

THE COST OF CLOUD EXPERTISE REPORT

2017



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THE COST OF CLOUD EXPERTISE

EXECUTIVE SUMMARY

The Cost of Cloud Expertise report was developed by Rackspace to explore the importance of expertise to an organization's cloud evolution and the impact the current technical skills gap is having on businesses. In collaboration with LSE academics and Vanson Bourne, we surveyed more than 950 IT decision makers and 950 IT pros from across the globe to better understand the barriers to increasing cloud usage, the impact this has on innovation and business growth, and the skills organizations require to compete in our technologically driven world.

Rackspace's Cost of Cloud Expertise study yielded the following findings:

ORGANIZATIONS ARE LOSING REVENUE DUE TO A CLOUD EXPERTISE DEFICIENCY

Nearly three quarters of IT decision makers (71%) believe their organizations have **lost revenue due to a lack of cloud expertise**. On average, this accounts for 5% of total global revenue, or **\$258,188,279*** per organization .

IT DECISION MAKERS ARE STRUGGLING TO KEEP PACE WITH THE CLOUD

Four in 10 IT decision makers (40%) are concerned that they **cannot keep pace with cloud technology's evolution and demands**, and 38% struggle to keep up with the expertise required to maximize the return on investment in the cloud.

SHORTAGE OF CLOUD EXPERTISE IS HOLDING BUSINESSES BACK

Nearly two thirds of IT pros (65%) believe that they could bring greater innovation to their organization with the right expertise. Similarly, two in five IT decision makers (42%) believe there is a lag in their organization's ability to deploy cloud platforms due to a lack of skills.

THERE'S SIGNIFICANT COMPETITION FOR THE BEST CLOUD TALENT

On average, it takes five weeks to fill an open role on an IT team – over 50% more than the overall average of 23 days¹.

IT PROS STUCK OPERATING, NOT INNOVATING

Nearly half of IT pros (44%) spend more time managing their organization's cloud services than they initially expected.

MOST IT DECISION MAKERS SAY RETURN ON INVESTMENT (ROI) HAS INCREASED WITH MANAGED SERVICES

More than half of IT decision makers (53%) say the ROI generated from cloud services has increased since adopting a managed cloud provider. More than half (55%) also believe that using a third-party managed cloud provider frees IT staff to focus on innovation.

* Calculation: (Average global revenue of respondent organizations ÷ 100) X Average percentage of global annual revenue lost due to a lack of cloud expertise. Calculation in numbers: (5,254,875,750 ÷ 100) x 4.91330891330891 = \$258,188,279

FOREWORD

BY JOHN ENGATES, CTO, RACKSPACE

Cloud computing was supposed to be simple. It was heralded as a so-called “game-changing” technology that would allow businesses to both scale quickly and operate their IT environment with greater convenience and efficiency.

But as it has evolved, so has its complexity. Amazon Web Services alone is adding around 1,000 new features a year, including everything from significant features and services to smaller upgrades. Looking across Microsoft, Google, VMware, OpenStack and other cloud platforms, the rate of change is high and just keeping up can be a job in itself.

Cloud technology has changed the way organizations operate for the better, but there is still one key ingredient needed to truly leverage the benefits – human expertise.

And, with technology now at the heart of every company, the fight for cloud expertise now spans well beyond the traditional territories. This is reflected by the cost of skilled cloud experts, and the apparent skills shortages, particularly in areas such as cybersecurity and migration management. Gaps in cybersecurity talent are of particular concern, given the level of threats organizations are now exposed to.

This need for the right expertise is only heightened in a business world that is more competitive than ever before – particularly given the current wave of disruptive start-ups.

A boom in U.S. start-ups and non-tech businesses looking for more tech talent has meant demand is outstripping supply for tech talent. While in the U.K., TechUK has warned of a “triple hit” to the technology sector due to its slow pipeline, uncertainty around hiring EU talent post-Brexit, and new restrictions to hiring non-European Economic Area professionals².

Across Europe there is a lack of specialist IT pros to fill the growing number of vacancies in all sectors of the economy³. In the Asia Pacific region, while cloud computing usage is growing, there are fears of a skills shortage in the coming years⁴. Latin America is also suffering a skills gap for technology talent⁵.



Without access to a solid pool of relevant expertise, organizations’ ability to take full advantage of the benefits offered by the cloud will always be limited.

Today, business models and technological innovation are inextricably linked. The cloud means business transformation is now technological transformation, but businesses do not have the expertise to enable this change.

While such a complex issue has no panacea, working with LSE academics, we have created some guidance for businesses on how to ensure they’re not held back by an expertise shortage. We hope that these insights provide a framework for your organization to step up its use of the cloud, innovate more and keep your talent happy.

I.T. IS STUCK OPERATING, NOT INNOVATING

With businesses now using an average of eight different clouds⁶ – including both public cloud technologies like AWS and Azure, as well as private cloud technologies like VMware and OpenStack – it's clear they see its benefits and are open to trying different services to best meet their needs. As the number of clouds they're using grows, so do the benefits. However, with this comes increased complexity and challenge.

RETURN ON CLOUD INVESTMENT

The findings show that 48% of IT decision makers already report seeing a positive return on investment (ROI) from migrating part or all of their IT environment to the cloud, with 39% expecting to see positive returns in the future.

From an operational perspective, IT decision makers reported that the cloud helps them compete more effectively (72%), achieve scale more quickly (70%) and get products and services into market faster (69%).

"[CLOUD] ALLOWS US TO BRING ONBOARD APPLICATIONS THAT ARE MORE CURRENT OR STATE-OF-THE-ART, AS OPPOSED TO RUNNING OLDER APPLICATIONS THAT MAY BE APPROACHING END-OF-LIFE. IT OPENS UP A WHOLE NEW AVENUE FOR US TO BECOME MORE INNOVATIVE."

PUBLIC SECTOR :: CIO



THE COMPLEXITY OF A MULTI-CLOUD WORLD

While the benefits of cloud migration remain clear for enterprises, achieving them is far from simple.

There could be a number of contributing factors that make enterprises unique when it comes to cloud applications, including:

- Stringent requirements and legal obligations placed on internal IT environments
- Legacy systems, and the physical and cultural challenges faced when transitioning to cloud-based services
- The consistency and coherence challenges they might face because of migration
- A variety of unique security and trust challenges

In addition, enterprises often end up wrangling multiple clouds – whether as part of a strategic multi-cloud strategy or as a result of Shadow IT – and must also deal with the increased complexity and administrative overhead of managing many different services.

As the Head of Cloud at a leading bank put it:

“[WE] HAVE USE CASES IN ALMOST EVERY PUBLIC CLOUD – NOT BECAUSE WE WANT TO... WE HAVE CONSORTIUMS OF BANKS THAT ARE BUILDING REGULATORY SOLUTIONS IN GOOGLE CLOUD; THERE’S CRM SYSTEMS THAT ARE IN AZURE; WE HAVE THINGS THAT ARE RUNNING AWS BECAUSE THAT’S THE ONLY PLACE THEY ARE SUPPORTED. IT’S IMPOSSIBLE TO SAY YOU’RE GOING TO HAVE A SINGLE CLOUD STRATEGY EVEN IF YOU WANTED TO BECAUSE THOSE SERVICES YOU WANT TO BUY ARE OFTEN TIED TO ONE OF THOSE PROVIDERS.”

HEAD OF CLOUD AT LEADING BANK



Many enterprises commented on the amount of time it takes to manage the cloud, with almost half (44%) of IT pros saying they’re spending more time than they initially expected managing daily IT cloud operations. In fact, a recent article⁷ argues that IT departments that adopt cloud computing and transform to manage external providers more effectively will thrive and grow. Those that do not manage this challenge will be in a difficult position.

The most intense users of cloud technology are also more likely to feel they are spending more time managing their organization’s cloud services – this being true in the case of both IT pros and IT decision makers. Half (50%) of executives in intense cloud usage organizations⁸ report that 15% or more time is spent managing cloud among their staff. Among less intense cloud usage firms, a quarter (25%) are spending 15% or more time managing the cloud.

THE TRUE COST OF CLOUD EXPERTISE

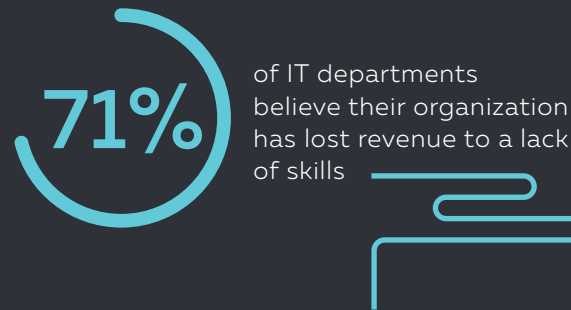
One of the biggest challenges enterprises have managing cloud platforms is a deficiency of internal cloud expertise.

The research highlights the major impact this has on enterprises, with almost three quarters (71%) of IT decision makers saying that their organization has lost revenue due to a lack of cloud expertise.

When extrapolated as a percentage of global annual revenue among large businesses this equates to 5% of total earnings. Given the size of the companies that took part in the quantitative research (enterprises with more than 1,000 employees), this represents a significant amount of money to the global economy – estimated to be around \$258,188,279* per organization surveyed, on average.

Aware of this significant financial impact, both IT decision makers and IT pros believe their organization would significantly improve if they could acquire the right balance of cloud skills. For instance, when asked if access to deeper expertise in cloud technology would help their organization increase its ROI on cloud services, the vast majority (84%) of the IT workforce said it would.

The lack of cloud skills is a serious business problem



On average, this represents a loss of **5% global annual revenue**

This loss of revenue amounts to

\$258,188,279

per organization surveyed on average

Historically organizations have managed their own IT on-premises or at collocation data centers; but the shift to cloud computing has brought increasing complexity and challenges. With the constant evolution of new technologies, organizations can no longer afford to hold back their adoption and fall further behind the competition.

To keep up, IT departments are shifting to cloud-based solutions, but they're struggling to access the expertise they need to realize the full benefits of these new investments: namely, solution architects, engineers, developers and systems administrators with real-world experience working with the relevant cloud technologies. This struggle is costing businesses a large amount of money and – given the growing need to run more workloads in the cloud – this could be set to increase further.

For organizations, it's important to consider the wider impact of not having the right skills in place. Ensuring that the lights remain on, while innovation drives the business forward, is a critical part of the puzzle. Only then, will they reap the full benefit of cloud computing.

* Calculation: (Average global revenue of respondent organizations ÷ 100) X Average percentage of global annual revenue lost due to a lack of cloud expertise. Calculation in numbers: (5,254,875,750 ÷ 100) x 4.91330891330891 = \$258,188,279

KEEPING PACE WITH THE SPEED OF CLOUD CHANGE

Today, managing any large IT environment means balancing constant change and evolution – a challenge that’s top-of-mind for both IT decision makers and IT pros.

Two in five (40%) IT decision makers indicated they were concerned about their organization’s ability to keep pace with the cloud’s evolution and demands. Nearly half (46%) also stated that – for an organization of their size – keeping pace with cloud technology was proving to be tricky. In addition, just over two in five (42%) IT leaders think that there is a lag in their organization’s ability to implement new cloud services and features as they’re released due to a lack of available skills.

Interestingly, among IT pros in high cloud usage organizations, almost two thirds (64%) agree that they are struggling to keep up with the expectations of cloud technology. This suggests that the more enterprises use cloud technology – and expose themselves to the powerful yet vast, diverse and highly complex ecosystem of tools and services at their disposal – the harder they find it to keep pace with its demands.

Companies report making strategic long-term decisions on their chosen technology platform as a result of the demands for talent:

“THE NEWER, EDUCATED, HOTTER DEVELOPERS, THE TALENT WE WANT, THEY HAVE EXPERIENCE WITH AWS. SO, IN ORDER TO RETAIN SOME OF THE TALENT, WE FEEL THAT IT WOULD BE BETTER TO MOVE OUT TO AWS, BECAUSE THERE IS MORE EXPERIENCE IN THE WORKFORCE ON THOSE PLATFORMS.”

IT DECISION MAKER, INSURANCE COMPANY



LACK OF CLOUD EXPERTISE: SHORT-TERM PHENOMENON OR A LONG-TERM BATTLE?

One might assume that the lack of expertise is a short-term phenomenon during the period of transition to cloud computing – that over time the evolution of cloud services will stabilize and the new skills needed will reduce. Our findings support this, with both IT pros (68%) and IT decision makers (77%) saying that over the next five years, they feel confident or very confident they'll have the right expertise in place to manage increases in cloud usage.

However, taking a general view, the cloud skills challenge relates to a broader skills crisis affecting the global workforce. Whereas complex digital technologies in the past have mainly helped optimize existing organizational processes, they are now closely interwoven into the organizational fabric.

For example, in a separate survey of 5,600 global executives, 60% reported that they struggle to keep workforce skills relevant and up-to-date when faced with rapid technological change⁹.



AGILITY AND THE RED QUEEN PROBLEM

Without the agility to adapt to the rapidly shifting technology landscape, the cloud journey will quickly stagnate and eventually become obsolete. Even when platforms appear stable, they need to remain flexible enough to support unbounded growth in their wider ecosystem.

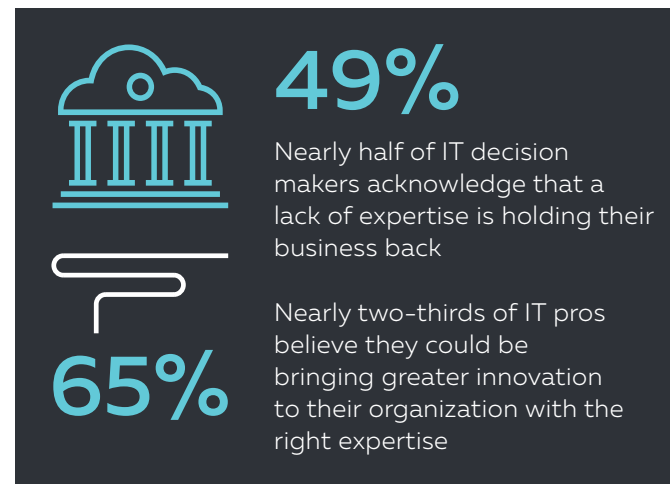
As an analogy, consider the so-called “Red Queen Problem,” inspired by the following line from the Lewis Carroll novel *Through the Looking-Glass*:

“NOW, HERE, YOU SEE, IT TAKES ALL THE RUNNING YOU CAN DO, TO KEEP IN THE SAME PLACE... TO GET SOMEWHERE, YOU MUST RUN AT LEAST TWICE AS FAST.”

Most famously applied within the field of evolutionary biology, The Red Queen Problem describes an existential mandate: adapt and survive, or stand still and perish. And what holds true in the natural world holds true in the business world: enterprises can’t afford to stand still when it comes to their cloud services – they have to work twice as hard at evolving their cloud infrastructure in order to remain competitive in a fast-moving sector. As a result, cloud demands not only specialist expertise, but also the ongoing development of such skills for enterprises to truly keep pace.

PERCEPTIONS OF AGILITY AROUND THE WORLD

IT decision makers in **Singapore (42%)** and the **U.K. (52%)** are the **least likely to describe their organization’s workforce as “agile”** when it comes to adapting to advances in cloud technology. IT decision makers from **Mexico (70%)** and **Germany (69%)** are the **most likely** to believe this is the case.



Albert Einstein once said, “The more I learn, the more I realize how much I don’t know.” Organizations are finding themselves in the same position when dealing with the cloud. As they dive deeper into their use of cloud to help innovate, they are struggling to keep pace with the constant technological changes and the expertise needed to succeed.

For many organizations, the cost of building training programs in-house, designed to advance the skills of staff on a continuing basis, can be too much. Combined with the fact that self-paced learning, with study guides and materials, can be slow and time-consuming, organizations risk being left behind whilst the competition picks up the pace.

In this fast-moving environment, organizations must be open to the potential of the cloud and be agile enough to deal with what is thrown at them.

RESPONDING TO THE CLOUD EXPERTISE SHORTAGE

Given the challenges facing enterprises – exemplified by “The Red Queen Problem” – it’s imperative they respond accordingly given the potential impact to growth and the competitive responsiveness of their company. If enterprises want to make their computing simpler and more efficient to support agility and innovation, then their recruitment strategy should reflect this.



CURRENT PERCEPTIONS OF CLOUD EXPERTISE

When it comes to the expertise enterprises currently have, IT pros and IT decision makers are generally in agreement that their organization lacks what it needs to make its cloud journey a success.

One Director of IT Asset Optimization described this particular challenge as:

“STAYING ON TOP OF SKILL SETS AND MAKING SURE YOU HAVE THE RIGHT TALENT TO EXECUTE ON, WHETHER THAT’S FULL-TIME EMPLOYEES, OR WHETHER THAT’S CONTRACT.”

Figure 1: Top areas IT pros and IT decision makers believe need vast improvement or a complete overhaul in their organizations

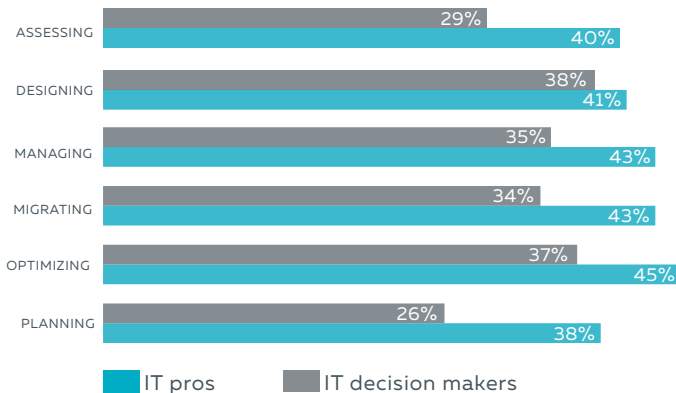


Figure 2: Cloud skills paid the most for

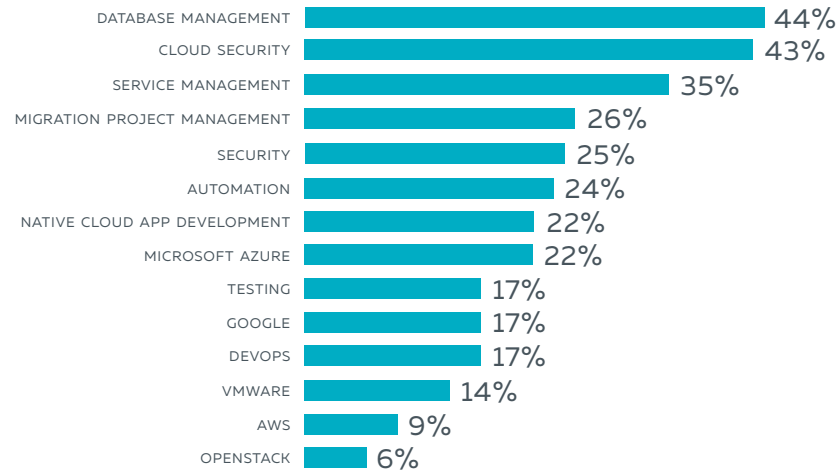
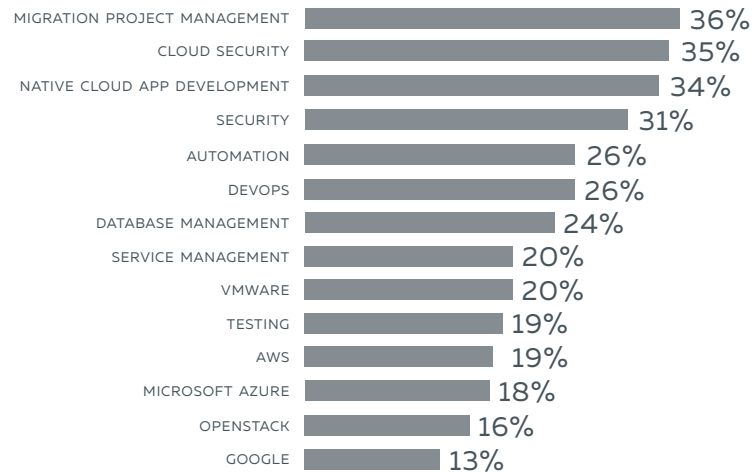
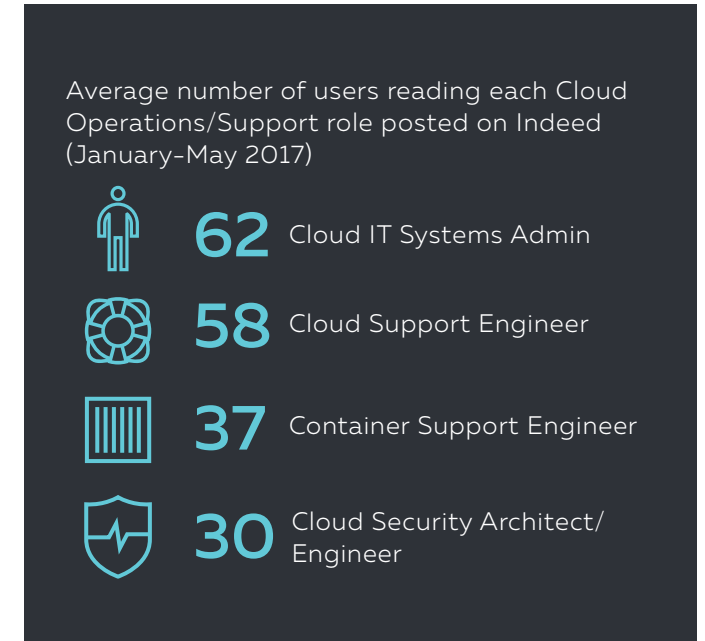
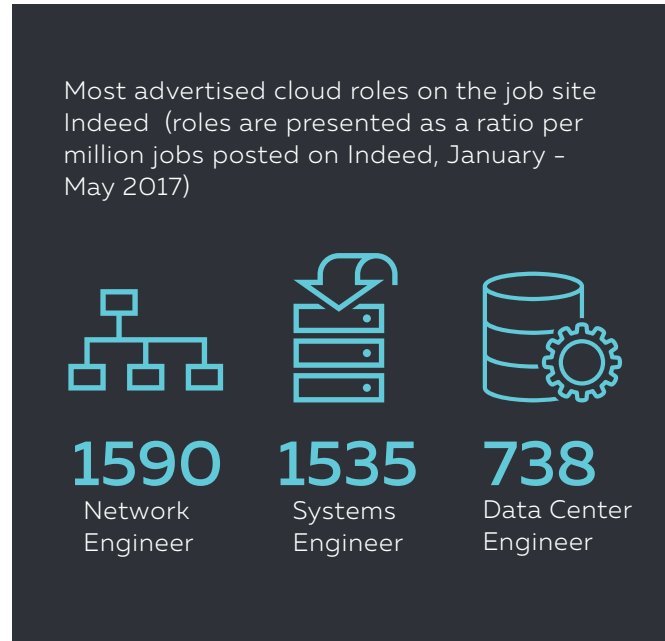


Figure 3: Hardest to find cloud skills



Data provided by Indeed, the global job site, showed the most advertised cloud roles and provided an indication of the type of roles most sought by IT pros. From a business perspective, Cloud Network Engineer roles were the most advertised globally, closely followed by Systems Engineer. However, among IT pros searching for jobs, cloud IT Systems Administrator roles received the highest number of views, followed by Cloud Support Engineers.

This further exemplifies why there may be a skills gap in enterprises. While businesses are looking for certain roles, there is a disconnect in the types of job that pros actually want to do.



RECRUITING TO UNLOCK THE CLOUD'S POTENTIAL

When it comes to ensuring they have the right talent in place, enterprises have two options available to them. First, they can improve their IT team's capabilities, either by hiring new talent or offering training to existing team members. Alternatively, they can adopt a partnership model, which could see them working with a managed cloud provider.

INSOURCING: HIRING AND TRAINING INTERNAL RESOURCES

Recruiting the right talent is never easy. And in the fast-moving IT sector, there are plenty of marquee firms that attract the best and the brightest. One interviewee made it clear that, despite being a global premium brand, they struggled to recruit IT talent:

"WE'RE RECRUITING BUT STRUGGLING TO ATTRACT TALENT BECAUSE PEOPLE DON'T SEE US AS A DIGITAL ORGANIZATION."

Another respondent at a media company stated that:

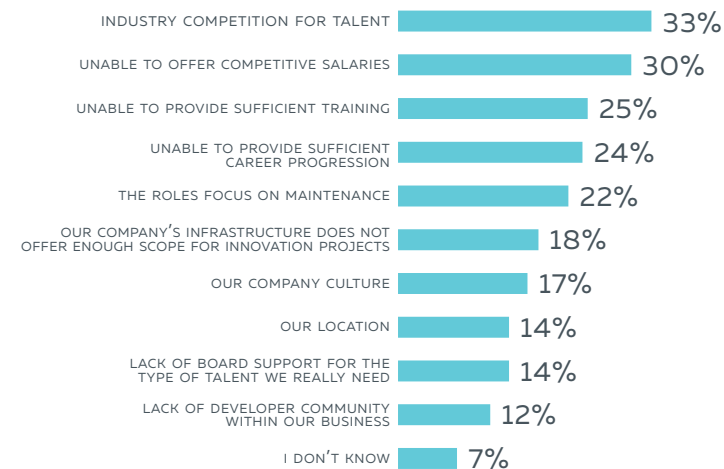
"RECRUITING FROM A COMPETITOR GETS VERY EXPENSIVE FOR PARTICULAR SKILLS."

Nearly half (46%) of IT decision makers state that they find it hard to attract the right talent to help manage their organization's clouds. A third (33%) of those who do not find it easy to hire the right talent to meet their organization's cloud needs stated that

their biggest recruitment challenge was competition for talent within the industry. Around the same amount (30%) said that being unable to offer a competitive salary to potential recruits posed significant barriers to recruiting the right expertise. Being unable to provide sufficient training to individuals (25%) or sufficient career progression (24%) were also seen to hinder recruitment.

The multiple recruitment issues reported confirm the general observations from both other surveys within the IT sector, and more generally, of a digital skills crisis. The research data suggests that the agility of enterprise recruitment processes may also hamper their ambitions to recruit the right talent. Yet an interviewee highlighted another challenge that "you have not got the expertise to know what [the cloud expert you are recruiting] is talking about," (Principle Engineer in a media company).

Figure 4: Top barriers to recruitment (IT decision makers)



Time is also an issue. On average, IT decision makers state that it takes at least five weeks on average to fill an open role – over 50% more than the overall average of 23 days found by Glassdoor¹⁰. This delay is compounded once individuals have been hired, with the majority (80%) stating that it takes a number of weeks or more to train individuals. In addition, nearly a third (32%) of IT decision makers stated that months of training and on-boarding were required for new recruits. With a high pace of change in cloud technology, businesses cannot afford to lose time in training new hires.

Our interviewees also highlight that, for those new to cloud, training is about building a shared capability for the business, not just one skilled person. The Head of Cloud from a Canadian bank stated:

“TRAINING HAS TO BE ABOUT CREATING A BUBBLE OF TRUE CAPABILITY AND THEN WORKING OUT HOW YOU EXTEND THAT BUBBLE RATHER THAN JUST ASSUMING PEOPLE CAN GO ON ALL KINDS OF TRAINING COURSES.”

One of the significant challenges for enterprises is having a critical mass of skills so they can collectively learn from each other¹¹. As an interviewee described it:

“‘COFFEE OPS’ AND ‘BEEROPS’ AMONG A TEAM ARE VITAL TO THE SUCCESS OF ‘DEVOPS.’”

IT managers report that it takes weeks (41%) and months (32%) to develop the necessary cloud skills. The most mature cloud companies also indicate that

it can take years – 12% of mature cloud companies against 3% and 7% of medium and low cloud usage companies respectively. This could indicate a dual need for mature cloud companies to rapidly learn and act, as well as engage in more long-term cloud activities.

Efficiency, particularly regarding onboarding and training, is also highlighted by the fact that enterprises are spending an average of \$57,578 on salary for new hires. Although new hires will no doubt be producing some useful work in this period, this does represent a significant cost to enterprises. Such cost also reflects inefficiencies in employee training:

“WE HAVE A LOT OF TRAINING PROGRAMS FOR IT STAFF – E.G., FOR BUSINESS ANALYSTS, IT PROGRAM MANAGERS. ON THE PROGRAM MANAGEMENT SIDE. FOR ARCHITECTS, THERE’S A VARIABLE LEVEL OF TRAINING. IT’S NOT COHERENT ACROSS THE WHOLE ORGANIZATION. SOME AREAS DO IT BETTER THAN OTHERS. THAT IS A PROBLEM.”

AEROSPACE INDUSTRY EXPERT

Unsurprisingly, the more intense a business’s usage of the cloud, the more it is likely to spend on staff as a proportion of its budget compared to less intense cloud users. This same logic can also be applied when it comes to staff training. Again, this demonstrates that even organizations using cloud on a more complex scale – those we would think are more adept at running cloud services internally – are still likely to feel the financial pain of staff costs as their ambitions grow.

Finally, staff recruitment can be constant, as cloud experts move rapidly between companies to improve their personal skills. As an interviewee explained:

“STAYING SOMEWHERE FOR FOUR YEARS IS A LIFETIME IN INTERNET TIME... THE AVERAGE CYCLE TIME FOR PEOPLE IS 18 MONTHS IN TECHNOLOGY... AFTER 18 MONTHS IT’S TIME TO DUST OFF THE CV.”

DEVOPS ENGINEER AT MEDIA BUSINESS



PARTNERSHIP APPROACH: WORKING WITH MANAGED CLOUD PROVIDERS

The second approach organizations can adopt is to find a third party to help manage their clouds – something that 83% of IT decision makers said their organization is currently doing to some extent.

Businesses see benefits from this approach. More than half (55%) of IT decision makers from organizations that work with a third party said the use of a managed cloud provider has freed up IT staff time and allowed them to concentrate on innovation. In addition, more than half (54%) again found it more cost-effective than trying to do it themselves. Similarly, around half (48%) said this enabled IT staff to increase benefits seen from the cloud.

As well as time savings, just over half (53%) of IT decision makers say that their organization has seen a positive return on investment since using a managed cloud provider, with an average increase of 9% per enterprise.

Echoing these benefits, more than half (54%) of IT pros have saved time in managing cloud services with a managed cloud provider. In addition, nearly a third (31%) said it allowed them to focus on innovation projects instead of managing day-to-day operations and two in five (40%) stated it helped in taking pressure off them.

Figure 5: What are the key reasons why your organization works with a third party to manage, maintain, and operate its cloud services?

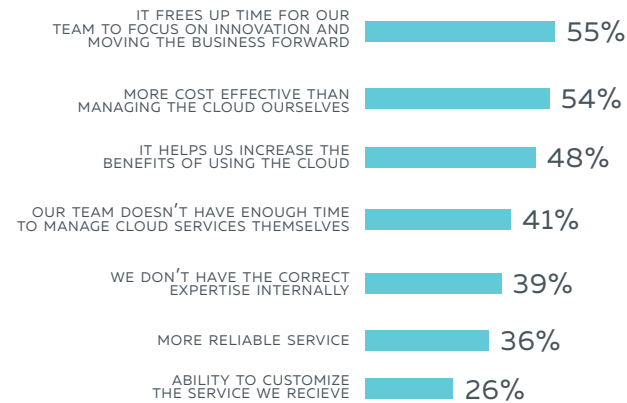
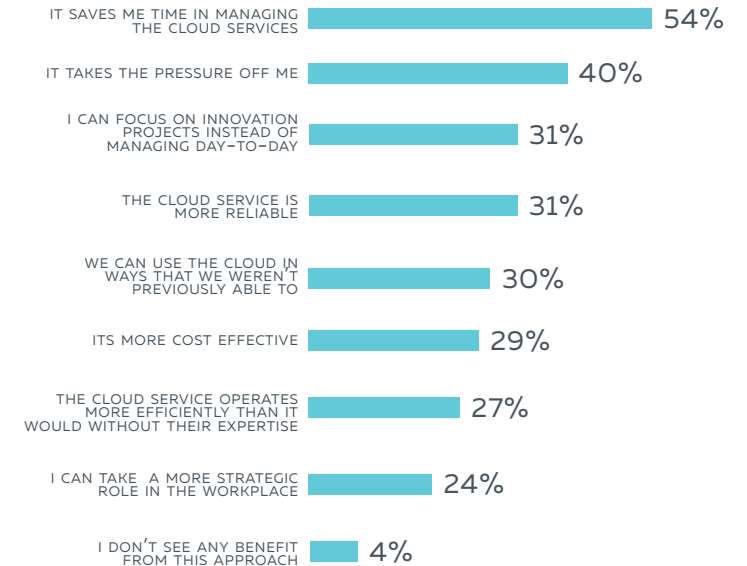


Figure 6: You have told us that your organization works with a third party to manage, maintain and operate its cloud services, what benefits do you see with this approach?



THE ADVANTAGES OF A PARTNERSHIP APPROACH

Managed cloud is a pool of expertise at scale. The managed cloud provider has many advantages and can enable organizations to pool expertise which can be applied as the need arises. As cloud usage grows, the managed cloud approach and the nature of the expertise available can provide dynamism to an organization's cloud journey.

The skills of a managed cloud provider are also likely to be better and recruitment cheaper (all things remaining equal). In workplaces, learning is undertaken as much through social interaction within communities of similar work, where employees can discuss challenges together and collectively learn and innovate. While enterprises may have specific experts, pooling this resource via a managed cloud provider allows them to learn from each other. Such pooled expertise can also help companies automate tasks – safe in the knowledge that they will continue to find work in other areas. As one user of a managed cloud service put it:

"WE DON'T NEED A LOT OF MANUAL INTERVENTION BETWEEN THE SYSTEMS TO KEEP THEM UP AND RUNNING. WE HAVE A HIGH DEGREE OF AUTOMATION ACROSS ALL PLATFORMS."

ASSISTANT VICE PRESIDENT OF IT AT MULTINATIONAL INSURANCE COMPANY

Finally, using a managed cloud provider can prove more agile:

"WE'RE LOOKING TO BE ABLE TO DELIVER PROJECTS FASTER AND SCOPE THEM SMALLER, ATTEMPTING TO FAIL FAST AND IMPLEMENT MORE FREQUENTLY. WE'RE ENGAGING WITH [OUTSIDE SPECIALIST COMPANIES] TO DEVELOP APPLICATIONS FOR US, AND DOING IT QUICKLY. THAT'S BECAUSE OF THE LACK OF AGILITY WITHIN OUR OVERARCHING IT ORGANIZATION. WE CAN GET RESULTS MUCH FASTER [THIS WAY]."

AEROSPACE INDUSTRY EXPERT



Every company is a technology company. And the battle to attract the best talent is time consuming, expensive and fierce. Yet, with each organization having different needs, even the cream of the crop requires specialist training to bring them up to speed with company goals.

Many organizations today are already benefiting by working with partners, who have the flexibility and scale to be able to learn and develop new skills while keeping the lights on. They can afford to foster a culture of learning to ensure they have the skills needed for any situation.

FORESEEING THE CLOUD SKILLS OF THE FUTURE

This report highlights the importance of cloud expertise and the role it plays in driving organizations forward. However, given the rapid shifts in the cloud environment and the technology sector as a whole, organizations need to look forward to ensure their skillset positions them for future success.



Responding to changes in scope and speed requires flexibility in both human and technical elements of an enterprise cloud infrastructure. Even as the continued growth of computing power promises important developments in automation, the role of human discretion to design, assess, contextualize, and control that automation is essential¹². The increasingly complex automation will signify more, not less, complex human-machine interactions. And while the integrated technology infrastructure offers a flexible foundation for service connectivity, it will be much more difficult to ensure matching flexibility of human expertise.

With only 37% of IT pros believing their current role will exist in five years' time, rapid change is expected, and organizations will need to work hard to keep up.

WHAT FUTURE CHALLENGES DOES CLOUD TECHNOLOGY POSE?

Given the future challenges of technological advancement and the human skills needed to harness it for business operations, retaining top talent over the next five years is a concern for more than half (56%) of IT decision makers, with nearly half (46%) also saying they're worried about the increasing complexity of the multi-cloud environment. Just under half (43%) say that having to invest more to develop their workforce's cloud capabilities is something that concerns them.

Given that the majority (69%) of IT decision makers are looking to increase their cloud usage over the next five years, organizations need to seriously consider how they can equip their workforce with the right expertise to avoid falling victim to The Red Queen problem further down the line. This is particularly important given that only 30% of IT decision makers believe they have the right skills in place to make this a success.

Staying ahead of the competition is also a major concern for IT decision makers: nearly half (45%) say they foresee challenges in being innovative over the next five years.



over the next

5 YEARS

retaining top talent is a concern for over half (56%) of IT decision makers, with nearly half (46%) also saying they're worried about the increasing complexity of the multi-cloud environment

EMERGING TECHNOLOGIES AND FUTURE EXPERTISE GAPS

Cloud technology will inevitably be shaped by new and emerging technologies. For instance, Artificial Intelligence (AI), automation and data science were pointed to by both groups of respondents when asked about the technologies that would have the biggest impact on their organizations.

However, when it comes to new developments, around half (53%) of IT decision makers said that having the right expertise in their team to keep pace with technology was a concern for them when looking to the next five years.

In addition, the data also shows that organizations could be facing skills gaps across a number of areas when it comes to emerging technologies. For example, 42% of IT decision makers said that their organization will need the expertise to roll out automation technology in the next five years, with database administration (31%) and AI (33%) also a concern.

Similarly, IT pros also predict a shortfall in skills when it comes to their organization's roll out of technologies such as automation (38%), AI (34%) and database administration (30%).

Top five technologies that will have a positive impact:

IT PROS

Cloud security/data protection – 75%
 Database administration – 65%
 AI/machine/deep learning – 62%
 Data science – 61%
 Automation – 59%

IT DECISION MAKERS

Automation – 75%
 Cloud security/data protection – 74%
 Database administration – 68%
 AI/machine/deep learning – 65%
 Data science – 62%

Top five technologies that expertise is required in:

IT PROS

Cloud security/data protection – 42%
 Automation – 38%
 AI/machine/deep learning – 34%
 Database administration – 30%
 Virtual reality – 26%

IT DECISION MAKERS

Cloud security/data protection – 48%
 Automation – 42%
 AI/machine/deep learning – 33%
 Database administration – 31%
 Virtual reality – 26%



SECURING THE FUTURE OF ORGANIZATIONS

Given the exponential pace of technological innovation, the research shows that many respondents are concerned about security – particularly when it comes to mitigating the rise in cyberthreats and data compromises.

For example, just under half (48%) of IT pros said that being able to keep their organization's data secure was a source of concern for them – similarly, well over half of IT decision makers (56%) had the same concern. An additional concern was ensuring that their department was fully compliant with a growing body of data protection and privacy regulations (50%).

The research also highlights that having the right security skills in place is something which neither IT decision makers or IT pros are confident about when it comes to the next five years. In fact, security is the biggest concern of both groups: 48% of IT decision makers and 42% of IT pros say that cloud security and data protection skills are areas of expertise that their organization needs to plan for and improve to meet future requirements.



48%

of IT pros said that being able to keep their organization's data secure was a source of concern for them

56% Similarly, well over half of IT decision makers had the same concern

NEED FOR NEW STRATEGIES

It is clear from the research that, when looking to the future, both IT decision makers and IT pros have concerns around changes in their sector and the appropriate skills to navigate them. Whether it's continuing to leverage innovation or ensuring the security of organizational data, they need to meet the dual challenge of having the right skills in place for operations now and in the future.



To respond to this expertise crisis, enterprise leaders may need some new strategies. Enterprises may look to globalization - harnessing skills from previously untapped locations - though this will involve the challenges of managing people from a distance. They might invest in buying innovative start-ups to overcome the inertia of their large enterprises¹⁴. They could also fragment their enterprise if parts are operating at different rates of flow¹⁵ or fragment their enterprise cloud infrastructure - outsourcing parts (either technical or human) to others - for example a managed cloud provider such as Rackspace. Our study suggests this final strategy has merit with over half (55%) of IT decision makers who used a managed cloud provider. Outsourcing freed up staff time and allowed the IT team to concentrate on bringing innovation to the business.

The most mature cloud firms are investing significant effort in building and maintaining a cloud infrastructure. Exactly because of the high hopes for increased automation, future enterprises must also be strategic in their focus on the human component of their enterprise cloud infrastructure - and strategic in how they maintain the flow of talent and expertise to match the flow of innovation in that infrastructure. Digital enterprise infrastructures supporting flexible reconfiguration of services depending on business needs will also be caught in the ambidextrous challenge of exploiting existing markets, while exploring new ones¹⁶. This challenge both relies on a high degree of automation, and on the ability to critically question the foundation for such automation when new markets begin.



of IT decision makers who used a managed cloud provider have freed up IT staff time and allowed them to concentrate on bringing innovation to the business

TACKLING THE CLOUD EXPERTISE CHALLENGE

Our report details the significant expertise challenges faced by businesses as they wrestle with the increasing scale, scope and speed of their IT demands in the face of a global IT skills crisis.

While IT leaders understand the potential benefits of cloud computing they must grapple with the inertia created by lack of expertise and the cloud complexity – inertia which this report shows can account for 5% of total global revenue – and at a time when competitive pressures demand constant innovation and change.

To support businesses through these challenges, LSE has prepared three core focus areas to overcome the cloud expertise challenge:



SPLIT THE IT FUNCTION INTO SEPARATE STREAMS

Innovating in today's cloud landscape involves a plethora of different, constantly evolving, external cloud services. Simultaneously, businesses are also under pressure to constantly evolve their own value proposition through digital technologies. Asking a single IT department to achieve this seems a recipe for problems, particularly in the context of the skills crisis. In response, we believe that companies should conceptually separate their IT function into two parts.

The first is a business-focused digital innovation function (DIF) whose role is to innovate the value proposition by supporting organizational exploration for new revenue streams. This is aimed at retaining detailed skills of the business and seeking to harness technology in support.

The second is an operations focused cloud management function (CMF) whose role is to ensure innovation in the operations of the services which support the DIF – the further exploitation of existing markets. Skills in the CMF are more generic – commodity cloud skills with a technology focus – and so it may be more strategically beneficial for many companies to partner with a managed cloud provider to handle this CMF function. Either way, the focus must be on keeping up with cloud evolution and internal business demand in terms of scale of demand, scope of demand and speed of innovation. Obviously the DIF must retain skills in managing and directing the CMF's innovation.

Fundamentally, both these functions are focused on innovation – the CMF is not a “service center” or outsourced service function – it must retain a constant focus on harnessing cloud services in response to constant evolution in technology and skills. Both functions can also leverage the newest and most advanced technology innovations. For the CMF, this will, however, be conducted in a more stable, codified manner and be aimed at existing business problems and markets, where for example, advanced machine learning can be applied to support the significant optimization of tried and tested processes and problems¹⁷. Conversely, the DIF requires much more skilled connectivity directly between the exploration of the integration of complex business innovation requirements, and the provision of a flexible digital cloud-based infrastructure.



DEVELOP A CLOUD SKILLS STRATEGY

Strategic choice may take businesses in a variety of directions spanning from a very small cloud footprint for a few specialized use-scenarios, to the comprehensive use of cloud for all or most enterprise apps. Whatever strategic approach is adopted, this report provides detailed evidence of the challenges faced by IT leaders in relation to cloud skills. For this reason we recommend every enterprise IT executive to develop a Cloud Skills Strategy. Such a strategy should map current skills in the enterprise, map future innovation trajectories and changes (both enterprise and cloud), and match these mappings with realistic market analysis of the available talent pool. This strategy should not be focused on mapping today's cloud usage, but on the flow of future cloud and digital innovation.

CONDUCT A FULL ASSESSMENT OF THE CLOUD ECOSYSTEM

Digital technologies provide easy means by which to establish complex networks of service provision in ecosystems of collaborating partners. Business outsourcing has supported organizations in applying focused innovation to support their core business strategy, while ensuring that essential support functions are conducted at best-practice levels. Today it's common practice that enterprises adopt an ecosystem approach to the provision of basic cloud services (for example pooling risk by relying on multiple providers). We would argue that a Cloud Skills Strategy should similarly adopt an ecosystem approach. The dual challenge of both constantly improving and significantly innovating can be greatly improved by relying on a balanced pool of skills and competencies both within and beyond the organizational boundary.

Crucially, as IT innovation continues (for example in artificial intelligence or Internet of Things) enterprises will need to develop means by which they can harness new expertise, and cease to be held prisoner by a lack of it. Ultimately the overarching strategic aim must be to match flexibility of cloud computing in terms of scale, scope and speed with similar flexibility of cloud computing expertise.



SUMMARY

Based on the findings of this report, there is no doubt as to the importance that human expertise plays in the evolution of cloud technology. Without the right skills and know-how among an IT workforce, organizations will struggle to keep pace in a world that is rapidly changing.



This isn't a challenge that organizations will be facing at some point in the distant future; it's a very real barrier to their progress in the here and now. One that is already having tangible impacts, particularly on revenue and business evolution as this report has highlighted.

Unfortunately, the expertise challenge isn't an easy one to solve. With strong competition in the market for very specific cloud expertise – whether it's for the migration and management of the cloud, or cybersecurity – an organization has much to consider when it comes to getting the right talent in place in order to advance their cloud aspirations.

As we've seen, the expertise problem is compounded even further when we consider the almost conflicting priorities of keeping the operational lights on while also finding room to innovate – “The Red Queen Problem.” With a whole raft of new technologies coming online, including artificial intelligence and automation, those wanting to reap the biggest rewards that cloud technology has to offer need to make a concerted investment of time into developing a Cloud Skills Strategy.

A clearly defined Cloud Skills Strategy can guide the training of an internal department in various clouds skills and help foster the flexibility the organization needs from the cloud. It allows the organization to draw on a pool of expertise to quickly meet the challenges of scale, scope and speed.

As this report shows, cloud has to some extent become a victim of its own success. It has brought huge benefits to businesses across the globe. However, as it's become a ubiquitous part of IT infrastructure and expanded the possibilities of what businesses can actually do, it is also forcing IT departments to push up a gear to keep pace – many not being prepared for this shift. However, taking a more holistic and strategic approach to the development and recruitment of the talent that sits behind the technology will mean that more and more businesses can fulfill their true cloud potential.



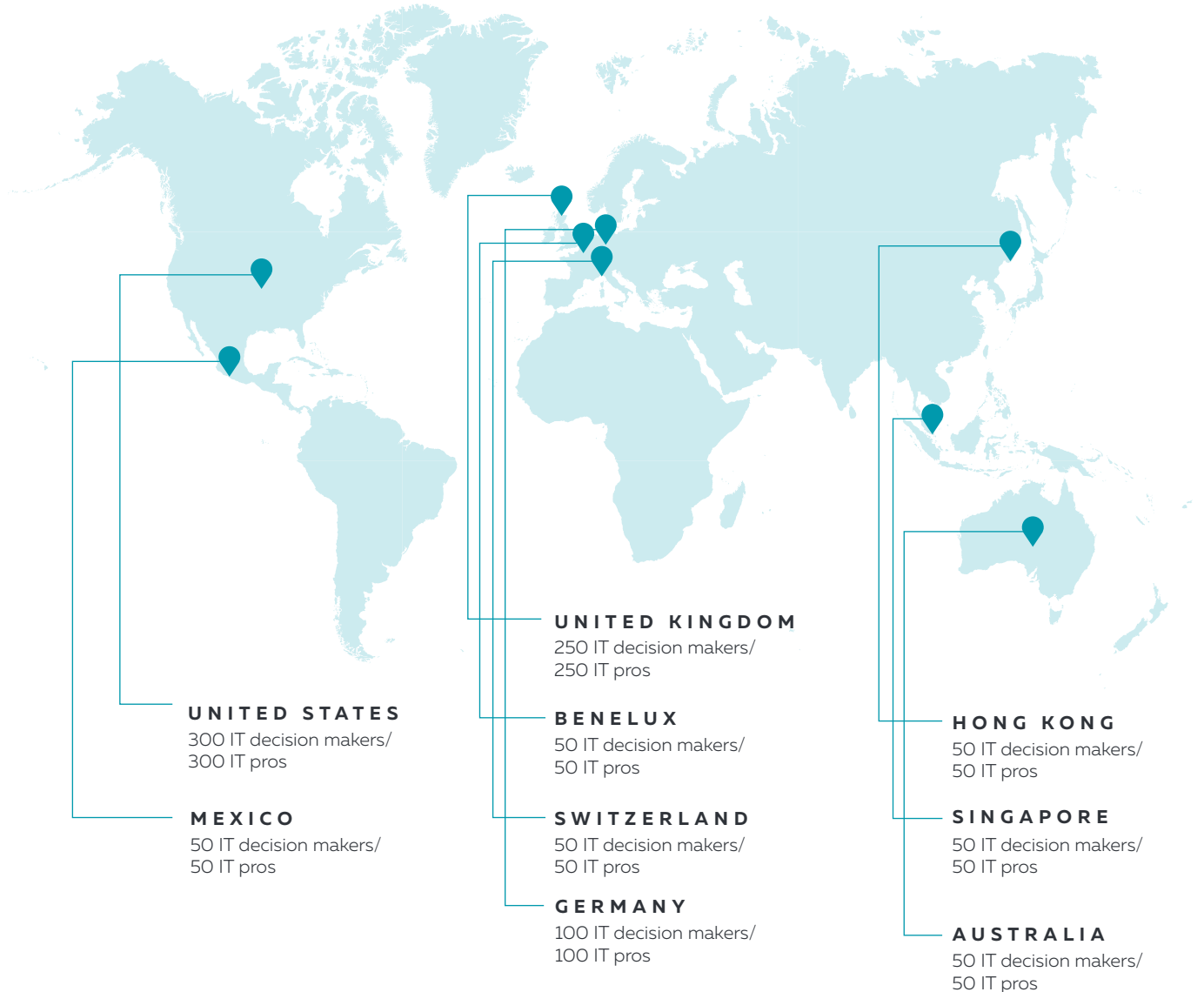
ABOUT THE RESEARCH

This research report was conducted by Rackspace in collaboration with LSE academics and with sponsorship from Intel.

With the support of the independent research house Vanson Bourne, we conducted a survey with 1,900 respondents from the UK, US, Germany, Benelux, Switzerland, Mexico, Singapore, Australia and Hong Kong between the months April-May 2017. The respondent pool comprised of 950 IT decision makers and 950 IT pros from organizations that used the cloud. All respondent organizations had more than 1,000 employees and came from both the public and private sector.

In addition to the survey, a team of LSE academics conducted extensive research into the current debate within academia, and the trade press, on cloud computing, process automation, and digital skills. They also, during June-July 2017, conducted a series of interviews with eight global enterprises within the target demographic for the project. A further 10 interviews were conducted by a consulting company. Enterprises were given the option of anonymity to allow more candid responses.

DEMOGRAPHIC BREAKDOWN



CLOUD DEFINITION

Cloud computing is a style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies.

ABOUT RACKSPACE:

As the leading managed cloud provider, Rackspace has the expertise that many businesses do not have access to internally. Our team of experts can handle the cloud on your behalf, across the world's leading clouds. We architect, migrate, secure and operate your cloud – and help you optimize for tangible business results.

We're also continually investing in our team of Rackers – experts in cloud – to ensure that every business can benefit from their knowledge and not be held back by a lack of cloud expertise. Businesses can hire the expertise of 3,000 specialists around the world, without needing a single extra seat in the office.

ABOUT INTEL:

Intel knows the Future of the Cloud because they are building it. The Intel® Xeon® Scalable platform offers the next generation foundation for cloud services that can support your data-intensive, latency sensitive workloads with hardware-enabled security. Intel Xeon Scalable processors offer businesses 1.65x higher system-level performance over prior generation, and for growing workloads like Artificial Intelligence, 2.2x performance over prior generation. From emerging new opportunities in AI and virtual reality to next-level media and transaction workload demands, running your cloud on Intel architecture provides the speed and responsive services you need on a trusted, agile platform.



RESOURCES

FOOTNOTES

- ¹ <https://www.glassdoor.com/research/studies/time-to-hire-study>
- ² <https://www.techuk.org/insights/news/item/10570-uk-faces-tech-talent-cliff-edge-without-urgent-government-action-warns-techuk>
- ³ <https://ec.europa.eu/digital-single-market/en/digital-skills-jobs-coalition>
- ⁴ <https://e27.co/growth-cloud-services-asia-pacific-looking-good-will-talent-gap-become-deal-breaker-20170426/>
- ⁵ http://www.cisco.com/assets/csr/pdf/IDC_Skills_Gap_-_LatAm.pdf
- ⁶ Rightscale State of the Cloud 2017. <http://www.rightscale.com/press-releases/rightscale-2017-state-of-the-cloud-report-uncovers-cloud-adoption-trends>
- ⁷ Vithayathil, J. (2017): Will cloud computing make the Information Technology (IT) department obsolete? Information Systems Journal. Early on-line article. <http://dx.doi.org/10.1111/isj.12151>
- ^{*} Calculation: (Average global revenue of respondent organisations ÷ 100) X Average percentage of global annual revenue lost due to a lack of cloud expertise Calculation in numbers: (5,254,875,750 ÷ 100) x 4.91330891330891 = \$258,188,279
- ⁸ We define categories of low, medium and high cloud maturity according to the number of different applications used in the cloud as follows: Low = 1-5; Medium = 6-10; and High = 11-17 different apps served
- ⁹ <https://www.economist.com/news/special-report/21714175-systems-continuous-reskilling-threaten-but-inequality-retraining-low-skilled> Zuboff, S. & J. Maxmin (2002): The Support Economy: Why Corporations are Failing Individuals and the Next Episode of Capitalism. London: Penguin. Schleicher, A. (2013): Skilled for life? Key findings from the survey of adult skills. Brussels, Belgium: OECD. World Economic Forum (2016): The Human Capital Report 2016. http://www3.weforum.org/docs/HCR2016_Main_Report.pdf
- ¹⁰ <https://www.glassdoor.com/research/studies/time-to-hire-study>
- ¹¹ Considerable research has shown the importance of collaboration in learning new skills. E.g. Wenger, E. (2000). Communities of Practice and Social Learning Systems. Organization, 7(2), 225-246. Orr, J. (1996). Talking about Machines: An Ethnography of a Modern Job. Ithaca, NY: IRL Press.
- ¹² Brynjolfsson, E. & A. McAfee (2017): Machine, Platform, Crowd: Harnessing Our Digital Future. WW Norton & Company. Carr, N. G. (2014): The Glass Cage: Automation and Us. W. W. Norton & Co. Bostrom, N. (2014): Superintelligence: Paths, Dangers. Oxford: OUP. Sørensen, C. & G. Pillans (2012): The Future of Work. The Corporate Research Forum. <http://www.crforum.co.uk>

- ¹³ OECD 2016 Ministerial meeting on the digital economy: "Stimulating Digital Innovation for Growth and Inclusiveness"
- ¹⁴ Just as large technology companies often buy start-ups for their talent rather than just their product.
- ¹⁵ So called ambidexterity or bi-modal strategies – though noting that these come with problems of oversight and management. See Birkinshaw, J., & Gibson, C. (2004). Building ambidexterity into an organization. MIT Sloan Management Review, 45, 47-55.
- ¹⁶ Holmberg, L. & L. Mathiassen (2001): Survival Patterns in Fast-Moving Software Organizations. IEEE Software, vol. 18, no. 6, pp. 51-55. Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: toward a next generation of insights. MIS Quarterly, 37(2), 471-482.
- ¹⁷ Google's application of DeepMind's AI techniques to optimise search is an example of this: <http://fortune.com/ai-artificial-intelligence-deep-machine-learning/>

GRAPHS

Figure 1: Analysis of IT pros who say that a vast improvement or complete overhaul is needed in terms of skills in the above areas, all IT pro respondents.

Figure 2: "Which cloud skills is/does your organization willing to/ currently pays most for?," asked to all IT decision maker respondents (950).

Figure 3: "Which of the following specific cloud skills areas does your organization find hardest to find new hires?," asked to all IT decision maker respondents (950).

Figure 4: "What do you think is holding your organization back in terms of hiring the right talent?," only asked to IT decision makers respondents who do not find it easy to hire the right talent to meet their organization's needs (629).

Figure 5: "What are the key reasons why your organization works with a third party to manage, maintain, and operate its cloud services?," only asked to IT decision makers respondents whose organization works with a third parties to manage, maintain and operate its cloud services (775), showing a combination of responses ranked first, second and third.

Figure 6: "You have told us that your organization works with a third party to manage, maintain and operate its cloud services, what benefits do you see with this approach?," only asked to IT pros respondents whose organization works with third parties to manage maintain and operate its cloud services (854).

Page 20 left: Analysis of IT pros and IT decision makers respondents who believe that the above technology innovations will have a positive impact on their role/organization over the next five years, all IT pros (950) and IT decision makers (950) respondents, only showing the top five most commonly chosen.

Page 20 right: Analysis of IT pros and IT decision makers respondents who believe that expertise is required or plan to improve in order to grow when it comes to the above technology innovations over the next five years, all IT pros (950) and IT decision makers (950) respondents, only showing the top five most commonly chosen.



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