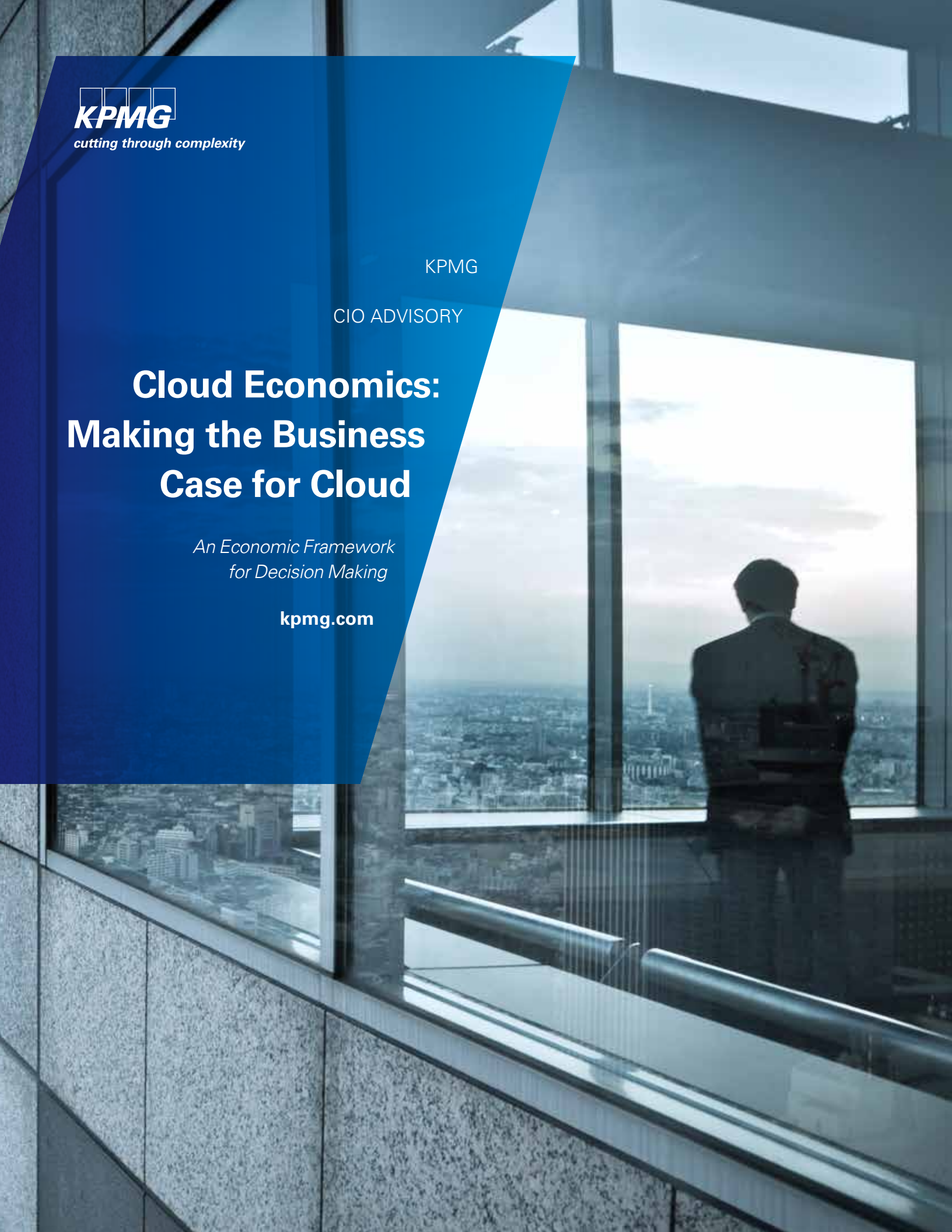

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cutting through complexity

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CIO ADVISORY

Cloud Economics: Making the Business Case for Cloud

An Economic Framework for Decision Making

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The Attraction of the Cloud

Cloud computing can enable innovation, dramatically reduce capital and operating costs, increase agility, and reduce time to market for new products and services. The cloud delivers benefits to both the business, through enablement, and IT via operational improvements. In fact, it is often an individual business unit that is leading the enterprise and IT towards cloud adoption.

Cost Savings May Be Significant

With typical IT organizations spending over 30% of their budget on infrastructure (primarily data centers and data networks), shifting some or all of this work to the cloud can save organizations anywhere from 10-20% of their annual IT budget, savings that can either be returned to the firm or reinvested in growth and innovation.

This cloud run-rate economic advantage comes from two primary cost drivers: higher utilization rates as a result of a significant drop in "capacity hoarding" and **lower unit costs** from the increased scale, newer technologies, best practices, and improved operational efficiency of the cloud providers. The **cost of ownership gap of 30 to 40%** between traditional IT and public cloud services is predicted to continue, if not widen, over the next few years, driving growth in the market for high-quality and secure externally-hosted cloud capacity at over 40% per year (see Figure 1).[1]

Capacity hoarding occurs primarily as a result of organizations not being able to accurately forecast their future capacity needs coupled with the typically long lead times to provision new infrastructure. Rather than risk the potential of not having sufficient capacity when needed, excess capacity is held back. Cloud technologies are "elastic" and provide the ability to add (and subtract) capacity quickly and easily. This eliminates the need to hoard capacity (with the resulting cost).

Business and IT Benefits Go Beyond Cost

For the business, the cloud represents an opportunity to break away from being locked into the perceived high-cost, slow-to-respond captive IT organization. Specifically, business users expect the cloud will enable them to:

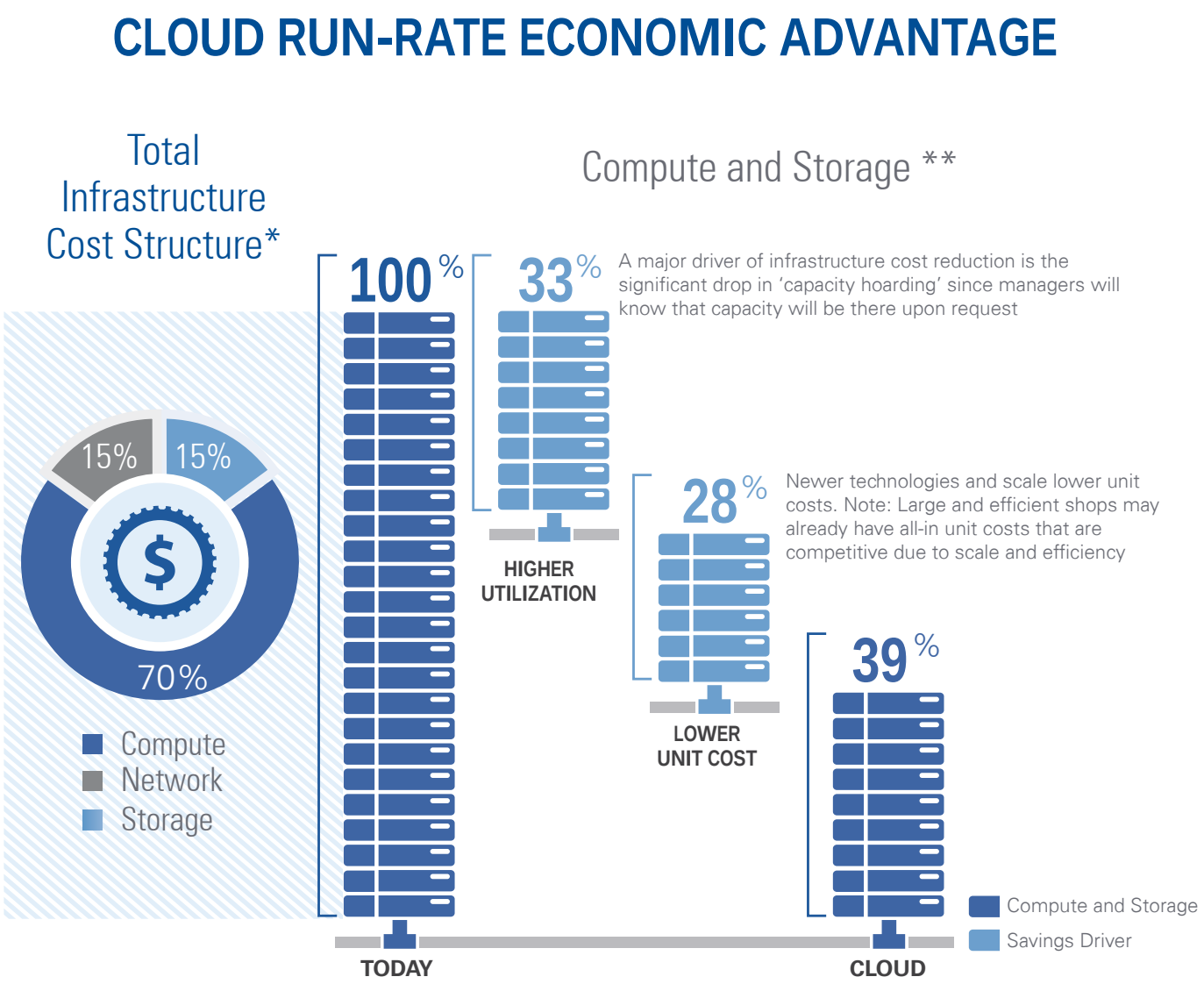
- Satisfy customer expectations for more and better services through online and mobile channels, faster and more flexible delivery, and greater product selection
- Innovate by leveraging mobility, social media, the cloud, big data, and other disruptive technologies
- Lower the cost of business operations through operational excellence
- Improve financial performance and its basis for competitive advantage
- Allow greater focus on core competencies by outsourcing non-core activities and freeing up capital, i.e., shifting CapEx to OpEx

From the IT perspective, the cloud presents an opportunity to capture operational benefits that increase efficiency and lower costs including:

- Increase speed-to-provision new services
- Satisfy on-demand surge capacity
- Lower cost through scale and higher utilization

[1] Source: Forbes/Gartner, February 2013

Figure 1a: Implementation of IaaS can save 30–60% of IT infrastructure costs

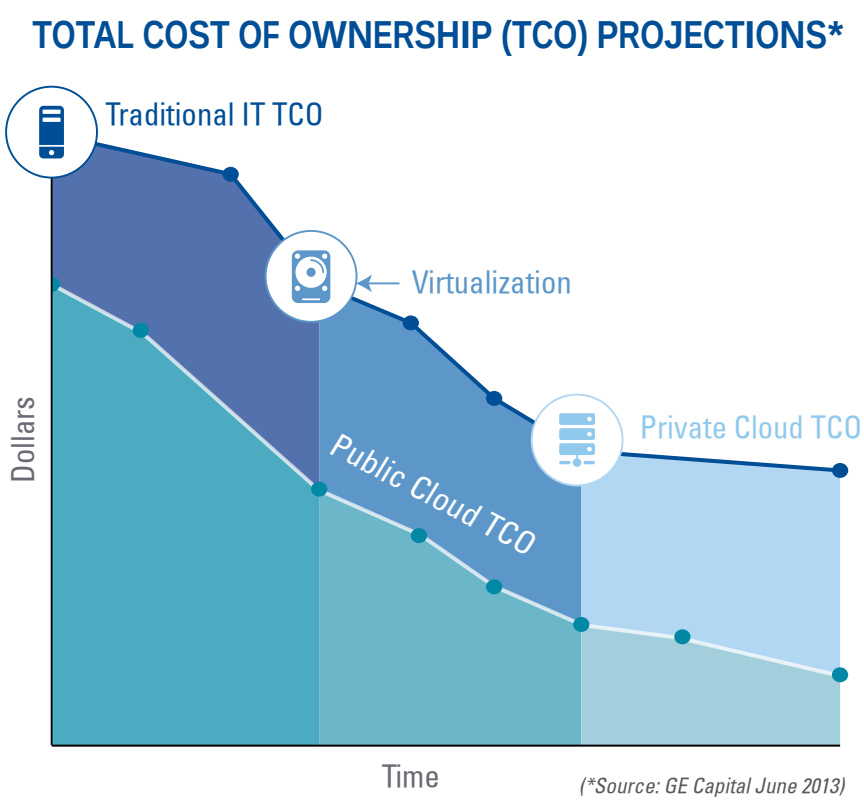


** Includes prorate share of facilities, until and labor costs supporting compute, storage and network capacity (approx $17 million)*

(Source: KPMG Analysis)

*** Based on total run-rate cost of $15 million per year*

Figure 1b: Total cost of ownership projections



- Buy high-value solutions without having to buy and manage the underlying infrastructure, i.e., software-as-a-service (SaaS).
- Improve resilience and diversity, operations, and disaster recovery.

These favorable benefits have given rise to four key trends that are driving infrastructure to the cloud. These trends include:

Software running on cloud is becoming the de facto standard. According to Forrester Research, SaaS has now overtaken on-premises solutions in categories such as human capital management (HCM), customer relationship management (CRM), and collaboration. Solutions once available with several different deployment options are now SaaS only, e.g., Oracle RightNow and SAP Ariba seldom offer on-premises anymore.[2]

Major share of all new servers are going to cloud providers. IDC expects 25% to 30% of all the servers shipped next year will be delivered to cloud providers. By 2017, this will be nearly 45%.[3] People are buying SaaS and capacity is shifting into cloud service providers. As a result of adopting SaaS and virtualization, one company avoided buying 200 new servers representing 20% of the current installed base across three data centers.

[2] Source: Forrester – Predictions For 2014: Cloud Computing
[3] *Computerworld*, Dec 2013

Developers are increasingly building apps in the cloud. The latest Forrsights surveys show that nearly 50% of business-unit-aligned developers already are building, or will build, apps in the cloud by the end of 2014; 55% of their peers in IT operations consider private cloud a top infrastructure priority; and 31% plan to adopt public cloud infrastructure-as-a-service (IaaS) in the coming year.[4]

Public cloud is the default backbone for "The Internet of Things".[5] The Internet of Things (IoT) will generate billions of data points in 2014, and aggregating this data and acting on its findings will best be achieved by capturing, analyzing, and responding from the cloud. If you want to analyze billions of inputs in real time or near real time, you won't want to pull the data back to your data center. With cloud-based Hadoop[6] and SaaS-based BI solutions proliferating, it's becoming hard to justify bringing this data down to analyze it.[7]

It is no wonder that many organizations, from small start-ups to global enterprises, are interested in capturing the benefits that cloud computing can deliver, but unless you are a startup with a blank canvas a major challenge exists—translating those favorable economic benefits into tangible bottom-line benefits given large sunk investments in existing infrastructure and legacy applications.

Greater Adoption Requires Overcoming the CapEx Conundrum

Today, IT capital infrastructure investments (CapEx) must compete with the general best use of the enterprise's available capital (including share buy-back for publicly held companies). As a result, there are compelling reasons for CIOs to transition from high-cost, internally provided compute infrastructure services in favor of more highly utilized and lower-cost public cloud provided services.

The challenge facing these CIOs is the significant existing legacy investment in servers, storage, and data centers that cannot be easily divested, especially for the most recent acquisitions, a condition we call the CapEx conundrum. This will require CIOs to build a persuasive business case and value proposition to present to the senior business leadership including the CFO. Failure to make the case will likely doom the organization to a downward spiral of high-cost internally provisioned infrastructure and associated structural cost disadvantage to its competitors that will worsen over time. Additionally, and perhaps an even larger problem, is the opportunity cost to the business resulting from a lack of speed and agility.

The cloud business case needs to address a number of key strategic business and technology questions to overcome this hurdle. For example, the cloud is not just about lower costs, what about driving business growth and increasing agility to rapidly respond to the market? At the same time, you can't ignore potential risks like security or compliance with regulatory, legal, and contractual obligations. From a technology perspective, there are concerns about what to do with legacy infrastructure, how to avoid vendor lock-in, the organizational impact on staffing levels and skills, and perhaps most importantly, the entire migration effort, which will require time, incur additional costs, and is fraught with its own risks.

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[4] Forrester's Forrsights Hardware Survey, Q3 2013

[5] The Internet of Things (IoT) refers to the network of physical objects accessed through the Internet including sensors, smartphones, wearable devices, etc.

[6] Hadoop is an open-source software framework for storing and processing data sets on commodity hardware. It is one of the underlying technologies for big data.

[7] Ibid

Navigating the Options

These cloud trends and benefits, coupled with the complexity and risks, are prompting CIOs and C-suite executives to ask a number of questions about what they should be doing to exploit cloud capabilities. The C-suite executives are concerned about the strategic, financial, and risk implications of moving to the cloud while CIOs are concerned about the issues relating to legacy investments, architecture and technology, vendor selection and management, migration, and organizational disruption.

The Six Key Trigger Points for Public Cloud Adoption

Typically, there are six key trigger points when CIOs find themselves considering externally hosted cloud as a strategic option. Each of these triggers has its own set of primary motivators influencing the decision. KPMG has identified five primary motivators for action including scalability, improving the long-term cost structure, minimizing the up-front investment, responding to a short-term lead-time, or the existence of an obvious solid business case. The matrix in Figure 2 illustrates the six evaluation trigger points and respective motivators.

When considering cloud options, organizations need to evaluate and balance the benefits against legitimate concerns CIOs will have. The concerns include excessive capacity, accessibility of the data, application readiness for migration, and security-related issues.

Figure 2: Six Key Trigger Points

SIX KEY TRIGGER POINTS

Evaluation Trigger	Primary Motivators for Action				
	Scalability	Long-term Cost Structure	Minimize Investment	Short-Term Lead time	Needs a Solid Business Case
Support major business growth initiative: Business needs significant increase in compute capacity to enable a major growth initiative	⏻	⏻			
Participate in enterprise cost reduction: Business is seeking long-term cost reduction through consolidation and optimization		⏻			⏻
Re-active: CIO may find themselves playing catch-up in response to a decision made by the business to use third-party software (e.g., Chief Marketing Officer contracts with Salesforce.com)				⏻	⏻
Pro-active: CIO needs to provide transparency to be cost competitive or business may go elsewhere. Also, a least every five years, CIO's need to evaluate long-term data center strategies in light of business needs and technology innovation	⏻	⏻			⏻
'Urgent' capacity need: Due to lack of pro-active planning, companies finds themselves subject to a tough and immediate constraint (e.g., data center running out of power yet we need to provide capacity for a major ERP roll-out).			⏻	⏻	
Acquisition: Technology organization and infrastructure acquired along with new business			⏻	⏻	

Note: These motivators favorable to external cloud must be balanced against key concerns CIO will have (e.g., excessive capacity, data accessibility, application readiness, security)

(Source: KPMG)

Complications from the Cloud Investment Catch-22

Once CIOs decide to move forward and explore cloud options they often find themselves in a "Catch-22." Because of the complexity involved, making the complete business case for cloud adoption requires detailed information about the expected ongoing benefits (lower operations costs), the one-time up-front migration costs, the write-off or depreciation run-off costs for the legacy assets, and the financial benefits for the investment (ROI/NPV).

But just estimating the migration costs alone requires an extensive effort including understanding the full scope of the need, reviewing the application and server portfolio, creating the architecture and general design of the cloud solution, completing a more detailed application design, and factoring any remediation costs. This detailed bottom-up tasking needed to calculate the implementation effort and the funding needed to undertake this work must first be allocated based on the very business case this detailed work helps justify, creating a "Catch-22."

To overcome this Catch-22 and rapidly reach a "short list" of the most practical and attractive strategic options, KPMG has developed a decisioning framework CIOs can employ to focus on key selection factors and evaluate them against the strategic options. There are four fundamental strategic options along a cloud architecture spectrum available to CIOs that represent a trade-off between moving to a favorable long-term cost structure and maximizing the ROI of legacy investments. The four strategic options are:

- **In-house/Private Cloud**. Maximizes the legacy investment by retaining everything in-house, but leaves a capital intensive and high-cost structure in place. Private cloud may be suitable for those applications that have strict security or regulatory compliance needs or where the migration costs are excessive.
- **Co-location:** Enables faster implementation due to avoiding building a new datacenter, but it retains all of the disadvantages of the in-house solution in terms of high-cost and limited ability to respond to demand surges.
- **Hybrid Cloud**. Realizes some of the advantages of public cloud, primarily cost-effective elastic surge capacity. Hybrid clouds are a compromise between private cloud and public cloud.
- **External/Public Cloud**. Maximizes the benefits of a low-cost structure and rapid capacity increases, but requires significant run-down of the legacy environment.

Each of these strategic options can be evaluated along four key selection factors representing the following:

- **Rejection factors** are showstoppers that immediately rule out a cloud approach. This includes things like legal and regulatory prohibitions and unaddressable security concerns.
- **Business demand factors** include usage, data characteristics, and urgency for increased capacity.

- **Technology configuration factors** focus on the supply side and include things such as capacity utilization, unit costs, power requirements, and age of the assets.
- **Financial factors** focus on the capital and operating expense implications.

Combining the strategic options and the selection factors results in a matrix that can be used to score the evaluation criteria across the strategic options for a portfolio of applications and services. Out of this will emerge a short list of options that can be evaluated in more depth within a holistic cloud-decisioning framework. A sample evaluation can be found in figure 3.

Figure 3: Key Selection Factors – Sample Evaluation Criteria

KEY SELECTION FACTORS – SAMPLE EVALUATION CRITERIA*

	FACTORS	STRATEGIC OPTIONS: In-House	Co-Location	Hybrid	Mostly Cloud*	COMMENTS
VETO	**Legal & Reg:** Requires physical hosting	◕	◕	X	X	Contractual or by regulation
	Write-off: Will not write-off legacy	◕	◕	X	X	This is a sunk cost under NPV
	Security: Concerns not addressable	◕	◕	X	X	Can conduct a security review
	Invest: Not willing to make large upfront	◕	◕	X	X	Out of pocket cost may be high
	Unsupported Tech: Not cloud friendly	●	●	X	X	E.g., mainframe or proprieatry
BUSINESS DEMAND	**Usage:** High peaks not internally smoothable	○	○	◕	●	Forces idle capacity
	Data: Large and monolithic	◕	◕	◔	◕	Data needs to be in one place
	Urgency: Need for more capacity now	◕	◕	◒	◔	No time to migrate to cloud
TECHNOLOGY CONFIGURATION	**Low average capacity utilization**	○	○	●	●	
	High Unit Cost: Relative to cloud	○	○	●	●	
	Old: Hardware mostly depreciated (near end-of-life)	○	○	◕	◕	More willing to migrate off
	# of DC: High # of DC's to consolidate	◔	◔	●	●	Consolidate and move to cloud both costly
	Out of Power: Inability to host more hardware	○	○	●	●	Very costly to add more power
	High Virtualization: Need to buy to hardware	○	○	●	●	Not able to squeeze more
	High Optimization: Cannot squeeze more	○	○	●	●	Cost already taken off the table
	Application Complexity: Not engineered for cloud	◕	◕	◒	◔	Risky and costly to migrate and test
	Quick Fix: Small spend works for now	●	○	○	○	Low-cost invesment meets immeidate need
FINANCIAL	**Capex:** Will invest up-front for favorable NPV and ROE	○	◔	●	●	Upfront migration may be costly
	Capitilize: Minimize P&L impact	○	◔	●	●	May be able to finance upfront cost

** Evaluation Situation: This example assumes client owns in-house data centers and the evaluation is triggered by proactively conducting long-term strategic planning*

** Assumes external cloud*

○ – *Not favorable to strategic option*
● – *Most favorable for strategic option*
X – *Excludes strategic options from further consideration*

Source: KPMG

Since the heart of a cloud decision will usually hinge on having compelling ROI, the focus should be on rapidly and efficiently developing a solid economic model for each of the items in the short list.

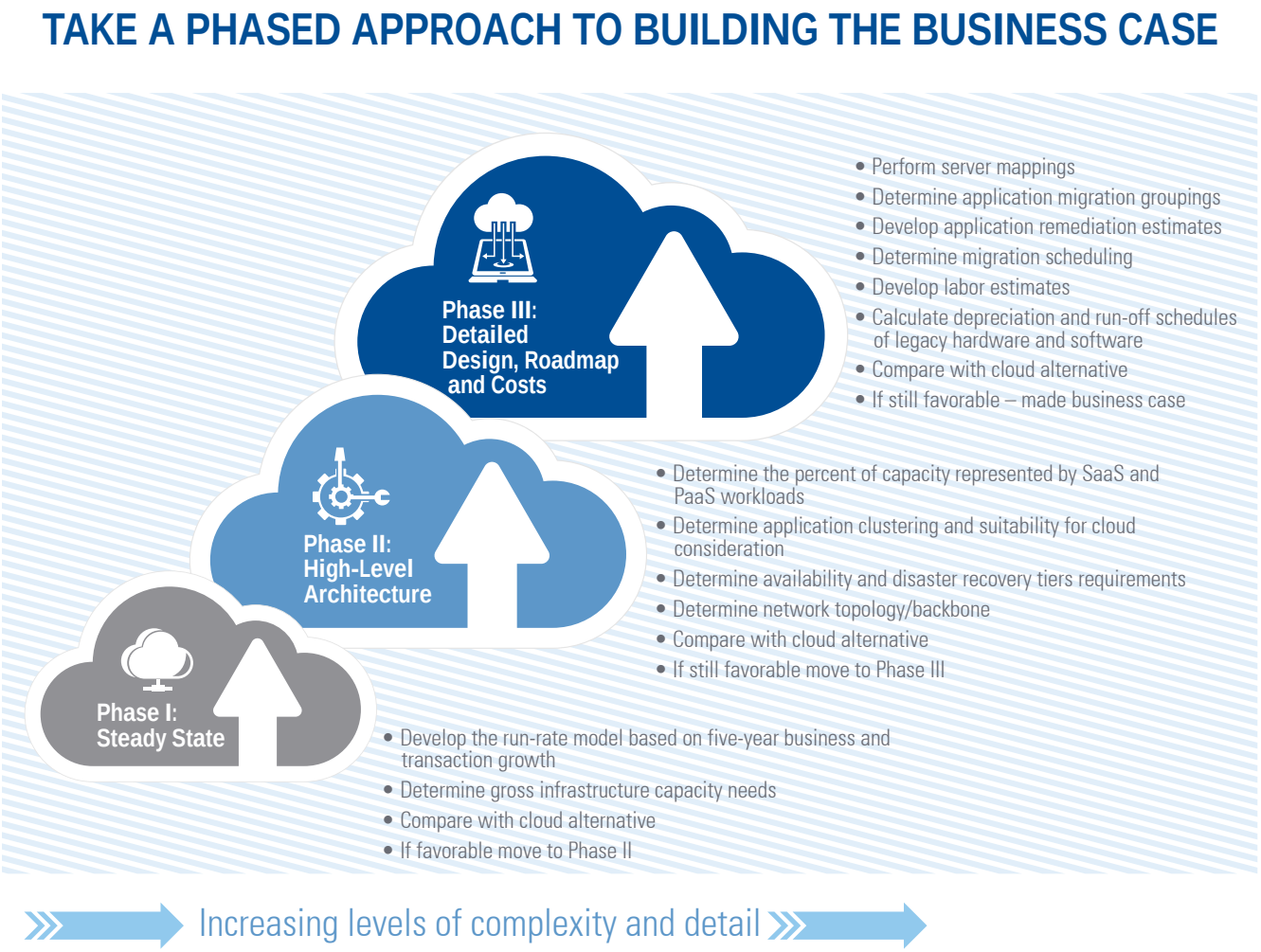
Take a Phased Approach to Building the Business Case

KPMG recommends taking a phased approach to business case development to better match the level of effort to the recognized value of cloud migration (see figure 4). Rather than making a significant up-front effort only to reach the end and conclude that the economics don't work; this approach starts with a high-level steady state run-rate evaluation of the most promising scenarios identified by the decisioning framework (Phase I). If these scenarios prove unattractive there is no point in spending time performing a high-level architecture assessment (Phase II) and calculating detailed implementation and migration costs (Phase III).

Develop the Run-rate Model in Three Steps

Developing the economic run-rate model is a three-step process to: (1) capture the needs based on existing capacity and expected growth; (2) map these needs to cloud vendors' equivalent and calculate costs; and (3) evaluate the cost of retaining the infrastructure in-house versus cloud alternatives under various scenarios. The goal is to develop apples-to-apples all-in cost comparisons across at least two or three viable scenarios: as-is (plus growth), hybrid, and mostly cloud-based.

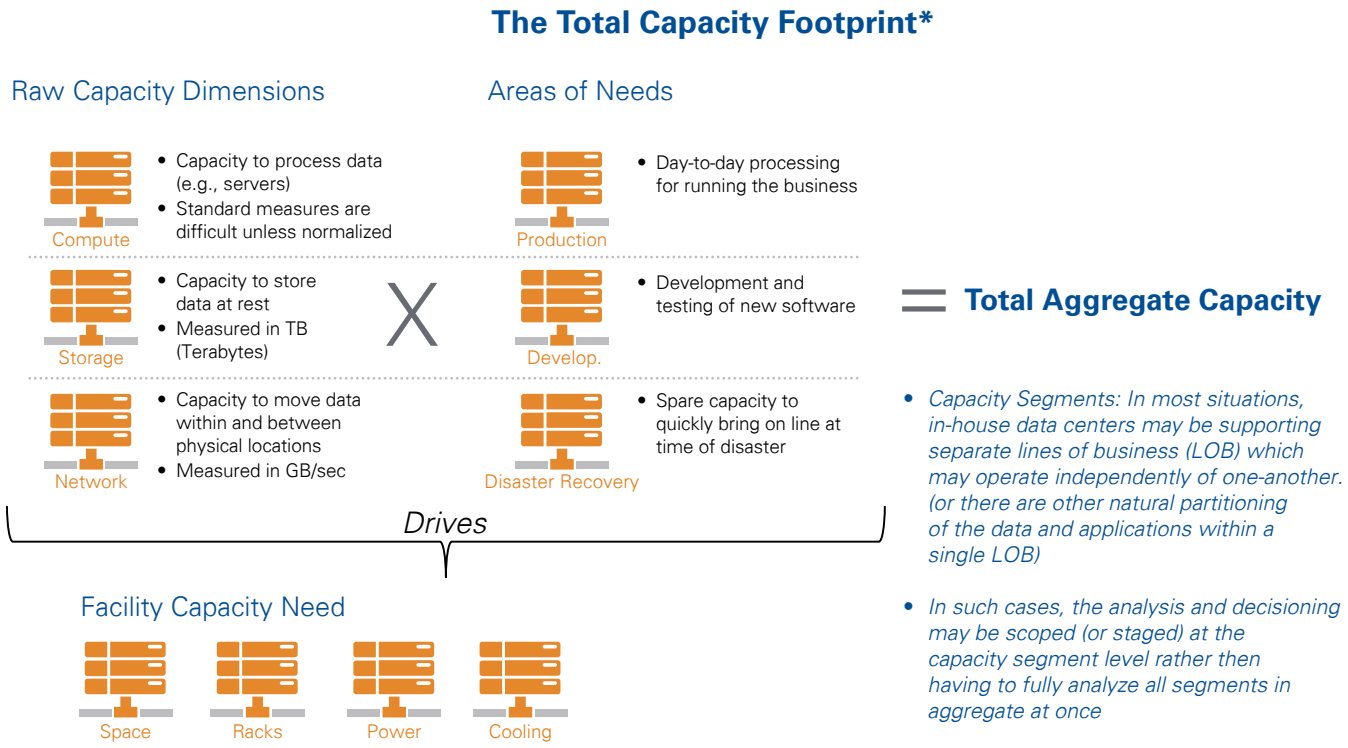
Figure 4: Take a Phased Approach to Building the Business Case



Step One: Understanding today's IT capacity footprint and long-term growth

The core of this cost model is understanding the current IT capacity footprint and long-term growth for compute, storage, and network resources multiplied by the demand from production, development, and disaster recovery uses to gain an understanding of the required total aggregate capacity, (see figure 5). This capacity footprint in turn drives the facility capacity needs that incur costs for space, racks, power and cooling. While computer hardware continues to enjoy increasing performance at lower costs via Moore's Law, data center power and cooling costs are growing at 12 percent per year.[8]

Figure 5: Step One – Calculating the Total Capacity Footprint



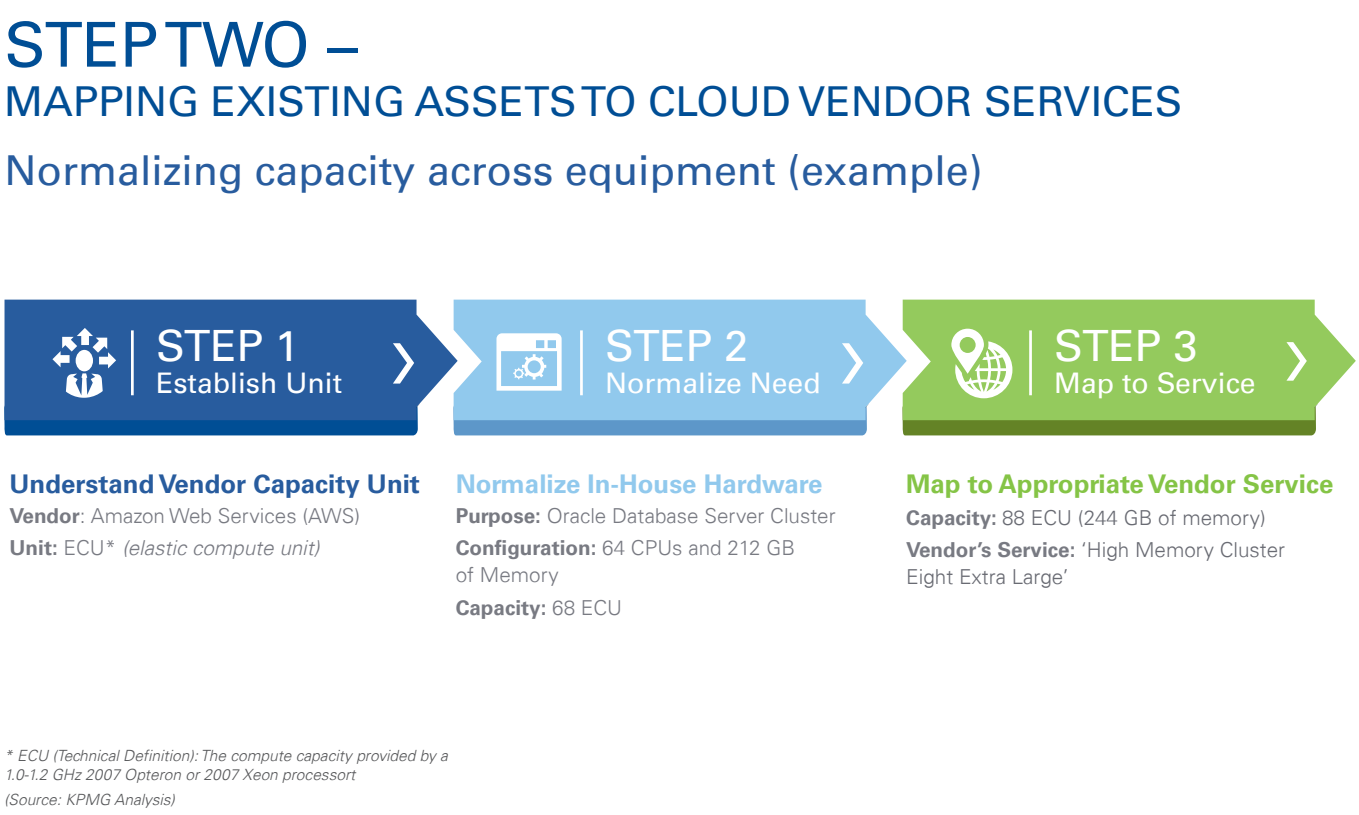
Source: KPMG

[8] National Data Center Energy Information Program, U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA), March 19, 2008

Step Two: Normalize and map existing usage to appropriate cloud services

One central challenge is the need to map the existing compute and storage usage across different hardware models to appropriate off-the-shelf services provided by cloud vendors. This requires developing a common denominator that can be used to translate your capacity requirements into a unit of measure that can be equated to a cloud service offering. Amazon, one of the first cloud providers with its Amazon Web Services (AWS) offering has defined the ECU (elastic computer unit) as a standard measure of compute performance. It defines one ECU as the equivalent capacity of a 1.0–1.2 GHz 2007 Opteron or Xeon processor. By using ECU as the common denominator, you can calculate the ECU capacity of your in-house hardware and map that to the appropriate vendor service (see figure 6).

Figure 6: Mapping Existing Assets to Cloud Vendor Services



** ECU (Technical Definition): The compute capacity provided by a 1.0-1.2 GHz 2007 Opteron or 2007 Xeon processort*

(Source: KPMG Analysis)

Once the mapping is complete the total **all-in unit cost** for each dimension of the capacity footprint can be established as the baseline for vendor cost comparisons. Cost categories include both direct and indirect costs. Some of the key cost considerations include:

- **P&L versus Cash flow Basis** – Modeling the financial benefits may be done on either a cash flow (NPV) or P&L basis. Cash flow may provide the most robust economic impact as considered by Wall Street analysts whereas P&L may be more familiar to IT management.
- **Treatment of Allocated and Overhead Cost** – Treating shared costs in an economically appropriate way that is best tied to the driver of the cost itself should be done carefully. This may often differ from traditional accounting allocations that can be based on a percentage of the directly allocated cost.
- **Network** – Understanding what portion of these costs would be impacted by cloud migration is important in capturing network cost. It is likely to include the data center LAN, the Internet connectivity, and may include some changes to leased lines configuration in certain circumstances.
- **Other** – Considering software licensing due to platform changes; staffing; tooling to manage the environment; third-party service contracts; migration overlaps, write–downs, and terminations is a key part of this process.

Step Three: Evaluate costs and assess benefits

With the baseline as-is costs calculated you can then calculate the apples-to-apples projected cloud cost based on total footprint need and the cloud vendor's pricing for the equivalent capacity (see figure 7). At this point you may choose to run other pricing and configuration scenarios and consider implementation costs, staffing, architecture, and tooling.

Figure 7: Step Three – Comparative Cloud Cost Projection Model (Illustrative)

Cloud Cost Projection Model*

Compute

	Instances	Annual Cost per Instance	Annual Cost ($000)
Production			
High Memory Extra Large	19	$1,563	$30
High Memory Double Extra Large	17	$3,005	$50
High Storage Eight Extra Large	7	$17,382	$125
High Memory Quadruple Extra Large	12	$5,406	$65
High Memory Cluster Eight Extra Large	26	$11,756	$310
Standard Large	55	$1,378	$76
Standard Extra Large	19	$2,392	$46
Second Generation Standard Double Extra Large	26	$5,071	$134
Cluster Compute Eight Extra Large	300	$17,539	$5,262
High Storage Eight Extra Large (8XL)	154	$30,403	$4,670
	636		**$10,768**
Disaster Recovery (DR)			
High Memory Double Extra Large	7	$70	$1
High Memory Cluster Eight Extra Large	7	$290	$2
Standard Large	38	$24	$1
Standard Extra Large	19	$43	$1
Second Generation Standard Double Extra Large	7	$88	$1
Cluster Compute Eight Extra Large	211	$232	$49
High Storage Eight Extra Large (8XL)	55	$544	$30
	346		**$84**
Total			**$ 10,852**

Storage

	GB/Year	Annual Cost per GB	Annual Cost ($000)
Production			
Server Attached	272,268	$1.20	$327
Network Attached (SAN/NAS)	2,286,512		**$4,482**
	2,286,512		$4,482
Disaster Recovery (DR)			
Server Attached	4,402	$0.80	$4
Network Attached (SAN/NAS)	85,334	$0.84	$72
	89,736		**$75**
	89,736		$75
			$ 4,557

(Source: KPMG Analysis based on typical cloud vendor pricing schedule at time of publication.)

If steady-state benefits are sufficiently attractive, management can progress to Phase II and III developing a more robust cash flow forecast considering optimization, architecture, legacy migration, and implementation costs. As work progresses, the detailed implementation costing work can eventually evolve into the implementation and migration plan.

Conclusions

Building a compelling business case for cloud adoption can be a complex, time consuming, and expensive exercise with no guarantees that it will result in a winning ROI. Organizations can save time and money by implementing a decisioning framework and following a phased approach to building a business case. Screening out unattractive options early in the evaluation and using a phased approach to building the business case can ensure that the level of effort performing the evaluation is commensurate with the expected return.

How KPMG Can Help

KPMG has extensive experience assisting clients with their cloud strategies and has seen 50–60 percent steady-state savings, 30–70 percent increase in utilization and paybacks beginning in less than 18 months. Specific areas of assistance include developing cloud economic models, optimizing existing infrastructure, vendor selection, and migration planning.

We can help:

- Mobilize and accelerate action towards capturing the benefits of cloud computing
- Develop the baseline cost model for existing infrastructure
- Identify the key criteria for cloud adoption
- Provide a cloud decisioning framework to evaluate options
- Build an economic model leading to a business case with ROI, NPV, and P&L impact analysis
- Leverage leading practices from industry and our prior engagements
- Design a cloud implementation strategy including application portfolio analysis and migration management

To learn more about cloud-enabled transformation please visit us at kpmg.com/cloudsolutions.

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