

The Transformational Opportunity of AI on ICT Jobs

Executive Summary

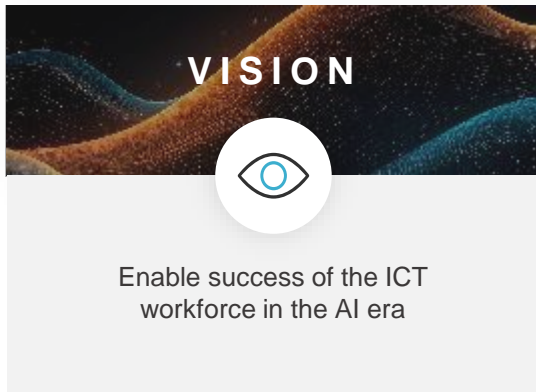
JULY 2024



About the Consortium

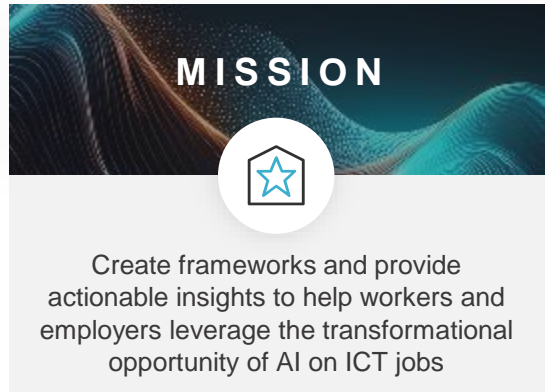
AI-Enabled Information and Communication Technology Workforce Consortium

On April 4, 2024, a Consortium of nine leading global corporations in collaboration with global advisors embarked on a collaborative endeavor with a singular vision of sharing insights to advance an AI-enabled information and communications technology (ICT) workforce. The Consortium was catalyzed by the work of the U.S.- EU Trade and Technology Council's (TTC) Talent for Growth Task Force, with the goal of exploring AI's impact on ICT job roles and identifying the skills and training workers will need to thrive in an AI-driven future.



VISION

Enable success of the ICT workforce in the AI era



MISSION

Create frameworks and provide actionable insights to help workers and employers leverage the transformational opportunity of AI on ICT jobs

Consortium members universally acknowledge the profound benefits of AI and the importance of their combined efforts with the acceleration of AI across all facets of business, while also fulfilling the goal of creating an inclusive workforce with family-sustaining opportunities. Consortium members commit to developing worker pathways particularly in technology focused job sectors that will increasingly integrate artificial intelligence technology. To that end, Consortium members have established forward thinking goals with skills development and training programs to positively impact over 95 million individuals around the world over the next 10 years. Consortium member goals include:

- Cisco to **train 25 million people** with cybersecurity and digital skills by 2032
- IBM to **skill 30 million individuals** by 2030 in digital skills, **including 2 million in AI**
- Intel to empower over **30 million people with AI skills** for current and future jobs by 2030
- Microsoft committed to training and certifying **10 million people in digital skills by 2025**, surpassing this goal by **training and certifying 12.6 million people a year ahead of schedule**
- SAP to upskill **2 million people** worldwide by 2025
- Google has recently announced over **\$130 million** in funding to support AI training and skills for people across the US, Europe, Africa, Latin America, and APAC

CONSORTIUM MEMBERS



CONSORTIUM ADVISORS



Catalysts

U.S.-EU Trade and Technology Council's (TTC) Talent for Growth Task Force and U.S. Department of Commerce

Foreword



Rarely do we find an opportunity to shape the future through advanced technology and industry stewardship. As we usher in the era of Artificial Intelligence (AI), it is with pride that we unveil an innovative report on the impact of AI on 47 distinct ICT job roles. This marks a significant moment for the AI-Enabled Information and Communication Technology (ICT) Workforce Consortium, setting a standard in our commitment to shaping the future of our industry. We aim to empower professionals and ensure they are equipped to thrive in an AI-driven landscape. This report curates tailored training recommendations to support the professional development of roles disrupted by AI advancements.



Francine Katsoudas
Executive Vice President and Chief People, Policy, and Purpose Officer
Cisco

In our next phase, we look forward to continued collaboration with G7 governments on the AI Action Plan, as we strive to expand our impact, particularly among women, underrepresented communities, and in developing countries. As technology accelerates and global organizations chart their path forward, we must be intentional in ensuring that we bring everyone along. We recognize that our collective efforts as industry leaders can accomplish more and forge robust public-private partnerships.

I extend my gratitude to the organizations comprising the AI-Enabled ICT Workforce Consortium. Your collaboration, commitment, and insights have been invaluable in helping to shape the future. Cisco's ongoing work is driven by our commitment to a more inclusive future, giving more people access to an AI-fueled world and enabling broader economic opportunity. Understanding how AI intersects with ICT roles is a crucial step in bridging the digital divide, and this report is a testament to a shared responsibility to this mission.



Generative AI has the potential to reinvent fundamental aspects of our daily lives. Embracing these changes requires a collaborative and dynamic approach, which is why I am honored to be part of a pioneering consortium that includes nine corporations and seven global advisors catalyzed by the US-EU TTC Talent for Growth Task Force. Together, we are tackling the opportunities and challenges that the ICT workforce will face as generative AI becomes increasingly prevalent.



Ryan Oakes
Global Health and Public Service Industry Lead,
Accenture

This report outlines the fundamental skills related to Generative AI that will enhance productivity, foster career growth and spark innovation across sectors. At Accenture, we are committed to the principle that responsible AI usage is imperative for both individuals and organizations. As highlighted in this report, it is essential that AI ethics training is an integrated part of the core skill set for every job.

I am optimistic that the consortium's efforts and the insights from this report will exemplify the effectiveness of public-private partnerships aimed at providing workers with a path for rapid upskilling and training opportunities. In the U.S., for instance, the Workforce Innovation and Opportunity Act (WIOA) funded public workforce system is well-positioned to support this upskilling at an accelerated pace and scale in collaboration with businesses such as those leading this consortium.

I look forward to continuing this collaborative journey and extend my gratitude to CISCO for their leadership while broadening global participation.

SIGNATORIES



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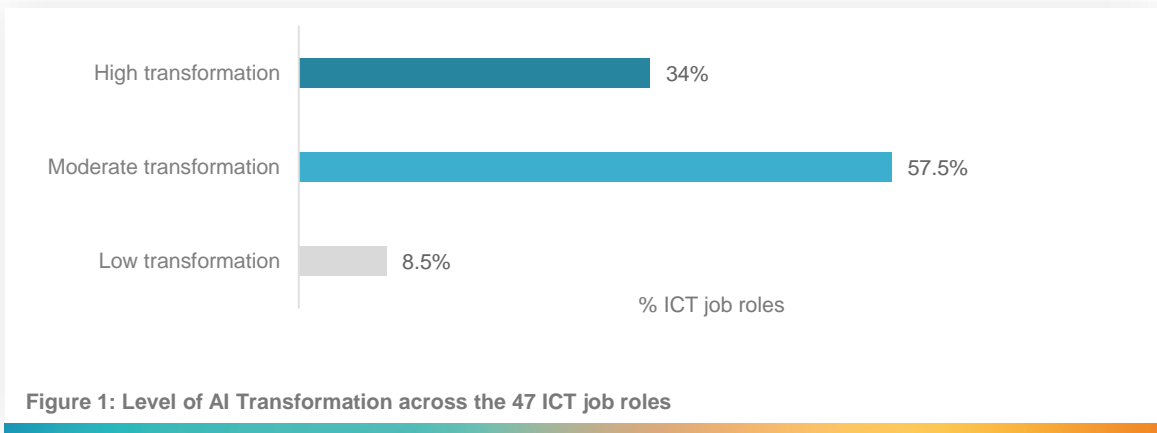
To understand the far-reaching impact of AI on Information and Communication Technology (ICT) jobs, we analyzed 47 ICT job roles that are most impactful at the **job family level, career level, individual job level, and skill level**, revealing comprehensive insights.

In this section, we will explore how AI is reshaping roles within the ICT sector, highlighting crucial areas of influence, essential skills required for success, and strategic steps to navigate this transformative landscape. These insights across dimensions offer a holistic view, empowering workers, and businesses to embrace the AI-driven future of work in the ICT industry.

Every ICT job becomes an AI influenced job

The integration of AI into ICT jobs marks a profound shift, promising substantial gains in efficiency, shift in skillsets for current job roles, the creation of new job roles, and notable technological advancements. Our study reveals the widespread nature of this transformation across the ICT sector, projecting that over **91.5% of ICT job roles analyzed are expected to experience either**

high or moderate transformation due to advancements in AI, highlighting its pervasive impact. (AI transformation labeling combines **the opinion of subject matter experts** and the % of the skills impacted. High: more than 70% of the principal skills affected by AI; Moderate: between 50% and 70% of the principal skills affected by AI; Low: Less than 50% of the principal skills affected by AI).



Over the past eight years, there has been a 323% increase in demand [1] for AI technical talent. The introduction of ChatGPT and other Generative AI (Gen AI) tools led to rapid AI adoption in ICT industry, since then this demand for new AI skills has increased by **65% over five years according to analysis from Indeed [2]**.

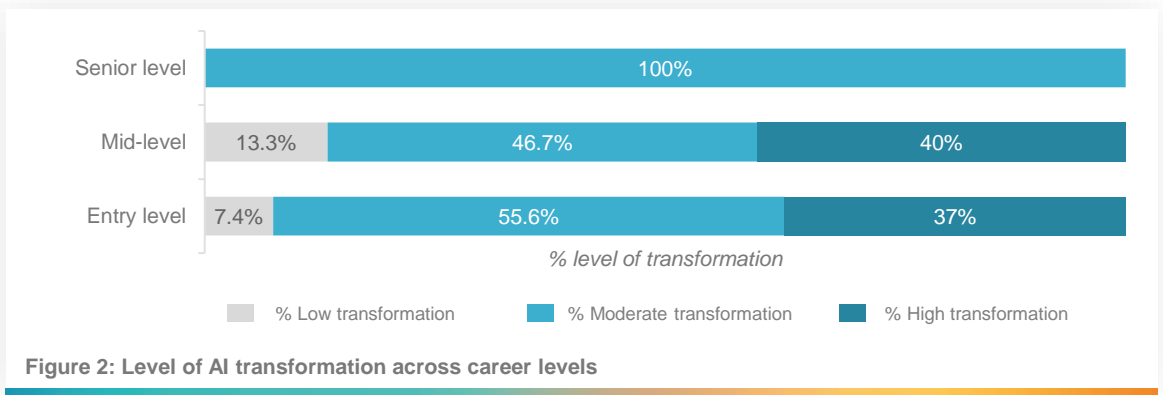
Furthermore, AI's integration intertwines with other technological domains like IoT and cloud computing, amplifying capabilities in interconnected environments. This synergy emphasizes the imperative for ICT workers to continually update their skills, embracing lifelong learning and adaptability to harness AI's full potential.

[1] Source: Microsoft and LinkedIn, 2024; [2] Source: Indeed, job postings data, 2024

Workers in entry and mid-level job roles have the most opportunities to upskill

In our analysis of career levels, we have observed that entry level and mid-level ICT workers are at the forefront of this transformation as **37% of entry level job roles**

and 40% of mid-level job roles analyzed, are expected to have high levels of transformation due to AI advancement.



AI has the potential to empower a broader range of workers to handle more complex tasks sooner. AI tools have demonstrated the ability to assist novice workers in acquiring capabilities comparable to those of experienced agents in just three months rather than 10^[3], presenting new avenues for career growth. This underscores the importance of reskilling and upskilling at entry and mid-levels.

Simultaneously, senior-level workers must embrace AI's transformative potential. Leading change effectively requires seizing AI opportunities to redefine organizational strategies and operational efficiencies.

Workers across all career stages can tap into AI's potential through specialized training, continuous learning, and collaborations with AI experts. Staying current with technological advancements not only enriches current roles but also ensures long-term career resilience in an increasingly AI-driven landscape. While AI and automation enhances efficiency in these positions, adapting swiftly to the evolving landscape remains crucial for worker growth and success.

Business and Management roles present the highest potential for transformation

To gain deeper insights into the extent of transformation, we also conducted a detailed examination of job roles at the functional level. These roles were categorized into seven distinct clusters, referred to as 'Job Families', based on their specific technical and functional

requirements: **(i) Business and Management, (ii) Cybersecurity, (iii) Data Science, (iv) Design and User experience, (v) Infrastructure and Operations, (vi) Software Development, and (vii) Testing and Quality Assurance.**

[3] Source: National Bureau of Economic Research, 2023

Distribution of the high, moderate, and low transformation among job families

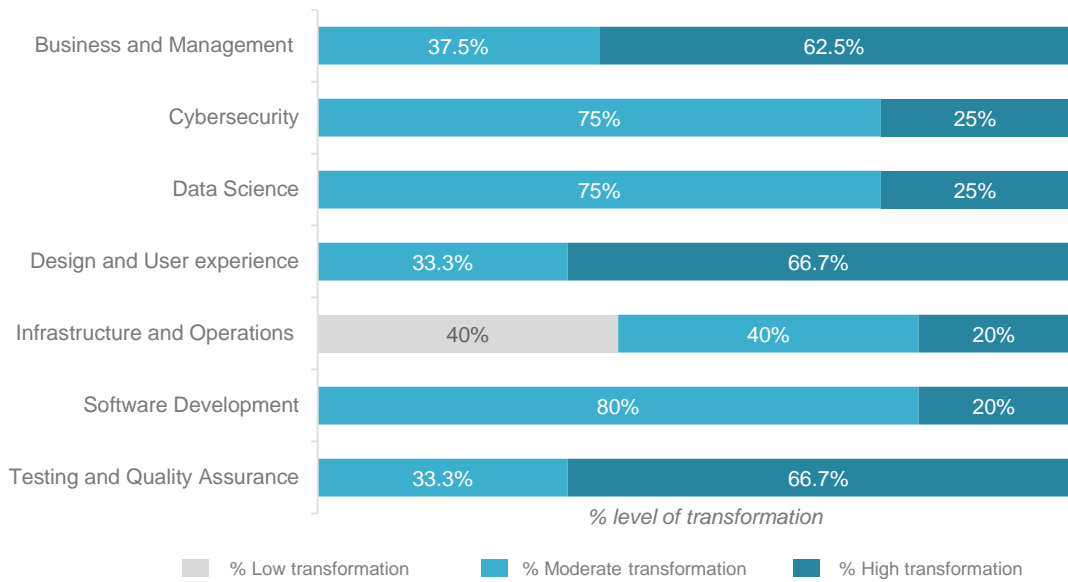


Figure 3: Distribution of the high, moderate, and low transformation among job family groups

Among the seven job families analyzed, Business and Management stands out, with 62.5% of job roles classified as high transformation and 37.5% as moderate transformation due to AI integration. This transformation is especially anticipated in entry level job roles such as Business Analyst, Business Intelligence Analyst, Business Systems Analyst, and Customer Service Representative [refer to Table 1]. AI has the potential to revolutionize these roles by enhancing operational efficiencies, facilitating strategic decision-making through data-driven insights, optimizing customer experiences, refining marketing strategies, and improving other functional aspects. Additionally, the Business and Management job family group is leading the pack in share of job postings according to our analysis of Indeed data. Software Development closely follows in second place^[4].

Meanwhile, the Software Development family group has shown significant transformation requirements, with 20% of job roles classified as high transformation and 80% as moderate

transformation, highlighting its pivotal role in AI adoption. According to data from Indeed, **one in 40 job postings for software developers in America mentions skills related to Gen AI**^[5]. The introduction of advanced AI tools for code generation and software development lifecycle management has notably reduced time-to-market through precise planning and predictable workflows.

Conversely, all job roles categorized under **low transformation belonged to the Infrastructure and Operations** family, underscoring its relative resilience to current AI advancements despite some roles within the group requiring transformation.

This trend suggests that AI is reshaping certain job families more than others, potentially altering the types of skills and roles needed. This may involve refining job requirements to better align with the demands of AI-driven advancements. Therefore, targeted strategies for skills development and adaptation to AI technologies is crucial for staying competitive and relevant in the evolving job market.

[4] [5] Source: Indeed job postings data, 2024

Job Family Groups

We have organized the job roles into seven job family groups categorized based on the similar technical and functional responsibilities, as shown below:

Job Family	Definition	Job Role
Business and Management	Managing the development, business analysis and marketing of technology products and services	<ul style="list-style-type: none"> Business Analyst Business Intelligence Analyst Business Systems Analyst Customer Service Representative Digital Marketing Specialist Product Manager Project Manager Senior Product Manager
Cybersecurity	Protecting systems, networks, and data from security breaches and cyberattacks	<ul style="list-style-type: none"> Cybersecurity Analyst Information Security Specialist Ethical Hacker Soc Analyst Level 1
Data Science	Analyzing and interpreting large sets of data to extract valuable insights	<ul style="list-style-type: none"> Data Analyst Data Engineer Data Scientist Data Specialist
Design and User Experience	Designing the user experience and interface	<ul style="list-style-type: none"> Design Engineer Product Design Engineer UX Designer
Infrastructure and Operations	Managing and maintaining computer networks, including installing and configuring network equipment and troubleshooting network issues	<ul style="list-style-type: none"> Database Administrator Help Desk Analyst IT Manager IT Support Technician Network Administrator Network and IT Automation Engineer Network Support Technician Senior Network Engineer Systems Administrator Systems Analyst
Software Development	Designing, coding, testing, and maintaining software applications and systems	<ul style="list-style-type: none"> AI / ML Engineer Application Developer Back End Developer Cloud Engineer Front End Developer Full Stack Developer Java Developer Principal Software Engineer Python Developer Software Architect Senior Software Development Engineer Senior Software Engineer Software Developer Software Engineer Web Developer
Testing and Quality Assurance	Providing technical support and assistance to users	<ul style="list-style-type: none"> Software Test and Debug Technical Writer Quality Assurance Analyst

Table 1: Job roles categorized by technical and functional responsibilities into 'job family' groups

Shift in skillset relevance due to AI transformation

The study highlights the top ten skill sets expected to undergo significant transformation and gain prominence and become increasingly relevant across various job roles, **along with the percentage of job roles requiring these skills. For instance, 100% of the job roles emphasize the growing importance of AI ethics and responsible AI practices.**

Additionally, we have identified another set of ten skills that may become less relevant due to AI advancements; for example, **31% job roles indicate a reduced need for basic programming and language skills, signaling a shift towards higher-level AI development competencies such as ML and NLP.**



Top 10 technical skills expected to increase in relevance (% job roles)

100%	AI ethics and responsible AI
100%	AI literacy
66%	Prompt engineering
20%	Large Language Models (LLM) architecture
20%	Agile methodologies
20%	Data analytics
11%	Machine learning
11%	Retrieval augmented generation
11%	TensorFlow
9%	Natural language processing

Top 10 technical skills expected to become less relevant (% job roles)

31%	Basic programming and languages
18%	Content creation
18%	Data management
16%	Research information
13%	Documentation maintenance
13%	SQL
7%	Manual XML handling
7%	Manual Perl scripting
7%	Integration software
4%	Manual malware analysis

Figure 4: Top 10 technical skills expected to increase in relevance and top 10 technical skills expected to become less relevant (% job roles)

Key learning recommendations

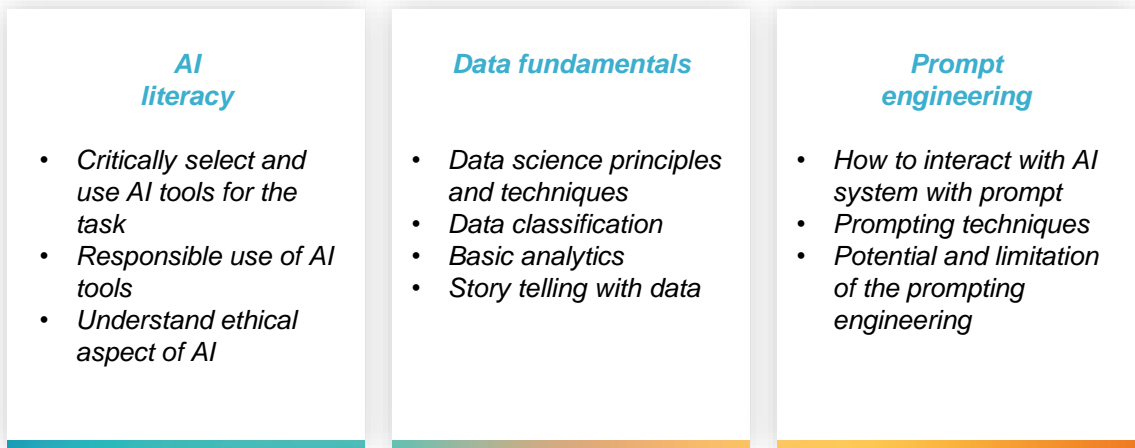
The study highlights a rapidly transforming job landscape where the required skillsets for ICT roles may undergo significant shifts. This underscores the pressing need for upskilling and reskilling initiatives among workers.

Essential training programs, specifically designed for both foundational and job-specific AI technologies, are crucial to equip the workforce with the necessary skills for future roles.

Essential common foundational skills needed across ICT job roles for AI preparedness

Based on the key findings of the study, we have identified three essential foundational skills (see below) based on the shifting skill requirements with AI transformation. Moreover, integrating durable skills such as time

management, critical thinking, and effective communication is essential. These skills complement the technical competencies and enhance readiness for evolving worker environments.



Job specific trainings needed across various ICT job roles

As part of our study, we have also identified target job specific skills and some training programs for each ICT role which are essential for workers to stay updated on AI advancements. These programs equip workers with vital AI-driven skills for ongoing innovation.

For example, few common trainings that are applicable across specific roles include: Machine Learning with Python Foundations, AI Security Nuggets, Python for Data Science, AI & Development, Training Neural Networks in Python or applying Gen AI as a Creative Professional.

Future growth of ICT job landscape through collaboration

The insights of the study indicate significant transformation in ICT job roles across career levels and job families. It is crucial for everyone—businesses, academia,

government, current workers, and future workers—to collaborate and actively participate in this skill development journey.



Businesses must invest in AI training to ensure workforce competitiveness and innovation, fostering growth in a technology-driven market. By investing in worker training, employers can attract and retain talent. Employers must take worker training needs and feedback into consideration when developing training programs.



Government leaders can advance AI through funding, policies, and partnerships that support effective upskilling and reskilling initiatives, ensuring a skilled workforce ready for technological advancements.



Academic institutions can update their curricula to include AI technologies and offer concise certificate programs that contribute to societal impact. By integrating practical, industry-specific AI skills, graduates will be well-prepared for the workforce, facilitating smooth transitions into professional roles. Academic institutions must prioritize investments in work-based learning initiatives, using flexible learning paths, and fostering collaboration with regional secondary education institutions.



Current workers should embrace lifelong learning to stay relevant. Proactively seeking reskilling and upskilling opportunities through employer programs, labor-sponsored training implemented by labor unions, online courses, or certifications allowing them to adapt to new roles and responsibilities brought about by AI advancements. Workers can leverage training programs sponsored by companies, academia, non-profits, governments, and labor unions.



Future workers should focus on acquiring a strong foundation in AI and related technologies. Internships, mentorships, and hands-on projects help build a robust skill set, positioning them as valuable assets to prospective employers.

The transformation in ICT job roles calls for a unified effort across all sectors. Collaborative initiatives such as industry-academic partnerships, government-funded training

programs, and community-driven learning platforms can accelerate the reskilling and upskilling process, ensuring a resilient workforce equipped for the future.

Roadmap ahead

As we look to the future, embracing emerging AI technologies will be pivotal in shaping our educational and job landscape. To effectively navigate this transformative era, it is essential for businesses and academic institutions to foster collaborative partnerships and integrate

cutting-edge skills. By prioritizing innovation and inclusivity, we can pave the way for a dynamic learning environment that prepares individuals to thrive in the evolving global economy.

Skills taxonomy

The Consortium will explore public-private partnerships to contribute to an AI skills taxonomy that provides a reference framework and a common lens through which skills are defined and mapped to corresponding job roles, along with the level of proficiency

required. An AI skills taxonomy would bring clarity and enable a common understanding among the public and private sectors to help frame learning opportunities, workforce development programs, and job requirements.

AI workforce playbook

The Consortium plans to introduce an AI Workforce Playbook, designed to empower small and medium sized enterprises and large companies to reskill and upskill their workforce proactively. This playbook may include job evolution and mobility with a focus on reskilling and upskilling initiatives while fostering a culture conducive to AI integration.

Drawing insights from diverse stakeholders such as labour unions, clients, partners,

coalitions, governments, academia, and underserved communities, we will leverage best practices to enhance workforce readiness and adaptability. The playbook may also capture key job roles and success stories of workers navigating and thriving through evolving job landscapes. It will be aimed at serving as a collaborative resource for sharing learnings and strategies that support continuous workforce development in an AI-driven era.

SUMMARY OF ICT JOB ROLES AND AI TRANSFORMATION

ICT Job Role	ICT Job Family	AI Transformation
AI / ML Engineer	Software Development	High
Application Developer	Software Development	Moderate
Back End Developer	Software Development	Moderate
Business Analyst	Business and Management	High
Business Intelligence Analyst	Business and Management	High
Business Systems Analyst	Business and Management	Moderate
Cloud Engineer	Software Development	High
Customer Service Representative	Business and Management	High
Cybersecurity Analyst	Cybersecurity	Moderate
Data Analyst	Data Science	Moderate
Database Administrator	Infrastructure and Operations	Moderate
Data Engineer	Data Science	Moderate
Data Scientist	Data Science	High
Data Specialist	Data Science	Moderate
Design Engineer	Design and User experience	Moderate
Digital Marketing Specialist	Business and Management	High
Ethical Hacker	Cybersecurity	Moderate
Front End Developer	Software Development	Moderate
Full Stack Developer	Software Development	Moderate
Help Desk Analyst	Infrastructure and Operations	High
Information Security Specialist	Cybersecurity	High
IT Manager	Infrastructure and Operations	Low
IT Support Technician	Infrastructure and Operations	Low
Java Developer	Software Development	Moderate
Network Administrator	Infrastructure and Operations	Low
Network and IT Automation Engineer	Infrastructure and Operations	High
Network Support Technician	Infrastructure and Operations	Low
Principal Software Engineer	Software Development	Moderate
Product Design Engineer	Design and User experience	High
Product Manager	Business and Management	Moderate
Project Manager	Business and Management	High
Python Developer	Software Development	Moderate
Quality Assurance Analyst	Testing and Quality Assurance	Moderate
Senior Network Engineer	Infrastructure and Operations	Moderate
Senior Product Manager	Business and Management	Moderate
Senior Software Development Engineer	Software Development	Moderate
Senior Software Engineer	Software Development	Moderate
Soc Analyst Level 1	Cybersecurity	Moderate
Software Architect	Software Development	Moderate
Software Developer	Software Development	Moderate
Software Engineer	Software Development	High
Software Test and Debug	Testing and Quality Assurance	High
Systems Administrator	Infrastructure and Operations	Moderate
Systems Analyst	Infrastructure and Operations	Moderate
Technical Writer	Testing and Quality Assurance	High
UX Designer	Design and User experience	High
Web Developer	Software Development	Moderate

Acknowledgment



“As we look to unlock the full promise that AI brings, it is essential that we equip people with the skills they will need, and which they are eager to learn. The far-reaching impact of this technology demands that we design learning pathways that will position everyone to have deeper AI skills as the work in our industry requires. The initial report from the Consortium is an important step to turn aspiration to action – with specific reskilling recommendations that can accelerate progress for individuals, organizations, and society.” – Ellyn Shook, Chief Leadership & Human Resources Officer at Accenture



“AI represents a never-before-seen opportunity for technology to benefit humankind in every way, and we have to act intentionally to make sure populations don’t get left behind. Across the Consortium member companies, we have made it our collective responsibility to train and upskill 95 million people over the next 10 years. By investing in a long-term roadmap for an inclusive workforce, we can help everyone participate and thrive in the era of AI.” – Francine Katsoudas, Executive Vice President and Chief People, Policy, and Purpose Officer at Cisco



"This report clearly demonstrates the immediate impact of AI on almost any career, regardless of industry or size. Creating a talent-centered organization, in which the entire workforce can learn and grow responsibly, is the next step for every successful business." – Ashutosh Garg, Co-CEO and Co-founder at Eightfold AI

Acknowledgment



"The benefits of AI must be accessible to every worker. We're proud to support the Consortium's new research, which will advance our shared vision to equip all workers with the AI skills they need to succeed in the jobs of today and tomorrow." – Lisa Gevelber, Founder of Grow with Google



"At IBM, we have been investing in the future of work through access to education and training opportunities for decades. The findings of this report further highlight the significant need for upskilling and reskilling, particularly with the rise of AI. Now, those in the ICT sector — from students to workers to employers — have the data about which jobs will change, how they will change, and what individuals and employers can do to prepare for this shift and remain competitive in the evolving global labor market." – Lydia Logan, Vice President, Global Education and Workforce Development at IBM



"We are excited by the impactful work this group is doing to understand the likely impact of AI on ICT workers and provide employers with the resources to support their workforce through this transformation. Indeed's mission is to help people get jobs. As AI skills rise in prominence, we're prioritizing skills-first hiring, to help job seekers demonstrate their AI capabilities and to connect employers to the broadest possible pool of talented job seekers across a broad range of industries." – Hannah Calhoun, Head of AI Innovation at Indeed

Acknowledgment



“We believe AI represents a paradigm shift with great potential to deliver new opportunities and tools, and our goal is to advance AI responsibly to help solve the world’s most significant challenges. Training, upskilling and reskilling workers on how to collaborate with AI and be critical thinkers is vital to our workforce and our next generation of innovation.” – Christy Pambianchi, Executive Vice President, and Chief People Officer at Intel Corporation



“AI can be a tool that empowers workers around the world, but they must have the skills to use it. That’s why Microsoft has committed to helping people and communities around the world gain new and necessary AI skills, and this new report contains important recommendations to take the global workforce into the future” – Naria Santa Lucia, Microsoft General Manager, Skills for Social Impact



“What stands out from this research beyond the undeniable needs for responsible AI development and broad AI literacy across-all ICT jobs, is the necessity for all roles to enhance their higher-order skills, such as critical thinking, creativity, and complex problem-solving. Beyond the initial adoption of AI, we believe evaluating the second-order effects of these skills shifts will highlight which skills will be commoditized and which will be differentiating in the future” – Nicole Helmer, Vice President & Global Head of Development Learning at SAP

AI-Enabled ICT Workforce Consortium

Our vision is to enable the success of the ICT workforce in the AI era

Website: <https://www.cisco.com/go/ai-workforce-consortium>

Training recommendations: <https://www.cisco.com/go/ai-workforce-consortium-training>

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