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Seeing Through the Clouds
*Navigating the Evolving
Technology Ecosystem*

Contact Information

Beirut

Ramez Shehadi

Partner
+961-1-985-655
ramez.shehadi@booz.com

Canberra

David Batrouney

Principal
+61-2-6279-1235
david.batrouney@booz.com

Chicago

Mike Connolly

Senior Partner
+1-312-578-4580
mike.connolly@booz.com

Delhi

Suvojoy Sengupta

Partner
+91-124-499-8700
suvojoy.sengupta@booz.com

Dubai

Karim Sabbagh

Senior Partner
+971-4-390-0260
karim.sabbagh@booz.com

Dubai/Frankfurt

Olaf Acker

Partner
+49-69-97167-453
olaf.acker@booz.com

Düsseldorf

Jens Niebuhr

Partner
+49-211-3890-195
jens.niebuhr@booz.com

Düsseldorf/Stockholm

Roman Friedrich

Partner
+49-211-3890-165
roman.friedrich@booz.com

Florham Park, NJ

Barry Jaruzelski

Partner
+1-973-410-7624
barry.jaruzelski@booz.com

New York

Philip Minasian

Principal
+1-212-551-6098
philip.minasian@booz.com

Fabian Seelbach

Senior Associate
+1-212-551-6073
fabian.seelbach@booz.com

Paris

Pierre Péladeau

Partner
+33-1-44-34-3074
pierre.peladeau@booz.com

San Francisco

David Standridge

Partner
+1-415-281-4995
david.standridge@booz.com

São Paulo

Ivan de Souza

Senior Partner
+55-11-5501-6368
ivan.desouza@booz.com

Shanghai

Andrew Caine

Partner
+86-21-2327-9800
andrew.caine@booz.com

Sydney

Vanessa Wallace

Partner
+61-2-9321-1906
vanessa.wallace@booz.com

EXECUTIVE SUMMARY

The traditional technology ecosystem, in which computing hardware and software are created and sold to businesses and consumers, depends on a distribution system that exists very much in the physical world. But the advent of cloud computing is changing that. End-users will be getting more and more of the computing services and applications they need over the Internet, from the cloud. Consumers and smaller businesses have already begun adopting many cloud-based services and applications, from productivity suites to streaming music. And large enterprises, in search of lower costs and more scalable productivity gains, are turning to the cloud to provide not just end-user applications but also the platforms and infrastructure they need to run their businesses.

As cloud adoption grows, the traditional technology ecosystem is facing disruption—but few players in the ecosystem are fully prepared. Most software and hardware players will need to change how they deliver their products and services and who they partner with, and many will need to refocus their strategies entirely. The disruption will increase opportunities for many players, including web and cloud masters like Amazon.com and Google, as well as telecom operators and other service providers. And it will likely create room for a new class of ecosystem participants we call aggregators,

including SaaS app stores. Many of the players in the traditional delivery channels, however, including distributors, systems integrators and value-added resellers, will have to rethink their current positions in the ecosystem. The forces that are shaping the new ecosystem will ultimately provide plenty of opportunities for players to capture the value being created if they can foresee the evolution of the space, reposition themselves accordingly, and move fast. The alternative—watching as others grab a larger and larger share of the space—will not be pleasant.

THE CLOUD TAKES SHAPE

The amount of hype swirling around cloud computing has reached a fever pitch in the past year. Articles and stories about it appear constantly, not just in the technology and business press but in consumer newspapers, magazines, and websites as well. Yet cloud computing may actually be one technology that lives up to its hype. The value of public cloud services is expected to grow at an annual rate of 27 percent over the next several years, from US\$16.5 billion in 2009 to \$55.5 billion in 2014, about five times the overall rate of IT services. As companies turn increasingly to the cloud for their IT needs, 80 percent of the companies in the Fortune 1000 are expected to be using some kind of cloud computing services as early as next year, and 20 percent of those companies may not own any hardware assets at all.¹

Given the size of the opportunity, it's no surprise that all kinds of players

are rushing into this market from every side. As with any disruptive technology, however, the opportunity will by no means treat all players equally. As we look ahead, we believe the technology ecosystem—the industry's entire value chain, including software vendors, hardware original equipment manufacturers (OEMs), service providers, distributors, resellers, and retailers—will operate very differently from the way it has in the past. How the ecosystem grows and evolves will depend on a variety of factors that will affect every player. Some will end up in a much stronger position, while others will find their position eroding, as the shift to the cloud undermines their long-held strengths. Survival and success will require each player to consider carefully how its role will change as the ecosystem evolves and to adjust its strategies accordingly.

As with any disruptive technology, cloud computing will by no means treat all players equally.

THE EVOLVING ECOSYSTEM

The technology ecosystem has long depended on a series of tight relationships among a number of fundamental groups along the value chain: independent software vendors (ISVs); OEMs; systems integrators (SIs), distributors, large-account resellers (LARs), and value-added resellers (VARs); and retailers. The traditional ISVs develop and customize software for large enterprises, small and mid-sized businesses, and consumers. This group includes everyone from small providers of point applications for specialized business and consumer software to enterprise-class ISVs such as IBM, Microsoft, Oracle, and SAP. The OEMs make the servers, PCs, storage, and networking equipment—as well as an ever-increasing number of new, connected devices, from smartphones to

tablets—and frequently bundle the ISVs' software onto their equipment as part of the sale.

Further downstream are the various distributors, which sell or resell, integrate, and customize software and hardware for the ecosystem. Both the LARs and distributors resell software produced by the ISVs—the LARs directly to enterprises, and the distributors indirectly to the VARs and retail outlets for the small and medium-sized business (SMB) segment. SIs and VARs typically will customize and integrate hardware and software to fit the needs of their enterprise and SMB clients, respectively, and may also source bespoke software directly in the process. Finally, the retailers, both big-box stores like Best Buy and online e-tailers, sell off-the-shelf

software and computing equipment to SMBs and consumers alike (*see Exhibit 1a*).

This ecosystem has long depended on a series of interlocking partnerships among these players, which together develop, customize, integrate, and distribute hardware and software, and sell it to the end-users, from single consumers to huge corporations. But it also has depended on the fact that much of the effort to customize hardware and software and distribute it to end-users takes place in the physical world, with all the constraints and choke points that entails.

Cloud computing is changing all that. The cloud holds out the promise of eliminating much of the complexity inherent in the current physical-world ecosystem. Though the OEMs' hardware, of course, needs to be distributed through the usual physical channels, software does not. Instead, it will be hosted by ISVs, specialized hosters, and other service providers such as telecom and cable companies, and provisioned over the Internet, typically on

an on-demand basis, to large enterprises, SMBs, and individual consumers (*see Exhibit 1b*).

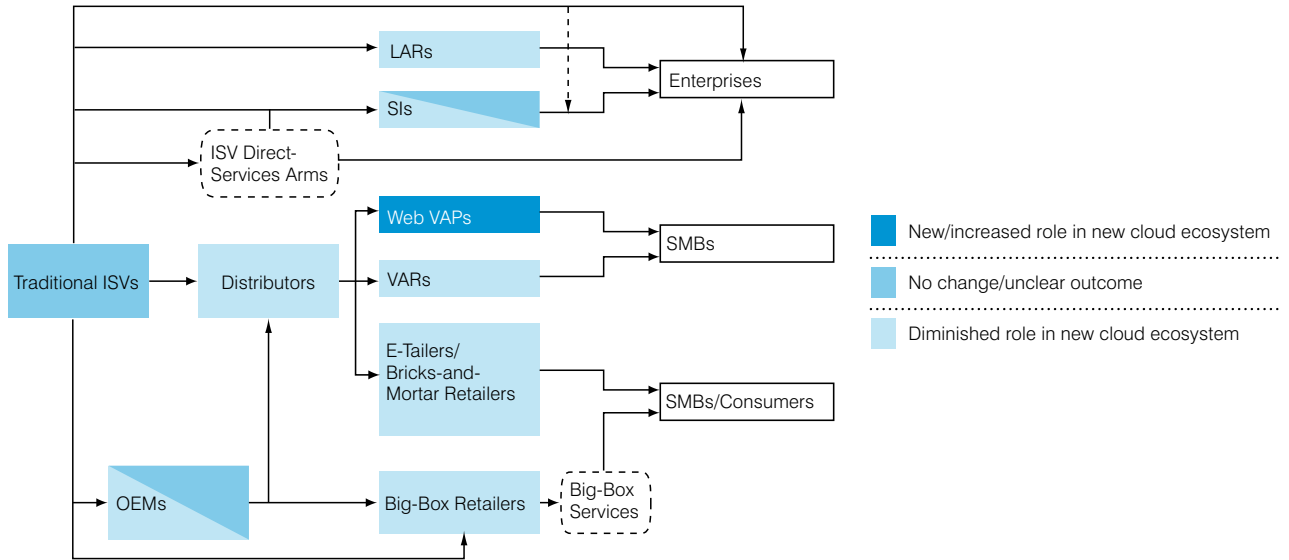
Of course, that vision has yet to be fully realized. The adoption of cloud computing by enterprises is still mostly limited to e-mail and collaboration tools such as Google Apps, selected sales and marketing applications such as Salesforce.com, and some cloud-based provisioning of core computing via services such as Amazon Web Services. Most companies—and many providers too—are in a transition phase, with most of their applications still coming from the physical world. To date, the primary driver of cloud services remains its advantages in delivering real-time or near real-time pricing flexibility and scalability. But more options are arriving all the time, ranging from increasingly sophisticated and specialized software-as-a-service (SaaS) applications to more complex infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS) offerings, all of which present advantages in both cost and productivity.

Further complicating adoption, the cloud operates in two distinct modes—public and private—which can also be blended together into hybrid approaches. Public clouds, such as those offered by Amazon and Microsoft, can reach enormous scale, providing large cost advantages, though security and service quality issues have thus far impeded adoption. Private clouds, on the other hand, allow tight control over service quality and alleviate most security concerns. Hybrid clouds, which combine the two and are therefore getting more and more attention, enable customers to reserve sensitive tasks for the private clouds while delegating others to public clouds, and they also provide peak storage or computing power from the public cloud when needed.

Notwithstanding the still nascent state of the market, adoption is moving along at a robust pace, attracting a wide array of IT players seeking growth in a challenging overall market environment. Together, these players will drive the transition to the new cloud-based ecosystem.

Exhibit 1a
The Traditional Partner Ecosystem Has Long Depended on the Physical Distribution of Software

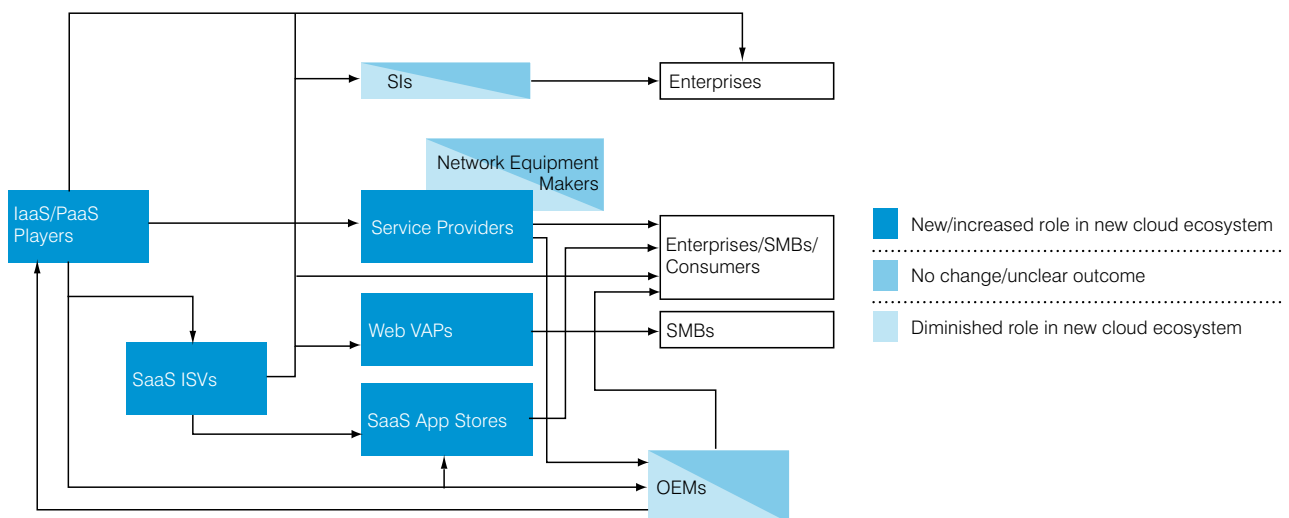
PRE-CLOUD PARTNER ECOSYSTEM



Source: Booz & Company analysis

Exhibit 1b
The New Partner Ecosystem Will Look Substantially Different from the Pre-Cloud World

PROJECTED CLOUD PARTNER ECOSYSTEM



Source: Booz & Company analysis

ADOPTION FACTORS

How the transition to a cloud-centric ecosystem occurs, and how quickly, will depend on a multitude of factors. Four in particular will initially affect the willingness of enterprises and consumers alike to depend on the cloud for their essential computing needs.

1. *The level of customization and integration required to provide enterprises with the cloud-based software they need:* Vendors are looking to develop standardized software for deployment in the cloud, beginning with solutions for SMBs and trickling up to large enterprises. However, it is not yet clear how quickly companies, especially large enterprises, will be willing to depend on such software and to standardize their processes to suit the software, particularly for their more strategic and sensitive needs. Companies with large

investments in on-premises IT systems may also be reluctant to make the switch to cloud-based solutions.

2. *The extent to which security, privacy, and auditability issues are resolved in public clouds, and across different verticals:* CIOs have long pointed to security concerns in their hesitation to adopt cloud computing—thus the popularity of private clouds, especially among companies in industries such as financial services and healthcare, where the protection of information is a high priority. Once these issues are resolved, public clouds will very likely grow in popularity relative to private clouds.²

3. *The degree to which consumers—as employees—succeed in actively shaping demand for business applications and related tools and devices:* The trend toward the “consumerization” of IT is undeniable; the question is how far and how deep it will go.³ The faster it occurs, the more likely that public and hybrid models will dominate the market, opening up opportunities for cloud providers to aggre-

gate applications and to create “curated” enterprise “app stores” customized for large enterprise customers and their employee-consumers.

4. *The extent to which new aggregation opportunities open up at the application (SaaS) and platform (PaaS) levels, and the speed with which players move to capture these new opportunities—becoming, in effect, the new distributors for the cloud-based technology ecosystem:* If hybrid clouds prove a winning combination, PaaS aggregation may become a powerful “one-stop” cloud solution, particularly for large enterprises.

These four factors will influence not just how quickly the cloud is adopted but also in large part the shape of the cloud-based ecosystem over the next several years. Whether public, private, or hybrid clouds come to dominate the space, what the role of the consumer in cloud markets will be, and how the fortunes of each player in the current and future ecosystems will play out—all will depend on the pace at which these trends emerge.

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DISTRIBUTION IN THE CLOUD

As players from all sides position themselves for advantage in the cloud world, each must evaluate what the new technology ecosystem is likely to look like, determine which part of the new ecosystem it wants and is able to play in, assess how it might influence the evolution of the market, and, where necessary, consider making strategic shifts in its capability system and route to market.

We see three overarching changes occurring as the partner ecosystem evolves to a cloud-based world. First, the role of traditional IT delivery players will very likely decline. Software distributors, LARs, VARs, and retailers and e-tailers—indeed, every player with a large investment in the physical distribution system—will need to craft new strategies as more and more software is delivered via the Internet. Even OEMs face the prospect of disintermediation as the value they capture from bundling applications with their hardware potentially declines.

Second, the value of customization and integration will likely decline, especially in the SMB market. This will put pressure on VARs and even SIs, as enterprises provision an increasingly greater portion of their IT needs on cloud-ready hardware and standardized cloud applications. Web value-added providers (VAPs), which typically partner with hosters to supply software, appear well positioned to capture SMBs' moderate remaining SaaS customization needs.

Finally, certain delivery and selling assets will likely increase in value. For example, players that can combine direct sales relationships, subscription billing relationships, e-commerce storefronts, hosted infrastructure, and secure application delivery will fare well. Service providers (SPs), including telecom operators, cable companies, and hosters, are therefore potentially well positioned to offer their own and syndicated cloud services, particularly in consumer and SMB markets, if they can adapt to capture the opportunity.

players, including systems integrators, service providers, Web VAPs, and SaaS app stores, will offer hosting, customization, delivery, and other services to enterprises, SMBs, and consumers alike.

1. Web and Cloud Masters

This group, which includes Microsoft, Amazon, and Google, has already established a foothold in the space, operating huge data centers and providing cloud services primarily to smaller enterprises and to SMBs. We expect that their role will grow as the new ecosystem becomes more developed. Already, they have expanded their offerings from SaaS to include IaaS and PaaS, and their control over software platforms and economies of scale are providing customers with a value-added one-stop shopping solution.

Among the challenges this group faces, however, is its ability to shape the market's evolution to a more public cloud outcome and to capture new opportunities for PaaS and SaaS aggregation. Potential avenues include working with partners to overcome security and auditability challenges associated with public clouds, helping to shape and further aid in the consumerization of IT,

and positioning themselves in the meantime to capture more of the hybrid cloud opportunity. As the adoption of cloud services extends beyond basic e-mail and collaboration services, these providers must also demonstrate their ability to provide sufficiently wide "horizontal" cloud offerings that can compete with industry-specific, best-of-breed applications, especially if they want to continue to increase their share of the enterprise market.

2. Virtualization and Automation Software Specialists

The early members of this group—notably players like VMware—have helped to make cloud computing possible, and their basic underlying technologies will no doubt continue to exert an important influence on the market going forward. Virtualization players are establishing a position in the PaaS market, seeking to achieve standardization of their proprietary platforms. In doing so, they are also focusing on hybrid clouds, which can seamlessly enable additional cloud computing resources to meet spikes in demand.

The basic challenge this group faces will be how to play the best-of-breed game against other platform competi-

tors while recognizing the inexorable change that will come as Web and cloud masters, integrated giants, and enterprise software specialists alike begin to incorporate similar technologies into their offerings, through either native or acquired capability.

3. Enterprise Software Specialists

These companies, which include large software vendors like Oracle and SAP, are narrower in focus, typically concentrating on enterprise-level software suites with industry-specific solutions. They occupy a strong position now, but they are also still seeking ways to manage the transition between the traditional and SaaS worlds. They could become strong PaaS players, especially in selective markets, and they may be well positioned to become SaaS aggregators concentrating on helping medium-sized and large enterprises build curated app stores. Currently these players are fairly selective about extending their efforts into IaaS—probably a wise course, given the scale advantages the integrated giants and Web and cloud masters are likely to exert in this area.

4. Pure-Play ISVs

The companies in this large group, including the likes of Autodesk and Adobe Systems, are already well

established in the market, though the competition is increasing. Many of them are still trying to make the transition to the SaaS world, where companies like Salesforce.com already reside. As cloud computing grows in popularity, they may find that they need nonphysical new marketing and distribution partners in order to get their software to market. Some may become candidates for acquisition by larger platform and suite players; alternatively, they could seek to partner with the new SaaS cloud aggregators for distribution.

5. Integrated Giants

Given their already strong presence in outsourcing and other enterprise-oriented activities, this group, which includes IBM and Hewlett-Packard, among others, is beginning to offer large companies cost-effective, highly scalable private cloud solutions cutting across IaaS, PaaS, and SaaS. Among the strategic considerations for members of this large group: Should they maintain their asset-heavy models or evolve to depend on fewer assets? And how deeply should they extend their current private cloud offerings into the hybrid and public cloud markets in order to hedge their bets as the public cloud market grows? On the one hand, they may find that the premiums they

demand for their lower-scale private cloud deployments will make them too expensive compared with public clouds, particularly as public cloud security and auditability challenges are resolved. On the other hand, there will certainly be a sizable and growing market for private clouds among certain verticals, as well as opportunities in the public sector and with specific sovereign government deployments. An early focus on these submarkets may distinguish the eventual winners from the losers.

6. Asset-Light Integrators

Firms like Accenture and Capgemini are already strong in outsourcing, particularly in application management but also in desktop and networking management, and many of these integrators have already made partnership deals to offer IaaS. Their advantage lies in their experience in transforming complex environments, but if the demand for their customization services declines, their consulting and integration businesses will likely suffer as well, leaving them to compete for an ever smaller slice of the large-enterprise pie. However, those with strong existing offerings in business process outsourcing likely will remain well positioned to offer those services via the cloud.

7. Service Providers

As certain delivery and selling assets increase in value as the cloud market evolves, the players with the widest ranges of these assets, including telecom operators, cable companies, and hosters, have the potential to become major players in the new ecosystem—and ideal partners for many—if they can successfully capture the opportunity. To varying degrees, depending on the player, these assets include direct sales relationships and reach into enterprises, SMBs, and consumers; existing subscription billing relationships, billing systems, and associated ratings engines; e-commerce storefronts; hosted infrastructure; and secure application delivery.

Hosters such as Rackspace and SoftLayer and telecoms including Verizon and AT&T are already providing remote storage, unified communications, and e-mail and collaboration, and many are developing asset-heavy enterprise strategies for the cloud. Hosters could become acquisition targets for many players, including the telecom operators and cable players themselves. Telecom and cable players have the further potential to offer networking-as-a-service (NaaS)

capabilities (sometimes also referred to as communications-as-a-service, or CaaS) and to tap into the proliferation of devices. Finally, telecom operators and cable players, and perhaps hosters too, may be able to leverage their wide set of potentially cloud-ready assets to become application and PaaS aggregators, though at the risk of straying too far from their core capabilities.

These service providers will need to make sure they can distinguish their services from those of other players, especially companies with extensive IaaS offerings. Service providers that choose asset-heavy approaches will need to clearly position themselves against the integrated giants in private clouds and the Web masters in public clouds. And the pure hosters need to expand their services beyond simple hosting if they are to maintain their edge over the big cloud masters as both groups fight for the SMB market.

8. Equipment Makers

This group includes the computing players, storage companies, network equipment makers, and end-user device makers, all of whose roles in the ecosystem are changing as more and more software is delivered via the cloud. The makers of servers and storage equipment—those that provide the CPUs and storage for cloud server farms—are likely to see their markets expand substantially as demand for IaaS generates the lion's share of growth in the cloud market over the next two to three years. But they will face continued commoditization, especially as public cloud providers seek to drive down the cost of infrastructure.

On the end-user device side, companies that develop PCs, Net books, tablets, and smartphones may see some increased pressure on their businesses as the cloud-based delivery of software reduces their ability

to capture incremental margins by bundling software on their machines. At the same time, device makers stand to capture increased value if they can create exceptional end-to-end cloud-to-device experiences, as makers of tablet computers are already doing through the cloud-based applications they offer. They are also likely to benefit if they can position themselves to capture the expected explosion in connected, context-aware appliances and sensors, and the dynamic applications optimized for them. No longer will users be limited to their company-issued desktops and laptops. Instead, they will be able to access company records and transactions on any mobile device.

9. Web VAPs

These companies provide a wide range of value-added IT services over the Internet, primarily to SMBs, typically sourcing computing and storage from hosters. As the cloud

The PC-based cloud ecosystem, borrowing a page from the mobile space, is likely to evolve its own aggregated app stores.

ecosystem matures, they could maintain or increase their position as they move more of their services to the cloud. However, they also risk being squeezed out and may become roll-up targets, especially for hosters, which will need to augment their own IT offerings if they are to survive. So these companies must work hard to distinguish themselves in a market where more and more players will be offering similar services.

10. Aggregators

The role of aggregators, we believe, will become increasingly important as the cloud ecosystem develops further. We see an opportunity for aggregation across both SaaS and PaaS, for different reasons. On the SaaS side, as noted above, pure-play

ISVs will need a route to market, so the PC-based cloud ecosystem, borrowing a page from the mobile space, is likely to evolve its own aggregated app stores. Indeed, Google and Apple have already created and launched stores for PC applications based on their respective browser and operating system platforms.

No matter how they evolve, aggregators offering a wide range of SaaS applications are likely to become major players in the future, essentially subsuming the task of software distributors in the current ecosystem. Google and Amazon, in particular, are worth watching to see how they approach this effort. There is also the potential for a cross-platform SaaS app store to evolve. Finally, we

believe that supply-side players will work with large enterprises to make a variety of enterprise-class applications available to employees through curated app stores. Such applications could be offered under variable “by the drink” pricing models, depending on features used, that would allow companies to make maximum use of their precious IT dollars.

On the platform side, PaaS-level aggregation will be required to support the expected popularity of hybrid clouds, creating an additional opportunity for those providing hybrid cloud services. Indeed, a wider opportunity exists for an entirely new class of players that can combine PaaS and SaaS aggregation.

Players must create their own visions of how the ecosystem will evolve and how they can shape the outcomes to their advantage.

SURVIVAL OF THE FITTEST

The disruptive power of cloud computing is becoming clear, and the players making up this evolving ecosystem are already making significant moves to build cloud capabilities and to position themselves as leaders in the space. Nowhere is this more evident than in the distribution of software, where the shift to the purely digital provisioning of software will have a profound impact on every player and on the way value is generated and captured.

The new ecosystem offers plenty of opportunities to create new sources of value, and many different types of players are converging on the cloud in hopes of doing so. But few players have clear, articulated strategies for winning; indeed, many have not yet begun to make the strategic moves necessary to navigate their way through what remain essentially uncharted waters. To do so, players must create their own visions of how the space will evolve and how they can shape the outcomes to their advantage. They must quickly develop strategies within the next six to 12 months in order to stake out their territory in the new ecosystem before it is fully occupied and to avoid the risks of making poor investments that cannot be undone. If they can adapt intelligently, they stand a much better chance of shaping the future state of the cloud rather than getting lost in the fog

Endnotes

¹ "Worldwide and Regional Public IT Cloud Services 2010–2014 Forecast" (IDC, June 2010); "Optimizing IT Assets: Is Cloud Computing the Answer?," by Andy Rowsell-Jones and Barbara Gomolski (Gartner, February 2011).

² "Cloud Computing: An Information Security Perspective," by Jens Niebuhr, Matthew W. Holt, Thomas Aichberger, and Angelo Rosiello (Booz & Company, 2011). www.booz.com/media/uploads/BoozCo-Cloud-Computing.pdf

³ "Friendly Takeover: The Consumerization of Corporate IT," by Rainer Bernnat, Olaf Acker, Nicolai Bieber, and Mark Johnson (Booz & Company, 2010). www.booz.com/media/uploads/Friendly_Takeover.pdf

About the Authors

David Standridge is a partner with Booz & Company based in San Francisco. He works with leading hardware and software companies in the high-tech industry, focusing on strategy, operations, and supply chain management.

Philip Minasian is a principal with Booz & Company based in New York. He works with leading technology and telecommunications companies, focusing on competitive strategy and corporate development, industry evolution, marketing strategy, and organizational culture and transformation.

Fabian Seelbach is a senior associate with Booz & Company based in New York. He concentrates on strategic issues of companies in the communications, media, and technology industries.

Jeremy Reich is a consultant with Booz & Company based in New York. He works with clients in the telecommunications and technology industries, focusing on strategy and operational improvement.

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