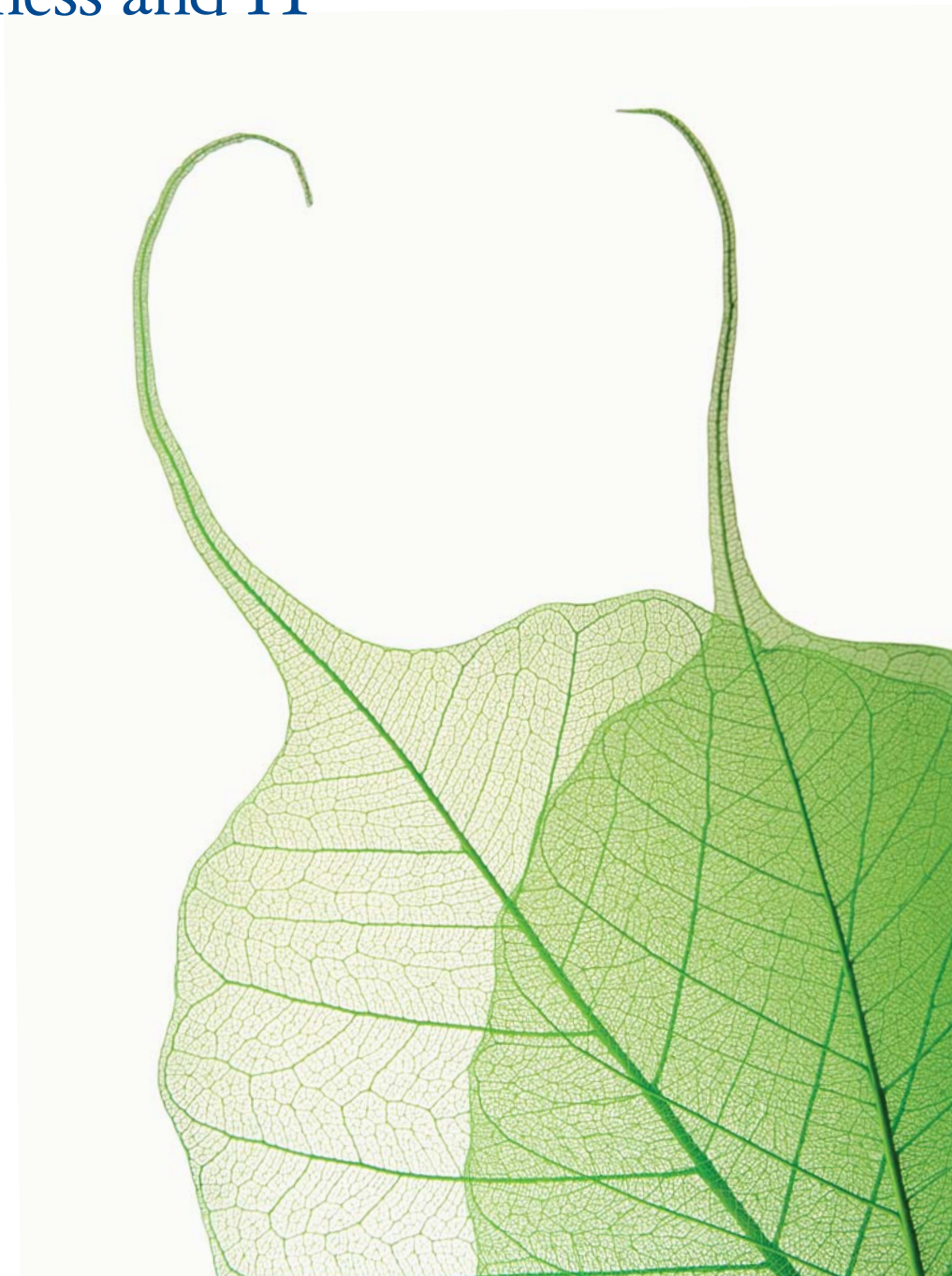
Deloitte.

Tech Trends 2011
The natural convergence of business and IT



Preface

Deloitte's annual Technology Trends report examines the ever-evolving landscape of technology put to business use. Topics are chosen based on their potential business impact over the next 18 months, with input from clients, analysts, alliances and our network of academic leaders. This year we identified 10 important trends, clustered in two categories: (Re)Emerging Enablers and Disruptive Deployments.

(Re)Emerging Enablers are trends that many CIOs have spent time, thought, and resources on in the past – perhaps multiple times. This year these familiar topics deserve another look due to specific factors in the technology or business environment.

Disruptive Deployments are trends that present significant new opportunities – offering new business models or transformative ways to operate. The technologies themselves are not necessarily disruptive, but when deployed as discussed, they could disrupt the cost, capabilities, or even the core operating model of IT and the business.

Our 2011 trends list plays significantly to the convergence of Social and Mobile computing – a convergence that is fundamentally changing how information is accessed and used in business operations and decision-making. "There's an app for that" captures the essence of this change, engaging users wherever and whenever they choose, and taking full advantage of the next generation of Cloud Computing. These finished business capabilities within the cloud, for both structured and unstructured information analytics, are changing the role of the CIO and the shape and size of apps. But what isn't changing is the importance of information security and privacy practices that can stand up to today's hyper-evolving cyber threat landscape.

All of these trends are relevant today. Each has demonstrated significant momentum and potential to have an impact – and each is important enough to support immediate consideration. Forward-thinking organizations should consider developing an explicit strategy in each area, even if that strategy is to wait and see. But whatever you do, stay ahead. Use the convergence to your advantage. Don't get caught by surprise.

Mark E. White
Principal and CTO
Deloitte Consulting LLP

Contents

(Re)Emerging Enablers

1 Visualization

See, discover and explore deeper insights within large, complex data sets

Enterprises move into 2011 with information at the forefront of their agendas. According to a recent Gartner survey, increasing the use of information and analytics is one of the top three business priorities[1]. Data volumes continue to explode, as unstructured content proliferates via collaboration, productivity and social channels. And while organizations are making headway on enterprise information management and broad analytics solutions, much potential insight is buried within static reports that are accessible only by a small fraction of the organization[2].

This static, tabular approach runs counter to fundamental patterns of human thinking; our brains have been tuned to recognize shapes, detect movement and use touch to explore surroundings and make connections. Thus, the true value of business intelligence is often lost as companies struggle to communicate complicated concepts and empower more stakeholders.

Visualization refers to the innovative use of images and interactive technology to explore large, high-density datasets. Through multi-touch interfaces, mobile device views and social network communities, organizations are enabling users to see, explore and share relationships and insights in new ways. Spatial and temporal context add physical location and sequencing to the analysis over time, allowing patterns to be uncovered based on the source, flow and evolution of information. Intuitive touch or gesture-based drill-downs and on-the-fly relationship mapping add immediacy to the analysis, encouraging manipulation and higher-order understanding instead of static or passive views.

Though a long-established discipline, visualization deserves a fresh look in 2011, partly due to the evolution of the underlying tools. In-memory databases and distributed MapReduce processing now allow trillions of records and petabytes of data to be sorted, joined and queried. Visualization suites complement business intelligence and analytics platforms, offering rich graphics, 3-D perspectives, interactivity and usability on par with leading consumer experiences – often with deployment channels on smartphones, tablets and other mobile devices.

Another difference in 2011 is the rich potential represented by unstructured data, whereby organizations can tap into millions of internal emails, instant messages and documents, as well as trillions of Facebook objects (100 billion page views per day[3]), Twitter tweets (90 million per day[4]), text messages, blogs and other content of potential concern to the enterprise. In the face of so many loose connections and non-intuitive correlations, visualization is proving to be an excellent mechanism to make sense of unstructured data and feed it into decision making and process improvement activities.

History repeating itself?

Visualization has deep roots going back to society's earliest maps, scientific charts and instructional illustrations – many designed to convey complex information in ways that simplify, communicate and foster understanding. In computer science, visualization has been attempted for decades, but has been limited by graphical horsepower, CPU, memory and storage constraints.

	What were the challenges?	What's different in 2011?
Spreadsheet/database chart builders	• Restricted to essentially four variables: x and y axis, size and coloring of plotted points. • Viewpoints typically restricted to static, siloed data – leaving little room for alternatives. • Limited ability to interact with the data – some drill-down, but queries and views were generally fixed.	• Three dimensional visual and interactive elements allow for many variables to be considered for any given analysis. • Visualization tools have continued to add features and toolkits – from stand-alone packages (e.g., SAS, ILOG) to productivity tool plug-ins (e.g., Excel) to cloud services (e.g., ManyEyes, Google, Tableau Public). • Tools allow information acquisition (with requisite cleansing and correlation) or real-time integration to connect relevant data, inside and outside of organizational boundaries. • High degrees of interactivity, both for drilling down and on-the-fly editing of core dimensions of the analysis.
Business intelligence/ reporting	• Tools required power users to perform self-guided queries and explore the data universe – demanding detailed knowledge of underlying data structures and SQL. • Primary focus on historical reporting – with tabular text or chart/histogram output. Without spatial and temporal context, many patterns were impossible to recognize. • Computational and storage bottlenecks either restricted the complexity of analysis or the size of data sets (or both).	• Business intelligence solutions are often part of rich analytics suites – which include visualization tools designed with business analysts and end-users in mind. Data structures are abstracted based on enterprise objects and metrics; 4GL languages allow drag and drop exploration. • The last few years have seen consolidation in the ERP/BI space (e.g., SAP and Business Objects, Oracle and Hyperion, IBM and Cognos, SPSS). As product lines are becoming integrated, organizations have easier access to, and an easier time feeding into, tools capable of driving visualization. • Natural links to performance management and predictive modeling tools, allowing not just confirmation of intuition, but discovery and insight. • High-performance appliances, in-memory analytics solutions, cloud-based infrastructure as a service and distributed data processing solutions have introduced cost-effective means to remove technology constraints.

Technology implications

Tools for rendering and displaying complex visuals are a natural part of this trend. Beyond the presentation layer, visualization requires foundational Enterprise Information Management and Information Automation disciplines – as well as means to integrate data silos within and beyond the organization[5].

Topic	Discussion
Master data management	Insights from sophisticated visualization solutions will only be as good as the underlying data. If entity-level relationships are not understood at the structural level, nuanced correlations and associations will be almost impossible to achieve at the business level. Even worse: the analysis will yield flat-out wrong conclusions based on faulty data.
Data quality	Any derived understanding will be compromised if the source data is dirty, inconsistent or of unknown quality. That's why leading organizations are adopting tiers of trust zones for data. Acknowledging a lack of control over external and unstructured data, different puzzle pieces are allowed to be included as a part of the analysis, but stakeholders are made aware of potential issues with the integrity of the data sources.
Integration	Ability to link multiple internal – and increasingly external – data sources to feed into the palette of information to be visualized. On-premise solutions typically feature batch and transaction-level movement of information between physical repositories driven by data, service or event based interfaces. If one or more cloud solutions are also potential sources, an external "integration-as-a-service" platform will likely become part of the technology landscape (e.g., CastIron, Boomi, Pervasive).
In-memory, distributed and cloud-based infrastructure	Infrastructure is needed to support processing of large data volumes – using either column-based compression optimizations, map reduce or elastic scale of the operating environment. These allow for high-performance computing characteristics at a relatively low cost, enabling complex visualizations and analysis.
Visualization rendering and interaction tools	Either as extensions to broader information suites or as stand-alone niches addressing the presentation and manipulation of complex analyses, visualization tools must be a part of the strategic information landscape. Many of these tools feature mobile application access – ranging from viewing pre-defined outputs to actively exploring the data universe.

Lessons from the frontlines

Matter of life and death

The University of Maryland launched the Similan effort to "enable discovery and exploration of similar records in temporal categorical dataset."[6] In other words, they wanted to enable searches based on a sequence of events – specifically, to be able to look through patients' electronic health records and find incidents of a specific pattern of treatments and symptoms that might be representative of an overarching disease or condition. For example, patients that predispose themselves to contrast-induced nephropathy would start with normal creatinine levels, then undergo radiation therapy and then have low creatinine levels within five days. Unfortunately, patient histories and charts were not easily searchable by event sequences.

Enter Similan. By allowing visual representations of events mapped against time, backed with effective search tools and animated event flows, the desired pattern is easier to recognize. Beyond healthcare applications, there are wide-ranging possibilities for commercial use of this technology, including events such as product line launches, M&A transactions, retail store openings, or corporate downsizings.

Living, breathing (digestible) almanac

IBM created a tool to showcase the power of visualization based on publically available data from the CIA's World Factbook, providing analysis comparing Gross Domestic Product (GDP) and population growth across the globe[7]. It compares the effectiveness of online analytical processing (OLAP)-based bar charts with integrated, spatial interfaces of the same data. A tree map shows GDP per country via rectangles of varying sizes, with color coding to represent varying population growth velocities. The view effectively communicates thousands of data points. By allowing the same analysis to be mapped spatially to the globe, new patterns can be detected based on regional activities, patterns that would not be apparent in the continental view. While each perspective has its strong points, the ability to switch from one to another allows for a wider range of analysis, and more potential for insight. Finally, drill-down is possible for any given country – providing end-user access to low-level detail.

Metering the Internet

Akamai's Internet visualization tools provide a view into multiple dimensions of online performance: overall web traffic, net usage indices based on transaction and content type and individual site visitation, response and application performance[8]. By providing real-time visibility into traffic, correlation to past performance for trending analysis and the ability to use touch-based gestures to investigate regions and activity over time, the complexity of two billion Internet users' habits is made simple and actionable. Organizations are taking advantage of specialized views describing retail Web site visits and e-commerce transactions by geography to improve their advertisement strategies and tailor consumer offers.

Where do you start?

Visualization is a largely untapped source of value, with current efforts typically focused on historical reporting, dash-boarding or predictive modeling. Establishing tools to improve consumption, increase exploration and better understanding of these activities is frequently an afterthought for organizations. It is often assumed that the analytics tools themselves will provide visualization capabilities out of the box, an assumption that does not generally hold up. Similar to the 2011 Technology Trend on User Engagement, consumerization and generational forces are driving radical new expectations for information access. The good news: these new developments can yield tremendous value for the organization, particularly when applied to the largely green-field terrain of unstructured data.

- **Business purpose first.** The types of tools and disciplines needed for visualization will be determined by the business problems to be addressed. That is critical to informing stakeholders and determining the degree of focus on communication clarity, how much to invest in exploration and manipulation, how mobile scenarios fit in and which visualization techniques are applicable. The range of possibilities is enormous – from simple Tree Maps and Bézier curves to advanced solutions like the University of California at Santa Clara's AlloSphere[9], a self-enclosed research center with two five meter radius hemispheres allowing fully immersive visual and auditory exploration of complex data sets (e.g., electron spin/ bonding, brain activity, etc).

- **Know your audience.** Choosing the right visualization technique has everything to do with what you are trying to do. Is the intent to clearly convey findings? Or to enable others to discover their own insights? Will it be leisurely consumed from a desktop in a corner office or by someone in the field to help resolve immediate, pressing issues? Clearly understand your audience – and their intended usage – to guide scope and design.

- **Information management mandate.** Worse than not having the answer to a question, is to have false confidence in an answer that is compromised. That's why master data management and data quality are crucial parts of the visualization story. Luckily, it is feasible to address information management in phases aligned with the scope of the business problems ahead. Just think through enterprise implications from the start so the journey can be accretive, not a series of redundant or divergent efforts.

- **Explore.** There are many open source options for exploring the potential benefits of visualization: ManyEyes, Tableau Public, Google Public Data Explorer and other services allow either exploration of public information or importing of private data for visualization and manipulation. Just keep in mind that normal security and privacy considerations apply for any sensitive intellectual property. Dedicated players like Qlikview, Spotfire, Roambi and offerings from IBM, SAP, Oracle and others, provide tools for rapid prototyping. Tool decisions should be based on existing technology footprints and expected use cases. By experimenting with several platforms, the business can be better educated on the art of the possible – driving an informed vision and investment roadmap.

Bottom line

The promise of visualization has been a long time coming, but the results often fall short of the business' imagination. With the mix of rich new tools, the rising quality of enterprise information and analytics, the untapped potential of unstructured data and the incentive of mobile use – the deck is finally stacked to make good on that promise. However, the richest visual presentation is of no use if the content is flawed.

Organizations with solid information foundations can use visualization to leap-frog competitors. Laggards can use the allure of visualization as strong reason to finally shore up data management concerns. Regardless of which category your organization falls into, your employees, customers and partners will soon expect access and transparency to information that can be explored, manipulated and acted upon. Leading companies will be in a position to profit from getting it right.

Endnotes

[1] Mike Vizard, *Gartner 2010 CIO Survey: A Time of Great IT Transition*, http://www.itbusinessedge.com/cm/blogs/vizard/gartner-2010-cio-survey-a-time-of-great-it-transition/?cs=38795 (January 19, 2010).

[2] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 6.

[3] Chris Crum, *Facebook Gets 100 Billion Hits Per Day*, http://www.webpronews.com/topnews/2010/07/21/facebook-gets-100-billion-hits-per-day (July 21, 2010).

[4] Leena Rao, *Twitter Seeing 90 Million Tweets Per Day, 25 Percent Contain Links*, http://techcrunch.com/2010/09/14/twitter-seeing-90-million-tweets-per-day/ (September 14, 2010).

[5] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 1.

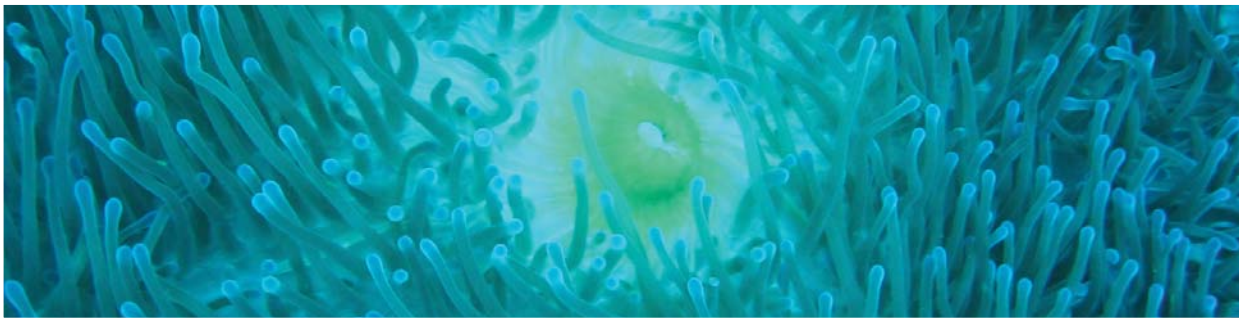
[6] Visit http://www.cs.umd.edu/hcil/similan/

[7] Visit http://visunetdemos.demos.ibm.com/blogsamples/factbook2/FactBookSE.html

[8] Visit http://www.akamai.com/html/technology/nui/retail/index.html

[9] Visit http://www.allosphere.ucsb.edu/

2 "Almost-Enterprise" Applications



Quick and agile solutions appeal to the business, but are they "enterprise enough" for IT?

Business units have historically had a love-hate relationship with IT. In the early days, IT was an esoteric specialty, far removed from core business competencies yet consuming a big piece of the budget. IT was often seen as unresponsive, expensive or flat-out ineffective, but business leaders saw no other choice for essential process and information automation. IT was left to balance these harsh perceptions with the practical reality of providing secure, reliable and scalable solutions with zero tolerance for fault or failure.

Individuals and departments have taken on this re-emerging self-service approach before. In the 1990s, the client/server trend gave almost anyone the ability to put a small server under their desk and build a Visual Basic application to help perform their job. This eventually resulted in a sprawl of apps that were outside the control of, and not subject to the disciplines of, professional IT. Some of these apps were eventually determined to be central to the business, and the lack of formality in their pedigrees created risk for the business. The CIO often had to adopt or rationalize these efforts.

As a result of the cloud revolution, Software- and Platform-as-a-Service (SaaS, PaaS) capabilities are being eagerly embraced by many business leaders for reasons including predictable results, easy and rapid availability and a demystification of IT. Put simply, the resulting almost-enterprise applications can offer transparency in the value and cost for services, in terms understandable by the business, without the overhead too often perceived with central IT departments.

However, the CIO has good reason to tread skeptically towards these new solution patterns – and with motives much nobler than self-preservation. Capital "E" enterprise applications have been institutionalized over the years for good reason. ERP providers have invested decades and billions of dollars in creating solid platforms worthy of businesses entrusting their critical operations. Hundreds of thousands of top developers have helped fortify and extend development frameworks like .NET and Java EE, with just as many proof points of their readiness for enterprise-class solutions. Many of these almost-enterprise solutions, on the contrary, are as short on formal reliability, transactional integrity, security and interoperability standards as they are long on anticipated functionality. In addition, while entire industries have matured to support development, governance, maintenance and monitoring of traditional enterprise applications, these capabilities are still in infancy for much of the SaaS and PaaS market. That said, the potential value of the next generation of self-service approaches to the business is real, with providers continuously improving to close the maturity and discipline gaps.

Because these almost-enterprise solutions are easily shared (internet-based) and inherently scalable (a function of the cloud backbone), the potential business risk exposure is significant. Threats include the possibility for business disruption, security and privacy risks and intellectual property leakage. And there is often the danger of additional vendor lock-in and the introduction of yet-another platform or (even worse) proprietary development language. CIOs need to anticipate this wave with sourcing guidelines, implementation standards and an upgraded delivery model designed around executing smaller, faster projects. At a minimum, they need to prepare for the inevitable: just like before, some of these applications will reach the scale, complexity or business criticality that necessitates centralized IT management and support.

History repeating itself?

Almost-enterprise applications represent the most recent iteration of a long-running cycle: the democratization of IT in search of better, faster, cheaper enablement of the business. While technology advances and entrepreneurial energy surrounding cloud make 2011's rendition particularly compelling, there is high potential for today's almost-enterprise applications to follow a similar evolution.

	What were the challenges?	What's different in 2011?
Desktop-ware (e.g., Access, Excel, Visual Basic)	• Difficult to distribute and scale; required either a locally-installed program or access to a physical file. • Version control and redundancy challenges, especially as the business became more dependent on one-off solutions. • Core IT was typically not involved in the development or maintenance of solutions – leading to exposure in the areas of security, reliability and maintainability. • Inefficiencies in both workload (e.g., time-consuming manual extracts of data to feed rogue applications) and operational costs (e.g., hundreds/thousands of underutilized servers sitting under desks). • Fragmentation of processes and data leading to additional inefficiencies and need for complex reconciliation when attempting to "roll-up" results.	• A broad and growing catalog of finished services available for purchase. Instead of buying building blocks, businesses are able to subscribe to cloud capabilities (e.g., sales lead tracking). • Easy access across the internet and rapid scale based on cloud backbone reduce deployment issues, but also raise risks of uncontrolled proliferation. • Utility-based model (pay-per-use), infrastructure "hidden" in the cloud, and improving enterprise development and maintenance tools mitigate the cost argument – if pricing and contract terms are favorably managed. • Highly extensible tools and platforms that make it easier to operate off a common/shared data set.
Document flow and task management (e.g., Lotus Notes, SharePoint)	• Similar to desktop-ware, widespread proliferation led to significant redundancy – which resulted in consistency and data integrity issues: Which version of the truth should be trusted? • Advanced security, fault tolerance and scalability features were sporadically implemented by the non-IT development community. • Applications could be extremely idiosyncratic. Any given document could be handled by multiple applications, introducing new complexities. • Started to deliver more collaboration and associated processes automation capabilities but remained incomplete, overly static and fragmented.	• Ability to establish standards and foundational services (e.g., data management, integration, security) that can decrease redundancy and address concerns of the overall stability and maturity of almost-enterprise solutions. • SaaS and PaaS platforms are rapidly adding features to provide reliability, security and transactional integrity capabilities that can be consistently applied (e.g., Google two-stage authentication for Enterprise App Engine platform). • Increasingly the cloud, social, mobile and collaboration worlds are combining to allow multi-faceted collaboration between people, data and documents.
Application service provider (e.g., FatCow, subscription Websites)	• Rigid implementations with minimal ability to customize for business-specific needs. • Applications were extended from on-premise, licensed platform models. Without multi-tenancy, they required dedicated operating environments, which impacted cost-saving potential. • Bandwidth impacted performance and availability. Offline access – if it existed – was sub-optimal.	• Solutions built specifically to support multi-tenancy provide additional configuration flexibility. • App Stores encourage specialized capabilities and cross-enterprise reuse and sharing even in relatively specialized business domains. • In-cloud integration can allow cross line-of-business or external collaboration. • Proliferation of broadband and mobile solutions has made the solutions viable. Incorporation of elegant offline solutions is closing the remaining gaps (e.g., Adobe Air).

Technology implications

Almost-enterprise applications require many of the same foundational disciplines that have been leading practices in traditional IT organizations for years, if not decades. But rather than representing optional approaches, they are becoming required to realize the full potential of the new hybrid landscape.

Topic	Discussion
Enterprise information management (EIM)	Whether almost-enterprise applications are focused on information analytics, financial transaction processing, sales, HR, collaboration, or support of other processes, a significant factor will be the accuracy and reliability of underlying data. The tenants of EIM are required here – from master data management to correlation of business entities and promoting matching based on imperfect information… to data archiving and managing retention and storage of cloud-based bits… to data cleansing which must expand its reach to the extended solution environment. Specific implementation approaches should be guided by the level of access to SaaS and PaaS data (either directly or via administrative tools), as well as the capabilities of data, application, and service-level APIs.
Integration (notably orchestration and event processing)	The ability to coordinate long-running end-to-end business processes across legacy and almost-enterprise applications is essential, especially as transactions increasingly require navigation of the "cloud of clouds" – hybrid footprints traversing multiple cloud providers, coupled with manual tasks and automated workflows. In addition to support service-oriented software architecture standards, almost-enterprise applications should include foundational event handlers for realization of asynchronous, unpredictable processes. While most of the new class of solution providers have open, extensible, SOA-compliant architecture, they are in the midst of building out mature integration frameworks.
Security and privacy	Data security and privacy are legal mandates for many industries, with restrictions on where data can be physically located and required controls for access to sensitive information – including internal intellectual property, private customer/employee data or business partner trade secrets. Identity, authentication, and entitlement services should be implemented enterprise-wide to manage who has access to assets, whether internally or externally sourced. Seamlessly passing credentials across clouds is technically challenging, but progress is underway. More likely, third-party solution providers will allow ICAM (identity, credential, access management)-related activities to be exposed and remotely invoked – ICAM-as-a-Service tying into core enterprise services.
Maintenance and monitoring tools	IT encounters a familiar pattern for new technology adoption with the initial immaturity of tools and leading practices for monitoring and maintaining the solution. These include native services for capacity, performance and health tracking across the stack (network, server, OS, DB, app server, application, UI); tools for deploying, managing and tracking code; and configuration changes and support activities (such as incident, problem and release management). In addition, many solutions still have minimal hooks to external monitoring and management standards or industry tools (e.g., HP OpenView, IBM Tivoli, etc). Leading solutions are getting more transparent about performance and uptime but there remains a reluctance to commit to concrete SLAs, maintenance windows are generally inflexible, and detailed visibility is often lacking. Due diligence is critical to guide contracting – and properly set internal expectations.
SDLC skills and methods	The tools and methods that allow configuration or development and deployment of almost-enterprise solutions continue to evolve and emerge very rapidly. They may or may not already be in the toolbox of the enterprise IT shop. For example, Ruby on Rails or Objective C may not be in the current enterprise architecture but CIOs are encouraged to establish a formal process for evaluating and on-boarding new tools and technologies in a given area. This may be a formal center of excellence or an informal stealth activity, but the effort will be attractive to many high-performing IT professionals who value staying ahead of the curve, and could be of value to the business overall. Furthermore, this generation of almost-enterprise solutions has largely been developed since the advent of Agile methodologies and as a result are ideally suited to them. In fact, employing a traditional waterfall approach with a sharp delineation between "build" and "run" functions can dilute the power of these new architectures. Often the embrace of cloud solutions is an effective trigger to drive the modernization of IT delivery approaches.
Cloud pricing and contract agreements	As services are increasingly sourced via the cloud, vendor, usage, and contract management become essential functions. Given the potential scale of almost-enterprise solutions, attempting to control these factors manually could create disaster, most likely in the form of runaway usage that leads to business disruptions or exorbitant fees due to unnegotiated ceiling clauses. In addition, many of these solutions introduce additional topics that must be taken into consideration such as SLAs, exit clauses, data usage rights and backup and recovery outcomes.

Lessons from the frontlines

CRM coup

A leading consumer products company with a significant ERP footprint endured a coup from one of its North American business units. Tired of waiting for an overdue second wave of a global roll-out that would finally deliver CRM functionality, the VP decided to launch a stealth Salesforce.com (SFDC) initiative for service management – self-funded and independent of IT. The CIO and head architect attempted to cancel the project, but the board intervened. The business was given a cautionary green-light, with caveats to include IT for design and integration to legacy data stores.

The project proved more complex that originally scoped, mostly because of unforeseen data cleansing needed to seed the SaaS environment and the desire to integrate into the business unit's existing HP OpenView business systems management tools. Native app-specific administration and maintenance tools were easy to use, but outsourced application management services and help-desk capabilities required adoption of standard enterprise services used by the rest of the company. Even with these challenges, the project was completed in less than four months – by far the fastest implementation of an almost-enterprise solution the company had ever experienced. The central IT group came to appreciate the simplicity of development and configuration of the platform, the robustness of the underlying design, configure, test and run capabilities, and the built-in governors to deter sloppy code. The decision was made to include SFDC as the standard for an interim CRM solution, and to extend the enterprise's existing TIBCO integration and Websphere identity and access management solutions to expose consumable services from the cloud.

Apps on demand

A chemical products manufacturer had been an early adopter of Google Enterprise Apps engine – focusing on building almost-enterprise applications anchored in the productivity and collaboration suites. One example was a series of Gmail plug-ins that read the subject of emails and automatically retrieve CRM and HR workflow documents from SAP, with embedded controls for taking action that, in turn, execute back-office transactions. Another was the ability to automatically update call notes in their CRM system with chat or voice transcripts, removing what was historically 90 seconds of low-value activity at the end of each customer service call.

This approach represents a clear difference from the company's historical application focus, which was based on enterprise solutions extended from their supply chain or financial systems. Average project duration has been reduced to approximately four weeks. Average business case capture and customer satisfaction levels have increased tenfold.

Swimming against the tide

The CIO of a leading insurance company had made the organization's "anti-cloud" stance very clear. Burned in a previous career role by a substantial investment in Active Server Pages (ASP), he issued a mandate that prohibited funding, support and tolerance for cloud-based services in the organization. Six months later the board came close to issuing a call of "no confidence" against the CIO because the cloud-free IT strategy was deemed a poor decision. The CIO decided to investigate his current IT spend across the infrastructure, platform and software stacks, and to his surprise he discovered that – in spite of his edict – 15 of his VPs and business unit leaders had already started the cloud journey. How did he find out? He queried their corporate credit cards.

Where do you start?

CIOs who think this trend is "not happening on my watch" should ask HR to poll their business unit leaders' corporate credit card accounts for charges from Amazon EC2, IBM, Google or Salesforce.com. Many Fortune 500 organizations will find at least initial dabbling, if not significant investing. CIOs need to take a number of steps *today* to take control – and advantage – of this re-emerging trend.

- **Take a hard look in the mirror.** Look at the effectiveness of IT. There is little motivation for an organization to seek change if it feels its needs are being met by the status quo. That said, rogue investments should not be looked at as an indictment. The cloud hype machine is in overdrive, and it is natural for business leaders to experiment.

- **Up central IT's game.** Take time to understand the root cause of rogue projects. If delivery reliability is in question, think about ramping up a portfolio and project management (PPM) effort. If the issue is transparency, consider adopting an IT service management mentality to crisply define the catalog of offerings you provide – along with cost, value and delivery metrics (SLAs) *described in business terms*. Being open-minded regarding areas for improvement will go a long way in the next stage.

- **Gain trust and credibility as an unbiased "conductor".** Position IT as an advisor for solution shaping and design. Take responsibility for creating the standards for when solutions like PaaS and SaaS are appropriate. Describe the design standards and patterns that should be considered when implementing the prescribed solution, even if IT is not involved. Enterprise architecture is a huge component of this, requiring domain (e.g., data, integration, security) experience and solution architects (typically tied to business and/or functional areas) to earn the trust of business executives and process advisors. And remember, trust will require compromise, with some recommendations including almost-enterprise applications.

- **Stake a claim for information, integration, and security.** Forward-build or contract for capability centers to support flexible delivery of these skills and services – creating a pool of resources to be shared across projects, across the lifecycle of solutions, and dynamically applied to multiple projects of short durations. There is a growing need to offer shared IT services around security, integration, maintenance and reliability as "tax-free" enablers for as many solutions as feasible. Ideally, these will involve incrementally building out capabilities in support of real business initiatives, instead of investing in standalone, lengthy, isolated or pre-emptive framework efforts.

- **Provide information for your people to understand tomorrow.** Finally, remember that parts of this transition will be highly personal. The skill sets of your people must evolve. Decision rights will almost certainly shift. Methodologies will look markedly different. Simply "keeping the lights on" will be less valued. Transparency is key. Treat your customers with respect and stay open-minded in decision-making, while building excitement about the possibilities of tomorrow's world.

Bottom line

With the advent of everything-as-a-service in the capability cloud, social computing inside and outside the enterprise and increasing investment in outside-in architecture, the traditional role of the IT department is at an inflection point. IT's importance and value potential have not changed, but it is now at the mercy of market arbitrage. The change imperative is clear: CIOs need to get in front of this democratization and self-service trend, notably since many of rogue investments will come back into IT's fold once they reach a breaking point in complexity or scale. When that happens, lines of business will once again be reminded that the initial app stand-up is the easy part compared to ongoing care, feeding and improvement. The CIO must consider taking action to be seen as the trusted caretaker and source of information innovation for the enterprise, not a naive landlord who is determined to maintain a status quo.

Almost-enterprise services are seductive. They're quickly growing in number and can be bought with the swipe of a corporate card. In today's operating environment, they simply can't be avoided nor ignored. CIOs must recognize the upside to their business customers while preparing to mitigate risk. Instead of creating "thou shall not" barriers, guide and govern the decision process while educating the business as to why some standards, disciplines and frameworks are worth the time and effort at almost any scale.

3 Cyber Intelligence

Protecting vital information assets demands a full-spectrum cyber approach

In 2010, security and privacy graduated from IT department concerns. C-suites and boardrooms took notice of highly visible incidents, ranging from malware-infected motherboards from top-tier PC manufacturers[1], to information theft from a leading cloud provider[2], to the manipulation of the underlying routing tables of the internet, redirecting traffic to Chinese networks[3]. At the same time, the regulatory environment around sensitive data protection has become more rigorous, diverse and complex. Organizations are aware of the shifting threat profile and are working to deal with technical barriers as well as sophisticated criminal elements. Incidents are increasingly originating in the trust vector – due to inadvertent employee behavior via the sites they visit, the posts they access on social media sites or even the devices they bring with them to the workplace. A "protect-the-perimeter and respond-when-attacked" mentality is no longer sufficient.

Yet the vast majority of businesses in 2011 have only limited capabilities to detect and react to point-in-time breaches. Vulnerabilities are understood based on past events – not based on emerging cyber threats or on the actual risk profile of the organization.

Cyber intelligence represents a vastly more sophisticated and full set of threat management tactics, providing tools to move to a more proactive "over the horizon" threat awareness posture. *Cyber analytics* looks to detect patterns across systems, networks, physical security logs and external cyber-threat intelligence analysis to predict future attacks. *Cyber forensics* is moving beyond root-cause analysis to include tracking of where attacks came from, and detailed tracing of what they were doing after the infiltration. *Cyber logistics* adopts an outside-in view of security, protecting against compromises in the value chain – from upstream suppliers to personnel sourcing. Powerful tools can allow advanced incident response, triaging "how" and "from where" attacks originated. And *cyber security* remains a key component – creating identity, access and control frameworks to safeguard assets, while embedding enforcement policies and procedures throughout the organization.

In 2011, security incidents remain nearly unavoidable. By building cyber intelligence capabilities, the impact of incidents can be contained, the source of threats understood, and learnings codified into controls that can help prevent future incidents. But beyond developing broader disciplines, organizations must embrace security and privacy as foundational to their business. Cyber intelligence efforts need to be championed by the C-suite, funded as a strategic priority, and empowered to become part of the operational genome of the company.

History repeating itself?

Individual cyber intelligence capabilities have been in play for decades, some since the earliest days of IT system design. Beyond the inflection point of a unified, holistic approach, there have been significant advancements in overall discipline:

	What were the challenges?	What's different in 2011?
Cyber security	• Many cyber security efforts were geared toward perimeter intrusion protection and detection. As threats shifted inside the trust zone, new tools and techniques were needed. • Identity and access management solutions were subject to systems silos – with isolated entitlements, activity logging and controls. Limited context of surrounding events made pattern detection of higher-order threats extremely difficult. • Technology solutions were manual, perceived as nuisances to the business and often circumvented. • The Chief Security Officer (CSO) or CISO, if they existed at all, were typically technologists with deep domain knowledge, but without a seat in the boardroom.	• Cyber security is increasingly framed as a combination of architecture, practices and processes – with equal focus on internal and external threats. • Highly integrated tool sets and investments in cyber analytics have helped connect dots and identify previously undetectable exposures. • Automated identity management tools are incorporated into day-to-day tasks, including smart cards, biometrics, fingerprint and handprint scanners. • CSO role has become common-place, possessing a mix of technology and leadership skills and a seat at the executive table.
Cyber forensics	• Incident investigations would conclude once root-cause analysis was determined and cleaned. • Self-contained analysis was rarely used to augment existing controls or update policies. At best, a script was created to improve response in case of breach recurrence.	• Cyber forensics is now looking beyond the host to the network layer, determining the source (inside or outside the organization) of the malware. This is correlated with other internal and known external threats using cyber analytics in an attempt to inform of future vulnerabilities. • Forensics results are part of a closed-loop cycle in cyber intelligence, improving directly-affected and associated controls.
Cyber analytics	• An understanding of the value of business analytics, without the models to apply the patterns. • Reactive approach to analytics based on situational awareness and descriptive analysis.	• An established tradecraft of analytics, reinforced by the realization that threats and opportunities are often hidden in plain sight. • Cyber Analytics is predictive, prescriptive and a part of a closed-loop cycle of continuous refinement based on other cyber Intelligence activities.
Cyber logistics	• Supplier security reviews were typically limited to deal signings and cursory annual audits. • Notable in manufacturing, reliance on several ever-changing sub-contractors and small hardware providers – each with their own risk profile – created potential weaknesses upstream in the supply chain. • Personnel checks occurred during hiring or contracting process – with clearance processing handled by largely unknown third parties.	• Cyber logistics includes extensive analysis to identify, assess and mitigate risk posed by vendors subject to foreign ownership, control or influence (FOCI), or other significant concerns prior to purchase or contract award. • Continuous audit of suppliers, including organization structures, corporate activity (e.g., M&A transactions) and ongoing verification of integrity of goods. • Cyber intelligence strategies include provisions for personnel security such as verifying legitimacy of background investigation agencies, proactive foreign travel risk advisory, and automated reinvestigations of executives and privileged roles.

Technology implications

Cyber intelligence is as dependent on governance and organizational change as it is on underlying technology. The tools themselves are an important part of an increasingly automated foundation for prevention, detection, and response.

Topic	Description
Identity, credential and access management (ICAM)	Identity, credential and access management solutions continue to be the foundation for enterprise risk management – integrated with physical security systems and automated tools for user, asset and system authentication.
Forensics	Cyber-criminal attacks have increasingly targeted computer memory – avoiding disc scan detection and circumventing many wireless and disc encryption techniques with in-memory key management. Traditional network scanning tools must be used to survey the full landscape and identify devices of interest, which are then treated to a full memory extract to determine any breaches – followed by code deconstruction, malware analysis and containment.
Analytics	Effectively studying associations between people, organizations and other security-relevant data elements across systems and organizational boundaries requires broad capabilities, including data management, performance optimization and advanced analytics - integrated with system log files, storage, physical security systems and mobile profiles[4]. Predictive modeling outputs are used to automate control updates, complemented by visualization to allow manual exploration of information. Additional value can be derived by providing insight to line-of-business decision making – ranging from fraud prevention to vendor management contracting.
Infrastructure management	A combination of change, device and asset management – reflecting the need to maintain inventory, monitor usage and promote firmware and operating environment updates to servers, desktops, mobile devices and physical equipment[5].
Secure software development lifecycle (SDLC)	Securing the technology value chain by introducing safeguards and controls across design, development, testing and deployment of IT solutions. With so many organizations dependent on external consultants, contractors and outsourcing providers, there is a need to control the entire upstream channel – including data and code being deployed across the enterprise and to customers.

Lessons from the frontlines

Be careful who you onboard

A government agency had historically performed security background investigations and adjudicative services using a labor-intensive, paper-based process supported by multiple software systems. A cyber logistics effort was launched to improve screening processes and controls for personnel employed, assigned or contracted to the agency – as well as to meet the Intelligence Reform and Terrorism Prevention Act (IRTPA) requirements that 90% of security clearance cases be processed within 60 days.

By developing a clearance case management system as part of their cyber intelligence initiative, the agency was able to expedite clearance handling, reducing processing time by 30%. And by integrating with its document imaging system and risk analysis tools, analysts were able to search and explore personnel history without violating personal identifiable information requirements, thereby allowing at-risk employees to be flagged and investigated.

Hidden in plain sight

A large national bank embarked on a cyber study to become more cyber-aware and bolder with their fraud capability. By looking at the exploits targeting peers they were able to establish linkages between who was targeting them and what applications they were after. The effort provided them with the understanding of how a string of 1s and 0s, resolved into clear indicators in application logs, can not only detect fraud but can also predict it. Tradecraft was used to understand what activities criminals were undertaking to bypass perceived security measures and harm applications.

The reality is that criminals have a staggering number of potential exploits, upwards of 40,000 highly customized threats for any specific campaign. By understanding what was unique about their organization and creating a cyber threat profile, they can now determine when there is something about their software, supply chain, network etc. that makes them a more attractive target. As a result, exploits are now proactively curtailed and the entire organization can be more predictive and prescriptive.

Digital footprint in the sand

A financial services institution with greater than 85% of revenue from on-line services subscribed to a third-party for anti-phishing services. What they didn't realize at the time was that a high-quality source of intelligence is often inside the data of the company itself: policies, logs and the rest of the data in their information ecosystem. Despite longstanding access to this information, and ongoing review of webserver logs, they had never pieced together the parts to recognize their threat vulnerability. By looking at the data differently, considering which other sites were referring users to their web site and cross-referencing those to sites not on their accepted list, they began to treat those visitors with more caution. As a result, they can now analyze patterns, peel back the onion with regard to unknown sites, and subsequently prevent phishing and other attacks.

There are so many directive and prescriptive efforts, and many times organizations don't even get the basic data from logs – either because logging isn't turned on, it's outsourced or it isn't archived appropriately. There is a gold mine of cyber data scattered throughout the enterprise.

Unfortunately, anti-phishing services companies typically don't see the threat campaigns as early as an enterprise can (or does) since attackers make dry runs on the organization before actually launching the exploit. Previously considered insignificant, this data and its patterns provide powerful insight – and can show the power of understanding the potential impact of the digital footprints you're leaving in the sand.

Where do you start?

Awareness of cyber threats is no longer an issue. As governmental agencies brief CEOs and presidents on the emerging landscape, and headlines paint vivid pictures of the impact of penetration, exfiltration and extortion, security should no longer be disregarded as a cost center buried within the IT organization. But with visibility comes accountability. Given the immature starting point at which many companies find themselves with regard to their security posture, their general sense of urgency is met with uncertainty about what specific steps to take. Here are four suggestions to help you get started:

- **Threat assessment.** Start by understanding the value of your organization's assets and current vulnerabilities. This will guide your entire cyber intelligence strategy, so take your time to get it right. Specific attention should be placed on operations in foreign countries, where the security of the underlying network and physical infrastructure cannot be assumed.

- **Intelligence network.** Use industry, government or third party relationships to establish ongoing intelligence partnerships to share leading practices, breach post-mortems and live dynamic intelligent feeds to drive policy and control refinement.

- **Risk management 101.** Many cyber security roads lead to and from an automated identity, credentials and access management solution. This becomes the baseline for authentication, entitlements and information controls. Integrate across internal transactional and security systems – then expand this footprint into business partners and any potentially customer-facing systems according to risk profiles.

- **Bring the CSO to the table.** CSOs should be both board-room advisors and general business leaders, with security domain knowledge but not necessarily tool-level experience. Many organizations have CSOs reporting into the Chief Operating Officer (COO) or Chief Risk Officer (CRO), a noticeable shift from their legacy in the IT organization.

- **Business connection.** Use Cyber Intelligence to enable the reduction of risk and loss to the business. Determine three to five use cases and show how it enables the business – saving money from incident prevention, preventing data leakage for brand protection etc. – beyond a typical threat assessment. Know what you have, get access to it and use it! Like business continuity, it can be an insurance policy that you'll hopefully never use.

Bottom line

Cyber intelligence gives organizations a framework of capabilities commensurate with the dynamic threats they're facing. While it's still necessary to build a rapid detect-and-respond cyber security function, organizations must go beyond this by adding tools to learn and adapt, protect against upstream threats and connect internal and external dots to predict future risks. This is critical for organizations that want to take a proactive stance against cyber threats.

Advanced capabilities in cyber intelligence will be essential in 2011 and beyond. Because of the pervasiveness of cloud, social computing and mobility technologies, organizations will have even less control over systems, infrastructure and data – many of which are being used more and more at the edge of the enterprise. Establishing a trusted, secure backbone and set of core services for these disruptive deployments will be a significant factor in their pace of adoption and their effectiveness. Get it right and you'll enhance your organization's competitive posture. Get it wrong and you may find yourself looking for another job.

Endnotes

[1] Jeremy Kirk, *Dell Warns of Malware on Server Motherboards*, http://www.pcworld.com/businesscenter/article/201562/dell_warns_of_malware_on_server_motherboards.html (July 21, 2010).

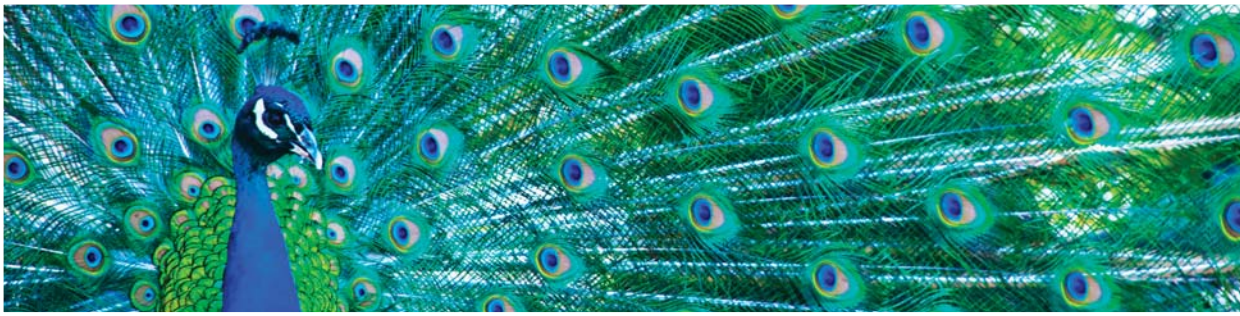
[2] John Markoff, *Cyberattack on Google Said to Hit Password System*, http://www.nytimes.com/2010/04/20/technology/20google.html?_r=2&hp (April 19, 2010).

[3] John Leyden, *China routing snafu briefly mangles interweb*, http://www.theregister.co.uk/2010/04/09/china_bgp_interweb_snafu/ (April 9, 2010).

[4] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 6.

[5] Description of the exponential growth in assets with embedded sensors, signals, and actuators is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 11.

4 CIOs as Revolutionaries



CIOs shift from stewards of, to catalysts for, business revolution

For years, technology advocates have called for CIOs to take a seat at the executive table. But the subtext has typically been as a *steward* of the business. This played well in the paradigm of IT as a support function and cost center, working downstream from the business strategy. This model also made sense for technology investments focused on automating core business processes. CIOs helped usher in waves of technology advancements, using ERP, client-server and the internet to drive efficiencies. It was about automating what the business needed to do – doing what the business had normally done, but doing it better, faster and cheaper.

More recently, companies have invested in automating what the business needs to know – information automation – increasing the visibility of information as a critical strategic asset for decision, action and even direct monetization[1].

In 2011, CIOs need to be more than business stewards, and potentially more than strategists as well. That's because cloud, social computing and mobility are fundamentally disruptive capabilities, shaking up business models and transforming how business is done[2]. Indeed, the technology agenda *is* the business agenda, and CIOs are the executives positioned to pull them into alignment.

In addition, the next-generation workforce has radically different abilities and expectations regarding information. They demand and deserve the tools to work effectively, usually in collaboration and not normally at a desk or in an office. These factors have broad implications for what an organization sells, how it engages with stakeholders, how it allows them to interact with each other and how work is performed.

But CIOs as revolutionaries? That may seem over the top, but think of what revolutionaries actually do. They challenge old rules, break up established institutions and overthrow business as usual – in the name of the greater good. As business innovation shifts to the edge of the enterprise, with more finished services delivered from somebody else's cloud, the old way of doing things is poised for a shake-up.

That said, CIOs can't rise to these new roles without demonstrating their ability to "mind the store" – improving efficiency, maintaining existing service levels and delivering on traditional business needs. And even then, yesterday's pressures won't go away. CIOs are still expected to control costs in traditional IT service areas. But those who can help the business to channel disruptive technologies can move beyond business strategist, translating innovations into meaningful contributions to the bottom line, creating aggressive plans to the future and leading the charge.

History repeating itself?

CIOs have long struggled with the balance between supporting the business and driving innovation, with their roles dependent in many ways on industry, geography and their relationships with other executives. In 2011, their push for a more strategic position appears to be shifting from aspiration to necessity.

	What were the challenges?	What's different in 2011?
"War-time" CIOs (during technology-enabled business transformation)	• CIOs were often tasked to play a key role in driving transformation initiatives supported by technology (large-scale global ERP implementations being a common example). However, the efforts were sponsored, led and in many cases originated by the business. • While moving IT to the forefront for specific periods, CIO roles returned to maintenance and support upon completion of projects, and the proportion of budgets matched that trend.	• The potential of cloud, mobile and social computing is transformational and unpredictable. This dynamism is what can make a lasting change to the CIO's role so important – positioning the organization to have the required agility to take advantage of market shifts. • Technology-enabled business transformation has left organizations with more complex dependencies on IT support, compounding the CIO's stewardship responsibilities. New disruptions shift the burden from directly managing operations to providing end-to-end capabilities, dependent on third-party services and infrastructure.
"Mind the store" CIOs	• A steady state was reached around the potential of IT in the business with mature back-office systems, sales and servicing solutions, e-commerce offerings and productivity suites. End-users were restricted to their corporate tools – and IT's function was primarily to control and maintain. • Many technology-led innovations were internally-facing improvements to the "business of IT," from IT service management to adoption of enterprise architecture to SOA-enablement of legacy systems. While important to the efficiency of the IT function, the business saw ongoing cost with little tangible return.	• The next generation of employees and the current generation of consumers expect new ways to interact with business. They demand usable, intuitive, empowering solutions, delivered at the edge, that provide a view of relationships, information and transactions tailored to the individual. Meeting these needs requires more than new tools; it also requires new skills and a new approach to enterprise market engagement. • Most of the innovations in 2011 will be inherently visible and valuable to the business, including mobility, information platforms for better answering "what do I need to know" and rapidly-delivered, functionality-rich cloud solutions.

Technology implications

The role of the CIO has evolved as enterprises have become increasingly dependent on IT – traversing business units, geographies and business processes. Beyond responsibilities for development, infrastructure and application support, CIOs must establish capabilities to support the changing business landscape – managing programs and projects, monitoring supported business services and allowing the hybrid portfolio of solutions to securely, sensibly and reliably integrate together.

Topic	Description
Business systems management (BSM)	Visibility into the emerging IT operating environment must accommodate not only on-premise monitoring of servers, networks and applications, but also availability and responsiveness of the growing ecosystem of public cloud, partner solution, mobile carrier and other services. CIOs need BSM solutions to solidify the linkage between business context and system performance.
Project and portfolio management	Tools to track investment priorities and project performance against objectives. Cloud and mobile opportunities may lead to short-cycle projects initiated throughout the year, with less focus on formal, annual investment cycles. CIOs will need to manage dependencies and track the health of even more concurrent activities, many executed outside of their direct sphere of control either by third parties or sourced directly within a line of business.
Vendor management	The CIO must own vendor management with technology and service providers – supporting on-premise, contracting, outsourcing and cloud models. Contracting, measuring service-level agreements, resolving disputes, market positioning analysis and contingency planning must become disciplines, and automated where possible.
Integration	Revolutionary CIOs will discover that the ability to integrate and orchestrate events across the ecosystem of services and systems is essential. It will likely become the fabric of their technology responsibility, requiring multiple interaction styles, real-time and batch, guaranteed or simply reliable, stateful and stateless, multiple performance/response SLAs and more. Integration frameworks must provide a mechanism for orchestrating events between cloud sources, originated across multiple internal and external channels.
Information	Master data management, analytics and visualization will become even more important capabilities for the IT shop[3].
Security	On the assumed priorities list, protecting IT assets is right behind "keeping the lights on." CIOs are downstream enablers of the vision of CSOs and CISOs, but are still held accountable if and when incidents occur[4].

Lessons from the frontlines

Revolutionizing the "third place"

Since being appointed as Starbucks' CIO in 2008, Stephen Gillett has revolutionized the in-store experience by embracing social computing, ubiquitous connectivity and the growing importance of mobile devices. In the midst of the recession and cost-cutting pressures, Gillett launched the 'My Starbucks Idea' viral campaign on cloud technology to solicit improvement ideas directly from customers. One result was free in-store Wi-Fi devoid of what were once confusing login screens, and the establishment of the Starbucks Digital Network which delivers content from T*he Wall Street Journal, USA Today*, Yahoo and others.

Starbucks is also now investing in mobile payment processing technology. Though refillable Starbucks cards were already used for one in five in-store transactions, the company invested in expanding their potential uses. A mobile payment platform was launched to U.S. stores in early 2011, allowing mobile devices to serve as proxies for the refillable Starbucks cards, with links to account balances and loyalty programs.

Recognizing the increasing importance of information, the programs allow Starbucks to capture meaningful customer information – feeding everything from product and experience improvements to knowledge of specific customer demographics and behaviors. Stephen Gillett's and Starbucks' approaches highlight both the growing relevance of connected consumers and the potential of the CIO to serve as an organizational compass.

What can IT do for you?

For many years, UPS has viewed technology as a critical enabler of their logistics and transportation business. But IT has expanded in recent years to become a driver of broader business innovation. Part of their success was spawned by CIO Dave Barnes' refreshing articulation of his technology strategy: "It's the business strategy. There's no difference."[5] A clear focus was placed on customer-centric innovation, often extending UPS' own initiatives to customers. One area is in its paperless invoice system which improved operations by reducing the number of physical copies of invoice and customs documents, while also advancing their broader sustainability initiatives. Another area is in its mobile solutions. Already an early adopter of these solutions, UPS continues to advance its capabilities with the fifth generation of the Delivery Information Acquisition Device (DIAD). The DIAD arms drivers worldwide with hyper-roaming across networks and carriers, on-board cameras, extended battery life to cover a full day's shift, and the compute and memory horse-power to handle increasing uses of multimedia files in daily operations[6]. At UPS, technology is the enabler that drives the ability of the business to meet its vision. As the company moves into enterprise software and business process consulting, IT's positioning will be key to UPS' ability to meet tomorrow's customers' needs.

Revolution: thy name is regulation

Some are born great, some achieve greatness, some have greatness thrust upon them. In the case of a leading insurance company, growing regulatory pressures in the wake of the great recession took choice out of the matter. IT would be a crucial element in their ability to meet new compliance and control objectives, and would provide visibility into the information required to navigate the organization's new strategy. The CIO first looked to "mind the store," creating enterprise-wide investment, architecture and governance strategies, driving efficiency and shoring up their ability to handle tactical business needs. The new operating model also targeted being able to identify, prioritize and execute on business transformation opportunities, moving IT into not only a more agile and responsive unit, but also one seen as helping guide business innovation. Cloud, mobility, social and analytics solutions are strategic pillars of the vision – with the CIO and the supporting IT organization together leading the charge.

Where do you start?

Few companies consider innovation and early adoption as core competencies, and still fewer look at their CIO as an advisor for how to capitalize on industry trends and market shifts. But it is because of these factors that the need for CIO leadership is so pressing. Depending on what position they find themselves in today, the paths forward for CIOs will likely follow one of three scenarios:

- **Devolutionary CIOs.** Because of cloud and other forces, lines of business have become direct acquirers, managers and owners of information services. Core legacy systems are contained, with new spend directed at the edge. Central IT has become a custodial function focused on general care and feeding, with the occasional emergency response when things go wrong. Potential next steps include:
  - Legacy renewal: Use a platform of improving data quality, consistency and information access to promote a new perception of the types of services IT can provide.
  - Become an accelerator: Look to create rapid deployment tools to assist businesses as they investigate cloud and niche investments. Redirect criticisms of being a bottleneck by instead helping businesses understand downstream implications to decisions. Look for ways to help connect speed-to-value with big-picture integration, security and information considerations.
  - Introduce CIO operational excellence disciplines to improve "keep the lights on" efficiency, setting the stage for a potential move up-stream.
- **Evolutionary CIOs.** The IT department becomes the preferred storefront for a wide range of services; some of which are developed in-house on packaged and custom software, others procured via the open-market based on degree of fit, functionality and cost dimensions. Central IT owns integration, master data management, security and end-to-end systems management. Potential next steps include:
  - Business services: Push for broader adoption of IT Service Management disciplines, including developing a services catalog of emerging and disruptive capabilities understandable by the business.
  - Mobile and social veneers: Look to improve existing businesses and processes via mobility and social computing – opening new channels or allowing faster and cheaper operations.
  - Information focus: Foster the shift from descriptive to predictive to prescriptive analytics and information automation.
- **Revolutionary CIOs.** IT makes the market for business services, introducing technology-driven disruptions to existing businesses or opportunities for entering net-new markets. The CIO is actively incubating potential new business solutions based on technology innovation. Advanced information and analytics capabilities are built to complement traditional systems, with the CIO becoming the trusted source of hindsight, insight and foresight for the organization. Continued advances include:
  - Agility: Make rapid deployment the de-facto organizational standard, influencing everything from investment and portfolio processes and portfolio management, through conventional SDLCs and support functions.
  - Social and mobile transformation: Use of social computing and mobility technologies to enter new business models or to radically change operations – internally as well as within the marketplace.
  - Develop centers of excellence for analytics and innovation: Include ideagoras and crowd sourcing for ways to create and leverage information assets.

Bottom line

The journey to revolution begins with a solid trust of the IT organization. Innovation is impossible if the basic blocking and tackling activities aren't locked down. If the foundation of trust is there, CIOs can begin to stretch into strategist and catalyst roles. And as information fast becomes the most important strategic asset for many organizations, revolutionary CIOs will not only own the safeguarding of and access to this information, but also its quality, usage and potential for business innovation. Viva le revolution.

Endnotes

[1] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 7.

[2] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapters 7, 9, 10.

[3] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 1.

[4] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 3.

[5] Bob Evans, *Global CIO: UPS CIO Barnes Shatters Dangerous IT Stereotypes*, http://www.informationweek.com/news/global-cio/interviews/showArticle.jhtml?articleID=224200299 (March 25, 2010).

[6] Chris Murphy, *Global CIO: UPS Provides Peek Into Future Of Wireless,* http://www.informationweek.com/news/global-cio/security/showArticle.jhtml?articleID=222500027 (January 25, 2010).

5 The End of the "Death of ERP"

Rumors of ERP's death have been greatly exaggerated

Every few years we see headlines with proclamations of ERP's imminent demise. Similar to the long-rumored "death of COBOL," the noise could continue for decades. Part of the problem starts with the name *ERP* itself. In the current world, the more proper description is probably Enterprise Applications. Enterprise resource planning harkens to a time when integrated financials and payroll were first being linked to production planning and inventory controls. Over the years, however, the impact of enterprise application players like SAP and Oracle has grown substantially, well beyond automating core back-office processes. This growth was achieved first by tackling the front-office functions like customer service, sales and procurement; then by adding workflow and reporting; and finally by refactoring platforms for better integration. Throughout this evolution, the underlying problem has remained the same: allowing large, complicated organizations to profit from standardized business processes and standardized data.

Today's enterprise applications have reached a point where an end-to-end business process can take advantage of any number of native package, custom, third party or even external (e.g., business partner or cloud-based) solutions, integrated as required to meet the needs of the business. At the same time, underlying ERP services can be encapsulated and invoked by a variety of channels, moving out of the back-office or even out of the enterprise. Users can conduct transactions and access trusted enterprise data via intuitive desktop front-ends, mobile devices, social computing platforms or analytics tools[1]. And with information automation replacing process automation as the *key* enterprise concern, recent moves to provide real-time, high-quality data acquisition, analytics of large data sets and sense-making of unstructured data have become essential[2].

Even with this massive increase in scope, organizations are still able to tap ERP applications to transform processes with reduced risk – at a lower cost and at a quicker pace. Configuration has become simpler through tool and method improvements from service providers. Functionality that once required customization is now built into core products. Labor arbitrage has driven down rates for implementation skills and commoditized them. And projects can now involve more concurrent activity. In fact, the traditional ERP players continue to expand the boundaries of the problems they help businesses solve – moving into information automation, mobility and collaboration arenas. Nearly half of all organizations with ERP implementations plan to make investments to expand their capabilities in the next year[3]. Beyond all that, the fact remains that legacy ERP investments are trusted by executives, and for good reason. These systems serve at the "heart of business" operations. While future IT investments may ultimately move to the edge of the enterprise, for the foreseeable future they will continue to exist on the ERP core.

Looking ahead, many mobile, social and analytics strategies involve extending existing enterprise applications, revitalizing their business cases and enhancing the value of original investments. For organizations that have invested tens (or hundreds) of millions in automating their core businesses – and for executives who have made their careers on these projects' successes – the future is clear: ERP can be an enabler of tomorrow's innovations, not a fading footnote of yesterday's legacy.

History repeating itself?

The "death of ERP" story is in many ways a rerun – something predicted and discussed for the past 25 years. As the repeating cycle between stand-alone software offerings, integrated bundles and alternative landscapes has played out, the end of ERP was consistently rumored. Cloud computing is only the latest false alarm that the ERP sky is falling.

	What were the challenges?	What's different in 2011?
Cloud (software-as-a-service)	• Several cloud-enabled options emerged, attempting to usurp traditional on-premise, licensed ERP options. Large enterprise adoption had been mostly limited to "edge" workloads such as email, collaboration, CRM and HR. • Security, reliability and compliance concerns prevailed. Though a mix of reality and perception, they were prevalent enough to caution executives in large-scale enterprises from moving too aggressively into cloud. • Many ERP implementations were tightly integrated to legacy systems and data stores, greatly complicating migrations from existing solutions.	• Leading ERP players are rapidly developing their own multi-tenant, off-premise, subscription-based offerings – leveraging their process and functional experience as a part of green-field development. For new investments, this will bring stiff competition to SaaS solutions. For current customers, it will provide light-weight offerings for emerging geographies and small business units, integrated to the full-fledged existing solution. However, the self-cannibalization implications are not lost on these independent software vendors (ISVs). They must address and overcome this hurdle. • Enterprise application players are investing heavily in analytics, mobility, social and other "edge" capabilities – looking to grow by enabling customers to extend existing investments, not replace current functionality via new platforms and delivery channels.
Leading enterprise applications	• Investment in middleware and application server layers by ERP players to ease integration of disparate end-to-end solutions was steady. • Open extensible architecture was meant to enable a marketplace of third-party, ISV developed apps – further enriching the platform's extended value. Limited catalog, lack of supporting ecosystem and difficulties incorporating into solution landscapes led to minimal adoption.	• ERP platforms now have business process management, business rules engines and master data management embedded in their platform engines, including architectural hooks for externally sourced events. • Viability of the app marketplace has been illustrated by Salesforce.com's App Exchange, increased adoption of platform-as-a-service and the renewed investments by SAP and Oracle to curate a lasting commitment to externally-developed applications and partner ecosystems.

Technology implications

While there are many strategic enablers for ERP's ongoing importance, there are several underlying technology concerns that must be addressed.

Topic	Description
Instance rationalization	Many legacy ERP efforts were forced to implement several instances – either due to technical performance constraints such as limits around data volumes, memory and CPU capacity, or network latency for global transaction processing; language barriers (before Unicode); or risk-themed strategic hedges such as unwillingness to entrust company operations on technology's promises for recovery point/time objectives. Instance consolidation will not only lower total cost of ownership (TCO), but it will also simplify ensuing analytics, social and mobile computing efforts.
Cloud-based infrastructure-as-a-service (IaaS)	Oracle and SAP have established their enterprise applications to run on virtualized, location-independent public cloud IaaS services. While organizations may limit initial experimentation to non-production instances, this can be an excellent approach for cost reduction and agility, notably when combined with instance rationalization. As usual, a business case is required to estimate cost savings potential, notably in large enterprises that have invested in IT operational efficiency.
Technical upgrades	Leading ERP packages have seen many integration and extensibility features added in recent releases. Organizations running older versions will be adding unnecessary complexity in integrating their legacy enterprise applications with other internal and external services – building interfaces, controls and management tools via custom code that have been added to the out-of-the-box capabilities of the latest platforms.
Integration	A broad services layer is necessary to coordinate access into and out of ERP and the extended solution architecture. This is essential for handling real-time translation, correlation and enrichment services, channel-tailored message delivery (crucial for mobile, social, Web) and event handling with internal and external services, including cloud-based solutions.

Lessons from the frontlines

Unexpected value

A global materials manufacturer was enjoying the benefits of its ERP implementation – reducing its number of days of sales outstanding by 12.9%; reducing SG&A as a percentage of sales by 1.9%; steadily reducing operational costs (IT spend dropped from 3% to 1.3% of revenue); and improving executive dashboards. With many operating units, they chose strategic standardization on ERP, opting for a single process template and a common data hierarchy. Even with organizational factions pushing for a more leading-edge model, executives insisted on operating stability.

This choice proved prescient when the company was acquired years later. Because of the existing ERP footprint, they were able to quickly identify opportunities to improve tax and commission structures – adding approximately an additional $50 million per year of benefit that would not have been possible without standardized processes and data. As a bonus, the integrated entity has credited its enterprise backbone as a critical enabler of its post-merger success – one whose role is increasing once again with investments in analytics and mobility.

Trojan horse: thy name is ERP

A leading foodservice supplier required standardized business processes across its operating companies and more than 100 distribution centers. With goals of boosting efficiency, improving sales and marketing execution, and increasing visibility based on better data management and automated operations, it sounded like a standard ERP business case.

But, along with the process transformation, the company is also overhauling order processing – introducing a rich-internet-application front-end based on Adobe Flex to integrate customer and order management services into a single, intuitive view. From there, sales representatives can automatically post transactions to the ERP – even when disconnected from it. Similarly, a mobile solution is being introduced to allow real-time inventory and order management from warehouses, extending the value of the core ERP through channels that can greatly enhance productivity and customer satisfaction levels. These capabilities are being delivered along with the core ERP transformation – incremental investment for greatly enhanced return.

Where do you start?

An organization's response to the end of the "death of ERP" can depend on where they find themselves today. Many global 500 companies already have a sizable investment in one or more of the leading platforms.

For companies with existing ERP, consider starting by identifying which processes are "need to play" vs. "play to win" – and establish a clearly defined corporate strategy for how each will be enabled for the business. If you make it clear that core integrated ERP will continue to play a critical role, you'll curtail some alternative technology or cloud rumblings from the business, and you'll reinforce your commitment to crucial staff.

It also makes sense to explore "edge" investments. As discussed in the 2011 Technology Trends on Applied Mobility, User Engagement and Social Computing, there are significant innovation opportunities outside of core operations. Look to take advantage of the ERP platform's capabilities in these spaces. Or implement low-cost, smaller-footprint solutions – even if on an exploratory basis. If they are fully adopted later, you can integrate them into the ERP backbone and expose standardized data and processes to the edge.

For small business and companies in emerging geographies, it might make sense to consider relatively green-field ERP investments. These types of organizations are well-positioned to take advantage of the best of the old and the most compelling of the new.

- **Evaluate cloud-based options.** Evaluate the Software-as-a-Service (SaaS) landscape, including cloud-based products from the traditional ERP players. For example, SAP *Business OnDemand* and *Business By Design* both offer a mix of core functionality delivered with cloud-like elasticity, flexibility and scale – but with the future potential to integrate with the full suite of offerings of the flagship products. These should be considered alongside emerging SaaS products, balancing features (how much is "just enough"?) with cost, time-to-value and operational concerns.

- **Selectively innovate.** Determine which areas of the business provide important competitive differentiation and innovate there. Accept strategic standardization for the remaining operational disciplines, taking advantage of multi-tenant solutions or out-of-the-box, standard options wherever possible.

Bottom line

Far from being displaced, ERP is seeing a resurgence. SAP recently reported a 34% surge in licensing revenue at the end of 2010 to a new record, while Oracle projects license sales will increase between 10% and 20% in their current fiscal quarter[4]. And the reasons might seem conflicting. On one hand, ERP's role in enabling core transactional processes has been reinforced by the lack of disruption from cloud challengers in this space. Even the most outspoken cloud zealots predict a hybrid future with continued dependency on licensed, on-premise, enterprise applications for a sub-set of operations. Basically, they are adopting a surround strategy, with ERP remaining at the core.

On the other hand, enterprise application players continue to move up the stack and to the edge, creating complementary strategic platforms for information analytics, mobility and social. Ever-increasing scope combined with control of the building blocks for standardized processes and data will enhance their continued resiliency.
Either way, ERP is here to stay. That said, the way these enterprise applications will be used is undergoing a rapid change. Now is the time to consider revitalization of these IT investment pillars – with a focus on innovation at the point of business impact. It's about what you need to know, delivered where you need to know it, when you need it. Long live ERP.

Endnotes

[1] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 8.

[2] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 7.

[3] Don E. Sears, *IT Is Heavily Invested in ERP, Application Consolidation Rising*, http://www.eweek.com/c/a/IT-Management/IT-Is-Heavily-Invested-in-ERP-Application-Consolidation-Rising-244711/ (July 29, 2010).

[4] Ragnhild Kjetland, *SAP Software Sales Reach Record, Beat Oracle's Growth Outlook*, http://www.businessweek.com/news/2011-01-13/sap-software-sales-reach-record-beat-oracle-s-growth-outlook.html (January 13, 2011).

Disruptive Deployments

6 Real Analytics

Shifting from business hindsight to insight to foresight

In 2010, many organizations began to see information automation outweigh business process automation as their highest priority area[1]. In the reset economy, analytics offered improved visibility to drive operational efficiencies, as well as a platform for growth by addressing heart-of-the-business questions that could guide decisions, yield new insights and help predict what's next. It seemed like a no-brainer. But companies quickly discovered that the journey is complicated – requiring a clear analytics vision aligned to the business strategy, several layers of supporting capabilities and the fortitude to embed analytical thinking across multiple facets of the organization. In 2011, leading organizations are launching broad initiatives with executive-level sponsorship, ready and eager to achieve their vision via real analytics.

Data volumes continue to explode, doubling every 14 months[2]. Regulators are demanding deeper insight into risk, exposure and public responsiveness. Public and private organizations alike are feeling increased pressure to achieve profitable growth. New signals are evolving that contain crucial information about companies and markets – including sensor-laden assets, unstructured internal data and external sentiments shared via social computing[3]. Cisco estimates that the amount of data flowing over the internet each year will reach 667 exabytes by 2013[4]. The magnitude and complexity of global businesses have made it even more difficult for leaders to uncover hidden insight.

The crunchy questions haunting the business require a combination of hindsight, foresight and insight. By investing in a balance of information management, performance management and advanced analytics, organizations can make small steps, smartly made to capture measurable results. These can span from improving fragmented customer relationships by analyzing omni-channel interactions, to providing an integrated enterprise view of risk and finance. This is the essence of real analytics: delivering business value through the continuous build-out of core information disciplines.

While getting the right answers is critical, many organizations don't normally know the right questions to ask to get there. Powerful new tools and supporting infrastructure have removed most technical constraints, but analytics initiatives continue to suffer from the lack of a clear vision and commitment to embed analytics-based approaches into how work is performed. Real analytics can add knowledge, fact-based predictions and business prescriptions – but only if applied to the right problems, and only if the resulting insight is pushed into action.

You can't drive your car with only the rear view mirror – equivalent to historical reporting. You use the view out of the windshield and the dashboard gauges – Enterprise Performance Management (EPM) and performance dashboards. In fact, many drivers take advantage of navigation systems fed by GPS to see the road ahead and direct the next turns. That's like going from descriptive analytics to predictive and prescriptive. That's moving from hindsight to insight to foresight for the business.

History repeating itself?

Over the past two decades, companies have invested heavily in back-office systems to automate their business processes. Information investments were typically siloed, static, historical and focused only on operational reporting for pockets of the business. Real analytics is focused on a more holistic, forward-looking approach, positioning information as an asset to support effective business decision and action.

	What were the challenges?	What's different in 2011?
ERP-based information repositories	• Large-scale packaged technologies form the foundation of many organizations' system footprints. Embedded reporting and performance management tools were leveraged to try to meet information needs. However, solutions were mostly backwards-looking, with minimal real-time dashboarding and limited advanced analytics. • Most organizations have a hybrid application landscape, with multiple ERP instances and tens or hundreds of ancillary systems that execute end-to-end business processes. Visibility confined to the ERP transactional store was insufficient for true business insight, but integration to other systems was costly and complex.	• ERP providers have invested in adding information platforms to their solution sets, including performance management and some advanced analytics tools. These are largely integrated into the core process automation solutions. • Integration between internal and external systems has been eased by adoption of open architecture standards and advancements in transactional and view-based integration tools.
Business intelligence/ reporting/data warehousing	• Performance improvement has been a critical part of the real analytics journey, but it is not sufficient because it lacks vehicles to guide insight and foresight. • Organizations often faced multiple isolated, competing initiatives buried within business units, functions and geographies – creating confusion and multiple versions of the truth. • Results of information efforts were only loosely linked to operations and decision making, limiting the amount of value realized. • Technical constraints forced the segmentation of information repositories into discrete, federated views. Complex operations, integrated views or even traversing of data sets were compromised. • Analysis was characterized by small datasets with variables between 10-20 and limited cases (<100), driven by unrealistic assumptions that datasets were linear, normal and independent. Data universes were restricted to static data snapshots interred by a handful of tools (e.g., SQL, SAS).	• Leading organizations have adopted a combination of performance improvement, information management and advanced analytics to meet the needs of the business. • Enterprise-wide governance is a critical dimension of real analytics, allowing for visibility across and beyond organizational boundaries. • Real analytics efforts are embedded in business processes with executive and management support, with continuous feedback loops so that actual performance can guide the next iteration of analysis. • A combination of improvement in storage, processing and network performance, as well as advanced new options for dealing with complex calculations on large data sets (e.g., high-performance information appliances, column-based in-memory databases, distributed computing tailored for data processing). For example, a large consumer credit card issuer recently analyzed two years of data (73 billion transactions across 36 terabytes of data) in 13 minutes. In the past this transaction would have taken more than one month[5]. • Analysis now routinely handles massive datasets with millions of variables and billions of cases, increasingly in real time. Tools such as PMML, DMQL, SPSS and DMX allow the focus to be on exploratory analysis to discover relevant patterns, trends and anomalies in data, without having an explicit goal in mind.

Technology implications

Real analytics represents a combination of information management, performance improvement and advanced analytics. Each of these capabilities has a number of critical underlying technical implications, with interdependencies requiring an enterprise information architecture spanning the entire stack.

Topic	Description
Information management	Tools for establishing trusted foundational data are essential. These include master data management for maintaining data correlation, consistency of semantic meaning, providing matching services to identify and link identical entities and enabling bidirectional updates across systems of record. Data quality is also a concern, requiring tools to monitor, analyze, report and scrub. Finally, tools to manage data governance are needed, and should be tightly linked with master data and data quality solutions.
Performance improvement	This drives to the heart of monitoring, reporting and recommending action by combining historical reporting, business intelligence and dashboards. Technical implications include report design, business rule development, business process integration and the development of dashboards and scorecards. Increasingly, performance management solutions also include mobile delivery channels, either through Web-based outputs or dedicated applications[6].
Advanced analytics	Advanced analytic tools enable predictive modeling, embedding analytics into business processes, discovery and information visualization[7]. This work typically involves advanced statistical modeling and correlation of widely disparate data sets, requiring access to internal and external data.
Infrastructure	Complex analysis on large data sets requires a high performance computing environment. Options in 2011 include on-premise appliances, in-memory column-based databases and cloud-based options for elasticity and distributed processing.

Lessons from the frontlines

Shining a light on addressable markets

While a specialty insurer's sales were growing 20 percent annually with 80 percent customer retention, the company had captured only six percent of the annual potential in its market. In order to grow the business, the company wanted to better understand its customer base with the goals to improve retention among current policyholders using targeted communication and cross-selling, as well as identify potential new customer segments that were more likely to purchase its policies.

To supplement what the insurer already knew about its customers, third-party market segment information (biographic, demographic, psychographic), enhanced census and other external data were used to append nearly 300,000 policies and 150,000 customers. Cluster analysis was used to identify primary customer groupings and segments, and, finally, decision tree analysis was completed to differentiate those segments that produced the highest value for the company. They added a market penetration study to compare existing and potential market share by segment.

For the first time, the insurer had a unified view of its customer bases as well as insights on customer behavior, preferences and lifestyles – all useful in creating new up-sell, cross-sell and retention strategies and focusing growth on specific consumer segments and regions. As a result, the company was able to increase product purchase loyalty and growth among key customer segments and attained measurable improvements, including migrating core segments to higher profitability.

Advanced auto(motive) analytics

By replacing manual, rule-based warranty claim reviews with scientific, automated methods, an automaker significantly improved its warranty claims adjudication process with the ability to preemptively identify potentially false or inappropriate (improper, exaggerated, embellished) claims. The legacy warranty claims adjudication process relied heavily on manual reviews, exception reports and static rules. The automaker needed a more scientific approach to adjudication that could help it identify potentially fraudulent or false activity in a more efficient, automated manner and also enhance its rule set with more sophisticated statistically grounded rules that are too complex for manual processes.

They first analyzed over 16 million claims and merged data from multiple sources which had never been harmonized – both within the company and from external business credit and "firmographic" sources. Then, using advanced modeling techniques such as decision trees, association rules, logistic regression and Benford's analysis, the company developed five sets of new rules capable of identifying potentially false or inappropriate claims. The organization added the new rules to their existing process in order to improve both the accuracy of its warranty claim reviews and the return on investment from the operation. The post-analysis predictive benefits were more than three times larger than initial expectations. Also, as an unexpected benefit, the company was able to create a list of pre-approved labor operations and parts for a given repair according to specific make, model and year – drastically reducing the need for reviewing and interpreting every claim.

Delivering on the premium

A leading insurance provider saw its core business being pushed to deliver more personalized services at lower costs – while facing increased transparency for demands, growing commoditization of its product offerings and overall slowing industry growth. Their response? A multi-year analytics program to increase sales effectiveness and operational efficiency, increase customer retention and better support executive decision making. Predictive modeling driven by online, agent and customer feedback was the cornerstone of the effort – with a core analytics competency center built to support needs across business units. The results speak for themselves: improved policy retention by 300 basis points, increased acquisition rates on abandoned quotes by 200 basis points and advances in customer satisfaction rates.

Where do you start?

Few organizations are starting from scratch when it comes to real analytics. Many organizations have decades of experience with information-related initiatives in various forms. Because of its wide scope, however, real analytics initiatives require special attention to dependencies on in-flight efforts. While specific steps vary company by company, some fundamental principles apply:

- **Crunchy questions.** Start by laying out specific, heart-of-the-business questions. Prime your business leaders with ideas from other industries showcasing how unstructured and external data can be applied in practical terms. Then prioritize according to what drives value, where returns will likely be higher and the degree to which results can be made actionable.

- **Start where you are.** Assess your current capabilities and get a clear picture of the gap between what your organization *can* do and what it *needs* to do. Think in terms of both technical capabilities and organizational depth. Grade yourself, prioritize projects aligned to crunchy questions and fill the cracks – both with small, focused efforts and with some cross-functional investments (e.g., enterprise data management).

- **Right fit analytics.** Match statistical models and analytics techniques to the job at hand. Overpowered solutions waste time and money. Underpowered solutions can miss important insights. Buy what you need and use what you buy – across tools and services.

- **Accelerate insights.** Automate delivery of the information people need to do their work and automate responses whenever possible, so that action is taken with more certainty and at the lowest possible cost.

- **Behavior change.** Recognize that a big part of the impact of real analytics will be creating a fact-based culture that embraces its repercussions, allowing analytics capabilities and outputs to be embedded into operational processes across the enterprise and up and down the organization.

- **New talent**. Institutionalizing real analytics will require new skills, including pockets of creative design, deep mathematics, statistics and behavioral change skills. Develop a strategy for how to locate it, develop it and retain it.

Bottom line

Complexity is growing, providing organizations with more data to manage, more decisions to make and less overall certainty. Some business problems are like puzzles, with pieces dispersed across internal and external players, captured in structured and unstructured forms. Competitive advantage will come from winning the race for clarity and precision, and from building the institutional skills to quickly solve the next puzzle that crosses your executives' desks. Other business problems are mysteries, where the clues may or may not be within your grasp. These require empowered leaders who understand the business issue, who can work with specialized resources to model the problem and who have the analysis tools to recognize and act on patterns that might lead to the solution.

Puzzles and mysteries are the purview of real analytics. Both start with a clear understanding of the business problem and a commitment to make the answer actionable once it is clear. Though the magic that happens in between is anything but simple, these two steps are the biggest factors to achieve effective results. Look in the mirror, state your intent for making analytics real, and start digging up your crunchiest questions.

Endnotes

[1] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 7.

[2] InfoNIAC.com. 487 *Billion Gigabytes of Digital Content Today to Double Every 18 Months*. Retrieved February 3, 2011, from http://www.infoniac.com/hi-tech/digital-content-today-to-double-every-18-months.html

[3] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 11.

[4] The Economist. "Data, Data Everywhere." Economist [Online]. February 25, 2011. http://www.economist.com/node/15557443

[5] The Economist. "A Different Game." Economist [Online]. February 25, 2011. http://www.economist.com/node/15557465

[6] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 9.

[7] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 1.

7 Social Computing

Social computing – not just media, collaboration or social networking – it's a new fundamental for enterprise IT

The rise of social computing in the enterprise is in some ways a return to the business landscape of Frank Capra's and Norman Rockwell's time – where business was local, corporations lived within a single office, and market value could be pegged by the sentiments on Main Street or at the water cooler. But as global business continues to accelerate, determining "who knows what" is becoming a challenge.

Today, the voice of the Internet masses is emerging as a source of consumer sentiment, often trumping corporate-controlled messaging delivered through stores, sales personnel and other traditional channels. Employees are finding better ways to get their jobs done – including tapping experienced people not on the payroll, often through consumer-focused technologies. While this may be alarming for many executives, the new world of transparency, knowledge flows and democratized opinion-making is rife with opportunities.

Social computing is the embodiment of these concepts, built on platforms that enable "tribes" to communicate, collaborate and conduct business. Tribes are collections of interested or affected stakeholders, formed around shared passions, pains or common traits[1]. The ability to monitor and even participate in their discussions is now common for businesses large and small.

As more of our personal and professional lives are conducted via technology, we are leaving rich trails of our preferences, opinions and behaviors. Beyond the immediate benefits of empowering stake-holders, this "digital exhaust" left in the wake of social computing today can and should be mined, providing a rich source of insight on market positioning, consumer sentiment and employee productivity. By applying search, pattern matching and sophisticated analytics to these structured and unstructured reservoirs of social data, organizations can position themselves to better understand their customers' perceptions, their employees' experiences and the problems that should be demanding corporate attention. In 2011, enterprises are taking notice.

Many early social computing experiments were either tool-based (*"We need to be on Facebook and Twitter"*) or broad, generic investments (*"We need a corporate blog"*). Now, leading companies are taking a results-centric and business-led approach, focusing on specific issues and tribes, soliciting membership and creating platforms for content, collaboration and transactional support. Public social channels are being mined in parallel, establishing visibility into external sentiment, even as internally-focused social computing initiatives are pursued. The supporting governance and underlying technologies are important enablers.

To avoid being left behind, purposeful investments are becoming commonplace, with existing processes and hierarchies being mindfully shaped to accommodate the dynamic pace of change and the importance of individual voices in our modern, hyper-social landscape.

History repeating itself?

While the social computing moniker is a relatively recent development, sociological and psychological studies on relationships between individuals, group behavior and their impacts on business have been around for nearly a century. Decades of IT advances have been rooted in improved productivity and collaboration – enabling communications, automating interactions and allowing discovery and sharing. The difference today is in the near-universal connectedness of the potential tribal population, vastly improved access to tools[2], and the usability of the platforms[3].

	What were the challenges?	What's different in 2011?
Collaboration suites	• Productivity and collaboration suites were often segmented according to internal trust zones, hampering internal sharing and discouraging (or intentionally preventing) the inclusion of external parties • Tool-centric approaches to discussion boards, wikis, blogs etc. were typically spearheaded by IT. Once built, the business often didn't know what to do with the platforms. • Siloed solutions were created, with separate tools for messaging, email, document sharing, content management, etc. Users who adopted early were rarely able to connect the individual pieces.	• New social computing platforms are either built on public offerings or have been designed with an "outside-in" mindset, recognizing upfront that external contributors are an important aspect of strategy. • Initiatives are being launched with focused intent, and adoption is often driven by the business. • Integrated tool sets like Microsoft's SharePoint 2010, IBM's Social Me and Salesforce.com's Chatter are designed to provide the necessary connections between disciplines.
Social networking	• Historically, isolated, data-constrained studies focused on anecdotal behavioral details and intelligent sampling of the community. • Understanding how network ties affect organizational norms was useful to many companies, but the lack of tools to leverage existing networks or shape new ones limited subsequent actions. • Fragmented communities and supporting online tools resulted in niche networks with diluted market share.	• Social network analysis is the formal science of individual and organizational nodes, relationships, and their applications to society, politics and economics. • Improvements in computing resources and analytical tools allows for real-time modeling of behavior across the entire network – leading to better understanding and the ability to explore and manipulate data. • Advances in mobile technology and services from the cloud allow networks to communicate and collaborate, enable transactions, and quickly form, scale and evolve. • Leading social networking sites have seen continued growth – in both number of users and frequency of usage. By the end of 2010, Facebook is estimated at well over 500 million users, with users spending more than 700 billion minutes on the site each month[4]. LinkedIn claims 90 million registered users, with 65 million unique visitors to its site each month[5]. Twitter has over 200 million registered accounts, with over 110 million tweets a day[6]. And enterprise-focused platforms are seeing rapid growth – from Yammer's presence in 80% of the Fortune 500[7] or Chatter's presence in over 77% of Salesforce.com customers[8].
Social media	• Social computing has often been relegated to *social media*, with YouTube, Flickr, and SecondLife as examples. The consumer-heavy nature of these early sites limited corporate interest beyond marketing and recruiting activities. • By focusing on the "media" of the delivery channel, companies found it difficult to support business transactions or to disseminate information that was either non-consumer facing, or consumer-facing without entertainment value.	• Video, pictures, and electronic documents have emerged as essential corporate communication tools, such as advertisements, training manuals, product catalogs, or vehicles for collaboration. • The shift to digital content created via disintermediated channels represents a crucial element of social computing today. Most platforms include "social media" support (sharing pictures, videos, etc.) as only one dimension of the community.

Technology implications

Social computing requires tools to help identify and discover knowledge, facilitate cross-boundary communication, harness distributed knowledge and discover patterns of emerging opportunities. Choices between public cloud-based options, extending internal collaboration environments or standing up new dedicated social computing solutions are driven by overall vision, intended usage and the trade-off of cost, time and control among the options.

Topic	Description
Security, privacy and compliance	Beyond identity and access management, controls are required to protect high-value intellectual property or other sensitive data. In addition, entitlements to underlying transactions, information stores and private profile data must be enforced. Finally, implications of aggregating, processing and holding publically available information must be understood so legal and regulatory guidelines are not inadvertently violated.
Blogs, micro-blogs, wikis and discussion board platforms	Most companies have marginal knowledge and content management capabilities. Those that exist are typically asset repositories – connecting interested parties to deliverables, not to insights or sources of experience. Blogs, wikis and discussion boards promote *dialogue* and *interaction* in ways that are persistent, searchable and able to be sustained via crowd-sourcing and moderators. Instances can be established via dedicated hosted in-house tools, through virtual private instances of public tools, or even over the public internet.
Legacy integration	Social computing solutions will likely require integration to existing email, instant messaging, knowledge management and content management solutions – and potentially require access to transactional applications and information systems. A combination of data, service and event-based integration capabilities are often needed, including mechanisms for interacting with externally-hosted platforms (especially cloud-based integration).
Analytics	Mining and reporting on large transaction volumes of internal and external social activity require broad data and performance management layers. Many organizations will invest in higher-order analytics to perform sentiment analysis and sophisticated predictive or prescriptive behavioral models.
Mobile solutions	Extending the reach of social computing to phones, tablets and other devices (like car entertainment systems, living room televisions and appliances) aids in adoption and usability – and allows location-based services to be added to social capabilities. Device management, mobile development platforms and mobile data management capabilities are required to support mobile channels[9].

Lessons from the frontlines

Developers unite

The SAP Developer Network (SDN) has grown from a modest experiment to a frequently-cited example of social computing in an enterprise setting. SAP created an ecosystem of discussion forums, wikis, videos and blogs which empower customers, systems integrators, employees and third-party vendors to access a broad network of passionate, knowledgeable, experienced people. While originally launched to support a new product suite, SDN was extended to many facets of the SAP solution portfolio. Today, SDN has more than 1.3 million participants contributing to more than one million separate conversations[10]. Responders are rated and rewarded for their activities, with points awarded to acknowledge frequent contributors and established contributors for specific topics. Since its launch in 2003, SDN has grown steadily. It now features Twitter feeds, a Facebook page, LinkedIn connections and ties to Foursquare in conjunction with user conferences and other events.

In addition to promoting customer satisfaction levels and engaging with its ecosystem of developers and implementers, SAP has used this platform to understand product issues, identify features for future releases and gain a clearer view of adoption patterns than traditional research could ever provide. SDN has become *the* primary channel for user queries, allowing customer services and sales support channels to off-load simple, routine questions and focus on the really complex problems.

Drinking our own Kool-Aid

As a part of a global network of member firms with access to over 169,000 practitioners in 140 countries, Deloitte thrives on the quality of its people and their experiences. To improve our responsiveness to market opportunities and customer requests, nurture cross-functional innovation and foster communities across geographies and business units, Deloitte launched a series of internal social computing initiatives[11]. Building from existing social networking, collaboration and knowledge management tools, the effort established support for multiple tiers of communities, content and channels, including mobile devices. With 100 thriving communities, this investment has enabled dozens of project teams to better serve their clients and has increased employee engagement to record levels.

Brewery buzz

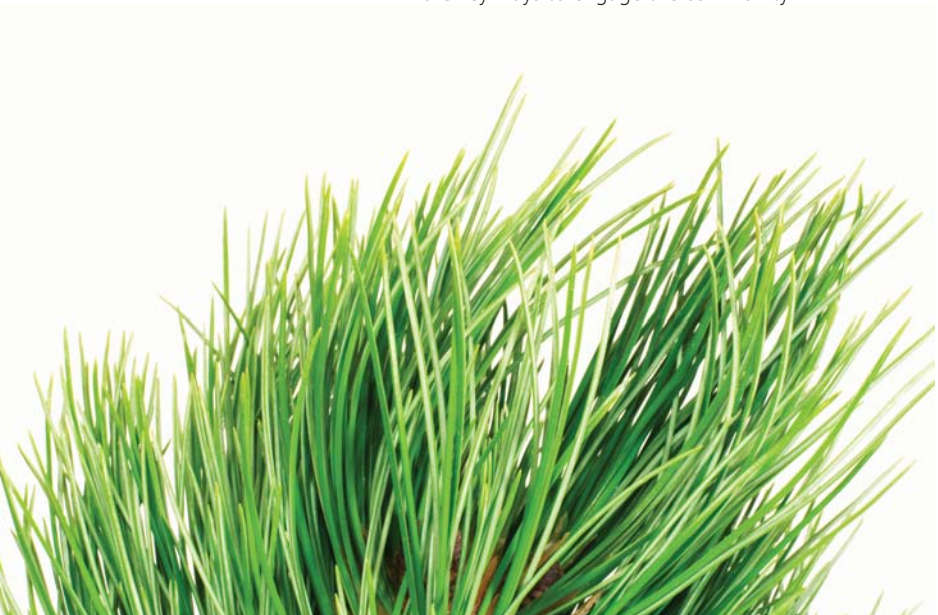
A global food and beverage company had a strategic imperative to shift its culture toward nurturing collaboration, engaging talent and driving adoption of leading practices across their federated organization. They launched a multi-pronged social computing effort, with an internal ideagora launched for product and service innovation. A fully-integrated platform followed to allow for collaborative project and portfolio management, video, voice, team sites, wikis and blogs – with links across, and to relevant external profiles (public Facebook, Twitter, LinkedIn accounts). Executives were shocked at the adoption path and the sizable reduction in email, number of innovation ideas submitted (100+) and the marked increase in online community activities.

Where do you start?

First and foremost, social computing requires a purposeful scope and good old-fashioned business objectives. If externally targeted, are you looking to reward loyalty? To find potential customers? Your goals should be very specific, defining which geographies, products or customer groups are of interest, and which metrics will be most useful to gauge success. If your efforts are internally focused, is the goal to improve product innovation and commercialization? To tap experienced resources and share knowledge across boundaries? Again, it's important to be specific and align your efforts with tangible, measurable and attributable goals.

- **Discover your network.** Recognize that social networks can actively influence the direction of the company, both inside and outside of the organization. Some influences are by desire and by design. Many have likely emerged organically. Understand these networks and identify the tribes well-positioned to help solve the articulated problem or to address the defined opportunity.

- **Identify social values.** Organizations need to separate the tribe concept from market segmentations and the company, product and service orientation of traditional sales and marketing. Depending on a tribe's focus and intent, members may go beyond employees to include customers, vendors, the general public and even competitors. Meaningful content, eased methods for undertaking transactions and a vehicle for open, transparent interactions based on the tribe's interests are key ways to engage the community.



- **Don't forget Human 1.0 factors[12].** The social computing relationship must be compelling for the individuals participating, with company objectives put in the background. If your initiatives are seen as vehicles for corporate communications or as an overt sales or productivity channel, the community will quickly be abandoned. This is especially true when interacting with tribal leaders. Direct attempts to influence or manipulate are not recommended. By genuinely forging relationships and finding ways to interact with these leaders, you'll be more likely to advance the organization's cause.

- **Social guidelines and policies.** Risk-intelligent governance is an important part of an evolving social computing strategy. That said, don't over-engineer from the start. Start small. Keep policies simple. Align with the existing organization structure. Use what is feasible within the tools to guide requirements. Learn from early, controlled successes and tailor your approach based on user feedback while also continually evolving with growing capabilities. But don't forget training. Many users have developed habits through their personal forays into social computing. Defining policies and governance is important, but just as importantly, build these guidelines into your employees' muscle memories.

- **Solution roadmap.** Tools will play a meaningful role in realizing the social computing vision. Decisions on social software platforms and consumption models (public, private, virtual private) should be balanced between the desire to increase the social network's critical mass, and the trade-offs as privacy and trust zones are crossed.

Bottom Line

Social computing is not a fad. And it's not something to be dismissed as a youthful or consumer oriented hobby. Organizations are increasingly dependent on dynamic ecosystems and rapid innovation – the former being a prime use case for social computing; the latter being one of many possible outcomes. Even for less lofty goals such as sales or productivity improvements, social computing can help your employees, customers, partners and prospects connect.

And connecting with stakeholders is always a priority. Because the fact is, people critical to the success of your business will continue to interact – whether or not you are aware, and with or without your consent. Fostering those relationships can yield tangible business benefits, while also providing insight on consumer sentiment, employee skills and market perceptions. Welcome to the hyper-social organization of the future.

Endnotes

[1] Francois Gossieaux and Ed Moran, *The Hyper-Social Organization* (McGraw-Hill, 2010), 21.

[2] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 9.

[3] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 8.

[4] Visit http://www.facebook.com/press/info.php?statistics

[5] Michael J. De La Merced and Evelyn M. Rusli, *LinkedIn Files Papers to Go Public*, http://dealbook.nytimes.com/2011/01/27/linkedin-files-to-go-public/?ref=business (January 27, 2011).

[6] Reed, Frank. *Twitter Reports 200 Million Accounts. So What?* Retrieved February 4, 2011, from http://www.marketingpilgrim.com/2011/01/twitter-reports-200-million-accounts-so-what.html

[7] Van Grove, Jennifer. *How Yammer Won 80% of the Fortune 500,* Retrieved February 4, 2011 from http://mashable.com/2010/10/22/yammer-growth/

[8] Doug Henschen, *Salesforce.com Acquisition Feeds Chatter,* http://www.informationweek.com/news/software/enterprise_apps/showArticle.jhtml?articleID=229000326 (January 7, 2011).

[9] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 9.

[10] John Hagel III, John Seely Brown, and Lang Davidson, *The Power of Pull* (Basic Books, 2010).

[11] Gartner, Inc. "Evolving employee social networks to support strategic communities at Deloitte (RAS Core Research Note G00200409)", Nikos Drakos, September 2010.

[12] Francois Gossieaux and Ed Moran, *The Hyper-Social Organization* (McGraw-Hill, 2010).

8 User Engagement

Empowering business by focusing from the "user down," not the "system up"

Software engineering has typically emphasized technical architectural "-ilities" – reliability, scalability, security, maintainability and flexibility. At the same time, low expectations were set for the other "-ilities" – namely, "usability" or employee interactions with enterprise technologies. While people grumbled about the systems they relied on for daily tasks, there were few examples of any better systems, and little impetus for corporate solution developers to implement change.

Fast-forward to today's knowledge workers who are dependent on an average of six systems to do their jobs and little tolerance for difficulty with them[1]. For these workers, the rise of consumer and Internet technologies has raised expectations for IT tools at work. Bing, Wikipedia, Facebook and Google Mail have defined experiences for search, knowledge management, collaboration and productivity. eCommerce strategies have become table stakes. And the rise of a technology-savvy workforce represents an opportunity to empower employees to find new insights, to continuously improve how business occurs, to engage customers to grow revenue and to build your brand at customer touchpoints.

Seizing these opportunities requires solutions designed with user engagement in mind, and a focus on users and roles that brings together whatever resources an individual needs to perform their work. *Usability* becomes a cornerstone of design, represented by:

- **Intuitiveness.** Simple, easy-to-understand, following consumer-design conventions for layout and flow. Atomic tasking design, bringing just enough automation with exactly the information and actions relevant to the task at hand. Similar to how Apple justified not including an instruction manual with the iPad, "You already know how to use it."
- **Interoperability.** Tasks and business processes usually require transactions performed across many systems. User engagement looks to build solutions that systematically handle end-to-end integration, instead of forcing users to alt-tab between disparate applications on their desktops.
- **Aggregation.** Related to interoperability, the ability to correlate and expose relationships in information (internal and external, structured and unstructured) can allow users to expedite tasks and engage in higher-order reasoning around the business problem.
- **Portability.** This requires creating a seamless, controlled experience for employees to perform business tasks on their second and third screens (mobile devices, home PCs and televisions)[2].
- **Outside-in.** Proactively designing solutions with the expectation of collaborating with external resources – systems, information, individuals – instead of assuming the transaction will take place within company walls[3].

User engagement can enable productivity gains, but that's not the only goal. Effectiveness and empowerment are even more important, allowing stakeholders to make better use of an organization's information assets. New working styles and operating models can be realized based on streams of information, actions and communication, instead of siloed systems and data. This is about engaging users by allowing them to execute their roles with the organization on *their* terms.

History repeating itself?

The science of human computer interaction emerged in the 1970s. Principles of user engagement have evolved from then to today's sky-high levels.

	What were the challenges?	What's different in 2011?
User experience (UX)	• Science of improving practical aspects of system interaction (utility, ease of use) with creative and emotional aspects of the experience proved useful, but fell into a niche – notably around Web design. • Many organizations do not have requisite skills in-house (creative minds, psychology backgrounds, design tool proficiency), forcing the use of expensive external resources. • Design was limited by the predominant input/output techniques – QWERTY, mice and immobile displays.	• UX concepts are being applied much more broadly to back-end legacy systems, mobile applications, cloud solutions, collaboration tools, social plug-ins and more. • Design standards and frameworks (e.g., MeeGo User Engagement Framework project, iOS Human Interaction Guidelines) have democratized some of the science of user engagement. • Multi-touch screens, still/video cameras, natural user interface (UI) (gestures, voice) and embedded gyroscopes and accelerometers offer new input/output (I/O) possibilities.
Web sites, Web front-ends and Rich Internet Apps (RIAs)	• Solution design was data-driven or focused on computing efficiency vs. user effectiveness.	• Technologies, tools and methods allow greater abstraction of the solution design away from the computing dependencies and toward usage patterns.
Portals	• Portals and "screen scrapers" attempted to provide a single unified user interface, but integration with back-end systems and information repositories proved costly and complex. If incorporated at all, scope was typically a slightly polished view of the legacy user interface, isolated from the rest of the portal experience. • Features were largely focused on personalization – improving look and feel through page layout and display options, but not improving content or behavior. Without rules or workflow engines, users were left performing the same inefficient tasks, just through a new front-end.	• Integration, master data management and process orchestration have become core disciplines for user engagement – moving beyond experience to influence how work actually is accomplished. • Between advances in development frameworks (e.g., HTML5, AJAX, Microsoft Silverlight, Adobe Flex) and a general shift toward open architecture standards, there have been dramatic advances in the ability to create mash-ups and composite applications, as well as to re-envision how applications are presented, data is visualized, and transactions are enabled. • Engines for business rules and workflow have been added to user engagement solutions, allowing management of routing and escalation logic and tasks.

Technology implications

Though rooted in the psychology of human-computer interface, user experience and ergonomic theory, sophisticated user engagement solutions require deep technology elements to realize the vision – especially the shift from passive look-and-feel improvements to fundamentally supporting how work is performed.

Topic	Description
Integration services	User engagement's impact is predicated on seamlessly tapping into systems and information stores to assemble whatever resources are needed for users to perform their roles. This requires linkage between existing enterprise integration buses, UI-platform connectivity (which may be a standalone solution such as mobile front-ends) and cloud-based integration suites. This represents a general shift from data and service-driven interfaces to event-driven integration.
Data management services	These are tactically important for performing translations, enrichments and "lazy loading" to improve UI-platform performance. And they are strategically critical in managing context and correlation, applying logic to enrich transactions with business rules, orchestration and workflow hooks to model user behavior and role-based needs.
Business rules engine, orchestration and workflows	These provide the veneer of usability and intuitiveness, and are powered by complex tools managing the link between individual tasks and long-running, multi-step, end-to-end business processes. It is important to go beyond greater simplicity and encapsulate other factors such as ease of interpretation and navigation based on unambiguous business terms, clarity and consistency of business rules and hierarchical linkage from tasks to higher-level processes[4].
UI platforms	UI platforms enable the creation of rich user interfaces featuring dynamic content updates, animated navigation, video and graphics comparable to consumer-grade options. This requires experience in tools such as Adobe AIR/Flex, Silverlight, HTML5 and JavaFX.
User experience	Creative design of layout, flow and interaction patterns add value, whether applied to packaged technology front-ends, custom systems, mobile applications or traditional functions such as site design and marketing. Technical requirements include skills for page-flow rendering, wire-framing and rapid prototyping. This isn't limited to Web site graphic and widget design. There are important lessons to learn from diverse sources such as the surge in mobility apps and the practicalities of shop-floor design and time-and-motion studies.
Commerce tools	In revenue-driving business models, commerce platforms provide everything from the nuts of bolts of catalogs and order management, to the advanced decisioning engines that drive recommendations and offers based on algorithms that can maximize margins or sales. Other tools plug in around this to provide the analytics needed to track a user's path from initial entry point through the mobile or online experience to a transaction that may happen via call center.

Lessons from the frontlines

Putting the service back in call centers

A leading consumer business company found its customer service confounded by internal complexities. Multiple acquisitions had led to solutions siloed by geography and product line, and years of decentralized upkeep had led to divergent customer service representative (CSR) platforms across call centers. One main constant was industry-lagging benchmarks on call resolution and customer satisfaction.

Enter user engagement solutions. Using CRM transformation as a Trojan horse, the organization decided to enhance the CSR desktop experience and replace the use of four legacy order management systems, three legacy customer management systems, a stand-alone computer telephony integration (CTI) application, a centralized customer service log and various Web-based content repositories.

The solution was a single Adobe AIR-based application tailored to how CSRs actually perform their daily jobs. Calls, texts or emails are now more easily answered, held or transferred. New tickets automatically pull customer history, default geography, product preferences, pre-load on-screen catalogs and recent service logs, with links to previous orders that might serve as templates. Call diaries are automatically updated based on CSR actions, canceling post-call free-text entries. The nine back-end systems are programmatically updated, replacing legacy manual entry for order maintenance, customer updates or other services. Agent productivity has increased 66%, with calls requiring an average of 60% fewer clicks to closure. Because the app is deployable via virtualized desktops or through Web channels, it is causing a fundamental shift in call center and CSR user engagement strategy.

Powering the plant

A major utility company's multi-year ERP went live, but productivity suffered beyond expected traditional ramp-up. The majority of the 2,500 users were non-technical workers who uniformly struggled with the new user interface. Specific business processes were operating at only two-thirds of expected efficiency, with training results significantly lacking.

Focusing on user engagement, the organization invested in a new front-end to simplify processing and improve visibility of the underlying ERP transactions and data. Transactions were simplified from 17 clicks on three screens, to five clicks on one screen. Relevant reports were pre-loaded to guide decisions. And a commercial Website was used as the model to promote intuitiveness and usability.

The results were astounding. The at-risk business process performance jumped to 300% of its goal. Training was overhauled, removing formal classroom components. Using only computer-based instruction, first-time completion rate for training increased from 27% to 98%, with a fraction of the original lost productivity. The power facility rating was no longer at-risk due to compliance issues. What's more, executive perceptions of the ERP investment completely shifted – with a better-than-expected ROI and net-positive feedback from the field.

The "e" in eCommerce is for engagement

A leading life sciences manufacturer was looking to extend products and services into new markets and package them as more compelling solutions, targeted especially toward under-served, non-institutional customers. With operations in more than 50 countries, dozens of back-end systems requiring integration and peak transaction rates of over 20 hits per second, the technical complexity of their environment was a main challenge.

After interviewing specific customers, the company was able to understand what worked well today and why. More importantly, they investigated the failings of their existing services and blue-sky wish-lists of enhancements. While receiving industry awards and accolades (including "top 5% in user experience") was a nice bonus, the business results were the real reward: a 300% increase in external channel revenue and a 150% increase in internal order growth, with reduced sales and service support costs.

Where do you start?

Clarity from the start is a must. First identify who your stakeholders are - those who will be most impacted by improving engagement with each class of users.

Internal-facing efforts typically strive for increasing ease of use, improving efficiencies and accelerating adoption. External-facing initiatives are usually aligned with priority business metrics – building brand, driving revenue growth, increasing profitability. Once the goals are established, user engagement, not surprisingly, starts with *users* – understanding their roles, their relationship with the business and how they interact with the organization.

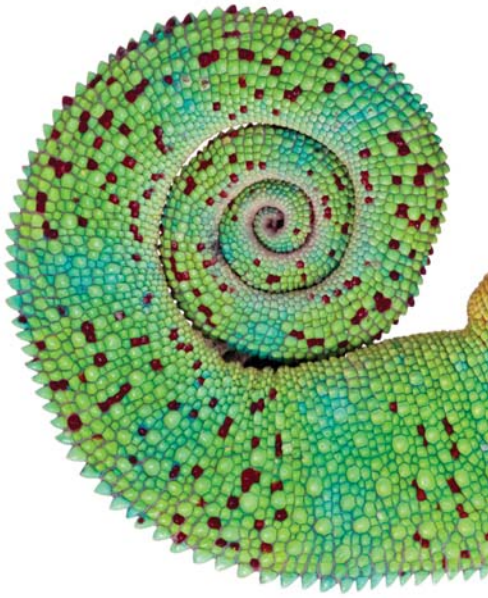
- **Persona, persona, persona.** Meticulously understanding the role of the targeted user is the first step. Whether focused on internal or external users, the organization must know how they operate, with whom they interact and how they engage with the business. Demystifying the key-stroke and mouse-click details of how they do their jobs (internally) or purchase/service goods (externally) is a necessary first step to envision a new way forward.

- **Roles and services.** Decoupling *how* stakeholders interact with *what* they are doing is the next step. Individuals likely play multiple roles in their various dealings with the organization. For some, the way things have historically been done may not only be good enough; it may the preferred way. The success of any user engagement initiative will come down to determining the subset of roles and services where user potential hasn't been met. This could be due to a lack of solutions, information and business process silos, too much complexity based on IT-centric engineering or dated systems with old-fashioned approaches to usability.

- **"User down" role-based vision.** With stakeholders identified and scope in hand, often the most difficult challenge involves creating a vision for users based on how they *should* be engaged to perform their roles. Existing business processes and systems should be understood to frame the answer, but should not constrain re-imagining what a stakeholder's role could look like. Blue-sky brainstorming requires carefully tapping user communities and benchmarking across industries, functions and process areas to solicit divergent thinking. The downside risk to asking what they want is potentially setting expectations that might not be deliverable.

- **Rapid prototyping.** Seeing potential solutions is an effective way for users to break historical patterns and to internalize proposed designs to the point of being able to refine or refute. Even if underlying data and transactions are stubbed, wire-frames and mock-ups should be used to guide the design toward improved usability.

- **Muscle memory.** User engagement should become embedded in the software development lifecycle, baked into the value case, scoping, requirements and design of solutions. If left as an after-thought, it will be too late. In that case, an effective option may be retooling the look and feel, but not improving how work is actually performed.



Bottom line

User engagement is not something business executives naturally think about – and is decidedly absent from surveys depicting IT spend priorities. Yet it lies at the heart of how businesses can turn newly-connected consumers into new revenue channels, and how they can empower employees to better connect dots and improve efficiency and effectiveness. Continuous improvement can start from the end-user, the literal point of business impact.

Enabling technologies are required for excellence in user engagement and they are easily available. Web x.0 tools, platforms and standards have reached a maturity to allow for bold investments. But the real impact rests in defining value, engaging users and enjoying the innovator's whitespace which results.

Endnotes

[1] Forrester Research. "Amway Integrates Notes And SharePoint To Drive Its Information Workplace," Rob Koplowitz, December 17, 2010

[2] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 9.

[3] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 7.

[4] Gartner, Inc. "BPA for the Masses: Is It Real?", Bill Rosser, June 25, 2010.

9 Applied Mobility

"The edge" has become the new battleground for innovation

The rise of mobile computing is staggering in sheer scale (5 billion subscribers by December 2010) and in its breadth of adoption – crossing age groups, economic classes and geographies[1]. Consumer interest in smartphones, tablets and untraditional connected devices such as set-top boxes, telematics, video games and embedded appliances is growing faster than with any other product segment, with a projected growth of 36% in the coming year[2]. Connectivity is nearly ubiquitous with today's mobile computing infrastructure and will only improve with the widespread roll-out of 4G, LTE and WiMAX in primary markets, and the impending launch of 3G in India in 2011[3]. As importantly, the mobile application (app) movement is fully underway, as traditional telephone service takes a back seat to messaging, email, media, social sites, games and productivity tools.

As new devices find their way into the hands of business stakeholders, organizations are realizing how powerful a mobile presence at the edge of their enterprise can be. The underlying network, form factor, user interface (UI) and raw device computing power are necessary enablers, but what really matters is harnessing these features into rich yet simple and intuitive apps to solve real business problems.

These solutions can be as simple as placing a mobile veneer over existing offerings and business processes – that is, conducting business as usual, but through channels untethered from physical locations. Think of nurses accessing electronic health records from their tablets instead of a stationary hub or nursing station; or of banks allowing customers to deposit checks anywhere by using their mobile phone cameras, resulting in customer convenience with the added benefit of off-loading processing tasks to the customer.

These new mobile solutions serve the full spectrum of transactional, analytical and social computing capabilities. Accordingly, they may depart from traditional app design and deployment concepts. Focused in scope and simple in execution, if only from the user's perspective, these apps have more in common with "applets" than with conventional multi-purpose feature-rich enterprise applications. This is precisely what makes them so powerful – they are elegant solutions to well-defined problems, and designed for operations on-the-go. The enterprise arms race has begun in these spaces and more – with big disruptions ahead for organizations that trail their competition.

The changes may be even more dramatic. For example, companies are already rethinking business processes and enabling new business models that would not have been possible without mobile technology. Evolutions in location-based services, social networks, mobile payment processing, low-cost device add-ons and integration with enterprise systems has led to the potential for employees, customers and suppliers to consume and produce sophisticated information, goods and services from *anywhere*. And with the extension of mobile solutions to sensors and actuators in physical goods and equipment, otherwise known as asset intelligence or "the internet of things," there is the potential for almost *anything* to become part of the mobile solution footprint. This will lead to entirely new business models like Zipcar's disruption of car rental – and even ownership – models, or to the connected consumer driving purchase decisions based on immediate access to product alternatives, price comparisons, reviews, inventory levels and direct-purchase options. The trend is toward a future where everything will be digital and available anywhere at any time, and mobile devices will be the medium of consumption. Tapping into this trend presents the opportunity for organizations to define real and lasting value in applied mobility solutions.

History repeating itself?

Deloitte's Depth Perception research featured Wireless and Mobility as an Emerging Enabler in 2010. But in 2011, the explosion of customer and employee demand and advances in foundational capabilities such as carriers, devices and app ecosystems allow for true business disruption.

	What were the challenges?	What's different in 2011?
Single-purpose industrialized devices	• Often seen in manufacturing, health care, public sector and the military, the durability and advanced communication features of devices came at a high cost, leading to selective roll-out. • Specialized capabilities typically required workers to have additional devices in the field, creating complexities and burdens in performing jobs. • Limitations of compute, storage and UI allowed only rudimentary data-entry and scanning functions.	• Protective shells and hardware extensions are available from various third parties, integrating through open ports/protocols (USB, Apple 32-pin connector etc.), allowing simple consumer devices to undertake highly specialized activities, while also enabling communication and multi-purpose functionality. • The ability to use commercially-available devices creates a fundamentally lower price point. • Powerful processors, memory, capacity, screen size, resolution and UI schemes remove hardware-based restrictions on potential mobile business scenarios.
App stores, cross-platform deployment tools and developer ecosystems	• Applications were classically hard to find, license and install – with limited (if any) options on the device. Discovering and deploying via the desktop proved complex. • For vertical app providers, differences in development platforms, deployment environments and management tools created limitations on marketplace size and availability.	• A critical mass of developers leads to a critical mass of apps, which leads to innovation and broader adoption. This is enabled by well-designed and governed sales and distribution channels such as Apple's App Store – whose catalog grew an estimated 111% in 2010[4], with 94% of applications reviewed within seven days of submission[5]. In response to the growing threat by Android, Apple recently revealed its App Store approval guidelines to developers and relaxed its rules on the use of Adobe's Flash. • Application adoption can easily reach critical mass to generate "buzz" and continue to drive incremental uptake. • The rising tide of spend in mobility apps has moved the needle forward on the availability and sophistication of cross-platform development, deployment and management tools. This improves the opportunity for a rich catalog of apps available even to narrowly-focused business domains.
Telematics v1.0	• Portability and accessibility constraints, with content and services existing only within the automobile. The user's existing digital content was virtually inaccessible. • Offerings largely focused on safety and navigation. While initially game-changing, these capabilities were quickly eclipsed by mobile phones. • System lock-in, with sporadic updates (if at all) that were prohibitively difficult for the average consumer to attempt.	• Auto manufacturers are increasingly adopting a hybrid model – combining in-dash systems with mobile services accessed through Bluetooth or wireless networks. • Solutions have expanded to include productivity (speech to text/email), collaboration (onboard social networking streams), and driver assists (sensor-driven parallel parking, Google's self-driving platform). • Platforms connected to the internet, allow ongoing automated feature updates and content upgrade options. • Extension of vehicle-mounted telematics position, presence and situational awareness to other hand-held devices allows new and important services to be conceived and delivered to customers and employees.

Technology implications

While many organizations have some form of wireless infrastructure and supporting policies in place, these were generally established before the explosion of potential usages and devices. Embracing the disruptive potential of mobility requires a new set of technical and organizational capabilities to govern security, development, deployment and management – as well as the supporting policies to control costs and manage compliance.

Topic	Discussion
Device management	Ability to monitor, manage and maintain devices connected to the organization's network – including enterprise-procured, as well as employee- and customer-owned devices. Allows tracking of assets, usage reporting, provisioning and over-the-air updates for software or profile revisions, backup/restore and remote locks or wipes for lost, stolen or compromised devices. Since several mobile device management tools exist, selection should align with the overall operating environment and IT maintenance strategy.
Security	Password protection, encryption, controlling device administrative rights (system settings, permissions to directly install applications) and managing entitlements to back-end services must be implemented – ideally extended from the organization's overall identity, control, and access management solution.
Development platform	Decision to adopt native device/OS SDKs, multi-platform mobile development platforms (e.g., SAP Sybase SUP, Adobe AIR/Flex, Pyxis), or use standards-based channels (HTML5 for Web-based; SMS or legacy WAP 2.0 for feature phones) is a strategic concern – informed by the target personas, applicable device standards and the desired capabilities of the intended mobile applications. Beyond versatility vs. native feature support, middleware implications need to be considered.
Product management	Dedicated focus to manage the lifecycle of mobile applications, including marketing product management (understanding market wants/needs, competitor movement, solution wish list), technical product management (managing bug/fix, feature, version roadmap), solution engineering (multi-platform support, end-to-end experience management), solutions delivery (distribution and channel support), and solutions management (on-going support). In many cases this can be an entirely foreign function to organizations that are targeting mobile marketing channels for products that haven't traditionally required such complex lifecycle management (e.g., CPG or automotive industries).
Mobile middleware	Mobile transaction management (dealing with interrupted sessions during transaction processing), integration with back-end systems, handling off-line data access and requisite synching, device-specific data management (pagination, "lazy loading" – retrieving only packets for data to be displayed instead of the full object) and managing translation, correlation and extension of data to the front-end.
Wireless policies	Contractual considerations to manage the explosion of wireless coverage and usages. Policies need to be retooled to consider device and plan eligibility, reimbursement, upgrades, refresh eligibility, types of pricing plans, employee profiles, categories of distinction within policies, security, expense management and control, vendor choice and considerations around international usage. While telecommunications providers are looking to combat predatory pricing and market saturation with moves up-stream with content and added services, there are opportunities for aggressive negotiations for many enterprise customers.
Application distribution	While public storefronts like GetJar, Apple's app store, the various Android marketplaces (e.g., Google, Verizon, Sprint) and RIM's BlackBerry App World allow for broad distribution of applications, a controlled enterprise distribution strategy is required for sensitive, internal-facing applications. These can be as simple as a repurposed Web server or platform allowing search, reviews and brokering of partner, vendor and recommended third-party applications.

Lessons from the frontlines

Coffee, your handheld and the future of your "third place"

Starbucks has been on the forefront of mobile strategies, launching two initiatives poised for convenience and customer engagement. The first is the Starbucks Card mobile app, allowing customers to pay for purchases using their smart phone, where a 2-D scanner at the POS reads a barcode linked to their Starbucks prepaid loyalty card[6]. Roll-out is underway to retail stores in 2011, along with support for additional mobile platforms (currently iOS and BlackBerry; an Android version is imminent).

The second is the Starbucks Digital Network[7], where customers are offered free WiFi (provided by AT&T) and free access to subscription editions of the *The Wall Street Journal*, *The New York Times* and *USA Today* – as well as content from Apple, Zagat and home-grown Starbucks entertainment (including movies, short films and literature). Customers are encouraged to enjoy content while in the store – tactically promoting longer stays and repeat visits. Perhaps even more importantly, Starbucks is establishing a beachhead of mobile relevance for the ever-connected consumer.

Because patients deserve better than a dry-erase board

As part of their broader eHealth strategy, the Tasmanian Government's Department of Health and Human Services wanted to identify ways to improve the quality of patient care while increasing organizational efficiency in their hospitals. One such area of improvement involved replacing a critical but outdated part of their operations – namely, a manually-updated magnetic whiteboard which tracked patients' admission and care during their stay in the hospital. Enter the Patient Journey Board, providing an iPad-enabled solution for full-lifecycle visibility into information about patients, and help with managing updates from admission to treatments and discharge[8]. Hospital staff updates patient information quickly and easily, and any changes are tracked for increased traceability, accountability and security. The overall result is that patient information is protected and managed easily and efficiently, leading to improvements in the quality of patient care.

The Rupee goes mobile

A significant joint effort has been launched in India to enable transfers of small amounts of money between bank accounts[9]. Backed by the National Payments Corporation of India (which includes the support of 10 major banks), customers can enable their existing accounts to allow mobile transactions via SMS or mobile apps, with the former featuring a lower daily limit over SMS (1,000 Rupees per day), but offering compatibility with the majority of the 600 million mobile devices in service. In the United States, Square, Paypal mobile payments and the announced (or rumored) inclusion of near-field communications in the next version of iOS and Android code-bases will make mobile payments a reality in 2011.

Where do you start?

For many organizations, the first step to applying mobility technology is to create a vision for its business potential – either transforming how tasks get done or opening net new avenues to interact with customers, employees or partners. As technical and cost limitations are overcome, organizations need to challenge themselves in the art of the possible – looking across industries and geographies for new ideas. However, a practical mobile strategy should start with the consideration of putting a mobile veneer on existing capabilities as a prelude to pursuing more innovative, substantial mobile initiatives.

- **Business first.** Mobile efforts should begin by understanding user personas and business impacts. That means determining the targeted-use cases by identifying stakeholders that could benefit, the business scenarios that should be targeted, and the specific business process improvements and new capabilities that would be enabled.

- **Adopt a *product* mentality.** As organizations introduce consumer-focused apps, product management disciplines become a necessity. Managing feature and version roadmaps, providing end-user support and implementing frequent updates are implied expectations from consumers. And so is the quality of the end-to-end user experience. Regardless of the number of moving parts required to fulfill the service, the user will hold the brand accountable for the quality and readiness of the service. The more critical the experience, the greater the potential impact if disrupted.

- **Keep scope simple.** Many effective mobile applications are specialized, intuitive and transient. Apps that target a focused business need and solve it simply are preferred to complicated multi-purpose solutions. Designing navigation and controls for single-hand or voice operation, minimizing interaction points and taking advantage of location-based services to filter and pre-populate information can simplify the user experience.

- **Choose favorites.** With more than 35 variants of wireless operating systems in the marketplace, universal compatibility could be an overwhelming goal. Many organizations will have a clustering of operating systems around a handful of platforms, with some indication for trends and evolving preferences. A phased roll-out approach can expedite progress. Unsupported users will have something to covet (and be no worse off than they were before), while early adopters can inform improvements and offer new ideas. Although foresight on eventual platform vision is required upfront to guide infrastructure and development decisions, a phased rollout can prevent diluted, over-ambitious initial efforts.

- **Cloud and social.** Many of the boldest plays in mobility will be combined with cloud and social computing technologies – tapping into information, services and relationships based on physical location and desired action. While some organizations have launched separate mobility, cloud and social planning areas of focus, their convergence – termed CloMoSo – has particularly powerful implications.

- **Mobile infrastructure.** There are many moving parts required to ready an organization to implement its mobile strategy. Planning should consider upgrades to infrastructure and operations, as well as telecommunication provider contracts and internal compliance and legal policies. The time it takes to reach operational readiness can take as long as the time required to scope and build pilot applications, so planning efforts should be launched upfront.

Bottom line

With the volume of smartphone shipments poised to overtake PC shipments by 2012[10] – and with connected, intelligent assets becoming prevalent, leading organizations have begun to aggressively establish their brands and services in the mobile world. According to a recent Deloitte study, more than half of Fortune 50 companies have a publically-available, customer-facing application or mobile-enabled Web page[11]. This growth will continue – notably as location-based services converge with cloud and social computing technologies, and as new consumer behaviors and expectations are established.

Even more significant is the potential for business enablement, specifically in how employees and partners interact. One mobility guru describes a not-so-distant future of continuous services and connected devices that fundamentally change the way we interact with each other – and with our corporate entities[12]. As we begin to separate from static, immobile computers and envision a world where business is increasingly conducted outside of cubicles and call centers, different business opportunities are born. Applied mobility is about rethinking business with an untethered mindset, innovating how the enterprise operates at the edge.

Endnotes

1 "Worldwide Mobile Subscriptions Forecast to Exceed Five Billion by 4Q-2010," ABI Research press release, June 30, 2010, on the FierceMobileContent Web site, http://www.fiercemobilecontent.com/press-releases/worldwide-mobile-subscriptions-forecast-exceed-five-billion-4q-2010.

2 Carl Weinschenk, *M2M Growth Impressive, Even by Telecom Standards*, http://www.itbusinessedge.com/cm/blogs/weinschenk/m2m-growth-impressive-even-by-telecom-standards/?cs=44909 (December 31, 2010).

3 Kenan Machado and Romit Guha, *Vodafone Essar to launch India 3G services in Q1 2011,* http://www.totaltele.com/view.aspx?ID=459586 (October 21, 2010).

4 Emil Protalinski, *Google, RIM, and Nokia beat Apple's App Store growth*, http://www.techspot.com/news/41914-google-rim-and-nokia-beat-apples-app-store-growth.html (January 10, 2011).

5 JF Martin, *App Store approval time still improving!,* http://www.buildingiphoneapps.com/2011/01/breaking-app-store-approval-time-still.html (January 19, 2011).

6 Credit Card Processing Blog. *Starbucks Widens Mobile Payments Test*. Retrieved February 3, 2011, from http://blog.unibulmerchantservices.com/starbucks-widens-mobile-payments-test/

7 Visit http://www.starbucks.com/coffeehouse/wireless-internet/starbucks-digital-network

8 Additional information is available in Deloitte Touche Tohmatsu (2010), "Case Study: Department of Health and Human Services Tasmania", http://online.deloitte.com.au/state-government-department.html

9 Cian O'Sullivan, *Mobile payments: Indian banks show how it's done*, http://www.gomonews.com/mobile-payments-indian-banks-show-how-its-done/ (November 23, 2010).

10 Patrick Thibodeau, *In historic shift, smartphones, tablets to overtake PCs*, http://www.computerworld.com/s/article/9199918/In_historic_shift_smartphones_tablets_to_overtake_PCs (December 6, 2010).

11 Deloitte Consulting LLP proprietary research, August 2010.

12 Ozzie, Ray. *Dawn of a New Day*. Retrieved February 3, 2011, from http://ozzie.net/docs/dawn-of-a-new-day/

10 Capability Clouds

The cloud market evolves from capacity to capabilities

For the past few years, the IT crowd has been enamored by "as-a-service" concepts and the potential to unleash the power of distributed computing, virtualization and ubiquitous networking. The message being spread is one of *capacity and cost* – the ability to tap into a nearly unlimited scale of computing power, storage, platforms and software with the hope of lower overall technology spending[1]. *Cheaper* and *faster* are interesting terms to the bottom line, but *better* is a term that business can really get excited about.

Capability clouds move beyond the building blocks of capacity to deliver finished services that directly address business objectives and enterprise goals. Instead of talking about machine images or database instances, the discussion shifts to the analytics cloud, the testing cloud or the sales cloud. And the conversation moves from the CIO's office to the CEO's office and the boardroom.

Similarly, capability clouds allow the discussion to focus on a more important set of values. The conversation shifts from total cost of ownership and asset efficiency to accelerating time-to-results, adding new functionality or changing business processes and business models. It's relatively easy for a business unit leader to buy a software-as-a-service tool for point solutions such as workforce planning or compensation management; the main requirement is simply a corporate credit card.

A focus on capacity is not a mistake. In fact, rapid low-risk innovation is a benefit of the cloud, at any level. But in a world increasingly defined by services, capability clouds represent an open market of offerings whose net value can surpass their individual, constituent parts. The cloud is finally being put in terms that the business can relate to, while enabling changes that the IT department has been clamoring for.

There have been three main drivers of cloud adoption thus far: a preference for operating expense over capital expense; speed to solution; and flexible, scalable access to specialized resources – be they technology, software or people. The capability cloud can add opportunities for agility and innovation in how business processes – even business models – are acquired, composed and revised. For example, an analytics cloud may go beyond just delivering analytics databases, models and tools. It may also offer PHD-level statisticians applying the art of the science for the benefit of your business, where you only pay for the level of service that you need.

As capability cloud adoption continues to mature, it will require and enable more hybrid cloud and multi-cloud environments. With the rapid pace of change, increasing success stories, the level of investment and innovation – not to mention the hype and attention – CIOs must be prepared to answer how they leverage the ecosystem of capabilities, services and value networks delivered by the cloud.

History repeating itself?

Cloud computing is continuously growing and maturing – in terms of its adoption, vendor landscape and offering sophistication. While the technology itself is an evolution of long-standing virtualization technologies, utility computing, application service providers (ASP), service-oriented architecture (SOA) services and high-speed networking, cloud deployment in 2011 makes technology potentially disruptive, especially as deployments move from capacity concerns to business capability enablement.

	What were the challenges?	What's different in 2011?
ASPs, managed service providers, grid computing, utility computing, IT outsourcing and other acquisition and delivery models	• Prior to the widespread availability of cloud computing services, previous models offered significant customization of implementation for each customer. Yet acquiring and deploying these IT services required sometimes lengthy and complex selection, negotiation and implementation phases. • Cloud services – particularly public cloud – involve simplification and standardization, but also offer streamlined selection and implementation.	• Cloud is now a tested architecture for some workloads for large-scale enterprises. Adoption may have been accelerated by recent economic pressures, but current cloud business cases benefit as much from speed-to-solution and sophistication of the capabilities, as they do from the trade-offs between operational and capital expenditures. • While *de jure* standards are still evolving, *de facto* standards are sufficient for confident enterprise deployment and integration.
On-premise virtualization, demand management and IT service management methods	• Adoption of these methods and tools are inherently valuable to the business of IT – creating efficiency, effectiveness and agility in the delivery of IT services to the enterprise. However, without the abstraction implied by cloud services, they stop short of enabling *business* service management. • Putting enterprise IT in a services management mode, particularly in the development of a rigorous services catalog, is an essential step in allowing the enterprise to fully participate in the cloud ecosystem.	• Beyond elastic capacity for IT services, capability clouds often emphasize the business service linkages. IT can clearly associate ROI in direct business terms. • The enterprise CIO can and must become a trusted storefront for these business services for business executives. Significant improvements in cloud operations support systems (OSS) and business support systems (BSS) allow effective subscription, billing, incident and customer management.
Capacity cloud computing	• Hype surrounding cloud computing was – and in some ways, continues to be – overwhelming, with many products and service offerings being rebranded to take advantage of the buzz – some with limited or no true cloud features. Early adopters focused on the technology realm – private infrastructure improvement, use of public platforms for non-production environments, point software solutions for adoption of specialized tools – primarily focused on IT services.	• Capacity cloud continues to be relevant for several usages – supporting applications with unpredictable usage needs and rapidly scaling edge solutions. But it needs to be viewed as one of many possible options, not the default application of cloud. • Capacity clouds are enablers for higher-value business services, necessary for realization of additional value. • Organizations have a much clearer definition of the "what" and "why" of cloud. Discussions in 2011 have moved from education to pilots and full-blown implementations, many utilizing capability clouds.
Service-Oriented Architecture (SOA)	• SOA was relegated to a technical architecture – effectively describing Service-Oriented *Software* Architecture. While the concepts were applicable to the business, few organizations moved beyond static business processes and inside-out focused architecture approaches to embrace business capabilities – a tenant of Services Thinking[2]. • Even as independent software vendors added compatibility for Web services, their underlying business and information models were data-driven and transaction-oriented, not service- or capability-oriented.	• Capability clouds lend themselves to rethinking about operating models in terms of services. Service-Oriented *Business* Architectures are beginning to emerge, where organizations have identified their catalog of critical capabilities and are making targeted fulfillment decisions for individual areas. • Multi-tenancy guides design principles that are usage- and purpose-driven, which naturally align to services. Because many of the platforms were designed in the era of SOA, they can be embedded, integrated and orchestrated – not acting as simply tacked-on interfaces applying modern standards to antiquated architectures.

Technology implications

The technology behind capability cloud providers is extensive – requiring deep network, virtualization, event management, resource management and quality management engines. Several vendors have feature-rich hardware and software products as cloud-enablers. The technical complexity is somewhat abstracted for cloud subscribers, but several considerations remain a concern:

Topic	Description
Cloud-to-cloud integration	Increasingly, organizations are implementing more than one cloud-based solution to meet their business needs. Instead of managing individual point interfaces, many organizations are supplementing their internal service bus or integration solution with a cloud-based hub – managing cloud-to-cloud interactions between the various APIs and services, while maintaining a single, high-availability, maintainable integration point to the enterprise. Examples of solutions include IBM's CastIron, Dell's Boomi and Pervasive's Integration Manager.
OSS/BSS capabilities	The ability to provide usage-based pricing and to rapidly provision services to scale up or down is even more difficult with capability clouds, where underlying solutions typically require a combination of services across the stack. A sophisticated offering is necessary to manage ordering, provisioning, metering, billing and remediation – with control points traversing the infrastructure, platform and application layers. For subscribers, the availability of these capabilities will be a limiting factor to contract and service-level capabilities.
Data management	This concern is especially applicable to global companies, where local data storage, privacy and protection regulations are critical concerns. At a higher level, information semantics, context and correlation are required to maintain master data between the enterprise and the cloud offering.
Maintenance and monitoring	Organizations are still responsible for their stakeholders' end-to-end experiences, even if they are increasingly realized through a hybrid environment of disparate on-premise and cloud-provided services. Comprehensive maintenance and monitoring tools must be enabled – not just to detect incidents, but also to identify potential bottlenecks or areas of concern. Stay focused on business services, not just underlying IT services. Application maintenance services (AMS) and application and development management (ADM) services have new complexities when they involve in-house or third-party development for, or in, the cloud. Service-level management and service-level agreements have not yet normalized across various capability types. CIOs must use the business case associated with a particular cloud service as the vehicle to plan and manage expectations and performance.

Lessons from the frontlines

Talent in the cloud

A healthcare provider has moved several of its human resource functions to the cloud, including recruiting, background checking, interview scheduling and talent onboarding. In the initial realization, the organization had to maintain relationships – and technical interfaces – to each provider, initiating transitions across the prospect-to-employee lifecycle through point interactions. The resulting complexity was beginning to outweigh the point-feature benefits of each solution.

Now the company is moving to a capability cloud strategy, sourcing the entire process from a single cloud provider, who in turn is managing the orchestration and individual transactions among the relevant players. The business receives the same functionality at a similar price point, but without the headaches of integrating between each individual tool.

Not your grandfather's collaboration suite

The internal adoption of Chatter by Salesforce.com illustrates how a collection of individual services, seamlessly integrated, can deliver a capability more valuable than its individual parts. Upon the Beta launch of Chatter, Salesforce.com's entire staff began using the tool – a combination of collaboration, presence, networking, messaging, document sharing and workflow features. By allowing searches across productivity, collaboration, social and transactional tools, users were not only able to find *things* (e.g., price sheets, documentation, design artifacts), they were able to find individuals and institutional experience that were previously hidden. Executives were able to mine the various bread crumbs – the digital exhaust – of the service and discover definitively who knew what, who was connected to whom and which stakeholders were their leading thought leaders[3]. The "capability" here is connecting people and information with far-greater effectiveness than can be achieved through siloed tools of limited scope.

Identities as a service

Though the idea of federated identities has seen many stops and starts over the past decade, capability clouds can offer the right balance of distributed services and tiered trust zones to make the concept a reality. A global bank was challenged with the security impacts of cross-organizational information and application sharing, with the expected complexity and operational risk. Affiliates, acquisitions, subsidiaries and joint ventures all had separate disparate security domains. At the same time, it needed to collaborate and share critical information with partners and governmental agencies, providing the right people with the right access to the right information at the right time. While their implementation today is an in-house private cloud model, more public cloud-based solutions will likely emerge as standards like Security Assertion Markup Language (SAML), WS Star (WS*), the Liberty Alliance protocols (ID-ff), and OpenID continue to evolve.

Where do you start?

The exploration of capability clouds should start with a clearly defined business problem in mind. Look at your backlog or ideally at your services catalog, and find a workload that would benefit from capability in the cloud. The National Institute of Standards and Technology (NIST) cloud criteria are a great place to begin. If your business problem or technology solution requires most of these characteristics, you should consider a "capability" cloud approach:

- End-user self service with automated customer subscription and provisioning
- Location independence and multi-tenancy with regard to service delivery
- Network ubiquity, with access anytime and anywhere there is an Internet connection
- Elastic performance and load, both up and down
- Elastic pricing and contract terms

Next, move to an actionable discussion by being specific on the nature of the potential cloud solution, including:

- **Service model.** While many companies begin their cloud journeys by subscribing to cloud computing resources, cloud offers a vehicle to monetize intellectual property or operational capabilities that were historically impractical to explore. For example, several health care plans are looking to offer claims processing, administration and analytics-as-a-service – shifting from traditional business process outsourcing models.
- **Workload.** Capacity discussions were focused on infrastructure-as-a-service, platform-as-a-service and software-as-a-service. Capability clouds instead focus on *what* is being delivered. Capability clouds typically include refined platform-, software- and higher-value software-as-a-service, as well as business processes and information analytics.
- **Delivery channel.** The decision between private, public or hybrid cloud solutions is tied to both the performance, cost and scale needs of the opportunity; as well as to the organization's industry sector, geography and executive personalities. While edge adoption is trending towards public clouds and core adoption is remaining private, there is no formulaic answer.

Once an opportunity has been assessed according to these dimensions, one way to get started is to simply get started. As one financial services CIO shared in an interview, "We didn't really know the value proposition at the time we were making the decision. You can't really know until you see it and experience it." But that doesn't mean you should "ready-fire-aim." Prepare a business case. If it's a small investment or a small downside risk – perhaps a pilot or a solution at the edge of the enterprise – it can be a simple business case. For bigger bets, develop a broader business case. Cloud isn't any sort of silver bullet. It's an investment in enabling the business, and you must go into it with specific expectations and metrics.

The beauty of cloud is the ability to rapidly innovate in low-risk environments. Solutions can scale at internet speed if the business and/or market demands it. Make a move, take its pulse, refine and repeat. The days of three-year implementation roadmaps can thankfully be behind you, replaced by agile composition, integration and orchestration of capabilities. May the cloud revolution finally begin!

Bottom line

The difference between capacity and capabilities is more than semantics – akin to the difference between access to a database schema and a programmatic, context-rich application programming interface (API). Or, put simply, a plain-speak written catalog of products and services that a general manager can understand. It doesn't invalidate the value of the lower-level offerings, but it dramatically changes the potential audience who might find it interesting – or at least comprehensible.

The tipping point of cloud will come when it can effectively disappear – when it becomes a part of the fabric of how business executes, not an add-on consideration or an adjunct strategy. Much like the choice between taking the bus, flagging a taxi, renting a car or buying your own automobile – each has a purpose for a specific place and time – our transportation capabilities are richer because of the potential options. Capability clouds will be a big step in changing the role and potential value of IT – shifting the focus its underlying machinations to business value.

Endnotes

[1] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 12.

[2] Additional information is available in Deloitte Consulting LLP (2010), "Depth Perception: A dozen technology trends shaping business and IT in 2010", http://www.deloitte.com/us/2010technologytrends, Chapter 10.

[3] Additional information is available in Deloitte Consulting LLP (2011), "Tech Trends 2011: The natural convergence of business and IT", http://www.deloitte.com/us/2011techtrends, Chapter 7.

Conclusion

When trends converge

(Re)Emerging Enablers are, by definition, already in play. Many companies have investigated them in some way, and have made investments. But important developments are underway this year, adding compelling new dimensions to the decision process. We recommend taking a fresh look at each (Re)Emerging Enabler to see how it can apply to you in the near term, and whether new investments make sense.

Disruptive Deployments require a more creative lens. Think tactically at the front-line or back-office. Look beyond competitor benchmarking and into other industries to spur ideas. Don't lose sight of business results that can be measured. Many opportunities require innovation and change – in business models, in the way work is performed, even in the very nature of IT assets. But the reward opportunities are real – as real as the dangers of falling behind.

By taking these steps, you can position yourself ahead of the game. But to really accelerate value, consider one more thing: Combine multiple trend topics to discover patterns of potential. Each trend is important individually, but a multiplier effect can occur when you evaluate them together. For example, Applied Mobility + Social Computing + User Engagement + Almost Enterprise Apps can offer an innovative approach to driving business value through software. Visualization + Real Analytics + Capability Clouds can help define a tremendously powerful and affordable platform for essential business capabilities. Take time to think through the relationships among the trends. Look at <anything> + Capability Cloud.

Explore <everything> + Cyber Intelligence. Stay mindful of connections as you identify the key tactical choices that you believe will generate top returns in your circumstances. Having a clear point of view on each – how it affects your business and how it fits into the strategic vision of your company – is a good first step. Understanding how multiple trends converge for even more innovation and value is a way to discover the big opportunities.

We close this year's report as we have done in the past, with a comment from writer and futurist William Gibson: "The future is already here… it is just not evenly distributed." Our hope is that the 2011 report on these ten trends will allow you to tip the distribution in your favor in the years ahead.

Authors

Mark White
Chief Technology Officer
Principal, Deloitte Consulting LLP
mawhite@deloitte.com

Bill Briggs
Deputy CTO
Director, Deloitte Consulting LLP
wbriggs@deloitte.com

(Re)Emerging Enablers	Disruptive Deployments
Visualization David Steier Director, Deloitte Consulting LLP dsteier@deloitte.com	***Real Analytics*** John Lucker Principal, Deloitte Consulting LLP jlucker@deloitte.com
"Almost-Enterprise" Applications John Peto Principal, Deloitte Consulting LLP jpeto@deloitte.com	***Social Computing*** Doug Palmer Principal, Deloitte Consulting LLP dpalmer@deloitte.com
Cyber Intelligence Ted DeZabala Principal, Deloitte & Touche LLP tdezabala@deloitte.com	***User Engagement*** Jaco Van Eeden Senior Manager, Deloitte Consulting LLP jvaneeden@deloitte.com
CIOs as Revolutionaries Matt Law Principal, Deloitte Consulting LLP mlaw@deloitte.com	***Applied Mobility*** David Smud Director, Deloitte Consulting LLP dsmud@deloitte.com
The End of the "Death of ERP" Bill Allison Principal, Deloitte Consulting LLP wiallison@deloitte.com Nidal Haddad Principal, Deloitte Consulting LLP nhaddad@deloitte.com	***Capability Clouds*** Chris Weitz Director, Deloitte Consulting LLP cweitz@deloitte.com

Contributors

Rich Baich, Heidi Boyer, Mark Charron, Jeff DeLisio, Suketu Gandhi, Ryan Jones, Rick Kelley, Doug Laney, Kristi Lamar, Peter Makohon, Blair Nicodemus, Nima Oftadeh, Johannes Raedeker, Peter Sedivy, Sudeep Singh, Cyndi Switzer, Andrew Szabo.