



Cloud Computing Trends:
At the Horizon's Watch

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Cloud computing is transitioning from industry buzzword to business-critical solution; recent technology forecasts name the migration to cloud as the biggest trend of 2011, with Gartner anticipating that the spending on cloud computing applications will reach \$150 billion by 2013. To date, the perceived business opportunity associated with cloud has driven start-up and established technology and services providers to make bets and stake out territory throughout the emerging cloud landscape based on conjectures about how the space might evolve. As customers begin to make substantial investments in cloud, it becomes critical for providers and investors to have an informed view of customer needs and buying criteria.

As follow up to our cloud primer, [Cloud Computing: Fact versus Fog](#), Grail Research interviewed 20 cloud computing experts in order to offer cloud providers, investors and prospective customers a more detailed and consolidated understanding of who cloud customers are and what is driving them to move to cloud today. Experts interviewed for this study span a cross-section of the most progressive cloud thinkers, including industry analysts, senior executives at major cloud vendors, and founders of technology firms. This report summarizes the key themes about customers and adoption drivers that emerged from the research.

WHO IS THE CLOUD CUSTOMER?

Four broad customer segments have come to the forefront in adoption of the technology:

- SMBs
- Large enterprises (selective)
- U.S. government
- Emerging markets

In addition, experts see other organizations migrating to cloud that have one or more of the following traits: complex supply chains, undergoing a significant reorganization, substantial rich digital content, and lack of legacy systems. Organizations within these segments or sharing these traits seem to be at the center of the most active adoption patterns for cloud.

SMBS AND MICRO-BUSINESSES

Debate over the most basic profiling of customer size seems to finally be subsiding, with the consensus emerging that for the SMB and micro-business, the value proposition of cloud is compelling. As Kevin Kelly, Founding Executive Editor of Wired Magazine states, "Access is better than ownership."

Cloud is a competitive edge for these organizations due not only to cost savings but also to the pay-as-you-go model that delivers an enterprise-class IT infrastructure to businesses that couldn't otherwise afford it. Another key benefit to these businesses is the ability to scale both up and down, rapidly

retrenching in a soft economy and responding immediately as market demand increases. Cloud keeps SMBs agile and viable.

LARGE ENTERPRISES SELECTIVELY ADOPTING CLOUD

While start-ups and SMBs will continue to be the primary adopters of cloud services, most experts believe that large enterprises are opening up to the idea of transitioning to cloud and are starting to migrate compartmentalized and discrete components of their business operations and data. Most experts believe that it has now reached a stage where it is “not an over-hyped trend” and is helping customers actually achieve “tangible and measurable business results.”

Although in the short term, start-ups and SMBs will continue to be the primary adopters of cloud services, some experts argue that large enterprises have a “greater incentive for adopting cloud” due to a more heterogeneous and geographically diverse operating model.

Look for large enterprises to build on cloud adoption beyond the well established software-as-a-service (SaaS) with strong interest in managing IT assets via infrastructure-as-a-service (IaaS). Expect some of the greatest demand and the next wave of enterprise adoption to come from database-as-a-service (DBaaS) which would include ubiquitous access to things like business intelligence (BI) tools, whether online or off.

“Early adopters of SaaS were primarily SMBs and while there are some large companies in the mix, the majority of users are mid-sized organizations with larger enterprises only now starting to put their toes in the water. In contrast, PaaS [platform-as-a-service] is being used across the board.”

— John Howie, Senior Director of Technical Security Services at Microsoft

U.S. GOVERNMENT

The U.S. government, under the direction of the Obama administration, is leading the way for government entities to adopt cloud. The potential cost savings in IT infrastructure seems to be emerging as the strongest incentive for governments in their battle against budget deficits. In 2009, the U.S. government opened an office to facilitate the adoption of cloud across agencies and help in the development of cloud computing standards. More recently, government organizations that included technology expenditures in their 2011 budget proposals were required to demonstrate why the option was selected over a comparable cloud solution.

And while the U.S. government has led the initial push to cloud, other countries are also looking to cloud for answers. Mahesh Kumar, Director of Product Strategy and Marketing at Dell, provides the example of the Australian government, which is “also looking to consume services on the Web” as it spends “about \$4.3 billion on IT” and has a target to “shave off a billion dollars” over the next 10 to 15 years.

EMERGING MARKETS

Gartner anticipates that the U.S. share of the world-wide cloud services market will be diluted from 60% in 2009 to 50% by 2014. Developing nations, especially those in sub-Saharan Africa, are at the forefront of cloud adoption. With increased focus on technology investments and lack of legacy systems in place, the economic benefits of a cloud-based model for these nations are clear.

Experts believe sub-Saharan Africa is especially poised to take advantage of cloud due to their increasing investments in the IT landscape and a “strong push from government to get its services into the cloud space.” Private-sector firms in the region are also displaying confidence and beginning to accept cloud services as a solution for their business requirements. While South Africa is expected to be the harbinger of this adoption, countries with no legacy systems, such as Rwanda, Nigeria, and Kenya, can also emerge as key customers as they increasingly invest in technology.

Other emerging economies across the globe are also expected to migrate to cloud to improve the productivity and efficiency of their businesses. IBM has set up cloud computing centers to serve local markets in China, India, Vietnam, and Brazil. Their most recent emerging market investment was in a \$38 million data center in Singapore. “The new Asia Pacific data centre will provide Indian organizations with the best available set of cloud options to achieve their IT infrastructure ambitions in order to become successful businesses,” said Ashish Kumar, IBM Global Technology Services, India/ South General Manager Asia. “In India, we see a great opportunity for the software development industry and other IT-driven businesses to leverage the IBM enterprise cloud offering in order to divert their test and development workload towards more productive use.”¹

Commercial support and desire for the success of these projects from multinationals like IBM notwithstanding, there are still major challenges to overcome in emerging geographies’ move to cloud; lack of ubiquitous access to Internet and electricity in developing countries is driving cloud providers to ramp up offline functionality. This is especially an issue for BI and other multi-user, high-touch types of databases. The need for increased mass awareness also remains a major challenge, which can adversely impact the adoption of cloud in the short term.

OTHER CHARACTERISTICS OF ADOPTING CUSTOMERS

Among companies that have been the most receptive to cloud, there are various common traits that can be observed: complex supply chains, significant reorganizations, rich digital content, and lack of legacy systems.

First, demand for migration to cloud has substantial impetus from organizations with complexities in their supply-chain management, particularly retail and logistics. Cloud can offer significant benefits to improve efficiencies of supply-chain solutions, while simultaneously reducing costs.

Second, cloud is gaining traction among companies that are under pressure to reorganize and optimize their business operations, including IT systems, to achieve cost efficiencies. In these organizations, the drive to cloud is a “fight or flight” scenario in which they must adapt to a changing business landscape or they will need to close their doors.

Third, firms that deal in data-heavy, extremely rich digital imagery are also adopting cloud. The most obvious are online and social media firms that have “heavy” Web content, such as images and videos, and interactive entertainment. Cloud will become increasingly attractive to these organizations because it offers a scalable and efficient means for storing and delivering content.

¹ “India to leverage IBM’s \$38 mn investment in cloud computing centre,” *Business Standard*, March 31, 2011.

Fourth, business setups/Web start-ups that do not have legacy systems are also moving towards cloud. In fact, the Web 2.0 companies weave cloud into the fabric of their business. Experts see the fundamental shift from ownership to access has already taken place, and is actually preferred. Organizations in this category discuss and refer to “cloud” like the “Internet” was referenced three to five years ago – as an implicit label that requires no other explanation: “I am using the cloud.”

While the picture of the cloud customer seems to finally be coming into focus with experts agreeing on who should be interested in adoption, the market is still early. There is still a lot of uncertainty around who customers are and what segments/traits will be the primary adopters over the longer term, so expect disruptions and emerging customer segments that have yet to be considered. For now, however, there seems to be some level of expert consensus around the first wave of what cloud customer profiles look like, with the questions now being directed to the acceleration and tipping point of migration on a mass scale.

WHAT IS DRIVING CUSTOMERS TO ADOPT NOW?

Experts all have opinions about specific factors driving organizations to adopt cloud now. The drivers around which there seemed to be some consensus were:

- The need for 24/7 access to data and applications
- Changes in perspective about cloud risk
- Improving alignment between customer needs and vendor solutions
- Decline in concerns about vendor lock-in

ACCESSIBILITY IS LEADING THE CHARGE

Accessibility is the number one driver our experts cited for cloud adoption. Most believe that organizations and consumers will “trade-off” other concerns about cloud to gain 24/7 access. The proliferation of compact and powerful mobile devices, cheap and ubiquitous bandwidth, and the increasingly dynamic business environment are driving the demand for this “anytime, anywhere, and anything availability” of data and applications. Experts believe that the desire for on-the-go access will continue to grow, which will further drive cloud adoption “from the small business all the way up to the big enterprise.”

PERSPECTIVES ABOUT CLOUD RISK ARE CHANGING

Security risk continues to be one of the most heated discussion topics around cloud. Experts are divided in their opinion about whether cloud offers increased security or introduces greater security risk. However, a significant number of experts cited changes in perspective taking place around security risk that are driving an increase in the number of organizations adopting cloud.

Cloud Viewed as More Secure by Some Organizations

Security is still being debated as one of the significant “risks” for cloud customers. However, due to increased attention by cloud vendors, it is no longer seen as an “insurmountable” challenge. According to experts, a number of cloud customers agree that cloud vendors provide better security than their existing in-house security infrastructure. As cloud vendors continue to provide evidence to support their claims, more and more organizations will migrate to cloud. A senior leader at a Fortune 100 technology firm

echoes this sentiment using the analogy of the early days of banking: just as people shifted from keeping their savings at home to trusting a bank to manage assets for them, organizations will move their most sensitive data to cloud – for the very purpose of keeping it safe.

Regulatory Compliance Cost Trumps Security Concerns

As more regulatory requirements are imposed by governing bodies around the management of sensitive customer and employee data, cloud solutions allow organizations to outsource the complexity of complying with these regulations. Cloud offers similar benefits to other “outsourcing” models, as it alleviates the internal resources required to set standards, implement solutions, and monitor compliance with existing and future regulatory guidelines. Organizations that choose to move sensitive data to cloud, thereby outsourcing the concerns and the pain of building in-house expertise, will select providers who are expert in applying and executing these extremely dynamic and complex requirements. Providers who specialize will become sought after by companies for the efficiencies gained.

“People will turn to cloud, moving things like their CRM systems... their HR systems ... because they can’t keep up with all of the compliance rules.”

— Jim Stikeleather, Chief Innovation Officer at Dell

Cloud Insurance Protects Against Losses

For those who want to take advantage of cloud but still see the risk as too high, there is now cloud insurance. Although cyber risk policies have been available for a number of years, the first cloud insurance is now available. Cloud customers who want to insure their data beyond the very limited liability that most SLAs offer will now be able to purchase policies offering organizations that move to cloud protection against the true costs and losses associated with adverse incidents such as downtime and security breaches.

Drew Bartkiewicz, CEO of CyberRiskPartners, recently launched the first global cyber risk intelligence platform to help CIOs analyze the operational and systemic risks. He is a staunch proponent of cloud, but cautions that there must be strategy and critical evaluation in determining exactly which data is migrated. He cautions, “not all clouds are created the same” and so the ability to access the different risk landscapes emerging with the acceleration of adoption becomes paramount. Drew expects “an environment of more shared risk – between cloud customer and cloud provider – which means much more innovation needs to happen in the fields of cyber accounting, cloud law, and cyber risk transfer.”

CLOUD MODELS ARE ADAPTING TO BETTER MEET CUSTOMER NEEDS

Hybrid Models Come to Fruition

For organizations that desire some of the key benefits of cloud but believe the risk is still too high, providers have moved to make the concept of the hybrid model a reality. The hybrid model allows organizations to immediately move at least a portion of their data to cloud and reap the benefits of public cloud while retaining some of their IT resources on-premise or in a private cloud.

For organizations who are the most risk-averse and reticent about making a move to cloud, there is a very simple, low risk, “entry level” solution. Jim Stikeleather, Chief Innovation Officer at Dell, points out that companies should look to evaluate hybrid models that can provide an optimum combination of operational and capital expenditure with “a private cloud that runs almost constantly at 100% capacity and then bursts out into a public cloud for variable capacity.” He sees this as a better way to drive business growth, as opposed to altogether avoiding capital expenditure on IT infrastructure and relying on operational costs associated with public clouds, which change depending on usage.

In November 2010, Rackspace launched its hybrid offering – Cloud Connect – which allows customers to combine dedicated hosting, private cloud, and public cloud in multiple ways to achieve customized solutions. Amazon’s Virtual Private Cloud (VPC), currently in the beta phase, is a hybrid offering that enables organizations to securely connect their existing IT infrastructure to the Amazon Web Services (AWS) cloud through a virtual private network (VPN) gateway.

Initial Delivery Models Adapt and Consolidate

Over the past decade, cloud computing has evolved into three distinct delivery models: IaaS, PaaS, and SaaS. However, as a result of shifting customer interest towards a combined offering under one umbrella, cloud service providers are beginning to look to “have multiple entry points across the different models.” Recent new offerings from vendors further substantiate this trend, as they try to extend their reach into the realm of different delivery models. For example, Elastic Beanstalk from Amazon, currently in beta, incorporates many PaaS features, while retaining the flexibility of AWS’s IaaS. Microsoft, too, has extended the PaaS functionality of Azure into the IaaS domain.

Before the various cloud models can fully consolidate, experts see providers focusing on filling critical gaps in cloud offerings. Databases are one area where there is still work to be done. Presently there are limitations to moving complex database operations to cloud and experts expect DbaaS offerings will emerge to address this. M.R. Rangaswami, co-founder of Sand Hill Group, is of the opinion that “so far databases in cloud haven’t reached the maturity of other cloud offerings, and we think more and more customers are going to want database solutions that are wrapped around a complete cloud stack and other application services. We think there is a growing need and a demand for different types of data and access methods including structured, non-structured, SQL and no-SQL databases in the cloud.”

As gaps are filled, experts ultimately expect to see consolidation of delivery models into a unified “stack-as-a-service” offering and subsequent consolidation of cloud providers to realize economies of scale. Alistair Croll, partner at technology firm Bitcurrent, believes that consolidation will be driven by customers who will want to build and deploy applications on top of their data. He says, “Once you put all of your data in one place, you’re going to want to chew on it and put it to work in many ways: let employees access it via a SaaS application; run some custom applications that use it; let your business partners access it; and so on. In other words, your data has a surface tension – it wants to stick together.

“You’re going to have a subset of data that’s always going to reside in your enterprise, and you’re going to have to integrate that with that public face in the public cloud, and that is where the hybrid model comes in.”

— Harold Moss, CTO for Cloud Security Strategy at IBM

This will inevitably lead to consolidation among a few very large providers who achieve economies of scale in centralized data, and the services that use that data will follow."

VENDOR LOCK-IN CONCERNS ARE SUBSIDING

Vendor lock-in, which binds an organization to a vendor for the products and services, has always been an area of concern for organizations. However, some experts believe that the issue is "overhyped" in the case of cloud. They believe that it has been blown out of proportion by "governments, policy makers, or standards bodies." John Howie, Senior Director of Technical Security Services at Microsoft, who also co-chairs the Cloud Security Alliance's Subject Matter Expert Working Group, says: "Vendor lock-in is probably overhyped... there are some aspects of vendor lock-in but it's not as big as people may imagine or certainly as bad as pundits would want to make it out... Customers have not shown any desire in data portability or service portability between service providers. They just want the best rate possible, and their service up and running and they don't care that they can move it from Google to Microsoft to XYZ Corp."

CONCLUSION

As cloud moves to the next phase of adoption, experts are seeing viable and sustainable customer segments emerge – including SMBs, enterprise, governments, and Web 2.0 startups – that further bolster the push to migration. They expect developing geographies to lead the next wave of cloud adoption where the sensitivity towards policies, standards, and privacy concerns are all but eliminated by the promise that cloud holds for their economic growth.

Experts agree that the evolution of cloud marks a fundamental shift in our relationship with electronic assets and our access to that data and information. Accessibility allowing for the "anywhere, anytime, anything access" of information takes center stage. Apprehensions around vendor lock-in, and security and privacy are fast subsiding, or in some cases, are acknowledged as "trade-offs" for the efficiencies needed to remain competitive in this dynamic business environment. Also, the arrival of cloud insurance and strategies for disaggregating risk will be used as competitive advantage by the most savvy and aggressively minded organizations. Interesting models, as Jim Stikeleather of Dell suggests, will emerge where companies move their most sensitive data to cloud, outsourcing the pain of managing regulatory compliance. And from more conservative companies, expect simple hybrid solutions where private cloud is used except in cases of extreme spikes.

The experts contributing to this paper conclude that if challenges to business adoption can be effectively addressed, cloud's impact has the potential to be of the same magnitude as the Internet – creating a revolution for technology and society.

For more information on this report, contact Jocelyn DeGance Graham at jdgraham@grailresearch.com. Follow Jocelyn on Twitter: [JocelynDG](https://twitter.com/JocelynDG).

LIST OF INTERVIEWED EXPERTS

QUOTED CONTENT PROVIDERS

- **Alistair Croll:** Partner at Bitcurrent; founding partner at Year One Labs, Inc.; associated with the launch of conferences such as Techweb's Cloud Connect, Interop's Enterprise Cloud Summit, and GigaOm's Structure
- **Drew Bartkiewicz:** Founder and CEO at Cyber Risk Partners, LLC
- **Harold Moss:** CTO, Cloud Security Strategy, at IBM Corporation.
- **Jim Stikeleather:** CIO at Dell, Inc.
- **John Howie:** Senior Director of Technical Security Services, Online Services Security and Compliance (OSSC) at Microsoft; co-chair of Cloud Security Alliance's Subject Matter Expert Working Group
- **Mahesh Kumar:** Director of Product Strategy and Marketing, Best Value Solutions Group at Dell, Inc.
- **M.R. Rangaswami:** Co-founder of Sand Hill Group; featured in *Forbes'* "Midas 100 List" as one of the world's foremost technology investors; host of the Cloud Industry Summit

SUPPORTING CONTRIBUTORS

- **Bernard Golden:** CEO at HyperStratus; cloud computing advisor for *CIO Magazine*
- **Dana Gardner:** President and Principal Analyst at Interarbor Solutions, LLC
- **David Lingenfelter:** Information Security Officer at Fiberlink Communications Corp.
- **James Watters:** Group Manager of vCloud Strategy and Market Development at VMware, Inc.
- **Jeffrey Kaplan:** Founder and Managing Director at THINKstrategies, Inc.; founder of Cloud Computing Showplace
- **Joel Allen:** Founder and President at AllenPort Co.
- **Laurie McCabe:** Partner at SMB Group, Inc.
- **Nick Keene:** Partner Account Manager of Hosting and Cloud Solutions at Microsoft, South Africa
- **Oliver Friedrichs:** SVP at Sourcefire, Inc.; founder of Immunet (acquired by Sourcefire)
- **Randolph Barr:** CSO at Qualys, Inc.
- **Ranjith Kumaran:** Founder of YouSendIt, Inc.
- **Tony Bishop:** CEO at Adaptivity, Inc.; recipient of "40 under 40 – Most Innovative IT Leaders" and "Premier 100 IT Leaders" as selected by *ComputerWorld*
- **Torsten George:** VP of Worldwide Marketing at Agilance, Inc.; member of advisory board at MktgVirtue, LLC

ABOUT THE AUTHOR

Named by United Business Media's CRN as one of the 100 most influential women in IT, Jocelyn DeGance Jocelyn has deep expertise in the areas of marketing, communications and research and has spent the majority of her career advising Fortune 100 companies including Hewlett-Packard, Intuit, and Arthur Andersen on strategic emerging technology decisions. Prior to joining Grail Research, Jocelyn directed the marketing program for an award-winning cloud start-up which was recognized by Gartner as one of the "Coolest Emerging Technologies" of 2010. She holds a Master's degree in Industrial/Organizational Psychology and a Bachelor's degree from University of California, Santa Barbara.

ABOUT GRAIL RESEARCH

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- [Cloud Computing: Fact versus Fog](#)
- [Cloud – from Buzz to Business Critical](#)
- [Navigating the Cloud: Insights and Guidance from Cloud Connect 2011](#)