

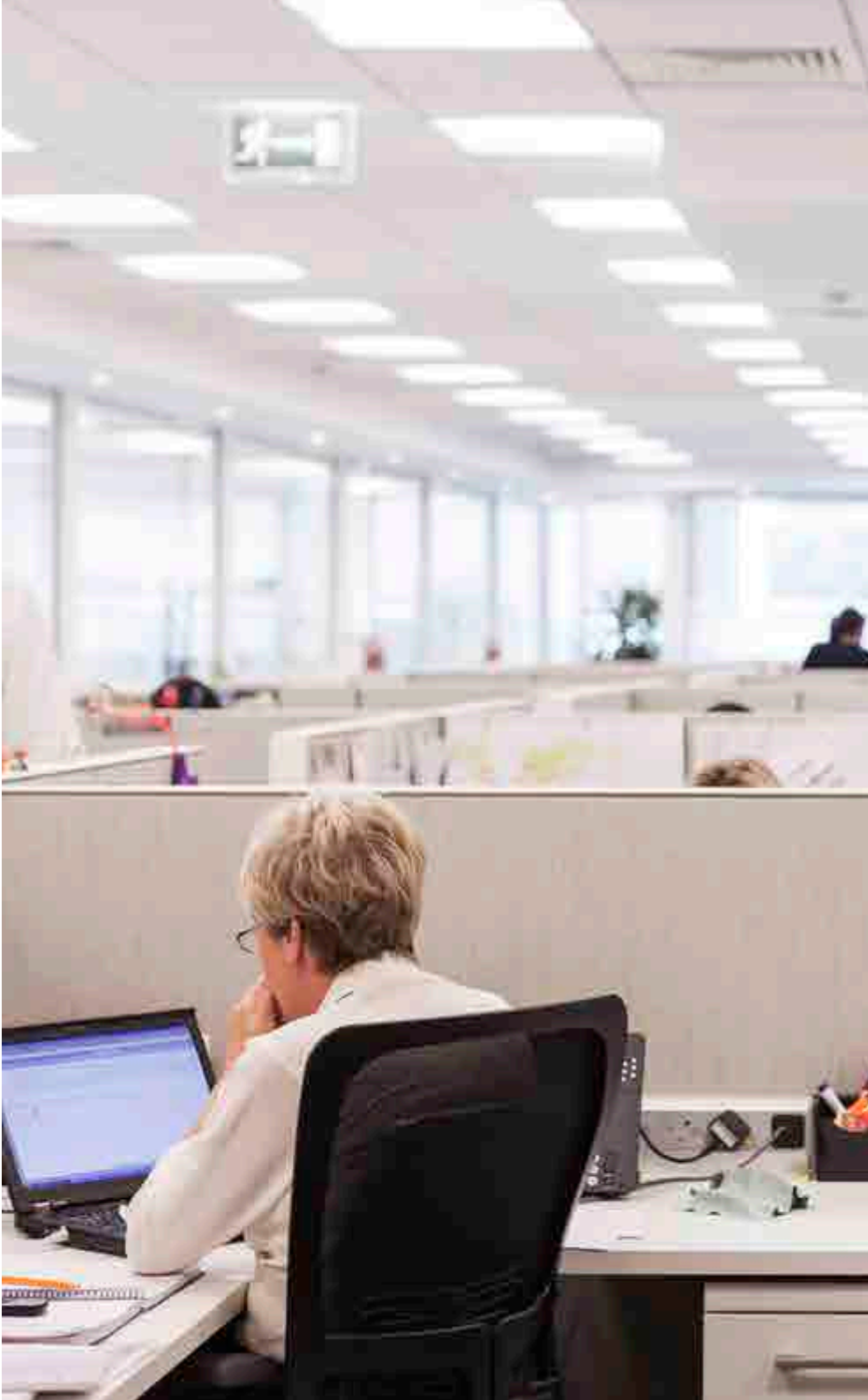
FS viewpoint

Clouds in the Forecast

*Cloud – a necessary
component of data centre
consolidation and IT
agility*

May 2014





Contents

Point of view..... 2

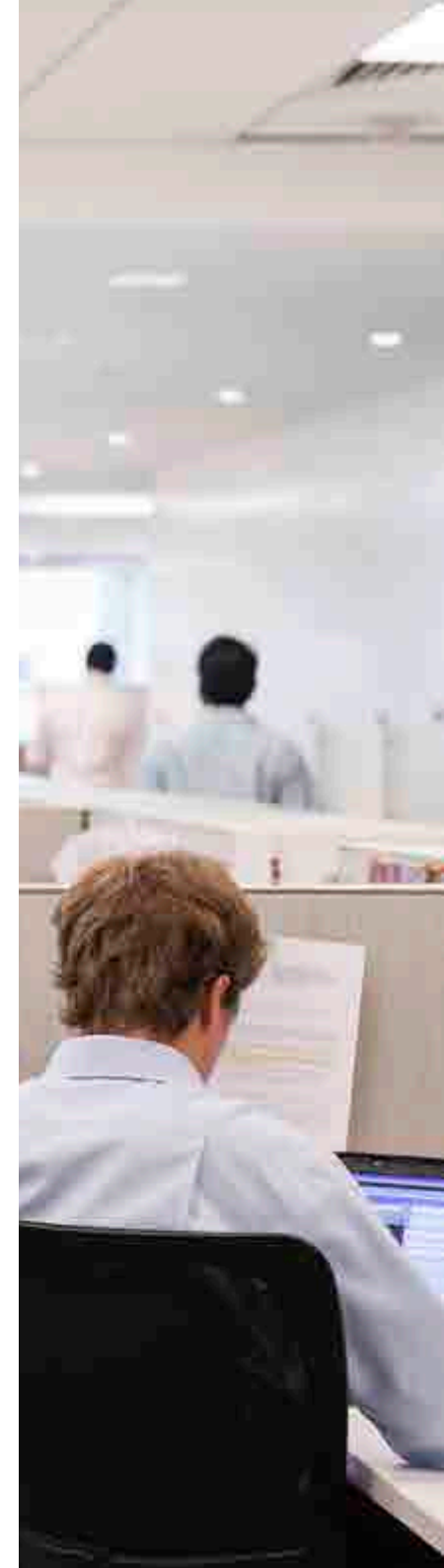
Competitive intelligence 14

***A deeper dive into the benefits
of cloud 17***

A framework for response 20

How can PwC help 27

Appendix..... 31



Point of view



Following a hailstorm of M&A activity, financial institutions are facing a critical need to consolidate their data centres. At the same time, IT agility has also become critically important, particularly in institutions that are under intense pressure to transform their technology.

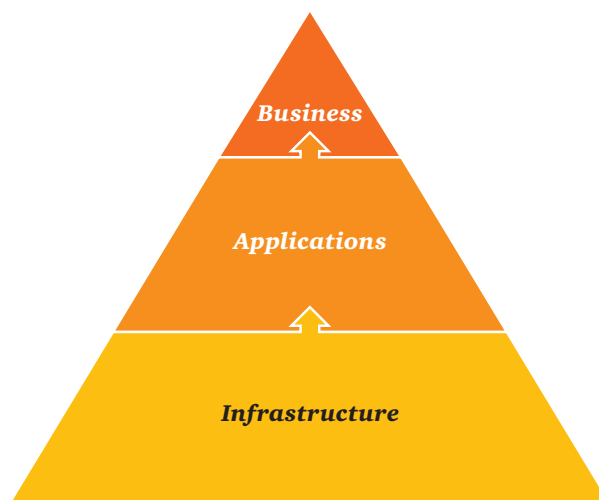
Today's institutions are facing dual pressures: to consolidate their data centres and to increase business agility.

In the wake of the 2008 financial collapse, financial institutions participated in significant mergers, acquisitions, and divestitures. Although the pace of these activities has slowed considerably, the overlapping mix of data centre assets left behind must now be consolidated into a cohesive whole.

Furthermore, as the business environment continues to change, financial institutions are feeling pressured to innovate to a higher standard—and to do so more frequently and across new platforms. The following factors

are driving the need for business agility at financial institutions:

- Accelerated product rollouts driven by channel innovation.
- Rapidly changing product portfolios.
- Aggressive time-to-market objectives.
- Unprecedented innovation in user interfaces and end-user platforms (e.g. tablets).
- Complex regulatory requirements.
- Alignment of IT strategies and goals with the overall goals of the business.



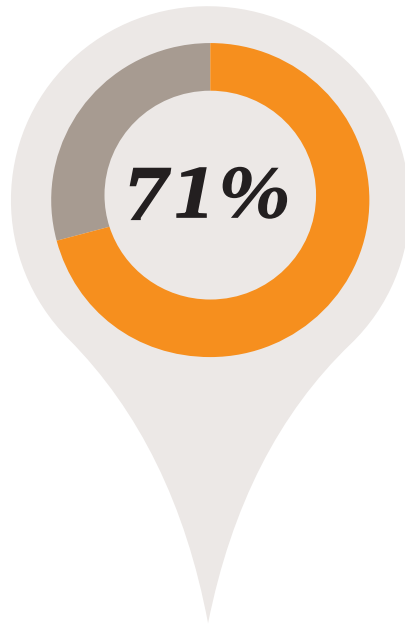
Cloud transformation begins at the infrastructure level and leads to more agile applications, resulting in faster speed to market and more flexibility to meet client needs.

The key benefits, beyond consolidation, include standardised application and development environments, resulting in better controlled and more efficient application lifecycles.

Cloud computing is a model for enabling convenient, on-demand access to a shared pool of configurable computing resources. It requires little provisioning while delivering rapid results.

We spotted an interesting trend regarding cloud in the financial services industry:

In the past few years, cloud has been increasingly adopted among financial institutions. As we see it, the resulting cloud environment has the potential to propel IT agility to new heights and fulfill the role of technology as a strategic enabler.



of financial services respondents said they would invest more in cloud last year—up from 18% in the previous year.¹

By adopting a private cloud, institutions can address their data consolidation needs, which will in turn boost IT agility.

¹ PwC, “Digital IQ Snapshot: Cloud,” March 2013, www.pwc.com.

Leading financial institutions are sending applications and services to the cloud as a means of meeting the challenges related to consolidating their data centre.

We have observed leading financial institutions leveraging the cloud to accelerate their data-consolidation efforts:

As early as 2007, a **leading capital markets institution** built a virtualised computing environment for its development activities, enabling the creation of 30-day temporary virtual machines (VM) for testing purposes in a fully automated fashion. This enabled the creation of a VM in minutes and the institution adjusted its chargeback and asset tracking mechanisms to support this new capability.

In 2011, a **Spanish bank** engaged in the consolidation of its international operations in a single data centre on a private cloud platform, thereby creating a scalable and efficient platform to support business growth.

In 2011, a **US-based global insurance carrier** with more than 15 business units across several continents engaged in the consolidation of its global infrastructure into fewer data centres. A private cloud infrastructure was chosen from the inception of the project to standardise the infrastructures, improve resiliency and availability, and facilitate the continued policy of acquisitions while keeping tenants segregated from a security and operations standpoint.

Typically, data centre consolidation only impacts the IT function. The addition of a private cloud, with the increased agility it brings, expands the scope to include business transformation. When a cloud programme is implemented, interactions are fundamentally changed among business operations, application owners and developers, and IT infrastructure. Thus, it is critical for the business case to clearly lay out the transformation path and for the programme team to take a holistic approach to leading the multi-year journey, bringing the appropriate stakeholders on board.

Leading financial institutions also view the cloud as a means of increasing organisational agility and of growing their global footprint.

These forward-looking institutions view cloud technology as a way to provide the business with the agile infrastructure it requires to deliver consistent service to internal and external customers around the globe. Using cloud technology, leading institutions are:

- **Adapting quickly when entering new markets.** Cloud presents an opportunity for a business to standardise its systems globally and to simplify the overall enterprise architecture. Having a common infrastructure already in place worldwide enables an institution to serve customers more efficiently and effectively.
- **Improving IT service to the business units—which, in turn, enables the business units to better serve their external customers.** As a result, the business units and IT are well positioned to work together as partners to carry out the organisation's strategy.
- **Improving the consistency of service to internal and external customers worldwide, leading to greater customer satisfaction and loyalty over the long term.** This, in turn, can foster international growth, improve competitive positioning, and ultimately deliver bottom-line results.
- **Coping with elastic demand across core software development lifecycle aspects of technology change programmes,** e.g. testing and development environments. This can save weeks over the course of such programmes by reducing the need for procurement and scheduling, ultimately resulting in better time to market.
- **Increasing the resilience of external websites.** Greater elasticity can improve online presence and the resilience of external websites, e.g. in the face of popular marketing campaigns.

Is migrating to the cloud more than just a cost play?

In the mid-2000s, financial institutions claimed the cost savings related to adopting virtualisation. But today the short-term benefits of deploying a private cloud infrastructure are more about agility and faster time to market than about additional cost savings. In the longer term, institutions will also benefit from the increased efficiency and lower support costs associated with having a standardised IT infrastructure.

Today's institutions are recognising the importance of aligning their business and IT strategy levers to improve the return on their cloud investment.

Business strategy benefits

Products, channels, and customers:

- Accelerated product development, multiple channels supported, and enhanced ability to meet customer needs.
- Business objectives more likely to be achieved (e.g., product innovation, operational excellence, customer intimacy).
- Depending on the focus of the institution's business case, potential benefits such as long-term savings from virtualisation, consolidation of virtual environments, increased efficiency, and scalability.

Risk and regulation:

- Security management enhanced to meet regulatory and business requirements; appropriate segregation of tenants and segregation of administrator duties enabled.
- Regulatory and compliance requirements, including standards and controls, adapted for consistency with the target environment.

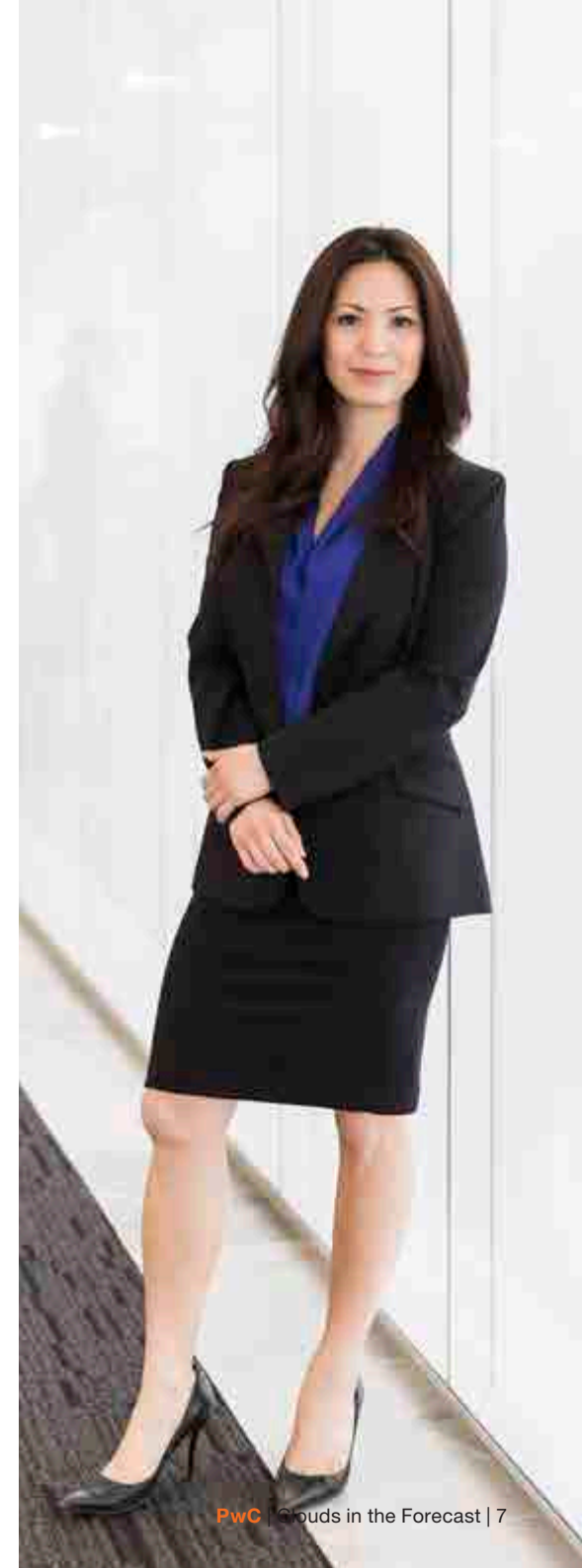
IT strategy benefits

Technology solutions:

- Ongoing revision of target architecture as the cloud programme evolves equals ongoing alignment with business drivers.
- Early confirmation of IT infrastructure readiness establishes success of migration.
- Overall programme supported from inception onward by enlisting vendors of key technologies as partners.

IT operating model:

- Clear roadmap facilitates a smooth transition from the old operating model to one that has been transformed by the introduction of cloud capabilities.
- Established governance of cloud initiative and day-to-day operations enables simultaneous management of both, as well as enhanced ability to prioritise and resolve conflicts.



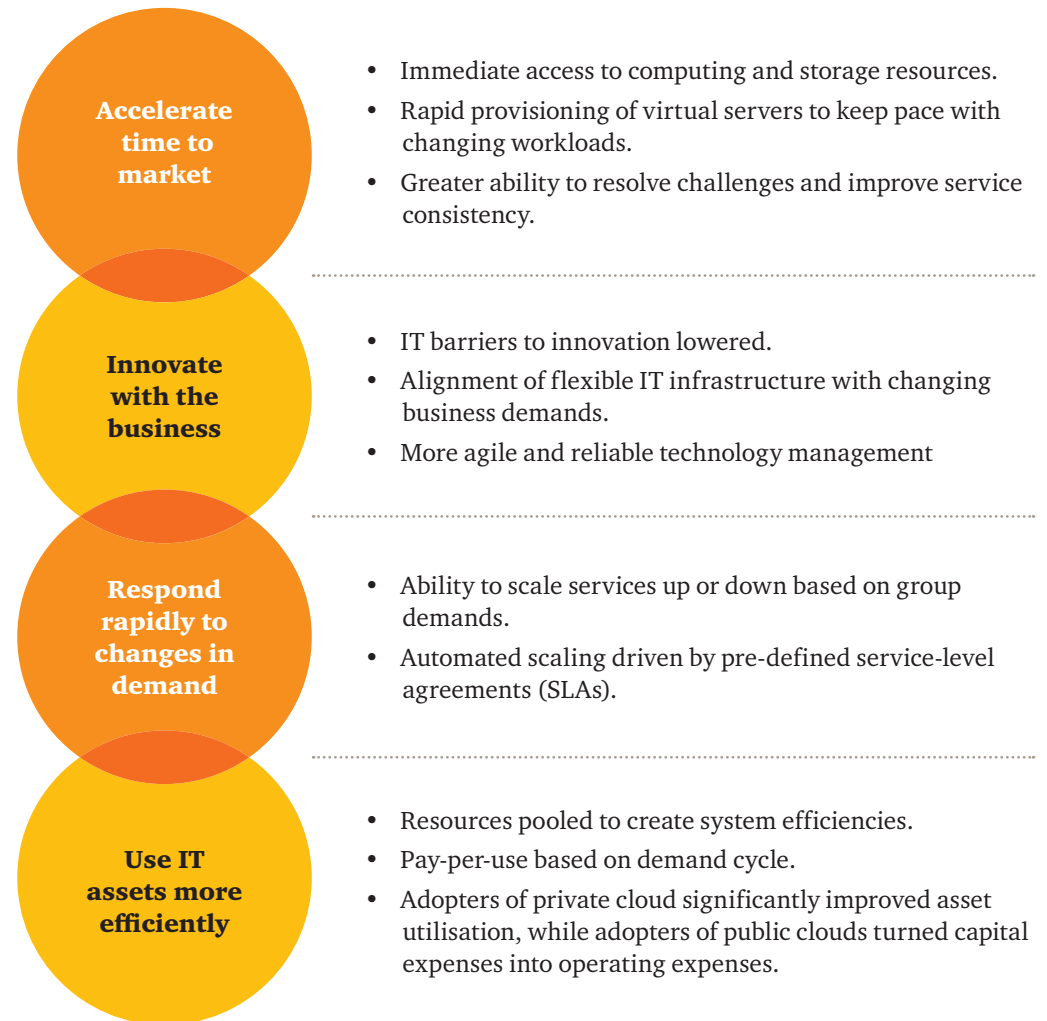
Implementing a private cloud has many benefits. From a high-level perspective, the private cloud increases infrastructure flexibility, complementing the benefit of scale provided by data centre consolidation. Looking one level higher, the benefits create an even more compelling case for change.

Deploying a private cloud increases the agility of institutions that are consolidating their data centres. A private cloud standardises infrastructure, enables the automated global delivery of a consistent level of service, and provides on-demand access to data.

As the majority of applications moves to the cloud, financial services institutions have an opportunity to lead the way by creating a completely cloud-ready environment. As the cloud market continues to grow, these businesses will have a competitive advantage over those with outdated environments.

Data centre consolidation provides the opportunity to extend the benefits of cloud technologies and solutions to the entire infrastructure and to make them a standard component of the overall architecture.

Cloud enables financial institutions to:



Looking ahead, we believe that the private cloud will become the standard infrastructure in the industry and a catalyst for platform standardisation. In our view, private cloud technology is an option that is well suited to the financial services industry.

Cloud infrastructure technologies provide a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources. The cloud requires few provisions while delivering rapid results.

Cloud technologies can be implemented in several ways—public, private, or a hybrid combination of both—each of which addresses specific challenges. Among these options, we have seen that a private cloud provides financial institutions with more of an opportunity to achieve agility while limiting risk.

A **private cloud** leverages internal IT assets with embedded user-access controls to offer compute and storage solutions to internal tenants. It can be customised for the specific organisation it supports and still be managed by in-house staff. Requiring capital investment upfront, a private cloud can address regulatory constraints—especially around data privacy—and may be financially competitive for larger financial institutions.

A **public cloud** leverages services from one or more external cloud providers. Applications are either deployed into the cloud or provided by the third-party provider. The public cloud overcomes the barrier of initial capital investments; however, the public cloud cannot be customised to the institution itself and is shared by unrelated tenants.



of financial services institutions surveyed plan to invest in private cloud technology.²

When is the public cloud used in financial services?

While utilising a public cloud is becoming more common at financial institutions, we have observed that its use is limited mostly to key applications. These applications include email services, certain voice capabilities, as well as software as a service (SaaS) offerings that have long been adopted by the financial services industry and are now further enabled by a public cloud.

In our view, the public cloud will be of greater interest to very large players in the industry when it has reached such scale and maturity that information can be stored outside the organisation and managed as if it were inside.

² PwC, “Digital IQ Snapshot: Cloud,” March 2013, www.pwc.com

Leveraging the private cloud for data centre consolidation also serves as a catalyst to improve security, since security measures cannot be added as an afterthought when implementing the cloud.

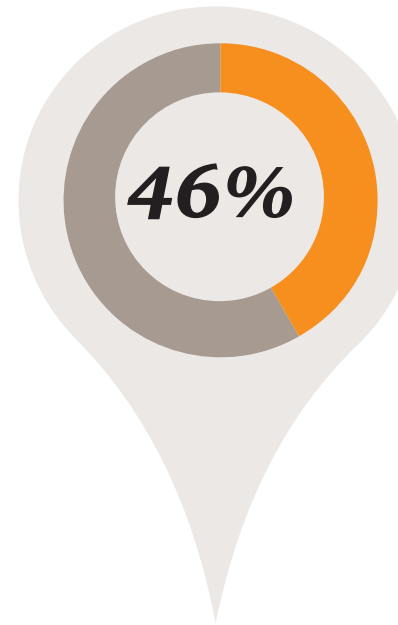
Security is a key up-front consideration when moving to a private cloud.

By its very nature, the private cloud forces IT organisations to consider security at the very foundation of the strategic planning and implementation of the data centre.

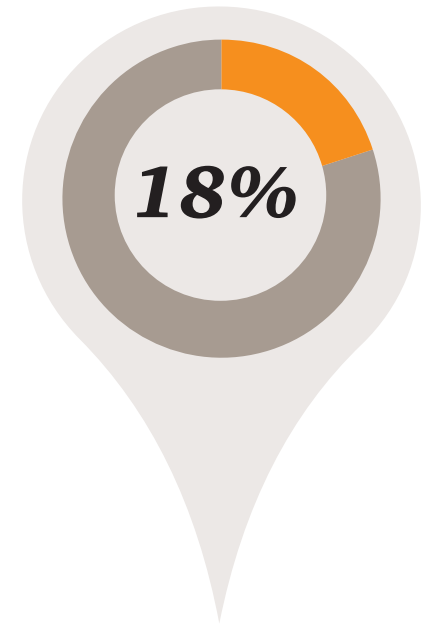
Applications that traditionally sat on separate servers are commingled on the cloud, which requires security controls to be clearly defined.

This, in turn, forces security specialists to be more involved with infrastructure from the first architecture/design working session, making it imperative for groups that formerly worked in silos to collaborate going forward.

Recognising this, institutions are increasingly focusing on security issues. However, financial services institutions are struggling to keep pace with the adoption of cloud computing. Only 28% of financial organisations surveyed have a cloud security strategy in place.



46% of all financial services respondents report that their organisation uses cloud services — and over half (53%) of those say the cloud has improved their information security.³



As it relates to security, financial institutions are struggling to keep pace with the adoption of cloud computing. Only **18%** of financial organisations surveyed include provisions for cloud in their security policy.³

³ PwC, “Defending Yesterday: Key Findings from the 2014 Global Information Security Survey ®,” September 2013, www.pwc.com/security.

When an institution strategically implements a private cloud solution that solution can help to achieve the overall objectives of the organisation—not just its IT goals.

Moving to the cloud is a complex undertaking that requires:

- Careful up-front planning.
- Organisational maturity, characterised by strong standards and controls.
- A solid business case, based on key business drivers.
- A framework that aligns technology goals with overall business objectives.
- A transformation programme that brings together business and IT as partners, to derive more benefits from cloud.

Cloud strategy should be developed with input from top management across the organisation—including the business unit leaders. Armed with the institution's business goals, along with its IT objectives, the IT organisation can move quickly to identify the appropriate path to move applications and services to the cloud.

PwC's Total IT Framework enables institutions to better understand the relationship between IT and the entire business. This increased scope of understanding enables IT to deliver innovative services and plan improvements that meet the business's needs and goals.⁴

A private cloud for data consolidation is one example of a technology solution that is most effective when designed to meet the strategic objectives of the overall business.

Total IT framework

IT strategy levers

Business
information

Technology
solutions

IT operating
model

Business strategy levers

Products

Channels

Customers

Risk and
regulation

⁴ PwC, "Rebooting your IT strategy: Using IT to accelerate your business," April 2011, www.pwc.com/fsi.



Challenges to implementation include cost related to upgrading IT architecture and of hiring cloud experts and perceived security risks.

Risks and other barriers can obstruct cloud solutions. But these can be overcome by applying a holistic approach, supported by leadership at the top.

Topic	Challenges	Solutions we have observed
Cost	<p>Building a private cloud requires a significant capital investment that can be difficult to justify—especially in times of economic uncertainty.</p> <p>Major costs include:</p> <ul style="list-style-type: none"> Architecture upgrade: Since some technologies and applications are incompatible with a private cloud, legacy and/or vendor supported applications may not be capable of taking advantage of new and better technology platforms. Hiring cloud experts: Implementing new, more sophisticated technologies requires an upgrade to the skill sets of most organisations. Cloud experts—who are rare and thus costly—will likely have to be hired to help implement the private cloud. 	<p>Make the business case: to win the support of top management—a prerequisite for the success of any cloud initiative—IT must develop a strong business case for implementing a private cloud.</p> <ul style="list-style-type: none"> Cost reduction is not the main driver of the move to cloud computing. The business case should focus instead on the immediate benefits—accelerated time to market, enhanced innovation, and increased agility—and the long-term efficiency associated with having a standardised infrastructure. Implementing quickly, starting with non-critical business activities, will help to build momentum and generate confidence in the private cloud. As successful rollouts of new services multiply, increased efficiency will become more apparent to everyone in the organisation.
Perceived security risks	<p>Due to the mistaken perception of some stakeholders that moving to a private cloud will put sensitive data at risk, financial institutions are often hesitant to take advantage of the power of the cloud.</p>	<p>Develop a thorough communications plan:</p> <ul style="list-style-type: none"> Top management should dispel the myth that a private cloud increases security risks (when, in fact, it does the opposite), and communicate its expectation that employees at all levels of the organisation will buy into the transformation. Effective, ongoing communications extolling the benefits of consolidation via a private cloud are critical to gaining buy-in across the organisation.

Risks and obstacles aside—financial institutions that engage in data centre consolidation to boost IT agility without first implementing cloud technology may find themselves at a disadvantage, falling behind competitors as the market moves rapidly forward.















Delaying the transition to cloud amplifies the following issues	Institutions that fail to leverage private cloud for global consolidation are at a competitive disadvantage	Businesses can be impacted in several important ways
Sub-par time to market	<ul style="list-style-type: none"> Institutions are unable to efficiently and effectively roll out new products. Product improvements are not timely, giving competitors an advantage. 	<ul style="list-style-type: none"> Product rollout takes months, or even years, rather than just days—thereby stagnating innovation and stanching the flow of new ideas and strategies.
Business rigidity	<ul style="list-style-type: none"> Businesses and their customers cannot benefit from the elasticity and channel flexibility that cloud consolidations can deliver. 	<ul style="list-style-type: none"> An institution's distribution model cannot be quickly changed to keep pace with changing customer preferences. Business units can lose out to their more agile competitors.
Lack of standardisation	<ul style="list-style-type: none"> Infrastructure and platforms are not standardised. There is less pressure to stop the purchase of ad hoc IT that does not conform to standards. 	<ul style="list-style-type: none"> Without standardisation, support is labor-intensive, inefficient, and costly.


Competitive intelligence

*Our observations of
industry practices.*



















Leading financial services institutions recognise that cloud technology is important and have begun—at varying paces—to transform themselves to take advantage of cloud.

Industry-leading practice	Industry-observed practices		
	Large US national bank	Global insurance company	Large capital markets institution
Transforming the infrastructure to support cloud as a standard.	 Implemented a hybrid model of software as a service (SaaS) and infrastructure as a service (IaaS).	 Recently had its first deployments of a global network of private clouds in regional infrastructure.	 Used private cloud as a vehicle to standardise as much as possible on a limited number of operating systems. Standardisation efforts introduced in dedicated environments were also being pursued.
	 Supported cloud initiatives by cleansing and modernising information architecture and automating data centre management.	 Reduced operational overhead by consolidating and standardising infrastructure on a private cloud platform.	 Virtualisation efforts undertaken in the mid-2000s have now been pursued with cloud services.
Design an agile IT infrastructure that reduces costs and enhances service offerings.	 The bank possessed the ability to quickly scale up (but not down) based on technology needs, including testing. New acquisitions were stood up quickly using a replicable model for technology and operational support functions.	 The redesigned IT infrastructure reduced the procurement process from weeks to days.	 Self-provisioning capabilities were offered to enable fast deployment of development machines.
	 The ability to scale up quickly enabled the bank to complete acquisitions in weeks vs. months.	 Full consolidation in a multi-tenant model was not established, and the business was not benefiting from better time to market; limited infrastructure sharing.	 Private cloud capacity was sized to anticipate peak usage, including seasonal request for compute capacity.
		 Sharing compute resources allowed the company to right-size environments while leveraging IaaS to dynamically add more compute/storage resources on demand.	 Had been exploring hybrid cloud and public cloud.

 Leading
  On par
  Lagging



Industry-leading practice	Industry-observed practices		
	Large US national bank	Global insurance company	Large capital markets institution
Enhancing high availability and disaster recovery capabilities through cloud computing.	 Using a cloud solution provided access to a Level 4 data centre through an industry-leading vendor without the considerable capital outlays required to build and maintain such a facility.	 Leveraging IaaS provided highly available and resilient environments critical to the online business.	 Failover was built in-cluster and was offered at multiple levels of service, from the 100% available spare capacity to degraded performance at a discounted price.
	 For disaster recovery and capacity spikes, this bank leveraged an external data centre to have a multiple-data centre approach without incurring the costs needed to build, plan, staff, and maintain internally owned remote facilities.	 IaaS resulted in standardisation across data centres providing enhanced disaster recovery capabilities.	
Utilising cloud to effectively align IT services and priorities to business objectives.	 Technology was viewed as a utility to deliver banking services, allowing business managers to focus on activities that drive revenue for the financial institution.	 Standardising platforms and providing a more dynamic environment allowed IT to focus on meeting future needs of the business.	 Private clouds were built to accommodate the vast majority of computer and storage business needs, in terms of feature set as well as service level agreements.
	 Virtualisation and automation had made significant strides, but applications had not yet been transformed to leverage that flexibility, and the business was not yet taking advantage of using the cloud.		 Dedicated environments with exception servers were still available at a typically costlier support.
Leveraging cloud to facilitate innovative solutions.	 Was able to provide customised systems to meet the bank's needs that traditionally have long implementation time frames, lacked flexibility, were complex, and would have limited the bank's ability to grow.	 Standardised to enable wider adoption of cloud and elimination of standalone computer hardware.	 Internal private cloud is used to provide flexible capacity and improve time to market for all development projects.

 Leading
  On par
  Lagging

A deeper dive into the benefits of cloud

Case studies



Case study: Working with PwC, an investment fund implemented a scalable private cloud solution, which enabled growth by acquisition.

Situation overview:

An investment fund planned to acquire multiple distressed or Federal Deposit Insurance Corporation (FDIC) failed community and regional banks in the US and to integrate them into one large national community banking franchise. The client turned to PwC for help in consolidating its post-crisis troubled bank assets into a single operation via a private cloud platform to be outsourced to a third party.

PwC helped the client to:

- Design, build, test, and implement a complete technology function appropriate for a start-up banking franchise—including core banking systems and applications, networks, e-mail, infrastructure, workstation services, service desk, security, and other aspects of technology typically found in a normal banking environment.
- Rapidly complete the technology build-out to support competitive acquisition schedules; have the banking platform ready for testing in 90 days and for production in 120 days.
- Perform business process analysis to define the banking systems (both necessary and complementary) and align them to the appropriate business processes; perform application-to-process mapping.
- Complete the acquisition of the first target community bank; build out of the central headquarters location.

Achievements and benefits:

The client met all of the project objectives set forth (see right). The acquired banks were migrated to the scalable, standardised cloud platform. Furthermore, by viewing IT as a utility or service, the investment fund was able to leverage cloud technology to improve its strategic position.

Specific benefits included: reduction in initial outlays and capital expenditures; on-demand services; greater resource capability to support its banks; faster speed to market for new acquisitions; exponential scalability; flexible staffing; greater flexibility in regard to technology decisions; access to top market facilities; and increased recovery capability.

Project objectives achieved:

Speed: Ability to quickly absorb acquisitions using a standardised technology and support models.

Scalability: Ability to support the bank's technology and operations platform as it grows to \$10 billion in assets and beyond across a geographically disbursed footprint.

Cost: A model that is cost-efficient across critical business activities, and includes volume discounts for future-state usage requirements.

Quality: A platform that is highly available, robust in features, and in compliance with regulatory and compliance requirements.

Case study: Working with PwC, a leading insurer consolidated its global IT onto a scalable, reliable private cloud platform.

Situation overview:

A multinational insurer was seeking a means of boosting international growth while supporting global IT demand via a nimble infrastructure. The insurer turned to PwC for assistance in consolidating its global IT environment via a private cloud solution. The project goal was to establish a regional data centre model with production/disaster recovery in three global regions, and then to migrate existing operations from multiple countries into their respective data centres.

PwC helped the client to:

- Design and implement a private cloud solution.
- Build and establish the proof-of-concept data centre as the target infrastructure, in a six-month period. This first data centre—ultimately to be used as a test area or lab—provided a template for each new regional data centre to be built going forward. In the next 12 months, following the same design, the insurer with PwC's assistance completed the remaining data centres, with each taking just three months.

Achievements and benefits:

The client met all the project objectives set forth (see right). Creating an engine for profitable international growth, the private cloud solution included the build-out of four data centres, three regional production centres, and one disaster recovery centre, with each taking three months.

This implementation enabled the following: improved standardisation, speed, and efficiency; improved risk management capabilities; consolidation of the IT infrastructure of 15+ countries; role-based access control and administrative segregation; the ability to meet the unique standards and requirements of each country; and compliance with the organisation's individual Payment Card Industry compliance (PCI) requirements and security management programme (SMP) controls.

Project objectives achieved:

Speed: Improved time to market and nimbleness in a growth environment.

Agility in a growth environment: Enabled quicker response to business opportunities and changing market conditions.

Scalability: Able to quickly adopt technology advances.

Cost and efficiency: Business expense reduced through standardisation and consolidation of common compute platforms; leveraged investments in technologies, facilities, and knowledge base.

Service quality: Improved current business service levels and response times.

Risk management: Stable, secure operations through uniform, consistent application of minimum policies and standards; greater disaster recovery made possible through increased levels of resiliency and automation.

A framework for response

*Our recommended
approach to the issue*



Align business and IT strategy levers—a key component of our framework for response—to improve the return on your cloud investment.

Business strategy levers

Products, channels, and customers:

- Consider how to use cloud to accelerate product development, support multiple channels, and better meet customer needs.
- Depending on your institution's market focus – product innovation, operational excellence, or customer intimacy – choose the cloud strategy that will best achieve your business objectives.
- Manage the financial aspects of the cloud initiative by focusing on the business case. If your organisation has not yet virtualised, the business case could focus on long-term savings. If you are seeking to consolidate virtual environments, increased efficiency and scalability might be the goals.

Risk and regulation:

- Manage security to meet regulatory and business requirements. Security should enable the appropriate segregation of tenants as well as the segregation of administrator duties.
- Adapt regulatory and compliance requirements, including standards and controls, to be consistent with the target environment.

IT strategy levers

Business information:

- Integrate the cloud initiative into the enterprise-wide business information model that provides guidance and data management standards for the organisation's data repositories, information sources, and client records.

Technology solutions:

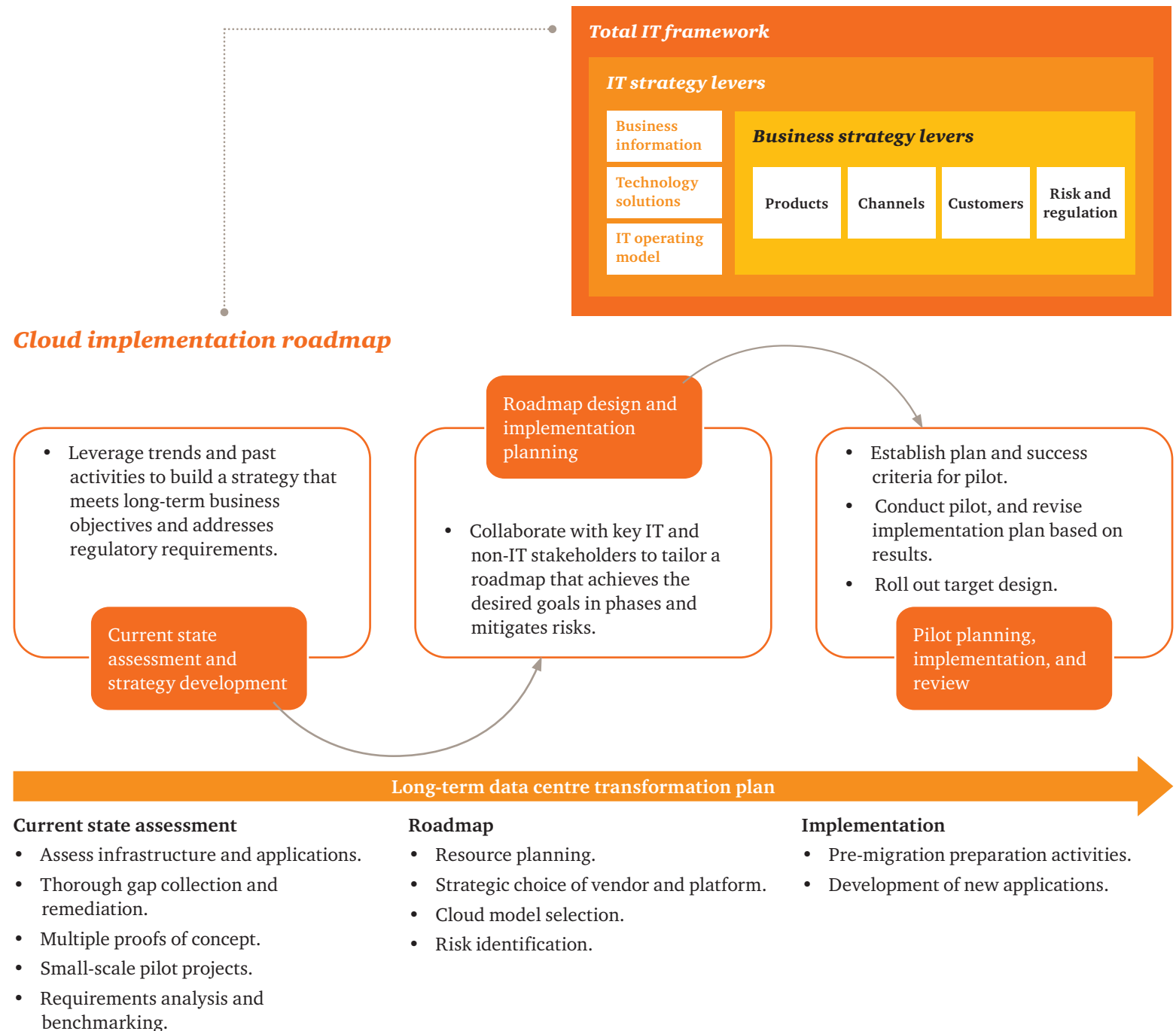
- Establish the target architecture and revise it as the cloud programme evolves so that it remains aligned with business drivers.
- Confirm IT infrastructure readiness early in the programme to facilitate the success of the migration.
- Enlist vendors of key technologies as partners that will support the overall programme from inception.

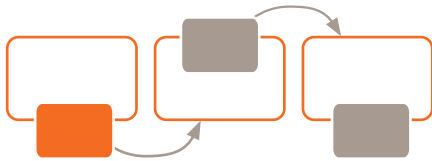
IT operating model:

- Develop a clear roadmap for implementing the transition from the old operating model, which will be transformed by the introduction of cloud capabilities.
- Establish governance of the cloud initiative and day-to-day operations in order to manage both simultaneously, and to prioritise and resolve conflicts.



Implement the cloud initiative within the context of the Total IT Framework—a holistic approach designed to align IT goals with business objectives.





Current state assessment and strategy development

Gain a deep understanding of the current IT environment, and develop a strategy for building the cloud-enabled target state environment.

Current state assessment

- Identify business, infrastructure, and application stakeholders to include in the assessment.
- Solicit objective feedback from stakeholders about business needs and readiness across people, technology, and process dimensions.
- Conduct interviews and one or more workshops to gather the required input

Strategy development

- Develop a long-term consolidation and cloud strategy that aligns IT capabilities and services with business needs and priorities.
- Measure and manage the strategy based on the maturity and willingness of the organisation to make changes.
- Build a multi-stage roadmap to guide the organisation through the consolidation process and cloud implementation.

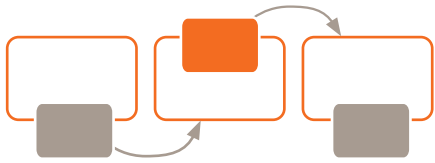
Developing a long-term consolidation and cloud strategy

Strategy components	Description
Requirements analysis	Infrastructure and application requirements must be established to enable selection of the cloud model and assessment of cloud vendor capabilities. This involves a thorough evaluation of the current on-site infrastructure and how those requirements translate into a cloud solution. The scope of the cloud implementation may range from a few applications to the entire environment. Business requirements should also be evaluated: How does the additional agility, flexibility, and responsiveness balance with costs for implementation?
Cloud model selection	Selection of a cloud model is guided by technical feasibility, security, and compliance considerations as well as business drivers for cloud adoption. The model should be selected on a cost-benefit basis that is based on current needs and future demands. The implemented cloud solution should provide a tangible benefit over the current infrastructure, while also considering the risks and compliance issues associated with financial services regulations.



Developing a long-term consolidation and cloud strategy

Strategy components	Description
Assessment of application readiness	<p>This step is one of the most critical in planning for cloud transformation. Applications must be able to work with cloud the same way they work in the physical worlds which means that:</p> <ul style="list-style-type: none">• Infrastructure layer is abstracted (e.g., logical addressing, no hard coding).• Failover is controlled at application level (e.g., no storage-based failover).• Middleware farms are enabled on the cloud.• Security/authentication/authorisation solutions are in the cloud.• Platforms and operating systems are standardised.
Instrumentation	<p>Whether internal and/or external, the cloud solution must be set up to enable enterprise-level support and management, including but not limited to:</p> <ul style="list-style-type: none">• Automated alerts when service levels are at risk or broken.• Utilisation and capacity management.• Performance monitoring, reporting, and tracking.• Change management.
Vendor strategy	<p>Various vendor options are available, including pure-play cloud providers, information technology outsourcing (ITO) vendors with cloud capabilities, and cloud management service providers. Vendor lock-in is a key consideration. A thorough evaluation of the vendor's scalability is essential to help establish a solution that would be suitable for future use. In the financial services marketplace, the ability of the vendor to provide high-performing security tools and significant customisation may also be critical.</p>
Benchmarking	<p>Careful benchmarking of current operational and financial metrics is crucial to realising business value from a cloud transformation. Cloud transformation should enable institutions to better serve customers with faster responses and more reliable platforms. In addition to current metrics, it is also important to confirm the uptime provided by cloud vendors to demonstrate that the availability will meet the organisation's needs.</p>
Transition management	<p>Moving to a cloud infrastructure represents a significant architectural and operational shift. As such, it requires thorough change management and establishment of a cloud operating model. Input from the chief technology officer (CTO), business stakeholders, and legal teams is essential to a successful transition. Additionally, managing internal users and support teams is paramount to promote a smooth transition and maintain operating capacity. Moving to the cloud has the potential to produce some internal resistance as infrastructure and IT support may be reduced.</p>



Roadmap design and implementation planning

Design a roadmap and implementation plan that will enable the organisation to capitalise on short-term opportunities and meet long-term business objectives.

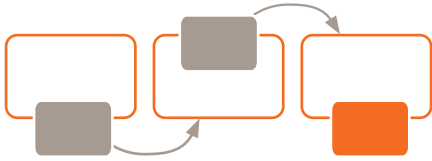
Roadmap design

- Leverage the results of the current assessment and strategy development to build a roadmap with recommendations for capitalising on 'quick win' opportunities and implementing long-term, sustainable changes.
- Identify high-level business benefits and costs associated with recommended improvements.
- Plot the recommendations on a prioritisation matrix that depicts the level of benefit and change. Illustrate the sequencing of implementation of the recommendations.
- Develop an executive presentation summarising recommendations for implementation.

Implementation planning

- Based on the roadmap recommendations, create an implementation plan for capitalising on 'quick wins' and meeting long-term business objectives.
- Confirm the conceptual architecture for the new IT environment.
- Develop engineering design principles for network, computing, security, and storage.
- Develop a target logical design for each data centre and for the global network.
- Assess and approve the target design.
- Identify key performance metrics for testing.





Launch a pilot of the cloud-enabled data centre consolidation to demonstrate the technological fit for the organisation.

Pilot implementation and review

Pilot planning

- Focus first on non-mission-critical data and platforms, and then move up the stack. Identify systems and applications that make sense to consolidate. Most financial institutions begin with developer applications, email, change management systems, and configuration management systems.
- Continue to research cloud-based solutions, to maintain the agility required to adapt to market moves, and to stay ahead of competitors that also leverage the cloud.
- Evaluate internal talent. Does the organisation have the right skills to manage the new cloud environment? Does it have sufficient resources to train existing staff in cloud technologies? Can vendor resources fill any existing skills gaps?

Pilot implementation and review

- Develop both quantitative and qualitative criteria for the success of the pilot based on business requirements and drivers. Focus on quantitative criteria such as performance-based information, and qualitative measures of success, such as the level of process acceptance, and feedback from those involved in day-to-day operations. Build and execute the pilot and conduct testing, with a strong emphasis on user acceptance testing. Modify the pilot as needed based on test results.
- In addition to focusing on design validation—the main goal of the pilot—test one or two applications, if possible, to gauge the impact of the consolidation on their performance.
- Revise the design based on the results of the pilot, and prepare to roll out the data centre consolidation programme.

How can PwC help

*Our capabilities and
tailored approach*



PwC Financial Services CIO Advisory

Business complexity, broader technology adoption, and increasing expectations have forced a shift in the role of IT.

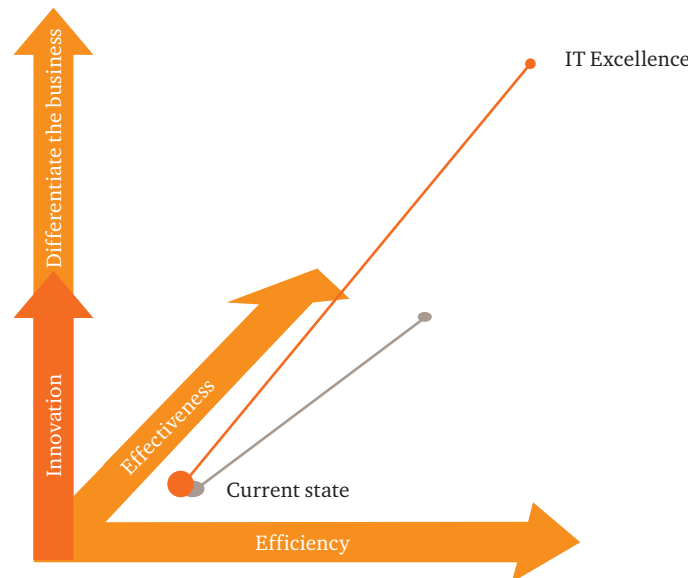
In the past, CIOs were focused on efficiency—e.g., supporting the business with optimal operational performance process changes to support the business strategies.

Now CIOs are also expected to advance the business by developing flexible capabilities to increase effectiveness—thereby enabling the business to grow.

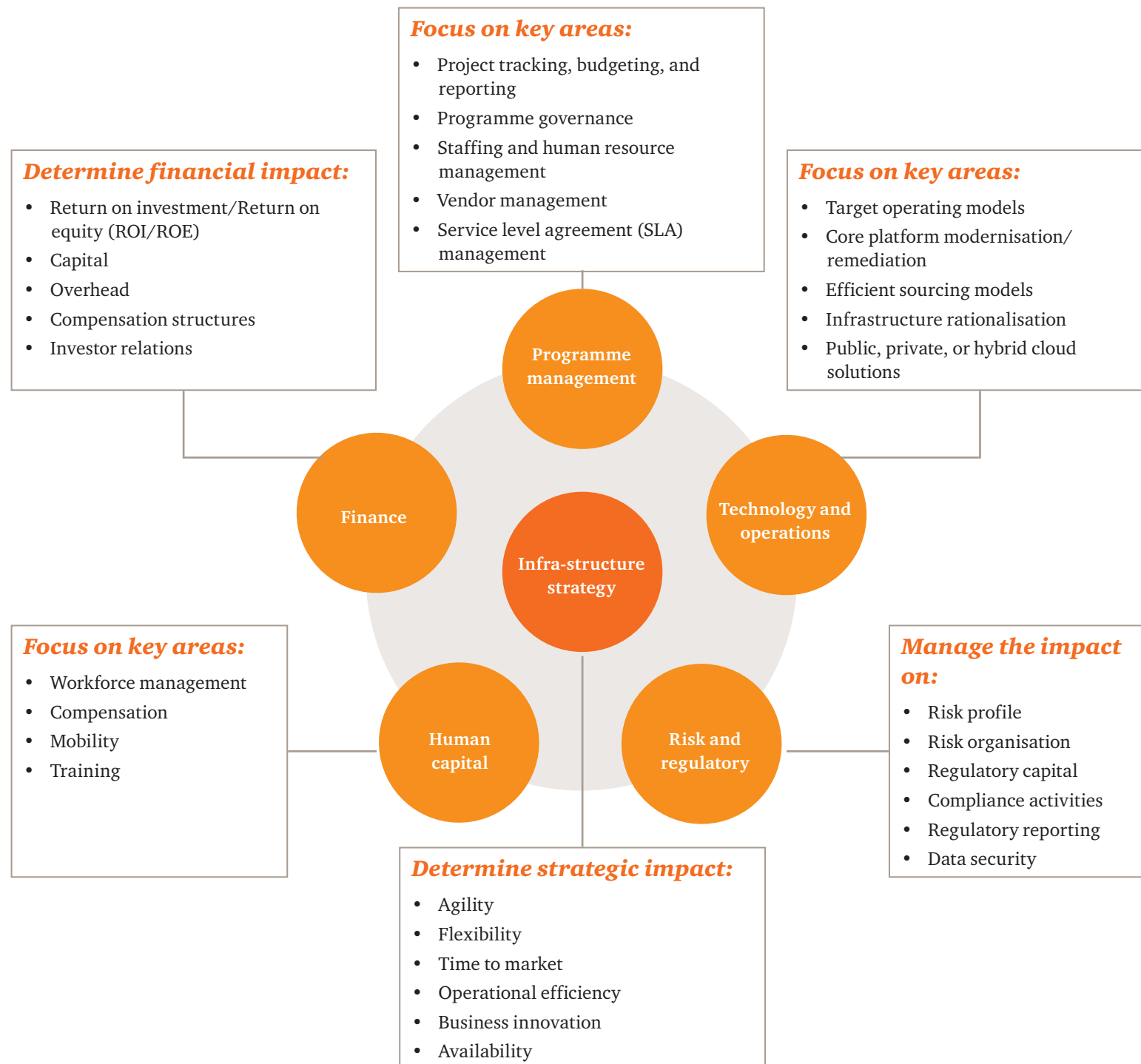
There is an increasing expectation to drive innovation—e.g., adopting new technologies to differentiate the business. Our CIO Advisory solutions help achieve IT

excellence and create sustainable business advantage by:

- Setting the course through strategy definition, enterprise architecture development, and organisation design.
- Driving business/IT transformation through strategic leadership and adoption of innovative IT solutions.
- Improving IT operations and infrastructure investments through integration of automated processes/tools.
- Providing improved business capabilities through accelerated application development, improved IT service management, and computing technologies.



The PwC infrastructure practice has a specialised cross-functional group to assist our clients with their issues related to technology, operations, legislation, regulations, and the market.



*What makes PwC's
Financial Services
practice distinctive.*

Integrated global network	PwC's Financial Services practice consists of more than 34,000 industry-dedicated professionals worldwide, including more than 4,050 in the UK. We serve large and multinational banks, insurance companies, investment managers, broker-dealers, hedge funds, and payments organisations. The UK Financial Services practice is part of the PwC global network, which has clients in more than 150 countries.
Extensive industry experience and resources	PwC serves more of the biggest and most complex financial services institutions than any other firm. We understand from personal experience the wide variety of business issues that affect the industry, and we apply our knowledge to our clients' individual circumstances. Moreover, our large, integrated global network of industry-dedicated resources enables us to apply this knowledge on our clients' behalf whenever and wherever they need it.
Multidisciplinary problem solving	The critical issues that financial services institutions face today affect their entire business. Addressing these complexities requires both breadth and depth, and PwC teams include experienced professionals in risk management, compliance, technology, business operations, finance, change and programme management, data and business analytics, economics and analysis, internal audit, tax, forensics, and investigations.
Practical insight into critical issues	In addition to working directly with clients, our practice professionals and Financial Services Institute (FSI) regularly produce surveys and thought leadership on the critical issues that face the industry. These publications—as well as the events we stage—provide clients with new intelligence, perspective, and analysis on the trends that affect them.
Focus on relationships	PwC's size, financial stability, and 150-year history all contribute to our long-term view of client relationships. We help clients translate strategy into action by helping them address their challenges in finance, tax, human resources, operations, technology, and risk and compliance.

Appendix

Select qualifications



*Consolidated data centre
by developing a utility
computing framework
and implementing a data
automation tool—Global
bank*

Issues

A top global bank wanted to cut operating expenses and increase efficiency without compromising the quality of its technology services. PwC proposed a utility computing solution and transformation programme, which included selecting and deploying a data centre automation tool for server and application lifecycle management.

Approach

The PwC team helped the bank develop a private cloud to support a utility computing strategy and framework for its midrange servers to enable the bank to apply this framework consistently against its current and future utilities.

PwC supported the client in developing not only the architecture and design principles for the private cloud, but also the instrumentation to support the utility computing features including self-provisioning, self-decommissioning, monitoring, reporting, and invoicing.

Next, the PwC team helped the client select a data automation tool, which included lab testing on three vendor products. Upon selection of a data automation tool, PwC assisted the client through to implementation, helping the bank develop a phased project plan and providing technical assistance with the design of the tool's infrastructure and application management.

Finally, PwC worked in collaboration with the client to develop user manuals and training guides for the new systems. This effort was part of the transformation of the IT model from a traditional hardware-based model to a utility-based platform supporting current business and growth, in particular newly acquired financial institutions. Critically, this platform is a core enabler of the acquisition of new assets and accelerated consolidation of the IT infrastructure and data centres onto the private cloud.

Benefits

The bank has completed Phase 1 of implementing the data automation tool supporting its private cloud strategy. The tool provides automatic provisioning and patching solutions.

Upon completion of the data centre automation solution, the bank will realise estimated annual savings of £15 million in personnel hours and reduced downtime, and it will recognise an additional £1.8 million in annual operating expense cuts.

Consolidated global data centres onto a cloud-ready infrastructure, leaving institution poised to absorb additional growth—Multinational insurer

Issues

Following the acquisition of independent insurance operations in several continents, a major multinational insurer was operating over 100 offices in 20 countries. In order to develop operational and cost synergies and economies of scale to position the institution for sustainable and profitable international growth, the insurer's global subsidiary launched a global data centre consolidation initiative.

Approach

PwC was brought in to help design a cloud-ready infrastructure that would be used in each of its regional data centres. This infrastructure is cloud-ready in the sense that it is heavily virtualised, offering multiple infrastructure-as-a-service options, and architected for multi-tenancy with a cohesive set of tools supporting role-based access and segregation of tenants.

Subsequently, PwC helped implement, build, and test three global regional data centres and a global disaster recovery site before supporting the actual migration of the newly built infrastructure. While automation of provisioning was not yet offered, the plan was to enable such capabilities once the migration was complete and the tenants were in production on the new infrastructure.

Benefits

As a result of the accelerated consolidation of country activities into a single infrastructure, the insurer is on track to realise its goal of achieving efficient, scalable growth. Approximately 30 data centres are being consolidated into four, supporting a private cloud platform as a result.

Additionally, the client is well positioned to create a strong, centralised IT organisation and to put local resources immediately to work in the new infrastructure.

www.pwc.co.uk/financial-services

To have a deeper conversation, please contact:

David Edelheit

+44 (0)20 7213 5989

david.l.edelheit@uk.pwc.com

.....

John Lyons

+44 (0)7590 351933

john.r.lyons@uk.pwc.com

.....

Robert Kirkwood

Director

+44 (0)7590 352490

robert.k.kirkwood@uk.pwc.com

.....

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