

Preparing the Workforce for Generative AI

Insights and Implications

Key findings

- **Artificial Intelligence (AI) is accelerating the shift to a skills-based labor market.** LinkedIn members already have seen the core skills of their job evolve by 25% since 2015. With new AI tools accelerating the pace and scale of change, we expect jobs to change even faster – by up to 65% total change by 2030.
- **Generative AI (GAI) is rapidly evolving, with the potential to perform tasks that, in the past, only humans could do— like writing, content creation, and data analysis.** We find that 84% of LinkedIn members are in occupations that could leverage GAI to automate at least a quarter of routine tasks and increase productivity.
- **As workers adopt and employ GAI tools, such as GPTs, they will deepen their AI literacy and develop skills that are complementary to AI, especially people skills and specialized industry skills.** As jobs change with the incorporation of GAI, workers will reduce the time spent on some tasks making other skills, including human-centric skills, much more valuable and in-demand.
- **The impact of GAI extends beyond the Tech industry or tech workers.** While Tech leads in the adoption of GAI skills with 77% of workers in occupations likely to be affected by GAI to different extents, all industries employ workers in roles that stand to be transformed by these new technologies. The diffusion across industries points to a broadening impact of GAI across the economy.
- **Potential GAI-driven automation will compel workers, business leaders, and policymakers to adapt fast.** To navigate this environment, leaders should prioritize reskilling and upskilling programs, collaborative human-AI workflows, and global collaboration aimed at fostering equitable benefits of AI.

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Preparing the Workforce for Generative AI

Fear of job displacement by technological innovation is not new

Throughout history, technological advancements such as robotic assembly lines, tax preparation software, and more recently AI technologies like chatbots or self-driving cars, have sparked concerns about the automation of human labor. Despite these concerns, demand for labor has remained steadfast, defying doomsday predictions. In general, the costs of technological shifts have been overwhelmingly offset by the creation of new jobs and by the transformation of old jobs into fast-growing ones that incorporate new skills and technologies. For example, the introduction of automated teller machines (ATMs) in the late sixties was feared to displace bank tellers; since then, [the number of bank tellers in the US more than doubled, with their skills changing tremendously](#), from clerking to sales and customer service. Moreover, it created new related roles, such as Banking Relationship Manager—which, according to our data, grew by 7% in the US in the last year alone.

More generally, AI and GAI innovations could usher in a new era of labor productivity growth and economic growth. The gains from productivity could help address the puzzling pre-COVID period in which [productivity growth proved elusive](#). It could also help address other longer-term trends in many advanced economies, such as demographic challenges from an aging workforce or labor shortages.

Regardless of technological innovation, whether employment in a given occupation expands or contracts is ultimately a function of supply and demand. On the supply side, emerging technologies often enable workers to do their job more efficiently. Think language translators, whose jobs are already being redefined by automation. Translators have increasingly relied on software tools to create draft translations, which they refine for nuance and quality. AI-powered tools enhance these drafts, reducing the need for extensive human intervention. On the demand side, productivity (and therefore, price) changes have been seen to move demand towards both directions. Following the translator example, while bulk-translation jobs may decrease, high-end projects like literature may increase opportunities for human translators, thanks to the cost-effectiveness of human-AI collaboration.

Although it is too early to know the net impact of GAI on the labor market or precisely measure productivity gains in specific occupations, what is certain is that this technological change will lead to a shift in many of the skills that define most jobs. In this paper we assert that GAI will have a substantial impact on a broad swathe of the workforce and that the change will be evident through an evolution in the occupational skills that workers bring and that employers seek. We anticipate that this skill evolution will generally elevate the focus on skills in the workplace and specifically heighten the importance of people skills.

Using LinkedIn's Economic Graph, a unique digital representation of the global labor economy spanning over 950 million professionals, we identify the skills that stand to be affected and those that will likely complement new technologies. Workers and companies can use insights from this analysis to be more strategic about planning and acquiring new skills, reskill and upskill on AI-powered technologies, and build on the necessary people skills to stay ahead. This is an advantage not available to workers and employers in past technological revolutions.

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Most jobs can leverage GAI

GAI is a new technology based on AI models that possess the ability to create new content – resembling some people skills. We identify jobs, companies, and industries where GAI is likely to have the most significant impact using our own skill-based framework. It highlights where companies and workers can benefit most from developing complementary skills to remain productive, agile, and competitive in the face of technological change.

A skills-based framework to understand GAI’s impact on the workforce

Despite uncertainty on the full spectrum of GAI capabilities, there is value in building a conceptual framework to explain how skills—and consequently jobs—can be impacted by these technologies. In this framework, we identify skills that can likely leverage GAI technologies (“GAI-replicable skills”) and skills that intrinsically rely on human proficiency and can likely complement these technologies (“GAI-complementary skills”). We then proceed to rank every occupation in LinkedIn’s taxonomy according to how likely they are to currently require these types of skills among their core 100 skills.

GAI-replicable skills: 500+ skills most likely to be replicable by GAI among LinkedIn’s taxonomy of ~38,000 skills. The most frequently added skills by members are:

- Communication & media skills: Writing, Editing, Documentation, Translation, Video, Photography, Music, Content Creation
- Business & industry skills: Financial Reporting, Email Marketing, Data Analysis
- Engineering skills: Software Development Tools, Programming Languages, Data Science
- People skills: Time Management Tools

GAI-complementary skills: 800+ skills which can (currently) only exclusively be performed by people, and that typically serve as complements to GAI technologies. The most frequently added skills among LinkedIn members are:

- Communication & media skills: Oral Presentations, Influencing
- Business & industry skills: Entrepreneurship, Maintenance and Repair, Military Strategy
- Engineering skills: Software Innovation, Product Innovation
- People skills: Leadership, Teamwork, Negotiation, Problem-Solving, People Management, Relationship Building, Creativity, Emotional Intelligence

This framework was designed to be generalizable and dynamic – which is why we reasonably expect results to change over time, following both the advances of AI and GAI, and changes in occupations and their skills beyond AI and GAI.

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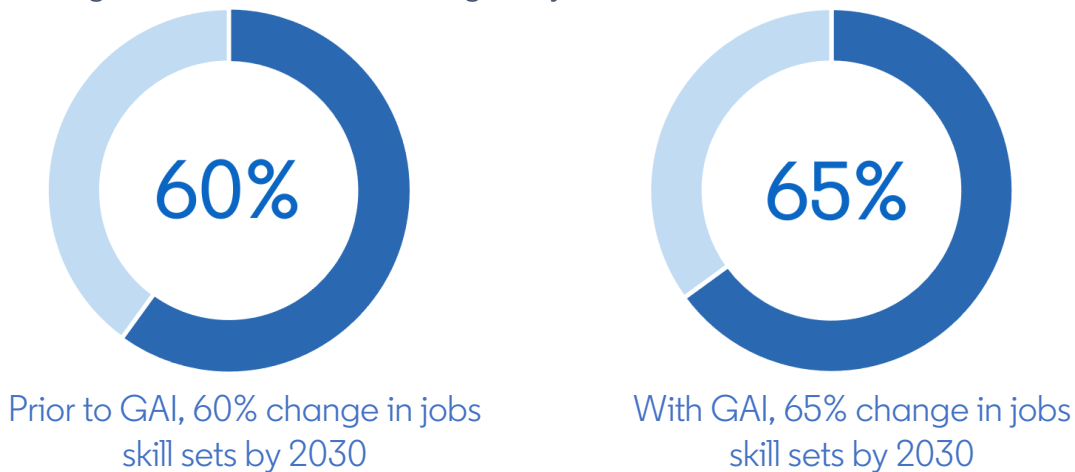
Findings

1) GAI is accelerating the shift to a skills-based labor market

[LinkedIn's Skills-First Report](#) previously found that members have seen the skills of their jobs change by 25% since 2015. At that rate, workers could expect their jobs to change by nearly 60% by 2030. However, with new GAI technologies and tools emerging every day, we now forecast the pace and scale of change to jobs to accelerate even more—by an additional 5 percentage points— to reach at least 65% by 2030 (Exhibit 1).

Exhibit 1. Anticipated job skill changes, 2015-2030

Percentage change in LinkedIn members' skills globally



Source: LinkedIn Economic Graph Research Institute

This underscores how GAI is both transforming the core skills required for many jobs and accelerating the pace of transition in the workforce. Implicit in the acceleration is the idea that productivity gains will be realized as workers rotate away from certain tasks and redeploy toward more productive, challenging areas. It also implies anticipating some degree of disruption to the workforce over time, consistent with other technological innovations where jobs lost bring associated challenges, but new jobs are also created. By taking a skills-based approach to understanding the tasks and occupations across the economy, our work suggests that fundamental changes to the way we work and allocate our time across tasks will materialize before we see changes in occupations and titles.

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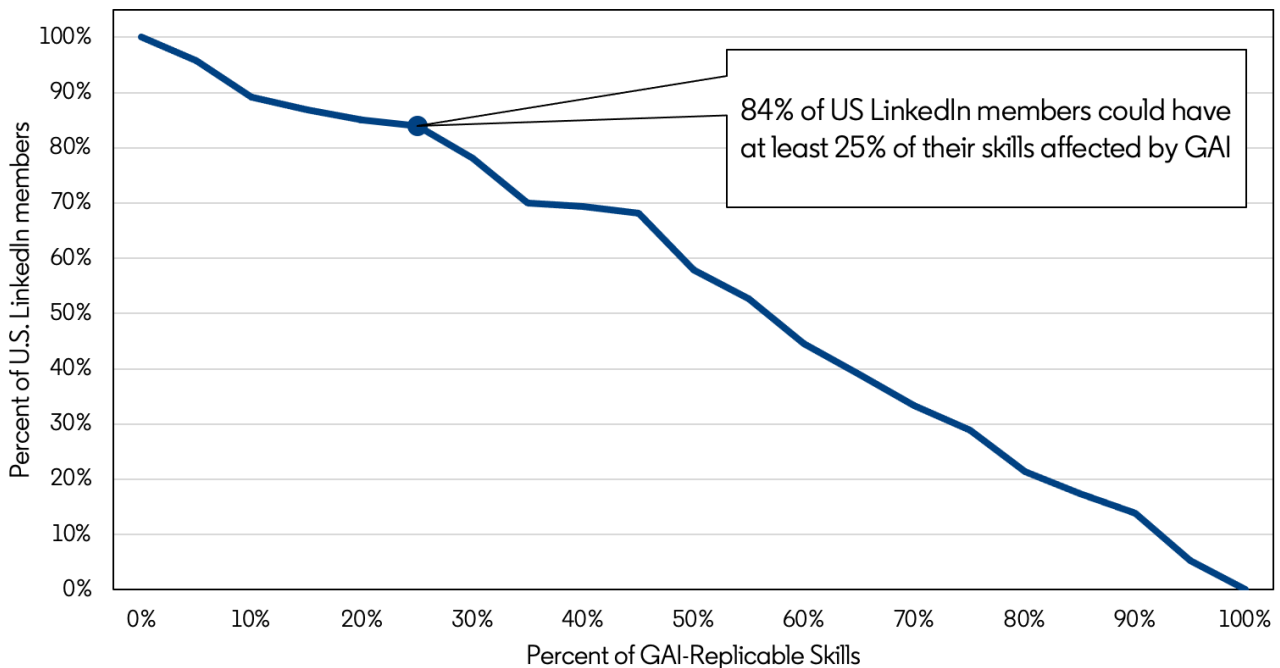
2) Most jobs require skills that can potentially be performed by GAI technologies, but not every job will be affected in the same way

GAI will potentially have a broad impact on the workforce. By analyzing the core skill composition of occupations, we find that 84% of US LinkedIn members are in occupations that could have at least one quarter of their core skills affected by GAI technologies (Exhibit 2).

We expect jobs to change by incorporating these new technologies that will reduce the time spent on applying some skills associated with routine tasks and make other skills much more important. For example, saving time writing or analyzing data unlocks more time for other meaningful work, like creative thinking, problem solving, and team leading. It is worth noting that no occupation is fully composed of skills that stand to be affected by GAI, which is why we do not expect any occupation to disappear in the near term.

Exhibit 2. US workforce exposure to GAI

Percentage of LinkedIn members with GAI-Replicable skills (estimate)



Source: LinkedIn Economic Graph Research Institute

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LinkedIn’s skills-based framework allows us to classify each occupation by the percentage of core skills that are potentially replicable by GAI and the share of core skills that are complementary to GAI. This categorization results in three groups of occupations (Table 1).

Table 1. Three groups of occupations

Group	Impact on occupations	Example
<p>Augmented by GAI <i>These jobs’ core skills include a large share of both of GAI-replicable and GAI-complementary skills</i></p>	<p>GAI may affect a relatively large portion of the skills in these jobs, leaving more time for higher value-added complementary skills.</p>	<p>Data Analysts automate the computation and interpretation of metrics with GAI, enabling them to focus their time on GAI-complementary skills, such as cross-functional influencing and stakeholder engagement.</p>
<p>Disrupted by GAI <i>These jobs’ core skills include a large share of GAI-replicable and a relatively low share of GAI-complementary skills</i></p>	<p>As GAI is adopted more broadly, these jobs will undergo reskilling, possibly leading to more innovation.</p>	<p>Language translators' skills shift from doing translations from scratch to reviewing and certifying machine-generated translations, or to specializing on specific legal or literary domains.</p>
<p>Insulated from GAI <i>These jobs have a relatively small proportion of GAI-replicable skills in their core skills</i></p>	<p>As these jobs are relatively protected from the influence of GAI, their core skills are likely to remain unchanged in the near term. Some of these jobs tend to be susceptible to other forms of automation, such as robotics.</p>	<p>Real estate agents might utilize GAI for writing house descriptions, but core relationship management skills would be insulated from GAI.</p>

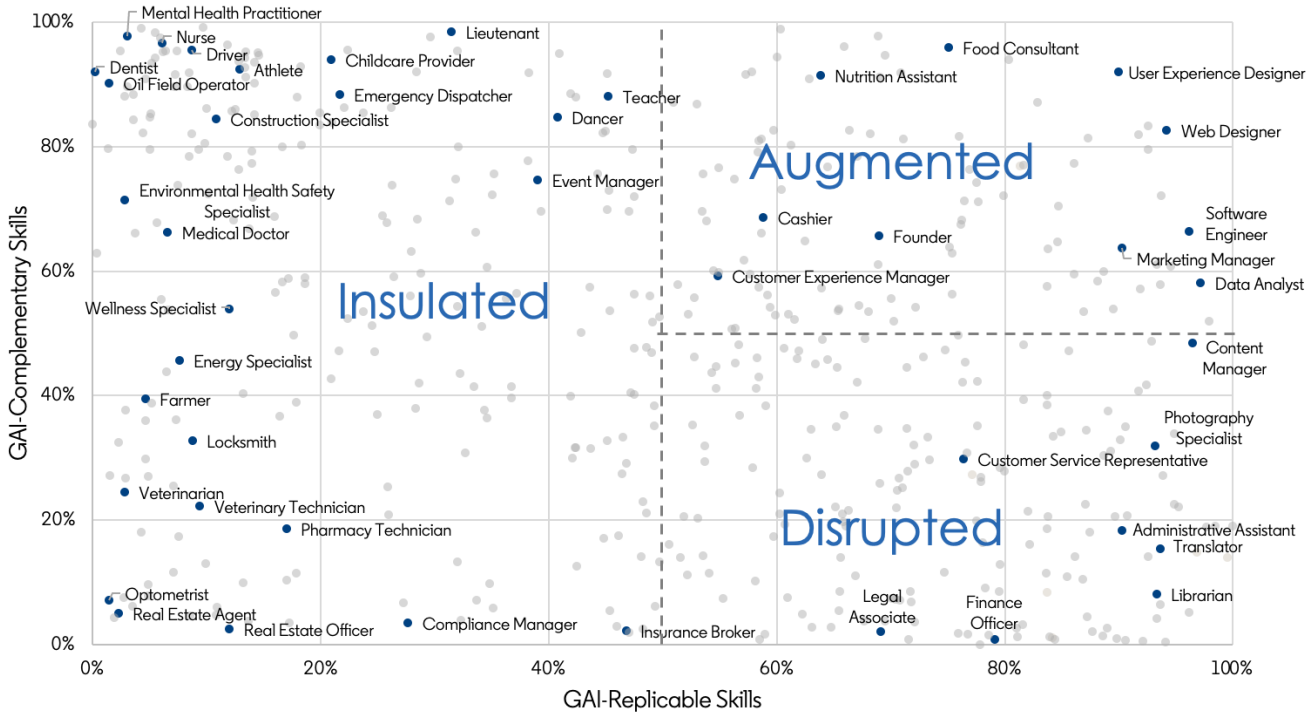
Source: LinkedIn Economic Graph Research Institute

Based on this framework, Exhibit 3 categorizes over 600 occupations according to how intensively their core skills are likely to be (1) most similar to what GAI can currently perform (replicable by GAI) and (2) most aligned with intrinsic human skills that complement GAI (complementary to GAI).

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Exhibit 3. Occupational composition by GAI-replicable and GAI-complementary skills

Normalized percentage GAI-replicable and GAI-complementary skills by occupation



Source: LinkedIn Economic Graph Research Institute

Our analysis suggests that most jobs require skills that can be performed by GAI technologies, but not every job will be affected in the same way. Each dot in Exhibit 3 represents an occupation, and some have been labeled for illustrative purposes; each occupation has been decomposed into its 100 core skills, and those skills were mapped to our sets of GAI-replicable and GAI-complementary skills, yielding the percentage of core skills in each occupation that can be considered GAI-replicable and GAI-complementary. We later normalize these values, to yield the relative stance of each occupation across these dimensions.

As a result of this process, we identify three relative areas for occupations: (1) jobs likely to be augmented by GAI because their core skills include a large share of both of GAI-replicable and GAI-complementary skills, (2) jobs that could be prone to be disrupted by GAI, as their core skills include a large share of GAI-replicable but a relatively low share of GAI-complementary skills and, finally, (3) jobs that may be insulated from GAI because they have a relatively small proportion of GAI-replicable skills in their core skills. Since the data is normalized, these classifications are relative. In this analysis, occupations in either the augmented or disrupted sections will be referred to as relatively exposed to GAI.

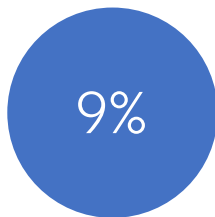
Preparing the Workforce for Generative AI

This framework tells us that, for example, Data Analysts' work can potentially be augmented by GAI in the near term for tasks such as reporting. Moreover, they may be able to lean more into their complementary skills, which include influencing and stakeholder management.

3) The most immediate impact of GAI is concentrated among higher-paid and higher-educated workers

The advent of GAI brings about an impact on the workforce that will likely have unequal effects on workers, depending on their skills level. Unlike most previous technological advancements that primarily affected workers in lower-paid roles or in jobs with lower-education requirements, the GAI technological wave will likely affect some of the highest-skilled and highest-paid jobs most (Exhibit 4). According to our research, some of the most impacted occupations involve a high degree of skills and expertise. Examples include Finance Officer, Mathematician, and Web Designer.

Exhibit 4. Relative impact of GAI by income and education



US LinkedIn members in jobs in the top quartile of GAI-replicable skills live in communities with median incomes 9% higher than those in the bottom quartile of GAI-replicable skills.¹



US LinkedIn members in jobs in the top quartile of GAI-replicable skills are 2X more likely to hold a bachelor's degrees or higher than those in the bottom quartile of GAI-replicable skills.

Source: LinkedIn Economic Graph Research Institute

4) Women and younger workers are likely to be disproportionately affected by GAI

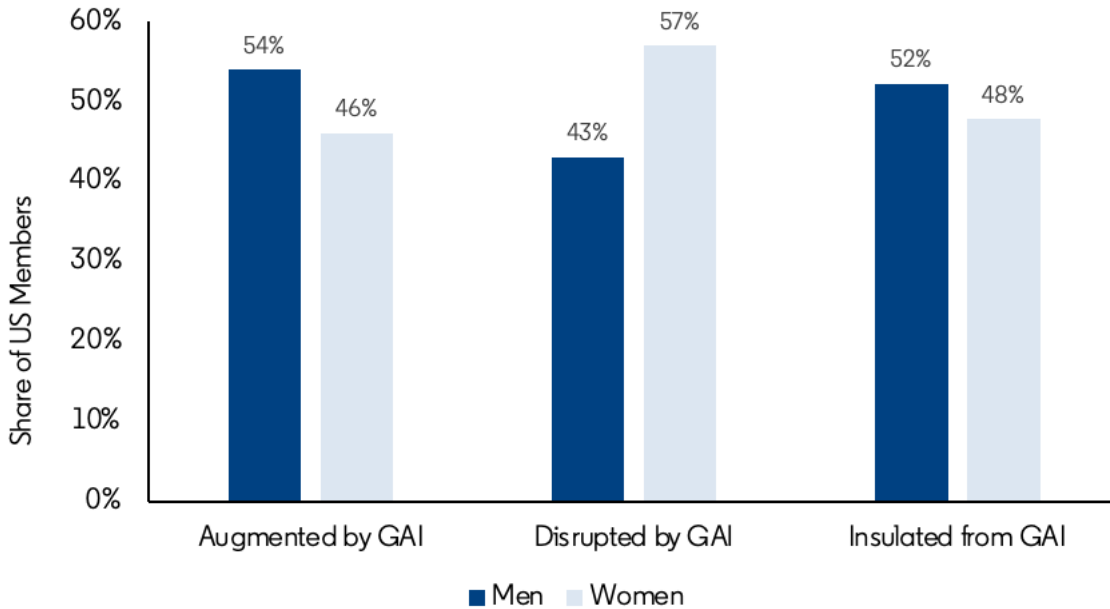
The potential impacts of GAI technologies are likely to be experienced to different degrees across the workforce. When we evaluate the distributional implications, we find that women and younger workers are likely to be disproportionately affected. This can be in part attributable to occupational segregation – differences in the likelihood of men and women to work in different occupations. As a result, jobs vary in terms of their gender and age talent composition and these differences are reflected in how these groups in aggregate may be affected by GAI.

¹Community income is estimated from US Census data.

Preparing the Workforce for Generative AI

Exhibit 5. Gender composition by GAI segment

Percentage of LinkedIn members by gender



Source: LinkedIn Economic Graph Research Institute

[LinkedIn and World Economic Forum joint research](#) indicates that multiple gaps remain between men and women in the labor market, such as in holding leadership positions, or work participation in STEM fields.² Our analysis in this report suggests that there may be yet another gender gap when it comes to exposure to GAI: women are underrepresented in jobs that are likely to be insulated or augmented by GAI, and are overrepresented (57% of US members) in jobs that will likely be disrupted by these new technologies (Exhibit 5).

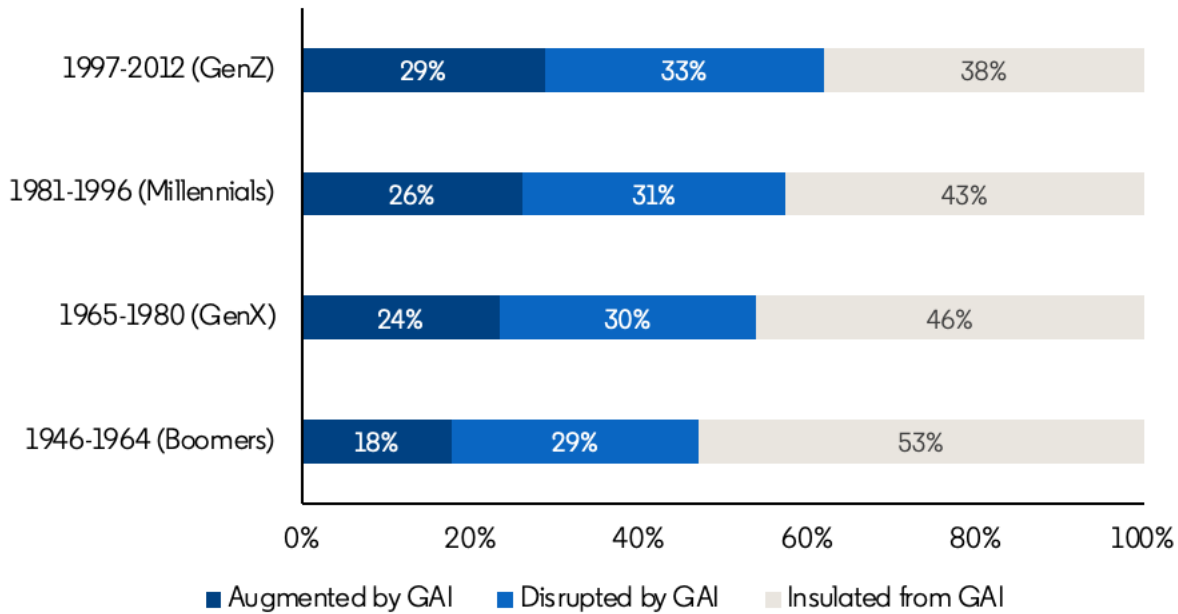
Examples of occupations where women are overly represented that could be disrupted include Medical Administrative Assistant (91% female), Office Manager (88%), and Legal Assistant (87%). On the other hand, examples of occupations where men are overly represented that could be augmented are Electrical Engineer (94% male), Mechanical Engineer (89%), and Computer Network Technician (88%).

² While we acknowledge that gender is a spectrum, due to data limitations we restrict our analysis to the binary classification of men and women.

Preparing the Workforce for Generative AI

Exhibit 6. Age generation distribution by GAI segment

Percentage of LinkedIn members by age generation



Source: LinkedIn Economic Graph Research Institute

When it comes to age, our research indicates that all generations face some exposure to GAI. However, younger generations face slightly higher exposure, especially in occupations that can be either augmented or disrupted by GAI (Exhibit 6). This is not surprising, as career starters tend to be relatively more represented in roles requiring GAI-replicable skills, such as writing and analytics, while they are still in the early stages of developing the people skills that can complement technology, and that come with longer professional experience, such as leadership and negotiation. Examples of jobs predominantly held by Gen-Z that could be augmented by GAI include Graphic Design Assistant (49% of US members are Gen-Z), Academic Tutor (46%), and Marketing Assistant (42%). Among jobs held by Gen-Z that could be disrupted by GAI are Clinical Research Assistant (57% of US members are Gen-Z), Industrial Design Specialist (47%), and Library Science Specialist (46%). In their favor, younger workers have more time (and potentially higher return) in their career to upskill and adapt to the demands of technological change, whether it is from GAI or future innovations.

By contrast, the Baby Boomer generation is relatively overrepresented in occupations that could be insulated from exposure to GAI. With more career experience, these workers are more likely to be in more senior roles that predominantly call upon people skills, like leadership and management. Examples of jobs typically held by Boomers that could be insulated from GAI include Board Member (33% of US members are Boomers), Managing Partner (21%), and Supply Chain or Environmental Consultant (17%).

Preparing the Workforce for Generative AI

5) Certain jobs are more likely to be relatively insulated from GAI

Despite the potential of GAI to have wide-ranging impacts on the workforce, some industries and occupations are likely to be relatively insulated in the near term. Jobs which rely on license mandates, government regulations, physical skills, ethical considerations, or empathic engagement all demand such a high degree of essential human functions, that GAI is not likely to immediately transform these roles.

19%

Compared to the average job, roles that mandate licenses³ or are government-regulated, may be 19% less exposed to GAI. Jobs like Emergency Dispatcher, Real Estate Agent, and Veterinarian tend to be relatively shielded from GAI due to their reliance on people skills. These jobs have critical requirements of public safety and professional accountability, requiring skills that only humans possess, such as moral judgment, ethical decision-making, and critical thinking. Furthermore, these roles, predominantly in healthcare and customer-facing industries, involve substantial human interaction and relationship building.

10%

Jobs that rely on physical skills to some extent, such as certain jobs in the education, construction, and arts fields, may be 10% less exposed to GAI compared to the average job. These roles require extensive human interaction, dexterity, and creativity skills that GAI is not likely to supplant. For example, childcare specialists provide nurture and care at an irreplaceable level of human connection and empathy, landscapers work onsite with a high degree of customization and creativity, and dancers perform tasks that demand artistic expression and physical execution.

7%

Jobs requiring green skills may be 7% less exposed to GAI, compared to the average job. As covered in [LinkedIn's Green Skills Report](#), occupations such as Environmental Health Safety Specialist, Construction Specialist, and Farmer frequently involve specialized knowledge and onsite application of skills that rely heavily on human judgment, critical thinking, and consideration of complex environmental tradeoffs— skills that are not easily replicated by existing GAI. Moreover, the green sector's focus on sustainability, energy efficiency, and ecological impact necessitates a high degree of regulatory compliance, adherence to safety protocols, and a deep understanding of environmental regulations. However, beyond GAI, [new AI applications may be capable of helping combat climate change](#), potentially augmenting many green jobs in the future.

³ Classification based on the National Occupational Licensing Database and manual curation.

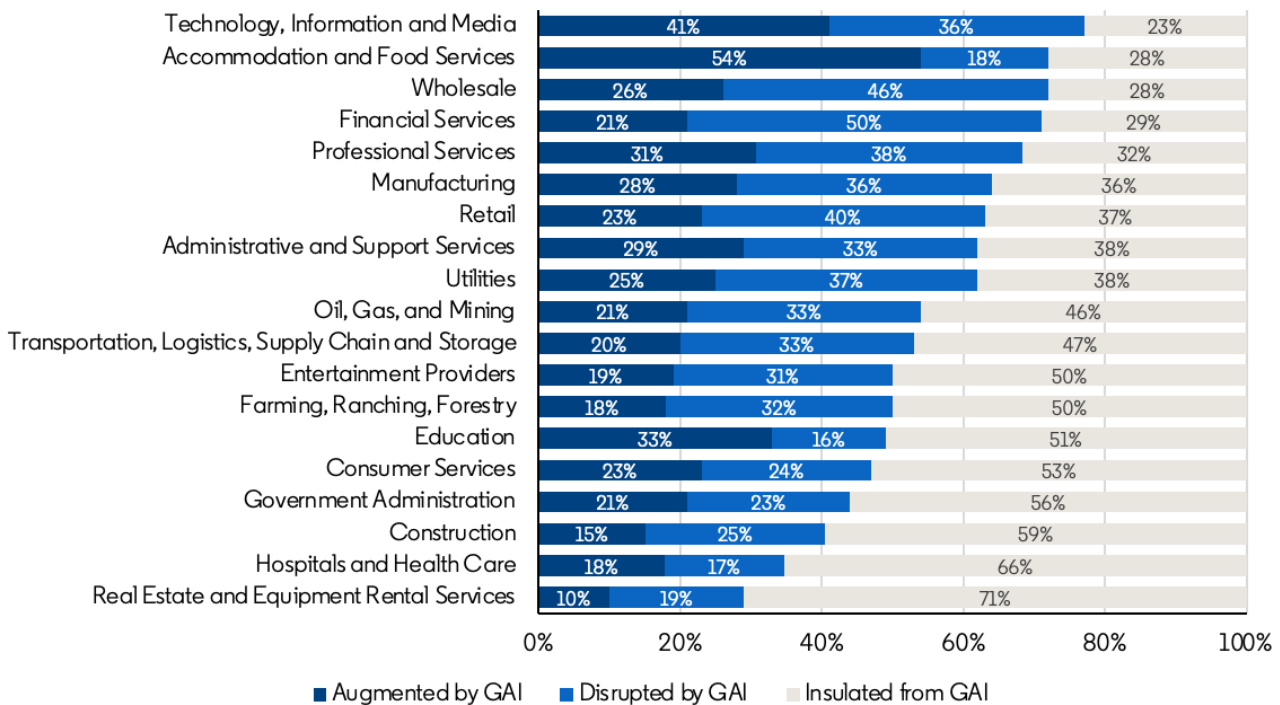
Preparing the Workforce for Generative AI

6) The potential impact of GAI varies across industries and goes beyond the Technology sector

Throughout history new technologies have impacted sectors and industries differently, and GAI is no exception. Our skills-based framework allows us to describe industry-level aggregate exposure to GAI-replicable and GAI-complementary skills (Exhibit 7).

Exhibit 7. Industry composition by GAI segment

Percentage of LinkedIn members by industry



Source: LinkedIn Economic Graph Research Institute

We estimate that the industries with the largest concentration of workers anticipated to be augmented or disrupted by GAI – where occupations have a relatively high exposure to GAI-replicable skills – are Technology, Information and Media (41% of US workers poised to be augmented by GAI, and 36% stand to be disrupted by GAI), Accommodation and Food Services (54% and 18%, respectively), Wholesale (26% and 46%, respectively), Financial Services (21% and 50%, respectively), and Professional Services (31% and 38%, respectively). Notably, at 33%, the Education Sector ranks third in share of US members that could potentially be augmented by GAI.

Technological inflection points, such as the one we are currently observing in the context of GAI, often result in widespread adoption and impact across entire economies over time. While it is not surprising that the Technology, Information and Media industry leads in terms of exposure to GAI-replicable skills –

Preparing the Workforce for Generative AI

since [most AI and GAI innovations come from this sector](#) – it is remarkable that the impact of GAI on the workforce extends across workers in all industries. The diffusion across industries points to the wide potential impact of GAI across the economy. Moreover, if these percentages in Exhibit 7 change over time, it may be informative regarding the potential speed of adoption as GAI transitions from early adopters to mainstream users. While new jobs directly related to emerging technologies will arise, most of the impact will likely be on transforming existing roles that will persist but evolve.

In the future of work: The conversation is about skills

While the long-term impact of GAI on the labor market and wages is still unclear, we expect that jobs will fundamentally change. The long-term impact will depend on how much and how quickly the market adopts GAI-augmented technologies. In the short term, we expect jobs to change by incorporating these new technologies that will reduce the time spent applying some skills, but that will make other skills much more important.

This is why the impact of GAI on jobs should be a conversation about building the right skills to adopt and complement GAI technologies, and not about job displacement. What is more likely is that it is not the exposure to GAI that will write the future of the workforce, but how leaders and workers respond to it.

Implications for leaders

A skills-based approach to strategic workforce planning: Leaders should comprehensively understand GAI's impact on their organizations and the economy. While new jobs directly related to emerging technologies will arise, most of the impact will likely be on transforming existing roles that will persist but evolve. By acknowledging the skills that stand to be most affected by GAI and those that complement GAI across roles and functions, leaders can optimize their hiring strategies and make informed decisions on the reskilling and upskilling programs needed to remain competitive in this changing environment.

In this context it is critical to recognize that using AI in hiring can help tackle labor market inequalities through a skills-based recruitment approach. The current labor market's oversight of exceptional candidates presents missed opportunities for companies, the economy, and society. Emphasizing a skills-based hiring approach not only invites more participants into the workforce but also levels the playing field for underrepresented groups. As global markets change, a skills-based approach can direct policymakers to enhance workforce initiatives, allowing businesses to access a broader, diverse talent spectrum and promote inclusivity in hiring.

Productivity gains via collaborative human-AI workflows: Leaders should recognize the potential for GAI technology to augment human capabilities. Building a culture that promotes collaborative people and AI workflows and adopts responsible guidelines for the use of AI, can unlock new avenues for productivity and innovation. Empowering employees to leverage AI technologies via increased AI

Preparing the Workforce for Generative AI

literacy may be crucial for success in a digitally driven economy and ensure that AI and GAI enhance human expertise rather than supplant it.

The rise of automation and AI has emphasized the growing importance of people skills, which have always been vital for job success. As hard skills' half-life diminishes, the significance of people skills, such as creativity and leadership, continues to grow. With AI technologies increasingly automating tasks formerly performed by humans, there's a shift towards collaborative intelligence, where humans and intelligent machines work together to achieve superior outcomes. This evolution requires companies to adapt their hiring focus on essential people skills, and employees to hone new capabilities, including effective AI communication, data interpretation, and spotting optimization opportunities.

Promotion of an equitable distribution of AI benefits: Leaders face an opportunity to address disparate impacts of GAI on different workforce segments, such as its potentially disproportionate effect on women and the youth. Collaborative efforts are needed to ensure an equitable distribution of AI benefits, and the mitigation of socially undesired effects. This entails prioritizing transparent research, combating systemic biases, and advocating for inclusive AI education. As technology, especially AI, becomes more integrated into our daily lives, a new baseline of AI literacy emerges. This is distinct from traditional digital literacy, which focuses on using and understanding digital technologies. AI literacy should encompass understanding AI fundamentals, recognizing ethical implications like privacy and bias, becoming familiar with AI-driven tools in the workplace, and grasping the broader socio-economic implications of AI on society.

With the accelerating deployment of generative AI, businesses must monitor labor market trends to remain competitive. Meanwhile, regulators and governments should support workforce development in digital skills, and education systems must evolve to produce an AI-ready workforce. By fostering global collaboration across research bodies, governments, civil society, and the private sector, leaders can navigate AI's complexities and lay the foundation for a more just and inclusive future.

Appendix

GAI-replicable and GAI-complementary skills

We identify GAI-replicable and GAI-complementary skills with the following steps:

1. We ask ChatGPT 3.5 (Feb 2023) the following prompts:
 - a. "What are the 100 top skills that AI technologies (ChatGPT, Dall-E, LaMDA, etc.) can perform very well?"
 - b. "What are the 100 top skills that can currently exclusively be performed by humans?"

We map these lists to LinkedIn's taxonomy with LinkedIn's taxonomy API, and we refine matches manually.

2. We expand coverage further by applying skill similarities based on skill embeddings to score skills that are similar to those flagged in each list, and by manually reviewing the skills in the popular skill groups containing the skills from the previous steps.
3. For external validation, we ingest and map to our taxonomy three exposure scores from the academic literature ([Webb \(2019\)](#); [Felten, Raj, & Seamans \(2023\)](#), and [Felten, Raj, & Seamans \(2021\)](#)). We use these scores to train a model that learns which skills contribute more to these three rankings, and we use this model to score all skills in LinkedIn's taxonomy.

Occupations exposed to GAI and complementary skills

To calculate the percentage of skills that are exposed to GAI by occupation, we use each occupation's [skills genome](#). An occupation's skills genome is the ranking of its top 30 most relevant skills based on a TF-IDF model. In this model, skills are relevant when they tend to be disproportionately added by members in this occupation compared to other occupations.

The thresholds for classifying occupations into high and low exposure to GAI and to GAI-complementary skills are based on the metrics' medians.

Segments exposed to GAI and complementary skills

Based on the classification of occupations by GAI-complementary exposure, we compute the share of LinkedIn members in each category as a share of all members in that segment, gender, generation group, etc. We report these shares and we run linear regressions to compare GAI exposure against dimensions of interest, such as skill type, education, and experience.