles in the full reindustrialization scenario. New joiners to the industry (from age 16 to 24) will fill about 26K or 27K of these roles, based on the different value-add growth scenarios.

We project that the gap to fill is going to be between 127K and 153K workers, conditional on the value-add growth scenario. New roles create new demand for skilled talent from an already thin talent pool. There's an opportunity, however, to reinvent the talent approach to meet ambitious manufacturing goals and legislative requirements.

2x

Increase in the labor gap as retirees outpace new industry hires

Labor gap by scenario US semiconductors 2035

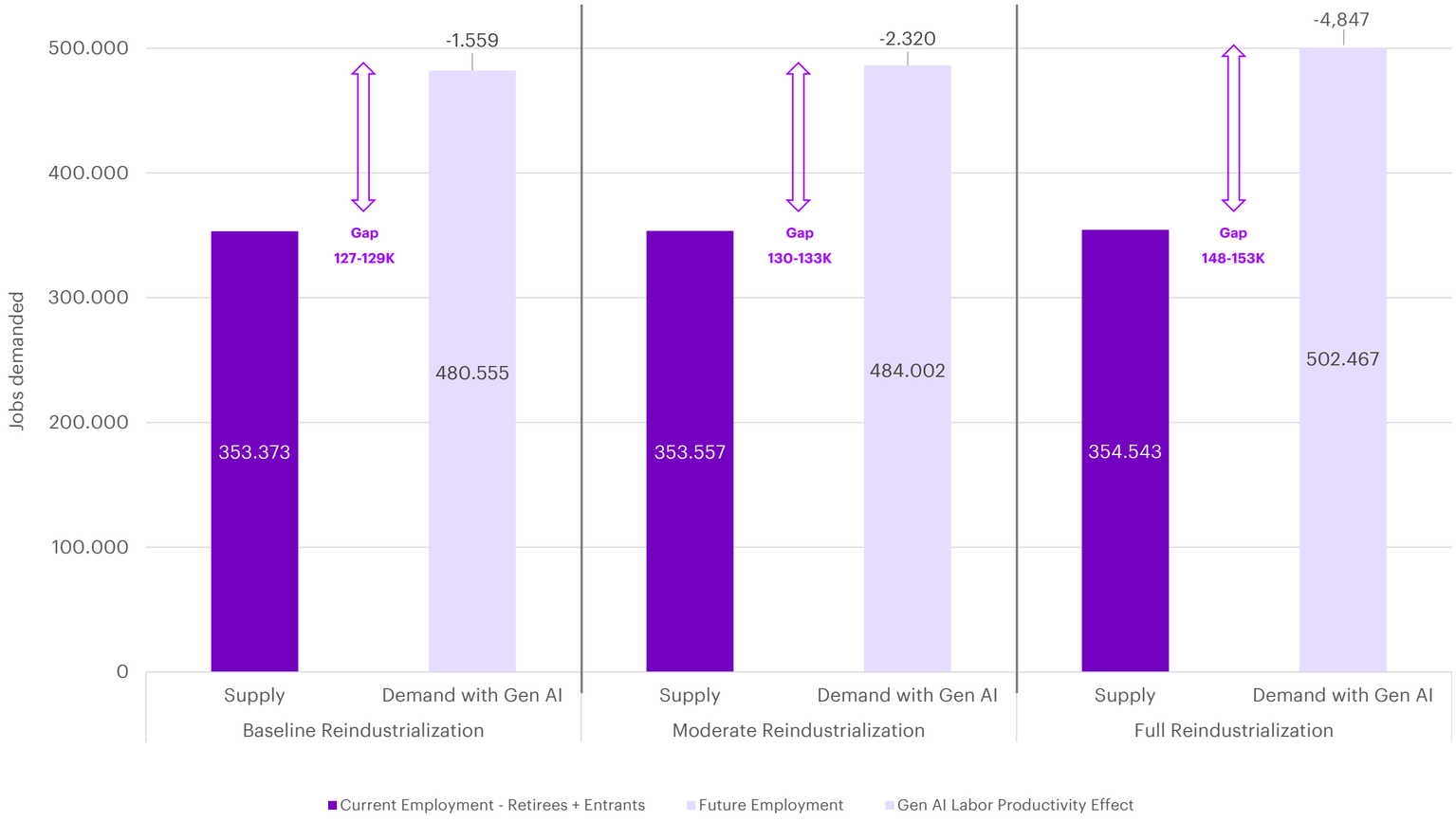


Figure 3:
The talent shortage today and tomorrow

Source: Accenture Analysis

Initiative 1:

Grow the talent pipeline with strategic workforce planning

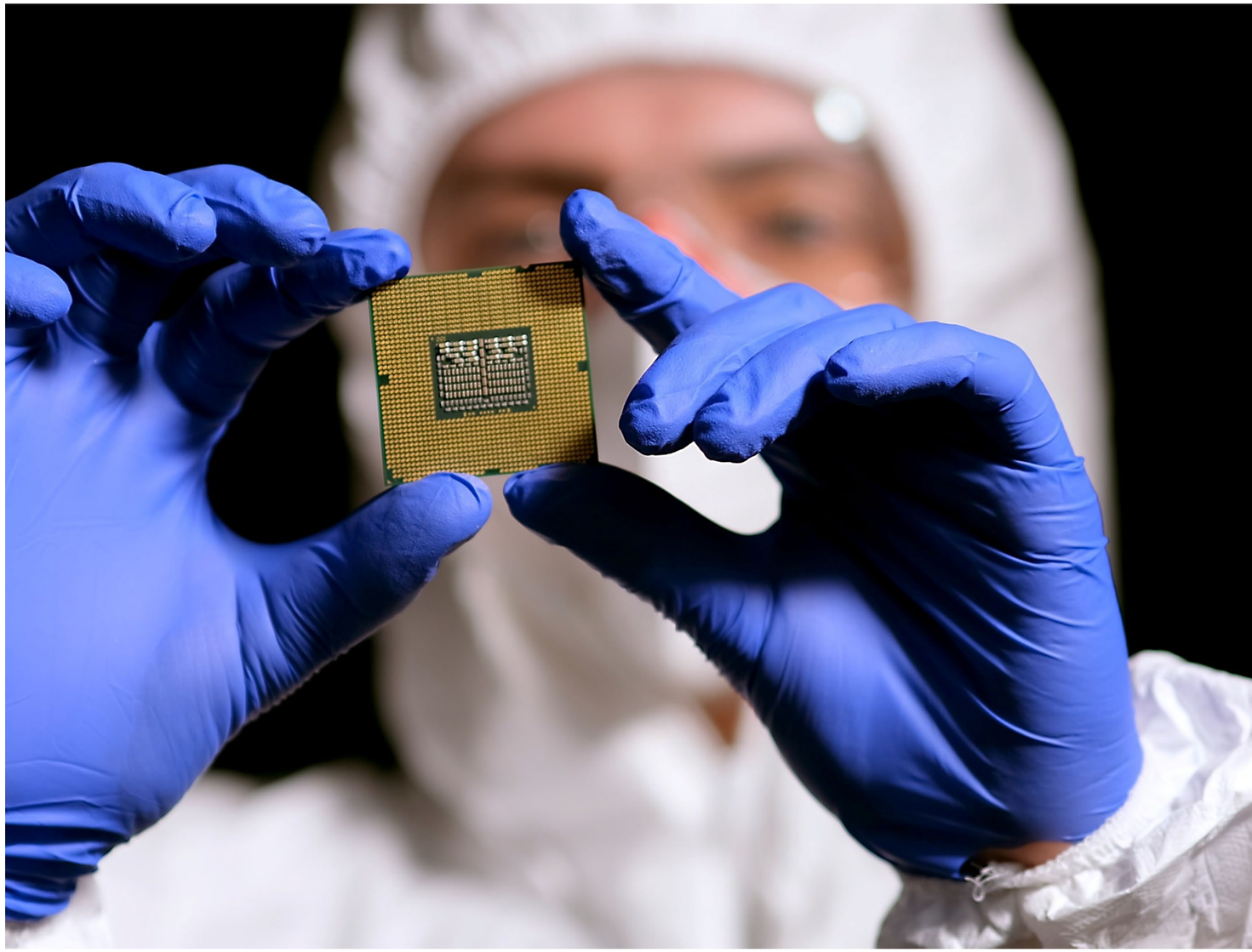
The US's ambition is challenged by an exponentially increasing labor shortage

The semiconductor industry should not have a one-size-fits-all approach to managing their workforce. To gain an advantage in the talent landscape, semiconductor companies need to strengthen their workplace desirability, look at different ways of attracting talent and connect with hidden and untapped talent pools.[11]

Workplace desirability in focus

A cornerstone of attracting semiconductor talent lies with workplace desirability. Solely increasing salaries is not a viable solution because of competitive manufacturing margins and inflexibility within the physical work environment. However, there are levers that leading employers have begun to use, such as offering wraparound services like childcare and loan forgiveness.

Micron increased its workplace desirability by reducing the barriers to working parents—especially mothers—with their development of a childcare facility located across the street from corporate headquarters.[12]



Enterprise leaders must tailor their talent approach based on where they sit in the value chain, who they are targeting and who they are competing with. Targeting talent needs to be a consideration all the way down to the job persona.

Workplace Desirability

This axis represents a perspective formed by Accenture based on interviews with experts and employees in the semiconductor industry. The spectrum represented is intended to reflect the non-compensation related factors that impact the desirability of a workplace environment. Fab roles typically demand longer hours, higher on-the-job stress, greater physical discomfort, less job flexibility and less mobility (for example, when forced to operate in hazmat suits on the fab floor). These variables disincentivize employees reskilling into these roles.

The relationship between desirability and demand (Bubble size = Predicted talent shortage)

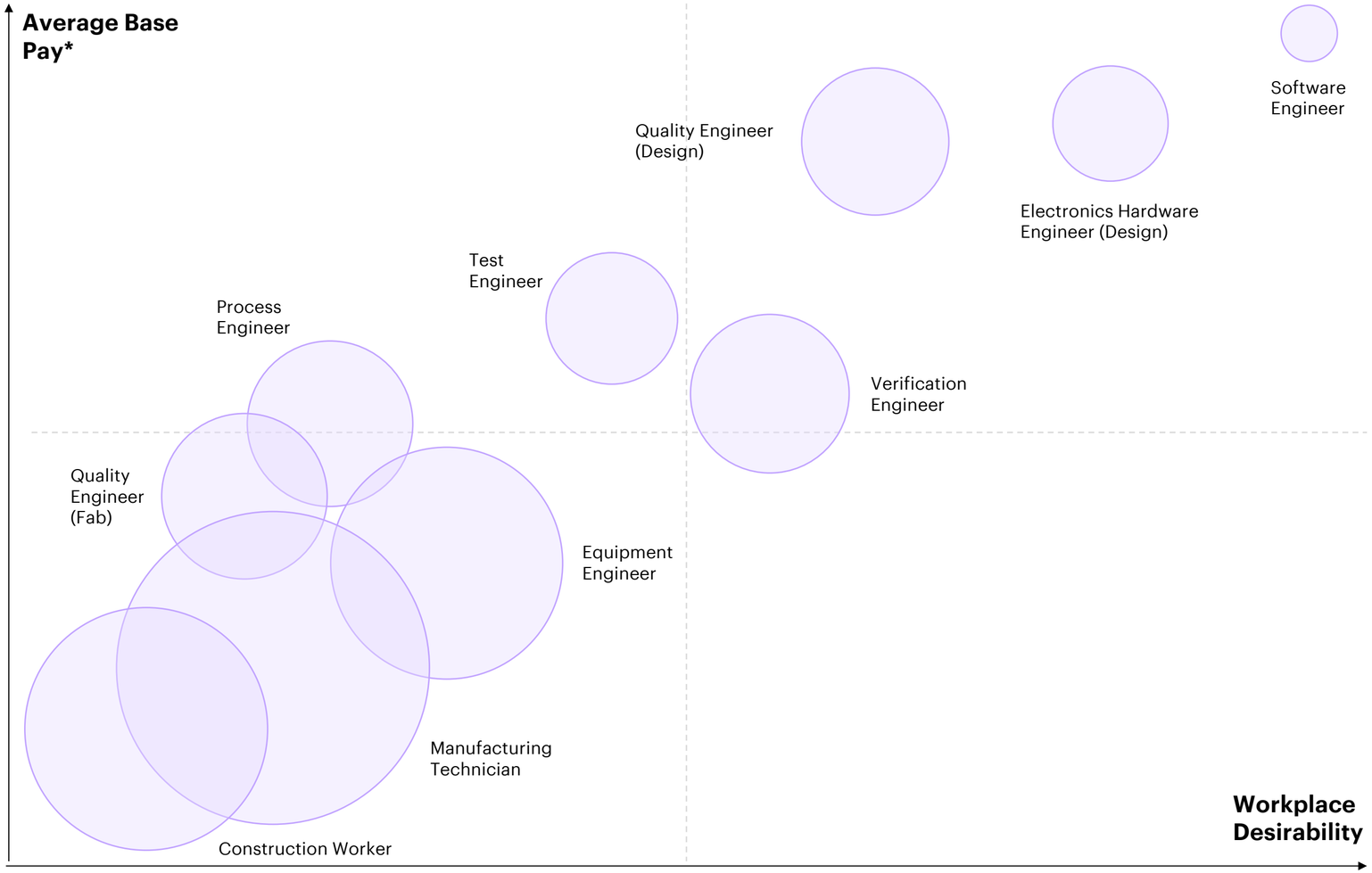
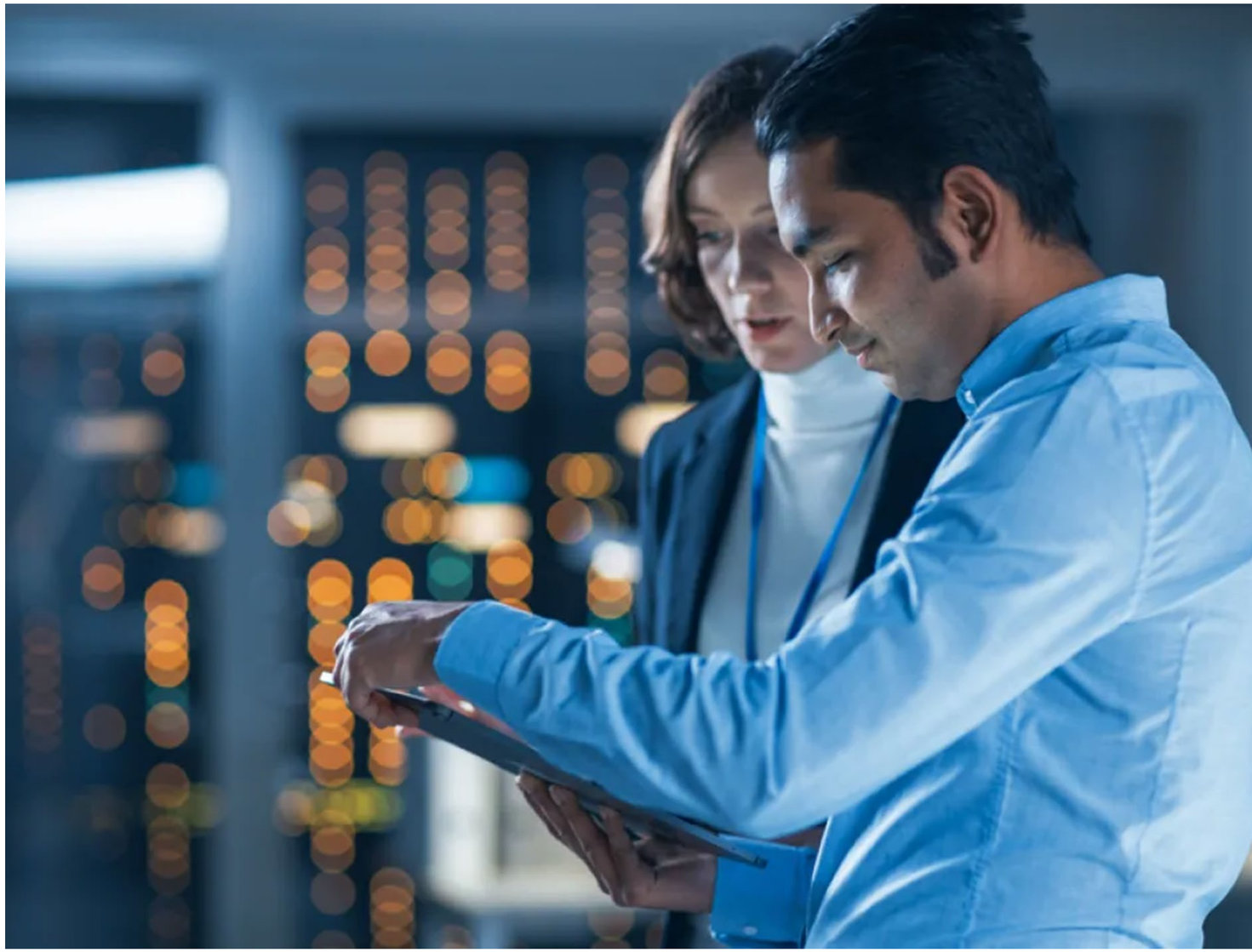


Figure 5:
There is a trade-off between role transferability and desirability

Source: Accenture Analysis
*Based on data from Glassdoor

Taking a community-based approach to workforce planning



To attract young people to the semiconductor industry, companies need to create programs that are immersive for a younger generation and that differentiate them from hyperscalers and other technology companies. University partnerships, for example, are key to offering exposure to the semiconductor industry as undergraduates select their desired fields. Semiconductor hubs from Silicon Valley to Austin were created in large part due to their proximity to world-class research institutions.

Partnerships can also help fuel emerging and expanding tech hubs through public-private investment, apprenticeships and other training programs that share a common need for talent. These initiatives reflect a collaborative effort to build talent and skills, connecting the public and private sectors through a shared model. Enterprises can, for example, help local governments attract more funding for workforce development and influence how these funds are used.

Each organization's approach to public-private partnerships is unique, depending on the specific roles in demand and their position in the value chain.[13] Tailoring these partnerships to the unique needs of each organization ensures they are impactful and effective.

Connecting with hidden and untapped talent pools

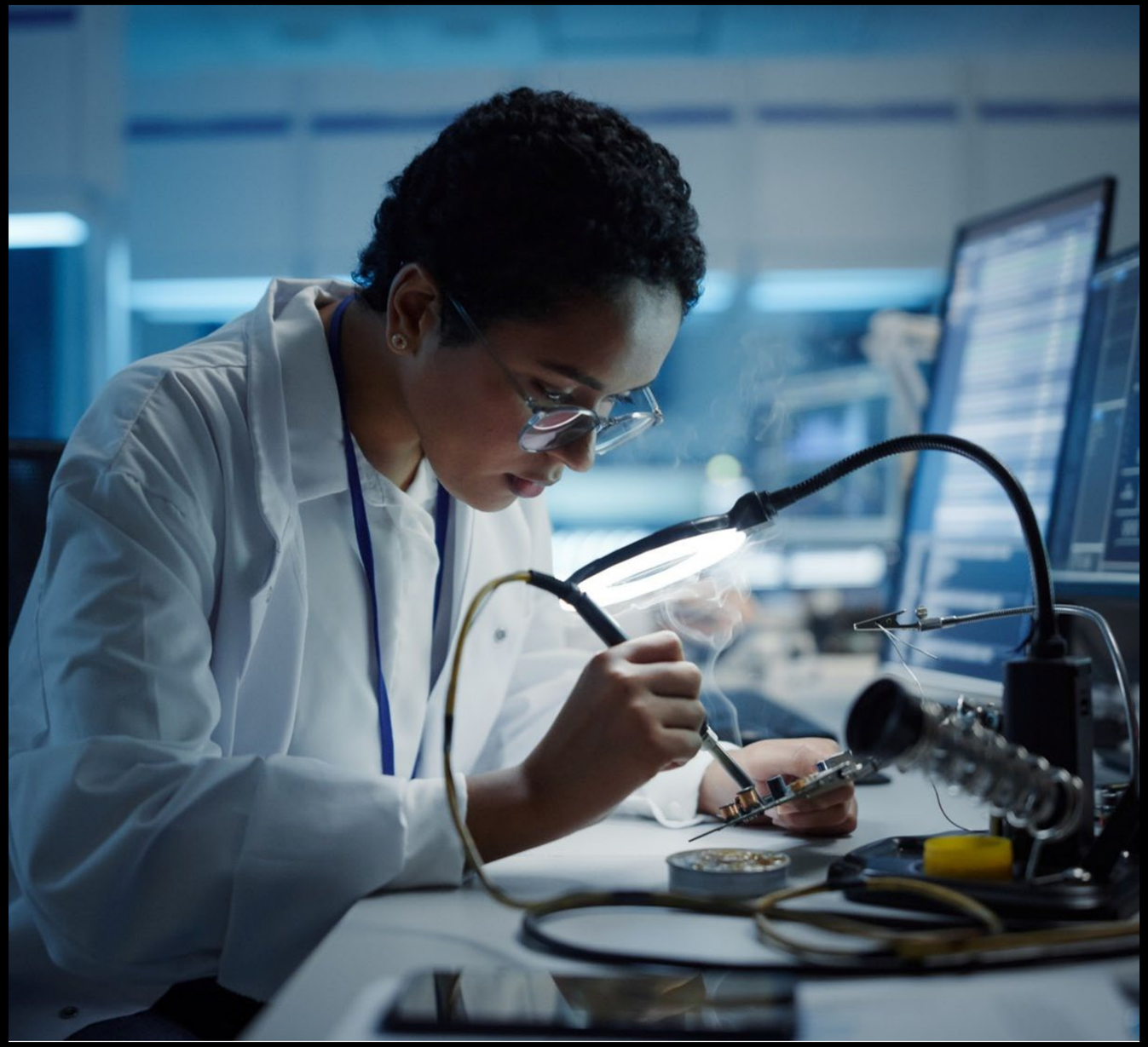
Semiconductor companies should increasingly use a more advanced recruiting strategy that explores previously untapped talent. This means, for example, investing in and hiring talent with associate degrees and considering alternative methods to preparing the workforce. Leaders can also intensify efforts to highlight semiconductor career pathways to other engineering sectors by thinking more broadly about what the “right” talent profile is and how and where to attract and develop talent.

Accessing untapped talent pools also means strengthening the employer value proposition (EVP) by refreshing it to emphasize cutting-edge opportunities, a commitment to sustainability, diverse career paths and a culture of innovation. This way, companies can better align their EVP with the broader demands of today’s workforce.

By strengthening their workplace desirability, looking at different ways of attracting talent and connecting with hidden and untapped talent pools, semiconductor companies can put in place a workforce plan that grows and even accelerates their talent pipeline.

Initiative 2:

Cut through the complexity of reskilling



Reskilling existing talent: A crucial but complicated step

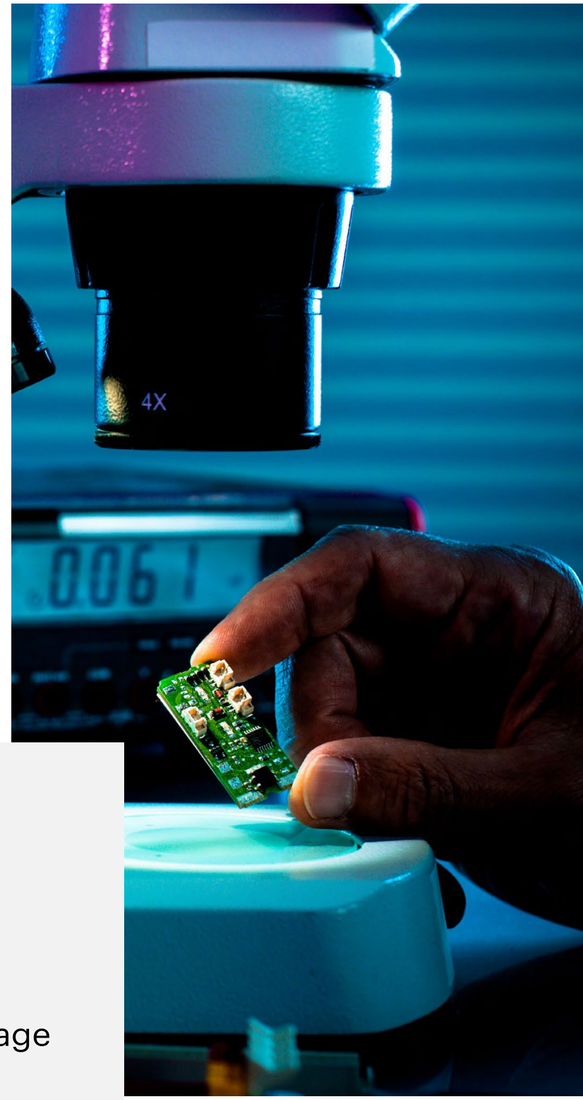
Reskilling industry talent is a complicated reality.

- Available programs focus too much on back-office roles, neglecting the critical need for skilled fab workers where the shortage is most severe.
- The effort is time-consuming, especially for the complex and high-pressure tasks in fabs; the industry needs to fill thousands of fab positions quickly.
- Programs need to balance critical operational needs with employee satisfaction when assigning new tasks; for example, design engineers may not want to shift roles along the value chain.
- Many open requisites require niche technical expertise, making skill transfer across functions challenging.

Our research paints a complicated picture. 74% of manufacturers are looking at upskilling existing workers as a strategy to address labor shortages, yet our research found 67% of manufacturing workers are not satisfied with the current training programs.[14] [15]

Educators and researchers agree that the most effective learning is personalized and contextualized to the needs of the learner and the environment where the learning will be applied. Leading IDMs, for example, have taken a different approach to reskilling by making significant investments into hands-on training education, public partnerships and leadership development initiatives to encourage employees to adopt in-demand data science and coding skills.

Intel launched its first US-registered apprenticeship program for manufacturing facility technicians in Arizona, activating an extended industry network by collaborating with the Arizona Commerce Authority (ACA), the Phoenix Business and Workforce Development Board, the SEMI Foundation, Maricopa Community Colleges District (MCCD) and Fresh Start Women's Foundation.[16]



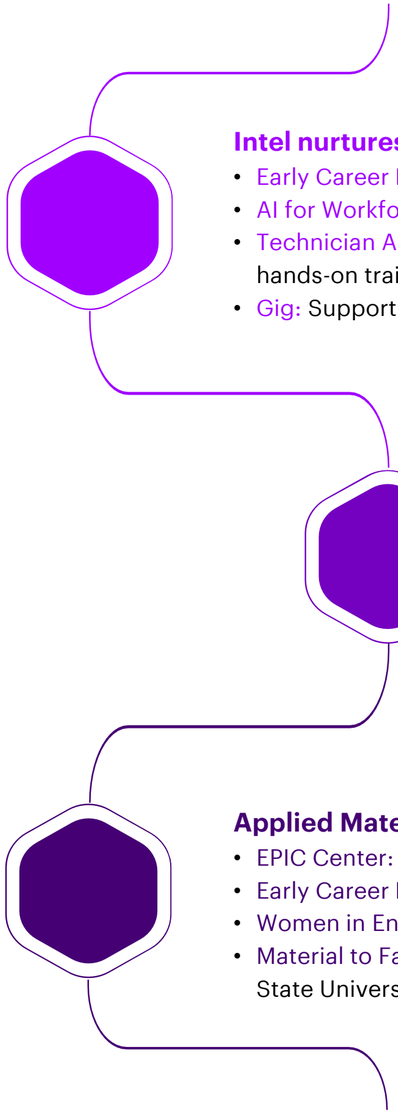
74%

manufacturers are looking at upskilling existing workers as a strategy to address labor shortage

Beyond reskilling: Expanding talent sources for a resilient workforce

Simply focusing on reskilling is insufficient. Enterprises should look at different industries to make real progress in filling certain roles. Businesses must use new ways, like cross-skilling, to grow their current workforce. This includes using other industries and less-traditional sources like undergraduate programs, community college students, internships and temporary workers.

As organizations invest millions into internships, scholarships and academic STEM programs, the realization of the investment is dependent on a circular talent approach that drives commitment for this talent to join the workforce. Employers that have defined their future workforce needs and can express this to their public and industry partners are better positioned to win the war on talent and have the coveted ability to pivot when necessary.



Intel nurtures talent to remain at the forefront of innovation ...

- Early Career Education: Offer 10-day "quick start" program to train students for technician roles.[17]
- AI for Workforce Development: Empower over 100+ employees to integrate AI into daily workflows.[18]
- Technician Apprentice: Deploy a one-year program offering classroom instruction and hands-on training. [19]
- Gig: Support rotation within Intel to gain exposure to new areas of the org & learn new skills.[20]

Micron invests in ongoing learning to retain premier tech talent ...

- Pledge to America's Workers: Enhance 10K career opportunities within five years through reskilling.[21]
- Rotation: Empower new hires to rotate across functions to build core technical & business skills.[22]
- Micron Leadership Accelerated: Build the next generation of semiconductor leaders.
- Micron University: Leverage the university partnership for workforce advancement in semiconductors for the future.[23]

Applied Materials accelerates career growth with cutting-edge programs ...

- EPIC Center: Platform to accelerate the commercialization of academic research across universities.[24]
- Early Career Learning Roles: Offer a year-long program for new graduate to learn new technical skills.[25]
- Women in Engineering: Offer early career development opportunities for women in the workforce.[26]
- Material to Fab Center: Establish collaborative Innovation Hub between Applied Materials and Arizona State University.[27]

Figure 6:
Reskilling Case Studies

Source: Accenture Analysis

There is hidden potential in underutilized talent sources, which are often overlooked by traditional workforce planning models. Semiconductor companies must also expand their talent pipeline, attracting a diverse candidate pool by offering a reimagined employer brand value proposition that changes the narrative around working in the industry. By giving candidates the skills they want, companies can meet the growing need for skilled workers while creating a more diverse and resilient workforce for the future.

While reskilling is part of the solution, it's crucial to identify talent supply levers and consider different sourcing options, such as cross-industry talent pools like automotive manufacturing. Knowing how to find and build the skills that are in demand helps organizations expand their talent pool and tailor their talent acquisition approach accordingly. This will help them stabilize their pipeline of qualified candidates and address skill gaps. For example, semiconductor employers should consider hiring from community colleges with strong electrical technology programs—or through apprenticeship programs—rather than limiting themselves to traditional university graduates.

Illustrative Role Structure by Degree Requirements

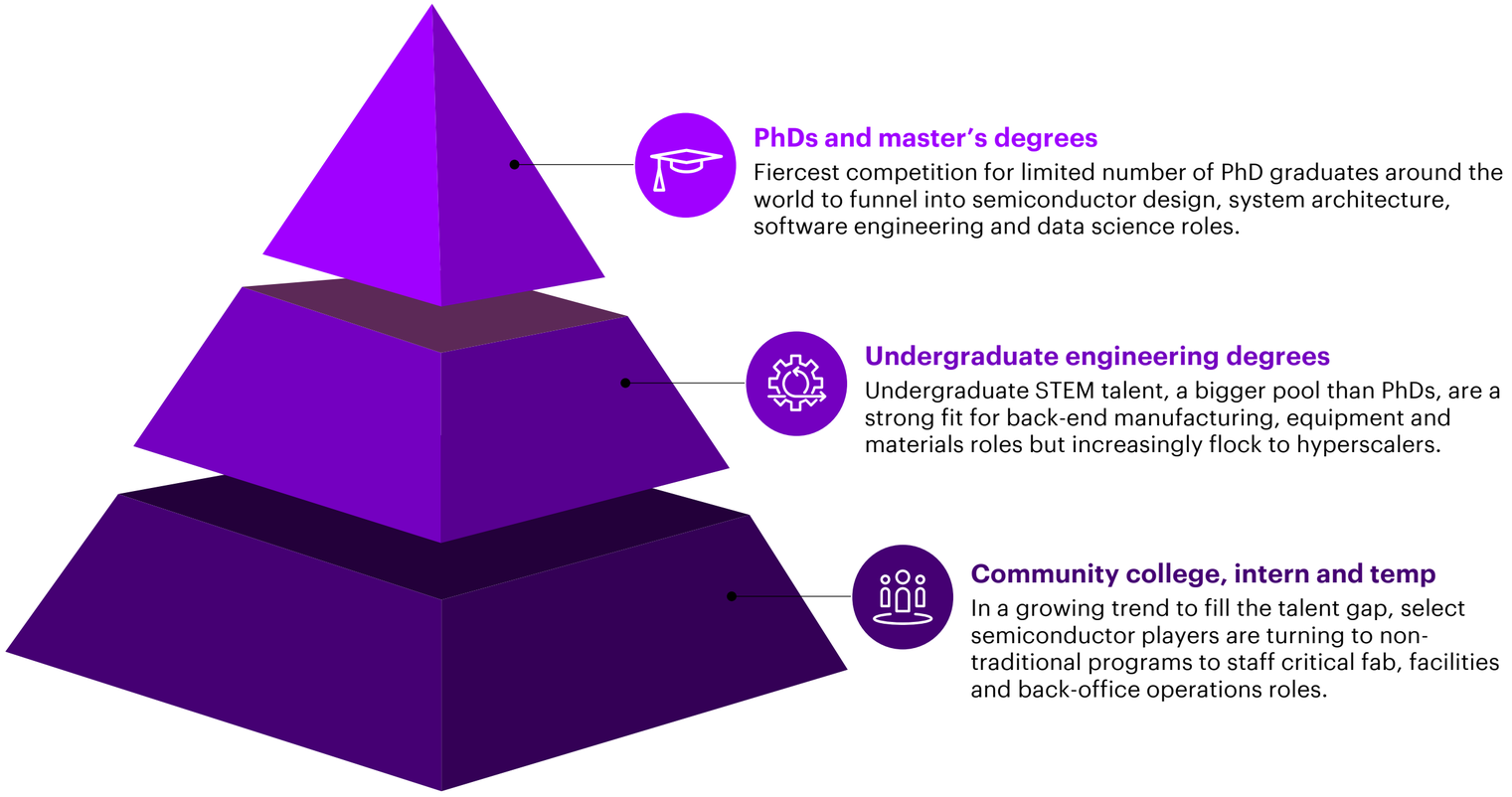


Figure 7:
Hidden potential lies within underutilized talents, a source that is often overlooked by a traditional workforce planning model

Source: Accenture Analysis

Initiative 3:

Seize the automation and AI opportunity

Tomorrow's automation and AI promise for fabs

There are limited use cases for scaling automation and generative AI today, but some hold the promise of significant efficiency gains. These projects can free up engineers' time and transform work processes. Our research shows that 1 in 4 respondents believe the top benefit of generative AI is increased productivity and economies of scale. Even though 1 in 3 respondents chose innovation in design or manufacturing, it's clear that the technology will bring new improvements and ways of working across the semiconductor industry.[28]

Embedded appropriately, the technology should alleviate demand for hard-to-reach engineering talent—which must be done in parallel to increasing the supply of skilled resources to better position the semiconductor industry to meet the urgent need for qualified STEM professionals. Broader use of these capabilities will be critical as the industry continues to compete for a limited pool of available talent.

Automation Opportunity Across the Value Chain

		IP	EDA	Design	Foundry	IDM	Equip-ment	OSAT	Materials
Digital Twin	**Fab Layout Planning** | Optimized manufacturing line layout (incl. tool layout, process separation)				■	■		■	■
	Automated Material Handling | Transport material from one place to another in manufacturing area				■	■		■	
	Automated Robotic Systems | Reduce particle contamination; improve process control & throughput				■	■	■		■
	Virtual Engineering | Remote Engineers-in-Charge (EICs) enabled by AR/VR				■	■	■	■	■
Design Simulation & Automation	**DFM (Design for Manufacturability)** | Validate that design meets requirements of manufacturing process		■	■		■			
	SLM (Silicon Lifecycle Management) | Monitors and optimizes semiconductor devices throughout the design, manufacturing and deployment stage		■	■	■	■	■		■
	Tool / Process Parameter Adjustment | Optimized process times per wafer or batch to improve yield				■	■	■	■	
	Automated Testing | Ensures that device functionalities align with end-user application expectations.				■	■	■	■	■
	Defect Detection | Computer vision-enabled defect classification to signal process / tool deviations				■	■	■	■	■
Gen AI	**IP Integration & Reuse** | SoC assembly solutions to boost design team productivity and lower costs	■	■	■		■			
	Sales & Marketing Analytics | Personalized outreach & tailored product recommendation with target marketing for faster sales conversion		■	■	■	■	■	■	■
	Root Cause Analysis | Provide insights that pinpoint specific issues, optimize overall performance by addressing defects and inefficiencies		■	■	■	■	■	■	■
	Engineering GPT | Determine design material availability and customer specification, improve time to market	■	■	■	■	■	■	■	■

Figure 8:
Across the semiconductor value chain, automation remains an under-leveraged source of value

Source: Accenture Analysis

Embracing AI: A path to future-ready workforce and enhanced talent strategies

AI will be crucial for developing a future-ready workforce and helping the industry address the talent gap over time. In the short term, semiconductor companies should adjust their talent strategies to attract and retain AI talent, especially in generative AI, and improve the employee experience.

Beyond workforce planning, embedding AI in HR processes can provide real benefits. HR teams will need to be able to deconstruct work, codify talent pools, identify opportunities for AI and automation and create the conditions for collaborative, agile teaming. Organizations must also keep pace with rapidly evolving employment regulations and workplace expectations.

As chip complexity and manufacturing demand grows, an AI-ready organization can provide the tools, skills and readiness to use the technology in new ways.

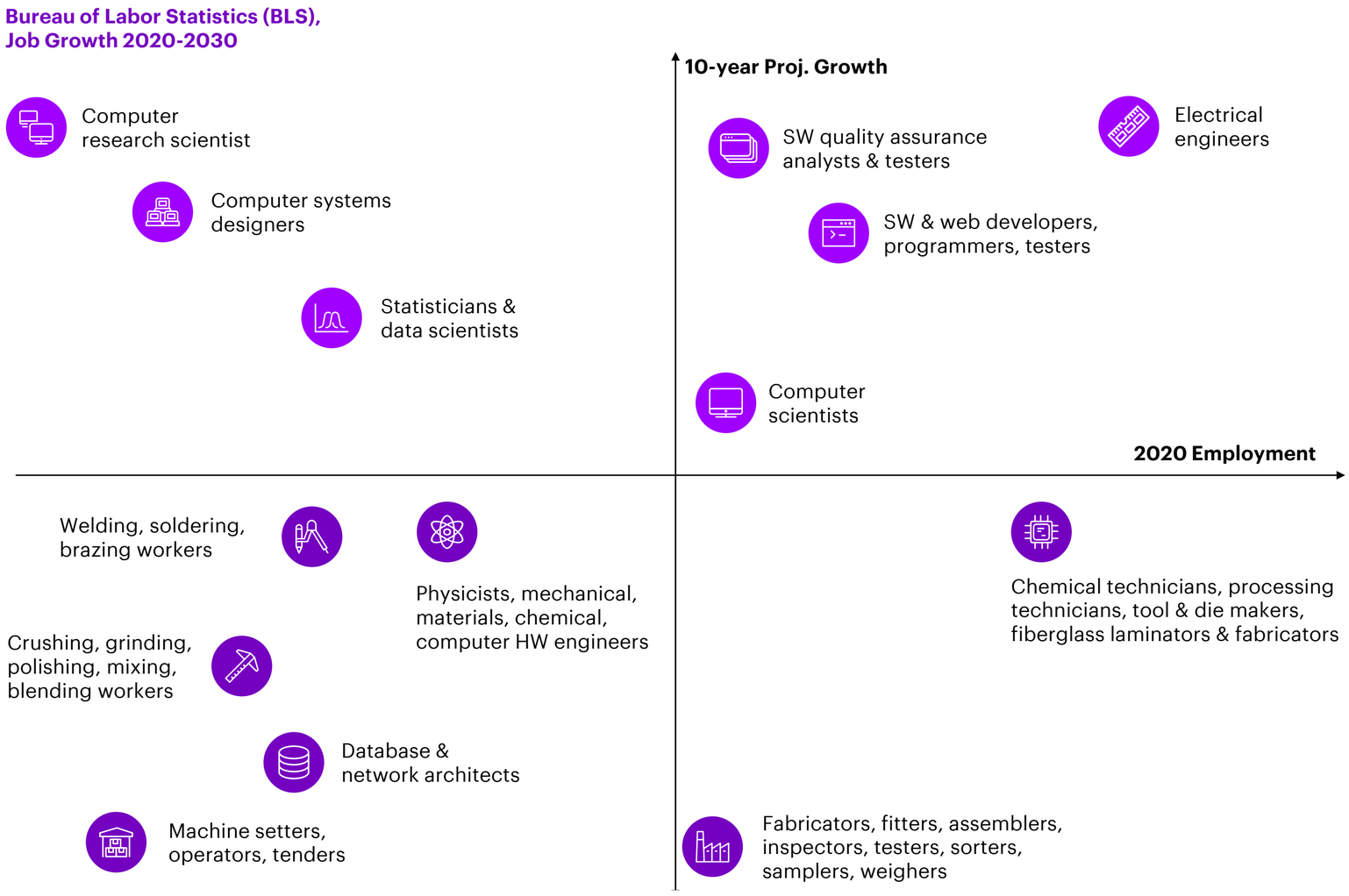


Figure 9:
Projected Change Semiconductor Roles by 2030 (Bureau of Labor Statistics)

Source: Accenture Analysis

Engagement:

Five actions to kickstart talent transformation

Prioritizing five actions will help semiconductor companies kickstart their talent transformations

1 Lead with a new, compelling brand promotion

Attract talent by engaging potential employees in new ways. Younger technologists used to like to work on emerging technologies; today they're looking for a sense of purpose in their work. Tweak company messaging to focus less on technical specifications and more on the larger role semiconductors play across multiple ecosystems. Use cases make a powerful example of purpose, semiconductors enable the transition towards a greener revolution when they're used in off-shore windmills. A job opening at TSMC Arizona Corporation notes, "America's leading tech companies are ready to rely on TSMC Arizona for the next generations of chips that will power the digital future." [29]

2 Nurture current talent by changing workplace culture

Re-engage talent in response to the current economic and political landscape. Rewards, skills transferability and employee support, among other levers, are part of this effort—but a building the right workplace culture is critical. Start by empowering managers to lead and support a top-down cultural change while responding to the industry headwinds. Intel's CEO is charting its path forward by revamping its culture to focus on engineering, flattening the organization and streamlining processes, among other actions.[30] Critical to this is driving a "startup mentality" to prioritize attracting talent, building relationships with customers and slashing bureaucracy.

3 Expand the talent profiles

Look at adjacent skillsets, inside and outside the industry. Tap into new and innovative programs that are cultivating skillsets that lend themselves to roles across the fabs like machinists, manufacturing engineers or technicians. Arizona State University reinvented itself into a $1B research institution with a world-class research environment while providing more access to education than ever before. This was due to the vision of a president who sees himself as "knowledge enterprise architect."[31] Another example is community colleges expanding beyond their roots to support the CHIPS Act with a number of programs in AI, EVs and green technology, among others.[32]

4 Leverage the ecosystem to plan for "known unknowns"

Plan for "known unknowns" in the current landscape by staying connected. In today's environment, part of this strategy requires getting creative to manage the fluidity of industry developments and challenges. Frequent connections and frank discussions are requirements in today's fast-moving landscape. Given the industry's volatility and uncertainty, chip companies need to collaborate and leverage the value chain and ecosystem to address and respond to these challenges through scenario planning. ASML's CHRO stressed that understanding the business's strategic environment is critically important for the CHRO function and often operates in the medium-term.[33]

5 Reinvent the human capital function

Design an AI-centric function that blends technology and values. Critical to this effort is people leaders having a seat at the table for setting and executing enterprise strategy. AMD was 48th in 2021 on "The Most Admired for HR" list, but it broke into the top 10 in 2022 and has continued to climb the ranks because the company focused its reinvention less on programs and more on values. By rooting their transformation in data and analytics, they took the emotion out of critical decisions.[34] Doing so enabled a fair and transparent way act on and acknowledge employee feedback regarding a number of different topics.

Conclusion:

Meet the talent opportunity

Talent is the next big disruption threat . . .

. . . It's also the next big differentiation opportunity.

Semiconductor company executives recognize that leveraging the right talent is critical to staying competitive. They must prioritize the recruitment, development and retention of individuals equipped with the right skillsets, understand how these skills drive growth for the organization and reinvent ways to attract, retain and reskill them to drive growth.

As the industry is grappling with the talent gap across its value chain—from engineers to technicians and construction workers—traditional "Copy Exact" methods are no longer sufficient.

To overcome this challenge, companies need to adopt targeted and strategic approaches tailored to their specific workforce needs.

Addressing the industry's talent shortage is a matter of strategic importance and US national security. By following through on the three initiatives outlined in this piece, semiconductor companies will be well positioned to meet their talent challenges and secure a sustainable, competitive position.

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About the Research

This study analyzes semiconductor industry labor market trends (NAICS Code #33441) using Lightcast data for job demand (2012–2024) and supply estimates, adjusted with NIOEM and BLS projections. Future demand is projected through 2030 using a weighted pooled forecast incorporating lagged demand and U.S. GDP indicators, leveraging Oxford Economics' forecasts. A political scenario analysis applies regression modeling, factoring in historical demand, import values, and producer price indices to assess potential policy-driven impacts on job postings. This approach ensures a data-driven forecast of workforce needs in the chip industry.

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