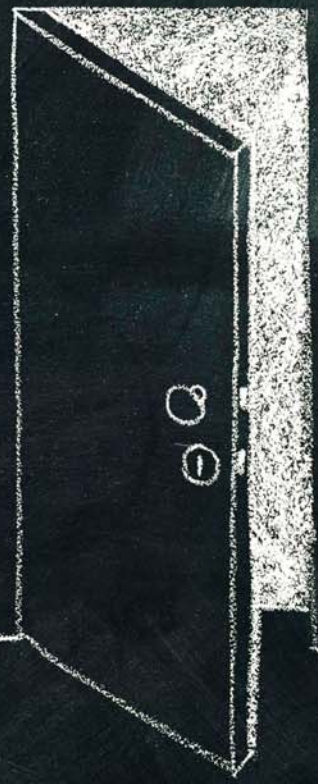
Accenture Technology Vision 2012

High performance. Delivered.



accenture

consulting | technology | outsourcing

Contents

We bring the Accenture Technology Vision 2012 to you at a time of unprecedented change in the global economy and the technology landscape. Our clients tell us that technology is more important than ever to their business success. Some of them sense that the world is on the verge of a new technology revolution. We agree.

This next revolution will differ from previous disruptions. This time, technology is present in every aspect of our lives. The lines between consumer and corporate technology continue to blur. On-premise and off-premise technology are melding to drive much quicker processing—and faster and better business results. The flexibility of new technologies and architectures is forcing us all to rethink how we harness IT to make it easier for our organizations to innovate.

The Accenture Technology Vision 2012 is designed to help you identify these changes—to make sense of the disruptions. But this year's report challenges companies to go a step beyond understanding—to start taking action. We urge you to plan thoughtful, appropriate responses and seize new opportunities.

It is time to focus on technology as a driver for growth and take the bold decisions to move beyond IT's legacy constraints—constraints that make it too difficult to change, too costly to pursue new opportunities.

The coming transformation journey—changing IT from roadblock to driver—won't be easy. It will call for a comprehensive strategy that leads to new architectures, new services, and new platforms. And it will demand prompt, disciplined execution to bring those new approaches to life.

The technology that you use will be radically different three years from now. Stand still and you risk being left behind. Act now and you will be poised for continued growth in the future.

Pierre Nanterme
Chief Executive Officer
Accenture

Kevin Campbell
Group Chief Executive - Technology
Accenture

Responding to what's ahead

Some drivers have an advantage over other motorists: they can see around corners at night. With adaptive headlights in their cars—lamps that swivel a few degrees when they detect that the car is turning—these drivers can spot the deer in the road a few milliseconds before the rest of us.

To take prompt action, every CIO requires the information equivalent of adaptive headlights—the ability to identify relevant trends before others do. Indeed, they and their business colleagues need the clearest possible guidance about changes in information technologies. With the right guidance, they can effectively lead their organizations as they adapt to the rapidly changing world we live in.

CIOs are feeling the pressure of a bevy of technology forces—forces like the superabundance of computing power and capacity and the soaring technology expectations of consumers, employees, and even CEOs. Discussions on the impact of cloud computing and mobility have become routine. IT organizations are just beginning to wrap their minds around Big Data. They're pushing to weave analytics deeper into the organization. And some are asking themselves what to make of the perennial discussion of the Internet of Things.

Yet even as CIOs begin to react, the list of change-making technologies continues to grow. Recognizing that forces such as the cloud are just the starting point, Accenture's annual Technology Vision provides our perspective on the future of technology beyond the conversations already on the table. This year's report—Technology Vision 2012—outlines the new technology trends that forward-thinking CIOs will use to position their organizations to drive growth, rather than focusing on cost-cutting and efficiency improvements.

Increasingly, business leaders find that their organizations' success relies on keeping pace with rapidly shifting technology. Companies must be prepared to recognize and take advantage of new opportunities enabled by new trends, like context-based services or social technologies. But the new moves will come at a price. To change with the world quickly and cost-effectively, there must be a new IT base—new architectures, new services, new platforms. And with a new IT base come new risks and new precautions, so information security has to become a top agenda item.

IT leaders must take action now. They must be the ones who lead their enterprises through this turbulent new world. Inside 100 days of reading this report, they should have begun to map out their strategies to leverage these trends over the long haul. Within 12 months, they should be starting to execute these plans to put their enterprises on the path to new organizations, new processes, new systems—even a new frame of mind.

Doing so means starting this journey together with the business. It demands detailed discussions with the rest of the C-suite. It will call for CIOs to internalize these trends so they can start framing these discussions—not talking about the technologies themselves but about the impact they will have on the business, and the new initiatives they can drive.

Some of you are already leading those conversations with your business colleagues—and with your IT staff. For those who aren't, are you ready?

Context-based services

Context—where you are and what you're doing—will drive the next wave of digital services


WHO?
WHAT?
WHERE?
WHEN?
CONTEXT

Forget about the much-discussed Internet of Things. The really interesting news is that data from a host of new sources, combined with technologies that rapidly aggregate and analyze the data, will deliver fresh insights that can give users much more immersive and valuable experiences online—and in the real world.

Services that alert you to the nearest Starbucks or gas station just aren't enough for users these days. Those services don't "know" you; they don't know what you're trying to do right now.

What can still attract users? Services that combine real-time signals from the physical world with location data, online activities, social media, and many other types of contextual inputs. It might be support for a pharmaceutical sales rep tailored to the context of the doctors she will be meeting and the drugs she's selling. It could be data made available to a technician at an oil refinery, customized to the equipment he's servicing and what its downtime history looks like. Or it might be a shopping app that gives a customer fast access to more information about a new jacket whose quick response (QR) code she's scanned in the store; tells her how far she is from stores that carry other sizes of the jacket; alerts her to her available credit balance; and gets instant opinions, via Facebook, from her friends about whether they like the jacket or not.

The new high ground for data services is not in location-based apps. It is in a kaleidoscope of context that adds up to rich user experiences—far more alluring than simple indications of how many friends are inside the same one-mile radius or what route to walk from this subway stop to that unfamiliar office building.

Today, we have ready access to enough historical and real-time data and we know enough about what is happening in enough places to be able to offer services that are enabling and entertaining. More data, by itself, isn't enough—technology now enables rapid aggregation of data from multiple sources and delivers new insights that can give users much more immersive and valuable experiences. The key—beyond the proliferation of data and the ability to analyze it every which way—is to ensure that context enables the services that make sense right at the point where an action takes place. In effect, context allows organizations to shift their focus from insight (for example, business travelers place a premium on the ease and speed of interaction when choosing rental car companies) to *actionable* insight (streamlining the car rental process allows frequent renters to avoid lines, thus increasing customer loyalty) to insight at the *point of action* (for instance, the rental company automatically detects when an accident with one of its cars has happened, proactively initiates emergency services if needed, and issues a replacement rental car to meet the renter at the scene, greatly improving the chances of creating a loyal customer for life).

CIOs and other IT leaders who get it—who grasp the importance of context-based connections—will be able to establish themselves, and their organizations, as strategic players. They will immediately be able to offer new levels of insight that will differentiate their organizations from competitors.

What context-based services *aren't*

It's important to deflect any misconceptions about context-based data services. To begin with, they are not about "really cool" mobile phone handsets—regardless of how much their new apps may impress. Although devices such as mobiles are indeed essential vehicles for some of those services, that is all they are. Mobility is just one of many factors that help to convey context.

Nor are context-based services all about the cloud. It's true that connected devices—mobile and otherwise—will exchange data with cloud-based service providers, but the cloud is nothing more than a logical data-aggregation point. Similarly, "context-based" is not synonymous with "location-based." The importance of being

able to integrate data from the physical world beyond location—inputs from QR codes are only one example—must not be underestimated. And context is not just another example of social media, although social certainly adds context such as shared interests or opinions. It's in the aggregation of all of these things that we truly see the power of context-based services. They create an experience that adds levels of utility and richness—and yes, complexity—that were not possible even just a few years ago.

Context-based services that transcend mobile apps

Context-based services have existed in rudimentary forms for some time; to an extent, they are evident in the Internet of Things—for instance, in the real-time readings on pace and time that marathon runners receive from a transmitter tag laced to a shoe. They are also apparent in the recommendation engines used by sites such as Amazon, Netflix, and LinkedIn. Recommendation software not only keeps track of your personalized history and uses it to infer interests; today, it can produce suggestions based on what others in your social circle or professional group are doing. For instance, if other users in your network are reading a popular business book, a site may propose that you purchase it, too—and provide a one-click link to do so.

And of course many phones—they do not even have to fit the definition of Web-ready smartphones that access vast stores of apps—have location-sensing capabilities that provide their users with useful proximity data, route planning, and more.

The next few years are likely to see an expansion in the volumes and types of sensors available to add context. The industrial world already benefits from radio frequency ID (RFID) systems in which RFID-tagged items supply contextual data about their locations, time, temperature, and much more. Now we anticipate a rush of specialty devices that will excel in niche areas—health monitors that test for blood sugar levels, for instance, or wristbands that transmit signals about a patient's activity levels to mobile-linked health care systems that add context about family health history to enable patients to improve their own health care. Apple's latest iPhone, for instance, contains Bluetooth Smart technology—a new standard that supports connections to sensors that consume very little power.

The power of context

One other source of context is in what is shared—which is where blogs, chat rooms, message boards, social media, product reviews, and the countless other wells of online data come in. We can detect or infer certain information about others based on our interactions with them or, even more simply, we can give them the opportunity to share it themselves. It turns out that users readily share meaningful personal context; they just need to have a compelling reason to do so.

So when a retailer provides QR codes in its stores, it enables the shopper to access new and valuable sources of information about a product or service. Because this is something the consumer wasn't able to do before—or wasn't able to do with such ease and reliability—he is willing to trade some personal data in exchange. That data in turn becomes valuable not only for the retailer and the original producer but for others in the shopper's social network as well.

Given richer context—access to the shopper's interests, shopping history, or age, perhaps—providers will offer services that better align with his needs and wants. Indeed, we expect that products, services, retailers, and enterprises will be differentiated based on their ability to meet users' requirements in this way.

The power of context will enrich not only online interactions but real-world ones as well. Today, online shopping experiences have surpassed what is usually available in the physical world; it is possible to view different colors, styles, sizes, and availability of merchandise; to put shopping carts on hold; to pay in many different ways; to redeem coupons easily; and more. The next few years will see a push toward merging the physical and virtual shopping experiences. Blippar, for example, offers augmented reality capabilities that allow retailers to experiment with doing just that today. And Shopkick enriches the in-store shopping experience with personalized offers, highlights products that others have liked, and rewards customers for walking into selected stores. The reward for walking in is just the bait; the context piece comes from location (knowing you're in the store), understanding interests and intent (scanning an item you're thinking about), and social connections (knowing what others liked).

The emergence of more context-based services will have a compounding— those new services themselves provide additional sources of context. The expanding richness of context will be a fast-moving capability that enterprises will need to watch.

What it means for the business

- New products and services based on context from inside and outside of the enterprise
- New contextual data services that enable companies to more easily add capabilities to their existing products
- New capabilities to experiment with new services and iterate quickly based on pilots

This time next year

Over the next 12 months, the IT organization should:

- Create strong links with business functions that directly influence the consumer experience.
- Compile a firm list of context-based services that is regularly updated as circumstances change—and that forms the basis of discussion with the business side in order to drive the platform for context across the enterprise.
- Form a pilot team that blends user experience specialists with data scientists to experiment with new contextual data services.
- Establish an environment that enables experimentation—rapid development, planning, and deployment.
- Begin developing a data platform to handle contextual data and analytics, including appropriate privacy controls on potentially sensitive personal information.
- Develop a data roadmap to depict how to acquire the critical data necessary for the next generation of context-based services.

"CIOs and other IT leaders who get it—who grasp the importance of context-based connections—will be able to establish themselves, and their organizations, as strategic players. They will immediately be able to offer new levels of insight that will differentiate their organizations from competitors."

What's possible

Several interesting examples show how context-based services may unfold. The service from a company called Reach.ly scans Twitter accounts in search of mentions of planned trips; with the information it gleans, it enables hotels to contact travelers who have indicated that they are heading to their vicinity. In another case, several mobile phone services providers are experimenting with technology that automatically deactivates phones while their owners are driving.[1]

And Misys, a provider of IT solutions for the financial services sector, is working to combat bank fraud with GeoGuard, its new consumer location-based offering running on the Force.com platform. GeoGuard collates geographic information and enables customers to allow their banks to request their most recent location information, regardless of the services they use. The banks benefit because they can reduce the considerable costs of confirming a customer's location abroad and reimbursing for any fraudulent withdrawals from an account.[2]

However, it is still early days for context-based services. Current services barely scratch the surface of what's truly possible. Although many of the technology challenges are being overcome, and although contextual data and the means to synthesize it have reached critical mass, other hurdles remain. For instance, privacy issues are likely to make headlines soon as privacy watchdogs jump in to defend against unauthorized tracking of citizens or consumers. In the United States, consumer advocacy groups are particularly vocal about such issues.

The skills needed to deliver context

So what will it take for IT departments to help their organizations deliver rich context-based

experiences to their customers? Context-based services should be limited only by the creativity of the business, not by IT's ability to deliver.

It should go without saying that skills in user interface design will be high on the list. At the same time, it will be beneficial to have expertise in the design of high-quality customer experiences, whether you're a retailer, a utility, or a product manufacturer. One individual should be charged with the responsibility of overseeing customer interactions across all channels. For example, the Washington Post publishing company recently appointed a chief experience officer, as did Cleveland Clinic some years ago.

Also needed: strong management discipline to get the best results from a mix of IT traditionalists and creative user-experience types. Orchestration skills will be essential for helping to handle the complex array of internal systems, not to mention the vendors now populating the data services market, where some forms of context will originate.

Because new sources of context are constantly popping up—and because there are always new use cases, new services, new players, and new customer needs—context-based services will also call for skills that encourage experimentation. And they'll require real flexibility and fast-paced ways of working because context that is constantly in flux will lead to a need for agile services that change as quickly as users do. IT practitioners who are geared to traditional IT cycle times will not be prime candidates for the new roles needed; they're unlikely to have what it takes to get the best from the new world of context and from an ever-changing mix of widely distributed contextual data.

Context-based services require very different thinking from IT leaders. They call for a much broader and more dynamic view of the possibilities for adding value for the business, and they demand different skills and stronger links within the enterprise than has been typical to date. But those who grasp the importance of these connections will quickly establish themselves as strategic players.

Your 100-day plan

Suggested actions to take during the next three months:

- Identify ways to drive the discussion toward the value of context; launch discussions of new context-driven opportunities with the business side.
- Start thinking in terms of multiple channels and following the mix of interactions that they enable (Web page to Facebook to retail to mobile...).
- Start cataloging the contextual data on hand.
- Start identifying new sources of data and determining how to acquire it (sometimes it must be bought, and sometimes new mechanisms will be needed to collect it in current systems).
- Sketch out the user experience skills needed to pilot context-based services.
- Plan an environment for experimentation.
- Draft ideas for how to leverage the technology that customers bring with them.

Converging data architectures

It's not about the "big" in Big Data—data architectures must bridge the old and the new


STRUCTURED
UNSTRUCTURED

Old approaches to data survive because structured forms of data make IT leaders feel they're in control. But new approaches to managing unstructured data provide a whole new notion of control—the ability to turn data into new streams of value. Successfully rebalancing the data architecture portfolio and blending the structured with the unstructured are key to unlocking that value.

In 2011, even a casual reading of the technology media indicated that big changes were starting to sweep through the IT department—whether IT leaders recognized it or not. Big Data—the catchall term for the explosion in volumes and types of data and the technologies emerging to support it—was already making big headlines. Conference speeches and trade press articles had begun the conversation about the importance of distributed data and the idea of data as a service. New technologies such as Apache Hadoop—a software framework that supports data-intensive distributed applications—were already gathering momentum. In our Technology Vision 2011 report, we pointed out that companies needed to start conceiving of data platforms in ways that better encompass the idea of data as *the* strategic IT asset.

Some enterprises are experimenting with data platform approaches, but it hasn't been easy. In fact, there has been something of a polarization, with many of those steeped in traditional relational database approaches defending the status quo facing off against a maverick camp that is enthusiastically—perhaps over-enthusiastically—seeing unstructured approaches to data as a panacea for all that ails IT today.

Neither stance is appropriate. Yes, what's emerging is a new world of horizontally scaling, unstructured databases that are better at solving some old problems. More importantly, they're prompting us to think of new problems to solve whose resolution was never attempted before, because it just couldn't be done. (Don't misunderstand the "big" in Big Data—for most enterprises it's not about finding ways to handle massive amounts of Facebook or e-mail data.) But that does not imply "rip and replace"; in no way does it render traditional databases obsolete. The truth is that now that we have technologies that can deal with different types of data, there is enormous value in maximizing the value of the data in existing systems—in hybridizing it with many forms of unstructured data.

Three changes that matter

There are three fundamental data architecture technology changes that, individually and collectively, have significant implications for IT leaders. We foresee a rebalancing of the database landscape as data architects embrace the fact that relational databases are no longer the only tool in the toolkit. We anticipate "bridge technologies" that will mix old and new database forms. And we fully expect advances from the new to re-invigorate the old. In short, we expect tomorrow's conversations about data architectures to center on rebalancing, coexistence, and cross-pollination.

IT leaders should be evaluating their data portfolios for opportunities to rebalance the use of relational and nonrelational databases. Today's data architects now have more choices for solving unstructured data problems than simply jury-rigging relational databases to do so. Where today the data landscape is almost entirely relational, we expect that

landscape to change significantly. Over the next decade, the proportion that is nonrelational will rise. It has been estimated that between 15 percent and 40 percent of all relational database management systems (RDBMS) implementations would be better suited to nonrelational platforms.[3] But that shift does not imply that relational is somehow inferior. IT leaders will need to make their choices based not on ideology but on the forms of data they are using and for what purposes.

The worlds of structured and unstructured data are rapidly converging. Leading IT practitioners must find ways to constructively manage the convergence and enable all forms of data management to coexist, sometimes using bridge technologies. That's the case at one large high-tech company that is using Hadoop to process and import data into traditional systems in ways that wouldn't be possible with just the RDBMS approach. In essence, the Hadoop framework becomes a preprocessing engine for analyzing raw data to extract important events before feeding the other systems. It is abstracted and integrated with existing reporting in such a way that it minimizes the impact on the rest of the enterprise.

Over the long term, the high-performing organizations will be those whose IT groups recognize the need for coexistence and effectively marry the two worlds to get the most from their data. IT leaders must still be realistic about the limits of what can be achieved via bridge technologies, sometimes waiting instead for the next generation of data technologies where cross-pollination between the structured and unstructured worlds will fill gaps. This cross-pollination is already happening at the vendor level. Nonrelational databases were the first to integrate horizontal scaling technologies into the core; now relational databases are starting to do the same. There is no shortage of start-up activity in the arena, meaning that investment capital is betting on cross-pollination; newcomers include Xeround, Scalr, Akiban, and Schooner. As these technologies reach maturity, enterprises should re-evaluate their readiness to tackle more complex data problems.

Established vendors don't plan to be left out of the new world. Just a few glimpses: Oracle has marched into the unstructured world by announcing its Hadoop-framework-based Big Data Appliance. IBM has built a new version of InfoSphere BigInsights for its smart cloud infrastructure that uses Hadoop to analyze structured and unstructured data. And Microsoft recently announced plans to deliver enterprise-class Hadoop-based distributions on both Windows Server and Windows Azure. The shifts in vendors' thinking are also seen in consolidation moves as established players acknowledge that they must move into these new realms. For example, Teradata acquired Aster Data Systems, a leader in Big Data analytics. The acquisition was designed to expand Teradata's portfolio and bring businesses greater depth of analytic insight and faster time to value as they unlock the full potential of their Big Data.

What's complicating change

Unfortunately, old IT habits die hard. Legacy thinking prevails. Existing views of data architecture are a product of the application lens that's been applied to system development for several decades. Approaches to structuring information, gathering data requirements, storing data, and even solving data problems are driven by a view of the world adopted from structured design approaches and the trusty relational database.

This structured view of the world is entrenched in organizations. Many CIOs still think of themselves not as the stewards of data but as the data "owners." And to a worrying extent, many senior IT managers remain convinced that all forms of data can still be dealt with using conventional relational databases, so they are unwilling to try other options. In many cases, the resistance is passive: stay the present course, ignore Big Data, and it will go away. In other cases, the pushback is that the new technologies are "toy technologies"—not considered "enterprise grade." In effect, the traditional relational database has been misused for decades because it has been seen as the only tool in the toolbox—and because IT departments haven't had the vision and skills to use it in any other way.

Yet we're seeing the rapid rise of another group—the iconoclasts who are scraping unstructured data off Web sites, wikis, and Twitter feeds in order to find insights that can help them discover new customer segments, identify new product directions, and more. These individuals are very much in touch with the Web-scale companies that are already big names in the consumer realm—companies such as Google, Amazon, Facebook, and Twitter. They are often plugged into the open-source movement and to the academic and other research communities that surround these Web-scale companies. For them,

What it means for the business

- Potential advantage for small and midsize competitors since they lack the "anchor" of heavy investments in legacy systems
- More accurate and more usable business projections through the expanded use of probabilistic data, enabled by new data platforms
- IT moves from blocker to enabler, improving the leverage of all available data, both external and internal to the organization
- Faster responses to queries, and more frequent and increasingly customized iterations on those queries

See also "What it means for the business" in Industrialized data services.

This time next year

Over the next 12 months, the IT organization should:

- Run data platform trials that leverage structured and unstructured data—with data in the platform and in use by one or more business processes.
- Create a list of other business processes that can begin to leverage data in the platform.
- Create a tangible, funded roadmap, subsequent to successful trials, to expand replatforming to a growing amount of data and other business activities.
- Appoint a top-level executive who is responsible for an overarching data-centric perspective—perhaps even appoint a chief data officer.
- Create a recruiting pipeline for data specialists in areas such as alternative database technologies and analytics.
- Demonstrate a "data stewardship" mentality rather than one of ownership.

See also "This time next year" in Industrialized data services.

the unstructured data milieu is something rich and new and fun and cool that they want to play with—and that can deliver real business results.

At JPMorgan Chase, for example, many lines of business now use a Hadoop shared service for jobs ranging from extract, transform, and load (ETL) processing and fraud investigation to social media sentiment analysis.[4] The service also provides low-cost storage for varied types of data; for instance, it stores traditional financial records and semi-structured Web logs as well as unstructured text and social comment feeds.

Oil and gas companies are using SAP's HANA in-memory appliance to review massive amounts of their raw exploration data. Utilities are using it to analyze large volumes of data from smart meters and to optimize energy generation based on predictive patterns of consumption.[5]

To a large extent, the maverick groups that are quite comfortable with all things Web scale are working in fields such as marketing, new product development, and customer relations, but as they derive new data and new scraps of insight, they are increasingly recognizing the need to work with IT to get actionable outputs from what they're producing. Forward-looking CIOs will want to hire those mavericks.

How to think about the three underlying changes

We predict that, increasingly, the effectiveness of IT leaders will be gauged by their ability to bridge the gap between the structured and unstructured worlds. Again, the important thing is that this must not be an exercise in "rip and replace." CIOs who are serious about enabling the coexistence of all forms of data will almost certainly have to evaluate and implement bridge technologies. For instance, Aster Data's SQL-MapReduce helps IT departments deal with their lack of skills in nontraditional database management until they have built up that capability. Bridge technologies leverage existing investments; they will not immediately disrupt existing IT operations and are unlikely to unsettle the relational database adherents. Deeper conversations with the software vendor community can help to accelerate the introduction of bridge technologies.

We expect that the rebalancing will happen as a slow evolution as IT departments retire applications and start to replatform in the cloud, on mobile devices, and using bridge approaches. Rebalancing is likely to achieve strong momentum where there are the most gains to be made—in customer-facing business processes, for example.

Forward-thinking CIOs will make strong business cases for new investments in select systems to accelerate the retirement of existing software. They will need to identify "burning platforms" that they can use as spurs for their new initiatives; a prime example would be a business process that can benefit from being able to concurrently and rapidly access multiple forms of data from a host of sources, both external and internal to the organization. Over time, of course, concern about the balance between relational and nonrelational will eventually become a tactical detail.

Furthermore, as CIOs envision how they can foster coexistence between structured and unstructured forms of data, they will need to resist popular notions that the Big Data

"The rebalancing of data architectures will happen as a slow evolution as IT departments retire applications and start to replatform in the cloud, on mobile devices, and using bridge approaches. It is likely to achieve strong momentum where there are the most gains to be made—in customer-facing business processes, for example."

"revolution" is all about victory over SQL. Many voices push forward the idea that scale is the driving reason why relational databases won't be used in the future. But that's not universally true and not always applicable; the arguments about scale serve as a distraction from the main issue. In practice, a lot of the conversation about Big Data is not necessarily about its "bigness." Very few organizations are going to need the type of scale that often makes the Big Data headlines. So, far from rendering the relational database obsolete, the new advances will be incorporated over time into the traditional databases, extending their performance.

New skills, new structure for IT departments

With an eye on the long term, CIOs will have to think in terms of restructuring their organizations. As a starting point, most enterprises need to build better data architecture skills across the board. They will also have to think in terms of reskilling. If IT groups have professionals who know only relational databases, they will perpetuate the "everything is a nail" problem. The IT leaders themselves will need to play the roles of orchestrators—adept generalists who excel at managing disparate sources and forms of data to create a symphony of new business possibilities.

At the same time, there will need to be individual experts with skills in areas that realistically do not exist in the traditional IT world—for instance, specialists in alternative database technologies who understand which to use in which circumstances. IT departments will probably post vacancies for specialists with statistical and analytical skills; in general, there will have to be a steady rise in the analytic literacy of the IT group. And as more of these kinds of specialty skills come on board, and as they reshape the interactions with the business side, the orchestrators will become more and more influential.

Old approaches to data survive because structured forms of data make IT leaders feel they are in control. But it's time to reframe the whole notion of control. It's time to stop viewing data as a means to an end—a platform that is designed to support an application—and start seeing it as an underutilized asset. CIOs cannot stop or slow change as the fundamental trends toward rebalancing, coexistence, and cross-pollination proceed. But there is so much that they can do to prepare for those changes.

Your 100-day plan

Suggested actions to take during the next three months:

- Identify the "burning platforms" among the organization's business processes that can become the vehicles for change.
- Map out individuals on the business side who are current "data owners."
- Map available IT skills in light of the need to rebalance database approaches.
- Draft new methodologies for data design in new projects.
- Assess where current approaches aren't meeting enterprise needs (for example, where data integration is fragile or where replication is unmanageable) and sketch out early retirement of applications wherever needs are not being met.
- Begin listing opportunities to provide new value-added data services.

See also "Your 100-day plan" in Industrialized data services.

Industrialized data services

Freedom to share data will make data more valuable—but only if it's managed differently


Business Impacts
Value of Data
New Products
DATA SOURCES
CUSTOMERS
FINANCIAL
RISK

Now that data is being decoupled, enterprises are using it in many different ways to unlock far more of its potential value. They're actively hunting for other useful data—outside their organizations as well as inside—while keeping their eyes open for opportunities to share their data. But most early data-sharing activities are ad hoc. Needed next: fresh approaches to data management.

You've got a problem if, several years from now, your IT organization is still organized chiefly around applications.

These days, data should be free to roam, and that is a very good thing. Once unshackled from this or that application, it can be moved, shared with alliance partners or suppliers, divided up, analyzed every which way, blended with other data—whatever it takes to unlock much more of its potential value. And that's exactly what some far-sighted organizations are doing now.

But freedom isn't free. There are hidden costs in properly valuing and managing data now that it can be decoupled. Most organizations' efforts to share data broadly are ad hoc. Let's say the marketing group is grabbing data from the customer relationship management (CRM) system so it can study recent loyalty trends. The system it sets up to capture, stage, and store the data is probably entirely different from the system that the finance department creates when using the same data sets to calculate, say, customer retention costs.

The outcome: companies are rapidly creating patchwork quilts of data integration systems whose sheer randomness and variety is leading to inefficiency and complexity that is unsustainable. Put simply, increased sharing of data through data services calls for a radical rethinking of how IT should handle data management. Data management shifts from being an IT capability buried within application support to a collaborative effort of IT and business leaders working in tandem that enables data to be used far beyond the applications that created it.

In the next few years, we believe, leading organizations will master the types of data management necessary to strike the right balance between constraint and freedom for their data, based on a clear-eyed view of the real value of the data. They will start to think in terms of *industrializing* the sharing of data.

As things stand, most companies have some way to go before they fully grasp the implications of decoupling data and then sharing it across the enterprise. The tendency is still to treat the emerging opportunities as data integration projects—as point solutions, not as ongoing data services. After working lifetimes spent in complete control of how and when their data is stored, accessed, archived, and destroyed, it's not easy for many IT managers to accept that they must now collaborate with others with whom they share "ownership" of their data.

Industrializing the approach to sharing data

Accenture's Technology Vision 2011 report identified decoupling as a wide-scale trend worth watching—and doing something about, especially as it relates to data. Many enterprises are starting to recognize that their data has value beyond its original purpose. More companies are beginning to engage in richer data sharing as analytics increases their appetite for more data and drives them to better utilize existing

data. In the financial services sector, for instance, enterprises are fusing customer data, finance data, and risk data to spur development of new products. In the process, organizations like these are creating, formally or informally, new data services to respond to the opportunities.

A virtuous cycle comes into play. The emergence of the data platform will enable organizations to expose more data as a service, accelerating the trend. It is starting to break down data silos and hide the complexity of underlying storage and access. As a result, sharing and integration get easier as at least some barriers are removed.

Today, these data services are being built on an as-needed basis as new use cases are discovered. Decisions about sharing data—and the chances of a business process owner knowing where to find useful data in the organization – are one-offs. How does the production manager who needs better forecasts find the sales analyst whose market research data fills in gaps in projections? But the continued push toward data platforms will soon enable this to happen at scale—"scale" not in terms of accommodating colossal volumes of data but in terms of industrialization, where a structured platform approach enables such decisions to be made over and over again consistently.

To a large extent, enterprises can do this because there have been dramatic advances in the technologies and capabilities used to manage, process, and store data. Many of these have been incubated by Web pioneers such as Amazon, Facebook, Yahoo, and Netflix, rather than traditional technology vendors. Essentially, the pioneers developed solutions for their own data-management challenges.

For instance, Amazon's service-oriented model is anchored by an agile data services architecture. According to chief executive Jeff Bezos, the advances in data management developed by his company's engineers were the starting point for the architectures that underlie the cloud storage and data management services offered by Amazon Web Services.[6] Amazon's CTO, Werner Vogels, has mentioned that Amazon's loosely coupled services model enables the company to respond very quickly to new ideas.[7]

As the horizontal-scaling technologies of these pioneers spread to mainstream business, they have been open-sourced, improved, and made ready for the enterprise. Previously, it has been necessary to "overprovision" a resource; now, data services enable users to provision for today and expand when they need more. So, on day one, the sales organization doesn't need to anticipate all possible data consumers for the order tracking system and doesn't have to invest in infrastructure for users that don't yet exist.

A new era of data management

It has always been difficult to provide business users with the data they need to make effective decisions. At every stage, the siloed nature of data tied directly to applications has thwarted IT's efforts to manage data consistently across the organization. Data management efforts must be duplicated for each silo, driving the cost up and ROI down—think North American versus Asia-Pacific sales, perhaps, or different product groups for hair care and for skin care. Taking data management from good to great often becomes an unappealing exercise after the third or fourth implementation. A data-sharing model, by its nature, will accelerate companies toward the notion of centralized data management. By creating an abstraction layer between data and applications, IT has the opportunity to standardize and industrialize data management. In this model, consumption of the data is what matters, not management of it. The path toward centralization becomes easier and more cost-effective.

Interestingly, this new world of data sharing is an about-face for systems administrators who have traditionally been charged with owning the data. Under the data-sharing model, the concept of data ownership is no longer valid. By its nature, the more data is shared, the more value the company sees. So, instead of ownership, CIOs must begin to think about data responsibility as well as data accountability. For the most part, data accountability is familiar ground: CIOs will still be squarely charged with laying the groundwork for data design, governance, and implementation. IT will be accountable for creating a centralized mechanism for how data is managed throughout systems and IT processes.

However, things shift from the traditional when data starts flowing through the system, becoming more and more distributed throughout the company. Business units from all over the enterprise will be creating, consuming, and sharing data with each other, making it important to focus on data responsibility. Who is responsible for the data at each stage of its life cycle? The shift has, essentially, resulted in the creation of a data supply chain. It will be up to the CIO to start working with business units to coordinate data responsibility from creation to distribution, more as if they were managing the end-to-end manufacture of a bicycle than a workflow of electronic ones and zeros.

What it means for the business

- Broader opportunities to leverage data—both internal and external to the organization—to gain insights that can enrich new product development, strengthen customer loyalty, and more
- Increased agility to respond much faster to data-driven opportunities
- More accurate and more usable business projections through the expanded use of probabilistic data, enabled by new data platforms
- New discussions of data's value and decisions about how to charge for its use

See also "What it means for the business" in Converging data architectures.

This time next year

Over the next 12 months, the IT organization should:

- "Re-architect" the organizational structure to gear it toward data services.
- Create and fill new roles: Senior role in charge of data management, along with data scientists, data curators, and others.
- Organize active, ongoing discussions with business functions about new data services needed.
- Develop a basic internal data exchange.
- Run data platform trials that leverage structured and unstructured data—with data in the platform and in use by one or more business processes.
- Develop a reusable framework for data valuation that can guide data management decisions.
- Create a list of other business processes that can begin to leverage data in the platform.
- Create a tangible, funded roadmap, subsequent to successful trials, to expand replatforming to a growing amount of data and other business activities.

See also "This time next year" in Converging data architectures.

"Put simply, increased sharing of data through data services calls for a radical rethinking of how IT should handle data management. Essentially, data management shifts from being an IT capability buried within application support to a collaborative effort that enables data to be used far beyond the applications that created it."

One data-management mechanism that will likely become more popular is the data exchange—a forum where data can be published and accessed. Some organizations are already trying out rudimentary data exchanges internally. We believe that these kinds of exchanges will grow organically within organizations, and best practices will begin to materialize in the next year or two. A next step would involve "open" data exchanges—exposing data to and seeking data from external partners such as suppliers and customers. Of course, publishing data to open data exchanges will not suit every organization or every piece of data. And there is nothing yet that is clearly destined to evolve into a kind of New York Stock Exchange for data.

Figuring out the value of data

However, before data can be shared—even informally—it has to be valued. Today, we think about the value of data in terms of what is required to store it. In the future, the value of data will be determined when it is used, in terms of its potential business impact. (*See The dimensions of data value.*) Organizations need to create a data management strategy to support the data services that make sense for them, considering the dimensions of data value and tying them to a broader set of envisaged use cases.

Traditional approaches to data management have viewed it as a cost center to be controlled; today's technology, tools, and practices reflect that goal. A new approach will encourage organizations to think in terms of trying to squeeze every bit of value from the data.

As yet, there is little concrete guidance for how to value data across the entire organization—let alone across the ecosystem of suppliers, customers, and other stakeholders who may need to use it, at least at some time or another. The more widely a data set is used, the more valuable it becomes. But how do you assign worth to it when it is combined with other data? Or split up? Or used multiple times over many years? Or when it might be at risk of being misappropriated? Not all data is valued positively; viewed in terms of security, some personally identifiable customer data, for instance, could conceivably have negative value.

As a rule, we expect data that concerns customers to be of high value. But even there, few, if any, active conversations are under way about how to assign value to, for example, CRM data that could be used to improve market share, benefit customer loyalty ratings, and reduce customer retention costs. Or imagine an electrical utility that uses electrical consumption information from its operations data to propose time-shifting deals for certain customers—incentivizing them to use power when the utility has a surplus and conserve it when demand is high.

New data valuation approaches will also influence the ways that data is stored, shared, published, secured, and destroyed. Do we save everything under the assumption that it will soon be useful to somebody somewhere? Or just the data that we guess will be most valuable? What rules govern the deletion of data? A plant supervisor can't simply archive machine data from a production line if it's now critical for other business processes, such as new product engineering or analysis of product recalls.

Rethinking the organization structure and skills needed

One central challenge for IT leaders is how to support the shift to data sharing. Forward-thinking IT leaders will move quickly to "re-architect" their organizations in support of data services. Should IT's data specialists even reside within IT, or should they be integrated with line-of-business functions? That's the kind of question that CIOs, together with the CEO's office, must be able to answer.

Central to those moves will be a hard look at the skills required. The more that data is shared, the more there is a case to be made for a chief data officer position. We're already seeing new job titles such as data curator, data scientist, and data steward. The curator will be the "product manager" for a set of data, responsible for its proper valuation but also managing the services that share it. The scientist will be the next-generation analytics professional, responsible for turning the data into insight. And data stewards will be latter-day database administrators (DBAs). In general, we expect an evolution and proliferation of data roles, with data management skills becoming much more dispersed than they are today, as has happened with programming.

Businesses are actively hunting for ways to extract value from their data. As this drives an increase in data sharing, IT leaders will find that a one-size-fits-all approach to data management will not work. They'll need to look for ways to centralize the processes and tools for data management. At the same time, the notion of data ownership must become more distributed, involving data consumers across the business. Industrializing these data sharing and data management approaches will be key to enabling the business to unlock data value.

Your 100-day plan

Suggested actions to take during the next three months:

- Identify the "burning platforms" among the organization's business processes that can become the vehicles for change.
- Assess where current approaches aren't meeting enterprise needs (for example, where data integration is fragile or where replication is unmanageable) and sketch out early retirement of applications wherever needs are not being met.
- Map individuals on the business side who are current "data owners."
- Begin promoting the CIO as the facilitator of discussions about data services.
- Map available IT skills in light of the need to rebalance database approaches.
- Sketch out a preliminary blueprint for a data management organization.

See also "Your 100-day plan" in Converging data architectures.

The dimensions of data value

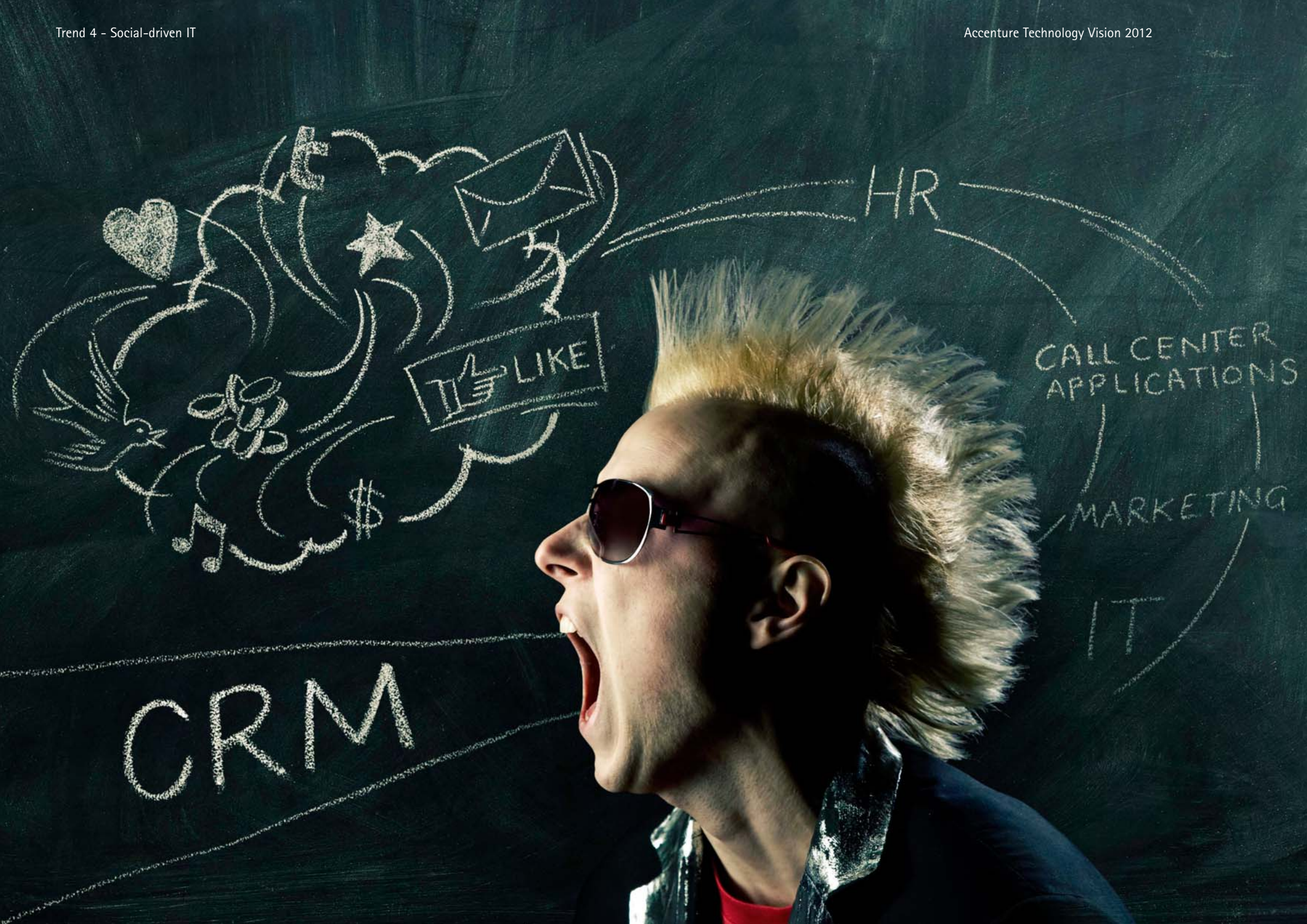
Data-savvy CIOs understand the impracticality of trying to build frameworks that enable them to put actual dollar values on data.

With that in mind, Accenture has developed these qualitative guidelines:

- **Utility**
  Our notion of data utility is a cornerstone of data value. The concepts of quality, provenance, freshness, and so on all play key roles in determining the value of data.
- **Uniqueness or exclusivity**
  Is the data unique or exclusive? Is access to the data controlled and owned by a few (meaning that it's proprietary data) or is it available publicly? For example, call logs are exclusively owned by the telcos, but government census data is available to anyone who wants it.
- **Ease of production**
  How easy or difficult is it to "produce" (collect, assemble, etc.) the data? This dimension is orthogonal to the previous one. For example, sentiment data on a company's products is all over the Web, but producing this data is difficult, because sentiment information is widely dispersed, locked in unstructured text, and hence difficult to extract.
- **Usage and sharing restrictions**
  Are there any restrictions, such as confidentiality or regulations, on how the data can be used, shared, stored, and so on? The more restrictions on the data, the less valuable it may become—it becomes more of a liability than an asset. For example, the many restrictions and regulations on personally identifiable information severely limit the value of this type of data for those that possess it.
- **Usability and integration**
  How easy is it to use and integrate the data from a data consumer's perspective? If the data (assuming it's external) can be easily used (and integrated) with internal data, then it is more valuable than data that cannot.
- **Trustworthiness**
  Here, we define trustworthiness not in terms of the data itself (that dimension is covered by "utility") but in terms of the sources and processes used to create the data. If these sources and processes are questionable (or even illegal), then the resulting data becomes a pariah that very few will touch, even though the data itself is extremely accurate.
- **Support**
  In situations where the data is acquired or purchased from a third party, will the data be "supported" by that third party? If not, then the data will have limited long-term value.
- **Consumer demand**
  Ultimately, the value of data will be influenced by consumer demand, and this demand will be driven by whether the data impacts business functions such as improving operational efficiency, enabling better forecasting, increasing market penetration or customer engagement, and so on.

Social-driven IT

Social isn't just a bolt-on marketing channel—it will transform interactions in the business world


HR
LIKE
CALL CENTER
APPLICATIONS
MARKETING
IT
CRM

Facebook, LinkedIn, Twitter, and other forms of social media are not just new communication channels to customers. They are powerful catalysts that are changing the ways your customers, employees, and partners use technology to interact with the world around them. Most organizations have yet to catch up to that reality, and almost none take full advantage of it. They must.

Who *doesn't* have a Facebook page?

The social media trend has swept across the world with breathtaking speed—and with astonishing impact. In the United States, Facebook is largely supplanting e-mail and text as the primary tool for communicating with friends. Social media has become de rigueur for businesses too—although mostly as an add-on marketing tool. And in more and more instances, online forums and Twitter feeds are becoming valued sources of insight for marketers and product developers eager to learn what consumers really think.

But that's not the only way that social platforms will be used by businesses in the future. The social media phenomenon has not just created a new channel to communicate; it has fundamentally changed the ways in which people communicate. Looking at the broader impact, we predict that leading organizations will soon start applying social platforms and social design mechanics to manage interactions across *all* communication channels to consumers, fostering greater intimacy with their customers, more efficiently, and with better outcomes. They will also see value in using enterprise social platforms for connections with and among employees—and even among enterprises.

The opportunity is to capture, measure, analyze, and exploit these social interactions in new ways. It means that social media must be seen as much more than a new "bolt on" channel; it has to be viewed as a catalyst for revisiting everything that touches a company's customers and, increasingly, other communities of stakeholders. It provides pathways to convey to the rest of the organization what has been learned by listening to consumers. The most immediate implication is that a company's call center applications, its Web presence, its customer relationship management (CRM) applications, its mobile experience, and other consumer channels all need to all be integrated with each other and be "social-enabled." So, for example, when a customer tweets about a bad experience with buying a mattress, it can be linked to his purchase history and to the reviews that he has posted on the retailer's website to determine the problem and—since he's a repeat customer—to reach out directly to him to address it before he calls to complain. At the same time, enterprises need to be on the lookout for opportunities to invent new channels through social, such as social polling via WayIn or Yahoo's IntoNow.

The challenge for IT managers, then, will be to revisit business processes and the systems that implement them. They will need to look across channels to define interactions. They must look at new forms of data generated by those interactions and evaluate the potential insights they can get from them. They will be obliged to revisit the organizational structures that perpetuate the separation of channels. They will have to think in terms of industrializing social platforms. And they are likely to have to update the metrics that define success for customer interactions.

No business is going to be able to exclude social. Those that dismiss its rising influence as a fad—or worse, as a preoccupation only for the young—will be doing their organizations a gross disservice. They will be effectively removing themselves from the conversations that their

consumers are already having about them and ignoring the new conversations that consumers are looking for. Complaints are being submitted to Yelp, instead of to you. Support forums point to how-to videos on YouTube that your call center employees don't even know exist. When a customer tweets to you that they want to increase their insurance coverage, will you be able to respond?

If they fail to engage with social, enterprises will essentially be encouraging their organizations' potential customers to be lured away by competitors that are increasingly interacting with those customers in the ways that the customers want to communicate. More ominously, they will be putting existing customer relationships at risk—and they won't be able to measure the decline in business until after it has happened.

What began as play and making friends is now driving business growth

Already, social technologies have permanently altered the ways in which consumers share information, collaborate, interact, entertain themselves, inform themselves, and maintain awareness of events around them. They choose to use Spotify to discover, discuss, and share music. They gather at eats.com and Menuism to see which of their friends is eating what where, to discuss what they think of it, and to be prompted to try dishes their friends like. They use TripAdvisor to trade tips on great places to stay while traveling. They use a variety of social sites to get discounts through group buying. Increasingly, they sign up to new sites via their Facebook or LinkedIn accounts. And they use Twitter to disseminate and discuss the hottest news.

Social platforms are gathering tremendous momentum: Bebo, popular in Europe, now has close to 120 million members, China's Renren has 160 million members, and Facebook's membership now tops 800 million. And in the last year, social platforms have shown big improvements in user security—specifically in social authentication (determining you're really you by using your social graph and photos) and in trusted friends (reclaiming your account by having a reset code sent to a friend you've designated in advance). Behind-the-scenes security has been stepped up too. Some social platforms now use behavioral analytics tools that look for anomalous behavior of users, sessions, and applications as well as link scanning (scanning links themselves and building a reputation system for the Web to flag potentially dangerous domains).[8]

But social isn't finished with changing the ways we communicate. One of the most prominent examples: Facebook recently launched the newest version of Open Graph—the framework that enables content developers to build apps that allow users to share whatever they are doing without overwhelming their friends. As founder and CEO Mark Zuckerberg explained at the company's F8 developers' conference, Facebook felt constrained by the Like button because it is perceived as an implicit endorsement of content.

The F8 event showed just how active the social media development sector is. Essentially, Facebook wants users to share everything they're doing, whether it's watching a show or hiking a trail, and it decided to create a way to "express lightweight activity". So the company is moving on to other verbs in addition to "Like"—such as "Read," "Watch," "Listen," or "Travel." For instance, if a homeowner's security company learns from social media that a customer is planning a vacation, that would present a good opportunity to offer the homeowner increased monitoring and sensitivity of her home security system. This is an example of an insight that would never have been available simply because the homeowner "liked" Hawaii.

Nouns in social are moving beyond people, too. Toyota Friend is a network that connects owners with their cars, their local dealership, and with Toyota itself. For instance, the car can send an alert for required service, just like a tweet.[9]

For users, the new features make their interactions with others richer and easier. For businesses, they further solidify the value of social platforms as ways in which businesses must interact with their communities of interest, whether those communities are customers or employees.

Increasingly mobile...and becoming easier to monetize

The social experience is increasingly a mobile experience. More and more location-based mobile platforms, like Foursquare and Oink, allow smartphone users to rate what's in or what happens at a place. At Foursquare, for example, users share their locations with friends while collecting points and virtual badges. Foursquare guides real-world experiences by allowing users to bookmark information about venues that they want to visit and making relevant suggestions about nearby venues. Merchants and brands use a range of tools on the site to acquire, engage, and retain customers and audiences. *See Context-based services earlier in this report.*

What it means for the business

- Better insight into conversations about the company
- More influence on the conversations currently happening about the company on social media
- Improved customer loyalty and more frequent and more consistent interactions with consumers
- More opportunities for more direct, personalized two-way interaction with end customers—streamlining faster and more meaningful feedback cycles
- Faster resolution of customer concerns, further improving customer loyalty
- More products and services that are better tuned to customer needs
- New services based on new cross-channel interactions
- Useful metrics on social's impact, enabling easier and faster assessments of successes and failures, investments, and more

This time next year

Over the next 12 months, the IT organization should:

- Engage in social listening to ingest and understand the social conversations that affect the enterprise.
- Establish a core IT team to design and pilot cross-functional social media platforms.
- Work with individual business units to help them layer their social strategies on top of IT's enterprise-wide strategy for social, with the goal of moving beyond the listening phase to managing social interactions with consumers.
- Put in place the technology to support the business's need to monetize its social interactions rather than simply communicating via social media.
- Identify the metrics that matter for tracking the success of social and ensure that the technologies used actually deliver those metrics.
- Evaluate the impact of social on the organization's roadmap for investment in collaboration.
- Determine how interactions among the organization's employees might change by using social.

"If they fail to engage with social, enterprises will essentially be encouraging their organizations' customers to be lured away by competitors that are increasingly interacting with those customers in the ways that the customers want to communicate."

It's also becoming possible to apply useful metrics to social media's impact—a key factor in making social much more relevant to businesses. Metrics are building blocks that will enable businesses to monetize their use of social.

As social media interactions replace existing interactions, it becomes easier to see them in monetary terms. For instance, as social media interactions replace, say, call center interactions, their value increases because the interactions are happening in a very public way, where pleased (or angry) customers express themselves for all to see. The monetization of social platforms is embryonic, notable for its isolated examples such as Starbucks' sales of gift cards and account management facility within Facebook. But there is every indication that it will escalate as more and more companies strive to move beyond achieving the "Like" to closing the sale. While there is still much speculation about the true size of the commerce possibilities, we expect an increasing percentage of consumer spending to go through sites such as Facebook. For instance, Walmart is experimenting today with the Shopycat app from @WalmartLabs.[10]

Social's soaring popularity is by no means limited to consumers. More and more companies are leveraging social platforms, many of them focusing on enabling interactions with their customers. As enterprises are getting started, a rich ecosystem of social vendors has grown up that support and surround the platforms, providing tools for capabilities such as campaign management or analytics and, now, for monetization. In different ways, companies like Klout, Gigya, and Wildfire provide pathways to monetize social interactions. For instance, eBay acquired The Gifts Project, a social commerce platform that lets friends pitch in on items as gifts.

Taking the next step toward a social strategy

The maturity and sophistication of today's social platforms have created real opportunities for enterprises, but many are approaching social

in ways that shortchange its true potential. In essence, their social strategies are disparate and disconnected; enterprises strive to say "they're *on* Facebook" or "*on* Twitter." At the very least, there is more that most businesses can do within the customer-facing realm. Today, customers have come to expect an integrated approach to their interactions with enterprises. So, for example, a bank's ability to give a customer the same answer to a question whether the customer e-mails, searches the bank's site, phones its call center, or walks into a branch should now be extended to its social channels.

There are, however, standouts that are actively exploring and experimenting with social strategies and the transformations they require. Canadian telecommunications company TELUS is using Twitter as a better and more immediate path to resolve consumer problems.[11] Instead of phoning a call center and waiting for a human with whom to interact, consumers leave a tweet. In effect, the company is using social as a new entry point into existing business processes. Early results show that customers who are using the Twitter channel are getting much faster resolution of their concerns and are much more satisfied with the telco's responsiveness. Its customer satisfaction ratings via Twitter are approximately 85 percent, compared with about 70 percent for its conventional contact center.

Similarly, insurer MetLife is using Facebook as a customer support channel, staffing a special team to resolve "crisis issues" in two hours or less.[12] (The incentive for this type of initiative: the chance to preempt the explosion of bad news that social media can enable if a disgruntled customer becomes vocal online.) Elsewhere, insurer Geico makes it possible for customers to pay their bills on Facebook—without pointing them to Geico's own site.[13] Studios such as Miramax and Warner Bros. are streaming movies through Facebook, providing full video rentals from a movie's Facebook page. Titles are still limited, but clearly both studios are experimenting with ways to use the new platform effectively.

From experimentation to transformation

However, looking beyond the marketing department reveals just how far most enterprises still have to go. Today's standouts have revisited and transformed only a single function, process, or interaction. Tomorrow's standouts will need to take those early experiments and replicate them across many processes, many systems, and many interactions. IT will need to work with the business to capture how their customers and other stakeholders might want to interact with their services—and determine how to manage accordingly across everything that social media touches.

So what does the rapid proliferation of social mean for IT departments? For one thing, they can be instrumental in breaking down the organizational structures that segment customers into interaction channels. If, for example, there is an IT subgroup that is responsible for the "digital" channel, its purpose and its place in the organization will need a rethink. Such siloed approaches erode the value of integrated customer interactions.

Similarly, IT leaders will need to help disrupt the mindset that says "social" equates with "marketing," forging links with other groups that touch customers and reaching out to business units, such as HR, that manage interactions with other communities. For now, social platforms are finding most traction within the business-to-consumer realm. But as we noted earlier, the nature of interactions is changing, and it's our belief that developments and successes with customer interactions will soon inspire enterprises to rethink enterprise collaboration and knowledge management—and later, to apply the same ideas across the extended enterprise, among the ecosystem of suppliers, customers, partners, and other stakeholders.

The social media question for businesses is no longer "What should I be posting to Facebook?" It's "How do my customers want to interact with my services?" Social is overturning our way of interacting with the world; it has its own language, taboos, interaction styles, communication channels, customs, habits, preferences, and pace. It provides businesses with new interactions, new services, new customers, new forms of loyalty, and new revenue. Those not actively engaged with or experimenting with social, or planning ways to move it beyond marketing, risk putting themselves at a significant disadvantage.

Your 100-day plan

Suggested actions to take during the next three months:

- Become an active user of several different social media sites to properly understand the customer experience.
- Start preparing for the social listening process. Begin to figure out what conversations consumers are already having about the company and where those conversations are taking place.
- Look for best practices in social in other industries that are "early adopters" in order to understand what is possible.
- Place IT at the center of conversations on social in the organization.
- Appoint a tech-savvy social champion who can easily demonstrate mastery of the new interaction models.
- Draft a survey of how business functions within the organization already use social and how their use compares with best practice across industries.
- Begin discussions with the business about which other business units are interacting via social; work across business units rather than just with marketing.

PaaS-enabled agility

A maturing platform-as-a-service (PaaS) market will shift the emphasis from cost-cutting to business innovation


NEW PRODUCT
TEST NEW MARKET
NEW PROCESS
EXPERIMENT
NEW SERVICE
PRODUCT
MARKET
NEW PRODUCT
NEW SERVICE
NORMAL BUSINESS OPERATIONS

IT leaders must look beyond cloud debates to pinpoint the business processes and applications that will matter most to their organizations—and that are best suited to a platform-as-a-service model. PaaS is not just a tool for squeezing cost out of IT; it will provide an environment that can support rapid evolution for key business processes that need continuous change.

More than ever, businesses have to be able to act and react quickly to changes in the market. IT's ability to support such agility has long been a laudable aspiration of many CIOs.

Platform-as-a-service (PaaS) technologies are emerging as key enablers to turn aspiration into reality. By providing the organization with a technical base to design systems that permit the rapid reassembly of business processes to suit new business needs, IT essentially enables the organization to launch and learn from quick, low-cost experiments. It becomes possible to innovate rapidly and react to market shifts in ways that were simply impractical before. For instance, a call center can quickly test a possible new protocol for flagging and prioritizing calls regarding the latest product release, working with a subset of customer service representatives. If customer satisfaction scores go up, the protocol can be integrated into the standard procedure; if not, the experiment can be rapidly iterated or scrapped.

For years, many IT organizations have been striving for these levels of agility. (At a recent conference for CIOs, the chief executive of a leading software vendor depicted business logic as a string of pearls that can easily be restrung.) They've tried to structure applications as collections of services. They've also invested substantially in integration efforts—think middleware—and funded custom development to extend the services. These efforts have also tended to remain in-house—a burden for all concerned. CIOs are now looking outside their four walls to find easier paths to IT agility.

PaaS offerings—defined as platforms sourced from and hosted by a service provider that handles the platform's maintenance, evolution, and operation—have been touted as an option, but until recently have not been sufficiently developed to be practical. Platform providers were not prepared to commit to the service-level agreements (SLAs) that CIOs would typically require before moving critical business applications to the platform. Similarly, CIOs may not have had clarity on how PaaS would impact their organizations' technology direction.

But the PaaS landscape is changing fast. More IT departments are now engaging and experimenting with PaaS, although primarily for ancillary services. For example, security company G4S is about to deploy a cash-in-transit application on Azure.[14] And Lionsgate, a global entertainment company, is deploying its SAP enterprise resource planning (ERP) system to Amazon Web Services.[15]

That said, it is tempting for CIOs and their top managers to evaluate PaaS as a cost-saving measure, using technical specifications as their lens. If they continue to do this, they will miss a large part of PaaS's potential. Instead, the key is to stay focused on the business services that will require a significant level of innovation, flexibility, iteration, and, therefore, experimentation over the lifetime of an application. It is PaaS's ability to enable the business to act and react quickly that will ultimately differentiate the organization from its competitors.

Reasons to pay attention to PaaS now

Platform providers have made significant strides, adding capabilities that were not typical this time last year. Data options on various platforms have increased: Google now offers Google Cloud SQL for use with Google App Engine, and Microsoft is piloting a Hadoop distribution on Azure. Enterprises that want to leverage their current developers' skills now have Java-based PaaS, such as Red Hat's OpenShift. And operational support—one of the biggest concerns for any IT shop—is now available. For instance, Rackspace now provides support for OpenStack.

There is also an accelerating convergence toward the PaaS space as the other as-a-service players move up and down the stack, each pushing toward a more complete set of capabilities on every layer. In last year's Technology Vision report, we predicted that this would start to happen throughout the cloud ecosystem. Today, providers with rich catalogs of business services—the software-as-a-service (SaaS) players, for example—are pushing down the stack, offering platform capabilities to augment their offerings. Salesforce, NetSuite, and Workday are actively moving into the PaaS space. SAP and Oracle are also expanding the relevance of their SaaS offerings with PaaS. Here we'll see an upsurge in PaaS "app stores" that unify the services offered on the platform; lightweight software engineering practices for assembling solutions will be the norm. PaaS app stores such as Salesforce's AppExchange, Intuit Marketplace, and Apperian are just the beginning.

At the same time, providers with strong infrastructure capabilities—such as the traditional infrastructure-as-a-service (IaaS) players—are busily adding platform services in order to climb the stack. In the short term, the emphasis here will be on custom development. For instance, VMware has moved from virtualization products into virtualization infrastructure, and now is establishing itself as a cloud platform provider with the introduction of Cloud Foundry. Others—such as Red Hat, through its OpenShift PaaS offering—are adopting similar strategies.

Moving toward an innovation mindset

Savvy IT chiefs are already thinking beyond metered cost when they're considering PaaS. However, it's our observation that there's still a strong tendency to look at PaaS offerings primarily as scale or outsourcing capabilities. Those are important aspects of what PaaS offers, but they represent only part of its value.

Simply put, in the longer view, the IT agility that PaaS creates will enable and even encourage business innovation—not simply IT innovation. It overcomes longtime IT challenges such as rigid application development, provisioning, and deployment, providing an agility that fundamentally lowers the barriers to business innovation. It will enable businesses to test new business models, new markets, new products, and new strategies. And it can make them far more responsive than they are today. For example, a company can open up new features and functions in production to a small user group. Instead of simply reading about the debate on whether it is ethical to fix grammatical and spelling errors in Internet reviews, companies can experiment to see what their users think. They can offer the automatic grammar-check functionality to a small set of reviewers and consumers and find out if they care. Companies often become paralyzed by these open questions; this experimentation gives them the ability to answer them.

PaaS involves shorter development cycles, enabling organizations to quickly iterate functionality and respond more nimbly to short-term opportunities. For example, during holiday-shopping sales surges, the platform allows the business to quickly add new functionality without an 18-month development life cycle. Support for, say, a special one-day retail promotion can be quickly added, rapidly scaled up when demand is rising, scaled down as the demand ebbs, and then removed after the holiday passes. Many current approaches stumble over parts of this scenario: almost all scale up readily, some can scale back, but few allow easy manipulation of the capabilities.

Importantly, shorter development times aren't just about getting products to market more quickly. Because applications can be built for less investment and fewer resources, both funds and staff are freed up to drive more experimentation and to start making early decisions about which experiments have the greatest potential to produce valuable outcomes. Amazon, for instance, focuses on keeping costs as low as possible for experiments—that way, it can run a lot more of them.[16] This rapid prototyping capability makes it easier to shut down experiments that aren't working and to figure out how to bring successful experiments back in-house for further in-depth work.

What it means for the business

- Greater agility—meaning a faster pace of change and speed to market
- Quicker entry into new markets and new business opportunities
- Fast, low-cost experiments to help minimize "big bet" investments and improve feedback
- Greater risk of overreliance on some platform providers
- Fresh opportunities to try out new business models

This time next year

Over the next 12 months, the IT organization should:

- Forge closer partnerships with the business to allow blended teams with fast-turn experiments in mind.
- Demonstrate the organizational structures and skill sets that will enable IT to evaluate and work with platform providers much as it works with conventional outsourcing services.
- Sign a formal agreement with at least one PaaS provider.
- Pilot one application with the PaaS provider to prove the PaaS business case and accelerate adoption through the enterprise.

It starts with the business process

Even with PaaS vendors growing in maturity, to some degree CIOs still struggle to decide what to look for in a platform-as-a-service. At the most basic level, PaaS must offer a breadth of applications and services that attract business users—such as inventory management or payroll. But, at the root, if platforms are to be truly viable, providers will need to offer—and IT leaders will need to look for—reusable business services, integration capabilities, and extension capabilities.

Enterprise IT leaders and their business colleagues will want to extract the maximum value from their reusable business services, utilizing them wherever possible, to preserve many of the benefits that PaaS offers, such as faster response and lower cost. At the same time, recognizing that the range of available applications and services will never meet all the needs of an enterprise, IT managers will look for integration capabilities that allow them to wire together multiple existing services, those from third parties and legacy enterprise services. Essentially, they need those capabilities to confirm that what gets moved onto the PaaS ("into the cloud") is connected to the enterprise in all the right ways, consistent with their approaches to security, data management, usability, and business process governance.

Where gaps persist, custom development may still be necessary to create or extend existing services. However, our experience is that overuse of customization dilutes platform benefits because it typically increases the costs of long-term maintenance and support costs. So, high-performance enterprises will try to preserve the benefits of PaaS by minimizing the use of extensions. They should be judicious about the decisions they make to create extensions—being honest with themselves about which services are differentiating and which are commodity—and source them accordingly.

In general, the more services that can be shared on a common platform—from financial management services, say, to inventory management—the easier it will be to handle the inevitable integration challenges, to hold down costs, and to demonstrate the true flexibility of PaaS. These services can be hosted as part of the platform and should be run and maintained with a set of SLAs. In many cases, they are optimized for the infrastructure they are running on.

A platform that offers a large body of services means fewer platforms to deal with over time. At the same time, as more active app stores of services develop around certain platforms—leveraging the ecosystem of developers that surround their platforms—they will present powerful ways for their platforms and core services to be augmented.

Even though platform technologies and strategies are evolving rapidly, there is still no single platform that provides all of the features we have described. In some areas, PaaS is quite immature: PaaS tools for management, development, and measurement certainly aren't what IT staff are used to working with on-premise, for instance.

It's also important for enterprises to consider the readiness of their own organization—both the IT group and the overall business—to use platform services. That calls for clear-eyed views of the enterprise's most valuable business

processes—potential as well as current—and for rapid understanding of which platforms will be of most use for which sets of business needs.

Being alert to lock-in

When evaluating PaaS options, IT leaders also have to be alert to the likelihood and consequences of platform lock-in. As they're assessing platform choices, they need to be careful that one part of their cloud strategy doesn't undermine another. For instance, the selection of a PaaS may affect their ability to use hybrid cloud for processes where seamless operation across on-premise and off-premise systems is needed.

Some platforms make it difficult to seamlessly move services and applications back in-house from the cloud. For example, users of Force.com are tied to that platform; it is not designed to accommodate an in-house version of its software stack. If users wish to move services back inside, they have to commit to some level of redevelopment. By contrast, other platforms, such as Azure and Cloud Foundry, do provide this flexibility because they allow users to replicate the stack in their own data centers, making it fairly straightforward to move services or data back into their own environments if they choose to do so. These types of platforms are useful for "cloudbursting" scenarios—handling overflow loads such as those incurred by seasonal sales spikes or end-of-fiscal-year processing. Even more crucial for many organizations, they simplify already difficult issues of data distribution like, for instance, when some parts of customer data must be kept in-house for policy or regulatory reasons.

Another desirable characteristic of hybrid platforms is that they offer some insurance if the PaaS provider isn't meeting a company's SLAs or if the security risks of using as-a-service technologies are deemed unacceptable. In effect, they provide an exit strategy, allowing companies to pull the applications back in-house when necessary.

However, these types of platforms have not dealt significantly with reusable business service catalogs to date, and the services that do exist are typically hosted third-party services. In such scenarios, bringing services back in-house is still uncharted territory—both technically and in terms of business issues such as licensing.

One important guideline to bear in mind: today, use of PaaS offerings looks a lot more like outsourcing, so when you're picking a platform, you're effectively picking a partner rather than a software vendor.

The path to utilizing platform-as-a-service will not be short; nor will moving every business process to PaaS make sense while the offerings are still maturing. But the payout can be big for those that start the journey now with the right processes. Do you know which processes are the right ones? Do you have a plan for how IT will be able to support them?

Your 100-day plan

Suggested actions to take during the next three months:

- Create a plan to reassess the organization's business needs to identify what else could be done with services that would add lasting value, assuming IT could deliver every application as a service.
- Assess the business architecture capability and start discussions on its evolution, focusing on the elements of business processes that are differentiating.
- Start short-listing appropriate PaaS providers.
- Envision PaaS's place within the overall IT strategy and how it augments the overall IT platform.
- Check and confirm that cloud platform choices don't create conflicts with existing plans to leverage hybrid cloud for certain processes.

Waiting for the hybrid cloud to grow up

Of all the cloud-related topics making headlines these days, hybrid cloud is arguably the one that is attracting the most interest from IT leaders. But they are stymied because of the relative immaturity of the tools and frameworks that support hybrid cloud.

We envision the necessary tools and frameworks maturing in three waves over the next few years.

The first wave, which we are experiencing now, centers on point-to-point, mostly batch-style, data integration between enterprise applications and software-as-a-service (SaaS) applications. The early adopters of this wave include enterprises that need to expand into a new geography and opt for a SaaS-hosted model for some applications, requiring data integration with existing applications. Other early adopters include those that need new functionality added to an existing system, which requires integration with external data sources in the cloud—social networks, for example. Another set of early adopters: those that need analytics applications where external sources are ingested or internal sources are published to cloud-based analytics systems.

Today, there is no shortage of tools for point-to-point integration, but frameworks for data integration that support hybrid cloud are few and far between, especially those that help with large-scale cross-cloud master data management. Furthermore, consistent data virtualization is still difficult to put together in a hybrid cloud context.

The second wave will see workflow that spans on-premise and off-premise services where the business process involves both. This will demand integration at data, service, and business process levels, potentially across multiple clouds. The challenges look much the same as in the first wave, but with far greater complexity, and a higher degree of consistency is required at multiple levels. Cross-cloud security management, for example, becomes critical here.

The third wave could be described as "white label" integration of enterprise applications in a hybrid cloud model, seamlessly mixing on-premise and off-premise services in the package. There's still a long way to go before cloud-based software development lifecycle tools and application frameworks have built-in support for hybrid cloud. End-to-end management across all aspects of the applications and systems is virtually nonexistent.

Orchestrated analytical security

Security breaches are inevitable—and data platforms (not just device management) will be how you deal with them


SECURITY
CHECK POINT

Nontraditional systems are now getting connected, exposing the organizations that use them in entirely new ways. Organizations will have to make peace with the security reality of today and begin preparing their second line of defense—data platforms—to mitigate the damage of attacks that get through.

Security-minded IT leaders are seeking ways to help their organizations harness new capabilities while managing the risks that come along with them.

The bad news: the organization will get attacked, and some attacks will get through. The good news: technologies are emerging to enable organizations to start responding appropriately to the threats that do slip past the gates.

The risk of attack on organizations' systems is soaring, and threat levels are skyrocketing as sophisticated, targeted forms of cyber-crime emerge. We're no longer talking only about solitary hackers and occasional virus outbreaks—we're describing increasingly professional attacks. Although most companies have invested substantially in IT security systems—even during the economic downturn—they are still largely unprepared for the scope, severity, and sophistication of today's attacks or for the growing list of exposed entry points that highly skilled attackers can now exploit.[17] Governments and organized crime groups are being added to the lists of hackers. Cars, assembly lines, pumps, and mobile phones are quickly becoming new vulnerability points for hackers to target as those systems and devices get connected to corporate IT. It's not an exaggeration to say that IT is frustrated by the confluence of security threats they now face.

We see a fundamental flaw in today's typical approaches to enterprise security. In too many organizations, the prevailing security mindset is about prioritizing compliance and then working down the list of other strategic security initiatives with whatever resources remain. Compliance is the comfort zone; it drives the security investment.

However, the new high ground is about fundamentally managing business risks by *expecting* and monitoring for security compromises in the first place and reacting to them when they occur—commensurate with the risks they pose to the business. So when a hacker gets through the firewall to steal customers' credit cards, a second line of defense can be in place. Companies can monitor the usage of the credit card data for anomalies; for instance, the copying or downloading of all card data can trigger a security mitigation plan. The "action" can be stopped midstream when it's caught early. A snapshot of the system and data can be taken for future analysis. Credit card companies can be notified of the card numbers that were stolen, and customer support can begin to reach out to cardholders affected by the losses.

Today, optimal IT security is not about 100 percent prevention; it's recognizing that to minimize the damage, first you have to know that attackers did get through and get a sense of how they did so. That calls for security professionals to think like the enemy at all times.

We see three core security issues that have received too little attention. First, IT leaders must be aware of the host of nontraditional "attack surfaces" that threaten their organizations today. Second, they must develop "data-centric" mindsets, leveraging new data platform concepts to design, implement, and run systems that substantially improve levels of protection. Third, security leads have to think and act in terms of orchestrating security resources and responses across systems, providers, and communications channels, bringing in relevant capabilities as needed.

Increasingly connected means increasingly exposed

In many IT security departments, the tendency is to prepare for yesterday's threats rather than today's and tomorrow's—and to tackle known security weaknesses without exploring those as yet unknown. The weaknesses that are much in the news these days are concerns about the risks of extending the enterprise through cloud computing and mobility systems. Both are among the top five reasons why organizations' security functions have become more complex in the last few years.[18]

Yet the cloud and smartphones are the least of it. Organizations are becoming increasingly exposed because they are increasingly connected. Legacy systems that were never designed for a connected world have been brought online, opening up further weak points. Nontraditional systems such as building controls, manufacturing controls, and power distribution networks are also connected, and IP-enabled devices in the home, car, and pocket open up further opportunities for attackers to exploit personal technologies.

Since IT security was never a part of these systems' original requirements, many are wide open to attack in the context of the new connected world. The warning shots are being fired: recently, the Internet was awash with reports of attacks on water-utility pumping infrastructure in the United States, including one attack that may have done physical damage. And a few years ago, other hackers penetrated a car's main communication bus using the vehicle's wireless tire-pressure-monitoring system as the cyber-gateway.[19] The manufacturing sector is perhaps the most vulnerable to such attacks; in one case, an Italian security researcher recently disclosed a security vulnerability in a control system used for yogurt production. At the time of the disclosure, another researcher, a university student, was able to identify 250 vulnerable systems using only simple online search engines.[20]

Given the convergence of security threats today, it is a good thing that there is momentum behind remediation efforts. The IT security community—from the U.S. government's Los Alamos National Laboratory to software vendors such as EMC—is working hard to push analytics out to the edges of their networks to better monitor and detect threats. McAfee snapped up NitroSecurity, a spinoff from Idaho National Laboratory that offers a security platform for industrial controls, a nontraditional security weakness. And venture capital groups are investing in start-ups that aim to manage the risks of nontraditional IT environments—from anti-tamper technologies for industrial control systems to embedded devices that shield the smart cards in your wallet from remote access. Leading organizations will recognize the expanded role of security in supporting the extended enterprise and seek ways to integrate these new techniques and tools into their holistic security architecture.

Leveraging new data platforms to better detect incidents

Security incidents will happen. The only way to minimize the damage is to detect when they happen. To deal with the complex and ever-changing array of threats, organizations must move from monitoring to understanding; from collection of data to visualization of behaviors and anomalies. That means, for instance, moving from simply maintaining a list of system administrators to flagging the creation of new sysadmin positions. It also calls for a shift from an asset view to a process- and data-centric view of what's happening in the networks. An example: moving from monitoring what badges have access to which areas toward monitoring how often badges are used to attempt to get into areas the badge holders don't have access to.

In reality, of course, it is impractical to do this using only traditional IT security approaches. Conventional perimeter defense is the first line of defense, but once threats have breached the perimeter, current approaches are not sufficient by themselves. Nor will these complex and constantly changing challenges be met by discrete systems that secure specific data assets or specific technologies such as e-mail scanning.

We predict that to better understand their risks and to detect attacks security organizations will increasingly turn to data platform technologies—technologies that provide access to and aggregation of data via services. The data platform will allow security to easily handle large volumes of fast-changing data—orders of magnitude greater in scale than traditional log analysis. It will also make it easier to harness new forms of data from the unstructured world, opening up additional opportunities for security analysis. These platforms will help organizations acquire a new understanding of their risk landscapes, explore their data in new ways, and create more timely detection and responses to improve the confidence of the business.

What it means for the business

- Increased vulnerability as a result of many more connections such as industrial control systems that were not designed to repel cyber-attacks
- Increased need to prioritize the risks of IT security breaches; specifically, learn to identify and highlight the data, systems, and initiatives that are critical to the business, and do so regularly to keep their security strategies current
- Increased involvement of the business functions in security given that only they can properly articulate the risks to their critical business processes and identify the irregularities that may indicate a breach
- Increased need for collaboration with IT security; by aligning their strategies, they can help to ensure that security does not become a barrier to business objectives
- New prioritization of information security as a board-level concern; business leaders must be ready for the shift to higher levels of security awareness and actions across the enterprise

This time next year

Over the next 12 months, the IT organization should:

- Establish processes that make robust, flexible security a priority when IT systems are being designed and developed.
- Demonstrate compliance at any time as a result of security investments—rather than letting compliance drive security investments.
- Create clear orchestration roles that specify how IT works with service providers.
- Rework all SLAs that prevent the organization from responding immediately (and appropriately) to threats.
- Identify the skills necessary to manage a data platform for IT security.
- Define a well-practiced, collaborative, strategic response to sophisticated and determined attacks.
- Implement effective mechanisms for regular, actionable dialogue with business functions about IT security issues.

In one scenario, the data security platform might help to suppress insider threats by analyzing data about comparative network usage patterns to see whether a suspect employee's time spent downloading reports is out of the ordinary. In another instance, the platform might compare information packets; the same packets going to different hosts could indicate that information is being echoed to a snooping threat. Or it could amend a user's privileges because it can track and correlate across several systems, system levels, and ID information, deducing that the user is "testing" your security by trying to use systems he doesn't have access to. The advantage is that the same data platform can help handle all of these kinds of tasks, whereas today each might be the job of a different tool.

It's important not to wait for vendors to deliver the perfect tools. Because your enterprise is unique, its vulnerabilities are and will be unique too, and therefore unlikely to be "healed" by standard product offerings. The emphasis must be on fully understanding your risk profile and the type of integrated picture that can help you better manage to it. A case in point: credit-card-ready parking meters will drive both government revenue and user satisfaction, but they also open up an entirely new risk point. Are IT staff in local municipalities monitoring that point for attacks?

Mastering risk and figuring out the big picture for your enterprise makes data and analytics the two new core competencies of the security organization. For example, security professionals at several large financial services firms are borrowing analytics techniques that those firms now use to compete on the trading floor. The security staff's goals: to be able to better detect and mitigate the damage from some sophisticated attacks and recover from other attacks far more rapidly when they do happen.

However, the grander vision of comprehensive data-centric security platforms is still largely just that—a vision. Such platforms will give enterprises constant and immediate monitoring of an organization's security status; they will deal easily with new data sources and detect and connect disparate events. They will also be capable of experimenting with correlations to detect attacks or determine root causes, and will have the means to take broader actions in milliseconds that fend off some attacks.

For now, there are plenty of "basics" that companies must revisit: the vast majority of all attacks could be denied or at least mitigated if companies were as disciplined and consistent as they ought to be about applying updates and patches to their existing security systems. The recently released Microsoft Security Intelligence Report, volume 11, found that less than 1 percent of exploits in the first half of 2011 were against zero-day vulnerabilities—that is, software vulnerabilities that are successfully exploited before the vendor has published a security update or "patch." By contrast, 99 percent of all attacks during the same period distributed malware through familiar techniques, such as social engineering and unpatched vulnerabilities.[21]

While they deal with basics like these, chief information security officers have to get busy figuring out what enterprise data is needed to feed into the data platform. And they have to find ways to build security into their new systems, evaluating new data sets to do so. Security can no longer be viewed as an afterthought.

Orchestrating security resources and responses

IT security chiefs who see the value of a data platform for responding flexibly to a host of threats will need to demonstrate that they can rapidly marshal security resources. At the management level, orchestration will involve identifying and accessing the right resources when needed and getting them to work in concert, at speed. As CISOs detect signs of attacks in progress, they pull in threat data from industry security researchers to understand what's at stake, tap into pools of niche skills to solve the problem, and then work together with various infrastructure, application, and service providers to close the vulnerability. Such orchestration may lead to flatter security organizations that don't manage policy, architecture, monitoring, incident response, and remediation from end to end but focus on selecting, guiding, and managing collaborative networks of specialty security providers.

The skills of orchestration will be not unlike those required for strategic outsourcing. Managers selected for orchestration roles ought to excel at harmonizing service-level policies among their infrastructure providers so that they can quickly work with them when a problem occurs rather than waiting for a response, which currently can take several days. Orchestrators will be masters at blending teams of business-oriented data specialists with no-nonsense professionals, who often have military and intelligence backgrounds and whose "constant vigilance" perspectives help counterbalance any traces of corporate complacency.

Those teams will include skills that are in short supply today in many IT security organizations. For instance, they will feature analytics specialists whose skills sets are a world away from what's required for typical security jobs, such as managing the appliance that monitors e-mail. Also needed: individuals with strong investigative and "sleuthing" skills. Instead of staring at a dashboard that reads "all clear," these experts will constantly be scanning the data for new patterns and anomalies. And because fewer of tomorrow's data solutions will be off-the-shelf and more will be tailored to each business, IT security leaders will want to hire more professionals who understand how to extract value from data. The challenge for many of those IT leaders is that such specialists are in short supply. Part of the reason: many are being hired by the security software vendors.

There is one bittersweet factor that sets the stage for development and implementation of much more stringent security systems in the near future. Quite simply, it is that more and more organizations are openly admitting that they've been attacked. While such revelations might seem to serve only to ring alarm bells—"everybody's at great risk, our systems are failing, our children are being stalked"—in our view, it's a very healthy step in the right direction. After all, if nobody puts their hands up to say they've been attacked, there is far less impetus to change.

Your 100-day plan

Suggested actions to take during the next three months:

- Identify the organization's most critical business systems and data sets and assess their vulnerability to cyber-attack.
- Identify nontraditional IT systems that are being connected to the IT backbone to assess their vulnerability to cyber-attack.
- Audit basic security operations—from patch management processes to how user access is managed and tracked, for instance.
- Sketch out the elements of a strategy to partner with select security providers.
- Meet with business peers to gauge alignment of security strategy with business strategy and to articulate a shared sense of risk tolerance.

Anonymization won't be enough to protect privacy

Nearly every day, we're bombarded by statements from employers, financial services institutions, health care companies, and other service providers notifying us that our information is being shared with various third parties. Some of these notices ask for our consent; others present a take-it-or-leave-it situation tied to using their services. In either case, we're usually assured that we shouldn't be worried because no personally identifiable information is being shared.

We *should* be worried. In the world of Big Data, that information may be shared all too easily. Because of the way the data landscape is changing, what's private today won't necessarily be private tomorrow. In one case, a graduate student was able to match available health care data with other publicly available records to assemble the medical history of a prominent politician.[22] We contend that it will soon be within the skills of many college students to be able to discover information about people who think their data is completely secure.

The truth is that, despite assurances of anonymity, today's privacy-preserving technologies will fail because the scale of, mobility of, and access to data make it ever easier to invalidate the mathematical assumptions on which the technologies are built. The algorithms typically used to provide anonymization employ sets of assumptions about the data, generally based on characteristics of scarcity—the deliberate omission of key data. Problems arise when data sets grow exponentially, use cases change, or the data is mashed up in unanticipated ways.

The frailty of today's anonymization technologies was already apparent in a study run a decade ago.[23] Using traditional data-access methods and conventional databases, researchers were able to uniquely identify 87 percent of the U.S. population simply by cross-tabbing zip code, gender, and date of birth information. Even at the level of a county—containing many zip codes—it was still possible to pinpoint 18 percent of the population. Traditional anonymization techniques become even less effective now that there are so many new data sources, new analytics technologies, and the power of the cloud.

Although the capabilities to circumvent privacy are getting stronger, the demand for—indeed, the outcry for—better privacy protection isn't going away. We anticipate that the real advances in privacy will come from new approaches to privacy policy and strategy that improve protection while balancing the utility of the data. From those, a new wave of supporting technologies will emerge to enable enforcement of those policies and implementation of those strategies in the real world.

How will technology alter the CEO's agenda?

Business leaders are motivated to act on the changes that imminent technology trends will bring. Their challenge is to make sense of what matters most—and when to take action. That's where their CIOs must step up. They have to begin to lead the conversation.

In a world where competitive advantage is clocked in hours, not quarters, and in which business models themselves are powerful competitive weapons, business leaders cannot afford to ignore or dismiss the most pressing technology trends.

Today, most C-suite executives sense that powerful technology shifts are sweeping across their organizations. Indeed, many have become quite familiar with the essentials of the changes that have evolved over the last decade—cloud computing, mobility, the push toward analytics, and other shifts that are already helping to hold down costs, improve productivity, or deliver fresh insights.

But they're less likely to grasp the technology trends that are just gaining traction—trends that are only now appearing on the horizon. This is where CEOs' and COOs' relationships with their IT chiefs can make a huge difference to how skillfully their organizations can turn the new trends to advantage. The trends themselves are inevitable; if an organization's top team does not quickly grasp their impact, a competitor's leaders surely will. The IT leadership has a vital role to play in conveying that impact.

Speaking the CEO's language to elevate the discussion

The six trends referenced in this report become the specifics of the discussions about the business impact that the CIO and team must initiate with their executive colleagues. Although driven by technology, these conversations must be carried out in the language of business—in terms of what impact the new trends will have on customer experience, revenue growth, profit margins, cost structure, cycle times, and more. The conversation must also focus on how the trends will affect the organization in aggregate. Two areas in particular require attention: moving beyond the constraints of legacy systems, and rethinking the IT–business partnership.

The decision to address legacy constraints needs to be made now. There are abundant signs that IT is reaching the limits of its capabilities, as currently constituted—it is becoming a brake on the business rather than enabling it to accelerate. Constant updating, patching, and jury-rigging of legacy systems is simply becoming too difficult in a world that is growing increasingly complex and faster-paced. For most companies, addressing this change will

not take place as one giant effort, but rather as incremental investments, updating systems one piece at time. The roadmap required to manage the change is not sketched out overnight; it involves meticulous planning and systematic design so that every discrete IT project takes the organization a step forward.

At the same time, the business and IT must become better partners—much more closely aligned. Certainly, the lines between them are blurring already. But much more interaction must happen. For instance, securing systems will require the coupling of traditionally disparate skills; it will call for a fundamental understanding of how security technology affects business processes, and it will mean that experimenting with new services will be as much about the contextual data that IT can gather as the business expertise that exploits the data.

In short, there needs to be a partnership that sees IT as much more than simply meeting the day-to-day needs of the business functions. That requirement forces re-examination of the IT–business relationship and the responsibilities of each party to the other. What obligations does the business now have if technology is to be leveraged for maximum value? How does the business stay up to speed with technology? What forms might deeper collaboration take? As data is applied for competitive advantage, how do companies start blending IT and business teams? And is there now a case for challenging current orthodoxies about the discrete IT department?

These lines of thinking raise some of the thorny questions about IT skills sets and IT organization structures that need attention now. The conversations between CIOs and business colleagues should revolve around what the organization *needs* IT to do—not what IT can and cannot do. The discussions should create a sense of urgency. They should galvanize action. Today would be a good day to start.

Coming soon – Technology Vision 2012 Business Implications report

How can we accelerate and augment innovation if we have a more agile organization? Is "social commerce" real? What new risks will we be exposed to in a "data, data everywhere" world? Do we need to rethink technology as we look at expanding into emerging markets?

Those are just a few of the questions that Accenture will answer in its upcoming Business Implications 2012 report—the essential companion to this Technology Vision 2012 document. That report will dive into the business priorities that we believe are natural outcomes of the trends explored in these pages, spotlighting the important subthemes that will drive executive discussions and identifying the management roles that will be needed to lead the coming changes.

Among the array of topics we'll examine in detail: reframing the use of technologies in emerging economies; social media's imminent impact on every type of business relationship, at scale; and new concepts of information privacy and security in a world where data is free to roam.

IT's agenda to create business impact in the year ahead

IT will need to become the catalyst for specific actions over the next year to position the organization to take advantage of the six overarching changes in technology that we have determined will have the greatest impact.

Context-based services

It will be the CIO's job to frame for the C-suite the opportunity of contextual services—pushing the executives to "dream bigger" and identifying what new products and services are becoming possible as context becomes key. Over the next four quarters, the IT organization should be driving the business toward a concrete list of context-based services and drafting a data roadmap that lays out how IT and the business, together, will acquire the critical data needed to deliver.

Converging data architectures and Industrialized data services

At a minimum, it will be necessary for CIOs to help CEOs and business lieutenants see broader opportunities to leverage data—internal and external to the organization. Within 12 months, as IT and the business continue to build out new data services, each data service project should be used as a stepping stone, helping to move toward development of a data platform for both structured and unstructured sources of data.

Social-driven IT

CIOs will need to lead the C-suite to a new understanding of the opportunity in social media. To start with, they will have to demonstrate that social is not just about Facebook, LinkedIn, and Twitter and that it involves more than just the marketing department. The business has to learn to see social technologies as the catalyst that is changing the ways that customers, employees, and partners use technology to interact with the world around them. In a year's time, the CIO should have a core team in place to design and pilot cross-functional, social-enabled systems. IT should be working closely with the business to reinvent the company's interactions with its customers, and to create and update the technology channels that support these new interaction models.

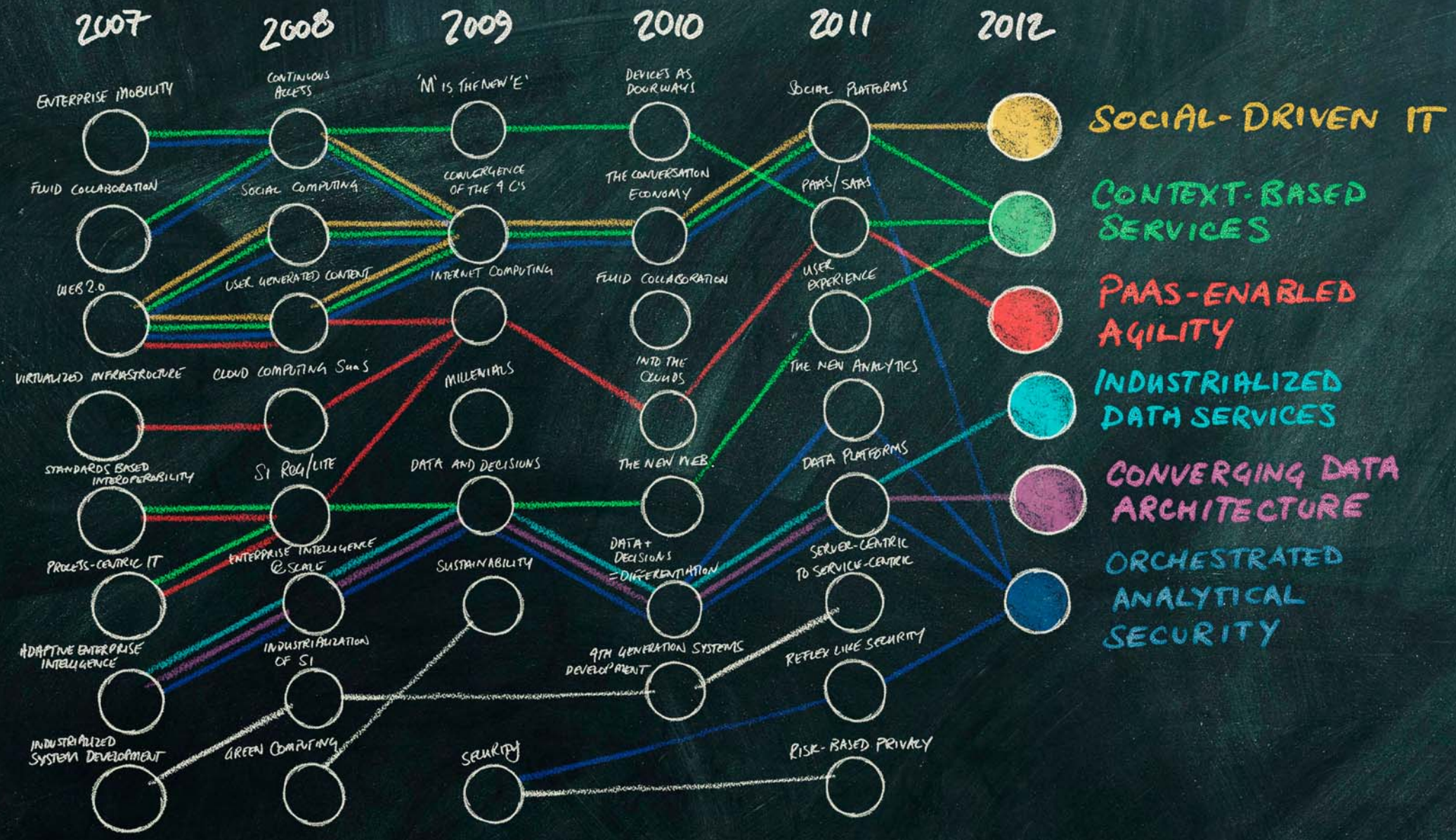
PaaS-enabled agility

The IT chief must parse the discussions about cloud computing, helping the business team to look beyond cost savings to put the focus back on the business process. Within 12 months, the processes that will benefit the most from agility and experimentation should be prioritized and evaluated for transition to PaaS. IT should be working with at least one PaaS provider and evaluating early results from a pilot program running with that provider.

Orchestrated analytical security

It's up to the CIO and chief information security officer to make security a board-level concern. Breaches *will* happen, and organizations need to start thinking beyond prevention alone. The CIO and CISO will need to align with business leaders to assume a vigilant monitoring mindset. Data will provide the clues, but both IT and the business are needed to effectively detect and respond to attacks that slip past the gates. Within the next four quarters, the CIO and CISO had better have good answers to the CEO's questions about the myriad new risks to data security. They should also be able to display a detailed roadmap for how they plan to aggregate the data needed to monitor the breaches that do occur.

Accenture Technology Vision 2007-2012



Research methodology

Each year, the Technology Vision team at Accenture Technology Labs sets out to determine the emerging IT developments that will have the greatest impact on enterprises, government agencies, and other organizations in the next few years.

The Technology Vision 2012 research effort began by collecting several hundred hypotheses from the Labs' scientists, architects, and engineers. Additionally, we reached out across Accenture to crowdsource fresh perspectives on technology change from the wide range of professionals who see its impact every day in their work with clients. The Vision team looked beyond the technology themes that are already driving change—themes as current as mobility, Big Data, and cloud computing—and concentrated on the topics that will soon start to appear on the agendas of most CIOs.

These hypotheses were then screened against inputs from an array of other sources. The sources included the recent activities of commercial R&D labs, the academic literature, the flow of venture capital funding, trends highlighted by IT analysts, and key themes at industry conferences. For perspective, we tapped Accenture's High Performance IT research and the findings from our annual CIO Forum. And we validated our hypotheses with Accenture practitioners who are continually helping our clients implement new technologies around the globe.

The Vision team then worked with our R&D groups to consolidate, filter, and prioritize, and to test each hypothesis against the following criteria:

- Certainty of transformational impact on corporate IT departments
- Velocity and scale of technology change
- Impact beyond any one IT or industry "silo"
- More than a "one for one" replacement of an existing solution
- Enables practical action in the next 12 months
- Transcends any one vendor or discrete "product" technology

These tests produced a handful of robust hypotheses that were synthesized into the six overarching themes presented in this year's Technology Vision.

End notes

1. New York Times
"A Short-Circuit to Distracted Driving"
January 20, 2011

2. Misys press release
"Misys Launches Consumer Location-Based Offering to Reduce Bank Fraud via the Force.com Platform"
September 14, 2011

3. GigaOM Pro
"Report: NoSQL Databases – Providing Extreme Scale and Flexibility"
July 6, 2010

4. InformationWeek
"IT's Next Hot Job: Hadoop Guru"
November 9, 2011

5. The Times of India
"In-Memory Computing Is a Huge Breakthrough"
September 21, 2011

6. Amazon.com
Annual Report (2010)
April 27, 2011

7. ACM Queue
"A Conversation with Werner Vogels"
May 1, 2006

8. All Facebook
"Facebook Security Improvements Coming Soon: Trusted Friends and Application Passwords"
October 27, 2011

9. Toyota press release
"Salesforce.com and Toyota Form Strategic Alliance to Build 'Toyota Friend' Social Network for Toyota Customers and Their Cars"
May 23, 2011

10. Walmart press release
"Walmart Unleashes Shopycat Holiday Gift Finder"
December 1, 2011

11. eMarketer
"TELUS' Social Media Team Solves Problems, Builds Relationships"
September 12, 2011

12. Insurance.com
"Why You Should 'Like' Your Insurance Company on Facebook"
November 9, 2011

13. Geico press release
"New GEICO App Gives Facebook Users Access to their GEICO Policies"
October 25, 2011

14. The 451 Group
"Microsoft Tunes Its Cloud Position to Play for a Hybrid Audience"
December 1, 2011

15. Baseline
"Two Keys to Successful Cloud Computing"
June 14, 2011

16. Harvard Business Review
"Institutional Yes: The HBR Interview with Jeff Bezos"
October 1, 2007

17. Accenture
"Traditional Approaches to Information Security Are No Longer Sufficient"
November 23, 2011

18. Ibid

19. Rouf, Ishtiaq, et al.
"Security and Privacy Vulnerabilities of In-Car Wireless Networks: A Tire Pressure Monitoring System Case Study" in Proceedings of the 19th USENIX Security Symposium, pages 323–338, August 2010

20. SANS Analyst Program
"Critical Control System Vulnerabilities Demonstrated - And What to Do About Them"
November 2011

21. Microsoft
"Microsoft Security Intelligence Report, Volume 11"
October 2011

22. Ohm, Paul
"Broken Promises of Privacy: Responding to the Surprising Failure of Anonymization" UCLA Law Review
Vol. 57, p. 1701
August 2010

23. Sweeney, Latanya
"Simple Demographics Often Identify People Uniquely"
Carnegie Mellon University, Data Privacy Working Paper 3, 2000

Contacts

Dr. Gavin Michael
Chief Technology Innovation Officer
g.c.michael@accenture.com

Scott W. Kurth
Director, Accenture Technology Vision
scott.kurth@accenture.com

Michael Biltz
Director, Accenture Technology Vision
michael.j.biltz@accenture.com

About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with more than 244,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$25.5 billion for the fiscal year ended Aug. 31, 2011. Its home page is www.accenture.com.