

Depth perception
A dozen technology
trends shaping business
and IT in 2010



Preface

Consultants, technology firms, and analysts have long been known for producing annual laundry lists of technology trends that will change the world, usually with “flying-car” glimpses of a magical new future. We have a different take – with an agenda designed to help CIOs in their efforts to solve their most pressing business problems.

This report shares the technology trends we see as relevant for 2010, clustered in two categories: Emerging Enablers and Disruptive Deployments. Emerging Enablers are core disciplines that have evolved within organizations – capabilities, skills, and philosophies that are critical for IT and the business to partner, innovate, and create more value. Most, if not all, CIOs will have addressed these topics in the past – perhaps multiple times. We think that they deserve another look this year due to specific factors in the technology and/or the business environment. Disruptive Deployments are trends that present significant *new* opportunities – offering new business models or transformative ways to operate in existing markets. The technologies individually may not be disruptive, but deployed as discussed, they may positively disrupt the cost, capabilities, or even the core operating model of IT and the business.

All these trends are relevant today, though some have not reached maturity. Each has demonstrated momentum and potential for impact – and we believe each is important enough to warrant immediate consideration. Forward-thinking organizations should consider developing an explicit strategy in each area, even if that strategy is to wait and see.

Depth Perception goes beyond headlines and broad definitions to a detailed look at new technology opportunities – how we got here, where we believe we’re going, and what we think it means. Each topic follows the same formula. The introduction, “where to start,” and “bottom line” sections of each topic should be beneficial to all audiences. Non-technologists may want to skim “history repeating itself” – and skip over the “technology implications.”

But whatever you do, don’t sit on the sidelines and wait for any of these trends to shape your business. Stay in control, and use them to your advantage. The future starts today.

For more information visit:

www.deloitte.com/us/2010technologytrends

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Disruptive Deployments

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Emerging Enablers

1 Information Management Finally Goes Enterprise

Leaders expect confident answers to fundamental business questions. Step one is the right foundation.

Information is the heart of the business of IT. It's right there in the name. But the CIO doesn't own the information – the business does. IT is the caretaker – responsible for enablement, compliance, governance, protection, and optimization.

Years of investment and growing complexity of the underlying technology landscape have led to islands of business automation – which in turn have produced islands of information. The inability of most organizations to manage this complexity has created frustrations, as IT has been unable to confidently answer seemingly simple business questions. These questions range from tactical operational concerns to broader cross organization and geography challenges. What do I ship to a specific customer location? How many items do I really sell in this category? What is the profitability of a given customer across lines of business? How much do I spend with a given supplier? How does a product perform across the globe?

Information management represents the collection of disciplines needed to help answer these kinds of questions – to control the information chaos and ready the playing field for the future. The scope can seem daunting: Managing the dimensions and lifecycles of data and information – including a strategy for measuring, monitoring, and controlling. Managing information quality, visibility, searching, semantics, structure, master data, privacy, federation, retention, and security. Ongoing processes and governance bodies for maintenance, stewardship, and controls.

The real trend is not the individual domains. In fact, we believe it is only by stepping away from these point solutions that you'll find the answer. Enterprise Information Management (EIM) is about developing an overall view



of the dimensions of the challenge – then marrying tools and techniques with governance disciplines and changing business behavior. Instead of being thought of as a technology tool, effective EIM embeds information quality and management into everyone's job description. Information management shifts from a back-office responsibility of skilled data analysts to an organic part of how business gets done at the point of business impact. Once an organization's information management has gone enterprise, it finally has the opportunity to leverage information as the strategic asset it really is.

Enterprise Information Management is about developing an overall view of the dimensions of the challenge – then marrying tools and techniques with governance disciplines and changing business behavior.

Emerging Enablers

Information Management Finally Goes Enterprise

History repeating itself?

Various waves of information solutions have taken shape over the previous decades. While value has been created in silos, the overarching challenge of truly enterprise information remains.

| | What were the challenges? | What's different in 2010? |
|---|--|--|
| ERP as <i>the</i> Information Foundation | <ul style="list-style-type: none"> • Process automation was the focus. Decisions made to support individual businesses in different geographies created disjointed visibility of information. • Information quality was either missing or seen as a point-in-time activity for go-live, not an ongoing discipline. Dirty data compromised process and information value. | <ul style="list-style-type: none"> • Significant investments from ERP providers into the information arena have made information management a thrust of implementations – explicitly incorporated into the underlying business case. • Organizations realize the importance of ongoing information stewardship, governance, and full lifecycle management, making process-based transformations excellent forerunners for information value initiatives. • Organizations are investing in third-party tools to complement enterprise application-based solutions. |
| Canonical Data Models/ Tool-based Master Data Management (MDM) | <ul style="list-style-type: none"> • Focused on answering the question, “How can I gather all the information I have?” rather than asking, “What information does the business need?” • Technology-led initiatives to describe a single enterprise data model managed through MDM tools failed to gain business buy-in – leading to solutions without users or advocates. • Top-down, “big bang” modeling exercises proved too complex for many organizations. • Tools focused on administrators vs. end users and ongoing data stewardship. • Limited use of enterprise solutions, with individual domain tools tied to each application vendor. | <ul style="list-style-type: none"> • Modern Meta and Master Data Management approaches start by categorizing subsets of information – focused on relationships that are critical for information flow. • Advanced matching and duplication detection capabilities (including deterministic and probabilistic models) reduce errors and manual intervention. • Workflow engines, process automation, and rich user interfaces have become key parts of the MDM solution suite for ongoing management, capturing expertise within the process and interface. • Shift towards governance that incorporates data quality monitoring, dashboarding, and compliance scorecards. • Industry standards and data definitions have emerged, reducing the need for costly, company-specific ontological exercises. |
| “Kitchen Sink” Information Initiatives | <ul style="list-style-type: none"> • Attempting a top-down information program while simultaneously tackling all of the relevant problem domains led to confusion, high spend, and little realized value. These “kitchen sinks” included business intelligence, data warehouse, metadata, master data, information quality, security, governance, risk, compliance, content management, knowledge management, image/document management, complex data modeling efforts, data cleansing, and consolidation projects – across all structured and unstructured data. | <ul style="list-style-type: none"> • The current trend is to tackle a subset of the domains and achieve a majority of the EIM vision in steps along a roadmap. MDM, Information Quality Management, and real-time process management are areas requiring focus – aligned to business needs with real, tangible results. • Information initiatives have business sponsorship with explicit value cases for the information assets and clearly defined, focused scope. |

Technology implications

Business process revisions, organizational change management, behavior/culture shifts, and overall business alignment represent the majority of the challenge. There are also key technology considerations that need to be addressed:

| Topic | Discussion |
|------------------------------|---|
| <p>Governance</p> | <p>Data stewardship Creation of dedicated roles, supported by user-focused tools, for managing elements of the information lifecycle across systematic and manual activities. Includes real-time integration components across internal and external technologies, as well as workflow tools for coordinating manual activities.</p> <p>Data resource management Governance to simplify, isolate, and redeploy tools and data assets, allowing deliberate technology decisions to be made by those who have the expertise to influence them. This should lend itself to improved management of data stores, technologies, and the sheer number of people and disparate skill sets required.</p> |
| <p>Applications</p> | <p>Master data management Consolidating and simplifying the management from individual tools for singular applications from a variety of vendors running multiple versions of tools. MDM should enable the ability to define and manage information descriptions and relationships – tools should maintain meta data, match/detect duplicates of new data against existing entities, consume and manage large volumes of data, and synchronize and maintain master data updates across internal/external parties.</p> <p>Information quality management Tools for reviewing data, determining records requiring cleansing, and either triggering automated rules or initiating manual workflows for investigation and resolution.</p> |
| <p>Infrastructure</p> | <p>Accessibility, availability, and security Management of data assets on a global level while striking the balance between capacity, survivability, security, and cost. This is driven by storage advances, distributed systems, and ubiquitous networks. It requires the ability to define and enforce availability, reliability, and performance SLAs, as well as data archiving approaches aligned with strategic storage/retention policies.</p> |

Emerging Enablers

Information Management Finally Goes Enterprise

Where do you start?

EIM initiatives can easily turn into complex, technology-driven affairs – overwhelming in scope and delivering little tangible value. Some organizations have created value by implementing individual components, but it doesn't get them where they need to be.

The organizations most successful at implementing EIM have taken a bottom-up approach rooted in addressing their business problems – building out master data management, information quality, and process management capabilities through initiatives focused on specific business areas, such as customer care or supplier spend analysis. This can identify pain points with the opportunity for real value creation – while building out the foundational components of EIM.

Regardless of the function or process area initially targeted, based on our experience, successful EIM programs share a number of characteristics. These include:

- Partnering with the business to become a change proponent as a part of an enterprise initiative. "Information management for the sake of information management" won't get the traction needed as a standalone effort.
- Creating a discipline and a culture around information quality – embedded in day-to-day operations with incentives.

- Taking a value-based, pragmatic approach to technology investments – in line with the magnitude of expected results.
- Identifying the incremental steps that will move them towards simplification and better governance – not large-scale transformation.
- An understanding of the assets that the organization has – infrastructure, tools, people, and skills – as well as the actual business goals to rationalize the approach and achieve buy-in and support.

EIM is a long journey for 2010 – and beyond. The EIM leaders will be those who develop a strategic plan for EIM and take measured steps to improve their capabilities. Companies that over complicate their goals or wait for the next technology-based silver bullet will likely fail to generate business value or fall behind their competitors who take the path of step-wise improvement.

The concern for the long-term health of information management is not something new, and it's certainly not something that should lose priority anytime soon. Ignoring it will only make it worse.

Bottom line

Master data cannot be isolated from business intelligence. Data conversion cannot be left to the devices of each individual project. And business units cannot be individually left to answer their "what do I need to know?" questions with whatever information they have at their disposal. The individual repositories of data and the supporting functions within an organization are all reflections of the same fundamental source: The underlying day-to-day activity and health of your business.

As data volumes continue to proliferate and stakeholders become more demanding, we believe owning the information space will shift from being a competitive differentiator to being a mandate for competitive parity, especially as businesses continue to rely on business partners and third-party operating models (think cloud computing) for pieces of their value chain. But either way, enterprise information management will be a key part of IT's responsibility – and one that organizations can no longer afford to treat as a collection of tactical concerns.

2 CIO Operational Excellence – Built to Run

Improving the “business of IT” by planning for the end-game from day one

The global financial crisis had a direct impact on a number of IT trends in 2009. With most IT budgets either slashed or stagnant, and an increased focus on cost reduction opportunities, IT operational excellence became top of mind for many organizations. Revisiting the basics in terms of process effectiveness and overall efficiency of the “business of IT,” was one approach many organizations used to drive quick hits across the cost-cutting spectrum.

Post go-live concerns have become a strategic CIO topic in IT planning, design, implementation, and operations. Operational considerations – from enabling agility to optimizing efficiency – are moving from project after-thoughts to key drivers for delivering on business goals.

“Built to run” now involves the full spectrum of CIO responsibilities:

- IT organizational issues such as formal IT and business alignment.
- Mature and robust requirements, risk, quality, and testing management.
- IT delivery model disciplines such as CMMI engineering principles, investments in tools, and processes.
- IT service management and ITIL, Green IT, and sustainability.

Forward-thinking organizations realize that these initiatives can strategically reposition their IT operational spend. Embodied by enterprise efforts like Green IT and IT Services Management, operational implications are starting to move from project after thoughts to disciplines embedded across the IT delivery model. Work is being expressed as IT services, with costs translated in business terms to IT’s customers.

This “built to run” mandate affects every stage in the IT lifecycle – planning, requirements, design, build, test, and operate. In fact, many improvements are based on better



understanding the touch-points and dependencies between activities along the lifecycle. Disciplined methods and tools can reduce the amount of effort required to return a desired result, while driving feedback for continuous improvement. Projects are balancing post go-live considerations with their expected business results, helping create more predictable and stable ongoing maintenance and management.

“Begin with the end in mind” has been a popular expression since it was first introduced by Stephen Covey in *The 7 Habits of Highly Effective People*. Now, more than ever, this approach is helping to drive IT operational excellence. Overall support expenses are being reduced by efficiency gains – allowing IT funds to be redirected towards strategic initiatives that create more value for the business. By providing clarity around the nature, cost, and expectations of services provided by IT, significant improvement are being made around business and IT alignment. The CIO supports the business of the business. Operational excellence addresses the business of IT. And it’s up to the CIO to make sure IT is built to run.

By providing clarity around the nature, cost, and expectations of services provided by IT, strides are being made around business and IT alignment.

History repeating itself?

Ever since information technology was adopted by businesses in the 1960s, the delivery and maintenance of IT has been a critical operational concern. Understanding the current focus on CIO operational excellence requires a view of previous attempts to improve the business of IT.

| | What were the challenges? | What's different in 2010? |
|-------------------------------------|--|--|
| <p>General IT Operations</p> | <ul style="list-style-type: none"> • Focus on IT components, their underlying steps, and technical outcomes (e.g., install a server, implement an application). • Maintenance and care of existing technology components consumes 60 to 80 percent of most IT budgets – and is not well understood by most business leaders. • IT cost centers were organized by technology disciplines or by regions and business units, disjointed from the IT services being provided and from the business value being produced. • Strategic plans typically focused on one-time project costs – with less consideration for ongoing support and maintain solutions. • Support organizations were often externally sourced and separate from teams working on continuous improvement or discretionary spend projects – creating a vicious cycle as the people supporting the system are removed from ongoing changes. Just as impactful, the perspective of those dealing with day-to-day issues of the system were not tapped as an input to guide future changes. | <ul style="list-style-type: none"> • Expanded adoption of IT Service Management mentality, building from ITIL set of best practices to create a formal, service-driven approach to planning, delivering, and supporting IT services defined in ways understood by the business (e.g., onboarding new employees). • Mature tools and processes to provide visibility to underlying costs, capacities, performance levels – articulated in TCO and opportunity costs that resonate with the business. • Ability to tie costs to business demand, with transparency over historical, current, and projected costs. • Escalating support and maintenance costs have caused post go-live considerations to be explicit inputs to the business case. • Forward-thinking organizations create explicit continuity between support and delivery organizations, tasking all parties to continuously improve outcomes – and expressing those outcomes in terms of business value. See the 2010 Technology Trend on Value-driven AMS for more on this topic. |
| <p>CMMI</p> | <ul style="list-style-type: none"> • The SEI's CMMI provides the framework for what processes should be addressed – not the prescriptive definition of how they should be accomplished. • Due to the abstract nature of CMMI, some organizations did not focus on both the execution and the management dimensions. | <ul style="list-style-type: none"> • Disciplines, tools, and prescriptive processes for realizing CMMI maturity are now widely available – eliminating any ambiguity on scope and approach. • CMMI is often adopted in conjunction with other frameworks (e.g., ITIL) to create a more complete operating model. |
| <p>Green IT</p> | <ul style="list-style-type: none"> • Initially, some executives were unable to understand that the benefits from Green IT were both environmental and financial. • Much of the low-hanging fruit around Green IT was connected with enterprise data center cost and energy reduction implications. Since these initiatives reflected “going back to the basics” of good IT architecture and infrastructure design, business cases were hard to build. • A communication gap existed between the IT and facilities organizations of many companies, with some CIOs unaware of IT's share of energy use and carbon impact. Utility bills were typically paid by facilities without a transparent charge-back model for IT, or even the ability to measure, monitor, or report on energy usage and carbon impact. • During the first wave of Green IT, many organizations were overwhelmed with too many competing initiatives – lacking clear priorities and focus. | <ul style="list-style-type: none"> • Green IT has moved to the top 10 list of CIO topics. Benefits of the first wave of ROI (energy, carbon, and cost reduction; improved ability to attract and retain talent; improvements in brand strength) have become widely known. • As the low-hanging fruit gets picked, executives will need to start focusing on the next wave – “IT for Green” – leveraging the IT organization to measure, monitor, and report on overall enterprise sustainability performance. • Industries affected by a potential carbon cap and trade bill or carbon tax, as well as those connected to major supply chains, should be proactive about getting the right systems in place to determine risk and compliance. These systems can also be used to measure performance and help drive the right investment decisions. • Companies taking a holistic approach to sustainability should ensure they investigate the potential for any cost-offsetting opportunities available in the form of tax incentives and rebates. |

Emerging Enablers

CIO Operational Excellence – Built to Run

Technology implications

CIO operational excellence requires a collection of process, people, and technology capabilities. The technology implications are listed below, but cannot be addressed without making simultaneous advances in disciplined governance, organizational and process considerations.

| Topic | Discussion |
|-----------------------|---|
| Governance | Processes Operational maturity with efficiencies, processes, tools, and resources to support ISO, CMMI, and ITIL. Customer service that incorporates a proactive approach to understanding and soliciting customer needs and ideas. |
| Applications | Standardized and integrated SDLC disciplines Requirements, risk, equality, and testing management must be addressed as integral activities in the business of IT. Treating these elements as part of the IT manufacturing process allows effective use of Six Sigma process quality methods to measure and manage IT. Incident and problem management Recording, routing, tracking, and maintaining visibility of open defects, change requests, or larger enhancement requests. Efficiencies can be gained by collectively viewing individual issues to rationalize and prioritize. In addition, feedback can be provided to inform business demand and portfolio planning. Resource demand and capacity planning Tools to aid understanding of role and skill capacity, aligned with sizing estimation tools, workload management, and project/issue/request pipeline to fulfill demand management. |
| Infrastructure | Virtualization, automation, and related infrastructure initiatives have been addressed in the earlier waves of Green IT and IT cost reduction. Server, storage and data center rationalization, power efficient computing and facilities, and physical-to-virtual at levels above the individual server or application are all important and valuable. These drive – and are driven by – both the 2010 Technology Trends on Virtualization and Cloud Revolution. |

Where do you start?

The different dimensions of CIO operational excellence provide some flexibility about where to start. Individual initiatives should take steps towards embedding the “built to run” philosophy as a part of the muscle memory of the IT function. First, make sure any incremental movement across IT operations, IT organizational design, sustainability, or project/requirements/testing management is done with the overarching vision in mind. Effective best practices to consider as you proceed include:

- **Focus on the ends of the IT lifecycle.** It is tempting to immediately focus on the perceived core functions of IT – build and break-fix. But for most IT shops, the real bottlenecks are up and down stream. Upstream includes planning, demand/capacity management, requirements, and scoping/design improvements. Downstream involves quick hits in Green IT and improving lower-level IT service management. These have the potential to lower total cost of ownership and percentage of IT spend dedicated to maintenance and management of existing IT.
- **It’s all about requirements.** Requirements are an excellent place to start – including high-level business requirements to guide investment decisions, high-level technical requirements to guide solution shaping, and detailed functional and technical requirements to accurately drive cost, effort, and timing. With disciplined involvement of the business and a focus on steady-state operational considerations from the outset, estimates can be more realistic and costly scope changes or can be reduced or avoided.
- **IT services, not IT components.** Instituting IT Service Management has the potential to lower total cost of ownership and percentage of IT spend currently allocated to ongoing maintenance and management. Organizations should consider:
 - Building a portfolio of IT services – a catalog of capabilities IT provides to the business and to itself.
 - Creating an IT cost baseline – identify IT spend as the business sees it today, across budgets, cost pools, and allocations.
 - Building an integrated IT service model – covering the people, hardware, and software required to deliver each service and capability.
 - Identifying areas for service and cost improvements – create a roadmap of efforts to drive efficiency gains.
- **Optimize your data center.** Recent advances in virtualization enable cloud architectures and allow dramatically re-envisioned IT asset requirements across computers, network, storage, applications, facilities, and operations layers. Simplifying the infrastructure can not only help ease operating complexity, but can generate quick wins for the organization’s Green IT efforts by reducing energy and carbon footprints.
- **Understand the end game.** Achieving the “built to run” vision should reach every stage of the IT delivery lifecycle. By moving from the outside in, improvements will be more tangible and significant at each step.

Bottom line

Individual IT operations decisions ranging from delivery model to cloud-based management can be greatly simplified by structuring the IT organization according to a “built to run” perspective. By proactively considering ongoing management needs and defining all the implications, the full magnitude of an investment can be weighed at its onset – positioning the organization to make more informed decision-making and to better prepare for the end-game from day one.

The “built to run” concept intentionally covers a broad focus area from Green IT to running IT as a factory. The unifying thread is an up-front focus on ongoing management of an organization’s IT solutions, which should help to couple efficiency goals with broader business and corporate strategies. We use the term “management” as opposed to “maintenance,” which is focused solely on technical break-fixes and upkeep. The difference is an important one, and is the heart of the “built to run” mandate.

3 Cyber-security

Moving from background technology to a priority business discipline

With intellectual property now fully convertible to ones and zeros, it was only a matter of time before defending enterprise information assets became a key concern. For too many years, security has been relegated to the technology agenda and accorded only marginal attention and budget by many organizations. Most perceived the threat to be containable, where a protect-the-perimeter approach was deemed sufficient. Responses were reactive, both to incidents and compliance requirements.

In 2010, the world has changed – and not for the better when it comes to threats. The threat landscape has grown due to proliferation of technology, global networks, and the sophistication of criminals. According to recent FBI studies, cyber-crime – with over \$1 trillion in annual revenues – has outpaced drug trafficking as the largest illicit global business.¹

The threats are not limited to strangers lurking outside the gates. People within an organization’s trusted circle – employees, customers, contractors, and partners – can bring risk as well, both through inadvertent mishandling of information or corruption. This insider risk is growing with the increasing use of insecure social media, phishing and spoofing, and worse. Employees can be preyed upon by well-organized cyber-criminals who thrive on stealing personal and corporate financial information. With the battleground for security and privacy moving inside an organization’s walls, a soft interior defense is no longer acceptable.



The implications of security risks have also transformed. No longer simply matters of fraud, the costs of responding to information breaches can be staggering. Between legal fees, customer communications, good-will spend, and public relations efforts, the hard cost can be significant. Just as important, consumer trust and the company’s brand and reputation are at stake.

Today, cyber-security must embrace both security and privacy as foundational elements of the business. An effective Cyber Threat Intelligence (CTI) program is systemic, well-funded, enterprise-wide, and championed in the C-suite. Cyber-security must be a central component of any enterprise risk management strategy, not just a technology responsibility.

With the battleground for security and privacy moving inside an organization’s walls, a soft interior defense is no longer acceptable.

¹Cyber-crime Revenues Exceed \$1Trillion Annually. (March 2009). *Government Technology’s Digital Communities*. Retrieved from <http://www.govtech.com/dc/628001>

History repeating itself?

Security is hardly a new concern for IT. Pieces of identity management and access control have been in place since the beginning of system design. But the ability to manage and protect the enterprise across resources and players has changed dramatically.

| | What were the challenges? | What's different in 2010? |
|---|---|---|
| Technology-driven Security Solutions | <ul style="list-style-type: none"> • The threat landscape was immature – connectivity was constrained, limiting the impact of global attackers. • Perpetrating attacks required a high degree of specialized knowledge, with only limited ways to attack the soft interior. • Low volume of incidents and lack of disclosure legislation dampened awareness and led to corporate complacency. • Security leaders were mostly technologists without a seat in the boardroom. Security was a low priority item – maintained as a matter of good hygiene, but with small budgets and limited scope. • Technology solutions were cumbersome, required manual processing, and seen as obstructive to the business in their day-to-day operations. • Security solutions focused on perimeter protection only. Protecting internal information assets was a secondary consideration. | <ul style="list-style-type: none"> • Cyber-crime has evolved into a set of highly specialized, mature criminal products and services – driven by the ability to monetize a company's data. • Relatively unskilled individuals can perpetrate damaging attacks. High-acumen entry barriers no longer exist. • Originating in California, state regulations require disclosing of any breach of personally identifiable information – making incidents front page news. • Organizations are staffing Chief Security Officers (CSOs) with a combination of technology and business skills – and giving them a seat at the executive table. • Improvements to underlying security technology have increased automation and usability – driving larger transparency to end-users. • Security is transcending policy-making and technology to become a concern of the extended organization and managed as a part of enterprise risk. • Security solutions protect data at all aspects of the lifecycle – at-rest, in-flight, inside the perimeter, and external to the enterprise. Continuous monitoring, logging, and event correlation are elements of sound security strategies. |
| Reactionary Security | <ul style="list-style-type: none"> • Security worked with a “whack a mole” mentality, gearing up for an immediate response to an escalated issue – either compliance or publicity driven – often for incidents befalling other firms. • Standing budgets for security were small, dwarfed by the sum of costs for fire-drill responses. • Companies didn't focus on understanding their information assets, collecting and correlating threat intelligence, and devising solutions commensurate with risk. • Inability to protect against incidents and breaches using non-traditional routes (e.g., insider threat and compromised assets of business partners upstream in the supply chain). | <ul style="list-style-type: none"> • Security is now looked at as a smoke detector instead of a fire truck, with proactive agendas based on risk and value. Incident response will always be required, but is not the primary objective of the CSO. • It is not enough to protect tomorrow from yesterday's threat. Solutions must be put in place to understand and mitigate risks – not as responses to named policies. • Organizations are initiating “cyber-threat intelligence” assessments to understand how information is managed internally – and valued externally. They are also deploying continuous sense-and-adapt approaches. • Tools and processes must move from managing incidents to recognizing patterns, allowing automated identification, prevention, and closure of risks. |

Technology implications

While security and privacy are moving beyond the domain of technology, the foundation for any protection strategy still rests within IT. The individual solution components have been in place for some time in organizations, but they need to be leveraged as integrated, enterprise assets to protect against 2010's cyber-security challenges.

| Topic | Discussion |
|-----------------------|--|
| Governance | Embedded security concerns Threats and opportunities must be fully understood. Priorities and shared responsibilities must be communicated across the organization, especially outside technology. Communications must be translated into day-to-day activities for stakeholders up, down, and across the core and extended organizations. |
| Applications | Identity management Companies need to move beyond piece-wise, fragmented identity management. It is not sufficient to have separate solutions for physical security, HR roles, permissions for system access, customer entitlement engines, and other isolated controls. Only by having a view across all these solutions can suspicious behavior be automatically detected and addressed. Access control Access rights to data should be developed with a clear understanding of who has access to the information and why – moving to a more focused protection scheme across more granular assets. Cyber-threat intelligence Advanced capabilities including perimeter monitoring for network intrusion detection and conversation recording and reconstruction, threat modeling and tools for lifecycle management, and capabilities to rapidly collect and review forensic information from devices that are suspect. |
| Infrastructure | Hardware solutions Reduce manual steps and increase pattern detection capabilities. Infrastructure solutions have been explored at the server and network layers, with many organizations implementing technology for a singularly managed network infrastructure that uses automated routines to protect data in-flight and at-rest. Device management The ability to protect end-user devices is required – including configuration management, detection of modifications, and policy-based controls. |

Where to start?

Revamping enterprise cyber-security can seem like a daunting task. Luckily, there are ways to improve without unleashing a tsunami of change. Here are some simple steps to consider as you get started.

- **Write the business case.** The value of security must move beyond fear and doubt. Quantifying the potential implications is critical for making the shift from reactionary incident response to enabling new business and IT priorities. Frame security like this: "If we don't do X, we won't be able to do Y." That will help educate the organization on the need for a new approach.
- **Break the misperception of security as an IT silo.** Organizations that leave cyber-security as an IT concern will struggle with risk management. At a minimum, the CFO, CHRO, and business leads need to understand and support the business case. Some organizations have moved security into legal and enterprise risk, and some have it reporting into the CEO to reinforce its cross-discipline importance.
- **Embrace regulation, but don't use it as the goal.** Potential new standards could level the playing field – and help define a target for base-lining minimum response. Don't make that the end goal, but use it as an impetus to change behaviors.
- **Reexamine the role of the CISO/CSO.** In many companies, this will require new organizational structures and skills from the chief security resource – and the need to reach-out across the extended enterprise.
- **What you don't know will hurt you.** Identify data at all areas of the value chain and develop a comprehensive risk profile. It's important to understand the value of an organization's assets – especially how information is potentially monetized by cyber-criminals. Cyber-threat intelligence programs include the creation of a cyber command center and daily regimens to review and communicate emerging threat data, instituting two-way cross-industry intelligence sharing, and regimented threat briefings by line of business/delivery channel.
- **First things first.** Without a robust identity, credential, and access management strategy (ICAM), it is impossible to protect the business. Look to automate wherever possible. Create a repeatable, controls-based approach.

Bottom line

Cyber-security in 2010 is a forced necessity. The underlying idea hasn't changed much, but as threats have multiplied and become more complex, urgency has grown exponentially. The speed at which threats are evolving is outstripping enterprise security adoption – creating an imperative to protect company, customer, and partner information. After years of being asked to justify security's micro-level value to the business, the macro-level importance has become abundantly provable.

Cyber-security can also play a role in growth; it is a key enabler for many technology-led innovations. Every one of the other 2010 Technology Trends has a direct dependency on a maturing cyber-security capability. From privacy controls between cloud providers and subscribers to managing access and entitlements across disparate user engagement channels, cyber-security is essential for any profitable future.

Finally, remember this: Cyber-security is not a project with a beginning and an end point. It spans beyond the IT box, addressing enterprise risk across the business. It must become a part of the corporate genome through a sustained, disciplined approach. The mandate is clear. Business as usual is business at risk. Cyber-security is a discipline that can no longer be ignored.

4 Best-of-Breed Enterprise Applications

Back to the ERP future

Enterprise applications are enjoying a resurgence of sorts – but with a fresh focus on agility and innovation. The days of a single-stop behemoth package to fulfill all of a business’ needs are fading fast. Instead, buyers are seeking to combine traditional packages for strategic standardization in parts of the business, without compromising the ability to use best-of-breed solutions for selective differentiation. They’re demanding the freedom to choose from legacy offerings, new custom capabilities, or other third-party products to satisfy their overall need for delivering results.

In 2010, companies are being driven by their own unique needs across business units and geographies, to explore alternatives to single global instances and universal process definitions. That’s not to say global standard process definitions are obsolete – not at all. For record to report, procure to pay, or other mature process areas, they are just as important as ever. In fact, common processes and data in these areas can be a big part of the business case for enterprise transformation. But, it should not be the de facto answer – especially for organizations with complex structures operating across wide-ranging jurisdictions.

The vendors for commercial off-the-shelf (COTS) software have responded to this growing need. For example, they’ve been acquiring and developing competing modules within a single vendor’s suite. They’ve also been developing and deploying sophisticated, service-driven integration capabilities. Finally, vendors are beginning to offer a hybrid approach to deployment – some parts licensed in the enterprise data center, and other parts subscribed from cloud. This is important for two reasons. First, it allows buyers to split an enterprise application investment into smaller chunks – growing capabilities over time. And second, the focus of transformation efforts can more naturally be split between value creation and efficiency gains.



The efficiency of standardized COTS-based processes is well known. But the ability to innovate and drive incremental business value has not always been at the forefront when it comes to investments in packages like ERP. By enabling customers to innovate and customize their business capabilities, organizations adopting a best-of-breed enterprise application strategy are finding opportunities for true business transformation – met by a diversity of technical and operational solutions that make sense for their specific needs.

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History repeating itself?

For organizations with a long history of ERP, any discussion of best-of-breed will feel like déjà vu. Way back when, things started with dedicated, discrete functional applications such as General Ledger, Accounts Receivable, Fixed Assets, and Inventory Control. This evolved to partially integrated systems such as Integrated Financials and MRP. As automation and integration continued to reach further across the business, companies adopted tightly integrated packages for ERP. Now the pendulum is swinging back to a collection of integrated, discrete functions or services. The difference today is in how they work together – within or across vendor suites – and the shared control frameworks that help maintain a consistent enterprise view of processes and information.

| | What were the challenges? | What's different in 2010? |
|-------------------------------------|--|--|
| Legacy ERP | <ul style="list-style-type: none"> • Businesses would attempt to adopt their processes to technology constraints to preserve out of the box solutions – potentially trading differentiation and agility for efficiency gains. • Integration outside of package boundaries required significant customization and proved challenging – especially in maintaining process and data standards between new enterprise applications and legacy systems. • Long and costly global process template efforts were often modified during country localizations and roll-outs – compromising parts of the value proposition. • Performance, language, and size limitations sometimes forced technology decisions counter to the business needs – leading to proliferation of ERP instances and system workarounds. | <ul style="list-style-type: none"> • Ability to customize individual services or process steps at a granular level, allowing the overarching application footprint to be sourced by best fit solution, regardless of package or custom, internal or external, owned or subscribed. • Continued investments by software vendors in open, extensible architectures and middleware and application platforms (e.g., SAP Netweaver, Oracle Fusion, Salesforce.com's Force.com). • Master data management and improved configuration management support localized solutions without compromising the end-to-end business process or enterprise view. • Infrastructure, database, and application architecture advances allow a truly global single instance. Now decisions can be based on strategic vision of the business and IT. |
| Software-as-a-Service (SaaS) | <ul style="list-style-type: none"> • SaaS represents only part of the best-of-breed ERP story – one type of solution for satisfying pieces of the end-to-end process need. Up to today, SaaS options represent individual pieces of the business landscape – a comprehensive strategy is still needed. • Widespread SaaS (and broader cloud) adoption demands increased focus on security, performance, reliability, and availability challenges. • SaaS delivered in the public cloud can have significant limitations in configuration and customization. | <ul style="list-style-type: none"> • SaaS as a strategic decision within the overarching best-of-breed ERP portfolio is fully viable – especially with the ability to focus on business capabilities where security, performance, and reliability considerations are not as critical (e.g., customer service vs. manufacturing). • Growing SaaS maturity and increasing traditional ERP provider footprint are allaying concerns. • Abstraction of process workflow using a services composition and orchestration layer – along with abstraction of business rules and definitions via a business policy architecture layer – are moving us toward true large-scale, multi-tenant enterprise SaaS. |

Technology implications

Many of the critical needs for realizing best-of-breed ERP fall outside the technology domain. Discipline and governance of the overall business and solution portfolio is essential. Most successful organizations name senior leaders as process owners – responsible not only for business capability and process definitions, but also for directing the supporting application footprint. That said, there are fundamental technology considerations that must also be addressed:

| Topic | Discussion |
|------------------------------|---|
| <p>Governance</p> | <p>Configuration/change/release management As more and more solutions are introduced to meet different business needs, the ability to track, control, and manage the dependencies and versioning of each technology component must be a core competency.</p> <p>Business process ownership Creation of structures and governance to drive accountability for the end-to-end needs of the business. They also define how requirements are met with the best-fit application strategy – and how alignment is maintained with the overarching operating strategy of the organization.</p> <p>Enterprise architecture Enterprise architects should be managing the intricacies of how end-to-end processes are realized across the entire lifecycle of various technology solutions. This is important for portfolio management (identifying cross-organizational opportunities), planning (helping to drive rationalization or re-use of solution components), and support (helping to triage and identify exactly where issues are located).</p> |
| <p>Applications</p> | <p>Integration A best-of-breed enterprise application strategy is virtually impossible without a robust integration architecture. Fortunately, there have been significant advances in this space in the past five years – both in the maturity of dedicated middleware platforms and in enterprise software’s expanded support for interfacing through commercial and open messaging frameworks.</p> <p>Master data management This is a key part of the solution fabric – enabling the correlation and management of critical information entities across multiple systems of record.</p> <p>Software upgrades Dated releases of major commercial off-the-shelf (COTS) software are likely lacking in capabilities for integration of custom or other system solutions. An up-to-date application portfolio is essential for adopting a best-of-breed enterprise application strategy.</p> |
| <p>Infrastructure</p> | <p>Growing abstraction Infrastructure implications are more abstract for the best-of-breed enterprise application trend. There is certainly a need for mature environment management – especially with the number of moving parts involved for each business process. As noted in the 2010 Technology Trend on Virtualization, a strategic focus on optimizing assets can lead to application, infrastructure, and data simplification. As pieces of the end-to-end business process rely more and more on cloud computing, there will be a shift from “own” to “subscribe” for IT assets – resulting in decreases in licensed software and required support.</p> |

Emerging Enablers

Best-of-Breed Enterprise Applications

Where to start?

Organizations can start the 2010 best-of-breed journey by taking stock of their current application footprint. Most companies will find themselves in one of two situations.

First is a “no vendor left behind” scenario – where years of investments have led to hundreds or thousands of solution piece parts that no one has the fortitude to inventory, much less try to fix. In this case, the best-of-breed approach is all about portfolio management. Focus on eliminating unnecessary uniqueness. Define strategic standards that rationalize and drive consolidation. Categorize assets by strategic disposition. Should it be sunset? Contained? Sustained? Grown? This assessment should not be defined just by technical underpinnings, but by how well applications can meet business needs. If you can’t justify why something is unique, it should be targeted for retirement, consolidation, or replacement.

In the second situation, a large portion of an organization’s business processes are realized by a small suite of enterprise applications – either custom or package. The place to start here is by understanding where pain is being felt across the value chain. Areas where package constraints

limit business capabilities or where differentiated functionality has been sacrificed in the name of standardization form the basis of opportunity. Enhanced functionality in new versions of the software packages may come into play, as may new alternatives introduced since original scoping decisions were made. For custom solutions, advances in standards, patterns, and tools provide opportunities to simplify and extend functionality that was previously too complex or expensive. Organizations should investigate current offerings – both of existing licensed software and across the broader market. The cross section of areas with high business need and strong new potential functionality form the short-list of where to begin the best-of-breed enterprise applications journey.

The beauty of this trend is the ability to create a quick roadmap – with bite-sized iterative steps that lead to implementing pieces of functionality as subsets of the end-game solution. A multi-year program implementing a behemoth system is no longer the only option. The 2010 Technology Trend on Services Thinking offers more insight into a capabilities-focused, services-oriented business architecture that is a powerful companion to this Best-of-Breed Enterprise Applications trend.

Bottom line

Many vendors like Oracle, SAP, and Salesforce.com have invested heavily in anticipation of the best-of-breed enterprise application revolution. Their efforts represent an entire technical stack focused on allowing any information or IT service asset to be used as part of an organization’s value chain – regardless of package or custom, internal or externally hosted.

Many Software-as-a-Service (SaaS) vendors are building market segments based on the notion that a company’s business needs can be met by a mixture of specialized solutions that are diversely sourced.

As with most opportunities, the issue will not be the technology. It will be winning the hearts and minds of organizations to re-visit their enterprise application strategies and portfolios – and decide to revitalize those investments. From rationalization to introducing innovative and differentiating piece-parts to the portfolio, there are huge opportunities ahead. The revolution is fully underway.

5 Wireless and Mobility

The battleground for innovation in the untethered enterprise

Mobility in the enterprise is going through a disruptive shift – precipitated by both technology and changing user demand. Ubiquitous wireless connectivity and capacity, powerful terminal devices, and a growing mobile application ecosystem lend themselves to previously unimaginable solutions.

Beyond laptops, Web books, and handhelds, the scope of what is considered a “terminal” device is expanding as more and different equipment is being connected to the network across the value chain. Smart power grids and meters can monitor real-time electricity usage by houses or businesses. Telematics in cars, for safety and security monitoring, automated service scheduling, and driver convenience – all delivered via the Internet. And even Asset Intelligence (another top trend), where real-world assets (e.g., shipping containers, shop-floor machinery, raw material pallets) can communicate events, execute rules, and automate countless tasks. Resources in the field now have access to the full suite of an organization’s IT solutions. They can capture information and provide feedback at the “point of business” like never before – serving the enterprise as sensor, signal, and actuator.

But device and infrastructure improvements are only the medium. The real impact comes from the ability to offer new business capabilities and to radically rethink business processes. Whether you’re arming a mobile sales force with full visibility to customers and products, creating a hospital “cart on wheels” for viewing medical records and images across patients, or automating cross-agency background checks from a squad car during a traffic stop, organizations are creating innovative offerings with content and collaboration moving beyond the desktop.

Advances in mobile business scenarios are the most important part of this trend. They are the conduits for innovation, enabled by advances in devices, which then



push the boundaries of existing infrastructure, leading to new rounds of advances. This has led to mobile application marketplaces and supporting ecosystems in a virtual supply chain of developers, publishers, store-fronts, and delivery systems – with an explosion of interest on both the consumer and supplier side. At Apple alone, there have been at least 115,000 apps downloaded more than three billion times – one billion in the last three months of 2009 alone.¹ From Google and Microsoft, to Ford and Intel and beyond, many other players are offering similar capabilities. The “application” movement is also driving expectations inside companies to improve the capabilities being delivered to a global virtual workforce. It all adds up to wireless and mobility being one of the premier enabling 2010 Technology Trends.

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¹ Jobs, Steve. “Apple’s App Store Downloads Top Three Billion.” Apple, Inc. January 10, 2010. Web. March 24, 2010. <<http://www.apple.com/pr/library/2010/01/05appstore.html>>.

History repeating itself?

The wireless revolution started in the 1990s – and has unfolded with starts and stops, fads, orphaned technology purchases, and outright failures. Many of the challenges presented below remain current in this highly complex, closed environment.

| | What were the challenges? | What's different in 2010? |
|--------------------------------------|---|---|
| Carrier-driven Wireless Era | <ul style="list-style-type: none"> Carrier-controlled platforms and proprietary hardware and operating environments (approximately 35 mobile OS versions currently available across wireless) made it difficult to support multiple standards. This stunted enterprise support of anything beyond voice and general messaging/Internet data packages. High voice and data costs created obstacles for extended roll-out and adoption. Bandwidth and responsiveness continue to be challenges as networks are strained by evolving device capabilities and usage behavior – especially with data. | <ul style="list-style-type: none"> Regulatory changes such as net neutrality and wireless device neutrality are driving open standards. This allows business models to evolve toward open systems for devices and applications. Some carriers allow open sourcing of devices, potentially reducing costs associated with application development, handset devices, and lower royalty or third-party IP fees. Voice is being commoditized and costs are decreasing rapidly in North America. Data usage is growing exponentially and will remain a significant market driver. Innovation in spectrum efficiency is being developed at both the hardware and software level (e.g., beyond 3G, WIMAX, LTE) to solve performance demands from end users. |
| Device and Handset Revolution | <ul style="list-style-type: none"> Device computing power and bandwidth constraints limited features. Compared to desktops or laptops, mobile devices provided limited input (keypads, miniature keyboards) and output features (low resolution, small screen size). Battery life proved to be an inhibitor of enterprise adoption. A mobile worker requires coverage of a full work day. | <ul style="list-style-type: none"> Improvements in chip sets allow devices to multi-task and run desktop-like applications with broadband-caliber connectivity. Platform consolidation and open mobile standards may accelerate functionality and application development. Vast improvements in user interfaces (e.g., multi-touch support, Bluetooth connectivity to other input devices, and large screens). Battery life is constantly improving, with today's devices averaging 10 hours of high-usage between charges. |
| Applications | <ul style="list-style-type: none"> Lack of an ecosystem for developing, publishing, and distributing left most platforms with only niche, in-house applications. Limited number of available applications, typically offered by in-house or a small number of licensed development groups. Application scope largely limited to email, voicemail, limited Web access, or games. | <ul style="list-style-type: none"> A virtual supply chain model has been adopted – integrating the publishing model and store-front for consumers. Large volume of applications available, offering productivity and features compatible with enterprise business. Embedded GPS and carrier features allow location-aware applications, offering innovative new functionality (e.g., innovation in retailing and advertising with location-based advertising, demand generation, and selling). |

Technology implications

Technology implications are large for enterprise customers, with the explosive growth in capabilities of the mobile Internet blurring traditional boundaries and creating new opportunities. Consider these fundamental technology issues that must be addressed:

| Topic | Discussion |
|-----------------------|--|
| Governance | Mobile device management Process discipline around provisioning and supporting device platforms, operating systems, and configuration management is required. Organizations need to monitor changes being made to handhelds and other networked assets – to support business processes and security for corporate data that is accessible on mobile devices. This becomes more complicated when the enterprise releases device ownership to the end user – moving support costs, but adding cost of diversity. |
| Applications | Mobile platform development discipline Employers must enable employees to access critical applications anytime and anywhere – and create new applications required by a newly mobile enterprise. This will lead to the need for mobile platform front-end development skills, expanded integration into legacy back-office capabilities, and increased security/privacy controls for data access and entitlements. |
| Infrastructure | Carrier infrastructure Roll-out of advances in new bandwidth and standards are being forced by the rapid growth in innovation and usage patterns by end-users. This will require both software updates (e.g., shift from EVDO to EVDO/A) and expensive build-out of antennas and towers (e.g., LTE). Devices Shift in open standards, wireless mobility, and expanded functionality for business and personal requirements. Enterprise Decreased need for desktops, facilities, and dedicated workspace will lead to shift in device profiles and physical infrastructure required to support the workforce. Increased need for wireless support internally for buildings that connect to wireless carrier networks. |

Emerging Enablers

Wireless and Mobility

Where do you start?

We believe enterprise mobility will reshape the wireless value chain. Carrier operating models and infrastructure, handset devices, operating platforms, and software development are all likely to be affected.

But for most organizations, the greater impact will be the expanded importance of mobile solutions as part of their business operating model. Clearly defining the business requirements and user needs is the first step. 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 will be enabled. Specific questions to ask include:

- What business processes require – or could benefit from – interaction with employees, business partners, and/or customers away from their desktop?
- Where could these existing processes be improved by increased automation or access to information and services?

- How have competitors used wireless and mobile solutions? What are best practices across other industries that might be applicable to the organization?
- What is the current technology footprint for different user types – including desktop, laptop, landline, handset, printers, voice/data plan, and other devices? Are all of these channels needed for typical day-to-day responsibilities? Are there opportunities for rationalization?
- How can development communities or publically available solutions be leveraged – as point solutions or as inspiration for new solutions?
- What IT governance is in place today – and how can it be extended to mobile platforms?
- What is the organization's enterprise vision – and how does the wireless and mobility strategy align?

Once the scope and business scenarios have been defined, start making plans to upgrade infrastructure and operations. The ordering is important: Wireless and mobility must be understood in business terms – and grounded in value related to real business outcomes.

Bottom line

Too many companies think of wireless and mobility as plumbing – focusing only on infrastructure and the underlying technical challenges of security, privacy, platform standardization, and legacy system integration. But we believe the real target should be the ability to drive business improvement, and that requires vision in scoping both tactical opportunities and boundary-pushing use cases.

The business benefits are multi-faceted. There is a compelling story around IT cost reduction as end-user needs are more clearly understood and assets are simplified. However, soft gains around brand and customer loyalty also exist, especially as consumers demand innovation and broaden their usage of mobile devices. And there is the potential for making positive changes to daily business operations – allowing the business to tap talent wherever, whenever. Wireless is a fundamental enabler in Asset Intelligence (another top technology trend) – enabling non-traditional assets to play a role in the extended IT landscape as both sources of information and actuators of automated tasks. Wireless and mobility provides the foundation for innovation – we believe leaders in the next decade will be those who take advantage of it.

6 Virtualization

How the shift from physical to logical is moving up the value chain – and setting the stage for a potential (cloud) revolution

Virtualization is in many ways a mature capability – with solid adoption across compute, storage, and network layers. It is not a top technology trend because it is new, but because its scope is growing across the stack and expanding to cover facilities, operations, and even business layers. Virtualization is critical to many strategic goals of IT, including IT cost reduction, data center consolidation, architecture rationalization, and the migration from physical to logical that currently culminates in cloud computing. Few other emerging enablers have as much potential to help improve service management, reduce capital expense and ongoing costs, and positively affect every stage of the IT lifecycle.

The cost benefits of virtualization are easy to understand. Reduced data center footprint, optimized application instances, and shared computing resources allow companies to retire servers, redeploy system administrators, and reduce operating overhead. But other benefits are just as appealing. Virtualization allows environments, applications, and data to be dynamically managed – enabling improved coverage and control of development and test environments for better quality assurance throughout project lifecycles. Data storage and structures can be revisited – removing redundancies, while introducing hierarchical storage to reduce spend on frames and spindles. And virtualization promotes innovation – by providing elastic resources that can be borrowed or leased across the organization based on business opportunity and demand.

The net result? IT is able to respond to business demand better, cheaper, and faster – and IT spend can shift from “keep the lights on” to driving outcomes meaningful to the business.

Virtualization is also one of the technologies at the head of the cloud. A highly virtualized infrastructure is typically a first tactical step toward deployment of a cloud computing architecture – where “strategic” virtualization allows fundamental changes to the business model, operating structure, and the way that business processes are enabled.



Multi-tenant stacks will become the norm in data centers, and a large portion of an organization’s IT assets may be virtualized in the cloud.

Virtualization’s impact is increasingly visible to end-users. Virtual desktops are finally gaining traction, allowing users to take their full machine configuration with them across locations and devices. Data virtualization is becoming commonplace to make access available regardless of data or user location. Finally, there is the potential for virtualizing at the workload level – load balancing and dynamically sharing CPU, memory, and storage resources. One hypervisor backing-up another, with automation tools able to shift workloads between resources. These are compelling possibilities for a concept more than 40-years-old – and exactly why virtualization is a top technology trend for 2010.

The net result? IT is able to respond to business demand better, cheaper, and faster – and IT spend can shift from “keep the lights on” to driving outcomes meaningful to the business.

History repeating itself?

The underlying technology of virtualization is evolutionary in nature – representing decades of progress from the mainframe to minicomputers to Unix and distributed computing platforms. Foundational aspects of virtualization can be traced back to the early days of the mainframe platform whereby virtual compute environments were first deployed.

| | What were the challenges? | What's different in 2010? |
|------------------------------|---|--|
| Siloed Virtualization | <ul style="list-style-type: none"> Virtualization of a single domain (computer, network, or storage) has been commonplace. However, coordinating and sharing resources across the platform was not possible. Most solutions were built to run on a single hardware platform – “app per box” – locking in vendors and adding complications for cross-platform interoperability. Difficult to scale and manage resource and load requirements, complicated due to immature and limited tools to manage virtual environments. Limited auditing and security tools for virtualized platforms. | <ul style="list-style-type: none"> Ability to run virtual machines cross platform – creating pools of hardware platforms and easy access to operating environments. Improved resiliency and disaster recovery capabilities. Robust set of management tools, especially cross-VM within a given hypervisor environment. A large skilled and trained labor pool with proliferation of virtualization adoption. |
| Mainframe | <ul style="list-style-type: none"> Resource management and partitioning on the mainframe were sophisticated, out-pacing capabilities in open platforms by more than two decades. Highly specialized and trained staff were required to manage and operate the environment. Software management tools were expensive and available from only a small group of vendors. Complex and expensive licensing schemes based on MIPS usage and/or CPU. Network protocols were not routable and had to be encapsulated for global users. | <ul style="list-style-type: none"> Ability to run hundreds or thousands of isolated Linux environments on the mainframe – coupling the robust mainframe operating platform with open architectures. Native TCP/IP protocol stacks available to the mainframe, alleviating many interoperability challenges. Sophisticated and mature management tools – increasingly capable of cross-hypervisor comprehensive management across the stack. |

Technology implications

The use of virtualization requires new approaches and technology architecture to fully realize the benefits and capabilities.

| Topic | Discussion |
|-----------------------|---|
| Governance | Management Managing virtual machine images and data/application instances requires sophisticated tools and processes. Virtual machine isolation and auditing – as well as resiliency, SLAs, and security – require mature process models that employ ITIL, ITSM, COBIT, and ISO 20000 capabilities. Eventually, management tools will be bundled into hardware that enables automation, security, auditing and reporting of the virtual infrastructure. |
| Applications | Multi-tenancy Historically applications were designed and developed assuming an Intel- or RISC-based operating environment, usually in a dedicated fixed environment with named, largely local resources. Multi-tenancy is becoming a more ubiquitous requirement which solutions must meet in their physical and logical designs. |
| Infrastructure | Hypervisors Future virtualization technologies will employ cross-hypervisor movement and management of virtual machines. This capability can either be viewed as increased management complexity or further simplification of application capabilities in a virtualized infrastructure. |

Where do you start?

Most organizations have made pointed investments in virtualization, following a sound outside-in strategy through the non-production landscape and into non-critical applications. In 2010, we believe there will be a movement to consider higher-order virtualization (operations, facilities, business functions) and core IT capabilities. From tactical storage virtualization to strategic enterprise IT cost reduction, every virtualization effort should consider the following order-of-operations:

- Simplify – eliminate unneeded diversity in environments, platforms, and applications.
- Standardize – establish reference architectures and play books for effective governance and delivery.
- Virtualize – get more logical per physical – compute, storage, network, facility, and operations layers.
- Automate – put technology to work in IT to reduce cost and error rates.
- Integrate – link people, processes, and technology for agility and scale.
- Innovate – SOA, Green IT, Web 3.0, cloud computing, ubiquitous access, and other business considerations.
- Repeat the cycle.

Aggressive virtualization of the IT environment can reduce costs and increase effectiveness. It can also change the IT operating model. One example involves IT chargeback, where business and IT organizations can have different levels of virtualization technologies deployed for servers, storage, and network. Each of these virtual platforms can be further broken down into smaller sets of services, such as CPU, memory, and data storage. Different levels have different chargeback models that will be deployed across organizations.

While technology challenges exist with virtualization, we believe the bigger hurdles are organizational in nature. Strategies to provide support of virtual resources may require a realignment of technical resources and a fundamental shift in responsibilities. This is exacerbated by the need to shift mindsets around ownership and physical, dedicated devices. IT has been trained over decades that vertical integration of supporting infrastructure is the preferred model. The move towards logical IT services with leased or even “pay as you go” resources will require change management to get effective adoption. The C-suite should evaluate the benefits, costs, and risks of an organically enabled IT organization that leverages virtualization, cloud, and multi-tenancy capabilities – and whether those should be built in-house or sourced from a third-party vendor.

Bottom line

Virtualization technology, specifically on the server, has become standard technology in the data center. Data centers themselves are beginning to virtualize, morphing into cloud nodes with resource pools that span multiple sites, supporting on-demand computing needs and real-time failover. Every layer of computing resource is trending towards an aggregate consumption model – not managing individual servers, networks, and storage arrays.

Organizations need to acknowledge all of the challenges introduced with virtualization: Virtual environment sprawl, contentions over software licensing and chargeback models, impact on data center resources, the need for improved change management techniques, requirements for incident management, and implications of security and regulatory compliance. That said, the benefits of a mature virtualization base coupled with the promise of tomorrow’s cloud-enabled vision should be more than worth the additional complexity.

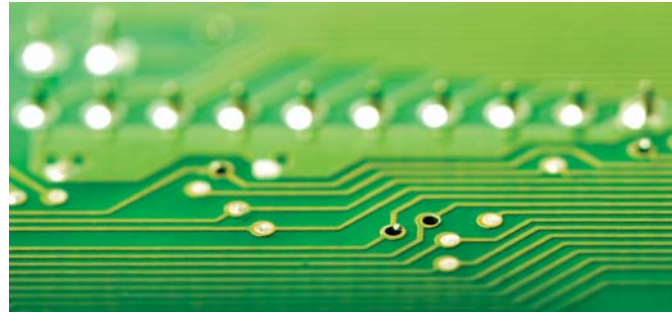
Disruptive Deployments

7 Information Automation

From automating “what I need to do” to automating “what I need to know”

Information technology has grown up in a process-dominated era where automation has focused on the question “What do I need to do?” and the “I” of IT has been something of an afterthought. We believe we have now decisively entered a new era, where automation can help answer a bigger question: “What do I need to know?” In this era, the ability to expose, associate, analyze, and present volumes of structured and unstructured content is one of the untapped sources of competitive advantage.

Accordingly, we are seeing organizations shift their information perspective from tactical, technical concerns to questions at the core of their business strategy. Instead of being driven by reports and data warehouses, they’re tackling strategic issues such as global supplier spend analysis, sales force optimization, and strategic research investment allocation. This trend is resulting in a move from the hindsight of a reporting mindset and the insight of performance management to the foresight of predictive analytics. Information is no longer considered a passive historian, it is recognized as a tool for understanding, reacting, and anticipating across departmental and business silos. For example, combining supply chain, sales, and finance information allows contribution margins to be integrated with production data, producing a more complete picture of product profitability – helping to meet a real business need with real business implications.



Whether the result of a larger transformation effort or a focused stand-alone initiative, the era of information automation has arrived, and organizations are recognizing that it is not optional. CIOs are accepting the mandate to provide both operational stability and insight to their business counterparts – which can only come from a concise view of what has happened in the past, the state of the business as it stands today, and intelligent predictions to feed future decisions. Welcome to the world of “What do I need to know?”

This trend is resulting in a move from the hindsight of a reporting mindset and the insight of performance management to the foresight of predictive analytics.

History repeating itself?

The need for process automation and improved “what do I need to do” are not going away. In fact, there is an even more compelling investment case today than there was 15 years ago. But information has moved from a side benefit to a prime driver.

| | What were the challenges? | What’s different in 2010? |
|---|---|---|
| ERP as <i>the</i> Information Foundation | <ul style="list-style-type: none"> Operational and transactional needs – not information – were the focus of most ERP implementations. Those reports that were included were based on the business processes being automated, not business analytics or key performance indicators (KPIs). ERP platforms had capabilities for historical reporting and decision support, but solutions had limited descriptive or predictive analytics functionality. Efforts to expand tools within the ERP suite often lagged behind the features and usability of dedicated advanced analytics solutions. Executives assumed information would be an output of ERP efforts. However, most implementations did not have an information vision (or budget). Many implementations did not include historical information as part of the data conversion. Visibility was limited to transactions occurring after ERP go-live. ERP solutions propagated the behavior of siloed data and didn’t address organic, home-grown systems and other hidden sources of data. | <ul style="list-style-type: none"> Forward-thinking organizations realize that a large-scale, all-consuming enterprise software package is not a prerequisite for achieving information capabilities. They have launched best-of-breed efforts to realize business intelligence (BI) and analytics solutions in which ERP is viewed as one of the many enterprise data sources. Enterprise technology players have made significant investments and acquisitions in support of their information capabilities. Once integrated into their process execution platforms, there should be much improved ability to realize an enterprise information vision. Multi-year ERP implementations are fast-tracking the master data and business analytics components to accelerate time-to-value, allowing visibility to be a precursor to the roll-out schedule. Enterprises are adopting a business KPI approach beyond operations, incorporating information needs of the business that extend far beyond what the package vendor requires for process execution. Information automation is a different discipline than ERP, requiring a different set of skills, rigors, and methods – especially when not in parallel with an ERP implementation. Organizations realize that ERP represents only a subset of the data required to meet the business’ information needs. |
| Business Intelligence Reporting/Data Warehouse | <ul style="list-style-type: none"> The term “business intelligence” has been used to describe a variety of investments. In many organizations it has been relegated to siloed tool-based efforts to create single-use reports or departmental data stores. Creating an integrated view across structured and unstructured data has required costly investments in enterprise information management – where value was difficult to justify without higher-order information goals. | <ul style="list-style-type: none"> Enterprise information management is viewed as a necessary, strategic capability. Data management, however, is only the base layer of the information value chain. BI supports quantitative performance management, which leads to descriptive and predictive analytics. The distinction between legacy transactional reporting efforts and advanced information integration/analytics can reframe priorities – changing the question from “how many open POs?” to “what is the cross-organizational customer profitability?” A larger and more appropriate set of stakeholders is engaged and invested in information value propositions. |

Technology implications

Governance and changing mindsets about the potential of information are critical to realize advanced information objectives. In addition, there are foundational technology factors that need to be addressed.

| Topic | Discussion |
|-----------------------|--|
| Governance | <p>Master data management As represented in the 2010 Technology Trend on Information Management Goes Enterprise, having the ability to correlate and manage business entities such as customers, products, and suppliers is necessary if information is to be relevant across organizational boundaries.</p> <p>Information quality management Tools and processes for maintaining clean and consistent data are a necessity if information is to be trusted – especially as the scale and scope of usage grows.</p> |
| Applications | <p>Analytics tools Recent consolidation of the market has led to advanced features being integrated into established platforms. Visualization and analytics engines have reached maturity. Usage and management of the tools are becoming the big challenge.</p> <p>Integration Realizing an end-to-end information automation vision requires access to data across and beyond the organization’s boundaries. Increasingly, information solution architectures are not built from movement of data into physical repositories (the data warehouse, operational data store model), but involve in-memory, column-based, virtual data consolidation and processing.</p> <p>Content management The ability to tap into cross-enterprise content (including customers, business partners, suppliers, and public resources) can be essential for historical and predictive analytics – especially given the proliferation of unstructured content (e.g., images, documents, audio, collaboration assets) in most organizations’ operations.</p> |
| Infrastructure | <p>While the majority of information automation’s impacts are at the operational and system level, the shift to virtual information views provides the potential to address overall data sprawl and storage proliferation – leading to a rationalization of hardware. Storage architectures will continue to be adaptive to information architectures, solid state storage will impact the Information Lifecycle Management (ILM) strategy and assumptions, and “storage clouds” will require reassessment of both security and privacy requirements and trade-offs.</p> |

Where do you start?

Most organizations already have access to the raw tools and technologies to begin information automation. The challenge lies in putting them together into a cohesive foundation, while addressing strategic aspirations that involve asking and answering the question, “How do we find out what we need to know?” This requires taking a step back and setting a higher bar for what a mature information offering can do for the business.

Each industry has a different set of core questions that are fundamental – and potentially unanswered by current IT solutions. Here are some examples: “Is the strategic effort around closed-loop marketing paying off?” “How can I bring products to market earlier?” Or the deceptively complex: “What is the real profitability across my customers or products?” The answers to these questions represent significant potential value – and can be used to justify transformative investments in information automation governance, skills, and foundational technology.

The fact that most organizations believe that they already have a mature information management offering can present a potential roadblock. Only if an organization is prepared to consider and measure what is currently known – versus what they really need to know – can a call for change be enacted.

Bottom line

The significance of the move to automating “What do I need to know?” is embodied in the large investments now made by traditional software giants – for example, SAP’s acquisition of Business Objects, Oracle’s acquisition of Hyperion and GoldenGate, IBM’s acquisition of Cognos and SPSS. Owning the information story has become a critical success factor for these platforms that have traditionally focused on process automation.

The growing demand for information management will only accelerate with maturing developments in cloud computing and service orientation. Increasingly, an organization’s decision-making and operating visibility are dependent on business partners, assets, and data that are outside their organizational boundaries.

As efficiency gains based on process automation give way to differentiating visibility and foresight into the health of a business, information becomes the currency on which business strategy can be conducted. And the engine by which growth is driven. Only by acting on this shift in priorities can organizations expect to be ready for the next cycles of competition – and collaboration.

8 Value-driven AMS

Moving beyond labor arbitrage in Applications Management Services (AMS)

With 65 percent of all IT service dollars spent on maintaining existing technology,¹ companies everywhere have been hard pressed to invest more in technology improvements needed by the business. In an effort to trim maintenance costs, many organizations entered into AMS contracts.

Unfortunately, while many have indeed seen their technology costs drop, inefficient processes and operating models have often stood in the way of fully realizing the expected value. Simply put, AMS contractors are no better equipped to add value and improve efficiency than in-house organizations. Clearly defined processes are often lacking, hand-offs between steps of the delivery model are often imprecise, and benefits usually come exclusively from having a lot of low-cost feet stamping out fires. Too often, contracts deliver bodies without service levels – and with little or no upside value added to the IT organization or the business. Even worse, the separation of operations and delivery resources has often led to severe knowledge gaps – hampering the ability to fix issues, leaving organizations with no real way to incorporate feedback from the “run” organization back into planning and build.

Outsourcing was meant to allow an organization’s highly skilled IT staff to shift their focus to business value, business planning, and innovation. But that didn’t always happen. Instead of establishing managed services with effective governance, the organization’s valuable talent was often burdened with the oversight of tactical, repeatable tasks – leaving them unable to innovate.



Forward-looking organizations are taking a new approach, realizing that application management is actually a part of a greater lifecycle – tightly linked to continuous IT improvement and business innovation. By focusing IT staff on governance, they’re supporting the cycles that drive innovation and create business value. Most importantly, they’re adopting an outcomes-based mentality that can drive internal efficiencies in the “business of IT” – as well as improvements in the “business of the business.” We call this disruptive deployment Value-driven Application Management Services – a key aspect of realizing results-driven, value-level management.

Forward-looking organizations are taking a new approach, realizing that application management is actually a part of a greater lifecycle.

¹The State Of Enterprise IT Services: 2009, Business Data Services North America and Europe. Forrester Research, November 2009. Pascal Matzke, John C. McCarthy.

History repeating itself?

Outsourcing as a management lever has been around for almost three decades – historically used in pursuit of cost arbitrage for non-critical business functions. The idea of value-level management through a results-driven AMS approach is new.

| | What were the challenges? | What's different in 2010? |
|-------------------------------------|--|--|
| Application Outsourcing | <ul style="list-style-type: none"> • Labor arbitrage and scale provided some cost relief, but resulted in increased pressure on quality, risk, agility, and internal management. • Separation between maintenance and continuous improvement led to staff augmentation and prompted “over the wall” engineering – favoring specifications over perspective and response speed over insight. • Cost, capacity, and contract execution against tactical SLAs were the primary goals. Process improvements were not priorities since suppliers could squeeze additional margin/improvements from lowering costs and increasing scale. • In some cases, Centers of Excellence were created to provide highly specialized labor pools – but IT delivery lacked cohesiveness. • Attempts to supplement scale resources with higher skill led to prohibitive costs. • Customer service was reactive and IT oriented (e.g., “how quickly trouble tickets are closed”) – which did not always translate to business’ perspective of IT quality and responsiveness outcomes. | <ul style="list-style-type: none"> • Application Management Services are being extended from Operations and Maintenance into Application Development Management and IT improvements, as well as broader lifecycle activities. • The value-level management concept is being industrialized, creating a mandate for highly skilled resources to be involved – to provide insight and perspective rather than “managing the outsourcer.” • Limits are being reached on suppliers’ potential bottom-line cost reduction – forcing a new focus on operational efficiency. • IT Service Management (ITSM) adoption has demonstrated that service-based delivery models can tangibly improve IT operations. • Through Centers of Excellence, organizations can achieve attractive blended rates with AMS. contracts, mixing low-cost capacity with access to highly-skilled senior specialists when needed. • A 360-degree approach to customer care uses metrics and outcomes that reflect customer satisfaction and improvement suggestions. |
| Business Process Outsourcing | <ul style="list-style-type: none"> • Deals were structured around business process improvement and business transformation, but these rarely manifested as repeatable tools and approaches, and resources were extensions of IT outsourcing – lacking domain expertise and requisite delivery model. • Value drivers and desired improvements were too high and not achievable. • The goal was IT cost reduction with Six Sigma process improvement and change management. Large scale transformations focused on IT spend without measuring business value reduced cost, but not to full potential. | <ul style="list-style-type: none"> • Suppliers are defining operational efficiency and value layers to complement traditional AMS of IT operations, maintenance, break-fix, and development. • Benchmarking and advanced analytics are being used to baseline organizational performance and expected improvements. • IT-enabled cost reduction can provide value with improvements in business results. • Value is added through “legacy” enhancements in lieu of large scale transformation. |

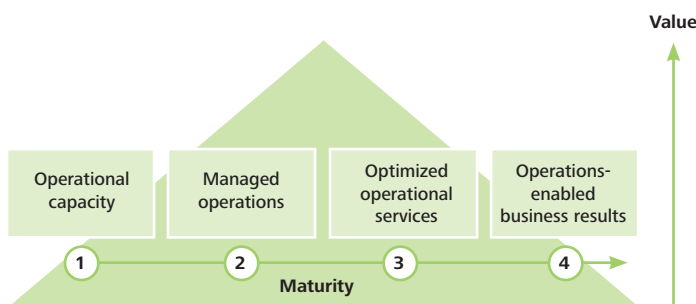
Technology implications

While the rightful focus of Value-driven AMS is on people, organization structure, processes, and governance, there are a number of underlying technology dimensions that are crucial for Value-driven AMS to succeed.

| Topic | Discussion |
|------------------------------|---|
| <p>Governance</p> | <p>Processes Adoption of IT Service Management is driving operational maturity with efficiencies, processes, tools and resources to support ISO, CMMI, and ITIL. Customer service must incorporate a proactive approach to understanding and soliciting customer needs and ideas. This relates to the enabling 2010 Technology Trend on CIO Operational Excellence.</p> <p>Value-level management Delivery models must support the identification, rationalization, prioritization, and business case around potential opportunities. Continuous feedback loops allow innovation opportunities from domain experts to be incorporated in planning cycles – based on the organization’s current operations. Ongoing business case measurement and realization reporting are required for true outcome/value-based efforts.</p> |
| <p>Applications</p> | <p>Incident/problem management Organizations must ensure that the proper tools exist to support the recording, routing, tracking, and visibility of open defects, change requests, or larger enhancement requests. When shifting from core AMS to operational efficiency or value-driven services, organizations have the opportunity to capture additional context around issues – and manage workflow to involve domain expertise as needed.</p> <p>Information management For every level of Value-driven AMS, visibility into performance metrics must be managed and transparent. For outcome and value-based services, descriptive and predictive analytics, knowledge management of previous experiences, and benchmarks need to be tracked, interpreted, and incorporated into goals and supporting processes.</p> |
| <p>Infrastructure</p> | <p>Unlike other top trends, Value-driven AMS is less about underlying infrastructure and operating environments and more about the organization, staffing, and delivery models that companies can use to maximize value from their IT spend. There are, however, some potential infrastructure implications, such as leveraging cloud Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS) for rapid provisioning and agility of the overall IT function. See the 2010 Technology Trend on Cloud Revolution for more.</p> |

Where to start?

Levels of application management services can be thought of as a maturity model – with each subsequent layer adding to the foundation of required capabilities of its predecessors.



As organizations climb in maturity, additional core services are required. Levels are iterative and additive – leveraging pieces of capabilities from lower foundational layers. Organizations will take different actions depending on where they find themselves on the maturity curve.

- **Level 1: Operational capacity:** Here the focus is on creating tools and processes to improve the blocking and tackling of maintenance and support – looking to improve availability and performance against tactical service levels. Organizations should look to take the first steps towards IT Service Management and the “built to run” mindset described in the CIO Operational Efficiency trend.
- **Level 2: Managed operations:** Here organizations have typically started to create structured approaches around the definition and execution of an IT service

catalog. They should drive to improve the efficiencies of the “business of IT.” Six Sigma and lean principles apply – looking to streamline hand-offs, automate manual processes, and reduce the amount of workload for the same end-result. The latter steps of realizing the CIO Operational Efficiency top trend apply here.

- **Level 3: Optimized operational services:**

Organizations at this level have had some success with continuous improvement of their underlying IT operations. They need to continue to pursue efficiency gains for IT, but also extend focus into business-oriented outcomes – identifying areas of potential value addressable through IT maintenance, management, and enhancements. The first step should be defining explicit metrics and proving to the business that the IT support organization can meaningfully drive value.

- **Level 4: Operations-enabled business results:** For organizations operating at the highest maturity level, the challenge is to apply the mentality to net-new opportunity identification. Instead of just suggesting enhancements to existing applications, IT should be proactively benchmarking against desired business metrics and identifying areas of improvement – across process, organizational, and technology dimensions. This is true innovation – where IT becomes a trusted business partner aligned to the same top- and bottom-line goals.

Plans for climbing the maturity model should be based on an organization’s specific value opportunities – balancing new capability introductions with more subtle enhancements of existing functions. Value must be demonstrated at every level – with credibility built through mechanics of low-cost “core AMS” that will be critical at the IT optimization and business outcome levels.

Bottom line

The transition to a value-oriented delivery model in AMS is transformative in nature – and has the potential to be truly disruptive. Successfully adopting the Value-driven AMS model requires a shift to service-driven IT, as well as the need for business operations to transcend historical issues with IT and business process outsourcing.

The tiered model for Value-driven AMS preserves market arbitrage principles for the lower maturity levels – suppliers must match cost structures and service levels as table stakes. But beyond the cost and scale, it provides a vehicle for enabling business results – allowing for resource fluctuations, distribution of risk, and a full blend of specialized skill-sets that need to be accessible at any time by the organization.

9 User Engagement

Right information, right user, right time, right context, right outcomes

For years, organizations grudgingly accepted the “limitations” of IT as immutable truths: Users spend far too much time logging in and out of well-intentioned applications designed around the constraints of information flows instead of real work flows. These individual applications didn’t talk to one another, requiring manual bridges between systems, content, and context – leaving users to their own devices for much of the insight needed to run the business. Dots remained unconnected, critical proprietary information went unmanaged and unshared, and decisions – from shop floor tasks to board-room endeavors – were poorly supported by the enabling IT.

But new themes have emerged. Intuitiveness. Interoperability. Portability. Aggregation. And In 2010, the CIO is challenged with providing a more useful and usable set of solutions for end users. Information must be put in the right context for a given individual at their point of need – with the ability to enable decisive action. That means:

- Modernization of legacy application usability – custom or package – with RIA (Rich Internet Applications) front ends.
- Mash-ups – Correlation, rules engines, visualization, orchestration, workflow, contextualization, filtering and tagging, push vs. pull – reconciling to a “single version of the truth” for customers and products throughout the enterprise.
- Web 3.0 – Social media and information sharing converging with enterprise knowledge management to deliver “insight management” through palettes and tools for collaboration and community performance.

User engagement includes many different components – all designed to enable a shift from content or knowledge management to insight management. Driving the end-user experience are a dynamic workspace, collaboration and productivity platforms, and the ability to incorporate tools for taking action into the experience. Today’s most sophisticated solutions embody many of these dimensions



in a single platform. As long as the efforts are coordinated, organizations can make significant progress by tackling them in multiple pieces, building integrated solutions.

The goal should not just be user productivity efficiencies – effectiveness is even more important. That requires a focus on adoption, context, and enabling effective decision and action – allowing stakeholders to make better use of an organization’s information assets. It means embracing new working styles and enabling tools – allowing people to interact with the organization on *their* terms. User engagement presents opportunities for dramatically improved business processes, services, and models. And when externally focused, it can promote customer loyalty and brand strength. We believe how organizations channel this potential without compromising security, intellectual property, and risk management will be one of the most compelling information battlegrounds of the next decade.

This is the promise of user engagement: Integrating information across technical boundaries, applying intelligence around relationships of data, events, and transactions to promote the right decisions for the business – on the user’s terms.

This is the promise of user engagement...to promote the right decisions for the business – on the user’s terms.

History repeating itself?

User engagement is an extension of one of the formative challenges of the information age – how to allow interaction with information processing on the machine. The QWERTY keyboard was invented in 1874. Serial text entry and 3270 terminals came to be in the 1970s. Graphical user interfaces and the computer mouse were introduced in the early 1980’s. Today’s user interfaces (UI) experiences have certainly evolved, but in an industry riddled with constant innovation, the changes in user engagement have been anything but dramatic. But things are changing.

| | What were the challenges? | What’s different in 2010? |
|---|--|--|
| Enterprise Application User Interfaces | <ul style="list-style-type: none"> • The focus of most enterprise applications was historically on underlying process automation. In many cases, user interfaces were poorly designed, proprietary and mandatory. Organizations had little choice but to adopt. • Each application operated within its own silo – requiring many different screens to do one’s job, and limiting the sharing of information, knowledge, and insight across a worker’s different responsibilities. • Application complexity was exposed to the end-user. The UI was not aligned with how users did their work, requiring multiple tools and views, as well as shifts in behavior. This resulted in high barriers for adoption, requiring robust training and change management programs. | <ul style="list-style-type: none"> • Enterprise applications have shifted toward standards-based, open architectures – allowing the underlying transaction engines to be exposed to whatever channels and front-ends are most effective to accomplish the work. • Integration and service-oriented architectures allow systems to share information much more easily between silos. • Sophisticated information solutions allow intelligence to be applied to data, events, and user behavior, so context can be added to link daily activities and automatically identify areas of potential interest or action. • Ability to deploy independent, intuitive RIA front-ends that can be role-specific – allowing users to engage with the content they need, in flows sensible to the task or decision, and in the deployment channel best suited to desired outcomes. |
| Portals | <ul style="list-style-type: none"> • Traditional “screen scrapers” became portal front ends. But many of these efforts tended toward one-size-fits-all with basic personalization services attempting to provide appropriate context. • Portals attempted to provide a single stop for users, but integration with legacy applications and information repositories proved costly and complex. If incorporated at all, legacy applications often involved only a view of the existing user interface – with data isolated from the rest of the portal experience. • Personalization was often limited to page layout and display options, not content or behavior. • Lack of underlying rules and workflow engines left users to manage the relationships between various pieces of content and applications exposed in the portal – which left them doing fundamentally the same inefficient tasks, just through a new front-end. | <ul style="list-style-type: none"> • Advances in integration, master data management, and process orchestration – as well as a general shift towards open architecture standards – allow mash-ups and composite applications that combine functions and capabilities from multiple sources. • Between advances in development frameworks to portlet standards (JSR 168/286), there have been dramatic advances in how applications are presented and interacted with, as well as how data is visualized. • Engines for business rules and workflow have been added to user engagement solutions, allowing management of routing and escalation logic, tasks, and available actions. |

Technology implications

The underlying technology of user engagement represents changes across the content production and consumption lifecycle.

| Topic | Discussion |
|-----------------------|---|
| Governance | <p>Integrated delivery model To realize the user engagement vision, organizations must have enterprise approaches to information, applications, and interactions with IT across business processes and functions. From aligning investments across an organization’s portfolio to project shaping and design, enterprise architecture, program management, and process/data stewardship will need to be put in place.</p> |
| Applications | <p>User interface Leveraging updated frameworks like JavaFX, Adobe (Lifecycle, Flex, Flash, and Air), and Silverlight, rich Internet applications allow interactive features and data push – as well as increasing support for multi-channel/platform deployment.</p> <p>Master data management Organizations must have a robust master and meta data solution to take advantage of advances in information aggregation, rules-based processing, and intelligent rendering.</p> <p>Knowledge management (KM) Creating a repository of retrievable, searchable content is key – especially as information is increasingly unstructured and originated outside enterprise transactional systems (e.g., news feeds, correspondence, or electronic documents). KM can also play a role in protecting intellectual property and sensitive information from unintended, inappropriate re-purposing.</p> <p>Enterprise applications Custom and package application transactions will increasingly be accessed through avenues outside of the native UI – by internal and external parties. Applications must be realized in a service-oriented manner – with well-defined, self-contained capabilities representing steps in a longer-running, end-to-end process.</p> |
| Infrastructure | <p>Devices Requires a shift from the mentality of laptops/desktops being the only terminal devices. Consumerization combined with generational expectations of the new workforce will amplify the role of mobile, social, and entertainment assets – many of which will not be owned, leased, or controlled by the organization.</p> |

Where do you start?

Organizations looking to start the journey towards user engagement need to take a hard look at their value chain. Study user behavior – with attention on what different systems, data feeds, communications, and unstructured activities are needed for people to do their jobs. Pay attention to how time is split between waiting for systems, manual actions, and other activities. For many companies the results are staggering – both in the magnitude of isolated or off-line transactions required and in the volume of distinct players involved. Patterns become detectable as interactions are repeated in a predictable manner.

From there, identify and prioritize the actual business scenarios. Besides looking for areas of high activity from profiling the user value chain, consider the following as likely candidates for early wins.

- **Multi-step, complicated manual transactions.**

Automation has always been an excellent driver for IT. Lightweight workflow, business process orchestration, and collaboration solutions can be put in place with relatively low overhead – setting the stage for more advanced user engagement.

- **Large-scale enterprise applications (package or custom).** For many organizations, their ERP investment or legacy custom applications are hampered by out-dated or unintuitive front-ends, leading to low adoption or incorrect usage. By creating a rich Internet application UI – with improved usability and mash-ups of related data/transaction – overall enterprise performance may be improved. This is a win-win for both IT and business users because the hard part of underlying process automation gets handled, allowing improved user effectiveness and potentially revitalizing long-standing IT assets.

- **Mobile/field operations not currently enabled by IT.** In conjunction with the 2010 Technology Trend on Wireless and Mobility, user engagement can offer new possibilities for delivering solutions at the point of need – where business is actually conducted. The power of handsets and other connected devices can fundamentally change business processes. User engagement strategies need to accommodate multiple delivery channels, including dedicated desktop clients, Web, and mobile applications – as well as nontraditional areas such as kiosks, point of sale systems, and newly networked assets. This is explored further in the 2010 Technology Trend on Asset Intelligence.

Bottom line

CIOs across all industries are faced with a common challenge: A cornucopia of systems, mountains of siloed data, and a charge from the business for better, faster, cheaper. User engagement leverages new tools and current assets to help drive change from the outside-in. It looks at end users and how jobs are done to inform and improve enterprise intelligence. By aggregating information and IT capabilities, users can be empowered, while advanced analytics and business rules are helping leaders to systematically connect dots and generate insights behind the scenes. Intuitive, simplified user experiences can also promote adoption and proper usage of tools. And by incorporating social media and collaboration community features, a real step towards collective intelligence can be made – harnessing the power of the extended enterprise's collection of experiences and expertise.

It is easy to get lost in any of the building blocks of user engagement – social media, collaboration, knowledge management, rich Internet apps, mobile solutions, and enterprise applications. Each represents exciting new technical platforms and functionality – and could easily consume a CIO's attention. But we have seen the benefits that can be achieved by taking a step back and remembering what all of these advancements seek to solve in the first place.

The way work gets done is changing. As is the relationship between the organization, customers, and business partners. Regardless of industry and operating strategy, we believe organizations that engage their users will have a competitive advantage today – and an excellent entry to tomorrow.

10 Services Thinking

SOA what? Service orientation extends to the business

Service Oriented Architecture (SOA) grew as a technical answer to an age-old question: How do companies gain agility and flexibility – especially in a world increasingly dependent on complex, interconnected IT systems?

Unfortunately, the potential of SOA has been constrained by its very definition. By confining SOA to the realm of IT, opportunities have been largely limited to Service Oriented (Software) Architecture. In 2010, look for SOA to move powerfully outside of IT into business strategy, organization design, and governance models. It's what some call Service Oriented (Business) Architecture – and it's a new way to manage the relationship between business and IT. This holistic approach is the essence of Services Thinking.

With Services Thinking, organizations focus on what capabilities each part of the business needs to compete effectively. They then decompose those capabilities into more manageable, independent pieces to enable rapid prioritization and alignment. The solution is operationalized through a series of service-oriented activities tied to underlying information and IT systems.

The technology behind SOA has reached maturity. Package vendors have opened their architectures and supported integration standards, removing the technical barriers to inter-application communications. Forward-thinking organizations are now applying these powerful tools to their overall IT delivery models *and* to their business strategies. They are finally starting to tap into SOA's long-touted potential.



With Services Thinking, organizations focus on what capabilities each part of the business needs to compete effectively.

History repeating itself?

Don't make the mistake of relegating Services Thinking to the technology domain – especially to the narrow area of Service Oriented (Software) Architecture. The power of the concept lies in applying the principles to the business and to managing the “business of IT.”

| | What were the challenges? | What's different in 2010? |
|---|--|---|
| Service Oriented Architecture | <ul style="list-style-type: none"> • SOA's hype cycle was especially steep. Lofty promises were met with disillusionment. Misperceptions remain around the potential and track record of SOA. • Misalignment between service-oriented technology and stove-piped business operating models made it difficult to position and govern true technology-enabled business services. • Early SOA suffered from lack of maturity in orchestration, security, distributed messaging, and processing logic. • Limited support for standards across commercial off-the-shelf package players underscored uncertainty and risk. | <ul style="list-style-type: none"> • The hype curve has moved on to cloud. SOA success stories are quietly replacing the backlash from early experimentation. • Services Thinking helps address SOA misalignment – establishing skill-based competencies and a capability-driven business delivery model. • Tools and open-standards have evolved – including out-of-the box support from almost every IT vendor in the software, platform, and operating environments. |
| IT Services Management (ITSM) | <ul style="list-style-type: none"> • Scope was constrained by design to lower-level technology capabilities. Though ITSM has been adopted by many IT organizations to improve the business of IT, it has not directly addressed the business of the business – strategy, alignment, or agility. | <ul style="list-style-type: none"> • Organizations have the ability and mandate to apply service management principles outside lower-level infrastructure and application support – into other dimensions of IT and business operations. • There is a shift toward measuring performance in terms of defined business outcomes and long-term value objectives. |
| Business Process Reengineering (BPR) | <ul style="list-style-type: none"> • Though it promised dramatic efficiency gains, the wave of 1990's BPR did not have sophisticated technologies to support recommended implementations. • The big-bang implementation model made it difficult to selectively address specific capabilities – and challenging to realize positive change in manageable increments. | <ul style="list-style-type: none"> • Supporting technologies have evolved – with mature tools for integrating and managing information, productivity, collaboration, process automation, workflow, and integration. • Organizations are able to use an incremental, federated approach to business or functional scope and associated IT elements. • Advances in data management and integration mean organizations can retain appropriate pieces of legacy systems in their end-to-end processes. |

Technology implications

Underneath the business and operational considerations of Services Thinking lie important technology components to support an integrated, agile enterprise. These components are grounded in the idea that organizations live in a service-oriented, event-driven world. Of chief importance:

| Topic | Discussion |
|------------------------------|--|
| <p>Governance</p> | <p>Business process management Orchestration and automation of multi-step, complex business processes – typically bundled with a business-rules engine for managing logic and workflow tools for managing manual interactions.</p> <p>Enterprise architecture Services Thinking promotes re-use of technology assets across initiatives. This requires processes for shaping solutions and enforcing standards, as well as service registries and asset repositories for managing dependencies across IT components.</p> |
| <p>Applications</p> | <p>Enterprise service bus Advanced integration platforms allow scalable, secure, reliable messaging with dynamic routing and distributed features. This enables process choreography, transformation, mediation, and management – ideally through a standards-based approach.</p> <p>Master data management Coordination of core business entities across internal and external business services requires master data normalization and governance.</p> |
| <p>Infrastructure</p> | <p>Extended value Infrastructure in traditional terms supports the services, functions, and tools used to execute SOA solutions. In terms of service orientated architectures specifically, there are no major technology implications for infrastructure per se. However, SOA <i>does</i> promote leveraging existing assets and investments.</p> |

Where to start?

With a broad innovation like Services Thinking, it's easy to make things too complicated and over-spend up front. That said, it still makes sense to start with the end in mind. Make sure you define the goals and vision sufficiently to guide both initial and incremental investments.

In the year ahead, consider targeting specific functions and processes where the business is constrained because of complexity. Identify compartmentalized, commodity business functions where repeatability and efficiency matter most. By treating these core capabilities as services, companies can expand sourcing options to include out-of-the-box ERP, legacy systems, BPO, or cloud offerings.

In addition, focus on opportunities to drive competitive advantage by improving agility and operational flexibility. These areas require solutions that anticipate and enable frequent change, be it from market or regulatory forces, competitive pressures, or internal innovations.

Once a roadmap for functional scope is determined, move on to foundational layers. Be sure to build in a plan for measuring impact. Many successful organizations adopt a "just in time build-out" model – creating just enough business, organizational, and IT infrastructure to meet early objectives, without diluting future growth. Manual workarounds and governance can be used in many areas up front, though they'll eventually give way to automation and policy engines. The journey to Services Thinking is marked with a cadence of demonstrated value, even as the groundwork is being laid for future realization.

Bottom line

By late 2009, most forward-thinking companies had made some investment in SOA – but few had realized the promised outcomes. That's because the *technology* tenets of SOA are mostly evolutionary improvements to long-standing software development principles. Same wine, different bottle.

The real potential comes from crossing IT's boundaries. For Services Thinking to drive real impact, it requires an end-to-end services mentality. Instead of focusing on business process design, shift to identifying, prioritizing, and decomposing services which make up business capabilities. Look at packages and large-scale legacy systems not as black-box absolutes, but as collections of discrete, re-useable services that enable agility.

Lofty ideas? Perhaps. But the major commercial off-the-shelf (COTS) providers are investing billions to make it a reality. That shows that Services Thinking is more than the technology flavor of the month. It's a smart new way to help drive more business value.

11 Asset Intelligence

Bring your value chain to life using signals, not just sensors

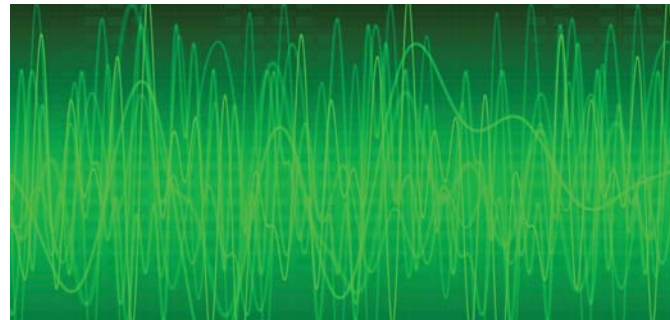
IT models of business operations have long relied on software abstractions and data approximations, with decisions derived from information systems running within corporate data centers. Other company assets, such as finished goods, equipment, materials, plants, and even many employees, were disconnected or passive participants. Until now.

The goal of IT should be to shift business decisions from reactive to proactive, to predictive, and ideally to automated. In 2010, companies have the opportunity to redesign their IT environments toward this goal – using assets as the starting point. What is an asset? Anything that is important to you and your business.

Through advances in auto-id, sensors, remotes, and wireless devices, it is now possible for any and all business assets to produce data and initiate events. From the simple pinging of current status to the detection of physical movement, changes in temperature, geo-positional tracking, chemical trace reads, biometric identity input, and more, assets today have an unprecedented ability to become sources of information.

Asset intelligence is not just about producing signals. It's also about responding to them – allowing assets to consume events and automatically execute tasks – all at a much more granular level than ever before. By moving decision and action to the edge, asset intelligence provides a network effect for distributed assets, an embodiment of Metcalfe's Law, where the value of the network increases exponentially with the number of connected systems or users.

But the key is not just plugging more things into the network or creating more raw data. Asset intelligence also focuses on interpretation and insight – dealing with events and relationships, not just the underlying assets. It's about signals, not sensors, and the difference is monumental. Having visibility into the temperature and humidity levels of facilities, the location of raw materials, and the status of a production line is interesting. But being able to



piece the events together to help make faster, smarter decisions – that's magic. Realizing that a pallet of paper has been in a room exceeding acceptable humidity levels for five days. Understanding that the saturated paper will cause failures in the pressing machinery at its current settings. Automatically adjusting the machinery controls. Signaling operators to investigate the building's HVAC system. Turning discrete bits of information into business meaning, leading to action. These are the essence of asset intelligence.

Asset intelligence depends on underlying sensors and data, but that's not enough. Volumes of raw information do little to help the business. The real value comes from creating an "asset engine" with rules, workflow, understanding of systematic relationships, and the ability to correlate events with business meaning. The goal is signals with business context, predisposed towards action. The net effect? Asset intelligence allows business processes to be re-envisioned to help create value from parts of the balance sheet that have been dormant in the IT landscape. This is a shift from push to pull, from supply-driven to demand-driven models for business decision and action.

Asset intelligence also focuses on interpretation and insight – dealing with events and relationships, not just the underlying assets.

History repeating itself?

The concept of tapping into devices for automation and improved information is anything but new. Just ask General Motors, who commissioned the first programmable logic controller in 1968. The difference today is in flexibility, usability, and intelligence – interesting from a technical perspective, potentially game-changing when empowered for the business.

| | What were the challenges? | What's different in 2010? |
|---------------------------|--|---|
| Machine to Machine | <ul style="list-style-type: none"> • High costs of sensor hardware (ranging from \$10 to \$700) forced limited coverage of assets, prohibitive total cost of ownership (TCO). • Limited computing power at the edge. • Limited availability of wireless network options; those that existed (VSAT) were too costly to embed in mobile devices. • Silos of data obscured business context – isolated input yielded volume but not insight. • Prescriptive usages (e.g., shop floor manufacturing sequential relay or motor control) were tied to proprietary hardware and networks. • Difficult to use the data that was generated – with no way to process, interpret, or take intelligent action. | <ul style="list-style-type: none"> • Dramatic reduction in sensor cost profile (ranging from \$0.05 for arrays to \$200 for high compute/multi-comm devices). • Server-like processing and performance characteristics – allowing business process automation, rules engines, workflows, and other higher order decisions to be made at the edge. • Ubiquitous tiers of wireless connectivity at acceptable cost profiles, with ability to embed hybrid network access in devices (WiFi, 3G, satellite). • Systematic relationships defined to add intelligence, event context, task automation. • Modern platforms (e.g., Microsoft, Axeda, Honeywell, and others) manage communications and data translation with low-level devices, giving organizations much more flexibility in defining custom asset and event definitions for their specific needs. • Leading platforms include integration, workflow, business rules engines, and collaboration components as part of their asset intelligence solutions. |
| RFID | <ul style="list-style-type: none"> • Tags provided location information, answering “where has an asset been?” – not “where is it now?”, “where is it going?”, or “what did it weigh when it was here?” • Required costly deployment of readers across rigidly prescribed route; limited coverage when “off the worn path.” | <ul style="list-style-type: none"> • Asset engines allow events from many different sources to be collected, interpreted, and understood with a business context. Move from discrete data to systematic insight – across the entire business process. • Array infrastructures allow much broader coverage than conventional antennas. |

Technology implications

The underlying technology of asset intelligence involves much more than the commodities of sensor hardware and communications devices.

| Topic | Discussion |
|-----------------------|--|
| Governance | Information management Metadata of asset classes and events are the building blocks of asset intelligence solutions. This must be linked to master data management and data governance solutions to maintain relationships and single definitions of truths. Analytics and business intelligence can help extend asset intelligence's usefulness – from historical analysis to real-time visibility to predictive and prescriptive behavior. |
| Applications | Asset engine This is a platform for native device communication, execution of business rules and workflow on network enabled devices, and signal creation and transmission. Flexibility for scalability, transmission channels, security, and reliability are desirable – as is interoperability across hardware and networks. Integration Integration services, especially Service Oriented Architecture (SOA), form the foundation of guaranteed messaging, routing, and enabling systematic relationships to span into other systems and data sources. This is especially true for ERP or large-scale custom platforms. Master data management As related to the 2010 Technology Trends on Information Management, User Engagement, and Information Automation, organizations must maintain relationships and consistency of core enterprise data across internally and externally sourced services and assets. |
| Infrastructure | Sensor equipment The device market has matured in recent years in terms of power, cost, and usability. While a critical part of asset intelligence, the underlying sensors and controllers are becoming a commodity. |

Where to start?

Most organizations have plenty of physical things and associated data that drive their business. But not all objects lend themselves to the business results of asset intelligence. Start by asking the following questions:

- What is an asset?
- Which assets play a significant role in targeted business processes?
- What information would be valuable to extract from each asset?
- What signals do you already capture, and how?
- What actions can each asset potentially undertake?
- What are the critical interactions or relationships between assets?
- What improvements or innovations could occur with real-time event visibility or task automation at the asset?
- Where is the latency in your value chain?

The analysis should be done across a company's entire value chain – from receiving dock to shipping dock to customer delivery, from shop floor to accounting to the CEO's office. Some scenarios will be obvious – like the importance of understanding location, movement, temperature, and contents of a shipping vessel. But others could be more subtle.

- Understanding duress (inversion, vibration, acceleration) of fragile goods or materials across the value chain.
- Managing the relationships between pressure gauges, valves, and pumps of an energy pipeline.
- Tying together physical and IT security systems to track front-gate, floor, device, and system access to determine suspicious behavior.
- Providing audit and financial accounting trails of goods and equipment – because every transaction in the enterprise has taxation implications.

Once an opportunity is identified, advancements in sensor hardware and other means of automated data capture make enabling data the easy part. And it can be built on existing sensors and controllers – not the “rip and replace” philosophy of past years.

Building the asset engine is where the complexity lies – allowing proprietary technologies to work together, defining the business rules and correlation services to enable relationships and context, and implementing workflow and security to allow trusted automated decision making. Many IT organizations have already begun investing in these disciplines. It is crucial that asset intelligence fit into the overarching information strategy and be tied from the outset to business objectives. If sold as a “machine-to-machine” play – focused on infrastructure and sensors – the real potential of asset intelligence will not likely be realized.

Bottom line

The underlying technology of sensors and wireless embedded devices is an important evolution, but is not in itself compelling. Asset intelligence is the application of those technical advancements to produce real business value. It is closely related to the thrust of the 2010 Technology Trend on Information Automation – the shift from hindsight to insight to foresight.

Asset intelligence breaks-down the paradigm of IT as “collect, aggregate, then decide” to a more real-time “sense, decide, and act.” It empowers more of a corporation's balance sheet as potential inputs to process and information automation – at ground zero of business operations. And ultimately, it shifts IT from a hypothetical model of the business to an active participant – allowing decisions to be made and insight to be gathered across the value chain.

12 Cloud Revolution

Cloud services – from technology evolution to business revolution

By helping organizations radically lower their cost of entry, speed time-to-solution, and put into place new models for elastic scale and pricing, cloud represents a compelling new chapter for how enterprises can better use IT. Though the technology itself is evolutionary in nature, its business applications are nothing short of revolutionary.

In many ways, cloud follows a familiar adoption curve of potentially disruptive technologies. The first phase has been about helping organizations do many of the same tasks they've always done – just better, faster, and cheaper. Companies are starting cloud conversations today primarily because they want faster speed-to-solution or reduced CapEx over OpEx for some IT enablement. Interesting? Yes. Impactful? Absolutely. But not really revolutionary.

It's the second phase of adoption that's disruptive. Beyond the conventional cloud layers of infrastructure, platform, and software is a potentially revolutionary use of cloud in and across the business. Some market players are wholly recognizing new approaches to provisioning and delivering current services – or even introducing services previously unrecognized in the market. They're leveraging cloud architecture and services to compete in new ways, delivering finished business services – Business-as-a-Service – without subscribers having to operate systems or software. They're creating new business models, such as cloud brokerages, to take advantage of dynamic supply and demand. These business models operate on a continuum from consolidated store fronts to full services arbitrage. This second phase of adoption is relevant both to cloud service providers and cloud service subscribers, for public cloud, private cloud, and everything in between.

Because cloud computing can have a profound impact on a company's IT model – and business model – technology and business leaders need to understand the broader impact of cloud capabilities. It's not just about the challenge of determining the right cloud vendors and implementation strategies. Data management policies,



security, risk, compliance, and even tax strategies are also areas that can be significantly affected by cloud adoption.

The cloud revolution offers the potential to increase IT capability, agility, and flexibility – allowing for dynamic scaling of resources, aligned with the speed of business change. Overall IT spending may be lowered by decreasing IT capacity inefficiencies using a “pay-as-you-go” model – requiring fewer data center resources and reduced maintenance costs. And perhaps most importantly, organizations are seeing accelerated time-to-benefit with reduced start-up costs, shorter project duration, and improved results. There are also potential tax and accounting benefits due to R&D capitalization rules and the opportunity to treat some IT costs as operating expenses rather than capital investments. These business dimensions are what make cloud so important – and revolutionary.

The cloud revolution offers the potential to increase IT capability, agility, and flexibility – allowing for dynamic scaling of resources, aligned with the speed of business change.

History repeating itself?

The underlying technology of cloud computing relies on a set of technology and operations advances representing decades of progress in virtualization, distributed computing, high-speed networking, automated provisioning, service-oriented architectures, and more. There have been many previous attempts to commercialize pieces of this technology.

| | What were the challenges? | What's different in 2010? |
|--|--|--|
| Application Service Providers (1998-2002) | <ul style="list-style-type: none"> • Applications were designed with the mindset of a dedicated operating environment – on a physical machine with local resources. The lack of multi-tenancy architectures and management tools often led to dedicated hardware/software stacks for each customer – compromising cost efficiencies and eroding margin. • Bandwidth and hardware limitations led to performance, reliability, and scalability issues. • IT organizations resisted the real or perceived loss of ownership and control – partially out of self-preservation. | <ul style="list-style-type: none"> • Multi-tenancy has been implemented across the stack – allowing partitioning and protection schemes at the operating system, data, application, and user layers. • Operations support systems (OSS) and business support systems (BSS) are maturing for both public and private cloud management. • Network and hardware advancements make remote enablement of pieces of critical business processes viable – across performance, availability, and cost dimensions. • The global economic recession led to an increased role of the business in software selection and cost reduction, driving adoption of Software-as-a-Service (SaaS) solutions. |
| Grid Computing (2003-2006) | <ul style="list-style-type: none"> • “The network is the computer” – though famously promoted by hardware, database, and systems software providers, the lack of multi-tenancy application architectures and related security capabilities undermined these impressive technical advances. • The market was crowded with contradictory approaches (e.g., a blade philosophy of horizontally scalable, modest discrete parts vs. an approach of vertically scaling large footprint appliances). | <ul style="list-style-type: none"> • Underlying computing, storage, and data layers are increasingly abstracted from the consumer, shifting to a true utility model. • Proliferation of supported infrastructure, platform, and software offerings built around cloud principles. • Continued hardware advances are improving performance, bandwidth, and scalability. • Emerging <i>de facto</i> and <i>de jure</i> standards support interoperability and diversity of providers. |
| Cloud Commercialization (2008 and beyond) | <ul style="list-style-type: none"> • Cloud computing is a multi-faceted concept without universally accepted definitions. • Organizations are awash with partial and inaccurate understanding of cloud – causing confusion and barriers. • Similar to the eBusiness frenzy of the late 1990s, every supplier has rebranded products as cloud – diluting the marketplace. | <ul style="list-style-type: none"> • Definitions for the types of cloud (infrastructure, platform, software, business), disposition of cloud services (public, private, hybrid, community, and virtual private), and business model (subscriber, provider, broker, and enabler) are gaining traction. • Free-market principles are forcing fringe products from the space, with higher-tier products gaining share. • Emergence of “capability clouds” offering clearly packaged services with direct business relevance and value, such as collaboration cloud, analytics cloud, and development or testing environment capability clouds. |

Technology implications

The use of cloud computing requires new approaches and technology architecture changes across the infrastructure, platform, and software layers.

| Topic | Discussion |
|------------------------------|---|
| <p>Governance</p> | <p>Maintenance and management Cloud service providers – either for public clouds or in a private cloud configuration – require mature operation support systems (OSS) for managing virtual machine images and data/application instances. Similarly, cloud services (topology, segmentation, traffic) must be configured and managed to maintain desired service levels. They also require business support systems (BSS) for subscriber management, billing, service catalog management, capacity planning, and business management.</p> <p>Cloud service subscribers require similar management tools and disciplines to plan and control the adoption and proliferation of cloud services throughout the enterprise. Effective adoption of IT Services Management (ISO 20000) and Information Technology Infrastructure Library (ITIL) disciplines such as an integrated Services Catalog and Configuration Management Database (CMDB) may allow for more effective adoption and more clarity for related business case value delivery.</p> <p>OSS and BSS reference similar capabilities in the telecommunications service provider space. The transformation of the telecommunications industry and resulting impacts and convergence with media and high-technology sectors is a strong historical cognate to this 2010 disruptive trend.</p> <p>Application development and management services The tradition of isolating applications management through outsourcing contracts undermines the full lifecycle value mindset required to drive continuous operational improvements and innovation. A shift to Value-driven AMS (another top technology trend) will help sustain the innovation opportunities inherent in the cloud revolution.</p> |
| <p>Applications</p> | <p>Application architecture The 2010 Technology Trend on Services Thinking speaks to the move from SO(S)A – Services Oriented (Software) Architecture – to SO(B)A – Services Oriented (Business) Architecture. Effective adoption of cloud services implies a services-oriented architecture for both applications (business capabilities) and operations. Software, data, security, and other IT services must be adapted to take advantage of the multi-tenancy, IP ubiquity, scale elasticity, and other essential characteristics of cloud.</p> <p>Security and data privacy The multi-tenancy nature of cloud – particularly outside the private cloud implementations – demand an increased focus on the ability to control access, maintain confidentiality of data and intellectual property, and protect systems and data from compromise. Solutions and standards are emerging now to deal with this array of challenges, as noted in the 2010 Technology Trend on Cyber-security.</p> <p>Integration Most organizations will deploy a hybrid cloud of conventional (on-premise) and cloud services for end-to-end solutions. The ability to seamlessly compose and orchestrate service execution and provide information visibility across these disparate components requires a robust integration architecture.</p> |
| <p>Infrastructure</p> | <p>Availability Enterprise cloud requires the ability to define and enforce availability, reliability, and performance Service Level Agreements (SLAs), as well as data archiving approaches aligned with strategic – and lawful – storage/retention policies.</p> <p>Environment rationalization Cloud allows organizations to exit non-core activities such as hardware and COTS software procurement and maintenance. Accordingly, reliance on local, owned resources will decrease – allowing lower IT cost profiles and the potential to redeploy resources against more strategic, business-facing concerns. This is enabled by the 2010 Technology Trend on Virtualization.</p> |

Where to start?

There is no single form of cloud computing, or single best method of adoption. The answer will depend on both the intended use and the maturity of the organization. But some themes emerge.

Adoption is typically easiest supporting new non-mission-critical applications, where reduced start-up times and lower up-front capital costs are the most compelling. These may grow into more substantive investments as solutions are proven. Likely candidates for initial infrastructure services include disaster recovery, overflow or surge capacity, and high performance computing applications. Platform-as-a-Service, such as test and development systems, messaging and collaboration, and website hosting are common early targets (especially intranet or non-critical capabilities), leading to rapid application deployment for specific business units/functions. For SaaS, most organizations start with sales force automation, CRM, or other non-core business functions – growing into more “core” functional applications as the SaaS offerings mature and as IT and the business establish a cadence for cloud service adoption and management.

Wide use of cloud computing for critical business applications such as supply chain and manufacturing are likely to accelerate, with adoption dependent upon resolving questions related to integration complexity, licensing, SLAs, and operational stability. As the largest ERP players move into the cloud arena, and as early adopters publicize success stories, these reservations will ease. The “killer app” event for core enterprise services in the public cloud requires the business policy configuration for ERPs to be abstracted into a separable architectural layer for both multi-tenancy management and for more effective recomposition and orchestration of information services within large and global enterprises.

The truly sweeping impact of the cloud revolution will be seen in deployment and adoption of true services grids – moving beyond the one-to-one relationships of subscriber and provider into many-to-many relationships of multiple clouds interacting for the maximum value to the subscriber business and for the provider efficiencies.

While we watch for that step, organizations can start today by looking at the following five cloud characteristics. If the company’s business problem or proposed technology solution requires at least a majority of these characteristics, then it makes sense to continue a cloud dialog:

- End-user self service (automated customer subscription and provisioning)
- Location independence and multi-tenancy with regards to service delivery
- Network ubiquity (access anytime and anyplace there is an Internet connection)
- Elastic performance and load (both up and down)
- Elastic pricing and contract terms (“by the drink”)

Start the journey with a toe-in-the-water – with a business case for a simple pilot project. But don’t assume cloud is a silver bullet. Plan, measure, and evaluate costs and benefits before, during, and after. Finally, don’t forget to address the underlying issues of the new business model or operating model. What are the appropriate account treatments for cloud subscription costs? What about tax jurisdictions for location-independent service provisioning? Are the current risk management and controls architectures appropriate and sufficient in a potentially distributed and inherently services-based environment? What information privacy and security requirements change in this world? This seems like a long list, but the business case must include these considerations.

Bottom line

It’s hard to recall a recent technology development that has been accompanied by more hype and expectations than cloud computing. Why all the excitement? It’s an idea actually backed by substance, with a clear value proposition driving customer demand. The convergence of standardized Internet technologies, virtualization, and automation of large-scale data centers has created a set of software services that were unthinkable even a few years ago. The qualities that define cloud computing – on-demand service, elastic capacity, and variable consumption – represent a powerful new way to deliver IT services. But it is the ability to enable new business services and business models that makes cloud truly revolutionary.

Conclusion

When trends collide

Emerging Enablers are, by definition, already in play. Almost all companies have investigated them in some way, and many have made investments. But important developments have expanded each story, adding compelling new dimensions. We recommend taking a fresh look at each Emerging Enabler to see how it can be applied in the near term – and if new investments make sense.

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

Consider taking these steps and you'll be ahead of the game. But if you really want to accelerate value, do one more thing. Move beyond individual topics and look for patterns of potential.

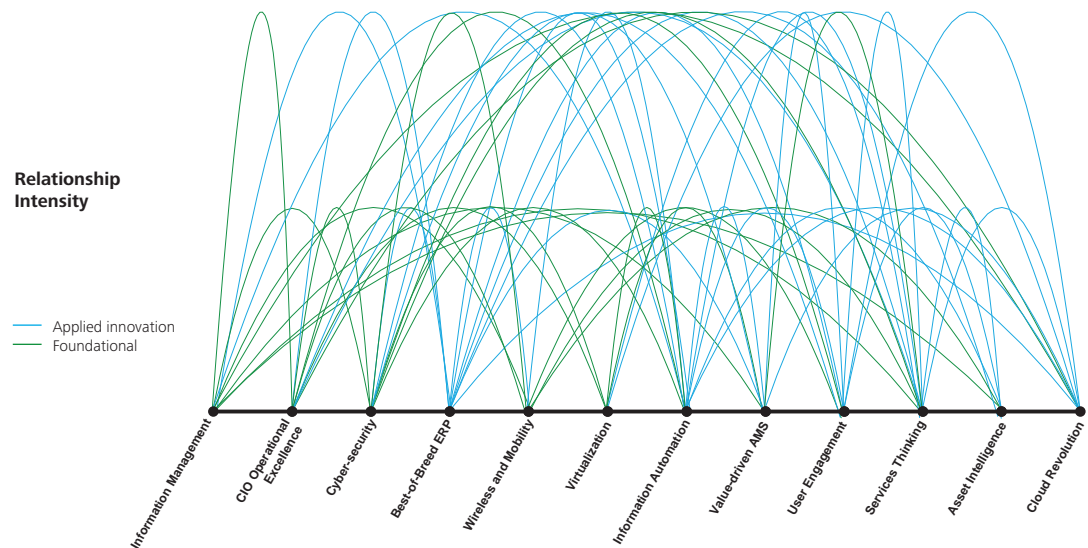
Each trend is important by itself, but a multiplier effect kicks in when you look at them together. For example, some trends are interdependent. Cloud is built on the shoulders

of Virtualization – and requires Enterprise Information Management, Cyber-security, and the service-awareness of CIO Operational Efficiency to achieve its transformative potential.

Other relationships have break-out innovation potential. For example, by combining Asset Intelligence, User Engagement, Wireless and Mobility, and Best-of-Breed Enterprise Applications, an organization could rethink its operational landscape – leveraging devices tied to both people and equipment to change how customers, employees, and shareholders engage with the business.

Take time to think through the relationships among the 12 trends. Stay mindful of connections as you identify the handful of tactical choices that you believe will generate top returns. We believe having a clear point of view on each – how it affects your business and how it fits into the strategic vision of the company – is a good first step, but understanding how multiple trends can drive even more innovation and value is how you'll find the big opportunities.

As writer and futurist William Gibson famously said, "The future is already here...it is just not evenly distributed." Hopefully these top trends will help balance the scale in your favor.



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