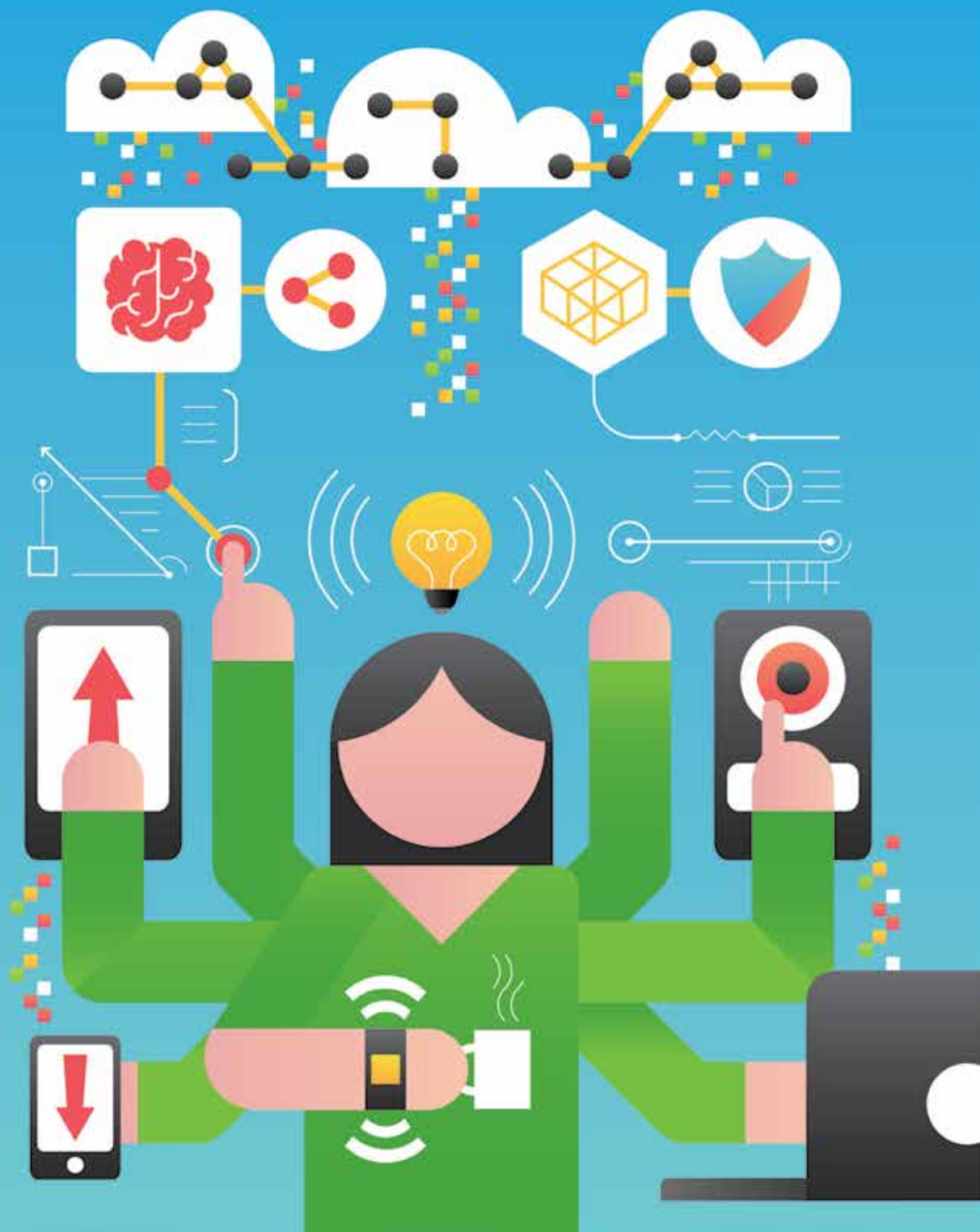# IT worker of the future

A new breed

IT worker of the future

A new breed

Scarcity of technical talent is a significant concern across many industries, with some organisations facing talent gaps along multiple fronts. The legacy-skilled workforce is retiring, and organisations are scrambling for needed skills in the latest emerging, disruptive technologies. To tackle these challenges, companies will likely need to cultivate a new species – the IT worker of the future – with habits, incentives and skills that are inherently different from those in play today.

BROAD demographic and generational stereotypes often move to front and centre when talk turns to employment trends and workforce motivation. Indeed, macro-level trends, including the ageing workforce, will likely have an impact on the IT workforce of the future. By 2025, for example, it is anticipated that 75 per cent of employees will fall under the "Millennial" banner – those born after 1983.[1] By 2020, retiring Baby Boomers are expected to leave 31 million positions open.[2] Gender inequality continues to plague the technology field – only 30 per cent of technology positions are currently filled by women.[3] Even though the number of STEM (science, technology, engineering and mathematics) graduates has increased by some 100,000 during the past decade, more than half of these graduates don't practice their STEM craft for a living. The trends have led the US Bureau of Labor Statistics to predict that one million US programming jobs will go unfilled by 2020.[4]

Although these patterns are important, they are only part of the story.

The new tech frontier

A handful of recent developments are having a dramatic impact on today's IT workers. The pace of technological change has been the subject of our annual *Technology Trends* report since its inception. With each new topic comes the need for education and new capabilities. The needs, however, are straining formal learning methods and the ability to maintain relevant curricula in such a dynamic landscape.

Moreover, traditional credentials may not apply in this new world. Certifications and years of experience are irrelevant in nascent technologies. Accomplishments and hands-on capabilities, which may or may not be developed through traditional employment or academic avenues, may well trump credentials. A demonstrated propensity for and ability to learn new skills may become as important as one's existing knowledge base. Most leading organisations will likely create a culture that supports and rewards continuous learning and helps direct IT employees toward emerging trends.

At the same time, exposure to and comfort with technology is reaching unprecedented levels, regardless of age, geography or education level.[5] The ubiquity of low- or no-cost technology coupled with a growing entrepreneurial spirit has given rise to the maker movement.[6] The movement encourages hands-on learning with not just software development, but the blending of coding with hardware and hard science. One byproduct of the movement is The Raspberry Pi, a credit card-sized, all-in-one computer that sells for $35 and teaches newcomers programming and product engineering, including the use of sensors, robotics and other hardware add-ons. The maker movement encourages tinkering, experimentation and prototyping, ideally in disciplines adjacent to workers' day-to-day responsibilities. Commercial successes from the movement include the Pebble Smartwatch, MakerBot's 3D printer, and Oculus Rift's VR headset.

But democratised innovation isn't just the domain of start-ups and incubators. It's also just as important to the war for talent as it is to the war for growth. Deloitte's annual Millennial Survey found that a company's reputation for fostering innovation is the single most important factor driving Millennials' employment decisions: It is a high priority for 78 per cent of all global respondents, and for more than 90 per cent of respondents in emerging markets such as China and India.[7]

Finally, the very nature of employment is changing. Despite a few high-profile bans on working from home by companies such as Yahoo,[8] companies are increasingly providing virtual work arrangements that stress flexibility over traditional incentives. And a recent survey found that 53 per cent of IT workers would take a 7.9 per cent pay cut in exchange for the ability to work remotely.[9] Technology such as virtual whiteboards, mobile robots and video capability built into messaging platforms connect team members who may be continents apart.

The adoption of crowdsourcing is rising for both those participating in crowd labour pools and enterprises looking to the crowd for dynamic, scalable resources. Jobs can be task-oriented, tapping local or global pools of vetted talent to handle simple, sometimes menial work. Or they can focus on highly specialised areas such as software engineering, data science, creative design or even management consulting.[10] A Bersin & Associates[11] study found that more than 32 per cent of positions were either part-time or contract-based. A growing number of these positions are being filled via crowdsourcing platforms such as GigWalk, Freelancer, oDesk, Kaggle, Tongal and others.[12]
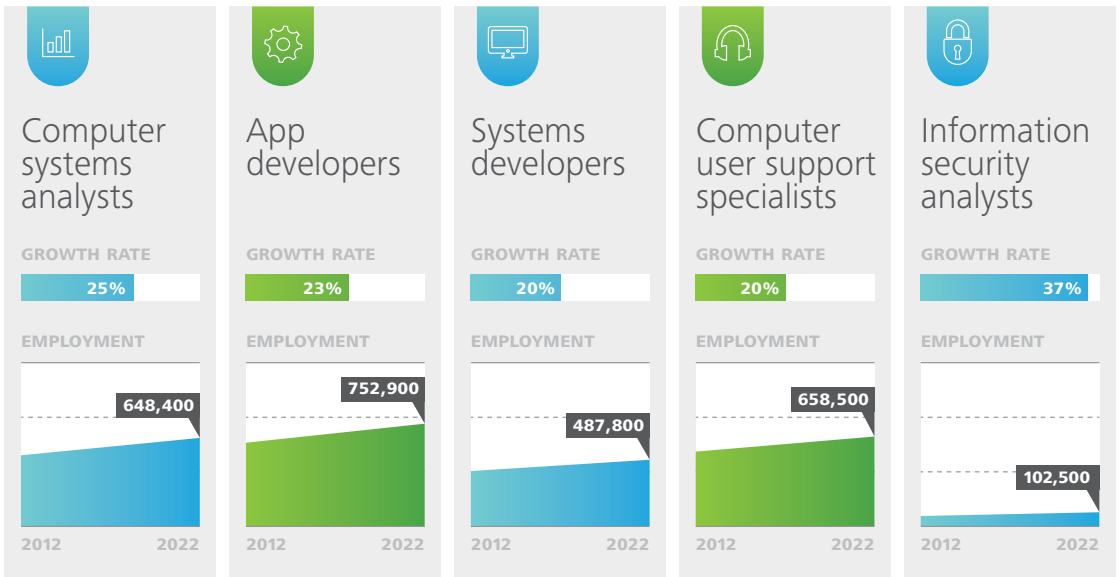
Design as a discipline

Design lies at the heart of the IT worker of the future. The emphasis on design may require new skill sets for the extended IT team – which may include graphic designers, user experience engineers, cultural anthropologists and behavioural psychologists. IT leaders should add an "A" for fine arts to the science, technology, engineering and maths charter – STEAM, not STEM. Designing engaging solutions requires creative talent; creativity is also critical in ideation – helping to create a vision of reimagined work, or to develop disruptive technologies deployed via storyboards, user journeys, wire frames or persona maps. Some organisations have gone so far as to hire science fiction writers to help imagine and explain moonshot thinking.[13]

Design can also underpin more agile, responsive techniques in IT management and delivery by instilling a culture focused on usability – not just concentrating on the look and feel of the user interface, but addressing the underlying architectural layers. Design can rally Dev and Ops around a shared vision of improved end-to-end design and end-user experience – responsiveness, reliability, scalability, security and maintainability in streamlined and automated build and run capabilities.

STEM occupations in high demand: 2012–2022 projected growth[a]

The increasing demand for science, technology engineering and maths (STEM) workers underlines their growing importance for the business – between 2009 and 2012, the ratio of general job seekers to online job postings was 3.8 to 1; for STEM workers, it was 1 to 1.9.[b] In addition, the Bureau of Labor Statistics projected STEM jobs would grow at a rate of 17 per cent between 2008–2018, with non-STEM jobs at 9.8 per cent.[c]

Computer systems analysts	App developers	Systems developers	Computer user support specialists	Information security analysts
GROWTH RATE	**GROWTH RATE**	**GROWTH RATE**	**GROWTH RATE**	**GROWTH RATE**
25%	23%	20%	20%	37%
EMPLOYMENT	**EMPLOYMENT**	**EMPLOYMENT**	**EMPLOYMENT**	**EMPLOYMENT**
648,400	752,900	487,800	658,500	102,500
2012 — 2022	2012 — 2022	2012 — 2022	2012 — 2022	2012 — 2022

STEAM: Adding arts skill sets to the IT team

The new IT worker is technical, functional, client-ready and creative, and may have non-traditional skills.

BEHAVIOURAL PSYCHOLOGIST   **GRAPHIC DESIGNER**   **USER EXPERIENCE ENGINEER**   **SCIENCE FICTION WRITER**   **ARTIST**   **CULTURAL ANTHROPOLOGIST**

Sources: [a] Dennis Vilorio, "STEM 101: Intro to tomorrow's jobs," *Occupational Outlook Quarterly*, spring 2014, http://www.bls.gov/careeroutlook/2014/spring/art01.pdf, accessed January 13, 2015. [b] Change the Equation, "What are your state's STEM vital signs?," July 2013, http://changetheequation.org/sites/default/files/About%20Vital%20Signs.pdf, accessed January 13, 2015. [c] United States Department of Commerce, "The state of our union's 21st century workforce," February 6, 2012, http://www.commerce.gov/blog/2012/02/06/state-our-union%E2%80%99s-21st-century-workforce, accessed January 13, 2015.

Bringing it home

Many IT organisations are improving their ability to sense and respond to emerging trends and modernise legacy systems and delivery models. Really understanding your workforce is important: Who do you have, what skills do they bring and are they sufficiently forward-thinking in their use of technology to lead your organisation in innovation? Consider the future IT worker's new skill sets and behaviours. A tactical example is the recent "bring your own device" trend. Seventy per cent of Millennials admit to bringing their own applications from outside their enterprise to support their work[14] – a trend that will likely only grow as more cloud, mobile and analytics offerings target the workplace. Organisations need to set policies that guide, govern and support workers' evolving adoption of external devices, applications, data and collaboration.

Cross-pollinating teams with both the young and old helps new hires gain practical experience with legacy systems and encourages established employees to broaden their skill sets into new areas. Isolated, commoditised skills will likely be outsourced or automated over time through machine learning, artificial intelligence and advanced robotics that replace blue-collar, white-collar and so-called "professional" jobs.[15] With this shift, coders, architects and engineers become even more important, and multiskilled, players with deep institutional knowledge will continue to be critical. Identify, nurture and seed the new breed, and introduce change team by team, project by project.

Spend your energy attracting, challenging and rewarding the right kind of talent instead of succumbing to legacy organisational constructs that are no longer relevant – unleash the IT worker of the future on your business.

My take

Mike Bracken, executive director, Government Digital Service

The Government Digital Service (GDS) is part of Cabinet Office, working at the heart of government to build digital public services that meet user needs, not government needs. As Executive Director of Digital, my job is to make sure GDS delivers a programme of work that will ultimately affect every citizen and every business in the UK, in one way or another.

This focus on user needs is well established in business, but for government it's a new concept. It requires civil servants to think again about digital service provision and digital service design – and at the same time, change well established institutional cultures and years of ingrained processes. It's not easy.

I say this often: digital change is about people. The civil service is changing, and its people are making that change happen.

For decades, government departments outsourced most of their technology. When the time came to procure something, they turned to one of a small handful of huge IT suppliers. A specification document was written, often inches thick. Then work would begin on writing code that met that spec – to the letter.

That approach is no longer sustainable. Technology moves too fast. By the time you've built the thing that meets the spec, the spec itself is out of date. We can't build public services that are locked down by paperwork. We need to be able to move faster, and we need to be more flexible.

So our new agile approach ditches the spec sheets and the big contracts. It removes some of the certainty but replaces it with flexibility. Our new service design process goes through agile development phases: discovery, alpha, beta and live. Frequent, constant user research is done to assess progress and refine the product. Third party services are bought cheaply, as-and-when they're needed, from a far broader range of suppliers than before.

This approach to service design requires a multidisciplinary team, working together in the same room: designers, developers, policy experts, user researchers, product managers, content designers, delivery managers, service designers. Give them time and space to think, collaborate and be creative.

The results speak for themselves: Register to Vote was built this way, and over 4 million people have used it since it went live in June 2014. Carer's Allowance was built this way, enabling the team to remove half of the questions from the application process – 176,000 claims have gone through it since October 2013. These are just two examples among many. Government is changing how it works and how it thinks. It's re-focusing on users and user needs.

We cannot meet those needs or build those services without the right people and skills in place, and that's why we're putting so much emphasis on hiring and training. Some skills have almost disappeared from the civil service, because they were outsourced away for so long. We're bringing them back in-house. Many people already have the skills they need, but simply need training and encouragement on using the agile approach to service design. That's why we wrote the Service Design Manual and put it online for anyone to read. That's why the Department of Work and Pensions has set up its Digital Academy, training civil servants in new digital skills.

Having those skills in-house makes all the difference. It gives us the flexibility we need to run agile projects. It gives us freedom to move faster, to experiment and re-shape as we go along. That's how we're making government services simpler, clearer and faster for everyone.

We have a saying in GDS: "The unit of delivery is the team." The sooner we get the team bit right, the sooner our users will benefit. They are, after all, why we're here in the first place.

Cyber implications

TECHNOLOGY has entered an era of usability, openness and convenience. End users expect solutions to be simple, intuitive and easy to use, not just for the IT worker of the future, but for the entire workplace of the future.

At the same time, the stakes around cyber security and data privacy continue to increase, making cyber risk management a strategic priority across industries. Yet traditional techniques like complex passwords, containers, key fob two-factor authentication and CAPTCHA verification can interrupt the end-user journey. Frustrated users may look for shortcuts or alternative means for carrying out their business. In doing so, they often bypass controls and introduce new vulnerabilities. Security protocols can only be effective if users follow them.

Therefore, it is critical to balance the need for security with a focus on user experience (UX) by creating a well-integrated, unobtrusive risk framework that is anchored around the end user's journey. Superior user experiences will have security attributes so tightly integrated that they are barely noticeable; they can quietly and unobtrusively guide users toward more vigilant and resilient behaviours. For example, technical advances in fingerprint authentication, facial recognition and voice detection embedded into commonly used consumer devices make it possible to protect without sacrificing user interface flows.

This marriage of UX and cyber risk management has a dark side. New threat vectors target weaknesses of specific personas within your employee base – spoofing alerts to update mobile apps with malicious proxies or corrupted links posing as social media interactions. The response cannot just be more usable, intuitive, risk-managed systems – education and awareness are critical. Arm your employees with not only the "what," but the "why" and the "so what." Beyond enforcing compliance, make cyber risk management a strategic organisational pillar and a shared cultural concern embedded across solution life cycles and operational processes. A broader enterprise governance structure can help, communicating the intent and importance of cyber security measures. Your employees should be taught how to identify and handle risk, not just how to comply with the minutiae of policies and controls.

The combination of cyber-aware user experiences and education programmes can elevate security and privacy beyond being reactive and defensive. And IT workers aren't just end users. They are also the creators and managers of the systems and platforms that drive the business. Cyber security and privacy should be tightly integrated into how software is delivered, how systems are maintained and how business processes are executed. As new IT organisational and delivery models emerge, build muscle memory around modern approaches to security and privacy. The IT workers of the future can become the new front and back line of defence – informed, equipped and empowered.

Where do you start?

CHANGE can be hard in any organisation. For IT, balancing the demands of tomorrow with the realities of today can be daunting, especially given the care and feeding needed for the existing IT footprint at the core of the business. Describing the IT worker of the future may not be easy, but driving the organisational change needed to realise that vision can seem impossible. Below are some ways to embark on the process.

- **Find your leaders.** Establishing a culture where the IT worker of the future can thrive starts at the top. What is the reputation of the IT department in the business and market at large? Are deep technologists celebrated or commoditised? Role models should be put into leadership positions throughout the organisational chart and measured partially by how they activate communities around them. Hewing to hierarchies and reporting channels is less important than fostering connectivity, education and growth anchored in the creative, design and technical skills central to your strategy.

- **Recruit differently.** Externships can put candidates quickly to work through "speed dating" versions of internships. They can also be used to vet the transfer of individuals within and across your organisation – a "try before you decide" method that allows both parties to understand aptitude, fit and interest. Similarly, some companies are hosting internal and external "hackathons," day- or weekend-long competitions where participants rapidly explore, prototype and demo ideas. Hackathons are no longer exclusively the domain of the tech-savvy startup or tech giant; state and municipal governments, as well as established companies such as 7-Eleven, Aetna, and Walgreens, are leveraging hackathons to unlock innovation.[16] Hiring decisions can be based on demonstrated results instead of on CV depth and the ability to navigate a round of interviews. Finally, consider training employees with no technical background – 38 per cent of recruiters are actively doing so to fill IT positions.[17] Graphic designers, artists, cultural anthropologists, behavioural psychologists and other backgrounds are fantastic building blocks for user experience, mobile, data science and other desperately needed skills. Adding "A" to the STEM priorities can be a key differentiator, especially as design rises as an important discipline needed in IT departments.[18]

- **Industrialise innovation.** Harness the energy of your people in previously untapped ways to give them an outlet and vehicle for exploring new and exciting skills. Not every organisation can afford to give employees open-ended time for continuous innovation, as do Google[19] and Netflix.[20] However, companies should have a mechanism for submitting, exploring and potentially developing new ideas. From ongoing idea competitions to marketplaces that match interest and need around new technical skills, enterprises should encourage people to grow and find ways to put their passion to work.

- **Embrace virtual.** Create a culture and provide tools that allow and support remote workers. Given the global nature of many teams, productivity, collaboration and communication tools are essential. Companies should provide them to full- and part-time employees as well as selected third parties for specific durations. To retain institutional experience, organisations should consider contract arrangements for ageing employees that offer part-time packages at lower compensation and benefits.

- **Outside in.** To achieve positive results, organisations will likely need to participate in external talent ecosystems. Define a crowdsourcing strategy that guides the usage of crowd platforms to solve your organisation's problems, and give employees permission to participate in crowd contests, on the job or off the clock. Incubators and start-up collaboration spaces are looking for corporate sponsors; they provide a chance to co-locate workers with inventors and entrepreneurs exploring new ground. Institutions such as Singularity University and the MIT Media Lab offer education programmes and opportunities to collaborate with leading researchers in areas like advanced manufacturing, artificial intelligence, medicine, social computing and big data. Deliberately seek out briefings and ideation sessions with your vendor and partner community to harness software, hardware, system integrator and business partner thinking and research.

- **Light your talent beacon.** Your own people are critical to attracting the IT workers of the future. Seventy per cent of Millennials learn about job opportunities from friends; 89 per cent of software engineers are staying put, having applied for fewer than two jobs in the past five years.[21] Leading organisations need to be a net importer of talent, and the front lines start with their people. Communicate your vision for the organisation, commit to the talent strategy and invest in incentives to drive retention and referrals.

- **Transform HR.** Not an insignificant task. Not every employee is being hired to retire, and the future worker of IT (and workers in other departments) will likely need a different set of services, support and development than they receive today. HR can become a competitive weapon in the war for talent by shortening the time needed to develop the IT worker of the future.[22] HR may need to be overhauled along with your IT organisation by shifting its focus from people and policy administration to talent attraction and development. HR transformation initiatives should consider the IT worker of the future – not just the existing employee base.

Bottom line

THE IT worker can be the bedrock of an organisation's ability to compete in this era of exponential technologies. But beyond rhetorical remarks about talent scarcity, few organisations are investing in attracting, retaining and developing their organisational capabilities. And while companies will secure commoditised skills through the most efficient means, innovation and growth will depend on workers with the skills and the vision needed to reimagine the art of the possible within the bounds of existing constraints such as the realities of existing systems and data and a limited understanding of emerging, cross-discipline technologies. While future technologies may not exist today, the need is clear, the potential is immense and the time is now to start retooling your people to be the IT workers of the future.

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Notes