**Harvard
Business
Review**

I.T. TALENT CRISIS:
PROVEN ADVICE FROM
CIOs AND HR LEADERS

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Whenever I have an opportunity to sit down with a CIO, it doesn't take long for our conversation to shift to their challenges around talent. Whether it's finding qualified data scientists or preventing their best engineers from being poached, all CIOs are facing their own talent struggles.

The IT talent war has emerged as a defining factor in a CIO's ability to achieve business goals. It's a challenge that spares no industry, and overcoming it will separate winners from losers. Ever-changing demands from new technologies make the war for talent an uphill battle. Virtually every business can use some help—and quickly.

This Harvard Business Review Analytic Services research, sponsored by Red Hat as part of The Enterprisers Project, details best practices from leading CIOs and industry experts who have each solved these problems in their own ways. Their stories contain invaluable advice for navigating the talent struggle we're facing. The report also underscores an emerging need—business leaders, especially those within both IT and HR, must collaborate to develop new ways of attracting and retaining technical talent that can handle the fast-paced, unabating demands of digital transformation.

A common theme that emerged from these CIO interviews is that culture is key. Finding solutions to these talent issues begins with a culture that empowers people by connecting them to an organization's larger mission. At Red Hat, an open organization, we've seen firsthand the business-altering innovation that occurs when people have the freedom to contribute in ways that go beyond the skills they list on their resumes.

We hope this report sparks new ideas for easing your IT talent troubles. Since this is an ongoing struggle, we plan to continue exploring this topic on The Enterprisers Project, our online community where forward-thinking CIOs can share insights and lessons. We invite you to join us there to continue the conversation.

Jim Whitehurst
President and Chief Executive Officer,
Red Hat

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Talent is now recognized globally as the single biggest issue standing in the way of CIOs achieving their objectives. —Gartner CIO Agenda 2016

EXECUTIVE SUMMARY

The shift to a digital economy is creating a talent crisis that is putting companies' survival—and CIOs' own careers—on the line. Competition for a finite pool of skilled technologists and IT leaders is sharply increasing as organizations of all types rely more heavily on digital technology. At the same time, the nature of the skills that organizations need in IT is changing. Digital business is being built cloud-first and mobile-first, and is heavily dependent on analytics, automation and new security models. Skills that were important a few years ago are fast becoming irrelevant. The higher-level skills now in demand are scarce.

The U.S. Bureau of Labor Statistics projects a growth in new computer and information technology jobs of close to half a million from 2014 to 2024.[1] But with an unemployment rate in tech that already hovers near zero, where will that talent come from? How many of those jobs will go unfilled? The situation is even more dire in Europe, where the European Commission predicts up to 825,000 unfilled vacancies for ICT (information and communications technology) professionals by 2020.[2]

The competition for talent will not be waged on an even playing field. Digital leaders are increasing wages and offering the kind of cutting-edge work that technologists crave. CIOs in historically low-tech industries (think local governments, law firms, real estate, manufacturing) must compete for talent with the likes of Google and Amazon, along with an ever-growing cadre of established companies that are aggressively transforming. With tech talent crucial to organizational success, CIOs and their HR counterparts must work together to change the paradigm for how they attract and cultivate talent.

CIOs who can't offer the highest wages or a full slate of cutting-edge jobs are doubling down on a blend of strategies to attract and retain the talent they need. These include defining and promulgating a compelling mission and

> With an unemployment rate in tech that already hovers near zero, where will that talent come from?

directly linking IT work to that mission; creating a culture of growth, empowerment, and transparency; and above all, making sure work is meaningful, challenging, and fun.

"When you're competing for a very small pool, the question is how do you become the best place to work?" said Tammy Erickson, executive fellow of organizational behavior at the London Business School and a leading authority on the changing workforce. This has all sorts of implications, including the need to get rid of non-differentiating work (running email, maintaining servers) as quickly as possible so internal IT can innovate better and faster.

It's a bit of a Catch-22; you need the best skills to innovate with technology, and you need a reputation for doing innovative work to attract that talent.

This talent crisis challenges the traditional approach to human resources and talent management—including how companies recruit, manage, motivate, and retain full-time staff. Technology leaders are pushing back on some of the conventional criteria used to evaluate candidates. They're calling for more flexibility in how they reward exceptional talent and embracing nontraditional alternatives to the use of FTEs. Approaches that served a more stable business model have become inhibitors.

"The classic approach to HR management derives from having a relatively fixed long-term strategy," said Rob Austin, a professor, author, and former executive who currently teaches the management of innovation and digital transformation at the Copenhagen Business School, and whose *Adventures of an IT Leader* is in use at over 440 business schools around the world. "We figure out what our strategy is in the long term and what capabilities we need to execute it." Job descriptions include required experience, skills, and educational background.

This "eventually devolves into some kind of a checklist. We start with slots in an org chart associated with these job descriptions, then try to find people who fit the description….That's not working very well anymore."

CIOs frustrated with the status quo are cultivating closer, more collaborative relationships with their HR colleagues. Together, they are co-creating solutions to one of today's thorniest challenges and bringing more flexibility to the process. In the following pages, we'll present some of their best solutions for surviving this talent crisis.

THE SCOPE OF THE PROBLEM

CIOs are already feeling the pinch. Well over half (59 percent) of respondents to a global survey of 4,000 IT leaders by Harvey Nash, a global recruitment company headquartered in London, said they face a skills shortage. The same percentage say they believe the skills shortage will prevent their organizations from keeping up with the pace of change.
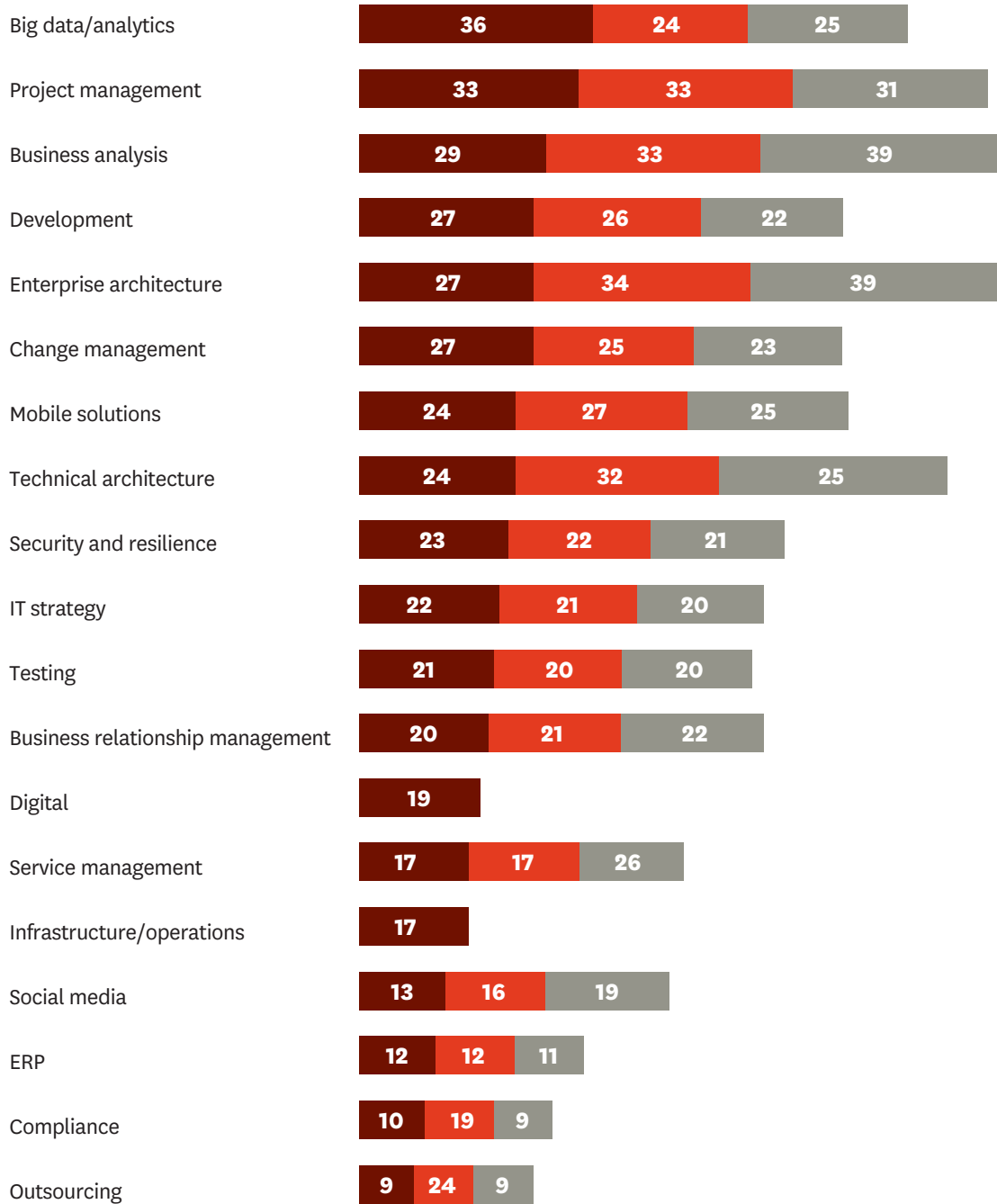
Business leaders are aware of the problem too. Fifty-four percent of the nearly 700 respondents to a recent Harvard Business Review Analytic Services study said they lack the people and skills they need in order to compete effectively in the connected economy.

FIGURE 1

A SKILLS SHORTAGE

Which functions do you feel suffer from a skills shortage?

● 2015   ● 2014   ● 2013

Function	2015	2014	2013
Big data/analytics	36	24	25
Project management	33	33	31
Business analysis	29	33	39
Development	27	26	22
Enterprise architecture	27	34	39
Change management	27	25	23
Mobile solutions	24	27	25
Technical architecture	24	32	25
Security and resilience	23	22	21
IT strategy	22	21	20
Testing	21	20	20
Business relationship management	20	21	22
Digital	19		
Service management	17	17	26
Infrastructure/operations	17		
Social media	13	16	19
ERP	12	12	11
Compliance	10	19	9
Outsourcing	9	24	9

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The CIOs interviewed for this report agreed that the most important thing to look for in new hires is not their specific skills but rather the characteristics and aptitudes they bring to the organization.

Big data and analytics top the list of hard-to-fill positions in both the Harvey Nash study and the 2016 State of the CIO report. And those numbers have gotten a lot worse when compared with responses over the past two years. figure 1 "Analytic skills are harder to find," said Alan Cullop, CIO at DaVita, a $13.8 billion healthcare organization based in Denver. "To become good in those areas takes a blend of business talent, mathematical talent, and computer science talent. Not a lot of universities offer curricula to create that [combination of knowledge and skills]."

Other emerging skills that are hard to find include cloud service management, mobile, and the Internet of Things. Even more traditional skills like application development, security, enterprise architecture, and integration are proving tough to fill—particularly because what's required for those roles is changing as organizations make the shift to cloud. "We need people who can integrate services across commercial cloud platforms," said Jay Ferro, CIO at the American Cancer Society—this is different from integrating the relatively fixed internal systems of the past. The drive for more automation affects roles as well, said Bryson Koehler, CIO at The Weather Company (recently acquired by IBM) and an IBM vice president and distinguished engineer. For example, "in our QA staffing model, we focus on hiring senior developer-type people," he said. "We want QA engineers to come in and focus on writing/producing automation test scripts, not doing traditional manual testing."

As scarce as these skills may be, CIOs interviewed for this report agreed that the most important thing to look for in new hires is not their specific skills but rather the characteristics and aptitudes they bring to the organization. Koehler looks for curiosity and openness, and a love of data, analytics, and weather. Ferro wants to know that new hires will be resilient and able to pivot in the face of change. Dr. David Bray, a senior executive and the CIO for the U.S. Federal Communications Commission (FCC), looks for creative problem solvers. "Like the character Sherlock Holmes, they should be excited about the problem or challenge of solving a case and motivated to doggedly pursue it until it's done," he explained. Active listening is critical as well. "We model, encourage, promote, and reward it," he said. Anil Cheriyan, CIO at SunTrust Banks, has developed a list of seven "next-gen attributes" that he looks for. see sidebar on page 10 "Passion" is a word that crops up frequently in these conversations. Given how quickly and constantly technology is changing, it makes sense that CIOs "hire for characteristics and train for skills," as many described their talent strategy.

SOURCES OF TALENT

There's no question about it: Businesses have a sourcing problem when it comes to technology talent. To address that, CIOs and CHROs are intensifying efforts in areas they know get results, including working more closely with institutions of higher education and emphasizing employee referral programs. But given the scope of the problem they're facing, that's nowhere near enough. So they're adding a number of other practices to the list, including:

Using social media to cultivate their own networks and those of their teams. Koehler says he gets his best people through personal connections. While Bray can't tap his own personal network (as a government agency, the FCC must follow a fair and equitable hiring process), team members who are not on the hiring panel can and do let their connections know when suitable positions are open and encourage them to apply. Having "impassioned change agents" on the team attracts other impassioned change agents, he said.

Social platforms give CIOs a more facile way to tap those connections, but "you have to invest in cultivating it and keeping it current," said Koehler. For him that includes following people on Twitter and monitoring community forums to see who's answering questions with insight. In-person networking is still important as well. Ferro and Koehler use speaking engagements as a way to "get people excited about what we're doing in IT," said Ferro, who, as a CIO at a nonprofit, can't compete on salaries for the best talent. He accepts invitations to speak in markets he might not otherwise have access to—including Denver, Austin, Oklahoma City, New York, Seattle, and California. "You have to go where the talent is," he said.

Becoming part of the open source community. For Jim Swanson, CIO at $15 billion agribusiness Monsanto, going where the talent is means being part of the open source community. By contributing to open source, Monsanto gets to know the leading engineers and becomes known as an innovator in IT. When they do make a hire, they're also tapping into that person's network. "A great engineer can bring 10 more with him," Swanson said.

The Weather Company's Koehler agrees. "Open source is a magnet for talent," he said. "It's a great way to attract engineers who are creative problem solvers and can give your company an edge. Innovative developers don't start their own projects with big, shrink-wrapped packages. They join or even start open source projects. Who wouldn't want that kind of initiative in their company?"

Focusing on diversity. As valuable as tapping personal networks can be, it's not so good for bringing diversity of thought and experience—so important for innovation during times of disruption. Organizations that want to ensure diversity are formalizing it through a variety of programs. The FCC's Bray intentionally hires for

12 TIPS TO SURVIVE THE TALENT CRISIS

Proven Advice from CIOs and HR Leaders

- Ensure team members feel they're part of something greater than themselves

- Invest in coaching, mentoring, training—one CIO said he'll cut headcount before he cuts his training budget. Curt Carver, CIO at the University of Alabama at Birmingham, sets aside 3 percent of his budget for training, "no matter what"

- Hire less for skills and more for emotional maturity and the ability to learn and change

- Offer interesting opportunities, such as working with the latest technologies or creating an application that will make a real difference in customers' lives

- Rethink the org chart and keep it flexible—Carver redesigns his every 12 to 18 months

- Redesign work around projects rather than roles, then tap into nontraditional sourcing methods such as crowdsourcing and talent platforms; not everything needs to be done by an FTE

- Use social media and speaking events to find and engage top talent

- Use open source as a magnet for talent by having your team become part of (and contribute to) the community

- Create affiliations with colleges/universities (course design, internships, etc.) and even K-12

- Invest in diversity programs that go beyond filling your corporate social responsibility requirements— for example, retaining women returning to the workforce or hiring individuals with autism

- Build a strong collaborative relationship between IT and HR

- Be clear about what you're offering up front (culture, mission, type of projects), and then be consistent in delivering that

cognitive diversity on the team. Monsanto has increased its internal diversity networks from nine to 22. More than just support groups, "we're getting great business insights," said Melissa Harper, Monsanto's vice president of global talent acquisition and chief diversity officer. For example, "our young professionals network is really helping us stay in tune with a younger segment of society that we haven't really connected with in the past." The company has developed partnerships with land grant universities and participates in programs like the White House TechHire Initiative[3] and LaunchCode,[4] designed to tap, develop, and place members of underrepresented groups with a network of employers.

Some large technology companies are expanding their concept of diversity to include a focus on neurodiversity—in particular, hiring high-functioning individuals with autism to fill a variety of technology positions. The motivation is twofold, according to Austin, who has co-authored articles on the topic in both the *Harvard Business Review* and the *MIT Sloan Management Review*. First is their belief in the link between diversity and innovation. Second is that as the talent crisis has become critical, "they've learned that not only are they able to find talent in nontraditional places; in this case they're getting quite strong talent." That's because some individuals with autism have exceptional abilities to recognize patterns in the midst of a lot of "noise." Many people with autism have extraordinary memories, and

their ability to sustain focus on repetitive tasks for long periods of time is particularly useful in some tech jobs. SAP, HPE, and Microsoft all have programs in place to hire and cultivate employees with autism. SAP has been doing this since 2013, starting with software testers and data analysts. SAP now employs over 100 individuals with autism, and has expanded the number of roles to 18, including business analysts, graphic designers, project managers, and IT support staff. HPE began its program in Australia and is expanding it globally. It has just announced 10 new roles in cybersecurity as part of this initiative.

Of course, this is another area where cookie-cutter approaches to HR have to change. For starters, "people with autism aren't good at telling you what they're good at," said Austin, so traditional interviews don't work. They may not make direct eye contact or offer a firm handshake. Determining whether the person is actually a good candidate can take weeks and a completely different approach. Specialisterne, the Danish company that started this trend, provides four weeks of training and evaluation for high-functioning autistic individuals to prepare them for employment. It has candidates work with LEGO MINDSTORM robots so they can demonstrate their abilities rather than explain them.

For its part, SAP is reevaluating all of its HR processes to root out those that might prevent the company from hiring talented people because they don't fit traditional norms, said Austin. This includes how it interviews, selects, and trains candidates.

Global and rural sourcing; moms and the military. Global sourcing is nothing new, but the degree to which it is being employed is. CIOs at large companies are increasingly comfortable leading global teams. "To address the labor shortage we have to get away from thinking on-shore/off-shore," said an IT leader at a large conglomerate. "We have to think globally and put collaboration tools in place" to make that work. His own leadership team is spread out around the globe. Of course, globally diverse leadership adds yet another skill need to the mix; these leaders must be adept at managing teams of people from different cultures who are also in different geographies.

But you don't have to go halfway around the world to find new talent. Ferro has had success with rural

sourcing—tapping into pockets of talent between the two coasts. Communities from St. Louis to Lafayette, Louisiana, are investing in technology and innovation.

Another nontraditional source of technology talent that Ferro and Curt Carver, CIO at the University of Alabama at Birmingham, have tapped is the remarkably successful Year Up program.[5] Year Up prepares low-income young adults for professional careers in a yearlong program that includes training, coaching, mentoring, and internships.

Some companies are reaching out to women returning to the workforce after taking time off to raise children.[6] Given how much technology and the work environment itself have changed since many of these women were employed as engineers or programmers, organizations offer training and internships to help them get up to speed.

And then there's the military. "There is a culture within [Monsanto] that values the skills and abilities that veterans bring and in turn leverages those resources to create an inclusive work environment as well as drive business results," Harper said.

Reaching beyond higher education to work with schools at the K-12 level. DaVita is "proactively involved at all levels of education," said CIO Cullop. Given the need for creative thinkers to innovate with technology and "envision how new functionality can be brought to life," DaVita focuses on STEAM, not STEM—adding the arts to the classic science, technology, engineering, and math. "We're working to make STEAM a more exciting, creative endeavor in the schools, communicating the kinds of opportunities that exist" and offering internships for high school students. DaVita has K-12 projects going in all of the locations where it has a strong IT presence—not just Denver and Colorado Springs but also California, Washington State, Nevada, New Mexico, Florida, Tennessee, and even internationally.

Monsanto is also investing in K-12. "The pipeline dwindles if you wait until university," said Harper. The company has invested $7 million in its America's Farmers *Grow Rural Education* initiative, to enhance math and science education in rural school districts. It has a partnership with the Girl Scouts around STEM and provides high school students with intern-like experiences "to build interest and excitement," she said. "We have to start younger."

A NEW APPROACH TO CONTINGENT LABOR: HACKATHONS, CROWDSOURCING, AND TALENT PLATFORMS

Another emerging trend is the ability to tap tech talent without ever bringing it onboard. While the idea of contingent labor is nothing new, some of these approaches are.

Monsanto was a major sponsor of HackIllinois[7]—a University of Illinois hackathon for data scientists that included thousands of students from a variety of institutions. "We need to digitize every part of the business," Harper said. HackIllinois "enabled us to have access to the best and the brightest," with some 3,000 prequalified students now in the company's sourcing database.

The Weather Company sponsors its own hackathons with outside talent to invigorate and incent its teams. These are advertised across the Atlanta area, and the company provides substantial prizes for winners. "On more than one occasion we have used the winning ideas and implemented them in our products," said Koehler.

The Weather Company uses HackerOne, which bills itself as a "vulnerability coordination and bug bounty platform," to identify security gaps. The company pays for a certain number of "finds," and HackerOne crowdsources the security testing to ethical hackers, paying them for each discovery.

The American Cancer Society uses crowdsourcing for quality assurance and user experience feedback. "We have to get really creative with the competition [for talent] out there," said Ferro. "Rather than hire C or D players, we have to be able to look at alternative ways of sourcing. We're not just looking for FTEs. We're looking for resources to get work done." This requires a shift in mind-set, he said. Instead of thinking, "I've got to go get a PM or a BA, two developers, or an architect...we're approaching it from getting a particular application or project out the door. Using a hybrid mix of talent has become very successful for us. There have been projects where we've combined crowdsourcing with Top Coder with rural sourcing combined with some contingency labor led by a full-time staff." An added benefit: This approach is building the organization's reputation as a progressive IT shop—the kind of place top talent wants to work.

But crowdsourcing and talent platforms (Top Coder is probably the best known of these) aren't for everyone—at least not today. While DaVita CIO Cullop holds some "code-a-thons" for innovation, regulatory concerns in the healthcare industry limit what he will do. Government CIOs will also be limited in what they can do in this area—at least for now. "Public service has to be fair in the contracts it awards," said Bray of the FCC. "It could be done, but we'd have to draft a solicitation to allow interested firms to bid on the work beforehand, to ensure it was a fair competition across all talent platform providers."

ATTRACTING TOP TALENT: MISSION, CULTURE, AND SHARED EMOTIONAL EXPERIENCES

As Tammy Erickson says, when you're competing for a small pool of talent, you have to become known as a great place to work. But what does that really mean? For IT professionals, it starts with having a modern technology environment and interesting projects to work on. This is especially important for Ferro, who, as a nonprofit, expects to lose many of his best people to higher bidders after only two or three years. So he has "rooted out 80 percent of our legacy software and highly customized applications" in order to get to a standardized platform. In this way, new talent isn't spending their first six months "getting ramped up on the nuances of our systems," he said.

But modern technology and interesting projects alone are not enough. The work has to be both challenging and meaningful, Erickson said. Meaning comes from having an organization mission that people can feel passionate about. Cullop is very explicit with his team that what they do ties directly to the organization's overall mission of care. The CEO talks about the fact that they're transforming healthcare with technology. At The Weather Company, IT knows they're helping get alerts to people that could save their lives. At Monsanto, they're feeding the world. Ferro's team is helping find a cure for cancer.

Whether or not an organization has a strong societal purpose, however, it's important to find meaning and make it explicit. For example, at SunTrust Banks, that means recognizing the important role financial security plays in people's well-being and serving clients to improve that. "If that's why you are at SunTrust, then you will do well there," said Cheriyan. "More clients are experiencing us through technology [via the web and their digital devices]. So for technologists, it's getting easier for them to understand the role they play in our purpose."

This is reinforced through storytelling and communication from leadership, and also by having IT team members visit bank branches or call centers and listen to client calls. "They build all this stuff, and they should see how it's working—see the client experience and what that's like. We get people out there," said Cheriyan.

CIOs interviewed for this report also stressed the importance of giving team members a clear idea of where the company and IT are heading within the context of that mission, and then connecting each person's role to that. "There are no IT projects at the FCC," said Bray. "Everything is a business project, and IT is baked into the overall mission. It's One Team, One Mission." The mission becomes the guide star for the work. Once that's established, then "we give our positive change agents autonomy, measurable goals, and meaningful challenges," he said. "The world is changing exponentially. In public service we need checks and balances, but we need to work with agility, resiliency, and efficiency too."

Erickson believes that a strong culture is key to both attracting great talent and providing the fabric that holds a team together. What that means will vary from one organization to another. "Not everyone needs a ping-pong table in the lobby," she said.

Asked how he'd describe The Weather Company's culture, Koehler is quick to respond and to tie it back to the greater mission: "Loud. Energetic. Open. Hardworking. Passionate. Committed," he said. "Our teams take seriously that we play a role in helping save people's lives. Millisecond delivery of notifications, forecasting, the right personalization—that gives us a great sense of purpose. Our mission is to prepare and protect you for tomorrow. The team will come through when you sign them up for a hard problem that you work on with them."
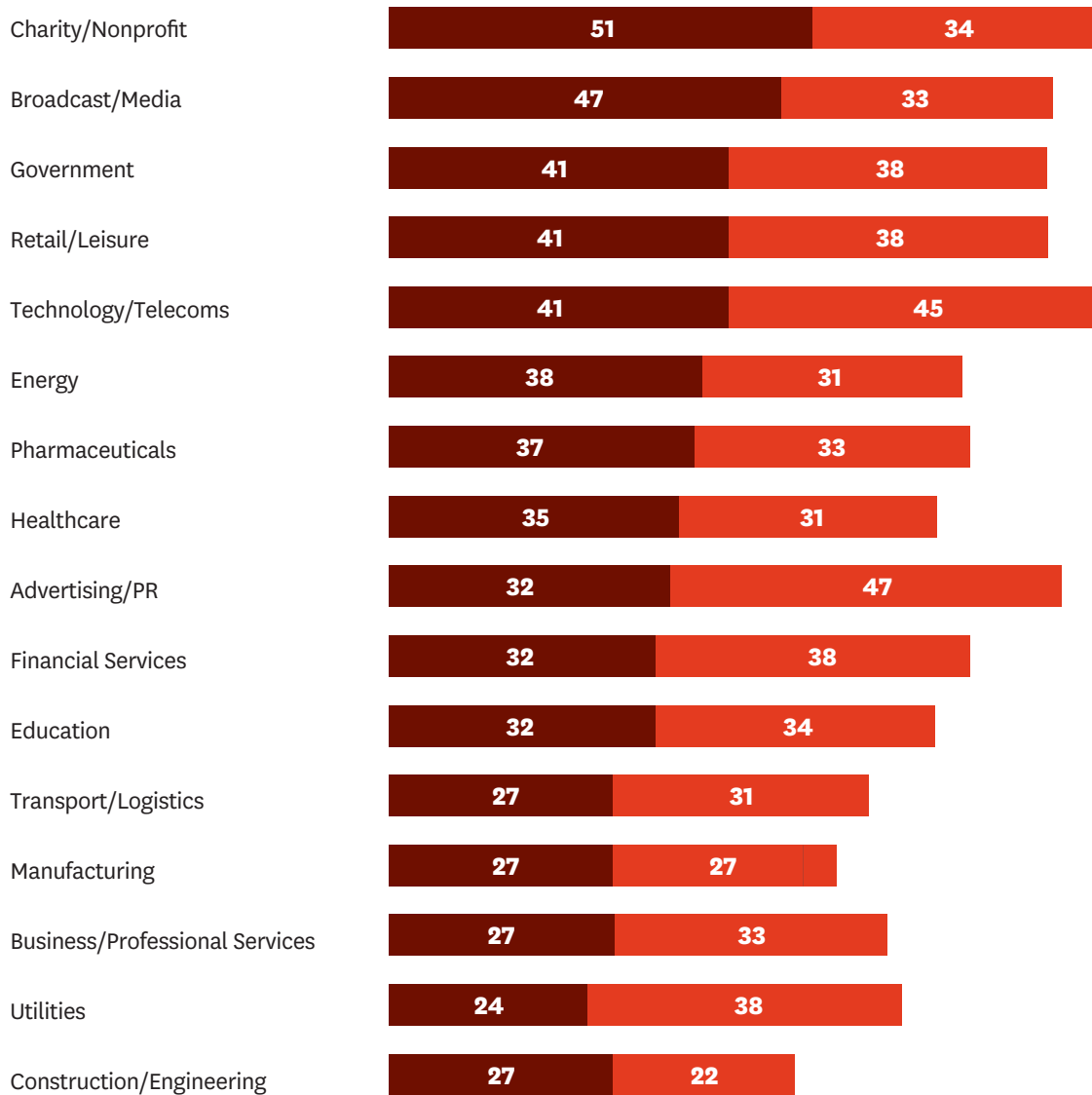
DaVita is also very intentional about culture, said Cullop, and then testing to make sure that comes through. "If someone feels valued for what they do—their opinion matters, they are told they are making a difference and working toward a noble cause, and if they understand how they connect to that and contribute, that creates a great culture." DaVita tests that through engagement

FIGURE 2

CIOs GREATLY CONCERNED ABOUT I.T. TALENT RETENTION VARIES WIDELY BY INDUSTRY

Percentage by industry

● 2015 ● 2014

Industry	2015	2014
Charity/Nonprofit	51	34
Broadcast/Media	47	33
Government	41	38
Retail/Leisure	41	38
Technology/Telecoms	41	45
Energy	38	31
Pharmaceuticals	37	33
Healthcare	35	31
Advertising/PR	32	47
Financial Services	32	38
Education	32	34
Transport/Logistics	27	31
Manufacturing	27	27
Business/Professional Services	27	33
Utilities	24	38
Construction/Engineering	27	22

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surveys and individual discussions about personal fulfillment. Cullop holds town halls and makes it safe to ask tough questions.

At the FCC, Bray's team has instituted their own "rituals and memes" that create a sense of community. For example, they have a "Thank-o-saurus" T. rex figurine that is decorated and passed along as a way of thanking someone, and a "Semper Gumby" plasticine figure for people who were most flexible during the week.

Having fun and engaging in service projects go a long way toward building a sense of meaning as a connected group. For Ferro's staff, that's being a top-20 Relay for Life team (there are over 100,000 teams worldwide, with over a million participants). They take part in dozens of fund-raisers and events "coming together as a team," Ferro said.

Community service "is a way for us to get to know each other and build bonds around the community," said Cullop, whose team builds homes, cleans up parks, and works in schools with underprivileged kids, providing backpacks, school supplies, and outings to the park to learn about nature. "It's a shared positive emotional experience," he said, and that creates strong connections.

Recognition is important for retention, CIOs agree. Cullop's "shining stars" are recognized during a night of honor, held during the company's leadership meeting. Ferro issues a "spirit of excellence" award each quarter for the person who has best embodied the IT Code (Integrity, Teamwork, Communication, Ownership, Dynamic, Excellence).

And let's not forget about pay. While it's not the top criteria for technology job satisfaction, it's actually growing in importance as demand for technology skills grows. The edge that organizations with a strong social mission might have is offset here for nonprofits and government entities. And all of this matters because most CIOs have some (55 percent) or great (32 percent) concern about holding on to their best staff, according to the Harvey Nash study. This varies significantly by industry, with charities and nonprofits leading the way and government not far behind. figure 2

NEW MODELS FOR THE DIGITAL AGE

CIOs and management experts agree that the traditional approach to human resources of filling relatively static slots on an org chart is not working well in the current dynamic environment. To compete on talent today, Austin argues, "We need to flip that around and instead identify people with interesting and uncommon capabilities and then design the job to get maximum contribution from them."

In some contexts this might include the deconstruction of work into projects, then tapping into an extended talent pool to get the work done. Managing work this way provides ultimate flexibility, enabling CIOs to tap internal and external resources as necessary through emerging platforms like Top Coder for software development and testing. Think of it as talent as a service.

"HR systems have been built up around the assumption that work is done by regular full-time employees," said John Boudreau, professor of management and organization at USC Marshall School of Business and author of *Lead the Work*. "It hasn't been built to ask, 'Can this piece of work be done on this platform?' Work doesn't get deconstructed well. Leaders have to get their head around how to break the work up into projects."

Such platforms can be a boon for CIOs to access specialized skills that they don't have the need for or capacity to fund fulltime, or when they need to spin something up quickly. But there are challenges to using them, including

concerns around protection of intellectual property and government constraints around hiring. For now, CIOs and CHROs should focus on redesigning work for flexibility, even if their use of external platforms may be minimal.

As a step in this direction, University of Alabama's Carver keeps his org chart flexible, overhauling it every 12-18 months. This is necessary to keep up with the pace of change, he believes. "To plan for an IT future, you've got to be agile and hungry, and that agility has to be demonstrated by strategic plans that are being updated and changed." This then flows down to new roles and "constant training," he said.

Another challenge that makes it hard to break out of the HR box is that IT's value can be hard to convey, said Chris Huff, vice president of mobile and consumer application development at The Weather Company. How do you explain the value of a 3x developer, someone who solved a problem in a day and a half that would have taken others weeks to put forth with less quality and maintainability? How do you tie the value of what they've done to business results? These things are hard. In the absence of a common vernacular, Huff, Cheriyan, Carver, and Ferro focus on storytelling to build collaboration and trust with their HR colleagues and other key stakeholders in the business.

Carver likes to have "white sheet of paper" conversations with his counterparts in HR and other parts of the faculty and administration in which they can "coauthor a solution," he said. "Then they own it too. It's not an IT thing; it's more constituent-focused." Ferro convinced a talent strategist in HR to try something creative and outside the norm after first helping to solve one of their problems with technology. "Once you win them over, it's easier to get their buy-in," he said.

The need for IT talent is only going to increase in an ever-expanding range of industries. Consider that by 2020, GE expects to generate $15 billion from software, which would make it one of the top 10 software companies in the world. As part of its new focus, GE is relocating its headquarters to Boston, where it will employ around 600 "digital industrial product managers, designers, and developers," according to a company statement. CEO Jeffrey Immelt chose Boston in part because "Boston attracts a diverse, technologically fluent workforce focused on solving challenges for the world."

Or consider that 70 percent of Monsanto's total jobs are already in science, technology, engineering, or math (STEM), according to Harper. Certainly many of those are in chemical and crop engineering, but increasingly, many are in IT, analytics, the Internet of Things, and digital operations. Monsanto is competing for skills not just with other agribusinesses but with companies in all industries, Harper said.

Most CIOs accept that they won't be able to retain people forever. Ferro is very pragmatic about that. "The hot-commodity folks are going to move on," he said. To minimize disruption to both operations and the company culture has required change—including how they share and retain knowledge, design applications, and support the business.

> How do you explain the value of a 3x developer, someone who solved a problem in a day and a half that would have taken others weeks to put forth with less quality and maintainability? How do you tie the value of what they've done to business results? These things are hard.

> CIOs must also be creative in sourcing and recognize that the skills they need today are likely not the skills they'll need tomorrow.

CONCLUSION

The shift to a digital economy has CIOs in a bind. At the same time that they face greater competition for talent, the nature of the skills they need is changing from what their current teams possess. CIOs and CHROs are going all in on a blend of strategies to attract and retain the people they need. This includes putting their organization's mission front and center, and being explicit about the role IT plays in furthering that mission. It includes ensuring that team members have the opportunity to grow in their careers as well as some autonomy in how work gets done. Successful leaders work diligently to build an authentic culture. Increasingly, that includes being transparent about goals, expectations, and outcomes, and ensuring that work is both challenging and fun.

CIOs must also be creative in sourcing and recognize that the skills they need today are likely not the skills they'll need tomorrow. Ferro thinks of it like a farm system in baseball. There are some skills you need today—go out and get them however you can so you can win your season. "At the same time we're trying to grow this talent and build these longer relationships," he said. And of course, the team overall has to be adaptable to change.

Today more than ever, companies are competing on the quality of their IT. CIOs and CHROs must co-create a more progressive, development-focused approach to talent management. Those that build the strongest teams will help ensure their organizations' place in the digital future.

ENDNOTES

1   Bureau of Labor Statistics, http://www.bls.gov/ooh/computer-and-information-technology/mobile/home.htm
2   Grand Coalition for Digital Jobs, European Commission, https://ec.europa.eu/digital-single-market/en/grand-coalition-digital-jobs
3   https://www.whitehouse.gov/issues/technology/techhire
4   https://www.launchcode.org/
5   http://www.yearup.org/
6   Tech Companies Help Women Get Back to Work, Wall Street Journal, http://www.wsj.com/articles/tech-companies-help-women-get-back-to-work-1460309159?cb=logged0.9857677698841323
7   https://www.hackillinois.org/

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