Technology Skills Gap
The technology skills gap: Can you close it?

Have you heard about the skills gap in the information technology (IT) field? If you haven’t, keep reading, because it’s a big deal, and one that could affect any company that needs to fill technology positions in the upcoming years. Specifically, we’re talking about the technology skills required to handle cyber security, network infrastructure, big data, server or data center management, and data analytics. Filling positions for data programmers, data analysts, and cyber scientists will be like finding a pearl in an oyster, rare and valuable.

How bad is it? According to a recent study funded by Microsoft®, there are 120,000 new jobs created in the United States each year that require the skills of workers with degrees in computer science. But according to education stats, the U.S. produces only 49,000 computer science degrees annually, thus creating a gap of 71,000 available jobs.¹ Often, these jobs remain open without qualified candidates. This creates a skills gap that leaves companies competing for the best talent or outsourcing to foreign workers.² The existence of an IT skills gap is further substantiated by PayScale®, a global compensation firm that reports salaries for information technology jobs are rising 5.1 percent per year, and that is 45 percent higher than an average job in America.³ CompTIA®, a technology association focused on professional development, also reports that 93 percent of employers indicate there is an overall skills gap among their IT staff.⁴ Add these statistics together and you’ll start to understand why the technology skills gap is quickly becoming a crisis.

The root of the problem stems from a lack of science and math education, which, according to the book The U.S. Technology Skills Gap by Gary Beach, threatens America’s future economic stability, workforce employability and national security. Further research shows that despite the fact that 11.8 million Americans are looking for jobs, there are 3.8 million jobs currently open due to lack of skills, and the situation is only expected to get worse. By some estimates, the United States will face a shortage of at least 14 million skilled workers by 2020.⁵ What’s the gap for data scientists? According to a 2011 study by McKinsey Global Institute®, the U.S. could face a shortage of up to 190,000 data scientists (or IT professionals) by 2018.⁶

² Ibid.  
³ Ibid.  
⁴ Ibid.  
This Blue Paper® addresses the technology skills gap and identifies some of the ways small- and medium-sized corporations can adapt. It focuses on strategies and techniques that can help you find (and keep) talented computer scientists. Whether it's outsourcing, providing unique perks and benefits to attract skilled professionals, or emphasizing training and education, it's important to find ways to not only fill these positions, but to keep them filled. The future health of your IT infrastructure could depend on finding the right talent, so keep reading.

What exactly is the skills gap?

Before we provide recommendations on how to close the skills gap, let's take a look at what it actually means. The American Society for Training and Development (ASTD), a professional development association, defines a skills gap as: “A significant gap between an organization’s skills needs and the current capabilities of its workforce that occurs at the point at which an organization can no longer grow or remain competitive because they don’t have the right skills to drive business results and support the firm’s strategies and goals.” 7

That's a pretty long definition, so let's put it in practical terms. In short, the demand exceeds the supply of IT professionals. There is a smaller percentage of skilled technology workers and companies find it difficult to attract and retain qualified tech employees. It's creating a war for talent across the country, in every region, sector and industry. PriceWaterhouseCoopers® (PwC®) recently released its annual CEO survey, which identified the availability of key skills as the second biggest threat to business growth. 8 The specific tech jobs where skills go wanting are security/cyber security, network infrastructure, big data, server/data center management and data analytics/business intelligence. For many companies, finding qualified candidates with these skills is getting increasingly difficult. As a result, some companies are offering massive incentives to attract IT professionals. For example, HubSpot®, a company that's rapidly grown from 300 employees to 500 employees offers employees a $30,000 referral bonus to anyone that recruits an “awesome” software developer. 9

Some say the technology skills gap is a result of an educational system that has not adequately emphasized science and technology. In the United States, 22 percent of degrees earned are in psychology, history and performing arts,

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and only 5 percent of degrees are earned within the high-demand areas of engineering and technology. In countries like India, the number of technical graduates is five times higher than the U.S., which is one reason the U.S. relies on international talent to fill IT positions. Indeed, statistics show that the U.S. is significantly behind other countries when it comes to core curriculum such as math and science. Globally, the United States is ranked 32nd in mathematics and 22nd in science. According to Adam Wiedmer, a director at the professional services corporation Seven Step RPO®, “there is a mismatch between skills being taught in the U.S. and the labor pressure in the market.”

The demand for computer and IT skills is only expected to grow in the upcoming years. Yet, the number of students focusing on these areas as a course of study is declining. Tracy McCarthy, Chief Human Resource Officer of SilkRoad®, a provider of cloud-based social talent management software, thinks businesses should partner with educational institutions to develop more business-appropriate courses. McCarthy recently said: “How do we encourage the right students to pursue technical tracks so we have the needed skills in work? This is a problem best solved by an integrated approach between education and business.”

Another reason for the technology skills gap is linked to the rapid technology advancements over the past few years. Emerging technology is quickly outpacing expertise as new devices and tools are introduced into the market. For example, think about the impact of the smartphone five short years ago—it’s revolutionized the way people communicate and the way companies operate. Staying on top of the latest technological advances is difficult when new tools and methods are introduced almost daily. Jim Sphorer, a director of the IBM® University Programs, agrees that education is the key. In a recent article for TrainingMag.com he said: “science, technology, education, and math skills (STEM) need to play a bigger role in our curriculum at all grade levels, and professionals must make continuing education opportunities a priority to stay informed on the latest technical advances.”

Experts also attribute the growing skills gap to the fact that Baby Boomers are retiring in unprecedented numbers. The generation that followed the Baby Boom is smaller, so the number of workers available is shrinking as a whole. In addition, most employers continue to seek candidates with experience, and with increasing

changes in emerging technologies, it’s difficult to find employees that have proficiency in specific skill sets. Also, since educational institutions and employers aren’t always keeping up with the changes, the workforce is left behind as well.

So now that you’re aware of the technology skills gap and what it means, what can you do? There are several things your company can explore to address the IT skills gap. Some of these include:

- Infuse cash and creativity
- Outsource IT talent (locally or abroad)
- Build an internal IT team
- Grow an employee base through training
- Be realistic regarding expectations and required skill sets
- Align IT with Human Resources

Each of these options is explained in further detail throughout the paper. However, it should be noted that what works for one company may not work for another. There is no magic bullet to closing the skills gap; you’ll need to determine what works for your company given your financial and resource constraints. But with the right combination of activities, you can find short- and long-term solution to help close the IT skills gap in your organization.

Think about cash and creativity

If you really want to close the skills gap and attract high quality IT professionals, first and foremost, you need to dig deep into your pockets and evaluate what you have to offer in terms of flexibility and culture.

Money talks when it comes to attracting the most talented developers and programmers, and the war for talent can be expensive. Big companies pay top dollar for the best IT talent, and many small- and medium-sized companies simply can’t pay what larger firms are offering. Moreover, signing bonuses, referral bonuses, cash bonuses and other incentives are handed out like party favors by top companies. As noted, companies like HubSpot pay up to $30,000 to any employee that successfully refers a programmer to the organization. Again, not many companies have an arsenal of cash to pay for talent, so here is where you need some creativity.

If you don’t have cash, you’re going to need to be creative with your perks and benefits to attract talent. Consider offering things like flexible work hours, the ability to work at home, or job sharing. Additional training and career advancement opportunities are also valuable perks that can be offered to new
technology hires. Paid time off and vacation allowances are also benefits future employees will appreciate. The point is that some of these things can make up for what you can’t provide in cash.

Some say a positive and engaging corporate culture is the best way to attract and keep IT workers. Simply put, a fun and desirable working environment can go a long way in attracting and retaining hires. How do you build a fun working environment for programmers and other IT professionals? Here are some ideas:

1. **Make your office space feel like home.** Forget cubicles and florescent lights, employees today prefer working in home-like spaces that are comfortable and cozy. A “home away from home” space helps promote work-life balance and creativity.

2. **Provide snacks and drinks.** It sounds silly, but giving employees access to food and drink goes a long way in promoting a collaborative culture. By providing a fully stocked fridge and pantry, employees are able to take a break in style without leaving the office. Not only that, it helps build a gathering place for camaraderie and collaboration.

3. **Establish play rooms.** Again, this might sound childish, but programmers and IT professionals need a break from the computer every now and then, and building a space with games or fun things helps break the monotony. Lego® Denmark, for example, has a designated playroom with toys and Legos for employees to let off steam. Other companies have things like slides and game rooms. You don’t necessarily need kids’ toys or video games, but the idea is to provide tangible ways to have fun in the office.

4. **Implement fun onboarding practices.** When new hires join your company, make sure they are welcomed and integrated into the team immediately. Let everyone (including managers) know that they’ll score points at assessment time if they’ve gotten to know new team members and invited them to get involved in appropriate current projects.

5. **Celebrate.** Think of fun and innovative ways to celebrate employee accomplishments and events. Recognizing a job well done with a simple celebration goes a long way in building morale and infusing elements of fun.

Overall, it’s important to get creative in order to attract the best IT programmers. Some say that a collaborative and enjoyable environment is the solution, especially if you can’t offer the cash incentives that big corporations dangle.

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Is outsourcing the solution?

A lot of companies turn to outsourcing to fill IT positions. In some cases, outsourcing can be the best route to take to close the IT skills gap. According to the technology recruiting, staffing and consulting firm Mondo®, in a survey of more than 200 IT decision makers, 48 percent of respondents plan to hire more IT contractors than full-time staff in the next 12 to 18 months, and 32 percent expect to increase their annual budget for hiring IT contract workers. The same survey found that 73 percent of companies currently use contractors for application development, Web and mobile development, application hosting and application maintenance. Moreover, 30 percent of respondents indicated they plan to outsource more application development work and 27 percent plan to outsource more mobile and Web development in the next 12-18 months. The website Outsourcing Newbie claims that computer professionals and Web programmers and designers are among the top outsourced positions worldwide.

Because demand and the price for talent is more expensive in the United States, some companies choose to outsource professionals from other countries. In fact, 63 percent of tech companies say they plan to outsource or manufacture products outside of the U.S., and that is a 35 percent increase from 2011. The number one outsourcing destination for U.S. technology companies is Southeast Asia, followed by India, Eastern Europe and Russia.

A recent story that made headlines was about a computer programmer who outsourced his own job to China. That’s right, a computer programmer who was making hundreds of thousands of dollars annually outsourced his own job to a programmer in China for roughly one-fifth of his salary. The scam went on for months before the company realized the programmer they hired was not doing the work, and he was only discovered when remote logins to the company’s server from a city in China raised a red flag. The incident was investigated by a third party computer forensics specialist, who discovered that the same scam was going on across multiple companies in the area with 50 other programmers.

17 Ibid.
The above story illustrates how easy it might be to outsource IT skills in other countries, since even internal employees are taking advantage of cheaper resources abroad. But the question remains: Is that the right course of action? What are the pros and cons of outsourcing to fill vacant IT positions?

According to Scott Gordon, a writer for the E-Commerce Times®, companies should look closely at the disadvantages as well as advantages to outsourcing. According to Gordon, cost savings can be a significant pro to outsourcing IT jobs. Gordon and others believe that all things considered, outsourcing tends to be less expensive than hiring a full-time IT employee in-house. Overhead and training costs are significantly less with an outsourced employee, and if you operate a small business, this can be significant.

Others, however, caution that cost savings is not always a benefit with outsourcing. According to Laura McGarrity, Mondo’s vice president of marketing, “… in some cases, it’s not any cheaper to outsource.” IT employees are much harder to find, and as a result, much more expensive to outsource. McGarrity claims companies often experience sticker shock when outsourcing IT clients, because the demand for employees with a highly valued skillset and experience comes at a high price. The bottom-line is that it’s important to look closely at what it costs to outsource versus hiring an internal employee before assuming a cost savings benefit.

There are, however, some benefits to outsourcing IT professionals. Round-the-clock service, for example, is a significant benefit. Most professional IT tech support firms offer 24/7 access to tech support specialists, either by phone or through remote access. Usually, outsourcing firms are well equipped to handle technology challenges at any given moment or can find internal resources to complete a job quickly.

Even so, there are some cons to outsourcing that companies should consider before taking the plunge. If you hire IT experts from other countries, for example, language or cultural differences might present a challenge. Offshore outsourcing is usually the least-expensive option, and if the specialist abroad does not have a firm grasp on your native language it can make communication difficult. Before you hire a firm abroad, experts suggest either conducting a thorough interview or using a small project to “test drive” their services.

The lack of a team-based approach is another disadvantage to outsourcing. Outsourced employees are not privy to internal workings of a company, and it

might take time to bring them up to speed when issues arise or when you want them to provide advice on future technology initiatives. Accordingly, it’s a good idea to use an outsourced firm for your IT needs on an ongoing basis, rather than on a project by project basis. The outsourced team will be more fully engaged with your corporate needs and requirements when it comes time to upgrade the network or handle projects that arise from internal changes.

Most experts agree, however, that despite the challenges, outsourcing IT staff is sometimes the best option, particularly for small businesses. Outsourcing tech support allows businesses to stay focused on core offerings without getting sidetracked by IT projects. It also gives businesses access to cutting-edge resources and expertise, without the costs typically associated with staying ahead of the technology curve. If possible, find a local firm that provides the right combination of cost savings, flexibility and 24/7 support to avoid any of the language and cultural issues you might find abroad. Outsourcing locally also provides easy access to on-site tech support when it’s needed. There are many companies that offer IT outsourcing opportunities, like Outsource2India and Bain&Company®. These are just two of the companies you can find online, in truth, it’s wise to do your own research and ask industry peers for outsourcing recommendations.

One versus many: Should you build an internal IT team?

If you decide not to outsource IT talent, the next logical step is to build one in-house. Of course, there are significant advantages to developing internal IT talent. First, you’ll have easy access to staff that can address IT needs immediately. Secondly, hiring a full-time IT support staff will help control costs, because regardless of any changes to IT needs and tasks, a salaried employee will be able to step in without demanding additional compensation.

However, given the current gap in finding IT professionals, you’ll pay a pretty penny to hire an internal programmer or computer scientist, and that’s if you can find one with the skills you need. For many small- and medium-sized businesses, having a full-time IT specialist with a full-time salary working on staff is too cost-prohibitive to even be considered a viable option. Aside from the personnel costs like payroll and benefits, companies will also need to provide ongoing training for IT personnel, which can be expensive. In addition, even if you find the perfect candidate, chances are that he or she will not be able to fulfill all your needs in the rapidly changing world of technology.
But even so, some experts still recommend that the best solution to close the technology skills gap is to start hiring IT professionals with basic skill sets and developing an IT team internally. Shashi Upadhyay, CEO of Lattice®, a big data applications provider, claims that it doesn’t make sense for organizations to hire a single data scientist, for a variety of reasons. Instead, companies of all sizes should look at the possibility of hiring multiple IT professionals to serve as a data science team. According to Upadhyay: “If you look at any industry, the top 10 companies can afford to have data scientists and they should build data science teams.”

Upadhyay cautions that when medium-sized companies hire just one or two data scientists, they often can’t provide a long-term career path for those people within the company. As a result, the data scientists get frustrated and move onto the next job. The solution is to build a team of computer scientists that can work together. “You will absolutely get a benefit if you hire a data science team,” said Upadhyay. “Go all the way [and] commit to creating a career path for them. And if you do it that way, you will get the right kind of talent because people will want to work for you.”

For many smaller organizations, building an IT team is untenable and unrealistic given budgetary restrictions and realities. However, experts agree that building a team has several benefits, if you can swing it. Aside from career mobility you’ll also establish camaraderie and teamwork that will help retain IT professionals for the long term.

### Just add water: Grow employees

In a recent article in Fast Company®, Donna Wells, the CEO of the business training company Mindflash® asserted that: “It’s time organizations stop dreaming of perfect employees and start growing them.” Wells isn’t alone in her thinking, a number of experts agree that the most effective short-term solution is for companies to stop complaining and start training employees to fill technology gaps internally. Simply, the suggestion is to hire and train partially qualified applicants to become fully qualified, productive employees. Or, are there existing internal employees that can be trained to support technological needs?

If you’re looking for a best practice example from a company that continuously trains IT professionals, look no further than IBM®. The company offers free

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23 Ibid.

training and educational resources for IT professionals, educators, and students through IBM developerWorks®—a Web-based technical resource and professional network. More than four million developers use developerWorks each month, with language support in English, Chinese, Japanese, Russian, Korean, Vietnamese, Brazilian Portuguese, and Spanish. The resources offered on developerWorks are free and regularly updated with the newest technology trends. For example, the site was just expanding to include cyber security, mobile application development, and smarter commerce tools that help retailers improve their business.

Most likely, your organization operates on a much smaller budget than a company like IBM, but there are still training opportunities that you can pursue that are affordable yet effective. And it's important to make training available to new employees as well as incumbent workers so that they can learn new skills. Here are some things a company of any size can do to promote technical training and increase the skill set of existing employees:

- **Partner IT and training.** Have your training department partner with the other departments in the organization so they are kept up to date on current needs as jobs change and new skills are required.
- **Be proactive.** Be proactive in identifying skills gaps and continuously communicate with other departments. All too often organizations wait until there is some kind of a crisis to try and improve skills.
- **Tap into the educational infrastructure.** Develop a strong internship (or co-op) program to help develop skills early on in the hiring process. Partner with local colleges and high schools to start “recruiting” future employees and build your employer brand. Check with high schools and appropriate college departments to see if they have internship programs that could solve some of your problems.
- **Hire attitudes and aptitudes.** Make hiring decisions based on attitudes and aptitude for the positions and design training investments to get skills in line with position requirements.
- **Use a multi-tier hiring approach.** Hire some people out of college/high school as well as those in early to mid-career and later career. This way you have a supply of talent ready to move into new roles as others exit.

SCC Educational Services, for example, is a medium-sized company that uses training programs to help grow technical skills. The training function partners with the client services and technical support department to update the existing competency model and map technical skills to actual jobs. Also, when the company revises the training and development map it receives input from client services and technical support to help shape the 90-day onboarding training
plan. As explained by SCC’s Chief Learning Officer Don Keller: “We color-coded the competency model to help managers decide which competencies need to be evaluated on the 90-day review for new hires. A representative from client services and technical support, and the training organizational development (OD) specialist, assigned to this project pulled all of the managers into a training session and gave them the tools to better assess new hires.”

The OD specialists also work with managers to develop interview questions based on the “must-have” competencies. From this, a detailed structural interview guide is used so the managers are all asking the same set of questions during interviews.

Enhanced training internally can help grow the skills required to support IT. Whether you are providing training to new hires or internal employees, the goal is to work with employees to develop needed IT skills.

Stop looking for unicorns and rainbows

To mitigate the skills gap, experts caution that companies need to be realistic with hiring expectations and the skills that are required. Many companies look for a wide array of technical skills, including analytics, computer science, modeling and statistics. In reality, it’s often difficult to find these skills in a single person, so it’s almost like looking for unicorns and rainbows. They don’t really exist.

In fact, employers often turn away job seekers willing and able to work because they don’t have the exact skills that match their openings. But waiting for perfect candidates is holding employers back, according to a survey from Manpower®. In fact, nearly 52 percent of surveyed organizations have trouble filling positions. Likewise, a recent Kauffman® Foundation poll of entrepreneurs found that 40 percent of those surveyed reported that finding qualified people is the biggest obstacle to growth.”

It’s not a bad idea to widen your pool of potential job applicants by making skills and knowledge that can be picked up on the job “desired” not “required” in your ads and job descriptions. Offering to pay for training and certification will attract even more applicants. Experts like Tracy McCarthy, Chief Human Resource Officer of SilkRoad, agree and suggest that employers modify their expectations. She recently said: “If you are having trouble filling jobs, is it because your expectations of the job applicant’s skills and experience are too high or specific? Challenge your thinking about the level of experience and skills you are demanding of applicants and look for a balance of specific technical skills and critical success skills, work attitudes, and self-management skills.”


Instead of finding the perfect candidate, companies need to look for applicants that possess basic skills and provide additional training in-house. For example, SCC Soft Computer® adopts this approach and hires individuals that have domain expertise and trains them from the ground up. According to Chief Learning Officer Don Keller: “We hire medical technologists for a variety of key positions (e.g., product specialist, business analyst, and technical support specialist) and rely on the subject matter expertise of these professionals. We transition their skills sets from medical technology to information technology.”

For the technical support team, SCC created levels for the technical competencies associated with various jobs in that department. “We labeled the competencies as basic, intermediate, advanced, and expert, and then we mapped these to the jobs,” Keller explains. “Managers review the competencies with their direct reports and set a development plan for any technical deficiencies. We take an additional step and link the competency model to the career path, so employees know where they need to be technically in order to be in line for a promotion.”

Two is better than one: Partner IT and human resources to close the skills gap

Technology needs must be clearly articulated with the human resource (HR) department so that they know what kinds of skills and positions need to be filled. Melanie Holmes, vice president from the ManpowerGroup, believes that one of the first investments a company should make is to align HR to the business strategy. “Based on the business strategy, HR must forecast the skills that will be necessary in the near term and long-term future,” she explains. “Then, an assessment of the current workforce should be done—including current skills, the age of the current workforce to predict retirements, etc. Finally, a gap analysis will determine what steps should be taken to ensure the workforce that is required for the future.” Holmes and others agree that HR departments should link with IT departments to answer the following questions:

- How many employees will we need?
- What skills are required?
- Where will we get them?
- Do they currently exist?
- Will we have to “make” them through our training investment?

28 Ibid.
29 Ibid.
Once you’ve answered these questions, HR is in a better position to get to work. When IT needs are defined, it’s imperative that HR and IT business functions follow up with the following actions:

1. **Advertise on your website.** Be sure IT openings are listed on your website. Anyone who visits your website is there because of interest in your company, so make sure the postings are up to date.

2. **Use networks for referrals.** Tell clients, business associates, friends and employees exactly what technology talent you need. Everyone has a network of acquaintances that could lead to the applicant you want. Make sure that any employee that provides a successful referral is rewarded, either financially or at performance review time.

3. **Get referrals from people you interview.** If you need to hire more than one new technology worker, let any good interviewees who express interest in working for you know, so they can recruit people they’d like to work with. If you can offer jobs to teammates who like each other and know they work together well based on their past experiences, they’ll have more incentive to join you and to stay.

4. **Don’t wait, make an offer quickly.** Make an offer as soon as you know which applicant you want. IT professionals are in demand and get lots of interview opportunities. If you pause, you could lose the opportunity.

5. **Stay in touch with tech workers that leave.** If valuable IT workers go elsewhere, don’t just find out why in the exit interview, but start re-recruiting them and stay in touch. Keep them on newsletter mailing lists and invite them to company social events. Workers who change employers often become disillusioned with their new jobs, and are happy to come back.

**What is next?**

Now that you have some ideas that can help attract and retain IT employees, it’s time to get to work. Whether you choose outsourcing, training, or creative methods to attract new hires, it’s important to get started. The IT skills gap is only expanding, and if you’re not proactive, you might lose the war for IT talent. Start building your arsenal today so that you aren’t on the battlefield when it counts.