Increasing Diversity in Technology —
From the Campus to the Workforce

Wendy Dixie first became interested in computers in eighth grade. Learning the BASIC programming language at school in rural Kentucky, she realized she could "make the computer perform certain functions, such as change colors on screen," she recalls. "That really intrigued me."

The experience led her to eventually major in computer science at Kentucky State University and ultimately to return as the school's CIO.

As she was pursuing her degree, Dixie never thought of herself as a pioneer.

"I did not realize that graduating with a computer science degree placed me in a small category of technology graduates," Dixie says. "Until I graduated and started working in the technology industry, I didn't realize there were a limited number of women and underrepresented populations [in the field]."

Anne Margulies had a similar realization when she first entered the technology field nearly four decades ago.

"I was either the only woman in the room, or if there were others, they were in support or nontechnical roles," she recalls.

By the time Margulies retired in May 2021, following a career that included positions as CIO of both Harvard University and the Commonwealth of Massachusetts, the field had grown to include "more women and minorities, but not enough in leadership positions," she says.

From classrooms to the CIO's office, higher education institutions play an essential role in ensuring the technology sector becomes more diverse — both as organizations that hire significant numbers of IT professionals and as a pathway for young people entering the field.

There's much work to be done. Even as the technology sector continues to grow — the number of STEM jobs has increased 79 percent since 1990, more than double the rate of overall employment growth[1] — women and minorities remain dramatically underrepresented. African American, Hispanic and Indigenous

people together represent just 16 percent of the IT workforce, with Asians representing another 14 percent, according to the U.S. Equal Opportunity Commission Bureau.[2] At Silicon Valley firms, the numbers are much lower.[3]

For women, the numbers have actually gotten worse since the dawn of the internet era. In 1991, women held 36 percent of computing occupations. In 2014, that number had fallen to 26 percent, although it has since leveled off and increased slightly, according to the National Center for Women and Information Technology.[4]

And in the colleges and universities that prepare students for technology careers, there remains a tremendous diversity gap. African Americans represent only 7 percent of STEM majors, for example. And only 18 percent of bachelor's degrees in computer science and 19 percent of bachelor's degrees in engineering were awarded to women in 2012.[5]

To be sure, there are some reasons to be optimistic about a more diverse IT future. First is simply the growing recognition in recent years that the lack of diversity itself is a problem in technology fields. Meanwhile, the ongoing national conversations inspired by the #MeToo and Black Lives Matter movements have brought a new understanding of the value of diversity. And the COVID pandemic accelerated workforce transitions in general, adding energy to an idea that's been percolating for more than a decade: that diversity, equity and inclusion result in a better, more creative and more resilient workforce — both on campus and in the fields that higher education prepares students to work in.

Barriers and Solutions

"The workforce we're recruiting is more agile, so higher ed IT organizations have needed to adjust," says Mark Askren, a senior fellow with the Center for Digital Government and the former vice president and CIO for the University of Nebraska. "We're looking to get the best people we can possibly get, and we're coming to an understanding that by having all voices represented, we can become stronger."

Higher education leaders and their partners can support diversity, equity and inclusion efforts to create a stronger technology workforce capable of greater creativity and success. But the work is not easy, says Kiersten Todt, managing partner of Liberty Group Ventures and a scholar at the University of Pittsburgh Institute for Cyber Law, Policy and Security.

"If diversity, equity and inclusion are truly important to an organization, the organization needs to roll up its sleeves to achieve these goals," she says. "It's not a check-the-box exercise, or diversity for diversity's sake. You have to internalize these goals and create a culture that supports and values them."

As the executive director of President Obama's Commission on Enhancing National Cybersecurity, Todt saw firsthand how women can self-select out of the security field.

"We have preconceived notions that in order to be in cybersecurity, you have to be a mathematician and scientist," she says. "Cybersecurity is about building solutions and solving problems, and those two concepts really mandate a multidisciplinary approach. We need sociology, psychology, math, English and history."

But negative perceptions about IT continue to dissuade women and people of color from entering it.

"It's not a secret that the technology field has been male-dominated from the beginning," Margulies says. "Some of the stereotypes are real, and they've made the field more unappealing and unwelcoming for women. We have to overcome a lot of those stereotypes and assumptions."

"There's no exact blueprint" for increasing diversity and inclusion, says Candace Williams, the manager of diversity, inclusion and belonging at GitLab, a technology company that provides open DevOps platform

Organizations and Associations
Several professional organizations can help connect IT employers with women and people of color. Here is a partial list:[6]

- *American Indian Science and Engineering Society (AISES)*
- *Black Data Processing Associates (BDPA)*
- *Black & Brown Founders*
- *Black Girls Code*
- *Blacks in Technology (BIT)*
- *CODE2040*
- *DigitalUndivided (DID)*
- *Information Technology Senior Management Forum (ITSMF)*
- *National Action Council for Minorities in Engineering (NACME)*

- *National Society of Black Engineers (NSBE)*
- *The Nonprofit Technology Enterprise Network (NTEN)*
- *Opportunity Hub (OHUB)*
- *Society for Advancement of Chicanos/ Hispanics and Native Americans in Science (SACNAS)*
- *Society of Hispanic Professional Engineers (SHPE)*
- *Wonder Women Tech*

solutions to private companies and government organizations. To start, she says, "focus on your people, ask questions and listen to what's being proposed."

The following approaches are some good ways to begin:

Talent Management

Implicit — and often unintentional — biases crop up throughout recruitment and retention processes, making them an important area of focus for many organizations.

"We tend to be quite subjective in our hiring without even knowing it," says Margulies, "and we tend to hire people who look like ourselves."

To address that, Harvard revised all IT job descriptions during her tenure to make them more "values-based," eliminating "both subtle and obvious" terms historically focused on male characteristics, such as "self-starter." More women have applied for IT jobs since these changes, Margulies says.

Similarly, enumerating a laundry list of desired skills in job descriptions may "discourage people who could do a great job," Askren says, noting that men are more likely than women to apply to postings even when they don't possess every listed skill. And other important capabilities, including soft skills such as teamwork, haven't traditionally been emphasized in postings. "It's easier to train people technically than on interpersonal skills, but the ads tend to be all about the tech skills," he says.

To change the composition of their workforces, organizations also must avoid "going to the usual suspects" when recruiting candidates, Todt says. A wide range of organizations, including the National Action Council for Minorities in Engineering, the National Society of Black Engineers and the Wonder Women Network, focus on different ethnic or cultural groups involved in technology. Many offer conferences or other ways to connect individuals with employers.

Diversity and the Bottom Line

Diverse workforces result in a wide range of benefits to organizations, including greater creativity, versatility and the ability to tackle new situations. But a growing body of research suggests that diversity also impacts the bottom line.

Consulting giant McKinsey has tracked the impact of diversity efforts at more than 1,000 global companies since 2014. Its most recent report found companies in the top quartile for ethnic diversity outperformed their peers in profitability by as much as 36 percent, while gender diversity on executive teams made companies 25 percent more likely to have above-average profitability.

That's the good news. The bad news? According to the report, the dramatic differences in performance are caused in large part by the widening gap between organizations which have embraced inclusion and diversity and those which are lagging in these areas.[7] "While most [companies] have made little progress, are stalled or even slipping backward, some are making impressive gains in diversity, particularly in executive teams," the report's authors state.

Once employees are hired, it's critical to ensure biases don't impact who is assigned to key projects or training and ultimately promoted. Tapping the expertise of broader campus resources like HR departments can help improve these processes.

"The typical IT organization is really good at IT and not talent development," says Askren. In higher education, he says, there may already be good on-campus resources for IT teams. "Campus HR organizations have greatly improved their diversity, equity and inclusion-related services, and partnering with HR can benefit both organizations."

Culture

Building an inclusive culture has proven difficult for many organizations.

"It's not easy to hire a diverse staff; it's even more challenging to get people to stay once they're there," Askren says. "The vast majority of people are absolutely trying to do the right thing and provide a fair and equitable environment. And yet we come up short."

Taking the first steps to change culture involves a "deep dive," says Todt. Part of the necessary self-reflection involves understanding why diversity and inclusion matter to the organization. "You need to be able to answer that question thoughtfully," Todt says. Finding the right answer "will catalyze organizations."

As with talent management, campus IT organizations can benefit from institution-wide diversity, equity and inclusion (DEI) efforts, including training. Faculty in multiple disciplines who study these issues also may be able to provide support, as can outside consultants and organizations.

"Far too often, underrepresented populations and especially women have to overcome biases even in institutions that believe they're culturally competent," Dixie says. "If organizations do not know where to start, there are organizations that can help educate them."

Finally, employee evaluations should emphasize each person's role in talent development and promoting diversity, equity and inclusion more broadly.

"If it doesn't come up in performance reviews, it's not important," Askren says.

Employee Resources

Organizations can also empower employees to create their own communities of support. Employee resource groups and talent management resource groups, known as ERGs or TMRGs, have proven to be effective tools in promoting diversity in a variety of settings, including higher education.

At Harvard, the Women in Technology + Allies (WIT+) program is a self-organized volunteer organization focused on building an IT community at the college "committed to increasing representation, retention and advancement of marginalized genders."[8] With several hundred members, the group focuses on education, awareness, mentoring and community building.

"It's had a big impact," Margulies says. "You can tell it's successful because it just keeps growing."

Whether formal or informal, groups such as these can go beyond race and

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gender to help cultivate a sense of belonging among other groups, such as single parents, different generations of employees, or employees with physical or mental diversities.

Technology

The same types of tools that fostered collaboration during the pandemic can help create a sense of belonging among a workforce that will likely remain more dispersed in the years to come.

"You can't put the circumstances of the past year in a box," Williams says.

Some software tools that facilitate inclusion are those that allow employees to communicate and add feedback to group discussions and those that enable remote and asynchronous participation in meetings. Organizations also can create dedicated online forums such as Slack channels for ERGs, as GitLab has done for a half-dozen different employee groups.

An institution's technology partners also can play important roles in helping create an inclusive culture, including by providing professional development to institutions' IT employees through communities of practice and other avenues of support.
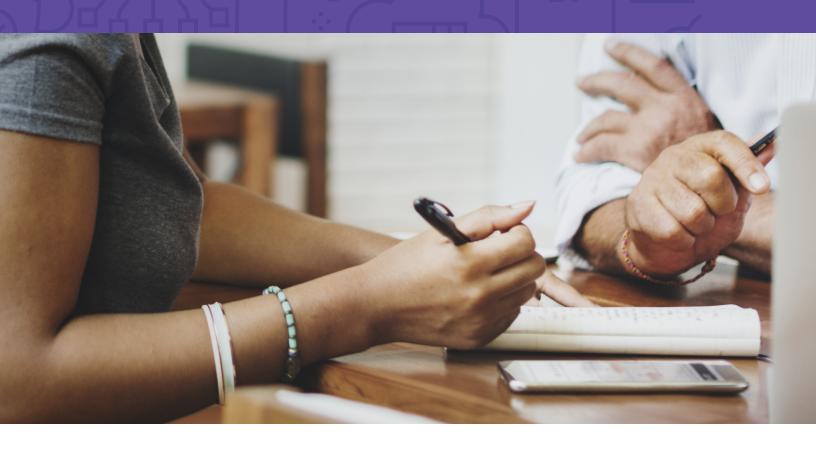
"Vendors can lead by example," says Askren, "and not always with technology."

Leadership

As with all aspects of workplace culture, leaders set the tone for diversity, equity and inclusion efforts. CIOs "need to demonstrate and articulate that diversity matters," Askren says. "I need to say it, and say it often — in strategic plans, in high-profile meetings, in recruiting, in advertising and to my own team. It's an area where walking the talk really matters."

Dixie says CIOs play a vital role in implementing and emphasizing internships, mentorships and other programs that support talent development efforts. Just as importantly, they must provide all employees with a sense of being welcomed, she adds. "Every opportunity I get, I try to do my best to uplift students and those in technology careers, because that was done for me."

Building A Stronger Talent Pipeline

Higher education and the companies that rely on its graduates share the challenge of building a stronger pipeline of technology talent. As in the technology workforce as a whole, diversity in tech-related education remains an uphill challenge. While students of all races are roughly equally as likely to enter STEM majors, 40 percent of African American and 37 percent of Latino students switch to different majors before earning a degree, compared to 29 percent of white students — gaps that don't exist in other competitive majors like business, according to a 2019 study.[9] Similarly, a 2017 study found that the low numbers of women in many STEM majors can be attributed in large part to perceptions of gender bias in those fields.[10]

Here are some best practices for creating a stronger, more diverse technology pipeline:

Start Early

Encouraging students to enter STEM majors begins well before the college years. "It starts in high school or elementary school," Williams says.

Colleges and universities can collaborate with K-12 schools to offer programs or projects that help spark an interest in technology. Kentucky State, for

example, offers mentoring programs for college-bound high school students.

It's also important to give students a better understanding of the wide range of opportunities in technical fields before they start college and once they get there.

"People tell me that they liked technology as a career but didn't want to go into the field because they didn't want to code or sit behind a desk all day," Dixie says. "The technology field is so broad and so many opportunities exist that people may not know about."

Create New Pathways

Clearer pathways through college and into careers could also encourage more students to enter technology majors, but they need to be more expansive than they're often currently envisioned.

"It's not a linear path but the ability of higher ed to lay out a broad understanding and attract a diverse group of students into a space," Todt says.

That broader approach to disciplines may ultimately extend to how technology majors are designed.

"When you look at majors in cybersecurity, we have to do more than restrict it to what we've done in the

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past — coding and math," Todt says. "Ethics, the consequences of technology, environmental impacts — all these pieces need to be integrated."

Build Culture and Supports

Institutions have long recognized they must make their campuses welcoming to all students. That also means emphasizing equitable representation among faculty and staff.

"Being able to see yourself in your instructors is important," Williams says.

Institutions can also leverage technology to make their campuses more inclusive to all students. At Harvard, a simple web app called "This is How You Say My Name" allows students to record the correct pronunciation of their names, which is then linked to information in the student information system (SIS) and campus directories.

Historically black colleges and universities (HBCUs) provide powerful examples of how to create supportive environments for students in a variety of fields. At Kentucky State, one of the most diverse HBCUs in the

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nation, "everyone took an interest in my academic career — not just my professors, but everyone who worked there," Dixie says. "HBCUs play a unique role in creating a diverse workforce by their existence alone. They help students have a holistic experience, allowing for student-focused academic support, mentoring, career development and life skills they're not going to obtain from other higher education institutions."

That's borne out by data. While HBCUs make up only 3 percent of the nation's colleges and universities, they have produced more than a quarter of all African American graduates in STEM fields, and nearly half of African American women who have graduated.[11] Eight HBCUs were among the top 20 institutions to award the most science

and engineering bachelor's degrees to African American graduates from 2008-2012, and they are the starting point for almost one-third of African American graduates in doctoral STEM programs.

Create New Roles for Business

To strengthen pipelines into technology careers, companies can — and often already do — offer internships, pre-employment opportunities and scholarships, and maintain a presence at career fairs and other campus events.

"As a priority, organizations need to be intentional and genuine in these efforts," Dixie says. "These efforts should be part of their organization's overall strategy."

The next step for technology companies may involve taking "the opportunity to be proactive with undecided majors," GitLab's Williams

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says. "Too often, we show up at career fairs after the fact." Simply introducing undecided students to technology in use on their campuses may spark an interest in the field, she says.

Many technology companies are also forging deeper partnerships with institutions that serve diverse student populations. Google and Howard University partnered in 2017 to create Howard West, an immersive one-year residency program that has since expanded to become a virtual academic program for students at other HBCUs and Hispanic-Serving Institutions (HSIs).[12] In June 2021, Apple awarded $5 million in innovation grants to four HBCUs as part of a $100 million racial equity and justice initiative.[13] And in a collaboration with HBCU Morehouse

College, GitLab engineers are working with students in a DevOps environment to create a feature the company will use in its flagship software.[14]

Conclusion

While the competition for IT professionals is high, colleges and universities have unique strengths that can help them attract the diverse IT workforces and faculty they need to remain relevant in the years to come.

"People want to do meaningful work, and they want to feel respected," Askren says. "We [in higher education] offer a great mission and environment."

Diversity, equity and inclusion efforts are already yielding results.

At Harvard, the percentage of women in the IT workforce has consistently increased by about 1 percentage point each year, and the composition of women in computer science majors is approaching 50 percent.

"It adds up," Margulies says. "But we're not seeing the impact in the workforce yet."

Ongoing changes to the IT workforce, including the shift to the cloud and the acceleration of remote work, provide both opportunities and challenges to address that gap.

"These changes are happening regardless, and the organizations that adapt quickly will have the recruiting and retention advantage," Askren says.

Higher education CIOs stress the importance of authenticity. Their organizations "need to be intentionally present and physically engaged with underrepresented populations — not just to say it, but to be committed to making it part of their strategy and overall culture," says Dixie.

For Dixie, who has worked at Kentucky State for nearly two decades, that kind of culture has shaped her entire career.

"It's an absolute honor serving at an institution which gave me my start," she says.

Endnotes

1.   https://www.pewsocialtrends.org/2018/01/09/women-and-men-in-stem-often-at-odds-over-workplace-equity/
2.   https://www.computerworld.com/article/3567095/it-snapshot-ethnic-diversity-in-the-tech-industry.html
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