

IT service management and cloud computing

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1 Overview

This white paper sets out to describe at a high level what cloud computing is, how cloud computing is a disruptive innovation and what this means to IT organizations across the globe. Under examination will be the effect of cloud computing on existing IT management practices, including IT service management (ITSM) and ITIL best practices.

The paper contains a number of real-life examples where current approaches require some adaption to cater for cloud computing. The summary concludes with an approach on how an IT organization can retain its current ITIL best practices in an environment using and adopting cloud computing and cloud based services.

2 What is ITIL®?

ITIL is the most recognized framework for IT service management in the world. Delivering a cohesive set of best practice guidance drawn from public and private sectors internationally, ITIL helps service providers with best practice guidance on the provision of quality IT services and the processes, functions and other capabilities needed to support them.

ITIL provides a systematic and professional approach to the management of IT services. Adopting its guidance offers users, customers and service providers a huge range of benefits. These include:

- Improved value creation
- Improved IT services through the use of proven best practice processes
- Improved customer satisfaction through a more professional approach to service delivery
- Alignment with business needs, including the development of a business perspective
- Improved productivity and reduced costs
- High-quality IT services that benefit the business customer
- A balanced and flexible approach to service provision
- Well-designed services which meet customers' needs – now and in the future
- Ability to adopt and adapt to reflect business needs and maturity.

3 What is cloud computing?

Cloud computing is seen as a new way of delivering computing resources. Cloud computing has been described as a business model for the use of underlying IT technologies. Therefore cloud computing is not new technology, but relies on the latest technologies to be delivered efficiently, effectively and with better economies of scale. The basic principles of cloud computing date back to the mainframe era of circa the 1950s and 1960s.

The following is a working definition of cloud computing¹:

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

According to the NIST definition, the cloud computing model is composed of five essential characteristics, four deployment models and three service models. In addition, cloud based services refers to situations where cloud computing is used to provide some element of an overall service.

¹ Defined by NIST. National Institute of Standards and Technology (US) www.nist.gov/itl/cloud/

4 Why is cloud computing important?

Cloud computing is a disruptive innovation in business and IT models. It is disruptive because it is changing how IT products and services are being provided for both the consumer and the service provider. Cloud computing is moving organizations away from the traditional software licensing models and premises-based data centre hosting to 'pay-as-you-go' or utility based pricing. Over time, as the adoption of cloud computing increases, organizations will see a reduction in the IT infrastructure which they would have previously bought, operated and maintained.

Cloud computing is a new business and IT operating model for delivering real-time or near-real-time information and access to services. It is because of this disruptive nature that modern cloud computing is extremely important. New opportunities can be identified and exploited at the benefit of the customer and consumer.

The explosion of data, compute power, networks and devices have converged into new types of online communities and services. This has changed the way business and social interaction work. For example, businesses no longer need to procure, operate and maintain full and complete back-end IT infrastructure and applications. Full or partial IT infrastructure and applications are now being provided by cloud service providers. In addition, the smart phone and tablet devices have enabled new mobile business models which did not exist ten years ago, via cloud enabled applications and improvements in data communications and broadband access and speeds.

Cloud computing speaks to the definition of a service as defined in the 2011 edition of *ITIL Service Strategy*:

A service is a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks.

The premise of cloud computing is it allows services to be provided with greater economies of scale, quicker, faster and cheaper and without the need for a service provider to own the entire IT infrastructure. Peaks in demand for IT, business and customer services can be automatically provisioned for, leading to a pay-per-use model. A pay-per-use model can, in certain circumstances, lower the full cost of service delivery without full ownership of back-end IT infrastructure.

Cloud computing enables organizations realize benefits which are included in the following table.

Table 4.1 The benefits to an organization of cloud computing

Benefit	Details
Reduces IT asset ownership	Cloud computing reduces the requirement for purchasing and managing items such as hardware, support, licensing, maintenance and warranty etc. All these items should be included in the cloud computing service and costs. Some organizations may wish to reduce their ownership of IT more than others for various reasons, including when: <ul style="list-style-type: none"> ● The IT equipment has fully depreciated ● The return on investment (ROI) been fully realized ● There is a requirement to reduced costs including capital expenditure on new IT assets.
Reduces overall capital expenditure costs (CAPEX) (see note below)	Less capital expenditure is required as less IT infrastructure, software and licenses are being procured directly.

Benefit (contd.)	Details (contd.)
Reduces IT overcapacity	Many organizations have underutilized IT assets and capabilities. They have built IT infrastructures to cope with high but infrequent peaks in IT usage. This leads to inefficient use of expensive IT equipment and services. Cloud computing can reduce overcapacity and handle increased needs for IT resources on a utility based pricing structure, lowering overall costs and increasing flexibility. Overall, cloud computing can introduce flexible demand and capacity management.
Increases the capabilities of the IT organization	Cloud computing and cloud based services allows organizations to use services which they may not have been able to afford in the past or not have had the capability to set up and deliver.
Leverages newer technologies	Cloud computing service providers are expected to maintain their services on the latest platforms, provide the latest features and functions and install the latest patches etc. This in turn provides the customers and consumers with access to the latest versions of technology, IT infrastructures and services that they might not have otherwise been able to provide themselves.
Provides utility based charging	Utility based charging or charging per consumption is recognized as a method for ensuring usage is charged for and non-usage is not charged for. Where cloud computing reduces or eliminates overcapacity within IT, the overall unit cost of providing those IT services would be expected to fall, at least initially. This is similar to a utility bill, e.g. electricity, where only the electricity used is paid for.
Introduces real economies of scale	Cloud service providers are expected to provide economies of scale. They build the infrastructure and support for multiple customers and consumers. This in turn should provide cost savings to the customers and consumers of cloud computing.
Enables resources to be scaled up and down quickly, matching increases and decreases in demand for IT services	Cloud computing allows a short-notice increase in demand for IT services to be met. Auto-allocation of compute resources, cloud bursting and spot cloud computing are all methods which can be used to scale resources up and down quickly, matching increases and decreases in demand for IT services.

Note: Reducing capital expenditure will lead to increases in operational expenditure (OPEX). Organizations should understand the impact of this and how to accommodate the increased operations expenditure within their budgetary processes. In addition, some organizations will prefer to spend the CAPEX they have raised for IT projects. Therefore it is important to identify the organization's strategy around how they intend to pay for IT services, systems and applications. In general terms, organizations are likely to adopt a hybrid approach to capital and operations expenses, using both traditional IT and cloud computing.

5 Why is IT service management important to cloud providers?

Cloud service providers are no different to traditional IT service providers in relation to their need to provide quality, cost-effective, secure and available IT services. A key value proposition of cloud based service providers is the provision of IT infrastructure and services under a utility or pay-per-use model. Cloud service providers should be focused on designing quality services customers and consumers require, while solving problems. Cloud service providers aim to provide value to customers by facilitating outcomes customers want to achieve, without the ownership of specific costs and risks.

For example, Platform as a Service (PaaS) may reduce the overall ownership and costs (capital and operational) to the customer, regarding their back-end infrastructure. It is incumbent on the customer to analyze the total costs and examine the potential for cost savings, including:

- Total cost of ownership (TCO)
- ROI
- CAPEX versus OPEX requirements.

The cloud service provider is expected to provide high levels of quality and service assurance in order to:

- Increase their customer share
- Deliver the services
- Ensure the integrity, security, availability and continuity of the services.

However, quality and service levels may not be open for discussion or negotiation with the customer. Therefore, it is prudent for the customer to understand if the customer can define the levels of service quality and assurance they require in a negotiated service level agreement.

Customers of cloud computing and cloud based services should expect, and demand, at least the same levels of service as that is provided by traditional IT service providers and internal IT organizations.

In many cases it is common for customers and consumers to expect even higher levels of service from cloud service providers. There are a number of reasons for this:

- Company data now resides outside of the organization and must be managed securely
- Security concerns
- Availability requirements
- Ensuring service continuity
- Cloud computing is new to the organization
- Fear, uncertainty and doubt
- The impact on public image regarding cloud computing reported in the public domain.

6 What should customers be looking for and expect from a good cloud service provider?

At a basic level, the customer should look for reassurances that services will be provided as agreed and expected. This is no different to any other service, including IT and non-IT services. One aspect of measuring and evaluating good service provision resides in comparisons of the cloud service providers adoption and practical application of standards, frameworks and methodologies.

The best practices advocated by frameworks such as ITIL and standards such as ISO/IEC 20000 and ISO/IEC 27001, for example, are still required to ensure a best practice and quality driven approach is applied to the design, management and improvement of both IT and cloud based services. While cloud computing is changing the backbone of how IT services are being delivered, the basics of service management today still apply and remain relevant. Over time current standards, frameworks and methodologies will need to evolve and expand further to focus on specific aspects of cloud computing.

7 What questions should be asked of a cloud service provider?

Even though the adoption of cloud computing and cloud based services is increasing significantly, many organizations may not know what questions they should be asking of their cloud service providers to reassure themselves of the quality, utility and warranty of services. The following table presents a number of basic yet important questions and considerations to discuss with cloud service providers.

Table 7.1 Questions and considerations to discuss with cloud providers

Question	Considerations
What ITIL best practices, security and data protection standards and guidelines are in use by the cloud service provider?	These questions seek to find out what best practices are in place and in use by the cloud service provider. The level of adoption can be an indicator as to how well services are likely to be provided, as well as how much focus is placed on the utility and warranty aspects of cloud computing and cloud based services.
Where does the data reside?	This poses questions about which legal jurisdiction applies to the data, who has access to the data from a legal perspective and also what data protection laws come into effect. Many organizations have a defined policy regarding access to data and the legislation that will apply to the data.
What availability levels are provided?	Some cloud providers may impose their service levels, including service availability, on the customer and not provide flexibility to match what the customer requires. This can be a factor when dealing with all sizes of cloud service providers. Customers should consider the following questions: <ul style="list-style-type: none"> ● What are the default or standard levels of availability (e.g. for public cloud offerings) ● What level of availability is the cloud service provider willing to provide to the customer's organization ● What level of availability is required by the customer and does it match that provided by the cloud provider ● Can the cloud service provider offer the flexibility to provide availability service levels in line with the customer's requirements?

Question (contd.)	Considerations (contd.)
What continuity plans are in place for recovering data, infrastructure and applications?	<p>Typical questions customers should ask include:</p> <ul style="list-style-type: none"> ● Can data be recovered ● What data can be recovered ● How long will it take to recover data ● What priority will my organization's data be recovered, in the event of a large data issue for the cloud service provider ● Are continuity plans documented, clearly defined and up-to-date ● Can the cloud service provider make available an end-to-end continuity plan?
What level of service resilience and backup is provided within the service?	<p>Even if the cloud service provider has a continuity plan in place, customers need to check what level of service resilience and backup is provided as part of the service. Customers may assume that their applications and services are fully resilient and backed-up, only to find out during a service outage that they have inadequate arrangements in place for these areas.</p> <p>The example below illustrates this point well:</p> <p><i>At some point a cloud service provider has to patch their systems. If they do this during out-of-hours in the GMT time zone, it will be in-hours in another time zone. This could have a knock-on effect to the delivery of services locally to cloud customers in the in-hours time zone, especially if server reboots have to occur.</i></p>
Does the service provider have a service desk function based on ITIL principles?	<p>The fundamental question is what support is provided by the cloud service provider.</p> <p>Customers should consider the following:</p> <ul style="list-style-type: none"> ● How will the service desks function ● Does the cloud service provider offer sufficient support coverage and hours of support ● What are the service level agreements (SLAs) for answering calls and do these meet the needs of the customer ● Is the cloud service provider's service desk local, onshore or offshore? Is there a potential language issue?
What metrics will be provided and are they relevant?	<p>Metrics are an important tool in understanding the level of service provided. Cloud service providers should work closely with the customer to ensure that the metrics are useful, relevant and easily understood. ITIL service level management and business relationship management will assist with defining appropriate service metrics and service targets.</p>
Does the service provider's change management process match the customer's needs?	<p>Typical issues and questions which arise include:</p> <ul style="list-style-type: none"> ● How will changes to the services provided by the cloud service provider be managed ● Will the customers and consumers be notified? Will they have a say in the changes being made and when ● How much control will the customer have over any changes ● How will changes affect the customer's services?

Question (contd.)	Considerations (contd.)
Does the cloud service provider require third-party providers in order to deliver services?	<p>It is quite common for service providers to rely on other service providers and suppliers to provide them with certain capabilities they do not have in-house. The same premise applies to cloud service providers. In general, cloud service providers will rely on other cloud service providers and third party suppliers to provide cloud platforms, applications and capabilities. This is also known as service aggregation and service arbitrage.</p> <p>Therefore it is incumbent on the customer to understand the level of reliance their cloud service provider has on other third party suppliers. For some organizations, this is a standard due diligence exercise. For other organizations, this will be a new exercise to be undertaken.</p> <p>Customers should consider:</p> <ul style="list-style-type: none"> ● What third party providers are required to provide the key cloud services ● Does the cloud service provider have sufficient back-to-back supporting contracts with the third party providers to ensure service provision to the customer?
How quickly can a cloud service provider scale services and capability and is this quick enough for the requirements of the customer/consumer?	<p>One of the five aspects of cloud computing is the ability to scale – increase and decrease – services quickly. It is important to ask cloud service providers how quickly they can scale up and down.</p> <p>Typical questions customers should ask include:</p> <ul style="list-style-type: none"> ● Can the cloud based systems, platforms and applications scale in line with the customer's requirements ● Can the cloud services provide enough resources and extra capacity to meet increased demand from all of their customers?

8 What challenges and opportunities does cloud computing present for IT service management ?

Cloud computing presents both challenges and opportunities to IT organizations, businesses, customers and consumers.

A current shortfall in best practice for the design, development, operation, management and improvement of cloud based services may be seen as challenge for some within the industry. This is especially true for hybrid IT environments. However, as this paper points out previous investments in IT management structures and best practices such as ITIL can be capitalized on and provide a solid foundation for managing cloud based services and hybrid IT environments.

Opportunities include a new way of providing IT and business services without the ownership and cost of setting-up, managing and maintaining backend infrastructure and underlying technologies. In effect, cloud computing allows an IT organization to effectively outsource some or all of its IT 'factory-floor'. This requires the IT organization to be less focused on lower-level IT activities and more focused on designing, delivering and managing quality services which utilize cloud computing and deliver benefits to their customers and consumers.

This table shows the additional benefits and challenges presented by cloud computing.

Table 8.1 Additional benefits and challenges

Area	Benefit	Challenge
Procurement and finance	Cloud computing lowers the need for upfront CAPEX requirements, instead costs are paid for on a utility basis, i.e. pay-per-use model.	Are the organization's current procurement rules and culture set-up to approve and finance fluctuating costs, i.e. pay-per-use over fixed price services?
Ability to scale quickly and reduce IT overcapacity	Cloud computing can be enabled to scale on-demand, or extremely quickly to meet sudden changes in demand for IT compute services. Demand for IT services can be matched exactly to the required capacity. This reduces the cost of scaling IT to meet only occasional spikes in demand.	Traditional change management approval times can eliminate the ability of IT to scale cloud services quickly and when needed. However, scaling quickly can incur additional and unexpected costs. Identifying the right balance of pre-approving cloud based change is required against the cost associated with those changes. Adopting ITIL based standard change models for scaling cloud computing scenarios is a recommended approach, which can help restore the flexibility of the change process.
Leverages new technologies	Cloud computing service providers are leveraging the latest in technology and IT platforms. By using cloud computing services the IT organization will have access to the latest in IT technology, without the associated costs of ownership, maintenance and upgrading.	Although the low level management activities associated with supporting the IT infrastructure will remain with the cloud service providers, the IT organization will need to understand and work with the latest technologies for service design and integration. Legacy IT systems and mainframes may not be as easy to interface into a cloud computing environment.
Reduces IT ownership	Cloud computing reduces the need to own certain elements of IT including hardware, infrastructure and IT backend systems. These are more commonly provided by Infrastructure as a Service (IaaS) and PaaS cloud service providers.	In moving to cloud computing under an OPEX model IT assets are no longer purchased by the organization. This means that IT investment costs can no longer be depreciated in the balance sheet. This is likely to cause some financial officers concern.

9 Adapting ITIL for cloud computing

Managing IT in today's environment is complex. Moore's law is a constant reality, which also reflects on the continual speed and increase of changes in IT. IT organizations now have to manage older technologies and services alongside newer technological advances. Hybrid IT is the cumulative effect of managing legacy IT, traditional IT and cloud computing.

Table 9.1 Definitions

Legacy IT	A legacy system is an information system that may be based on outdated technologies, but is critical to day-to-day operations.
Traditional IT	More modern approaches to the provision of IT, business and application based services.
Cloud computing	Defined previously in this white paper.

Therefore hybrid IT requires an updated approach to the design, development, deployment, management and continual improvement of IT as a whole. This does not mean that current best practices, frameworks and standards are redundant or obsolete. On the contrary, current best practices, frameworks and standards provide an ideal foundation on which to develop and adapt management structures for cloud computing and cloud based services.

To provide some context to this premise, a number of examples are provided which outline how existing ITIL best practices can be adapted for cloud computing and cloud based services.

EXAMPLE 1: SERVICE CATALOGUE AND CLOUD MARKET PLACE

Cloud computing introduces new roles within IT and the organization. One key role is that of the cloud broker. Cloud brokers and cloud service providers generally use cloud market places, also known as cloud stores, through which cloud services are displayed for sale. A good example of a cloud market place is GCloud² which is provided by the UK government.

With a cloud market place or a cloud store both the buyer and consumer can clearly understand the services available to them and the level of service provided. Pricing is transparent and services can be compared against other similar services easily. Contact details for each supplier is clearly provided as well as terms and conditions and various other service attributes.

A cloud store is a good example of a service catalogue. Services are defined clearly and presented via a central portal. Services must be pre-approved before being listed, or in effect before going live. ITIL best practices for a service catalogue, service catalogue management and service portfolio management are applicable to cloud stores and cloud market places. The service portfolio lifecycle is extremely relevant to services in a cloud store or cloud market place, consisting of service pipeline, service catalogue and retired services.

The process of adding a service into a cloud store, or cloud market place requires the same concepts and customers' needs as for a service catalogue. Services require sufficient levels of service design, service transition, service operations and continual service improvement to develop the service offering, make the service offering available, improve the service offering and at the end retire the service offering or replace with a new service offering.

EXAMPLE 2: CHANGE MANAGEMENT

Change management is the process responsible for controlling the lifecycle of all changes, enabling beneficial changes to be made with minimum disruption to IT services.

The scope of change management can be increased to control the management of Software as a Service (SaaS) based subscriptions. Each additional SaaS subscription will incur an additional OPEX to the business. Multiply this by hundreds or even thousands of SaaS subscriptions in a given year and costs climb exponentially. If SaaS subscriptions come under the control of the change management process, the costs can be controlled effectively.

Firstly, the change management approval process can be adapted to approve or decline additional SaaS subscriptions. The relevant stakeholders such as the OPEX owner, the requestor and the procurement department can form the Change Advisory Board (CAB) for SaaS subscription change request approval decisions. The decision to approve or decline a SaaS subscription increase can be based on available budget or who is to pay for the increase in costs and the need for more subscriptions.

Secondly, the change management system now has a record of all SaaS subscription change records. A report can be compiled showing all of the increases in SaaS subscriptions and a validation carried out to see if those subscriptions are still required. If they are not, a change request can be instantly raised to approve reducing the number of SaaS subscriptions, thus reducing the recurring charge, immediately lowering costs.

2 UK Government Cloud Store link: <http://govstore.service.gov.uk/cloudstore/>

Thirdly, pre-defined standard change requests can be adapted to allow for certain cloud computing changes to be pre-approved. Pre-approval could be granted as long as it is within pre-defined rules and parameters, e.g. when scaling services within pre-defined cost limits. This approach will enable the organization to benefit from the scalability and rapid elasticity of cloud computing in a pre-defined, controlled and organized manner.

These approaches will allow the change management process to work effectively in cloud computing environments. IT can provide these value-added initiatives and cost control processes very easily by simply adapting their change management process and increasing the scope of change management.

EXAMPLE 3: SERVICE DISINTERMEDIATION

Service disintermediation in relation to cloud computing is where consumers of services provided by IT buy services directly from a cloud provider or cloud broker, instead of through the IT organization. Service disintermediation can happen when the following occurs:

- The IT organization fails to provide value to customers
- The IT organization fails to provide services which are publicly available, fails to be flexible and is not delivering customer requirements
- Viable alternative SaaS are readily available with attractive price points.

Key areas of focus for the IT organization to mitigate against service disintermediation are included in the following table, with corresponding ITIL reference points.

Table 9.2 Mitigation activities and ITIL reference points

Mitigation activity	ITIL reference point
Demonstrate clearly the value IT delivers to the organization.	Service level management, service portfolio management, service catalogue, business relationship management.
Offer similar services to that of cloud computing service providers, to the organization and their end-users.	Service strategy, service design, transition planning and support, change evaluation.
Increase the flexibility and agility of IT in providing services.	Service design, service transition planning and support, demand management, change management, request fulfilment.
IT can become a service broker, offering services through a clearly defined service catalogue or service market place.	Service catalogue management, service level management, service portfolio management, request fulfilment.

ITIL best practices can help alleviate service disintermediation by focusing on designing and delivering services which end-users and service consumers require. This guidance is provided throughout the five core ITIL best practice lifecycle stages.

In essence, such adoptions are the forerunner of cloud service management, which can be seen as an extension of the management of IT services. Cloud service management is concerned with introducing good practices for the management of cloud computing and cloud based services.

10 Summary

There are a number of key messages to take away, which are listed below.

Cloud computing is disruptive, yielding both benefits and constraints. Each organization has to look at the value they can receive from the disruptive nature of cloud computing.

Cloud computing is gaining market share and popularity. This is partly due to innovative cloud offerings now available, hype, marketing, the cost benefit equation and scalability etc.

Cloud computing can yield significant savings and benefits to an organization under the right circumstances.

Cloud computing requires the IT organization to adapt their existing practices, policies, processes and procedures in order to successfully utilize cloud computing to the fullest.

ITIL continues to be a valid framework to be used in IT organizations where they have adopted, or are likely to adopt, cloud computing and can give reassurance that the cloud service provider is using best practice.

IT organizations using ITIL and other frameworks and standards, will be required to adapt certain elements of their operations to cater for the disruptive nature and benefits of cloud computing.

For those organizations using ITIL best practice and other frameworks and standards the message is clear: there is no need to undo the current IT organization and how it operates. Use ITIL and existing frameworks and standards as before, but identify the areas that need to be updated, changed or modified to cater for the changes required by cloud computing to realize the value that cloud computing can bring to the organization as well as to the customers and consumers.

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www.cloudcredential.org/certifications/pcsm

Mark was one of the first people globally to be awarded the ITIL Master accreditation, is an ITIL Expert and is the author of 'The Service Catalog – A Practitioner Guide'.

About Cloud Credential Council

The Cloud Credential Council, (CCC) is the international industry representation body mandated to develop and drive alignment of standards training and certification for individuals in the cloud computing domain. The CCC is independent and vendor neutral and has an expanding list of members consisting of public sector and academic institutions, cloud providers, cloud consumers, cloud brokers, professional associations and international certification bodies from across the world.

The mission of the CCC is to accelerate successful cloud adoption through world-class training and certification.

To assist organizations understand this paradigm shift in IT service management, the Cloud Credential Council has created a range of certifiable cloud computing courses. The Professional Cloud Service Manager (PCSM) course and exam is now globally available and covers many of the areas that an organization needs to understand in order to adapt their current IT operations to successfully develop, deploy, manage and improve cloud computing and cloud based services. The PCSM certification will benefit holders of any ITIL certification and also those without.

For more details: www.cloudcredential.org

About AXELOS

AXELOS are a joint venture company, created by the Cabinet Office on behalf of Her Majesty's Government in the United Kingdom and Capita plc to run the global best practice portfolio, including the ITIL and PRINCE2® professional standards.

The goals of AXELOS are many and varied, each one aimed at helping businesses and individuals reach success, empowering them to truly stand out in a competitive market:

- We continually promote and advocate quality training.
- We strive to encourage growth, development and progress.
- We always look for innovative new solutions to improve best practice standards and processes across the board.

The result is improved skills that are relevant to the industry as a whole and enhanced employability for all, benefiting the global economy. The benefit to you and your business in particular: better trained employees, streamlined operations, and the peace of mind of knowing that you are working with an industry-leading organization, which provides products and services with a long-standing reputation for setting the industry benchmark.

Reviewers

AXELOS would like to thank the following for reviewing this white paper:

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