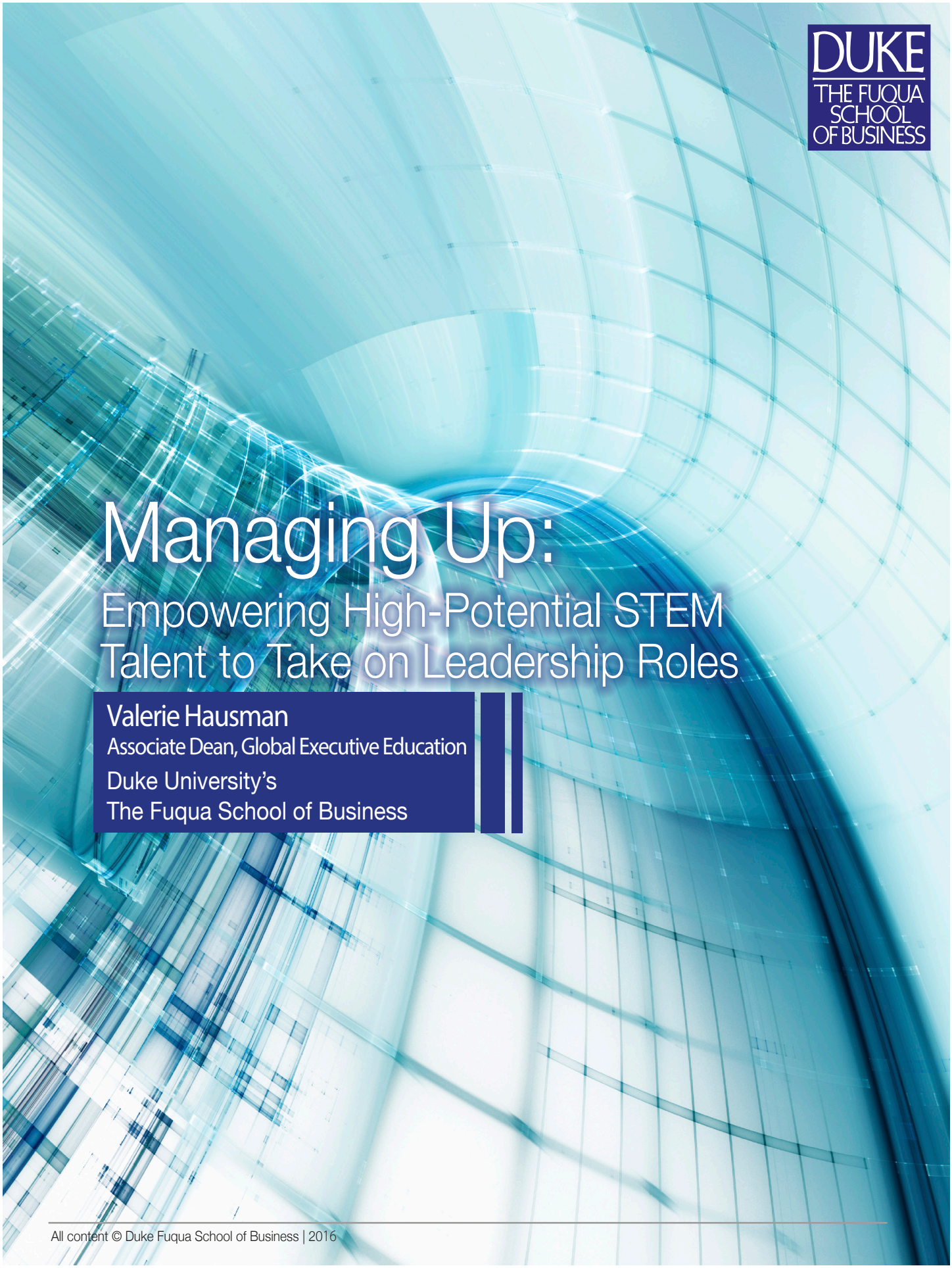

Managing Up:

Empowering High-Potential STEM Talent to Take on Leadership Roles

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Executive Summary

It's never been a better time to be a STEM (science, technology, engineering, and mathematics) worker. In this brave world of Software as a Service (SaaS), startups, and hyperscale growth, STEM jobs are growing faster than companies can fill them. It's not an overstatement to say that STEM experts are the new kings and queens of industry and are using the talent shortage to their strategic advantage.

Leading companies are building cutting-edge programs to recruit, retain, and develop highly skilled workers—and help fill their management benches. For this white paper, *Managing Up*, we interviewed eight senior leaders, from the global Vice President to Chief Learning Officer (CLO) level at AT&T, IBM, and SAP to acquire their perspectives on how to develop today's STEM workers and prepare them to lead through change.

Among our findings: companies need to invest in STEM talent early, reaching back to middle school and redoubling their efforts at the university level. Leading enterprises are using a new definition of diversity and inclusiveness to ensure all employees have access to the information, tools, and mentors they need to succeed. Millennials are teaching Boomers—and often managing them. And enterprise learning is going through a profound transformation. STEM talent may be the future of enterprise, but each employee has a responsibility to own his or her career and be a continuous learner.

We invite you to read this white paper, access our point of views (POVs), and share our SlideShare.

Managing Up features in-depth interviews with the following industry executives:

- **Kerry Brown**, Vice President, Enablement, SAP
- **Mark Collins**, Senior Vice President, Mobility Sales and Service Operations, AT&T
- **Jenny Dearborn,** Senior Vice President and Chief Learning Officer, SAP
- **Stanley Litow**, Vice President for Corporate Citizenship and Corporate Affairs at IBM and President of the IBM International Foundation
- **Florian Michaelsen**, Diversity and Inclusion Lead, SAP
- **Ann Rosenberg**, Vice President, University Alliances, SAP
- **Sharon Ruddock**, Chief Learning Officer, SAP Global Customer Organization
- **Pamela Seplow**, Vice President and Global Head of Career and Talent Management, SAP

Want to learn more about our thought leaders' perspectives on STEM-related topics? Read our industry POVs:

"This Problem Is About US Competitiveness Writ Large": IBM's Education Partnerships Build the STEM Workforce of Tomorrow

"It's a Never-Ending Quest to Find and Develop Talent": Building a Diverse and Inclusive Workforce Is Essential to AT&T's Corporate Success

"They Bring an Innovation and Entrepreneurship Mindset": Millenials Set to Rule the Empire at SAP and Other Global Enterprises

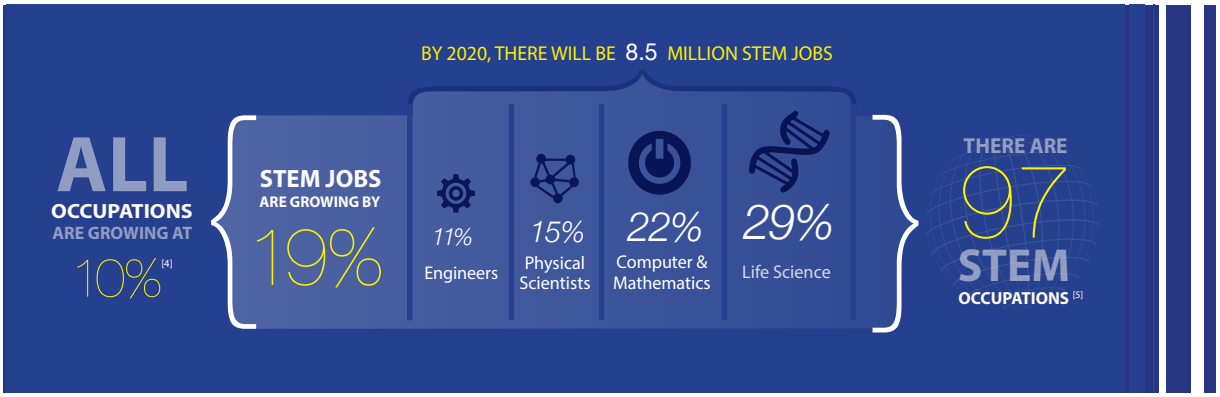
"Using Learning as a Strategic Bridge to Drive Transformative Change": The Chief Learning O icer's Imperative at SAP

Disruption:
IT'S THE NEW NORMAL IN BUSINESS.

From big data to managed services, sensors to robotics, and automated processes to hyperscale computing, technology has enabled the stratospheric rise of digital businesses. It has also enabled innovators and operational perfectionists to take market share at the expense of fl t-footed peers.

For every Apple, there's a Blackberry that didn't anticipate the consumerization of IT. For every Netflix, the e's a Blockbuster that didn't move its business online. For every Nucor, there's a traditional steel company saddled with fi ed costs and aging infrastructure. In fact, the modern IT organization's priorities have been distilled from fi e to just one: time, or speed-to-market.[1]

Industry disruption and transformation are creating significa t opportunities for innovative thinkers and risk-takers. However, these trends are also changing the recruitment and retention paradigm for all companies. The reason why? Demand for STEM workers is skyrocketing, and there simply aren't enough skilled employees to staff oles. In fact, STEM roles are growing at nearly twice the rate of all other jobs.[2] As a consequence, STEM employment will increase to more than 8.5 million jobs by 2020, and there will be a shortfall of 230,000 advanced-degreed workers by 2018.[3]



Developing STEM talent?
IT'S BOTH A BUILD AND BUY PROPOSITION.

While the competition will be fie ce for new talent, companies are also realizing that they need to develop their own workforces to achieve strategic business goals and fuel growth. "For the most part, you can't hire and fi e yourself into a different workforce to achieve transformation. You really need to train and grow the people that you have in order to get there," says **Jenny Dearborn, Chief Learning Officer, SAP**. Concurs **Pamela**

Seplow,Vice President and **Global Head, of Career and Talent Management, SAP**, "Salary and benefits a e table stakes. You have to offer professional development opportunities to retain your talent and stay competitive in the marketplace."

This white paper, *Managing Up,* features interviews with senior executives at three global enterprises powered by STEM workforces—**AT&T, IBM,** and **SAP**—who offer their insights into changes companies need to make to enable their STEM workforces to develop their skills and management abilities. It is also accompanied by four industry POVs on critical STEM-related topics: building a diverse and inclusive workforce, the need for public-private partnerships, the rise of the Millennial workforce, and the CLO's imperative. Please see Executive Summary for more information.

As businesses and processes become increasingly digitized, companies will seek a new generation of leaders who can connect the dots between data, processes, and marketplace opportunities. In this new era of business, decision-making is based on hard science, rather than intuition and risk-taking. From C-suite executives to middle management, companies will need STEM leaders who possess both the hard skills of data analysis, marketplace forecasting, strategy-setting, and relentless R&D, as well as "soft skills" such as communication, collaboration, and team-building.

Making an ongoing investment in growing staff capabilities is 't just good sense:
IT'S GOOD BUSINESS.

*Bloomberg Businessweek/*Hay Group found that companies ranked in the top 20 for leadership ability significantly outperformed the S&P over a 10-year period,[6] while a McKinsey study identified talent development as one of the five "game changers" for US growth and renewal, stating that proactive, ongoing investments could add $165 billion to $265 billion to the nation's economy by 2020, and $1.7 trillion by 2030.[7]

Our experts agree. In interviews they stressed that building the capabilities of the STEM talent pool isn't just good for their individual companies: it supports the growth of customers and partners and is essential for US competitiveness. But this imperative is not just about creating a talented workforce: it's also about developing leaders.

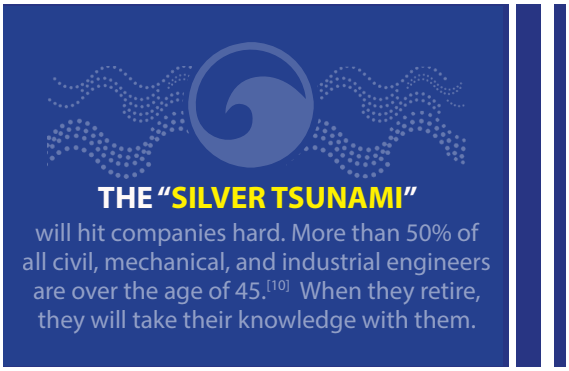
Wick Moorman, Chairman and CEO, Norfolk Southern Corporation says: "Everyone with backgrounds in the STEM disciplines can be and should be a corporate leader. A STEM-aware CEO will simply set the stage for those people to succeed."[8]

Would that it were so easy. While this CEO's call resounds with the corporate community at large, accomplishing this objective may not be as simple as it seems. Consider the following facts:

- The battle for STEM talent is global and increasing in intensity.
- Women and minorities are missing out on STEM roles and growth opportunities.
- Industry changes are challenging companies' ability to keep up.

The battle for STEM talent is global and increasing in intensity.

Technology innovators such as Google, Amazon, and Facebook, are opening their pocketbooks and poaching thought leaders and STEM experts from competitors. As a consequence, traditional industries such as financial se vices, utilities, defense, and government will find it difficul o retain top talent, who are lured by the opportunity to "open source" their own careers with big-name SaaS companies and other players. Small wonder there is already a "frenzied grab for talent"[9] that will only increase as more companies become digital enterprises.



Manufacturing, which constitutes up to 90% of all private R&D spending in major manufacturing nations, will be particularly hard-hit.[11] The industry holds no allure for 52% of US teenagers, and its workforce is rapidly graying.[12]

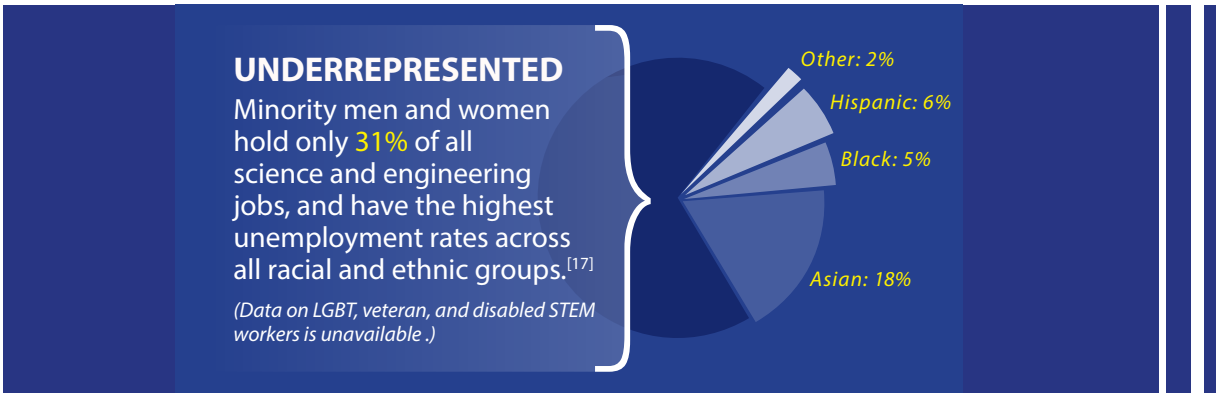
Women and minorities are missing out on STEM roles and growth opportunities.

While the STEM workforce shortage is global, its impact is disproportionately felt by diverse workers and job candidates. White men hold fi e out of every 10 STEM roles; white women, nearly two; and minority men and women, just three.[13]

The issue begins in early education, when young students of all races, but particularly minority children, check out of science and math. Among the reasons why: These students don't have access to the high-quality education, resources, and mentoring they need to absorb challenging concepts and skills and cast a vision for how they will use them in the future. This trend continues with low college completion rates, as minority youth drop out in high numbers. And it is exacerbated by rising job requirements, according to **Stanley Litow, Vice President for Corporate Citizenship and Corporate Affairs at IBM** and **President of the IBM International Foundation.**

In today's society, an increasing number of high-paid career-track jobs now require advanced degrees. As a consequence, "a large percentage of the next generation doesn't have the skills required to take on 21st-century jobs—both those that exist now and those that are being created," says Litow. That's why companies like AT&T, IBM, and SAP are reaching back and investing in educational interventions, from technical academies where minority students graduate with associate degrees and industry-ready skills; to research grants, fellowships, and internships for promising diverse students; to broad-based university programs, that leverage massive open online courses (MOOCs) to help students in all markets gain an industry context and build their technical capabilities. Read our POV on public-private partnerships.

The STEM shortage is also partly due to worker attrition, as employees migrate to non-STEM roles for family and other reasons. Of 100 women who graduate from university with bachelor's degrees, only 12 have STEM degrees, and only three of this group will remain in STEM careers 10 years later. Meanwhile, underrepresented minority male and female scientists and engineers experience much higher unemployment rates than their non-minority peers.



Companies are leveraging robust diversity and inclusion programs to create a level playing field whe e all can succeed. They're also harnessing the power of the group. Companies like AT&T, IBM, and SAP play host to a wide array of networks diverse employees can use to navigate professional development opportunities, find ca eer mentors and sponsors, and advocate for themselves in global enterprise. Meanwhile, fl xible work environments and work styles can help primary caregivers stay on track for a STEM management role, while attending to their other priorities. While that's typically a priority for women, says **Ann Rosenberg, Vice President, University Alliances, SAP**, Millennials also cite fl xibility as key to achieving work-life balance. Read our POV on building a diverse and inclusive workforce.

Industry changes are challenging companies' abilities to keep up.

"When you look at the speed with which technology is changing, there is a huge difference before and after the cloud," says **Sharon Ruddock, Chief Learning Officer, SAP Global Customer Organization**. "Before the cloud, SAP had a development cycle that was 18 months long. Now, every 90 days we're releasing a new product, and often we're issuing smaller releases on an even more frequent basis."

Mark Collins, Senior Vice President, Mobility Sales and Service Operations, AT&T, concurs, saying that the pace of industry and technology change is raising the bar for both STEM and STEM-aware employees alike. Productivity and collaboration tools are creating an environment where "the technical requirements are growing ever greater. What you're seeing is much more of a bias to an all-Internet Protocol (IP) world."

So it's no surprise that many STEM workers aren't thinking about their soft skills. These professionals say the top three most critical skills they need for job success are analytical or critical thinking; evaluation, analysis, and troubleshooting; and complex problem solving.[18] When surveyed for the Kelly Global Workforce Index about their need for improvements, about half cited a desire to enhance skills in such areas such as mathematics, calculations, measurement, and monitoring; and systems, computer, and software.[19]

Yet this perspective is short-sighted. Employees increasingly need soft skills, such as communication and collaboration, to succeed as team players and ascend the management ranks. "If you look at the Conference Board, which did a survey of Fortune 500 companies last year, 70% of the workforce, according to large companies, lacked problem solving, writing, and presentation skills. So it's clear that even if you can find the echnical skills you value, you also have to include the skills that are valued in the workplace," says Litow.

Concurs **Kerry Brown, Vice President, Enablement, SAP**: "I think the challenge for STEM is that the profile of the perso who is naturally extremely detail-oriented and is able to work through the algorithms and the math and the science isn't necessarily as socially conscious as other employees. Continuing to build that social awareness within the STEM population is what is going to make technology that much more powerful."

So how can companies help employees build these valuable abilities?

To Succeed at Diversity and Inclusion, First Recruit Broadly

SAP has a broad-based diversity and inclusion program, but that doesn't stop its staff from constantly reconsidering its efforts. To that end, when an African-American network told **Florian Michaelsen, Diversity and Inclusion Lead, SAP**, and his colleagues that they weren't casting their net wide enough, the company took the group's advice. It's now targeting historically black colleges and universities directly in its sourcing and recruiting strategy.

In addition, the company is seeking to expand opportunities for populations that might not otherwise have a chance to succeed at high-paid professional jobs. "There are so many untapped talent pools in the category of differently abled people. Why not give them a chance when it will do good for us as well?" asks Michaelsen. He is heading a program at SAP called Autism at Work that is recruiting individuals on the austism spectrum for coding and document review positions. According to Michaelsen, these workers are able to spot errors and inconsistencies in work and stay on-task with repetitive assignments.

SAP's sales force creates opportunities for non-STEM talent by enrolling its new hires in a nine-month SAP Academy program, which includes training in STEM technology, as well as business and soft skills. According to Ruddock, this holistic approach opens up roles to women, underrepresented minorities, and other groups.

Leverage technology to empower workers and help them grow their skill sets.

Companies are moving from a "push" mode of training to a "pull" model of continuous learning. They're leveraging new technologies and approaches, such as MOOCs and on-demand training, collaboration platforms, and social sharing tools to promote continuous learning. And they're making sure integrated technologies deliver an exceptional user experience that mirrors what employees experience in their personal lives. Employees expect and demand tools such as personalized recommendations, time-saving apps and educational games across all the devices they use. Read our POV on the CLO's imperative.

"Access to content, information, and real-time communication is off the cha ts," says Collins. "Technology has helped individuals self-actualize. Now there are so many tools and communications capabilities professionals can use to equalize themselves with other talent in the marketplace and make them even better," he says. His

company's NanoDegree and master's degree in computer science, offered through MOOC provider Udacity, are two cases in point.

SAP has opened up access to its technology and thought leadership via MOOCs. Hundreds of thousands of individuals use Open SAP's coursework to self-train on the companies' technologies and get accredited, preparing for new roles or learning technologies that will help them succeed in their current jobs. That's especially key in emerging markets, where both entry-level and current employees can use internet connectivity, tablets, and corporate coursework, to "leapfrog" their lack of academic credentials and create game-changing opportunities for themselves and others. SAP views part of its contribution as helping talent in developing markets use its technologies to build sustainable businesses.

Meanwhile, the company offers student and corporate versions of SAP Learning Hub to paying clients. Universities leverage SAP Learning Hub to support teaching in critical areas, such as big data and enterprise resource planning, says Rosenberg.

"Recent evolutions of Learning Hub really take advantage of a lot of emerging trends, in terms of open learning, social, collaborative learning rooms, personalization, and micro learning," says Brown. By making learning a team effort, STEM talent can help enhance their communication and problem-solving skills as they learn new concepts and skills. They also can learn when, where, and how they want, digesting content in bite-sized chunks on the job, at their home office, or on the go.

Corporate learning leaders can also provide enterprise learning to help newly minted managers acquire the skills they need to lead teams successfully. Some companies take up to seven years after promoting individual contributors to manager roles to get them firs -level manager training, says Dearborn. "Letting new managers just figu e it out on their own is terrible for these managers, their direct reports, and the company. It's a shame and a waste of talent and money." With MOOCs, on-demand training, and networks lowering the cost of skills enablement, that problem should increasingly become a thing of the past.

Promote a culture of innovation and idea-sharing.

So how might this look for a new manager? Instead of taking a week off or training, an up-and-coming manager at SAP might participate in CEO Bill McDermott's online leadership class, take a mini-MOOC on negotiation skills, and crowdsource other content online. Collaboration platforms enable workers to interact in real-time and collaborate on problem solving. That's especially desirable with Millennial workers, says Brown. "You're creating sustainable behavior, because you're helping workers grow a toolset that is familiar and preferred by that population. So when you give them the ability to build micro-learning with low-fideli y videos, micro-blogging, creating communities, crowdsourcing, you're allowing users to build it in a form and a function that is desirable." Read our POV on the rise of the Millennial workforce.

In this new model, everyone is a teacher and a learner. Companies can provide critical tools, but employees must leverage them to create content and share answers and solutions, addressing knowledge sharing and learning

at the point of need. This model is elegant in its simplicity. Employees retain concepts better when they produce their own learning. Sharing solutions strengthens internal relationships and fosters each individual's sense of accountability for the group's success. And crowdsourced content is far less costly to produce than central training programs.

Organizations are also beginning to measure user adoption and performance in real-time. Big data can be used to personalize the delivery of information and resources, suggest next steps for workers, and keep them on track for achieving their career goals. SAP measures 110 to 140 data points on user performance to identify high-potential talent for new challenges and help workers who may be flounde ing in their roles.

110 to 140 data points

SAP collects per employee to optimize talent management.

Our interviewees say that ensuring resource equity is critical to growing STEM workforce capabilities. This doesn't just mean promoting diversity, although that is absolutely essential. It also means that internal groups such as finan e and human resources have the same chance to pursue professional development opportunities as revenue-generating organizations, such as sales. Dearborn manages a central fund to ensure that every employee has equal access to the programs they need to develop their skills at no cost to their organizations. While funding is essential, managers play an important role in promoting employee development: by allowing staff o take time to participate in training, reinforcing the importance of new learning, and ensuring that they put new behaviors and skills to work.

"Who is the most influe tial person when it comes to the employee retaining knowledge they've learned in a training class? Is it the fantastic instructor or the highly motivated employee? Actually, it's the manager who wasn't even in the class, who says, 'This class is really important. I think it's a great class. I went to it myself. I'm excited you're signed up for it, and I can't wait to talk to you about it afterwards,'" states Dearborn. "When it comes to getting employees to change their behavior or make that management or learning stick, it's really about reinforcement and practice. The manager plays an invaluable role in making this happen."

Organizations are also experiencing benefits f om reverse mentoring: pairing recent graduates with senior employees. Ruddock says the strategy has been a "magical" solution for boosting the excitement and productivity of new hires and seasoned experts in SAP's sales organization. Young Millennials can share fresh ideas for solving thorny challenges, while more senior staff can o er insights into navigating the corporate culture and driving to results. Digital natives and collaborative by nature, Millenials are hard-wired for learning new technologies, working on teams, and mastering the art of social selling. This is no passing fad, says Ruddock. "In not too many years, the major buyers of our software will be Millennials. We can't sell to these customers if our staff does 't understand that audience."

Provide high potential talent with early leadership opportunities.

Technology has also leveled the playing field or talent. Reared on tablets, Google Drive, and social networking, today's students bring considerable digital skills to their roles. And with the wealth of online resources, many are taking their expertise a step further: learning coding, building apps, and starting businesses. Precocious high-schoolers are being recruited for top STEM internships at leading companies. Global CEO roles are being filled y thirtysomethings. And emerging talent is being given the opportunity to lead project teams and business units. One-third of US workers say their boss is younger than they are, and for 15% the gap is at least 10 years.[22] "It's not uncommon to see 30-year-olds managing 50-year-olds," said Rosemary Haefner, Vice President of Human Resources at CareerBuilder.[23]

While reporting to baby-faced bosses can create discomfort for older workers, they are here to stay: Millennials will constitute 75% of the workforce by 2030,[24] so they will increasingly be given early opportunities to lead. And they deserve them: Young workers are coming to their first jobs with better digital skills and a greater understanding of the industry context than ever before. And those who take advantage of industry MOOCs, internships, and innovation competitions while in college have a head-start on their careers.

1/3 of US Workers
Have a younger boss
Source: Forbes

Millennials Will Be
75% of the workforce by 2030
Source: Forbes

Employees are their own best advocates.

"Everyone brings unique talents to the table. We think about talent management as the sweet spot of capability, ability, opportunity, and desire," says Seplow. Companies can provide online training, rotational assignments, and networking opportunities, but employees need to avail themselves of all the resources that are provided to them and take ownership of their careers.

"When you walk in the door of an operation of a particular division or a company, that's just your first s ep. You are going to need all of the experiences and capabilities that you can assemble to propel yourself from one set of responsibilities to another," says Collins. He says that learning is a life-long commitment, and that employees need to reinvent themselves to keep place with marketplace and technology changes.

Brown says that task is easier than ever, because employees have the know-how to get just the learning they need at that time, making the challenge of continuous learning doable. "Back to growing that STEM talent, it's about giving them access, so they can get what they need to know to be successful." Students can digest new concepts and acquire skills via micro-learning that's personalized for their particular role and career growth objectives. Gone are the days of sitting through long training classes waiting for the two or three insights that will be relevant

to their career. Employees can now find th t information online and package and customize their own learning programs, as long as they meet corporate standards.

Want to build a strong STEM management bench?

HERE ARE SOME STRATEGIES.

- **Fill the pipeline:** Identify talent early and communicate a clear path for career development to employees. Don't expect employees to navigate online resources, such as webinars and virtual learning, themselves. Make sure online training and collaboration tools are intuitive, provide a sound user experience, and are backed by support. Also provide critical input on an ongoing basis, offering employees regular performance feedback, career development checkpoints, and face-to-face meetings and relationship building.

- **Have a defined strategy:** Develop and articulate a STEM talent management strategy that includes regular training, education opportunities, mentoring, and progressively more responsible work assignments in different environments. Create role-based career models that show STEM talent how they can propel themselves and their talents forward, while leveraging company resources. And provide 360-degree feedback so that employees receive input from a variety of people they work with.

- **Create a culture of continuous development:** Employees want to invest in their own careers, but need the time, resources, and encouragement to do so. Make sure that ongoing career development is a corporate value that's promoted from the C-suite to the team level and backed up by best practice and on-the-job actions.

- **Empower line managers:** Give line managers the tools, messages, and motivation they need to develop their STEM teams. Ensure accountability by making talent development a strategic priority and tying bonuses and raises to their achievement of preset metrics.

- **Provide regular stretch assignments:** Honor STEM desire for challenging work assignments that test their technical skills and cognitive gifts, but also stretch their soft skills. Projects should involve communication and collaboration with teams that span functions, organizations, and geographies.

- **Leverage external education:** Partner with business schools to help employees get both an academic and real-world perspective on industry disruption – and how to lead through change. Full-time MBA programs can help promising STEM talent fast-track a course to management roles, while executive education programs enable employees who want to stay in the workforce enrich their leadership skills or gain targeted expertise.

Employees are their own best advocates.

Here's how employees say they want to develop key skills:[25]

70%

of all employees want it[26]
On-the-job experience

Provide employees with challenging work assignments, constant feedback, and easy access to managers and leaders.

59%

of all employees want it
Continued education/training

At leading business schools, STEM students represent 1/3rd to nearly 1/2 of the enrolling class.[27] "I think the combination of a STEM background with business skills is really powerful," says Ruddock.

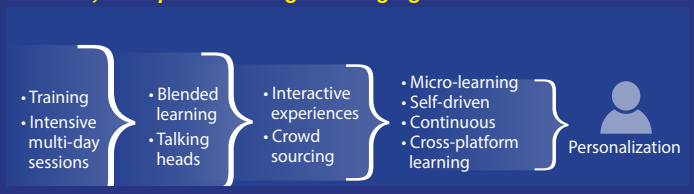
31%

of all employees want it
Professional certification

SAP sets requirements, but enables employees to create their own learning journey en route to certi ication and accreditation. "Your instincts about your individual needs are smarter than any system telling you what the right path is," says Dearborn.

26%

of all employees want it
Seminars or webinars
However, enterprise learning is changing.



19%

of all employees want it
Special/stretch/rotational assignments

Big data can help talent management teams identify high-potential talent and provide them with fast-track opportunities for advancement.

19%

of all employees want it
Structured mentoring

According to business expert Sylvia Ann Hewitt, men are 42% more likely than women to have a high-powered sponsor helping smooth the path for their career progression.[28]

18%

of all employees want it
Job sharing

Job sharing opportunities can help STEM talent, such as family caregivers, from defecting to non-STEM roles.

16%

of all employees want it
Professional organization memberships

Trade and technical associations enable members to stay current on industry issues, increase their knowledge and skill base, and make important connections.

Source: Kelly Global Workforce Index Presentation for talent development statistics. See Endnotes for all citations.

- **Ensure regular interaction:** ICF states that the best way for STEM employees to develop leadership skills is through day-to-day interactions with their managers and direct reports during the daily business of executing work responsibilities.[29] Companies should make sure that managers provide ongoing opportunities for two-way communications, in the form of team meetings and one-to-one conversations.

- **Encourage nonlinear thinking:** STEM employees are often laser-focused on driving to results. Encourage STEM employees who are exceptional individual contributors to seek others' input and facilitate joint brainstorming and decision making.

- **Provide varied training opportunities:** Provide education in a variety of formats, such as web-based, live and on-demand training; classroom sessions; brown bags; and peer reviews. In today's era of scalable learning, it's tempting to over-rely on web training, but this doesn't address employee's diverse learning styles and can decrease engagement over time. Let employees drive the creation of their own content where appropriate and share their wisdom with others via collaboration platforms and other tools.

- **Create a virtuous loop of virtual collaboration:** In the global race for talent, companies will increasingly honor employees' desire to work where they live, rather than forcing them to relocate close to company offices. Virtual training rooms; global brainstorming sessions; and always-on video, audio, and content streams and knowledge sharing can help STEM managers lead from afar and minimize travel requirements.

- **Offer leadership opportunities:** Enable STEM talent at all levels to lead projects and teams, so that they develop management skills early, gain visibility for their efforts, and prepare to take on progressively more challenging assignments. This is especially critical with Millennials, who expect early access to management opportunities. Some 73% of best-in-class companies give all of their staff the oppo tunity to develop leadership skills vs. 47% of all other companies.[30]

- **Embed mentoring in your company's DNA:** Pair STEM talent with mentors who offer insight and exposure into skills and opportunities several levels ahead. Also team recently minted STEM managers and experts with new hires and encourage mentoring to go both ways.

- **Promote diversity with real action:** Provide women and minorities with key supports for career advancement, such as mentoring, sponsorship, training, and access to professional groups. Sponsors can encourage women and minorities to seek out challenging opportunities, ask for pay raises, and set reach goals, as they champion their cause to others.[31]

- **Access the power of the group:** ICF recommends appointing STEM talent to special task forces and committees.[32] Companies also encourage employees to participate in professional associations, such as technology networks, female executive forums, and minority leader groups where they can access industry training and new thinking, as they network with colleagues.

- **Focus on retention:** Empower STEM talent with the ability to serve as innovation champions, progress against defined ca eer paths, and participate in blended teams for exposure to different skill sets. Honor STEM employees' different work styles with fl xible work programs; mobility tools; job sharing; and access to virtual centers of excellence, where they can both access subject matter experts – and be them.

External partners can help companies build STEM workforce management skills.

From our interviews with these global executives, it's clear that companies can't solve the STEM crisis, build a skilled workforce, and develop managers on their own. Partnering with education organizations at all levels is absolutely essential. Working hand-in-hand with public school systems and universities, companies can build a strong STEM pipeline, identify early talent, collaborate with students on solving industry challenges, and promote innovation and entrepreneurship with the next generation of employees.

With current STEM workforces, higher education can also play a vital role. Companies can leverage business and executive education programs to provide STEM talent with targeted, intensive opportunities to enhance their skills. These programs enable emerging STEM leaders to step away from day-to-day responsibilities to gain a global perspective about marketplace opportunities from professors and seasoned executives that enriches their own corporate experience. They also work on challenging assignments with peers who represent diverse professional, industry, ethnic, and personal backgrounds. STEM managers can share their insights into how technology enables the business, while their business colleagues can share perspectives on strategy-setting and how it's changing as the world drives to real-time decision making and responsiveness. In addition to developing soft skills such as communication, collaboration, and team building, STEM business students develop robust international networks of peers they can leverage in the future.

"In my personal opinion, these programs enable employees to explore alternatives that may cross over from one industry to another," says Brown. "They give broader business ownership knowledge to STEM-capable individuals who are very good problem-solvers at engineering-type activities and process orientation, but need help developing accountability and responsibility as leaders in a safe environment."

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FOOTNOTES

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