fs viewpoint

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July 2013

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Clouds in the forecast

Cloud—a necessary component of data center consolidation and IT agility

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Point of view

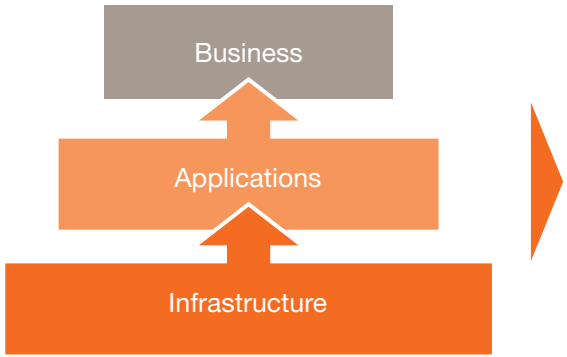
Following a hailstorm of M&A activity, financial institutions are facing a critical need to consolidate their data centers. At the same time, IT agility has also become critically important, particularly in institutions that are under intense pressure to transform their technology.

Today's institutions are facing dual pressures: to consolidate their data centers 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 center 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 standardized application and development environments, resulting in better controlled and more efficient application lifecycles.

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.

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:

71%

of financial services respondents say they will invest more in cloud this 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 center.

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 virtualized computing environment for its development activities, enabling the creation of 30-day temporary virtual machines (VM) for testing purposes in 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 center 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 centers. A private cloud infrastructure was chosen from the inception of the project to standardize 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 center 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 program 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 program 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 organizational 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 standardize 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 organization'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.

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

In the mid-2000s, financial institutions claimed the cost savings related to adopting virtualization. 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 standardized IT infrastructure.

Today's institutions are recognizing 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 virtualization, 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

Business information:

- Enterprise-wide business information model— providing guidance and data management standards for the organization's data repositories, information sources, and client records—better supported by integration of the cloud initiative.

Technology solutions:

- Ongoing revision of target architecture as the cloud program evolves equals ongoing alignment with business drivers.
- Early confirmation of IT infrastructure readiness establishes success of migration.
- Overall program 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 prioritize 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 center 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 centers. A private cloud standardizes 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 center 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:

Accelerate time to market.

- Immediate access to computing and storage resources.
- Rapid provisioning of virtual servers to keep pace with changing workloads.
- Greater ability to resolve challenges and improve service consistency.

Innovate with the business.

- IT barriers to innovation lowered.
- Alignment of flexible IT infrastructure with changing business demands.
- More agile and reliable technology management.

Respond rapidly to changes in demand.

- Ability to scale services up or down based on group demands.
- Automated scaling driven by pre-defined service-level agreements (SLAs).

Use IT assets more efficiently.

- Resources pooled to create system efficiencies.
- Pay-per-use based on demand cycle.
- Adopters of private cloud significantly improved asset utilization, while adopters of public clouds turned capital expenses into operating expenses.

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

50% of financial services institutions surveyed plan to invest in private cloud technology.[1]

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 customized for the specific organization 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 customized to the institution itself and is shared by unrelated tenants.

When is the public cloud used in financial services?

While utilizing 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 organization and managed as if it were inside.

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

Leveraging the private cloud for data center 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 organizations to consider security at the very foundation of the strategic planning and implementation of the data center.

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.

Recognizing 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 organizations surveyed have a cloud security strategy in place.[2]

40% of all financial services respondents report that their organization uses cloud services–and nearly half (48%) of those say the cloud has improved their information security.[1]

As it relates to security, financial institutions are struggling to keep pace with the adoption of cloud computing.
Only **28%** of financial organizations surveyed have a cloud security strategy in place.[2]

1 PwC, "Eye of the Storm: Key Findings from the 2012 Global Information Security Survey®," September 2011, www.pwc.com/security.

2 PwC, "Changing the game: Key findings from The Global State of Information Security® Survey 2013," September 2012, www.pwc.com/security.

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

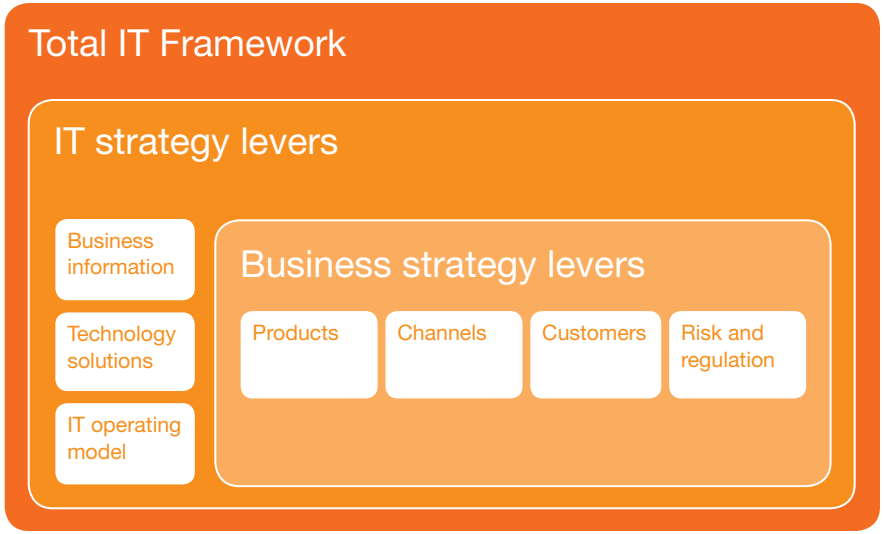
Moving to the cloud is a complex undertaking that requires:

- **Careful up-front planning.**
- **Organizational maturity, characterized 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 program 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 organization—including the business unit leaders. Armed with the institution's business goals, along with its IT objectives, the IT organization 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.[1]

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.



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

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

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

Topic	Challenges	Solutions we have observed
Cost	**Building a private cloud requires a significant capital investment that can be difficult to justify—especially in times of economic uncertainty.** **Major costs include:** • *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 organizations. Cloud experts—who are rare and thus costly—will likely have to be hired to help implement the private cloud.	**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.** • 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 standardized 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 organization.
Perceived security risks	**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.**	**Develop a thorough communications plan:** • 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 organization 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 organization.

Risks and obstacles aside—financial institutions that engage in data center 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	• Institutions are unable to efficiently and effectively roll out new products. • Product improvements are not timely, giving competitors an advantage.	• Product rollout takes months, or even years, rather than just days— thereby stagnating innovation and staunching the flow of new ideas and strategies.
Business rigidity	• Businesses and their customers cannot benefit from the elasticity and channel flexibility that cloud consolidations can deliver.	• 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 standardization	• Data and application platforms are not standardized. • There is less pressure to stop the purchase of ad hoc IT that does not conform to standards.	• Without standardization, support is labor-intensive, inefficient, and costly.

Competitive intelligence

Our observations of industry practices.

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

Industry-leading practice	Industry-observed practices		
	Large 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). Supported cloud initiatives by cleansing and modernizing information architecture and automating data center management.	Recently had its first deployments of a global network of private clouds in regional infrastructure. Reduced operational overhead by consolidating and standardizing infrastructure on a private cloud platform.	Used private cloud as a vehicle to standardize as much as possible on a limited number of operating systems. Standardization efforts introduced in dedicated environments were also being pursued. Virtualization 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 ability to scale up quickly enabled the bank to complete acquisitions in weeks vs. months.	The redesigned IT infrastructure reduced the procurement process from weeks to days. Full consolidation in a multi-tenant model was not established, and the business was not benefiting from better time to market, limited infrastructure sharing. Sharing compute resources allowed the company to right-size environments while leveraging IaaS to dynamically add more compute/storage resources on demand.	Self-provisioning capabilities were offered to enable fast deployment of development machines. Private cloud capacity was sized to anticipate peak usage, including seasonal request for compute capacity. Had been exploring hybrid cloud and public cloud.

Leading On par Lagging

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

Industry-leading practice	Industry-observed practices		
	Large 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 center through an industry-leading vendor without the considerable capital outlays required to build and maintain such a facility. For disaster recovery and capacity spikes, this bank leveraged an external data center to have a multiple-data center approach without incurring the costs needed to build, plan, staff, and maintain internally owned remote facilities.	Leveraging IaaS provided highly available and resilient environments critical to the online business. IaaS resulted in standardization across data centers providing enhanced disaster recovery capabilities.	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.
Utilizing 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. Virtualization 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.	Standardizing 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. Dedicated environments with exception servers were still available at a typically costlier support.
Leveraging cloud to facilitate innovative solutions.	Was able to provide customized 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.	Standardized 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.

Project objectives achieved

Speed: Ability to quickly absorb acquisitions using a standardized 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.

Situation overview:

An investment fund planned to acquire multiple distressed or Federal Deposit Insurance Corporation (FDIC) failed community and regional banks 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 the central headquarters location.

Achievements and benefits:

The client met all of the project objectives set forth (see left). The acquired banks were migrated to the scalable, standardized 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.

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

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 standardization 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.

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 center model with production/disaster recovery in three global regions, and then to migrate existing operations from multiple countries into their respective data centers.

PwC helped the client to:

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

Achievements and benefits:

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

This implementation enabled the following: improved standardization, 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 organization's individual Payment Card Industry compliance (PCI) requirements and security management program (SMP) controls.

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 organization has not yet virtualized, 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 organization's data repositories, information sources, and client records.

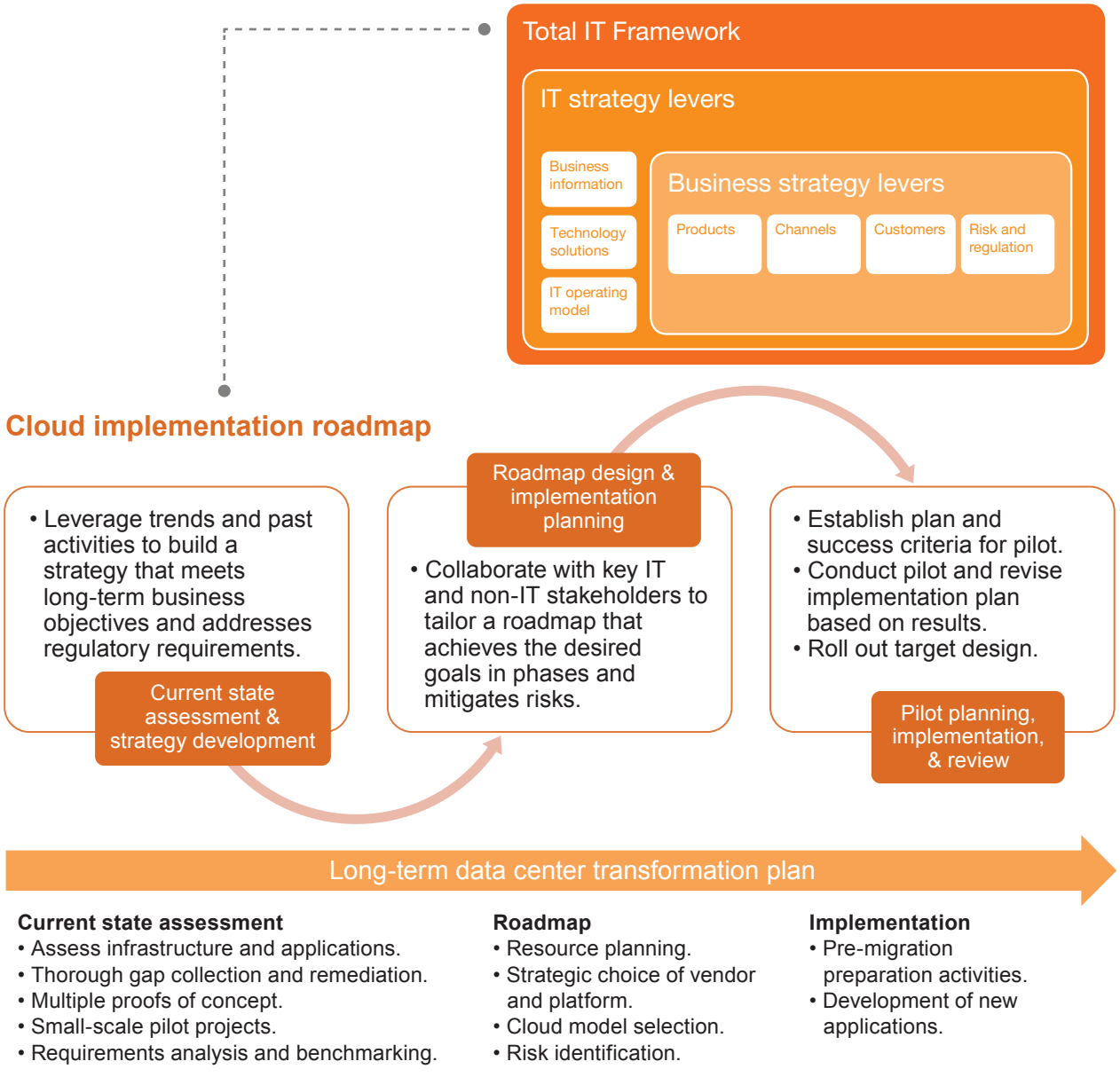
Technology solutions:

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

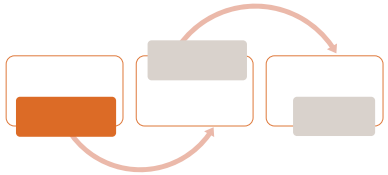
IT operating model:

- 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 prioritize 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.

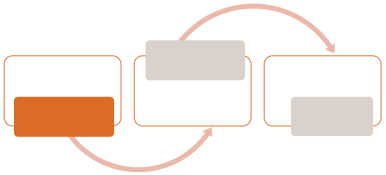
Strategy development

- 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 organization to make changes.
- Build a multi-stage roadmap to guide the organization 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.

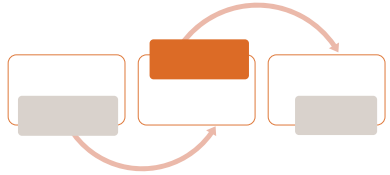
Current state assessment and strategy development *(continued)*



Developing a long-term consolidation and cloud strategy

Strategy components	Description
Assessment of application readiness	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: • 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/authorization solutions are in the cloud. • Platforms and operating systems are standardized.
Instrumentation	Whether internal and/or external, the cloud solution must be set up to enable enterprise-level support and management, including but not limited to: • Automated alerts when service levels are at risk or broken. • Utilization and capacity management. • Performance monitoring, reporting, and tracking. • Change management.
Vendor strategy	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 customization may also be critical.
Benchmarking	Careful benchmarking of current operational and financial metrics is crucial to realizing 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 organization's needs.
Transition management	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.

Roadmap design and implementation planning



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

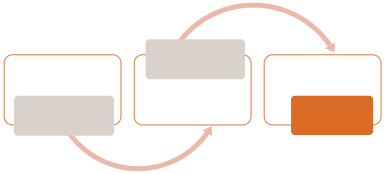
Roadmap design

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

Implementation planning

- Based on the roadmap recommendations, create an implementation plan for capitalizing on "quick hits" 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 center and for the global network.
- Assess and approve the target design.
- Identify key performance metrics for testing.

Pilot implementation and review



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

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 organization 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 center consolidation program.

How PwC can help

Our capabilities and tailored approach.

PwC Financial Services CIO Advisory

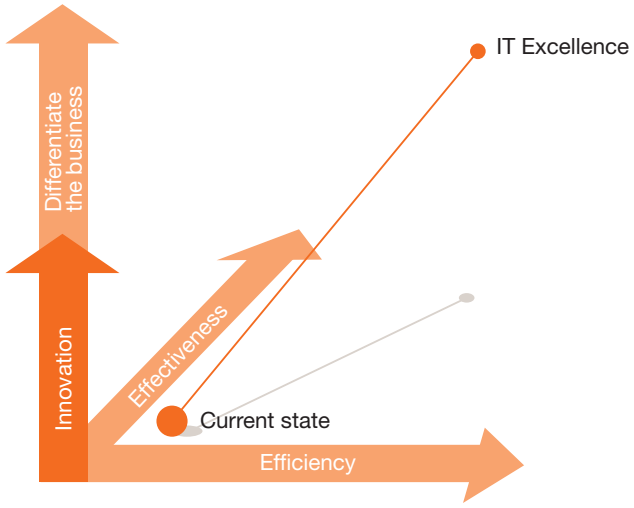
Business complexity, broader technology adoption, and increasing expectations have forced a shift in the role of IT.

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 organization 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 specialized cross-functional group to assist our clients with their issues related to technology, operations, legislation, regulations, and the market.

Determine strategic impact:

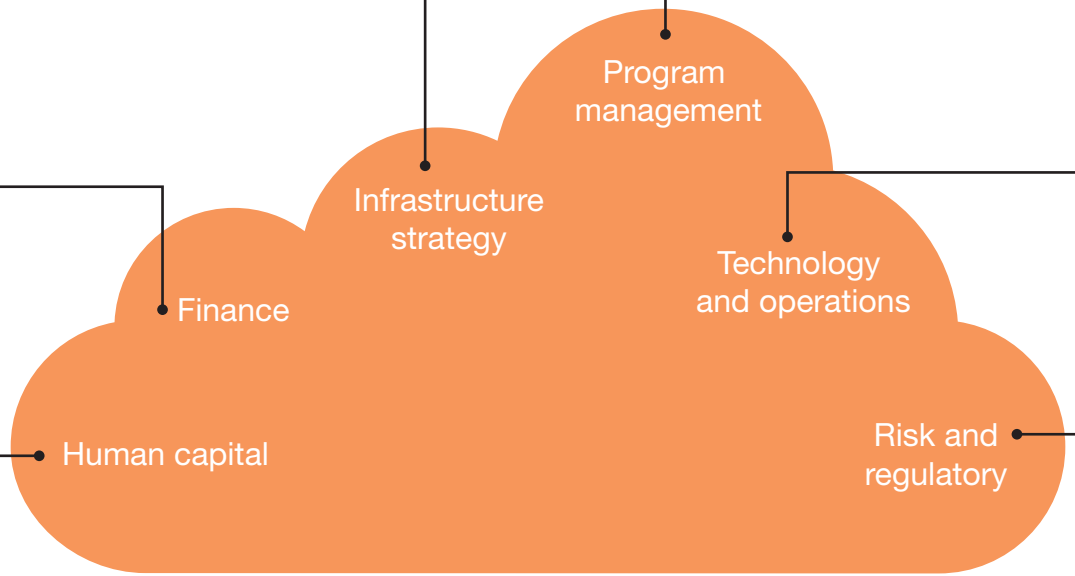
- Agility
- Flexibility
- Time to market
- Operational efficiency
- Business innovation
- Availability

Determine financial impact:

- Return on investment/Return on equity (ROI/ROE)
- Capital
- Overhead
- Compensation structures
- Investor relations

Focus on key areas:

- Workforce management
- Compensation
- Mobility
- Training



Focus on key areas:

- Project tracking, budgeting, and reporting
- Program governance
- Staffing and human resource management
- Vendor management
- Service level agreement (SLA) management

Focus on key areas:

- Target operating models
- Core platform modernization/remediation
- Efficient sourcing models
- Infrastructure rationalization
- Public, private, or hybrid cloud solutions

Manage the impact on:

- Risk profile
- Risk organization
- Regulatory capital
- Compliance activities
- Regulatory reporting
- Data security

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 4,500 in the United States. We serve large and multinational banks, insurance companies, investment managers, broker-dealers, hedge funds, and payments organizations. The US Financial Services practice is part of the PwC global network, which has clients in more than 150 countries.
Extensive industry experience	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 service teams include experienced professionals in risk management, compliance, technology, business operations, finance, change and program 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 client 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.

Creation of the first cloud-based bank—Regional bank

Issues	The client had planned the unprecedented acquisition and integration of several distressed or Federal Deposit Insurance Corporation (FDIC) failed community and regional banks into a large national community banking franchise. The client sought to develop a new centralized banking platform from the ground up to reinforce its centralized design, and to implement a ground-up banking platform capable of rapid scaling to accommodate multiple acquisitions.
Approach	PwC helped design and implement an end-to-end banking platform. PwC also helped to establish that the new platform met regulatory requirements to allow regulators to sign off for acquisitions to move forward. PwC assisted in the integration through: the application recommendation, systems design, cloud design, outsourcing/vendor selection, project management, vendor management, and compliance requirements. The PwC team helped develop a cloud-based design with the banking systems built in a virtual, outsourced, private cloud environment, and developed a workstation services environment consisting of regional outsourced support, remote support models, and virtual desktop/application infrastructure.
Benefits	With PwC's assistance with the vendor and technology selection processes, the platform was developed and in testing within 90 days of vendor selection and contract signature. The banking platform went live as expected, within 120 days of acquisition closing and with no significant interruption in customer or banking operations. Flexibility of the cloud-based bank allowed for three additional acquisitions to be completed within the same year. Compliance to regulatory requirements was maintained throughout the process, reducing risk of compliance issues and allowing continued participation in the lucrative FDIC bidding processes. The client has maintained PwC as a key partner in acquisitions and technology projects since the completion of this project.

Consolidated data center 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 program, which included selecting and deploying a data center automation tool for server and application life cycle 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 centers 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 center automation solution, the bank will realize an estimated annual savings of $25 million in personnel hours and reduced downtime, and it will recognize an additional $3 million in annual operating expense cuts.

Consolidated global data centers 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 center consolidation initiative.
Approach	PwC was brought in to help design a cloud-ready infrastructure that would be used in each of its regional data centers. This infrastructure is cloud-ready in the sense that it is heavily virtualized, 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 centers 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 is complete and the tenants are 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 realize its goal of achieving efficient, scalable growth. Approximately 30 data centers are being consolidated into four, supporting a private cloud platform as a result. Additionally, the client is well positioned to create a strong, centralized IT organization and to put local resources immediately to work in the new infrastructure.

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"Clouds in the forecast: Cloud—a necessary component of data center consolidation and IT agility," PwC FS Viewpoint, July 2013. www.pwc.com/fsi

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