The State of Digital Skills in the U.S. Economy

Education and Training of a Big Data Workforce Symposium

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ITIF | INFORMATION TECHNOLOGY & INNOVATION FOUNDATION

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Today's Presentation

1. Global Digital Economy Requires Digital Workforces
2. Assessing the State of Digital Skills in the U.S.
3. Best Practices and Policy Recommendations

Increasingly Digitalized Global Economy

- 60% of global GDP has been digitized, meaning is impacted by the use of digital tools, as of 2022.
- Value of global data flows has exceeded the value of international merchandise trade.
- “Half of all value created in the global economy over the next decade will be created digitally.” – Tekes



Sources: Accenture, “Digital Disruption: The Growth Multiplier”; McKinsey Global Institute, “Digital Globalization: The New Era of Global Flows”; IDC, “IDC FutureScape: Latin America IT Industry 2019 Predictions”

Which Calls for an Increasingly Digitally Talented Workforce

- Individuals will need digital skills if they're to contribute value in the global digital economy.
- 97 million new digital jobs will be created globally in the first half of this decade.
- If America can train 5 million workers for digital jobs in the next 5 years, U.S. GDP would increase by $250 billion.



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Assessing the State of Digital Skills in the U.S. Economy

STEPHEN EZELL I NOVEMBER 2021

An increasingly digitalized global economy requires ever-more digitally skilled workforces for nations to remain productive. Unfortunately, domestic and international assessments of digital skills show the United States is lagging its competitors.

KEY TAKEAWAYS

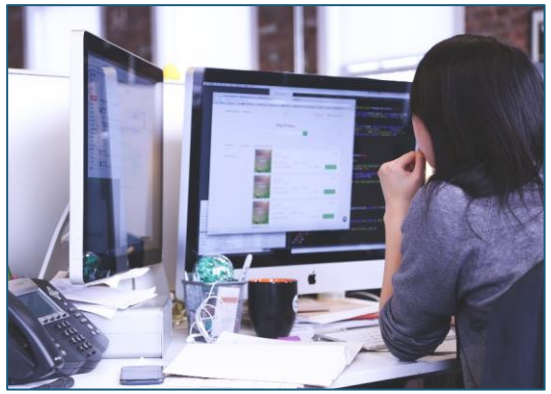
- According to the OECD, fully one-third of working-age Americans possess even limited digital skills. One in six are unable to use email, web search, or other basic online tools.
- The United States ranks just 29th out of 100 countries for the digital acumen of its workforce in business, technology, and data science, according to Coursera.
- This comes against a backdrop of increasing digital skills requirements for many U.S. occupations. Brookings found that whereas only 44 percent of U.S. jobs required medium-high digital skill levels in 2002, 70 percent did by 2016.
- Digital skills are critical to higher wages: Jobs that incorporate higher levels of digital content pay more—in fact, for every 10 percent increase in ICT-task intensity, the average U.S. worker's salary increases 4 percent.
- The United States needs to increase its number of computer science graduates and concentrate particularly on women, who represented 37 percent of U.S. computer scientists in 1995, but just 24 percent today.
- The United States needs to significantly increase its investment in workforce training, including for digital skills. As a share of GDP, the federal government now invests less than half as much in such programs as it did 30 years ago.
- With corporate investment in workforce training also falling by 30 percent as a share of GDP from 1999 to 2015, Congress should expand Section 127 tuition credits.

INFORMATION TECHNOLOGY & INNOVATION FOUNDATION I NOVEMBER 2021

Sources: PECC/CTPECC: "Understanding Digital Skills in the Digital Economy Era"
Gabe Dalporto, "To Future-Proof the American Economy, We Need 5 Million Digital Jobs in 5 Years"

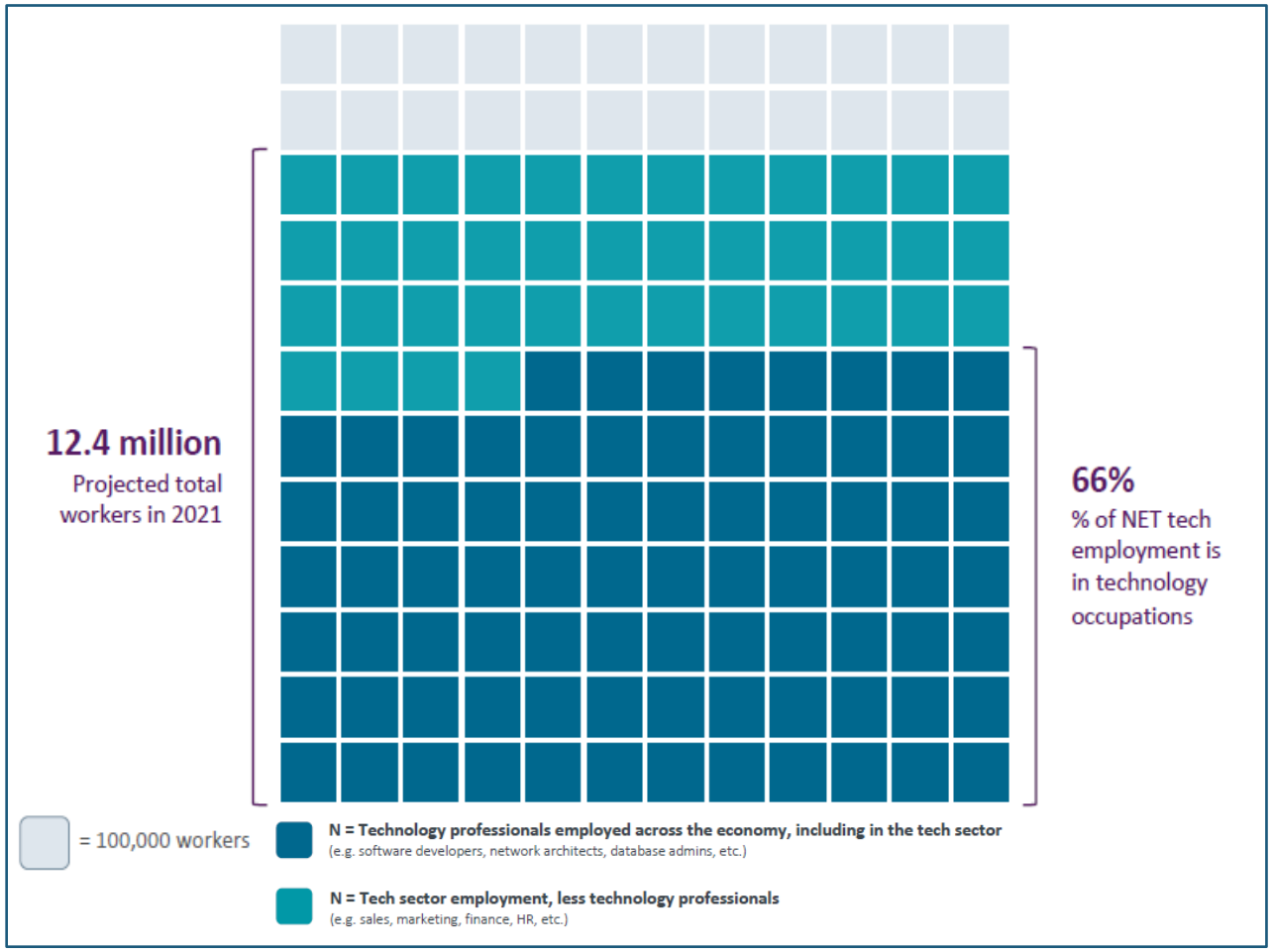
Two Categories of Digital Skills in an Economy

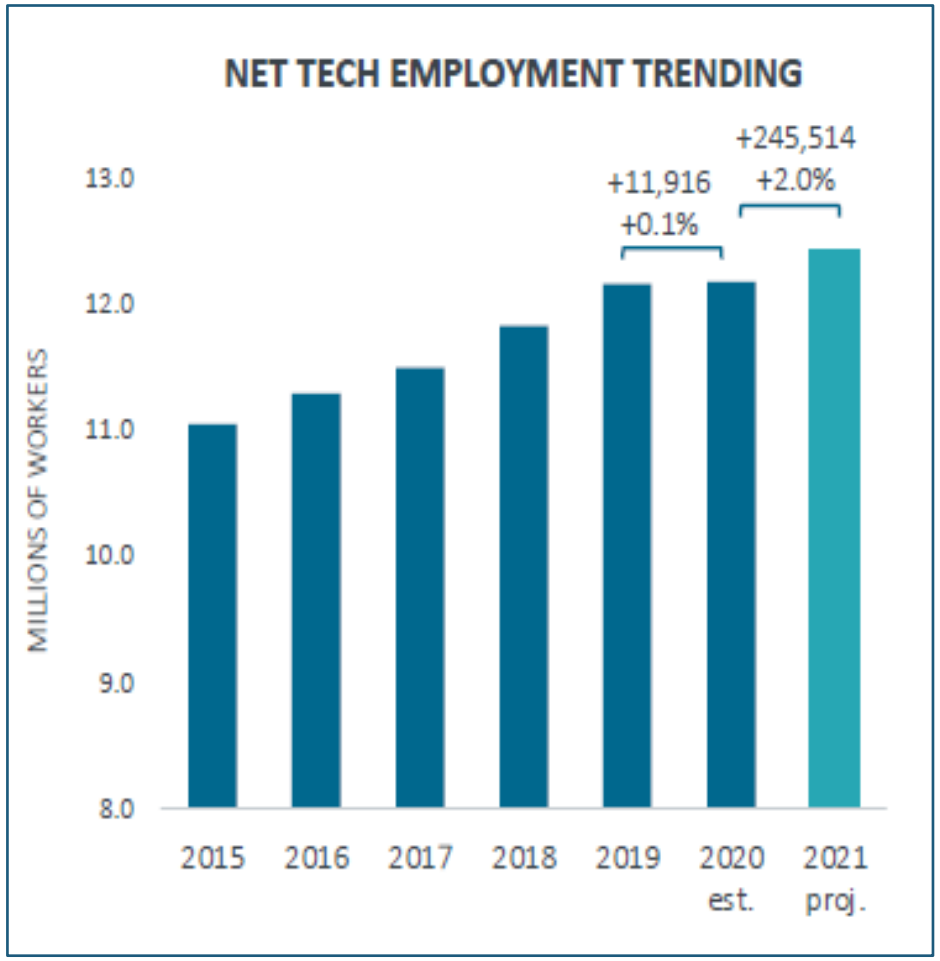
1. Those needed to work directly in ICT industries or occupations.
   - Software coders, AI developers, semiconductor designers, network operators.
2. Those requiring facility with digital tools to perform work in traditional occupations like finance, manufacturing, healthcare, etc.
   - Ability to use Microsoft Office programs, videoconferencing tools, access CRM databases, use automated/virtual reality (AR/VR tools), etc.



Source: ITIF, "Assessing the State of Digital Skills in the U.S. Economy," October 2021

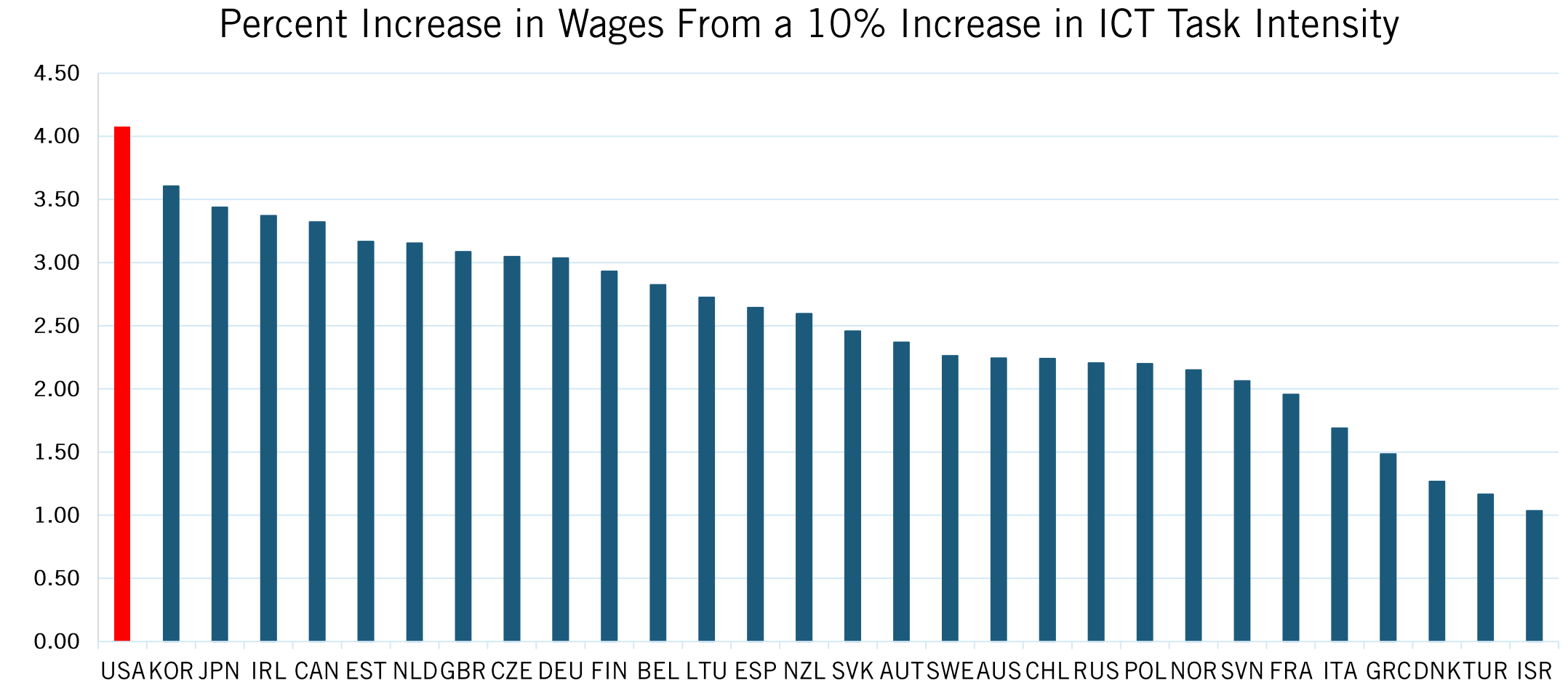
Extent of Core ICT Jobs in the U.S. Economy





Source: CompTIA, "Cyberstates 2021"

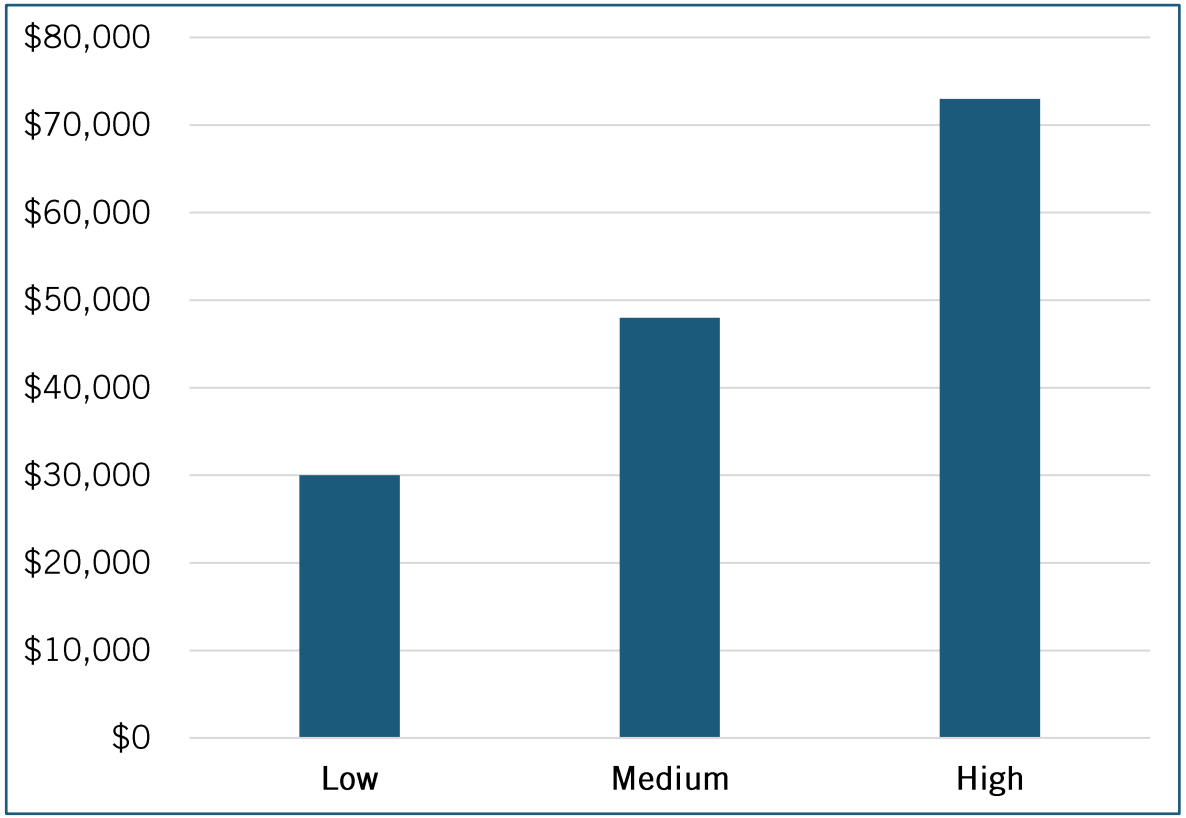
ICT Task-Intensive Jobs Pay More



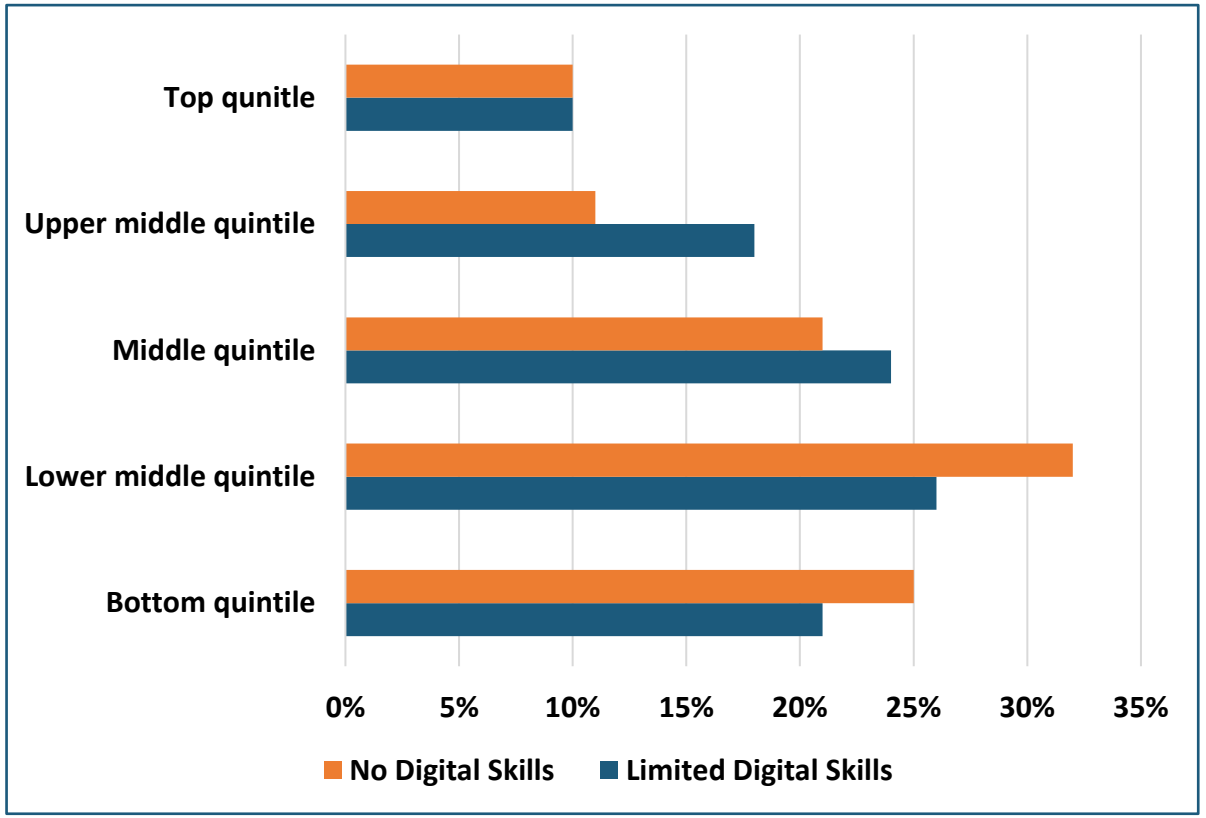
Source: OECD

Jobs Requiring Higher Levels of Digital Skills Pay More

Mean Annual U.S. Wage by Digitalization Level, 2016



Earnings of U.S. Workers By Digital Skills Quintile



Sources: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)
Amanda Bergson-Shilcock, "The New Landscape of Digital Literacy" (National Skills Council, May 2020)

Today's Presentation

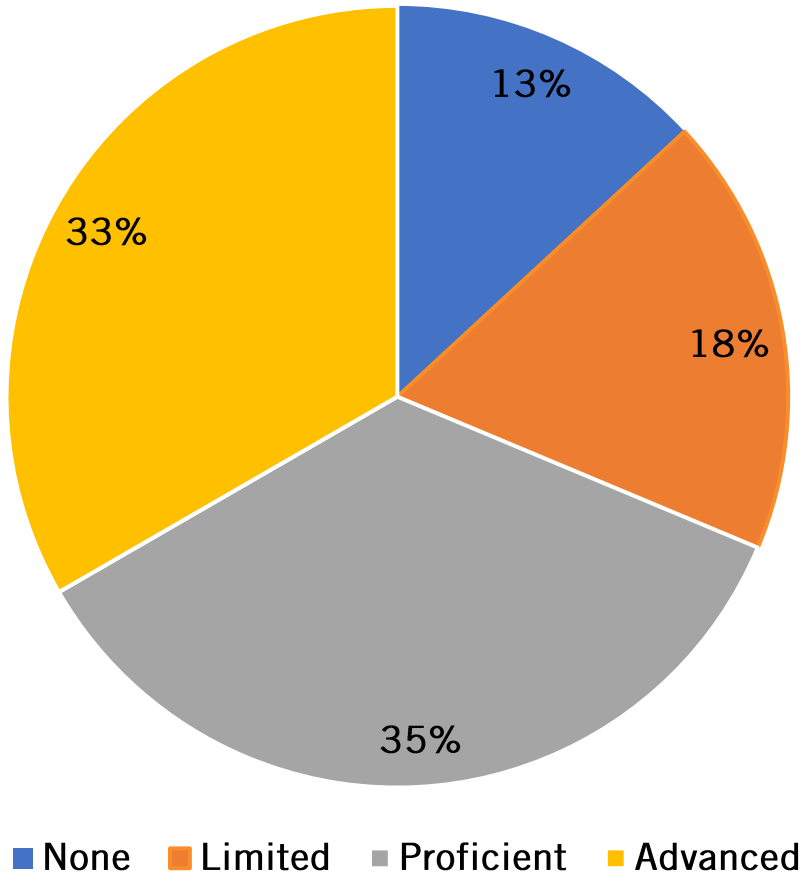
1 Global Digital Economy Requires Digital Workforces

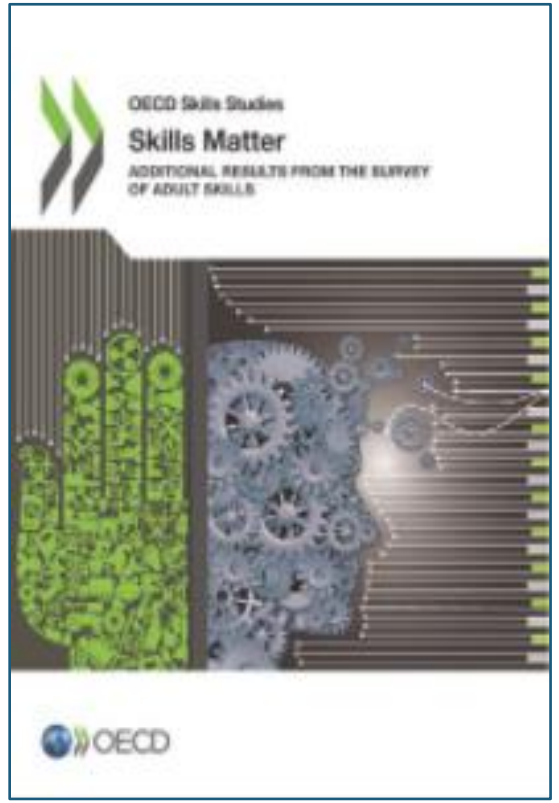
2 Assessing the State of Digital Skills in the U.S.

3 Best Practices and Policy Recommendations

Almost 1/3rd U.S. Workforce Has No/Limited Digital Skills

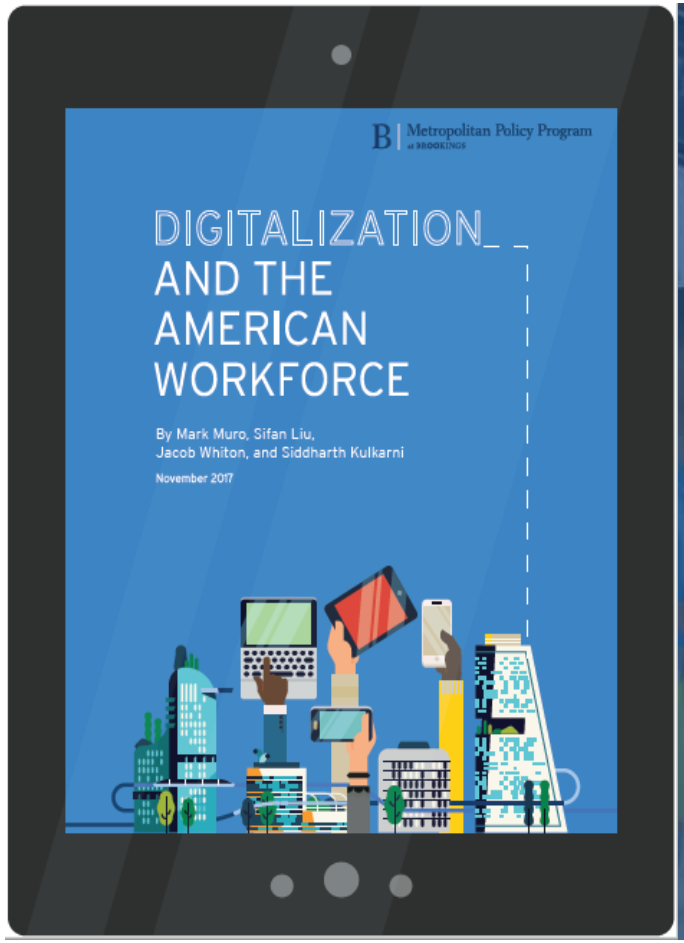
- **None:** No prior computer use; not willing to take test.
- **Limited:** Can complete only very simple digital tasks.
- **Proficient:** Capable of using basic digital productivity tools (Outlook).
- **Advanced:** Can use both generic and specific technology apps; solve tasks with multiple steps.





Sources: OECD, "Programme for the International Assessment of Adult Competencies"; Bergson-Shilcock, "The New Landscape of Digital Literacy"

Study of Digitalization Intensity of U.S. Occupations





Two categories of O*NET digitalization data

- Knowledge of computers and electronics
- Interaction with computers

Comprehensive digitization score from 1 to 100

Software developers	94
Electrical engineers	77
Lawyers	58
Mechanics	55
Registered nurses	55
Security guards	31
Restaurant cooks	18
Construction laborers	17
Personal care aides	14

Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)

Categorization U.S. Occupations by Digitization Intensity Levels

High
(scores above 60)



Software developers



Financial Managers

Medium
(scores between 33 and 60)



Registered nurses



Office clerks

Low
(scores below 33)



Construction laborers

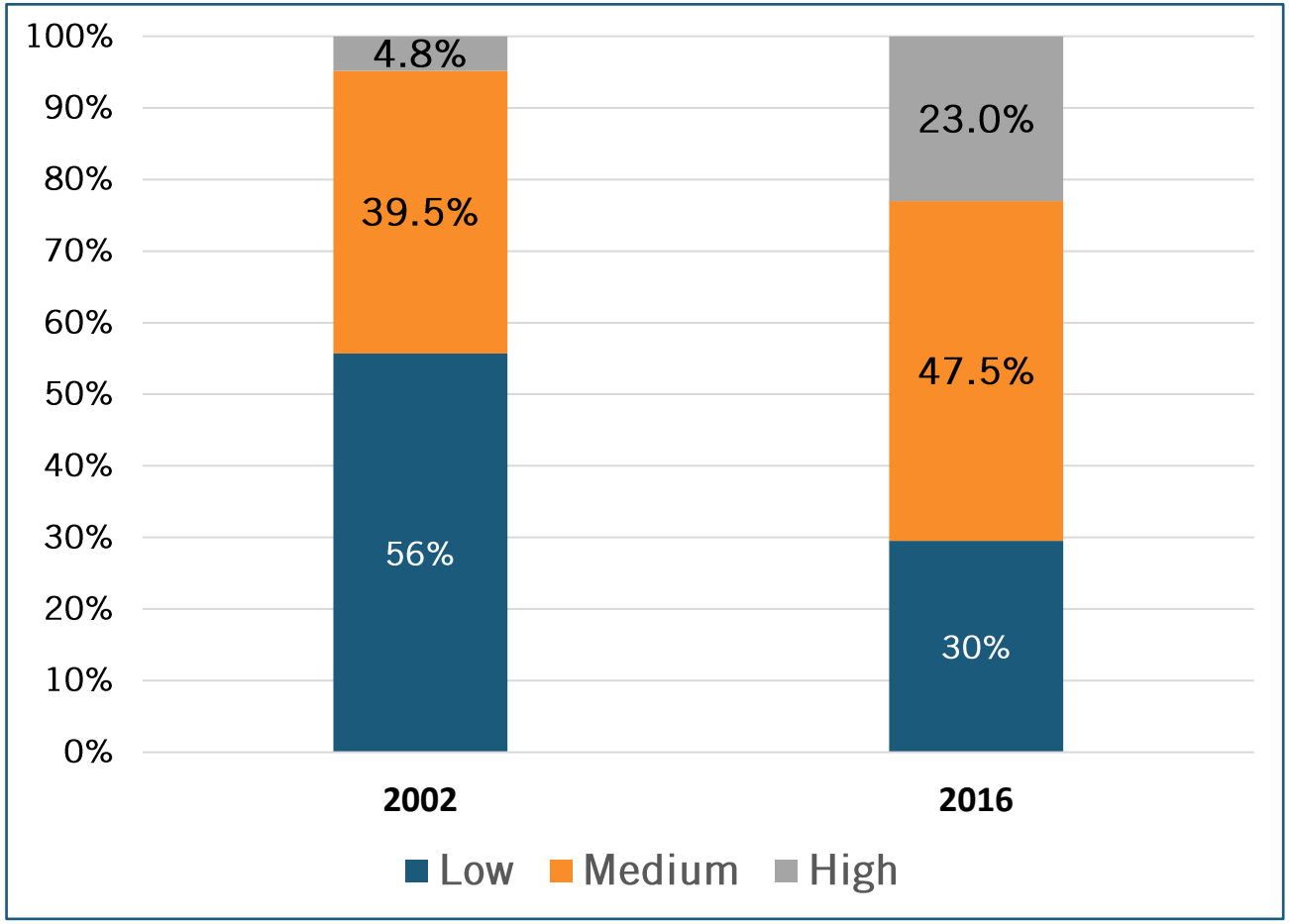


Personal care aides

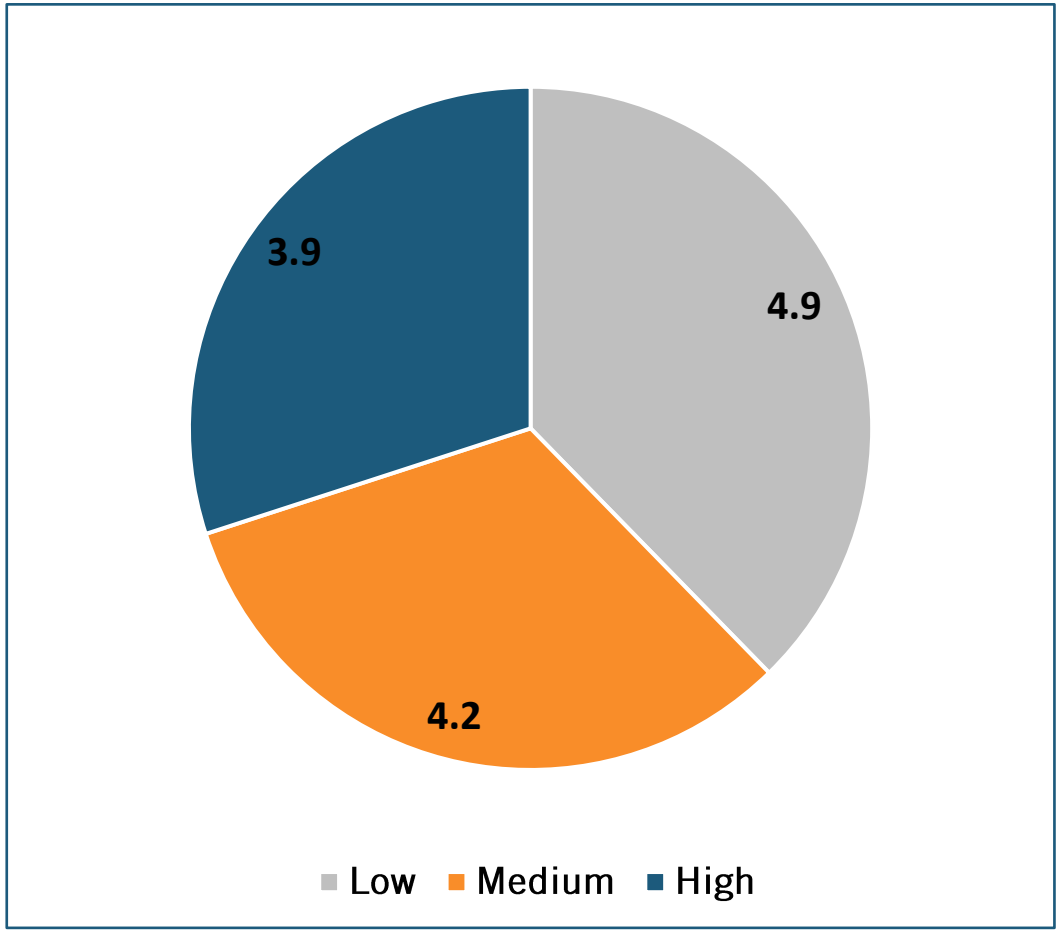
Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)

Occupations in the U.S. Economy Becoming More ICT-Intensive

U.S. Employment by Levels of Digitalization, 2002-2016

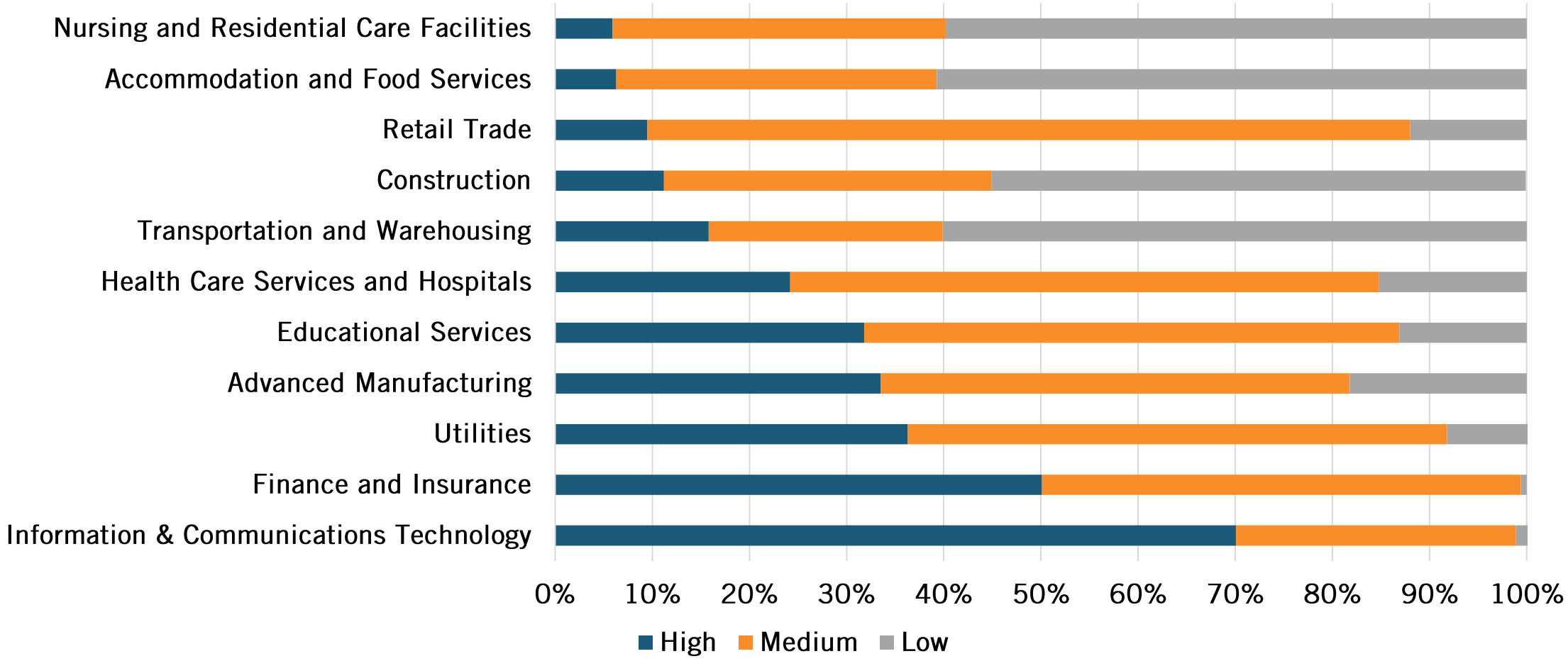


U.S. Jobs Created by Digital Skill Level, 2010-2016



Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)

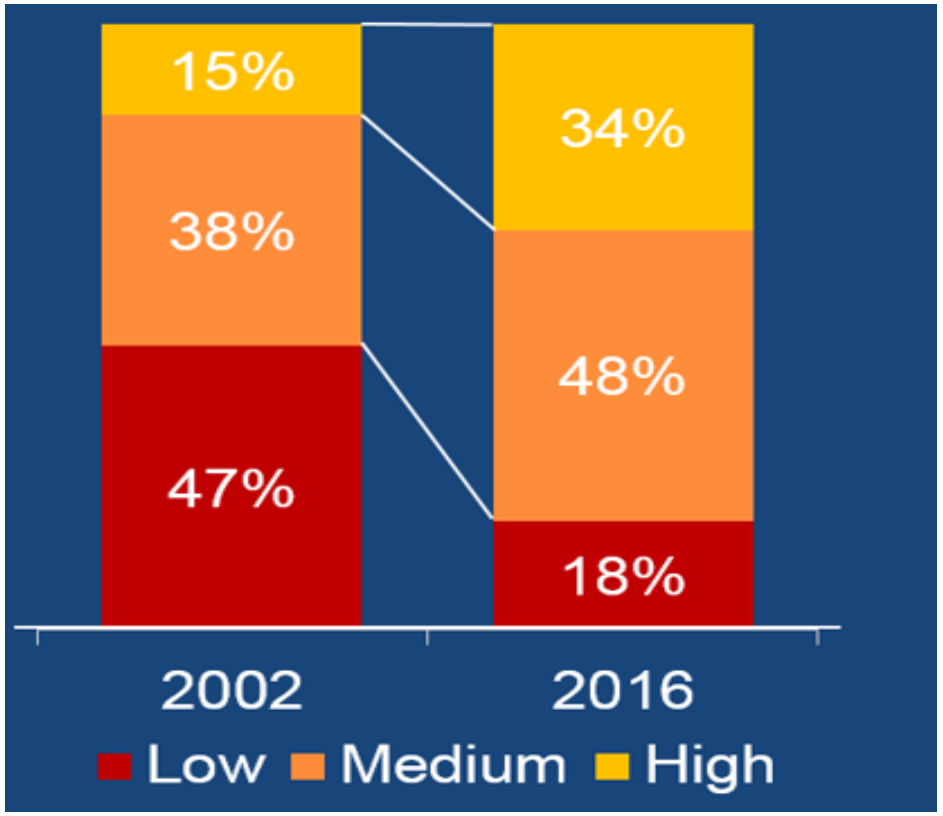
Occupations in the U.S. Economy Becoming More ICT-Intensive



Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)

Manufacturing Jobs Especially Becoming More ICT-Intensive

Advanced Manufacturing Employment by Digital Skill Level

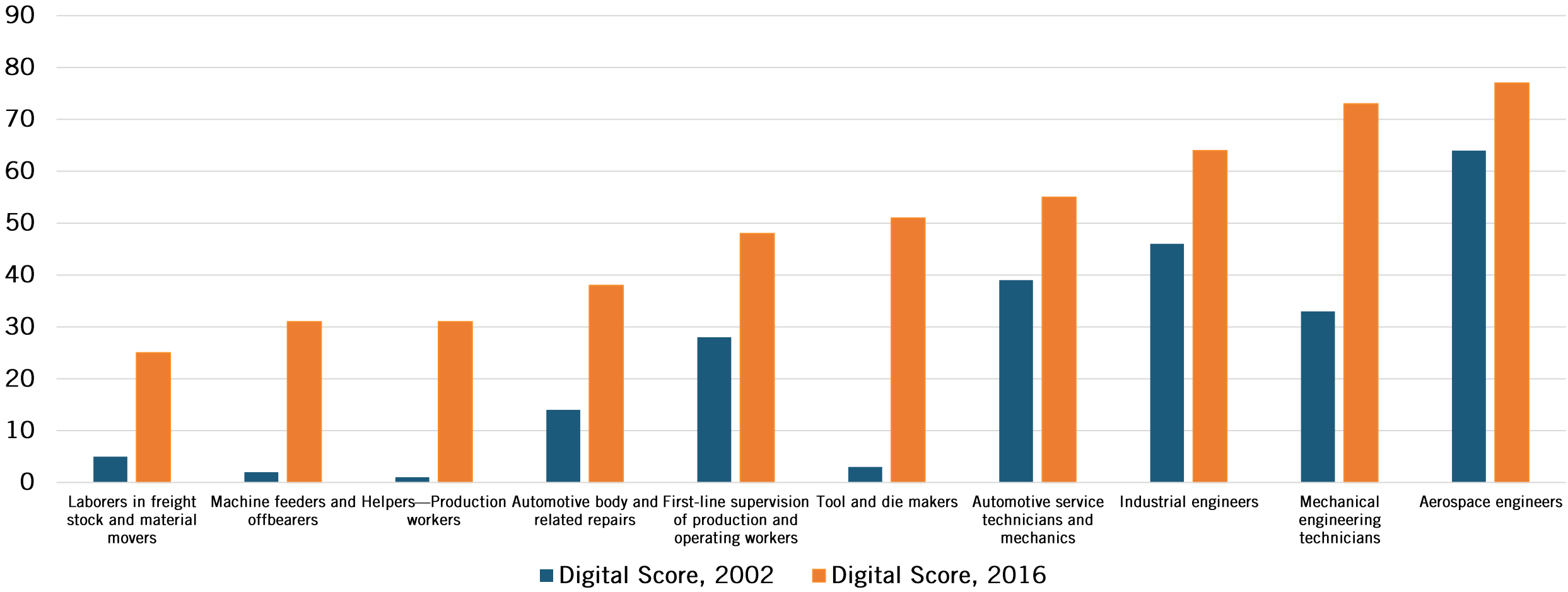


82% U.S. Mfg. Jobs Require Medium-High Digital Skills



Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)

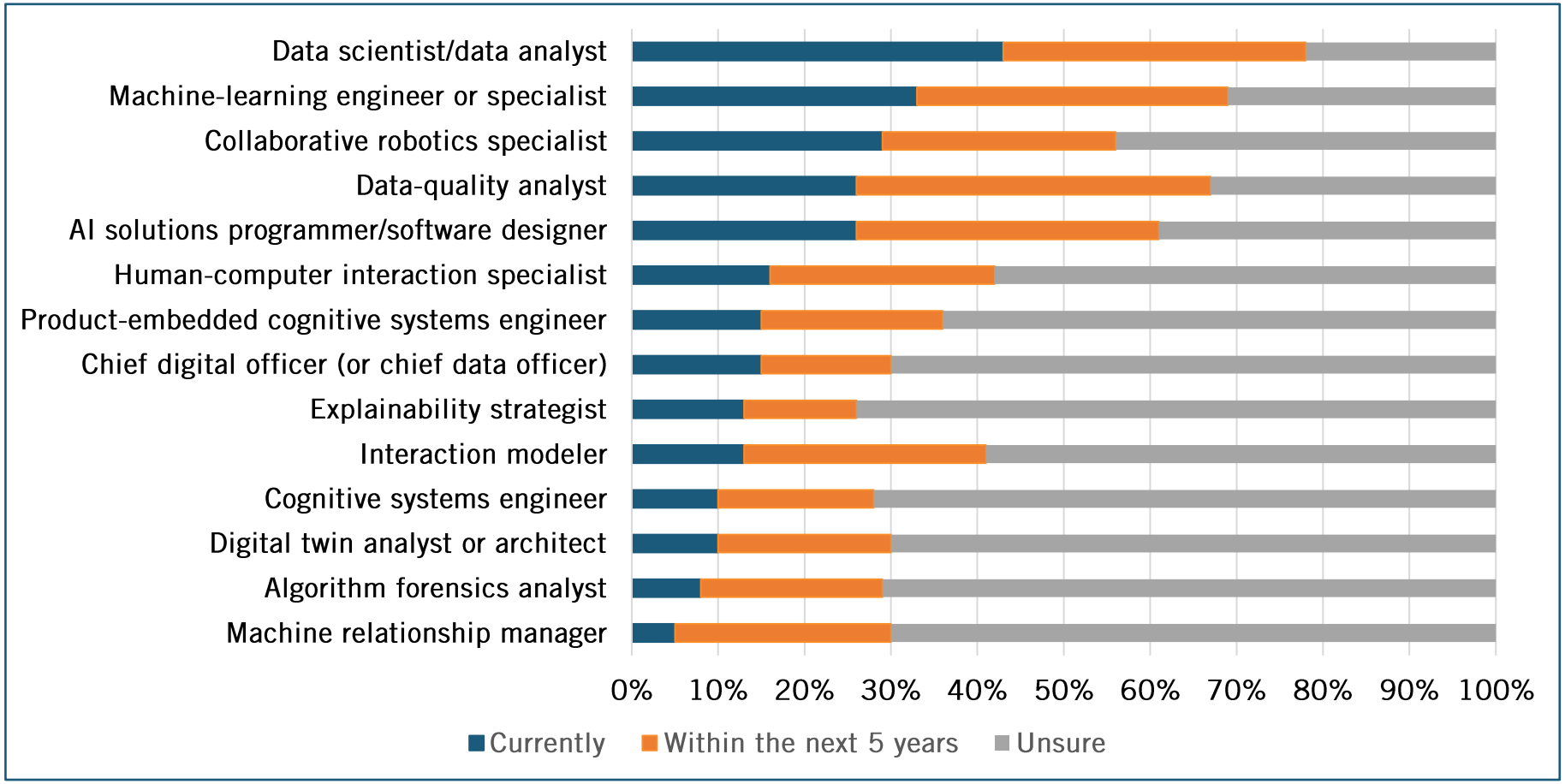
Manufacturing Jobs Especially Becoming More ICT-Intensive



Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017)

AI-Specific Jobs Emerging in the Manufacturing Sector

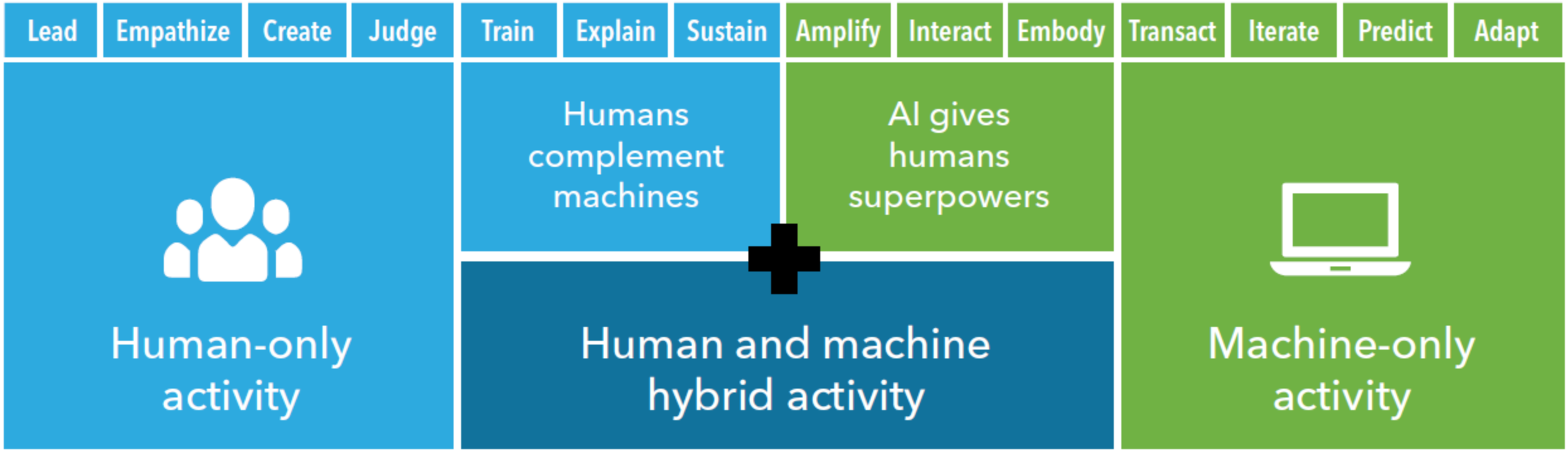
AI-related Jobs U.S. Manufacturers Anticipate Introducing in Next 5 Years

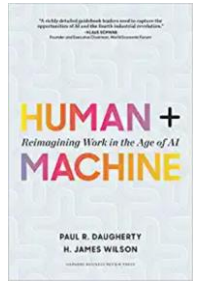




Source: Stephen Ezell and Robert D. Atkinson, ""The Manufacturing Evolution: How AI Will Transform Manufacturing and the Workforce of the Future" (ITIF, August 2019)

Role of Humans and Machines in the AI Era

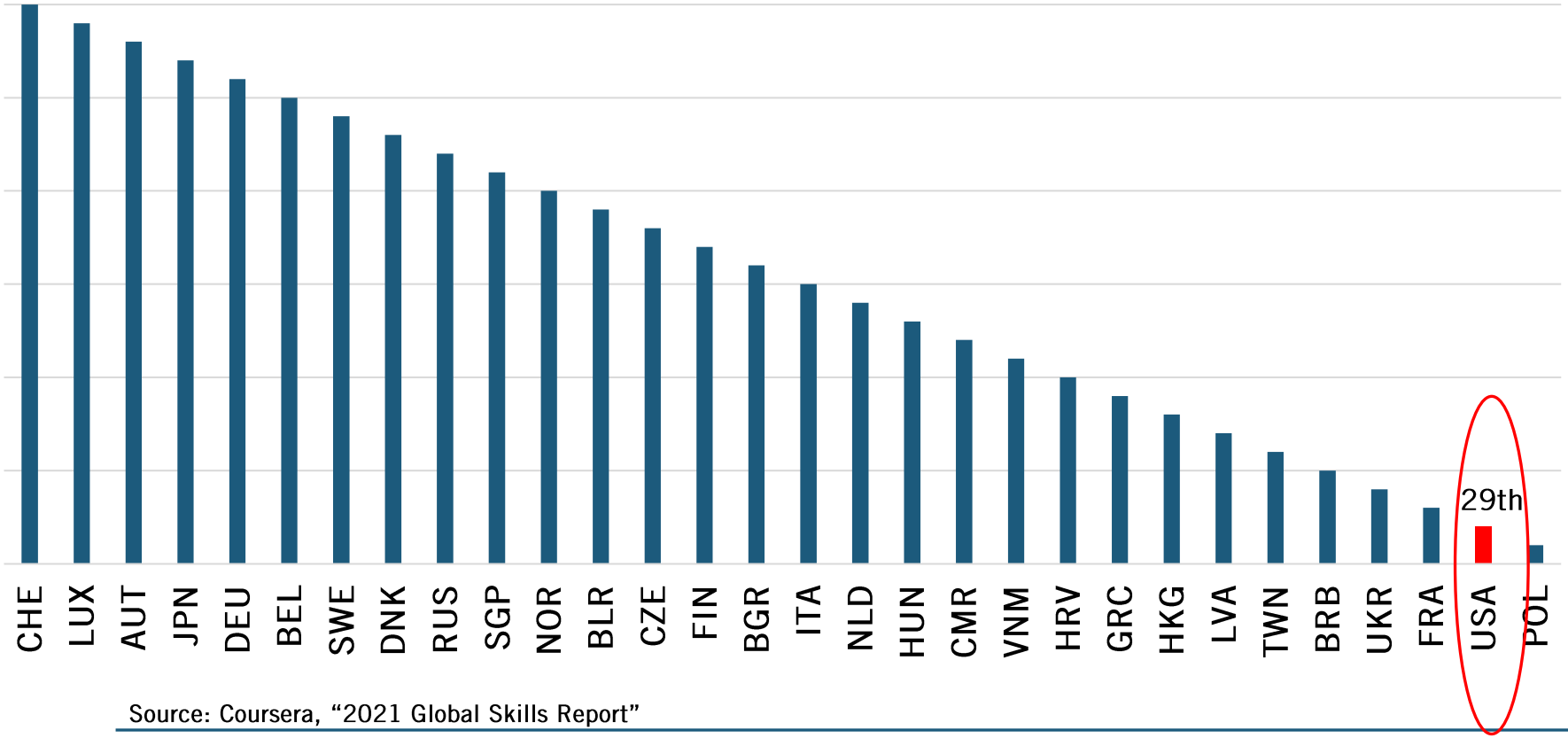




Graphic based on diagram from Daugherty and Wilson, *Human + Machine: Reimagining Work in the Age of AI*

U.S. Faltering in Global Digital Skills Rankings

Top-30 Countries by Global Digital Skills Ranking (Coursera 2021 Rankings)





Source: Coursera, "2021 Global Skills Report"

Today's Presentation

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3 Best Practices and Policy Recommendations

Best Programs and Practices Teaching Digital Skills in U.S.

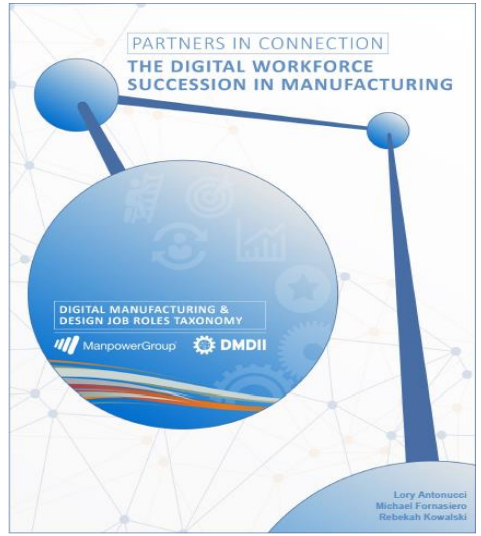
techgirlz
A PROGRAM OF CREATING IT FUTURES

girls who CODE

BLACK GIRLS CODE
imagine. build. create.

Microsoft
IMAGINE ACADEMY

TOOLINGU
sme



Policy Recommendations: K-12 Education

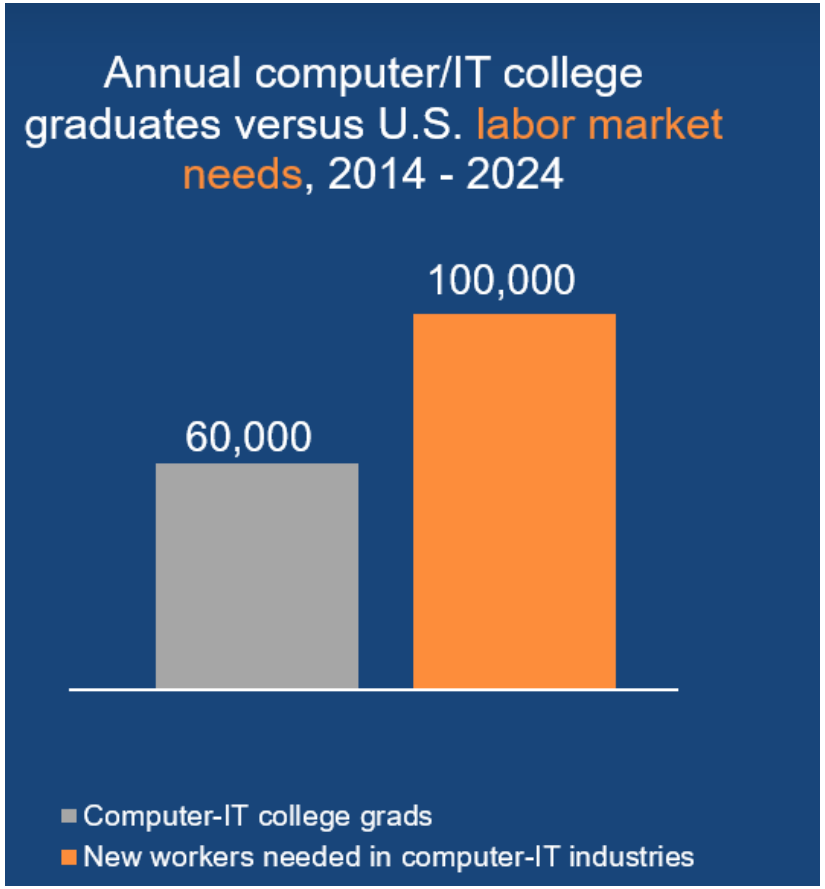
- ✓ Allow computer science to count toward high school science requirements.
- ✓ Teach computer science in all U.S. high schools.
- ✓ Double the number of STEM charter high schools in the U.S.

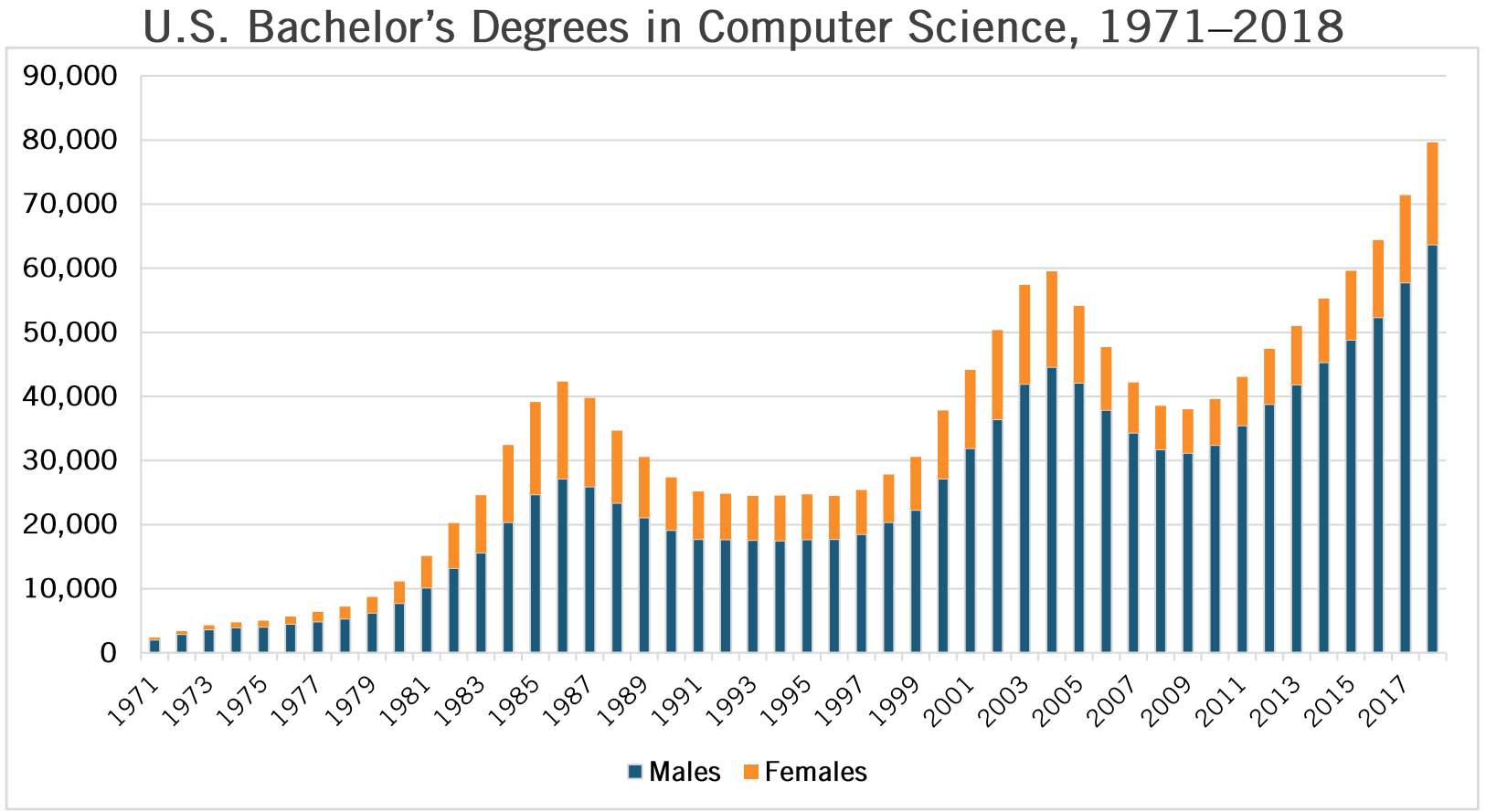




Policy Recommendations: National/Federal Level

1. Increase the number of U.S. computer science graduates…

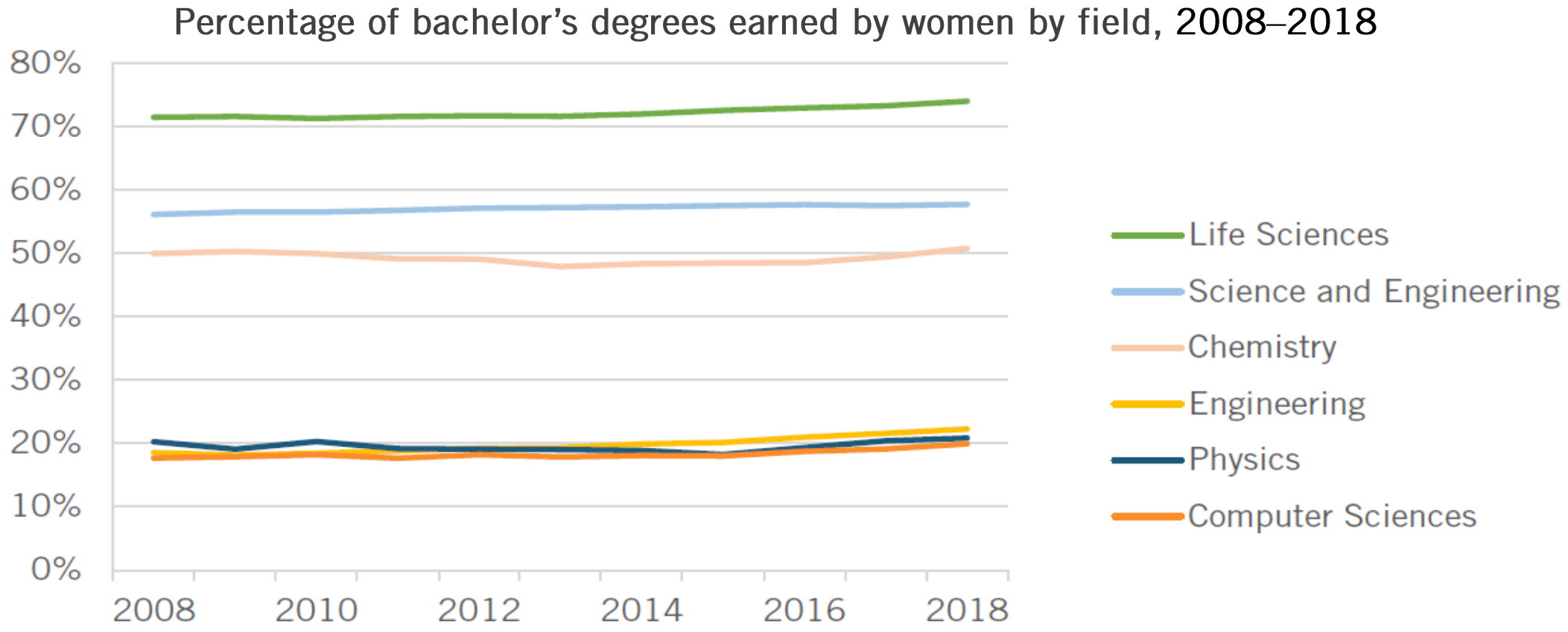




Source: Mark Muro et al., "Digitalization and the American Workforce" (Brookings, November 2017); 2016 BLS; National Science Foundation

Policy Recommendations

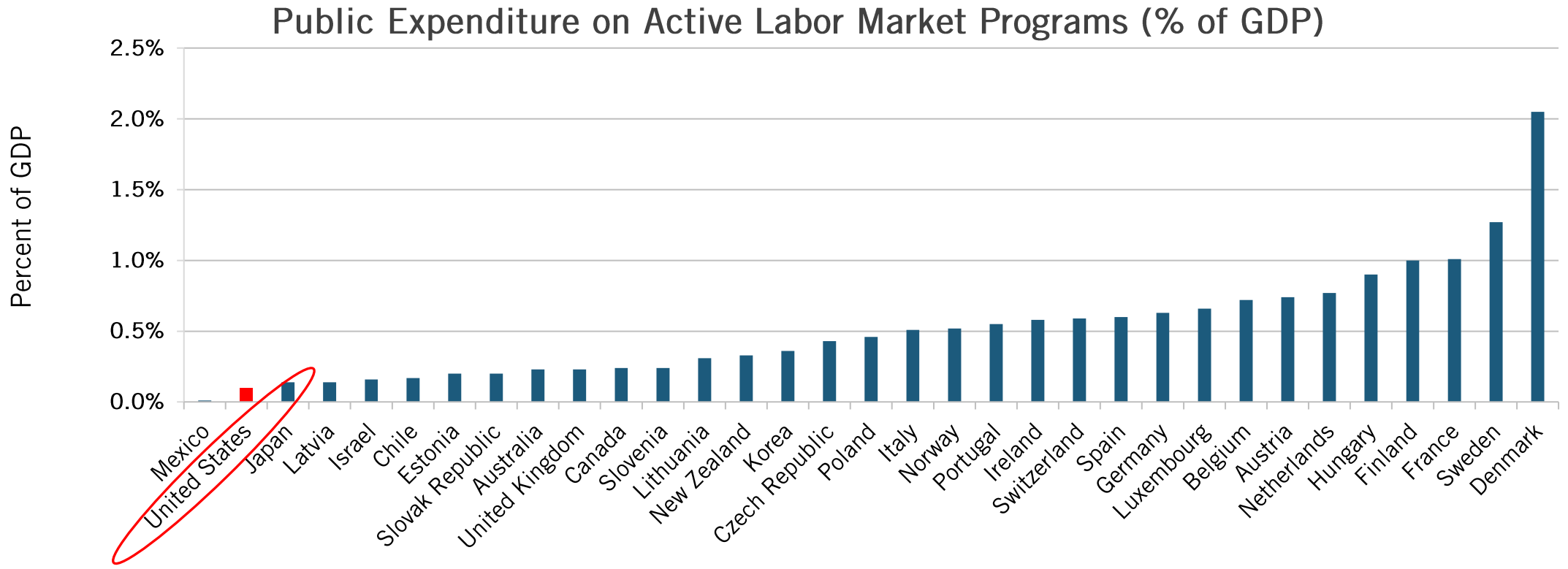
1. Especially for women…



Source: National Science Foundation, 2018

Policy Recommendations

2. Increase federal investment in labor market skills/training.

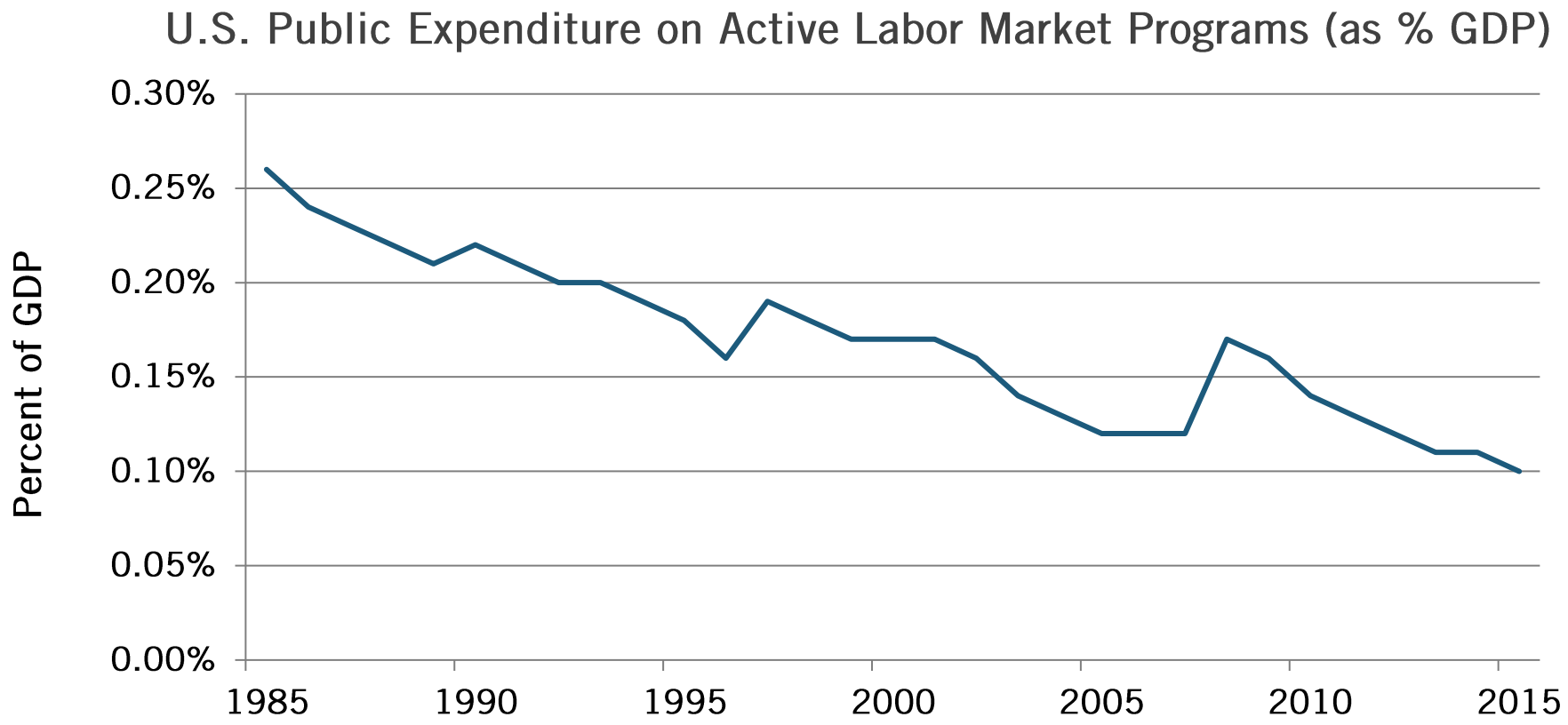


Note: Data for New Zealand and Estonia is from 2014, UK is 2011.
All other countries are from 2015

Source: OECD, "Public Expenditure and Participant Stocks on LMP"

Policy Recommendations

2. Increase federal investment in labor market skills/training.



Source: Executive Office of the President, "Artificial Intelligence, Automation, and the Economy," (2016)

Policy Recommendations

3. Make AI education a national priority.

   – Finland has launched a national strategy to educate 1% of its workforce in the basic concepts of AI through a course titled “The Elements of AI.”

   – U.S. NSF should create a new industry-AI Fellowship program graduating 1,000 AI Ph.D.s annually with AI skills for workforce needs.

Policy Recommendations

4. Expand tax benefits for employer-provided tuition assistance.

   - U.S. corporate investment in workforce training as a share of GDP fell by 30% from 1999 to 2015.

5. Create a knowledge tax credit (combined with R&D tax credit).

A facility with digital skills is indispensable to a modern individual's, enterprise's, and nation's long-term competitiveness.

Thank You!

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