



THE LONDON SCHOOL
OF ECONOMICS AND
POLITICAL SCIENCE ■

The Transformative Effect of Cloud on Firm Productivity and Performance

Defining the benefits and impact of cloud as a 21st Century digital enabler

Executive summary

Dr Alexander Grous • March 2019



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Executive Summary

Cloud can help deliver a 20% productivity enhancement in an integrated technology structure and when combined with best management practices. Cloud also facilitates accelerated time-to-market for products and releases, and is ushering a paradigm shift in how organisations implement technology: ‘heavy-lifting’ is increasingly being segmented to cloud providers, emancipating an enterprise to focus on developing differentiated offerings. As a result, technology is no longer a critical path item. Many digitally native start-ups are ‘all-in’ for cloud, enabled to enter the market due to the adoption of this technology.

One of the most frequently cited transformative attributes of cloud by firm managers is the adoption of a ‘leaner’ technical organisation, and the alignment of organisational structure and practices around this. The observed benefits include lower costs; an agile delivery model with faster releases, resulting in a higher return on equity (ROI). This research ‘peels the organisational layers’ through primary engagement in organisations with CxO level managers and other individuals across Operations, Technology, Resourcing, Finance, DevOps and other areas internationally, including drawing on over 20,000 interviews in 35 countries across firm size and industries since 2007, and enterprises encompassing around 1 million employees.

As cloud continues to evolve, so too will the organisations adopting it. Best-performing enterprises are increasingly positioning cloud at the core of their strategy. For many, ‘cloud is the strategy’. A best-practices cloud-centric approach includes alignment between functions and the creation of a centre-of-excellence. When these elements are brought together, they can result in competitive advantage to the enterprise. Many of the most successful firms ‘hard-wire’ a cloud ethos in their culture, supported by best management practices to create sustainable benefits that utilise the transformative and productivity-enabling benefits this technology.

This research indicates that cloud continues to reduce technology and organisational costs while boosting development productivity by a factor of five in many cases and enhancing ROI. The observed benefits are agnostic of firm-type, location, size or sector. The research continues to indicate that these results are possible when cloud and technology adoption is underpinned by ‘good management’.

Academic Lead



Dr Alexander Grous

Lecturer & Researcher - Department of Media and Communications, LSE

Dr Grous has been at the LSE since 2007 and is attached to the *Department of Media and Communications*, where he teaches at postgraduate level including on the MSc in Digital Media and Communications and other LSE Management and Executive Programmes in the UK, EU and other countries. The Department is ranked #1 in the UK and #4 globally in the 2019 QS World University Rankings, reflecting its teaching and research strength.

Dr Grous teaches in digital, management practices, technology and innovation, socioeconomic analysis and other areas. He undertakes research that has an applied focus, blending close industry engagement with complex quantitative modelling and qualitative analysis to produce reports and research in topical and emerging areas. Dr Grous' work has been utilised by Government and enterprises, with a particular interest in the socioeconomic modelling of technology use, and has received industry recognition including assisting global agency Ogilvy to win the best B2B campaign award at the International Content Marketing Awards in 2018 through multi-platform campaign designed around the global research study '[Sky High Economics](#)'.

Dr Grous has been researching cloud and disruptive and emerging technologies since 2007 alongside management practices and the impact on firm performance that best practice technology management can deliver. This includes participation in one of the first efforts to construct a dynamic model on the [impact of cloud computing in industrial and service sectors](#) in 2012, and ongoing research in cloud and technology across organisation types, size and sectors internationally, quantifying the impact on firm performance across the firm's areas. The enclosed research draws on considerable close engagement with firms and ongoing research internationally.

Dr Grous brings extensive international experience to the LSE including as Managing Director for Lockheed Martin's Infocom Division in EMEA, CEE/CIS and from CEO and COO roles in US\$250-500m technology companies engaged in digital, e-commerce, P2P and B2B activities. He has also worked in FMCG companies such as PepsiCo in strategic and marketing roles.

1. Cloud Drives Greater Productivity, Innovation and Product Differentiation.

“An entire digital environment can be set up in 10 minutes. Before, such tasks would take weeks or even months.”¹

- R. Heely, Head of Technology, Macquarie’s Banking and Financial Services Group

Organisations innovating in the cloud are more productive, more inventive and focus on their business differentiators.² Ninety per cent of micro to small-to-medium companies would not consider market entry if a traditional model of IT was utilised due to a number of prohibitive factors: technical and infrastructure costs; skills required to manage technology; additional resources; scaling complexity and costs.³ Managers in global brands including *Netflix, Airbnb, Fortnite, JustEat and Deliveroo*, cite multiple benefits in the continued adoption of cloud: cost-savings;⁴ agility and scalability;⁵ automation to enhance productivity in development and customer care, and rapid decision making in Technology and Product Development through reduced organisational levels and lower complexity.⁶ An acceleration of time-to-market through cloud is also observed in multinational enterprises adopting the technology: *“[Cloud resulted in] a reduction in time to launch a project by about 75 percent. What used to take four days now only takes one day,”⁷* (N. Morgan, Enterprise Architect, Digital Marketing, Unilever). In addition, cloud is being increasingly utilised for innovation and experimentation to enable the rapid development of business differentiators: *“We improved time to launch for a digital marketing campaign from two weeks to an average of two days. That’s more than seven times faster than our traditional environment. If a brand manager has an idea, he or she can implement it before the competition.”⁸* (P. Clarke, CTO, Ocado). These cloud benefits are observed across sectors:

Netflix: *“The other thing is that the cost model is really nice for us. You pay for what you use. That allows us to do a lot of experimentations...I can now spin up an entirely new set of machines in the tens, or hundreds or thousands in an afternoon and chunk through my data and see if we’ve done better, and I only pay for the portions I use. It allows us an amazing amount of freedom in experimentation.”⁹*

- D. Hahn, Netflix Senior Engineer

Ocado: *“We wanted greater agility for our engineers; to be able to experiment faster, to be able to deploy into production faster...our engineers wanted to be able to run experiments before we even knew if we wanted the infrastructure to stand it up long term. Our engineers can go from conceiving an idea to having it deployed in production in under an hour.”¹⁰*

- P. Clarke, CTO, Ocado

Capital One: *“The ability to provision on the fly is critical to our productivity and speed to market,”¹¹*

- R. Alexander, CIO, Capital One

¹ <https://www.redhat.com/cms/managed-files/rh-macquarie-banking-digital-cloud-application-development-openshift-container-platform-case-study-f6460kc-v2-201704-en.pdf>

² LSE interviews including in-situ Google Campus London attendance and interviews with founder and VCs engaged with start-up funding; additional interviews with KPMG, AWS, Sapient, Technology leads.

³ Ibid.

⁴ <https://aws.amazon.com/solutions/case-studies/airbnb/>

⁵ <https://diginomica.com/2015/05/29/the-cloud-takes-away-the-infrastructure-strain-at-just-eat/>

⁶ LSE interviews with SMEs for Management Matters, 20,000 firms; ICT interviews with SMEs 2016-2017.

⁷ N. Morgan, Enterprise Architect, Digital Marketing. <https://aws.amazon.com/solutions/case-studies/unilever/>

⁸ S. Yalamanchili, Unilever, op cit, and <https://www.unilever.co.uk/about/who-we-are/introduction-to-unilever/>

⁹ D. Hahn, Netflix Senior Engineer, in: <https://www.computerworlduk.com/cloud-computing/how-netflix-moved-cloud-become-global-internet-tv-network-3683479/>

¹⁰ P. Clarke, CTO Ocado: https://youtu.be/Bp82g_TuYvg

¹¹ R. Alexander, CIO Capital One: <https://youtu.be/OE90-ExySb8> and

The adoption of cloud spurs innovation, productivity and time-to-market and other transformative elements:¹²

- In the Air Transport Sector, enhanced broadband connectivity to aircraft is spurring cloud adoption and greater ‘off the plane’ analytics with annual potential efficiency forecasts of 2-5% equating to annual savings of US\$2.6-US\$6.5 billion.
- 85% of small and micro firm managers indicate that rapid-market entry is a key technology-enabling requirement, versus 33% in 2013.
- 95% of start-ups would be prohibited in entering the market if a traditional IT model was utilised versus cloud.

In-company case-study analysis with start-ups ‘all-in’ with cloud highlights the use of the technology as the primary business enabler.¹³

Case Study: A Cloud Guru (www.acloud.guru)

"We have zero ops staff. Our cloud provider manages infrastructure. We have only ever employed developers and we have a test-driven strategy that also sits on top of cloud. We can create, test and experiment fast in a manner that is not possible without cloud."

- S. Kroonenberg, Co-Founder

A Cloud Guru is a serverless cloud start-up that provides online cloud training with certification courses in public cloud for Amazon Web Services, Microsoft Azure, Google Cloud, and Linux. In-company analysis highlights that the Company has been cloud native from the outset, and utilises serverless cloud. A smaller number of organisations have embraced serverless cloud to date in comparison to the use of containers, but its use has grown 75% between 2017-2018, versus a 36% growth rate for containers over the same period, and is expected to be adopted by a larger number of organisations.¹⁴

A Cloud Guru has a global footprint in 170 countries and employs 80 people to design and deliver its training courses. Cloud has been an enabler for market entry with a number of benefits cited: (i) accelerated time-to-market from business concept to go-live; (ii) low operational overhead; (iii) rapid scalability; (iv) no infrastructure to manage. The Company’s cloud footprint includes 287 Lambda Functions and 19 micro-services, with daily usage of 6.49 million Lambda Invocations, 1.85 million API requests and 3.8+TB of data via CloudFront. No costs are incurred for the footprint or micro-services. The corresponding costs incurred for the Lambda Invocations and API requests are US\$579/month and US\$149/month respectively. The ability to access favourable cloud payment terms has been a further enabling factor for the Company, reflecting similar market feedback by other cloud-enabled start-ups, positioning this as a key aspect of market entry and growth: *"We also had a two-year payment holiday from our cloud provider letting us grow before we needed to fund anything, but even since we have seen payment reductions."*

The benefits conferred by cloud combined with a low-cost operational model were key to the Company’s formation. Serverless cloud was selected as this was congruent with the strategic and operational requirements of the Company. This commenced with more highly coupled functions reading to-and-from

¹² LSE Management Matters interviews with 20,000 firm managers in 35 countries; Productivity and technology research and interviews with UK enterprise customers https://www.yourreadybusiness.co.uk/wp-content/uploads/2017/08/1198-Vodafone-LSE_productivity_paper-Final.pdf; AWS Client interviews.

¹³ Ibid.

¹⁴ Rightscale. (2018). State of the Cloud Report.™
https://www.suse.com/media/report/rightscale_2018_state_of_the_cloud_report.pdf

the same database before a change was made to the development of micro services. Serverless has enabled the Company to be vendor-agnostic and architect across different cloud environments. The productivity-enhancing benefits of serverless cloud include: (i) greater ROI from the cost base through the faster delivery of revenue-generating courses from concept to upload; (ii) support of the applications directly by the development teams; (iii) hiring development resources versus IT Support and related functions to focus on code writing capability.

Management practices were optimised to complement the efficiency-enabling benefits of serverless cloud: best development practices were adopted; high-quality testing occurred; an *automation culture* was implemented, close and consistent communication occurred between teams. A major cited benefit of cloud was the ability for teams experiment, test and release code and features rapidly: *“Our business it to help people get certified for cloud. Through a cloud-native strategy, we are nimble and respond to market conditions adapting as required. We would not be here as we currently are today if we were limited to a traditional IT model.”*

2. Cloud Enhances Firm-Level Productivity and Differentiation

“Our cloud provider takes care of undifferentiated heavy lifting, and that helps us focus on developing innovative features and delivering great value to our customers”¹⁵

- A. Kesavan, Software Engineering and DevOps Director, *Xilinx*

Productivity can be enhanced through the utilisation of ‘heavy lifting’ by the cloud provider, resulting in organisational resources being directed to effort that differentiates the firm. Cloud enhances organisational productivity through the disintermediation of technology: infrastructure, processes and operations that are increasingly being transferred to cloud providers. This results in the transformation of the firm and a number of key observed benefits:¹⁶

- The adoption of best management-practices in combination with technological solutions can remove blockers to enhancing performance and result in an uplift in productivity of 20%.
- Almost all managers report the deployment of additional resources in differentiating activities that can aid in developing competitive advantage.
- 80% of Technology Managers are now engaged directly with the Product Development Team from the concept stage, a trend observed in less than 20% of firms in research five years ago, reflecting the ability to rapidly develop code and deliver a fast time-to-market strategy.
- Development times for code have reduced by 60-80% over the past five years as more businesses have adopted cloud.
- 90% of enterprise customers are utilising the cloud to make productivity gains in 2018, versus 55% in 2013.

In-company case-study analysis highlights that many of these factors are increasingly being observed in both large and small organisations. In many cases, these benefits are the key catalyst for the adoption of cloud from the outset as an enabling market-entry mode.

Case Study: *Vidsy* (www.vidsy.co)

“In the early days of Vidsy, we were building multiple products with a skeleton engineering team. With that level of resource available there was no question but to go with cloud, due to the managed aspect of the service and the quality that is delivered.”

- C. Revett, CTO

Vidsy reflects how technology start-ups are adopting cloud for its transformative benefits. The Company utilises cloud for cost-effective virtual storage and in facilitating rapid deployment capability in an agile manner. Vidsy’s business model connects a global network of creator talent with brands, to produce mobile-first advertising. The Company utilises crowd-sourced micro digital content that is stored in the Cloud and rapidly accessed by brands. This provides brands with access to a video-production platform that is bereft of administrative effort and cost.

¹⁵ <https://aws.amazon.com/solutions/case-studies/xilinx/>

¹⁶ LSE productivity and technology research and interviews with UK enterprise managers, 2015-2016.

https://www.yourreadybusiness.co.uk/wp-content/uploads/2017/08/J198-Vodafone-LSE_productivity_paper-Final.pdf; LSE interviews with Technology Managers engaged in cloud deployments and applications covering over 0.25million customers per annum and deployments in multiples of this; *LSE Management Matters interviews with 20,000 firm managers in 35 countries.*

Vidsy has adopted a micro service architecture with around 40 services in production at any one time, reflecting a strategy of single role-responsibility. The Company has utilised containers from the outset with cloud employed as the enabling transformative model for market entry, with multiple benefits cited: (i) low-cost of operations and storage; (ii) the utilisation of a smaller team than otherwise would have occurred due to cloud providing key IT and related infrastructure and its administration; (iii) rapid scalability, as the Company's storage continues to grow rapidly; (iv) maximising resource budget through the delivery of the adopted technical model with a smaller number of 10 technology/development resources, and; (v); an accessible scalable platform without performance constraints. Cloud is the primary enabler underpinning Vidsy's business model, facilitating the delivery of its core services while its cloud provider undertakes the provision of infrastructure and related functions. This is congruent with the results of this research across start-ups and SMEs where cloud has provided market entry, growth and differentiation that previously were not possible to the same degree.¹⁷

¹⁷ LSE research, op cit.

3. Productivity: A Key Benefit

*“We improved time to launch for a digital marketing campaign from two weeks to an average of two days. That’s more than seven times faster than our traditional environment. If a brand manager has an idea, he or she can implement it before the competition,”*¹⁸

- S. Yalamanchili, Digital Marketing Services ,Global Technical Manager, Unilever

Multiple productivity benefits can accrue to organisations adopting cloud across organisational functions:¹⁹

- Increasing development productivity by a factor of five in many cases: *“Development, testing, and deployment all showed productivity gains in the neighborhood of 500%....a 500% improvement inefficiency means that developers could perform tasks five times faster with cloud than with other in-house alternatives.”*²⁰
- Reducing time-to-market and corresponding governance by 500%-2000%: *“We have seen internal governance processes and corresponding time to market drop from 9 months to 10 days: technology is no longer on the critical path,”* (C. Astley, Director- Cloud Practice, KPMG).
- Reducing release cycle times by 50-100% due to major code releases occurring in shorter frequency than pre-cloud.
- 77% of organisations indicate that cloud had enabled more rapid code release.

The use of cloud is increasingly becoming integral within organisations that provide technology services including technology providers and consultancies. These organisations are a ‘barometer’ for cloud market trends: cloud is utilised both within these firms and as a service to enhance the productivity of client organisations. Case-study analysis highlights the growth of cloud in both cases.

Case Study: KPMG (www.KPMG.co.uk)

“One of the biggest reasons by far for the implementation of cloud by customers today is agility. Of course cost provides the compelling business case but customers tell us they want servers in minutes, not weeks or even days and to be able to scale and launch quickly.”

- C. Astley, Director, Cloud Practice Lead, KPMG UK

KPMG’s Technology Practice in the UK provides services to a customer base that spans SMEs to global enterprises nationally and internationally. Case-study engagement highlights that the increased adoption of cloud resulted in a number of benefits to the Organisation: (1) reduced time-to-market for the delivery of solutions; (2) the disintermediation of IT administration, overhead and other components, with cloud providers undertaking the management of these; (3) a change in the skill base engaged in technology; (4) changes to organisational structures and governance; (5) lower existing technology costs and other operational costs by 20%-80% with an average observed reduction of 55%. The Company cited that cloud enabled *productivity enhancement* to occur for clients who faced similar challenges, with these following the initial more expedient benefits that accrue from lower costs.

Engagement indicated that sectors such as Banking, Finance, Insurance, and Retail are leading the large-scale adoption of cloud for productivity-enhancement, with organisations increasing their ROI on cloud

¹⁸ <https://aws.amazon.com/solutions/case-studies/unilever/>

¹⁹ LSE Management Matters interviews with 20,000 firm managers in 35 countries; Productivity and technology research and interviews with UK enterprise customers representing 0.3 million employees; https://www.yourreadybusiness.co.uk/wp-content/uploads/2017/08/J198-Vodafone-LSE_productivity_paper-Final.pdf; AWS Client interviews.

²⁰ R. Perry, IDC at: https://media.amazonwebservices.com/IDC_Business_Value_of_AWS_Accelerates_Over_time.pdf

investment through: (i) the reduction of technology/infrastructure costs and technology resource costs along with a greater throughout of effort; (ii) increasing the number of releases and updates in a defined time period with a lower cost base; (iii) utilising 'agility' to monetise a greater number of concepts from 'design-to-release' in days, versus weeks or months. Interviews highlight that technology providers are evolving their service and product offerings to meet demand for agility, rapid speed-to-market, lower IT, storage, application and access costs that cloud delivers. In the process, this is transforming the engagement model for technology providers. The delivery of services by major technology providers such as KPMG is customer-driven and reflects general trends in the utilisation of cloud: *"We know that we can provide the environment to provide lower cost, agility and other benefits; the key is having the people on the ground who can make this happen."*

A key organisational segment adopting cloud is small to medium enterprises (SMEs).²¹ Case-study engagement highlights that these firms are enhancing productivity through transformation across areas.²²

Case Study: Monzo (www.monzo.com)

"From the start, the Company founders had a clear vision of the scale of the business and requirements. Anything but a public cloud strategy doesn't seem to make sense. Also, for us it was about familiarity: it's a relatively young workforce here who are digitally savvy and not familiar with the 'old days' of procuring hardware, so having a virtual server and an API call away is the norm."

- C. Evans, Platform Team Lead, Monzo

Digital transformation is a continuous process in the Banking and Finance Sector.²³ Cloud adoption concomitant to legislation such as Open Banking, PSD2, and GDPR are continuing to foster a new bank climate encouraging new entrants and an API-driven paradigm in which agility and on-demand-access to infrastructure, tools and applications is the norm. This is resulting in FinTech start-ups rapidly coming-to-market.²⁴ Cloud is increasingly being adopted to facilitate agility in this sector.

Monzo is an example of a company utilising cloud as a core strategic tool. The Company is a UK based start-up digital-only bank that provides current account services and a credit card. The Company has grown to over 300 employees and leverages a cloud-driven digital businesses to obtain a number of benefits: (i) a lower number of resources dedicated to managing overhead functions, with these functions undertaken by the Company's cloud provider; (ii) technology teams focused on the development of code that drives functionality; (iii) open-source utilised wherever possible; (iv) container utilisation, with serverless under review for future applicability.

Monzo's market entry and operational model is predicated on cloud adoption that will be utilised for further geographic expansion. The key benefits of cloud adoption include: agility, encompassing the rapid development and release of code for functionality, enhancements, and fixes; speed-to-market, and lower costs; *"Agility can be measured in minutes versus weeks when we go to market with anything."* These reflect productivity enhancement that the Banking Sector in particular has been adopting in the release of an increasing portfolio of digital products and services with speed-to-market continuing to emerge as

²¹ Doherty, E., et al. (2015). Migrating to the cloud: Examining the drivers and barriers to adoption of cloud computing by SMEs in Ireland: an exploratory study. *Journal of Small Business and Enterprise Development*. V(22)3; pp.512-527. <https://doi.org/10.1108/JSBED-05-2013-0069>

²² LSE research, op cit.

²³ Misra, S.C., and Doneria, K. (2018). Application of cloud computing in financial services: an agent-oriented modelling approach. *Journal of Modelling in Management*. V(13)4; pp.994-1006. <https://doi.org/10.1108/JM2-12-2017-0131>

²⁴ Ibid.

a key benefit for the Sector for the adoption of cloud.²⁵ Challenger banks in particular may utilise cloud, including cloud-based core banking platforms, to reduce entry costs and time-to-market. These banks, along with smaller banks that have lower IT budgets and less in-house expertise, could arguably benefit from cloud the most.²⁶

²⁵ Hon, W.K., and Millard, C. (2018). Banking in the cloud: Part 1 – banks' use of cloud services. Computer Law & Security Review. V(34)1; pp: 4-24.

²⁶ Ibid

4. Enhancing ROI: 'Do More for Less'

*"If you take into account the true value, the improved IT availability, the time saved on not running backups or patching operating systems and instead focusing on more strategic IT, cloud has definitely given us more return on investment."*²⁷

- C. Morgado, CTO, Just Eat

Cloud can enhance ROI by improving the performance across organisational areas:²⁸

- Cloud reduces the operating costs in almost every organisation that adopts the technology.
- Almost two-thirds of SMEs indicate that their cloud spending is likely to grow by at least 25% as they migrate additional applications and services and re-align their IT and work practices.
- An ROI from cloud investment of 70%-500% can occur, with this improving over time as organisational practices adapt to cloud. In some case-studies, an ROI of over 600% has been observed seven years after cloud implementation.²⁹
- Savings of 90% can occur in infrastructure maintenance costs.
- Server 'spin-up' reductions of over 1000% can be achieved, with decreases for in-house mobilisation from 10 weeks to minutes.
- Footprint cost reductions of 50% for large scale data-centric enterprise through cloud-managed data protection, and redundancy across territories.

The ROI of cloud can be significant for large complex organisations in particular. These include public agencies where cloud is utilised both for internal and external use.

Case Study: NHS Business Services Authority (www.nhsbsa.nhs.uk)

"We have a cloud- first strategy. Our drivers for cloud adoption were flexibility and the speed that we could get applications out there and the cost-savings that we could make. We used to take 8 months to do a single deployment, such as for the European Health Card Service that we run, and we can now do this in 15 minutes. Time to market has dramatically improved."

- C. Suter, Lead Cloud Architect

The NHS has annual expenditure of £123 billion and employs around 1.5 million people in the UK including: 103,430 doctors, 285, 893 nurses, 21, 597 midwives, 132,673 therapeutic and technical staff, 19,722 ambulance staff, 21,139 managers, and 9,974 senior managers.³⁰ Over 1 million patients are treated every 36 hours, with 16.2 million hospital admissions occurring annually, and 89 million outpatient attendances.³¹ The NHS Business Services Authority (NHSBSA) provides back-office support for activities for NHS employees, hospitals and some patient functions encompassing: (i) prescription processing; (ii) scanning and digitising of patient records; (iii) pension payment administration including payments from hospitals to staff; (iv) payments for GPs and some other outgoing payments; (v) running the EU Health Card. The Organisation is adopting cloud to transform how it engages with the NHS's employees to provide services, and how GPs and other medical resources can optimise their engagement

²⁷ <https://www.computerweekly.com/news/2240206602/Interview-Carlos-Morgado-CTO-Just-Eat>

²⁸ LSE CxO interview, 2016-2017 covering 20 multinationals and large enterprises encompassing approx., 1m employees to assess the ROI of Technology including Cloud and Productivity, <https://amadeus.com/en/insights/white-paper/managing-every-mile-how-to-deliver-greater-return-on-investment> LSE Interviews with UK and Technology Leads in SMEs.,

²⁹ <https://www.trackvia.com/blog/cloud-computing/the-amazing-roi-of-cloud-computing/>.

³⁰ <http://www.nhsconfed.org/resources/key-statistics-on-the-nhs>

³¹ Ibid.

with the NHS to obtain both patient records and for other functions. This also encompasses dynamic changes that occur as a result of on-line activity: *“We often get spikes of traffic to our site from references in the media, but we utilise auto-scale and never have to worry about not being able to cope.”*

The NHBSA employs around 20,000 people and migrated to a cloud environment in 2016. Company engagement highlights that cloud has delivered efficiencies across multiple areas: deployment times have decreased in some cases from 8 months to 15 mins; micro services are now routinely utilised; cost savings of over 80% are being reported in areas where greater self-service and automation is occurring through cloud enabled platforms and applications; contact centre build has occurred in 2 weeks with automated response by a bot accounting for over 40% of calls resolved, and new releases, with enhancements and other functionality released multiple times per week in an agile manner. The NHSBSA utilises containers with its cloud provider delivering the infrastructure, licenses, and other technical overheads required via a pay-as-you-go model: *“The impact of cloud is evident both on NHS employees and for the health practitioners that deal with it at many engagement points. The technology has made a difference on how they work, for the better.”*

5. A New Paradigm

“Our success at Dow Jones can largely be attributed to making developers the focal point of the transformation journey, and treating them as paying customers... All of this led to the formation of our Center of Excellence team (internally referred to as the DevOps team... The Centre of Excellence team at Dow Jones enabled the transformation of our software development and operations practice.”³²

- M Patel, Former Head of DevOps, Dow Jones.

This research consolidates results from industry engagement internationally from 2009 on ICT adoption including cloud computing and management practices, by organisations across the spectrum of size and complexity. The most productive and successful enterprises adopting cloud reflect a number of common attributes:³³

- Optimised management practices.
- Cloud positioned at the core of a transformation or market-entry strategy.
- A centre-of-excellence cloud function, either with an individual for micro/SME firms, or departments for larger enterprises.
- A continued investment in technology.
- An agile operating model.
- Flexible working practices.
- An investment in people both for existing and emerging areas including technology.

This research highlights that organisations that enact transformation through an integrated *cloud-centred* strategy achieved a number of tangible benefits including:

- A reduction of 10-20% in HR resource costs and the use greater use of self-services for employees.
- A reduction in turnaround times for some decisions by 50-70% due to the removal of many complex larger capex decisions for infrastructure and technology.
- Technical teams reduced by up to 100% in cases as some technical functions are transferred to cloud providers.
- Enterprise technology costs reduced 20-80% with an average of 55%.
- ‘Freedom’ to assess emerging areas such as Artificial Intelligence (AI) and Machine Learning (ML), with 70% of managers utilising cloud addressing these areas versus 25-35% of non-cloud managers.

These results highlight the paradigm shift that cloud is ushering across organisation types irrespective of size and location: *“Cloud has forced us to think differently about how we organise as a business, how we treat our engineers, and how we hire,”*³⁴ (G. Haus, SVP- Retail, Direct Bank Chief Information Officer, *Capital One*). This trend will continue as cloud evolves and becomes further embedded in organisational strategy, culture and execution.

³² <https://medium.com/aws-enterprise-collection/using-a-cloud-center-of-excellence-ccoe-to-transform-the-entire-enterprise-cc89d416.e934>

³³ LSE research, op cit.

³⁴ G. Haus. Gill Haus, SVP- Retail, Direct Bank Chief Information Officer, Capital One: <https://www.forbes.com/sites/peterhigh/2018/02/26/a-capital-one-cios-take-on-blockchain-ai-innovation-labs-and-more/#27cfbb54c77>

Conclusion

The adoption of cloud continues to transform organisations. Decision times, resources, infrastructure and costs have reduced while experimentation, innovation-rates, product-development and time-to-market have accelerated. Organisations adopting best management practices along with an intensive use of technology can obtain around a 20% improvement in productivity.

Digitally-native organisations and those that adopted an 'all-in' cloud strategy displayed the greatest agility, ROI, equilibrium between resources and roles and an innovation culture. For many start-ups in particular, an all-in cloud strategy was frequently the enabler for market entry, while larger incumbent firms are increasingly perceiving these firms as potential competitors and not reserving this for other peer firms: a recent shift in market dynamics.

A key result from this research is that the benefits of cloud computing are maximised when combined with sound management practices: implementing or enhancing one without the other can suppress the potential enhancements to the organisation often from significant investment and effort.

Disclaimer

This research represents data and analysis undertaken through both primary and secondary investigation. The data are provided to illustrate the results from areas investigated. Any reliance on the information occurs at the risk and discretion of the user. No responsibility is taken for the use of information, with users encouraged to undertake their own analysis to validate any decisions.