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- ☐ **Technical Research Report:** a traditional academically rigorous research paper with detailed methodology, analysis, findings and references.

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RESEARCH BRIEFING

MITSloan

Volume IV *Number 1A* *March, 2004*

MANAGING THE IT PORTFOLIO: RETURNS FROM THE DIFFERENT IT ASSET CLASSES[1]

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Why Use Portfolios for IT

Just as investors address their risk and return objectives using portfolios of financial investments, firms have portfolios of information technology (IT) investments. Four different management objectives guide firms' investment in IT. Each objective results in a different IT asset class with a unique risk-return profile. Just like any other investment portfolio, the IT portfolio must be balanced to achieve alignment with the business strategy and the desired combination of short and long term payoff. This briefing builds on the IT portfolio benchmarks described in the March 2003 briefing and presents the returns from the four asset classes.

Four Management Objectives Leading to Four IT Asset Classes[2]

Our research found that business leaders have four different management objectives for investing in IT:

- Transactional—cut costs or increase throughput for the same cost (e.g., a trade processing system for a brokerage firm).
- Informational—provide information for any purpose including to account, manage, control, report, communicate, collaborate or analyze (e.g., a sales analysis system or reporting).
- Strategic—gain competitive advantage or position in market place (e.g., ATMs were a very successful strategic IT initiative for the innovating banks increasing market share).
- Infrastructure—base foundation of shared IT services used by multiple applications (e.g., servers, networks, laptops, customer databases). Depending on the service, infrastructure investments are made with the objective of either reducing IT costs via consolidation and/or providing a flexible base for future business initiatives.

By investing to address the four management objectives, a firm creates an IT portfolio with four asset classes (see the center of figure 1). The average firm allocates 54% of its total IT investment each year to infrastructure. Utilizing the infrastructure are the transactional systems accounting for 13% of average IT investment. The informational systems sit on top of, and use both the transactional and infrastructure systems accounting for 20% of average IT investment. Similarly, strategic systems use both the transactional and infrastructure systems and account for 13% of average investment. Just like a personal investment portfolio with cash, bonds, equities, property etc., the four IT asset classes have different historic risk return profiles.

The Returns from the Four IT Asset Classes

IT investments in the transactional asset class aim to reduce unit cost and increase productivity. Firms that invested more heavily (than their competitors) in transactional IT had superior productivity (measured by sales per dollar of assets) and lower costs. The results suggest transactional investments pay off by using IT to support or automate repetitive business processes. For example, UPS, a very successful

[1] This CISR briefing is the second in the series on IT portfolios. The previous briefing, Vol. III, No. 1C, is entitled "Managing the IT Portfolio (update circa 2003)" by the same authors, March 2003. This research draws on and extends the material on IT portfolios in "Leveraging the New Infrastructure: How market leaders capitalize on IT" by Peter Weill and Marianne Broadbent, Harvard Business School Press, 1998 with a CISR study of 147 firms in 2003. This research was made possible by the support of CISR sponsors in particular CISR Patron Microsoft Corporation and the National Science Foundation, grant number IIS-0085725.

[2] The total IT investment includes all centralized and decentralized IT spend (expenses and depreciated capital) both insourced and outsourced plus all people dedicated to IT services and management. The analysis based on 147 firms used data from 1999 to 2002. All results linking IT investments and performance presented in this briefing are statistically significant and controlled for industry, firm size, R&D and advertising expenditure.

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but cost conscious logistics firm, provides free package tracking information on its website or integrated into its customers' ERP systems. Before on-line tracking, customer calls to its call center cost UPS around $2 each and sometimes required two follow-on calls within UPS to locate the package - with a total cost of $6. Each tracking query now costs UPS a few cents and during the Christmas rush period there can be 6 million tracking requests per day.[3] If the firm's strategy is to use IT to cut business costs and increase productivity, weighting the IT portfolio with transactional investments more heavily than the 13% average makes sense (see the March 2003 briefing for benchmarks by industry). We estimate transactional investments have solid returns of 25–40% per dollar.

Investments in the informational asset class aim to provide more and better information to manage, control, report and analyze customer needs. Firms investing more heavily in informational IT had higher quality and larger margins. Thus these firms proactively used the output of their informational investments to make better decisions often about customer needs. Over a period of 20+ years 7-Eleven Japan have built an integrated information system including point of sale devices at its 9,000+ franchise stores. Counselors visit stores weekly to help store owners use the information to choose the right range of products for their store. 7-Eleven is not only the most profitable retailer in Japan but is able to offer its demanding customers many new products while reducing average stock turnover from 25 days in 1977 to nine in 2003.[4]

Investments in strategic IT aim to gain a competitive advantage by positioning the firm in the market place for growth. Successful strategies include electronic connections providing customized services to the customer (e.g., Amazon's recommended books service) and customized products (e.g., TD Waterhouse's personalized investment analysis). Strategic IT is a high risk high return strategy with high failure rate (we estimate at 50%) but large potential upside with successful initiatives gaining a two to three year lead on the competitors. Firms with more strategic IT investments generate more revenues from modified and enhanced products indicating that these investments are effective in increasing sales. We see no evidence for increased profits, but it is possible that the profit effect requires more than the two year lag between investment and performance captured in this study.

Investments in IT infrastructure serve multiple purposes. Some infrastructure investments aim to reduce cost through standardization and consolidation (e.g., server or data center consolidation). Other infrastructure investments provide a platform for delivering firm-wide initiatives such as a shared customer database for a single point of customer contact. Still other infrastructure investments are to enable future IT initiatives and flexibility such as modular architectures. More infrastructure capability is expected to reduce time to market for new business initiatives.

The returns from the IT infrastructure asset class reflect this complex set of objectives and present a strategic choice for senior executives. Firms that made more investments in IT infrastructure did have higher valuations and faster times to market. However, there is also a cost. Firms with more IT infrastructure investments took a short-term impact on their profitability with lower margins and return on assets in the year of the infrastructure investment. However, the stock market appears to reward long-term investments such as IT infrastructure. Thus firms that maximize their infrastructure investments have higher market valuation but lower short run margins and ROAs. After presenting this finding to a CEO in financial services his response was "that balancing act makes sense to me. We make the same tradeoffs in all our infrastructure investments such as people, buildings and research."

Our research shows that it is not only how much you spend on IT that is important but also making the right IT investments for your strategy. Understanding the return profiles of each of the four IT asset classes helps managers make more informed IT investment decisions that are linked to their strategic goals. Figure 2 compares the IT investments and portfolios of all firms with those of top performers. Top performers across all industries spend an average of 4% more on IT but have similar portfolios to the average firm. The industry differences are interesting. For example, top performers in financial services spend 10% less than the average firm, but have portfolios more weighted to infrastructure.

Just like your personal investment portfolio, an enterprise's IT portfolio must be aligned to its strategy and balanced for risk and return. Use the results in this briefing, as you would a stock broker's

[3] For more information, see Ross, J.W., "United Parcel Service: Delivering Packages and e-Commerce Solutions," MIT Sloan CISR Working Paper No. 318, March 2001.

[4] See "7-Eleven Japan: Reinventing the Retail Business Model," by Kei Nagayama and Peter Weill, MIT Sloan CISR Working Paper No. 338, January 2004.

report containing historic returns of different asset classes and the average asset class composition of high return portfolios. A firm's investment portfolio alone does not determine performance outcomes. Better returns are available by matching the type of IT investments with the firm's management practices and competencies as in 7-Eleven Japan's use of counselors. The next briefing in the series looks at the management practices (e.g., HR capabilities) that help top performers convert their IT investments into bottom line business value.

Figure 1: Returns from the Four Asset Classes in the IT Portfolio

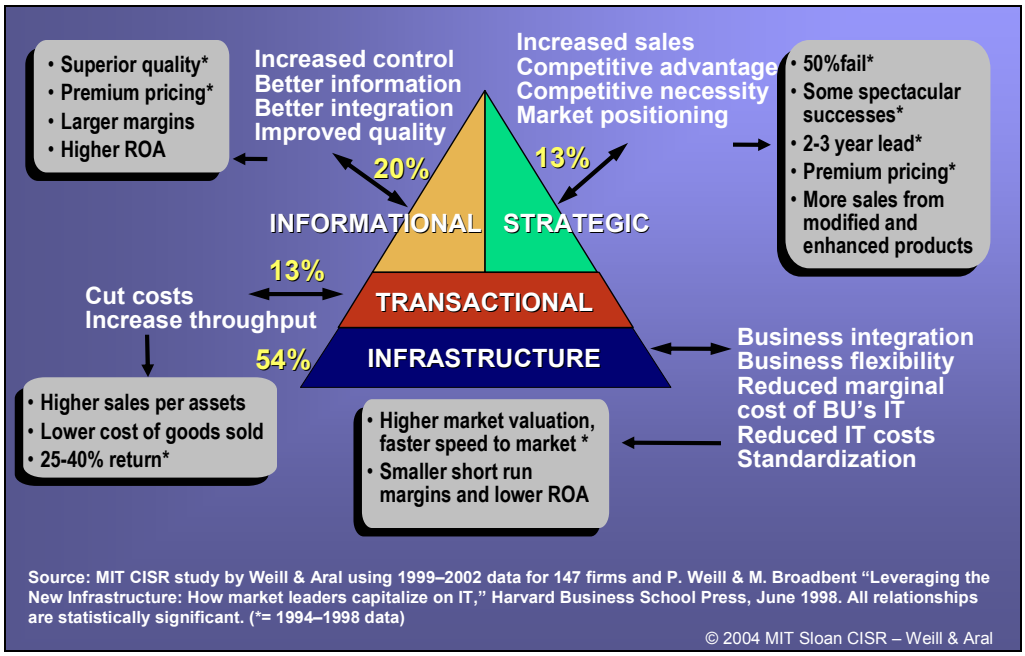
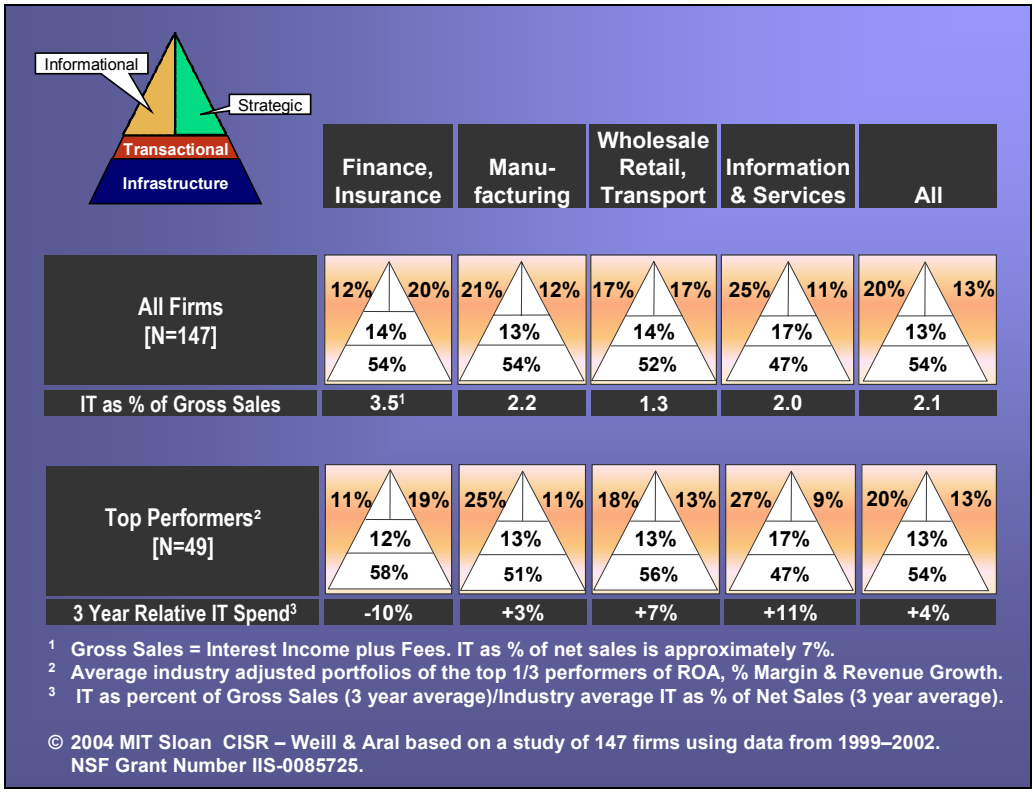


Figure 2: Top Performer's Portfolios are Somewhat Different



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RESEARCH BRIEFING

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Volume IV *Number 1B* *March 2004*

ENTERPRISE ARCHITECTURE: DEPICTING A VISION OF THE FIRM

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As IT units build solutions, they create the legacy that defines a firm's IT capability. Intentionally or not, the resulting capability locks in assumptions about internal and external relationships and process definitions. But whose assumptions are being locked in? What business capabilities are these platforms enabling and what possibilities are they constraining? In this briefing we describe the concept of enterprise architecture on one page. We have observed that this tool can coordinate project decisions and facilitate discussions between business and IT management to clarify options for a firm's IT capability—and then communicate the vision.

Defining Enterprise Architecture at Delta Air Lines

In 1997 when Leo Mullin became CEO of Delta Air Lines, he quickly learned that he had acquired an IT capability resulting from a failed outsourcing effort. Unhappy with the outsourcer's services, each of Delta's 17 functional units had effectively built its own IT capability. The firm had as many IT platforms as it had functions, and those platforms were not capable of communicating with one another. The predictable outcome was that Delta's ticket agents, reservation agents, gate agents, baggage handlers, and others often lacked the information they needed to do their jobs—frustrating both customers and employees.

Mullin brought in Charlie Feld as CIO to help the firm survive Y2k and start to build an enterprise-wide IT capability. Feld started by working with the leadership team to clarify the vision for how the firm would do business going forward. The leadership team described an as-is and a to-be state as follows:

AS-IS	TO-BE
17 functional silos	Process view of the firm
17 IT units	Standardized IT environment
17 major platforms	Focus on the customer
17 answers to a single question	Corporate IT infrastructure to support cross-functional process

The to-be state outlined guiding principles for the firm's enterprise architecture. As a first step in adopting a process view of the firm, the management team defined four core processes: customer experience, operational pipeline, business reflexes, and employee relationship management. The customer experience identified all the ways Delta touched its customers. The operational pipeline was concerned with loading, moving, unloading and maintaining planes. Business reflexes included scheduling, pricing, accounting and related administrative functions. Employee relationship management encompassed all the processes involved in meeting the needs of Delta's highly mobile workforce.

Once the team came to agreement on the core processes, they iteratively developed an enterprise architecture graphic capturing the processes, data, and interfaces constituting the essence of the operating model at Delta (Figure 1). At the heart of the model was the Delta Nervous System, which provided real-time access to, and updates of, Delta's core data. The Delta Nervous System was designed to make data available to customers and employees on a need to know basis through multiple interfaces, including (but not limited to) PDAs, gate readers, laptops, cell phones, reservation systems and others. The software was event-driven in that some changes in data initiated automatic notification to specified applications and individuals.

CIO Feld, who led the development of the enterprise architecture, estimated that the management team needed about 60 iterations before everyone agreed on Delta's enterprise architecture graphic. IT and business management's shared understanding of the architecture helped establish development priorities and kept senior management focused on generating benefits from new IT capabilities. Delta focused on building a long-term IT capability while addressing its Y2k crisis and initial process improvement goals. Delta's enterprise architecture has not saved the firm from the competitive challenges facing hub and spoke airlines or industry downturns, but it has given Delta a reliable, cost-effective IT foundation from which the firm can expand into new products, services or markets.

Defining Enterprise Architecture at MetLife

Although IT leaders recognize the importance of senior management leadership in defining IT principles, many business leaders do not enthusiastically embrace a role

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in defining how IT will contribute to business strategy. The enterprise architecture graphic can force a discussion exposing executives' assumptions about IT capabilities. Unlike Delta, where the senior management team drew the enterprise architecture graphic, MetLife's IT unit drew up an enterprise architecture to capture the IT unit's understanding of the role of IT in achieving strategic objectives. (See Figure 2.)

As an outgrowth of several large mergers, much data at MetLife is locked into individual IT applications. Nonetheless, MetLife's current strategic initiatives are focused on more integrated customer service. MetLife's enterprise architecture graphic reflects the firm's need for shared data. The integration hub pictured in the enterprise architecture graphic recognizes that it will take some time to extract data from applications and create a fully populated centralized data store. In the meantime, the integrated hub will hold reusable code that accesses data embedded in legacy applications. Stakeholders gain access to the data using a standardized portal architecture, shown on the left-hand side of the diagram.

MetLife architects use their drawing to communicate with senior managers and business partners the underlying logic for IT development at MetLife. The enterprise architecture guides new application development by explaining how IT will deliver on the firm's IT principles. For example, MetLife's enterprise architecture embodies principles of reuse in its portal architecture—every application will apply the same standards for output to stakeholders. In addition to providing a common customer view, the centralized data stores and integration engine enhance information integrity by reducing redundancy. Thus, the enterprise architecture translates IT principles into a clear vision of how IT will enable business objectives.

A high-level architecture graphic captures decisions resulting from debates on where shared infrastructure stops and applications begin. The MetLife architecture shows that the channels, portal, data stores and integration engine are all shared across applications. The presentation and business logic applications are thus distinguished from infrastructure. Communicating where infrastructure stops and applications begin simplifies future infrastructure and applications decisions and promotes shared understanding of IT capabilities in the enterprise.

Using the Architecture Graphic to Recognize the Need for Change

As long as a firm does not change its basic operating model, the enterprise architecture graphic should guide development of business applications and infrastructure. Management may tweak the architecture as new technologies or changing market conditions introduce new opportunities. But the value of the architecture graphic is that it supports management efforts to identify ways to leverage IT in the firm.

On the other hand, if a firm fundamentally changes its approach to the market, management will want to rethink the design of the IT capabilities—and perhaps redraw the enterprise architecture. For example, Schneider National, a large US trucking firm had a highly effective enterprise architecture in the early nineties. The firm had built mainframe-based systems accessing shared data and providing that data to mostly centralized staff. When Schneider became the first trucking firm to introduce satellite systems to track its tractors, the firm's existing architecture allowed it to convert the satellite data into enhanced customer service. But when Schneider management determined that intense price competition in the trucking industry made it difficult to grow profitably, the firm expanded into logistics. Management noted immediately that the logistics business demanded a very different architecture—one with powerful desktop capabilities located at customer sites and allowing for segmented data bases. Rather than try to force fit the existing architecture, Schneider designed a new architecture for the logistics business. Starting from scratch and therefore having the freedom to deploy newer technologies allowed Schneider to move rapidly into the logistics business. Schneider management's understanding of its enterprise architecture helped the firm recognize when it was time to start over just as clearly as it had helped identify opportunities to capitalize on the capability in place.

Getting Value from an Enterprise Architecture Graphic

Experiences at Delta, MetLife, Schneider and other firms suggest 4 steps for generating value from an enterprise architecture graphic:

1. Start by defining the core enterprise-level business processes and the data they depend on.
2. Iterate the graphic until senior business executives agree on the vision of how the firm will operate.
3. Use the graphic to facilitate communication between business and IT managers about the role of IT in the firm.
4. Use top-level understanding of the enterprise architecture to secure a commitment to exploring the impact of all IT-related projects on the enterprise architecture.

Figure 1: Delta's Enterprise Architecture

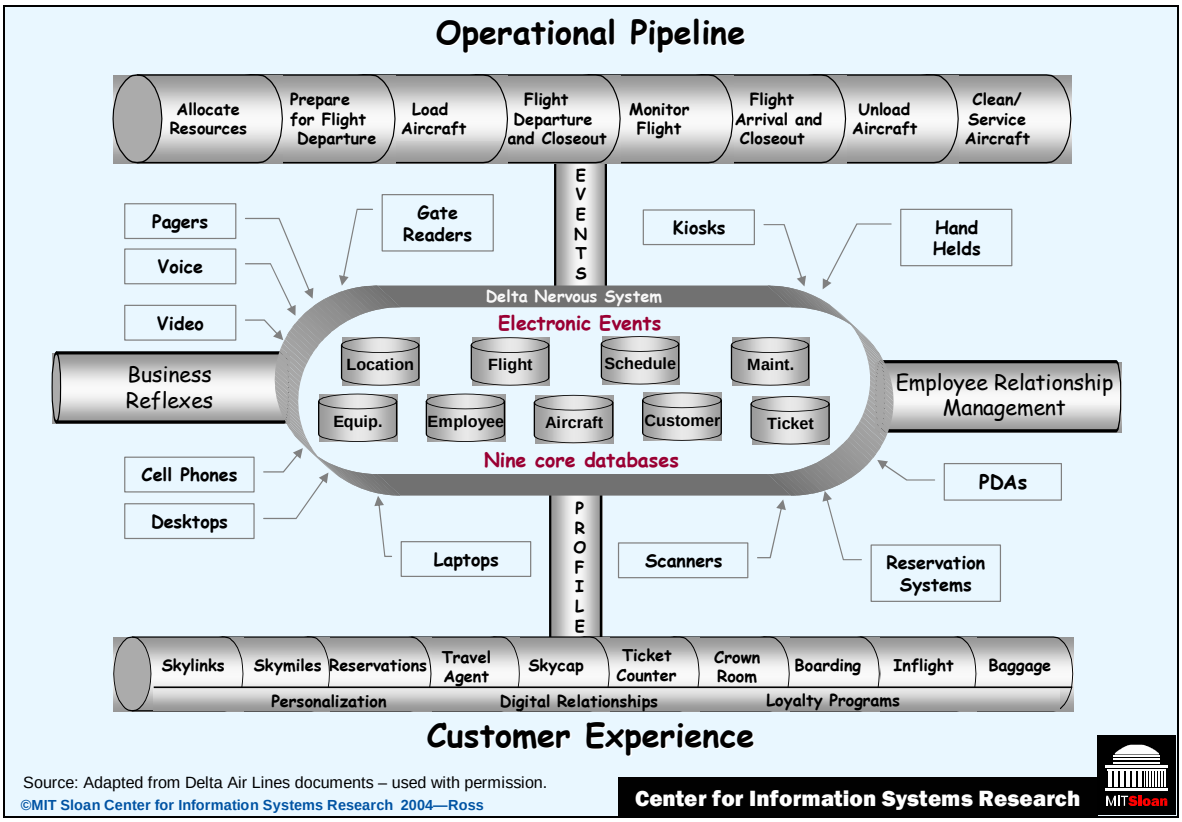
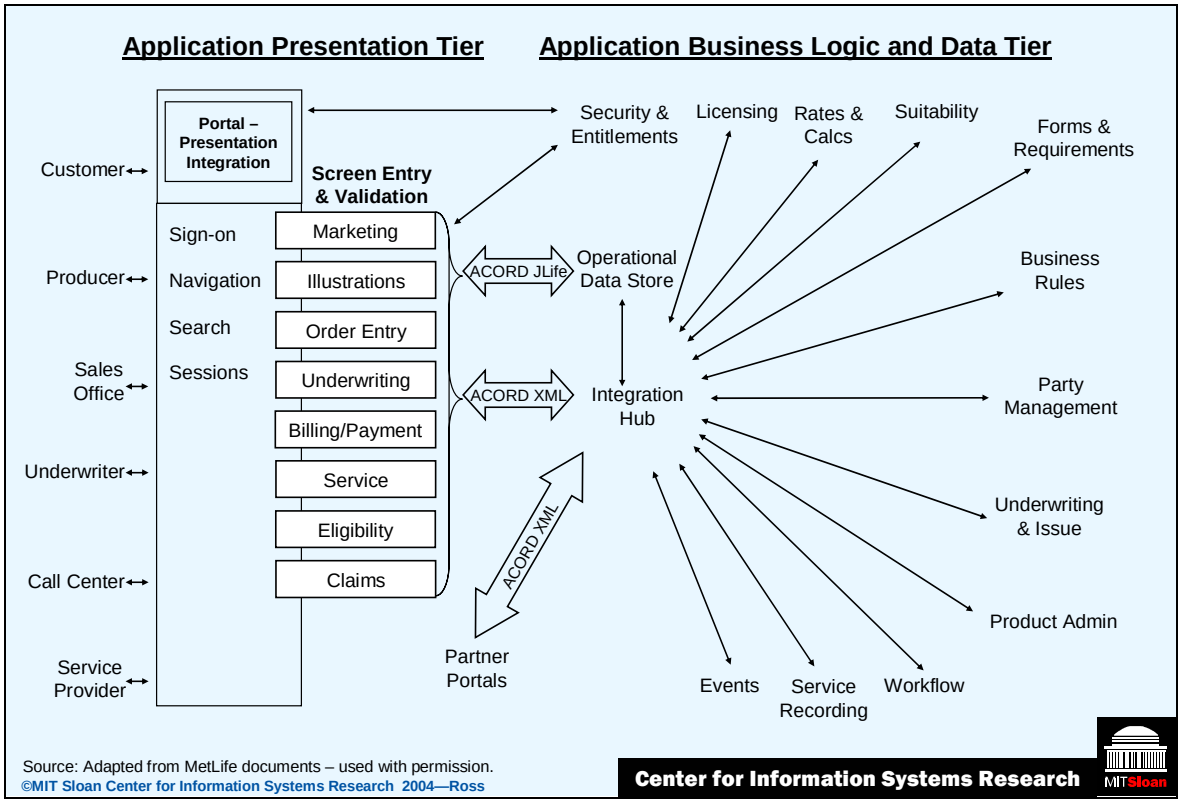


Figure 2: MetLife's Enterprise Architecture



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RESEARCH BRIEFING

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UNDERSTANDING THE ENTERPRISE'S IT RISK PROFILE[1]

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Every enterprise faces a large number of risks as part of doing business. Some risks, such as the loss of a key executive, are not IT related. Others, such as global credit risk, have an important IT component, but are largely business-driven. There are four dimensions along which IT itself constitutes a risk to the enterprise (see Figure 1). These risks arise from the way the enterprise's existing IT assets and processes are arranged, as a result of managerial tradeoffs made over many years. Understanding the firm's levels of risk and risk tolerance along these four dimensions is the first step in implementing a mature IT risk management process. In this research briefing, the four dimensions and their drivers are described. Case examples illustrate the nature of these risks and the tradeoffs inherent in managing them.

Research Method

To develop the Enterprise IT risk framework, we interviewed 45 senior IT and business managers in 12 firms. We asked them to talk about the types of enterprise risk influenced by their IT assets, organizations, and processes. We also asked what conditions increase risk, and what practices reduce it. After consolidating more than 700 items from the interviews, we identified a list of more than 100 risk factors, in six categories, that influenced a risk dimension.

Defining the Four Dimensions

A working definition of "risk" is a potential exposure that can impact an important organizational objective. An enterprise IT risk is a potential exposure facing the enterprise as a result of any aspect of the IT environment. This includes IT assets, organization or processes.

The four dimensions of Enterprise IT Risk correspond to four enterprise-level objectives of IT:

- *Availability*: keeping existing processes running, and recovering from interruptions.
- *Access*: ensuring that people have appropriate access to information and facilities they need, but that unauthorized people do not gain access.
- *Accuracy*: providing accurate, timely and complete information that meets requirements of management, staff, customers, suppliers and regulators.
- *Agility*: implementing new strategic initiatives, such as acquiring a firm, completing a major business process redesign or launching a new product/service.

Each initiative for IT funding, organization, sourcing and technology shapes an organization's risk profile for the short and long term. The initiative can affect the likelihood of an adverse event, its impact (financial, reputational or otherwise), or both.

For example, some firms are implementing "single sign-on" capability, in which people can use a single user ID to access many applications. The move, which is aimed at improving user satisfaction, is also seen as improving risk management. Unfortunately, in many implementations, this is only partly true. Single sign-on can reduce the *likelihood* of an intrusion, since security personnel can focus on a single access point, and users are more likely to follow security policy if they have only a single user ID. But, many single-sign-on implementations actually increase the *impact* of an intrusion, since a single intruder has access to more data.

This example illustrates how IT risk management is much more complex than just implementing technology. There are other categories of risk factors (see the bottom of Figure 1). The enterprise must compartmentalize information, understanding which users should have access to what applications and information. Policies must be created in keeping with the security/privacy needs of the organization as well as its customers and regulators. IT must

[1] This research was made possible by CISR sponsors and, in particular, CISR Patrons Gartner and DiamondCluster International. The author also wishes to thank research associates Michelle Salazar, Zheng (Philip) Sun, and Robert Walpole.

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have staff who can responsively administer user access, and must train all users and vendors in the procedures. By considering each of the six categories of risk factors, managers can avoid missing an important piece of the puzzle.

The Enterprise Risk Profile

Few organizations, when considering a new initiative, go beyond ROI to consider the effect on the enterprise risk profile. The single sign-on example was within a single risk dimension, but most IT arrangements affect multiple dimensions. Unfortunately, many decisions are made without considering all four risk dimensions. Many firms fall into patterns where one type of risk (most commonly availability) is prioritized over others. Or, worse, they routinely fail to examine one or more dimensions of risk. Over time, a series of incremental decisions, each one following the firm's standard practice, leads to a risk profile in which some risks are well controlled while others have huge (and often unknown) exposures.

Figure 2 shows the Risk Profile: a tool to communicate the enterprise's relative risk exposure and tolerance on the four dimensions. The blue diamond represents the potential level of risk to the business as a whole, before any risk management is undertaken. The maroon represents the IT component of enterprise risk, along each category. The green inner diamond represents IT risk tolerance, meaning the amount of IT risk that the enterprise chooses to live with. Finally, the beige represents the risk gap—the amount of risk that has not yet been mitigated.[2]

The risk profile in Figure 2 is for GCI, a large global manufacturing firm.[3] To compete in very tough markets, GCI relies on strategic agility enabled by frequently buying and selling firms. To address agility risk, GCI moves each acquired firm to a standard technical infrastructure, but keeps the applications intact and under the control of the business unit manager. By standardizing infrastructure, the firm reduces costs and somewhat reduces availability risks. By keeping each business unit's unique applications under the control of the business unit manager, GCI believes it reduces agility and availability risks.

Unfortunately, GCI's approach has led, over time, to a large gap on access risk (see point A on Figure 2). Dozens of global or local applications each have their own passwords and security procedures. Copies of competition-sensitive information, such as the global business plan, are stored locally in each site.

In addition, there is a large gap on accuracy risk (see point B). To get a global snapshot of financials, the CFO asks managers in each business unit to manually upload data into a data warehouse. The manual process was much less expensive than a proposed $10Million automated solution, and it works well. But financial data is up-to-date only twice per month, and financial processes cannot be fully certified for Sarbanes-Oxley.

GCI's IT managers are currently identifying initiatives to address the risk gaps in access and accuracy. In keeping with GCI's decentralized philosophy, these initiatives will not require standardizing all systems globally. Instead, they will involve automatically integrating information from disparate applications, and coordinating, rather than centrally controlling, user access. In addition, senior executives may choose to 'live with' the manual financial process, but add manual controls to ensure financial data integrity.

Using the Risk Profile and Risk Framework

The risk profile (Figure 2) can be created for the enterprise as a whole, or for important parts such as major business units, major global regions or even critical business processes. The profile can be linked to the funding process, so that initiatives that reduce risk gaps receive priority over those that do little to reduce risk. Then, managers can use the risk framework (Figure 1) to ensure that each initiative addresses all categories of risk factors.

The risk profile can also be a negotiating tool. Many disagreements over IT priorities can be traced to differing risk perceptions. Comparing each manager's perception of enterprise risk exposure (beige diamond) and risk tolerance (green diamond) can resolve disputes and help forge a common direction for the future.

In combination with a mature risk management process (which will be discussed in a future research briefing), the risk framework and risk profile tools

[2] The profile can be generated using either top-down or bottom-up methods. Many managers find that, by trying to plot risks and risk tolerances subjectively on a 0 to 10 scale for each dimension, they come to a better understanding of the tradeoffs and risk tolerances facing the enterprise. Others use the tool in a bottom-up way, consolidating very detailed information from their risk tracking databases into a single picture. Either way, the risk profile is a valuable way to communicate enterprise IT risks to senior executives. We have developed of questionnaire to assess a firm's IT risk and generate their risk profile.

[3] This is a disguised name for a large, well-known manufacturer.

can improve risk awareness and reduce IT-related exposures. Awareness of risks enables managers to efficiently prioritize which risks they'll reduce and, just as importantly, to choose which risks they'll accept.

Figure 1: Enterprise IT Risk Framework

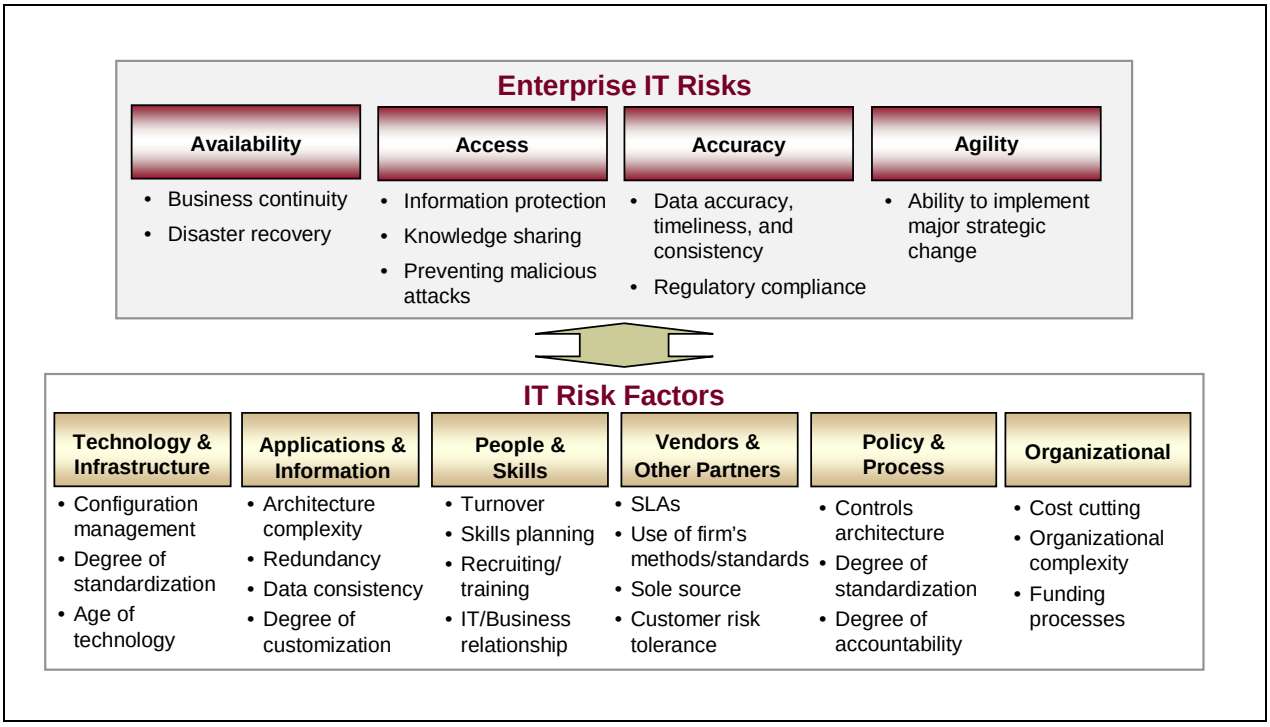
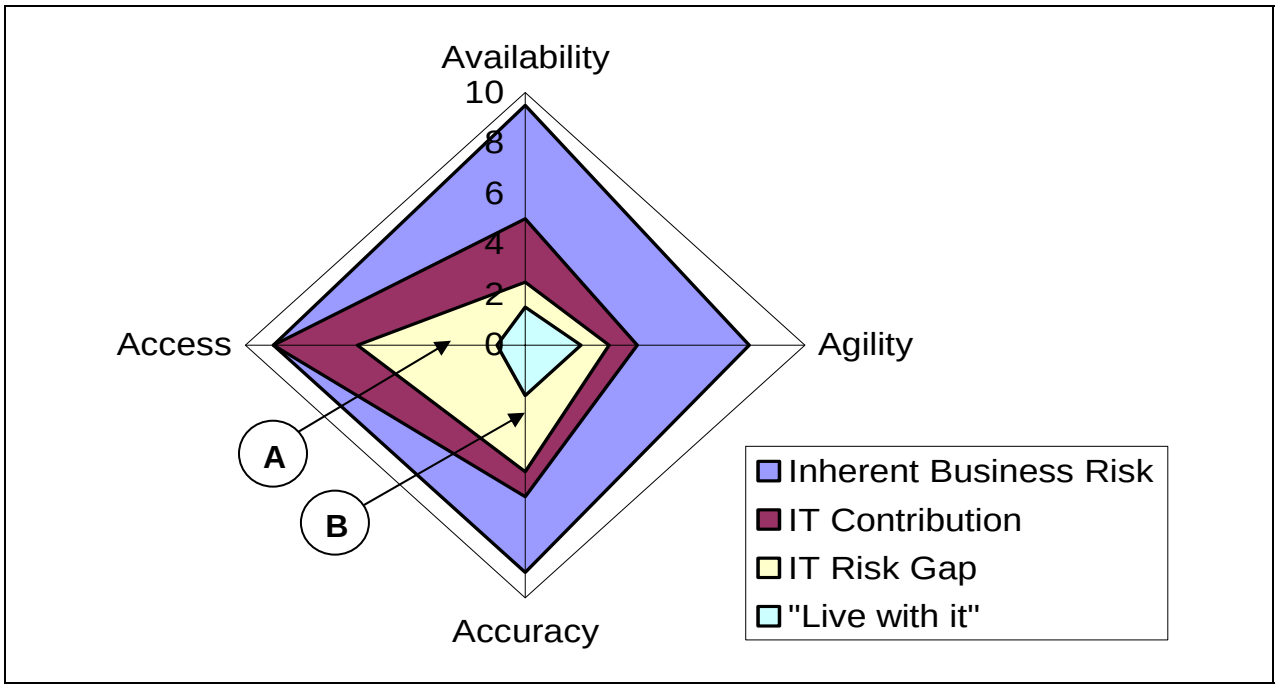


Figure 2: Risk Profile for Global Components, Inc.



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RESEARCH BRIEFING

MITSloan

Volume IV *Number 1D* *March, 2004*

PROJECT GOVERNANCE AT USAA

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IT governance aims to align IT capabilities with a firm's strategic intent and performance goals. But a firm's IT capability results from hundreds of projects implemented year after year. How can a firm ensure that governance decisions filter through each project to yield both project and enterprise-wide benefits? USAA's approach to project governance is instructive.

USAA, a diversified financial services firm, manages over $66 billion in assets. In 2003 USAA was one of only three property and casualty insurers, and the only homeowners insurer, to receive top ratings from all three rating agencies (Moody's, Standard and Poors, A.M. Best). According to a USAA press release, "The rating agencies cited USAA's superior market position in the U.S. personal lines insurance market, low-cost expense structure, high customer retention, and ability to deliver excellent service, among other factors, in determining USAA's financial and credit ratings."

Traditionally, USAA had been structured to encourage business unit specialization. The company had no insurance agents or bank branches. Instead, each business unit developed a call center with specialized customer service representatives. By the time Bob Davis became CEO in April 2000, USAA had embraced the concept of integrated customer service. Davis drew a picture of his vision for a more integrated company, and IT management developed his drawing into an enterprise architecture called SEITA (Strategic Enterprise IT Architecture). SEITA specified that USAA customers will gain access to USAA's products and services through multiple channels integrated through a standardized process, technology and data environment.

Designing IT Governance for Enterprise-Wide Synergies

To implement Davis' vision for a more integrated firm, USAA made structural changes emphasizing enterprise-wide processes. For example, the business unit marketing departments were consolidated in a corporate marketing function. A key change was the creation of a new Enterprise Business Operations (EBO) unit. Headed by an Executive Vice President reporting to the CEO, the EBO is responsible for all enterprise-wide projects.

In addition to structural changes, USAA designed IT governance processes to encourage enterprise-wide synergies. Consistent with principles of effective IT governance, USAA clarified IT decision rights for each of the five key IT decisions. Figure 1 briefly defines key governance terms from our prior work.[1] USAA's governance arrangements, summarized in Figure 2, vest decision making responsibilities in five different groups:

USAA's ***Executive Committee*** consists of the CEO, the presidents of the five major operating companies, the CIO, and the head of EBO. This committee meets monthly to clarify enterprise-wide goals and distinguish enterprise and business unit boundaries. The committee's decisions are reflected in the firm's enterprise architecture.

Enterprise Business Operations (EBO) defines and implements enterprise projects reflecting the enterprise-wide goals specified by the Executive Committee. The EBO has a staff of 260, including 14 program managers who coordinate multiple projects related to a single business process (e.g., customer relationship management). EBO is responsible for both IT and non-IT projects but most projects at USAA have an IT component.

The ***IT Company*** (ITCO) is USAA's IT unit, organized as a separate operating company. ITCO establishes rates for IT services based on a combination of its unit costs and negotiations with its customers (i.e., the other operating companies).

[1] For a description of the five key decisions see Weill, P. and J. W. Ross, *IT Governance: How Top Performing Firms Allocate Decision Rights for Superior Performance,* Harvard Business School Press, forthcoming 2004 or P. Weill and M. Broadbent, "Describing and Assessing IT Governance—the Governance Arrangements Matrix," CISR Research Briefing Volume II, Number 3E, October 2002.

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ITCO's service rates include overhead charges so that IT management can invest in firm-wide infrastructure as needed. ITCO takes responsibility for ensuring that investments in the firm's technical infrastructure move the firm toward its desired operating state.

The ***Architecture Committee*** is a subunit of ITCO, headed by the Chief Technology Officer (CTO). The fifteen member Architecture Committee includes USAA's technical fellows (technologists who have reached the top of the technical career ladder). The committee defines technical standards and works with IT architects to identify common needs across the firm's several hundred business unit and enterprise-wide projects.

The ***Integration Steering Committee*** establishes project priorities. Chaired by the executive vice president of EBO, this nine-member committee includes senior managers representing each of the major business units as well key corporate functions and IT. In establishing project priorities, the committee considers the potential value to the firm of both business unit specific and enterprise projects. The committee also considers the availability of needed infrastructure and the readiness of the organization to effectively implement each project.

USAA ensures coordination of IT decisions through overlapping memberships in these decision structures. For example, EBO's executive vice president is on the Executive Committee and heads the Integration Steering Committee. Thus, as the Executive Committee defines enterprise priorities, the executive vice president takes responsibility for reflecting those priorities in the funding decisions of the Integration Steering Committee and the project designs of the EBO.

Similarly, the CIO sits on the Executive Committee and heads up ITCO. In addition, both the IT representative on the Integration Steering Committee and the CTO heading up the Architecture Committee are members of ITCO's senior management team, which makes infrastructure decisions. These overlapping memberships ensure that IT decisions reflect the business objectives of the senior executive team. Through their participation on the Executive Committee and Integration Steering Committee IT leaders have a forum to communicate the impacts of projects on the enterprise architecture and to educate management on the capabilities the enterprise architecture provides the firm.

Governance Mechanisms Targeted at Projects

USAA has implemented a set of roles and processes at the project level to ensure that IT governance decisions are enacted throughout the firm. Tim Handren, Executive Vice President of Enterprise Business Operations and the Chief Operations Officer for USAA notes that USAA focuses project governance on aligning individual projects with enterprise-wide objectives:

> *Acquire, retain, develop a relationship with somebody—that's the context for every one of our projects. We may be doing something in life company related specifically to its work flow system, but now what we're doing is we're saying "Yeah, but wait a second We're all driving towards this master view of one—not one size fits all—but one standardized process across all of these entities." So as we do that project, we'll advance the life company a lot closer, and everybody else a little bit closer, to [our] desired operating state.*

USAA has implemented project management, project design, and project review processes to align project goals with strategic enterprise goals and to achieve on-time, on-budget results.

Project management. Each project at USAA follows a standard project development methodology mandating a six-phase project life cycle. Every senior manager and project team member is familiar with the methodology as specified in USAA's "green book." Early phases of the project life cycle help determine the viability of the project—ability to implement, likelihood of receiving benefits, availability of needed infrastructure. For enterprise projects, management assigns a project sponsor in the key business unit as well as co-leaders from EBO and the business unit.

Project Design. IT architects are assigned to project teams. These project architects are responsible for ensuring that individual projects are compliant with technology standards and that related projects reuse technologies as appropriate. If a project architect feels an exception to standard is warranted he or she either seeks approval from one of the assistant vice presidents authorized to grant exceptions or refers the request to the architecture committee.

Project Review. On a monthly basis CEO Davis meets with business unit presidents to review financials and to discuss the progress of major projects. These one on one meetings serve to identify the need for any senior management

intervention, to reassess resource allocations and goals, and to avoid surprises in business unit or enterprise outcomes.

Handren notes that another key factor contributing to effective governance is a culture of both accountability and teamwork that USAA has worked for years to develop: "We have a phrase that we use: *Mutual Respect and Admiration through Shared Experiences.* It describes a state in which you each know what the other person is doing, and you have a certain level of trust, admiration, respect and confidence in each other. We have this model working now, but it's something we've been working on for years."

These project governance processes reinforce high-level governance decisions as USAA builds out its enterprise architecture. In addition to well-orchestrated governance processes, Davis encourages behavior consistent with his enterprise vision through a bonus program for all employees based on enterprise goals. In 2002 every USAA employee—from the mailroom clerk to the top executive—received a 16.7% bonus to recognize achievement of enterprise goals. Senior managers were also compensated for operating company results and their success in meeting their individual objectives. In this way, USAA has supported its governance processes with an incentive system that rewards desired behavior. In 2002 USAA spent only 2% of project expenses on projects eventually declared non-viable while delivering 99% of its projects on time and on budget.

Figure 1: Key IT Governance Concepts

Five Key IT Decisions		IT Governance Archetypes	
IT Principles	High level statements about how IT is used in the business	Business Monarchy	A group of, or individual, business executives (i.e., CxOs). Includes committees comprised of senior business executives (may include CIO). Excludes IT executives acting independently.
IT Architecture	An integrated set of technical choices to guide the organization in satisfying business needs. The architecture is a set of policies and rules for the use of IT and plots a migration path to the way business will be done (includes data, technology, and applications)	Feudal	Business unit leaders, key process owners, or their delegates
IT Infrastructure Strategies	Strategies for the base foundation of budgeted-for IT capability (both technical and human), shared throughout the firm as reliable services, and centrally coordinated (e.g., network, help desk, shared data)	IT Monarchy	Individuals or groups of IT executives
Business Application Needs	Specifying the business need for purchased or internally developed IT applications	IT Duopoly	IT executives and one other group (e.g., CxO or BU leaders)
IT Investment and Prioritization	Decisions about how much and where to invest in IT including project approvals and justification techniques	Federal	Shared by C level executives and at least one other business group (e.g., CxO and BU leaders) – may also include IT executives. Equivalent of the center and states working together.
		Anarchy	Each individual user

Figure 2: USAA's IT Governance Arrangements

IT Decision	Governance Archetype	Mechanism
IT Principles	Business Monarchy	Executive Committee of CEO, CIO, Executive Vice President of Enterprise Business Operations, 5 operating company presidents
IT Architecture	IT Monarchy	Architecture Committee of 15 senior technologists headed by CTO
IT Infrastructure Strategies	IT Monarchy	ITCO Senior Management team
Business Needs	Federal	Enterprise Business Operations unit for enterprise systems; Business unit leaders for local systems
IT Investment and prioritization	Duopoly	Integration Steering Committee of 9 senior managers, including IT, headed by EVP of Enterprise Business Operations

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RESEARCH BRIEFING

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IT GOVERNANCE & STRATEGIC DRIVERS — AGILITY, SYNERGY, AUTONOMY[1]

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Strategic drivers—agility, synergy, autonomy—are major orientation decisions business leaders make when determining how to compete and organize. Governance in general, and IT governance in particular, is driven by these and other decisions. We define **IT Governance** as *specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT*. This briefing provides research evidence and guiding principles for IT governance design at large and complex enterprises competing on each of these three strategic drivers. The results from top performers identify which of the governance archetypes (i.e., business or IT monarchy, feudal, duopoly and federal) work best for each of the key IT decisions[2] (IT principles, infrastructure, architecture, application needs and investment)—see Figure 1 for definitions.

Agility—be fast within a business niche

Agile firms are by design modular and adaptable; with coordination of learning across the firm, and with high responsiveness to market changes (see Figure 2). Enterprises striving for agility aim to act faster than their competitors. They emphasize local responsiveness, modular capability and enterprise-wide coordination when it gives leverage to the business units. We found firms striving for agility also had higher profitability (see Figure 3) and studied those agile firms with higher profits.[3]

The profitable and agile firms typically set business and IT principles incorporating agility at the most senior levels of the organization leading to senior executive involvement in many IT decisions (see Figure 3). Often agility was achieved within a range of previously identified business areas. For example Citibank Asia achieved relatively fast times to enter new geographical markets using modular capabilities and infrastructures (e.g. for previous specified product such as credit cards and bank branches) tailored to meet local needs. Agile firms typically rely on federal decision making for business application needs. Federal decision making allows business unit executives to drive business application decisions but include input of both corporate and IT executives. When deciding on IT Principles, IT Architecture and IT Investments, firms tended to follow one of two patterns companies in industries with higher dependency on IT[4] relied heavily on duopolies, thus leveraging IT corporate executives. Companies with lower dependency on IT had business monarchies leading the use of IT for agility. Making explicit the tensions between business unit and firm wide needs and then compromising is critical for profitably agile firms.

Duke Energy International, the division of Duke Energy (with H.Q. in Charlotte, North Carolina) in charge of energy businesses in Latin America, ASPAC and Europe, has a clear mandate to respond to changes on the complex business environment of emerging markets by combining speed and flexibility. This combination has been achieved

[1] This CISR briefing is the fourth in a series on IT governance. For more information see: 1) Peter Weill & Jeanne Ross "IT Governance**:** How Top Performers Manage IT Decision Rights for Superior Results" Harvard Business School Press, 2004; and 2) "Tailor IT Governance to your Enterprise" Gartner EXP Report, October 2003. This research was made possible by the support of CISR sponsors, and in particular CISR Patron Gartner and their EXP Program.

[2] The patterns described in the briefing were derived from statistically significant correlations between financial performance (the specific measure is shown in parentheses) and governance archetypes for 104 enterprises listed on US stock exchanges. The patterns represent generalizations of how top performers govern IT. The enterprises identified the importance of the three strategic drivers: agility (to achieve industry adjusted ROE), business unit synergies (industry adjusted ROE) or business unit autonomy (industry adjusted revenue growth). The case studies were conducted by Gartner on enterprises that were in top 10% performers in at least one of three categories in our sample—profit, revenue growth or asset utilization—and that also scored high on IT governance performance. For further discussion of the case studies see Gartner report in footnote 1.

[3] Profit was measured as three average, industry adjusted, return on equity (ROE).

[4] Defined as % revenue spent on IT. High spend industries were financial services, telco, professional services, logistics and manufacturing. Lower spend were utilities, retail, primary and extraction, government and healthcare.

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by strong governance defined by eight principles. DEI's CIO Max Kennedy and DEI's President Richard McGee developed these principles which were implemented at the local level, giving each region/country the ability to decide internally. These decisions have increased nimbleness, and have helped Duke Energy International identify opportunities to innovate.

Synergy Across Business Units—emphasize firm-wide performance

Firms achieving synergy emphasize standards and reduce duplication within different business units. Synergistic companies require both a clear top-down approach from business leadership to define common working areas, and an ability to negotiate priorities to balance fulfillment of needs between different units. Synergies are typically centrally defined and coordinated, and business units are aware of both global and local implications of a decision, thus making enterprise-wide styles and mechanisms a mandatory requirement. Firms seeking synergies within our study were significantly more profitable.

Enterprises seeking synergies that also led on profit typically used similar decision making governance to agile firms but emphasized synergy not agility. Negotiation is required at both corporate and business unit level to define priorities to achieve higher enterprise-wide rather than business unit profitability. Similar to agility, synergistic firms with higher ROE in industries more dependent on IT used more duopolies than business monarchies. This negotiation occurs using the federal model for business applications needs. Investment decisions were typically made with a duopoly involving IT leaders to capitalize on reuse and sharing of resources and to enable a single point of customer contact.

Coors Brewing Company (CBC) based in Golden Colorado is the US division of Adolph Coors Company. Like most beer companies, CBC is pressured to grow faster than the market and compete by cutting costs in back end operations. After recently launching a three year plan to become process driven, CIO Virginia Guthrie focuses on delivering on the strategy. Clear processes permit IT managers to work on business-case development, while EDS, the service provider, manages the data center, help desk and desktop. The Project Management Office is becoming a major governance tool because its processes touch the business most. IT is taking the lead in creating processes for project management and developing standards for all of Coors. By helping define processes that touch all the business units, accountability and control of previously disperse IT groups has been significantly enhanced.

Business Unit Autonomy—emphasize growth

Autonomy is the ability to allow each business unit to perform independently and innovatively according to changes from the outside environment while still being part of, and benefiting from the enterprise. This behavior requires distinct and independent processes which delegate both intelligence and accountability of decisions to the business unit level. Each entity is encouraged to define its own needs, processes and systems. To achieve autonomy the corporate center provides enterprise-wide financial and risk management processes, with a thin, firm-wide IT infrastructure capability where each independent unit is not only allowed but also encouraged to have its own, independent infrastructure. Since autonomy places value on the ability of the business units to react to changes and take away market share from competitors, revenue growth was the key metric to assess the success for autonomous firms.

Successful autonomous enterprises placed investment and accountability at the business unit level. A federal model for deciding on IT principles allowed business units to leverage IT resources from the corporation, while negotiating at the senior level the objectives of IT for the entire firm. However, when deciding on business applications needs and IT investments, both resources and decisions were managed at the individual business unit level (feudal model).

At Katz Media, a subsidiary of Clear Channel Communications, the largest US media representation company, autonomy is highly valued. Revenue per customer, customer retention and market share are the critical performance metrics. These measures are driven from two basic enterprise goals: increase sales and revenue per customer. Because business units have to compete for the same customers (among 10 business units, three sell TV time and four radio time), negotiations are critical between each business unit and corporate. David Prager (Katz Media's CIO) functions as a negotiator, funding different IT projects by doing matchmaking among business unit leaders, and prioritizing common needs to the corporate IT budget, approved directly by the CEO. Even though the units compete, they prefer IT standardization because it reduces their costs. Beyond this one-on-one negotiation, Katz Media utilizes the office of CIO, IT budgeting process, Service Level Agreements (SLAs) and business cases to govern the IT department most effectively.

High Business Unit Autonomy & Synergy—paradox of maturing firms

Finally, some enterprises experienced pressures to achieve both high synergy and high autonomy among their business units. Firms that achieved high profitability under this scenario solved the paradox by negotiation and reaching compromises. While business monarchies were the archetype of choice in most governance decisions, a choice of feudal (emphasizing autonomy) or business monarchy (emphasizing synergies) was typically made for IT Investment decisions.

Figure 1: Key IT Governance Concepts

Five Key IT Decisions		IT Governance Archetypes	
IT Principles	High level statements about how IT is used in the business.	Business Monarchy	A group of, or individual, business executives (i.e., CxOs, may include CIO).
IT Architecture	An integrated set of technical choices to guide the organization in satisfying business needs.	Feudal	Business unit leaders, key process owners, or their delegates
IT Infrastructure Strategies	Strategies for IT capability (both technical and human), shared throughout the firm as reliable services (e.g., network, help desk, shared data).	IT Monarchy	Individuals or groups of IT executives
Business Application Needs	Specifying the business need for purchased or internally developed IT applications.	IT Duopoly	IT executives and one other group (e.g., CxO or BU leaders)
IT Investment and Prioritization	Decisions about how much and where to invest in IT including project approvals and justification techniques	Federal	Shared by C level executives and the other business groups (e.g., CxO and BU leaders) – may also include IT executives.
		Anarchy	Each individual user

Figure 2: Strategic Drivers

	Agility[1]	BU Synergy [2]	BU Autonomy
Business processes	– Modular, adaptable and easily combined – Firm-wide coordination & learning	– Some processes standard across several BUs – Some processes integrated across several BUs	– Each BU's processes are distinct & independent – Emphasis on BU decision making
Organization and skills	– Front line people skilled at assessing market changes – Firm wide responsiveness culture quickly recombining assets	– Top down leadership specifying synergies – Remove duplication	– Encourage BU innovative capacity – BU skills focused on local value discipline
Management systems for coordination (e.g., incentives & IT architectures)	– BUs adapt to local conditions according to firm-wide organizing logic	– Synergies centrally defined and coordinated – BUs focused on both BU and firm-wide strategy	– Few mandated processes – Enterprise financial and risk management
Information and information systems[3]	– Modular capabilities centrally coordinated & architected – Infrastructure shared & reused	– Substantial integrated firm-wide infrastructure and shared services	– Thin layer of firm-wide infrastructure – Each BU infrastructure & systems tailored
Actual Performance[4]	Higher profit (ROE)	Higher profit (ROE)	Higher revenue growth

[1] Drawing on the work of Duncan (1995), Kayworth, Chatterjee, and Smabamurthy (2001), Sambamurthy and Zmud (2000).
[2] "Aligning IT Architecture with Organizational Realities" Jeanne Ross, David Robertson, George Westerman, Nils Fonstad. MIT Sloan CISR Research Briefing, Vol 3, No 1A, March 2003.
[3] Drawing on the work of Kayworth, Chatterjee, and Sambamurthy (2001), Weill, Subramani, and Broadbent (2002).
[4] Had better or worse industry adjusted performance.
Source: *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*, P. Weill & J. Ross, Harvard Business School Press, 2004.

Figure 3: IT Governance Decision Patterns for Differing Strategic Drivers

	IT Principles	IT Architecture	IT Infrastructure Strategies	Business Application Needs	IT Investment
Agility	**Business Monarchy or Duopoly**	**Business Monarchy or Duopoly**	**Business Monarchy**	**Federal**	**Business Monarchy**
BU Synergy	**Business Monarchy or Duopoly**	**Business Monarchy or Duopoly**	**Business Monarchy or Duopoly**	**Federal**	**Duopoly**
BU Synergy & Autonomy	**Business Monarchy**			**Business Monarchy**	**Business Monarchy or Feudal**
BU Autonomy	**Federal**			**Feudal**	**Feudal**

Note: Firms with significantly increasing or higher industry adjusted ROE (for agility and synergy) and growth (for autonomy). Empty cells mean that no archetype was superior.

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MATURITY MATTERS: HOW FIRMS GENERATE VALUE FROM ENTERPRISE ARCHITECTURE

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MIT Sloan Center for Information Systems Research

In order to better serve their customers and to cut operating costs, firms are instituting enterprise-wide efforts to leverage synergies and reap economies of scale. Initiatives such as "One State Street," "One DuPont," and JPMorgan Chase's "one firm—one team" place IT in the role of strategic enabler. New CISR research indicates, however, that firms can't just decide to use IT strategically, write a slogan, and then reap the rewards. Rather they must ***learn*** how to make IT a strategic competency.

In an earlier CISR Research Briefing,[1] we explained how a firm's learning about the strategic role of IT can be represented in four stages of enterprise architecture maturity. A firm's enterprise architecture is *the organizing logic for a firm's core business processes and IT capabilities captured in a set of principles, policies, and technical choices reflecting the standardization and integration requirements of the firm's operating model.*

In a recent survey of 95 firms, we acquired specific data on investment patterns and management practices associated with the four stages of architecture maturity. In this study, firms achieving greater architectural maturity reported lower IT costs, shorter IT development times, greater discipline in their business processes, and more strategic benefits (e.g., customer intimacy, product leadership, and strategic agility) from IT. In this briefing we describe how firms capture and formalize the learning from each architectural stage so that they can benefit from the current stage and, if appropriate, migrate toward later stages.

IT Investment Patterns

As firms learn to apply IT more strategically, they evolve their IT investment patterns. For example, firms in the first stage—Application Silo— invest heavily in local applications. In some cases this investment pattern represents a strategic choice. Holding companies, for example, may choose to be stage 1 firms. Most companies, however, have been (or still are) in stage 1 by virtue of historical investment patterns that focused on business cases addressing local business needs.

As shown in Figure 1, firms shift their investments away from local applications and into shared resources as they move through the second and third stages. In the second stage, firms are developing shared infrastructure services. Firms like State Street and Carlson migrated to this stage in an attempt to generate cost savings through technology standardization and consolidation.

By the third stage—Data Rationalization—firms are sharing data and standardizing business processes. Firms like Air Products and MeadWestvaco moved into this stage through an investment in an ERP, while Delta Air Lines focused on developing shared data to enhance customer service and airline operations.

Finally, in the fourth stage, firms' investment patterns are focused on smaller, reusable application and process modules to support a more modular operating model. Firms like ING Direct create standard business application modules that can be used by any of their business units. In some cases, modules can be used off-the-shelf, thus accounting for the slight increase in the investment in local applications in stage 4 firms.

In addition to the variation in their investment patterns, we found that IT spending levels varied from stage to stage. Firms in the first stage have the highest IT budgets as a percentage of total spending (corrected for industry differences). This finding is not surprising. Application silos limit opportunities for enterprise-wide purchase agreements, sharing of technical expertise, and consolidation of data centers. IT spending decreases as firms introduce first hardware and then software, process, and data standards (see Figure 1 budget data). At some point in the third stage, however, the IT budget edges upward, a trend that continues into the fourth stage.[2] While these figures might discourage firms from moving into the latter stages, our sense is that the objective in stages 3 and 4 is to replace process inefficiencies with IT-enabled standardized processes. Thus, firms would expect to offset increased IT spending through process efficiencies.

[1] J. Ross and P. Weill, *Stages of IT Architecture Maturity: Pursuing Alignment and Agility*, CISR Research Briefing Volume II, No. 2A (July 2002).

[2] The very small representation of stage 4 firms is consistent with our impression that few firms have reached that stage. Thus, findings should be viewed cautiously.

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IT Governance and Management Patterns

As firms' investment patterns change, they also start to generate different kinds of value (see Figure 1). But getting value from IT demands far more than investment in building out the technical requirements of the architecture. We have learned that when IT units build enabling IT capabilities, firms may—or may not—generate value from them. Managers must introduce new management practices to formalize organizational learning about how to manage IT investments and generate IT value. They will not achieve increased value from simply changing investment patterns.

Management Practices Key to Stage 1

In our study respondents rated the value they received from a set of IT management practices, and we determined statistically which practices generated greater value as architecture matured (see Figure 2).[3] For example, in stage 1, key practices supporting firms' efforts to generate value from application silos were:

- well-designed business cases,
- a standardized project methodology, and
- program managers who coordinated related projects.

These three practices represent sound methodology and fundamental project skills. They can help firms generate value at any stage, but firms who acquire the learning associated with these practices at an early stage are better positioned to generate value from subsequent IT investments.

Management Practices Key to Stage 2

Practices that were associated with greater IT value in stage 2 included three mechanisms facilitating more centralized IT funding:

- an IT steering committee,
- centralized funding of enterprise applications, and
- an infrastructure renewal process.

These funding initiatives help firms support enterprise-wide initiatives and are important to the migration from stage 1—where firms think about optimizing local business needs—to stage 2, where firms focus on maximizing the benefits of standardized technologies across the firm. The other three mechanisms of particular value in stage 2 are all related to managing a standardized technology environment:

- formal architecture compliance process,
- architects on project teams, and
- an architecture exception process.

Together, the six practices important to stage 2 reflect the growing need for IT governance to address the challenges of using IT as an enterprise-wide, rather than business unit or functional, asset.

Management Practices Key to Stage 3

Following on technology standardization in stage 2, key management practices in the third stage help firms adjust to process integration and standardization. While technology standardization has its challenges, process standardization will surely confound and irritate business unit leaders. Practices emerging as important in stage 3 emphasize the increased role of senior management in setting direction and defining enterprise-wide processes. These include:

- enterprise-wide process owners,
- a statement of enterprise architecture guiding principles,
- business leadership of project teams, and
- senior executive oversight of enterprise architecture.

These four practices highlight the need for senior management to articulate business direction, and to implement IT-enabled processes to fulfill the business vision.

Management Practices Key to Stage 4

Finally, in the fourth stage, firms were implementing practices for communicating and assessing IT. These included:

- a one-page graphic for communicating an enterprise vision,
- post-implementation assessment, and
- a formal research and adoption process.

These three practices could seemingly add value at any stage, but their delayed importance to firms in this study and our prior experiences studying IT management practices suggest that firms are failing to take advantage of these tools at an earlier stage. They are valued by firms in stage 4 because these firms have generally benefited from good IT management practices. The survey instrument did not collect behaviors such as developing directories of reusable process components, but we anticipate that the ability to create and reuse application components is critical to the fourth stage.

All Management Practices Support Business Value

What is important to note about the management practices listed in Figure 2 is that they are cumulative. Practices key to value in stage 1 are still important in stage 2—in fact, they are more important. Thus, if firms do not acquire good practices in early stages, they reduce the odds that they will be able to generate significant value from their IT initiatives in later stages. Long lists of failed ERP and CRM implementations, lightly used data warehouses, and abandoned workflow

[3] The practices listed in Figure 2 were statistically significantly related to architecture maturity. We identified the stage at which each practice emerged as most important by comparing the means and determining the stage at which the value of the practice demonstrated its largest increase in mean value.

management systems highlight the potential for wasting money on IT. We interpret these findings to mean that firms embarking on an enterprise architecture journey should plan for steady increases in IT value through gradual enhancements in IT management. We have found no shortcuts to business value from IT.

Figure 1: Architecture Maturity Stages

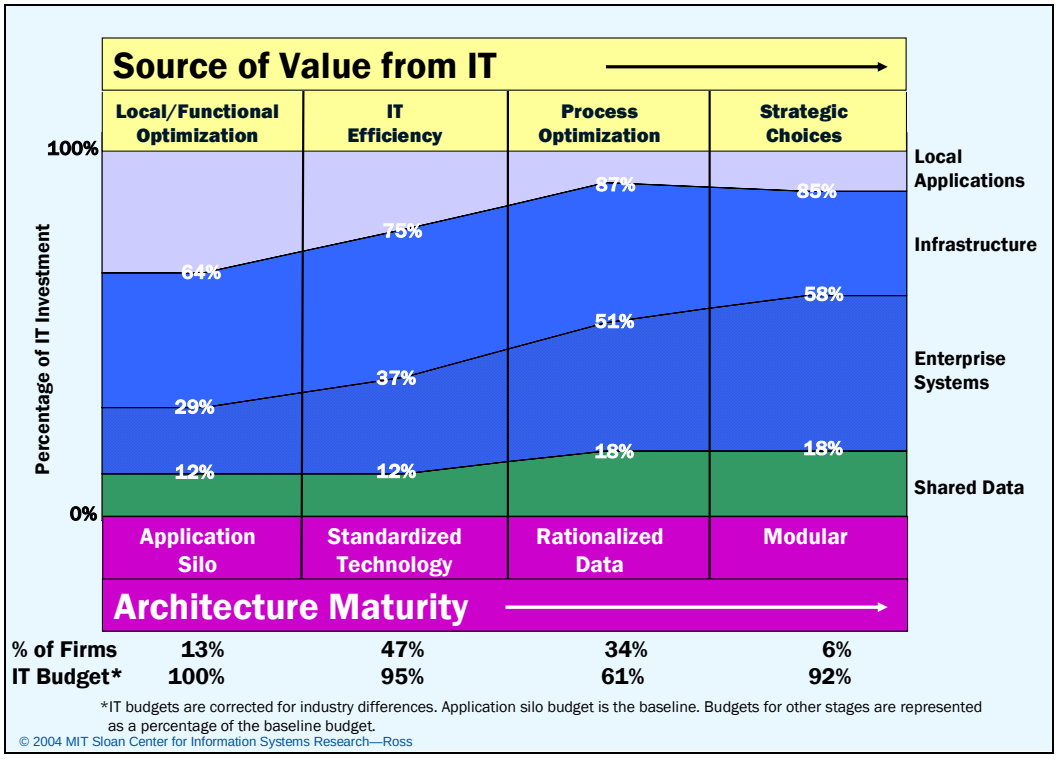
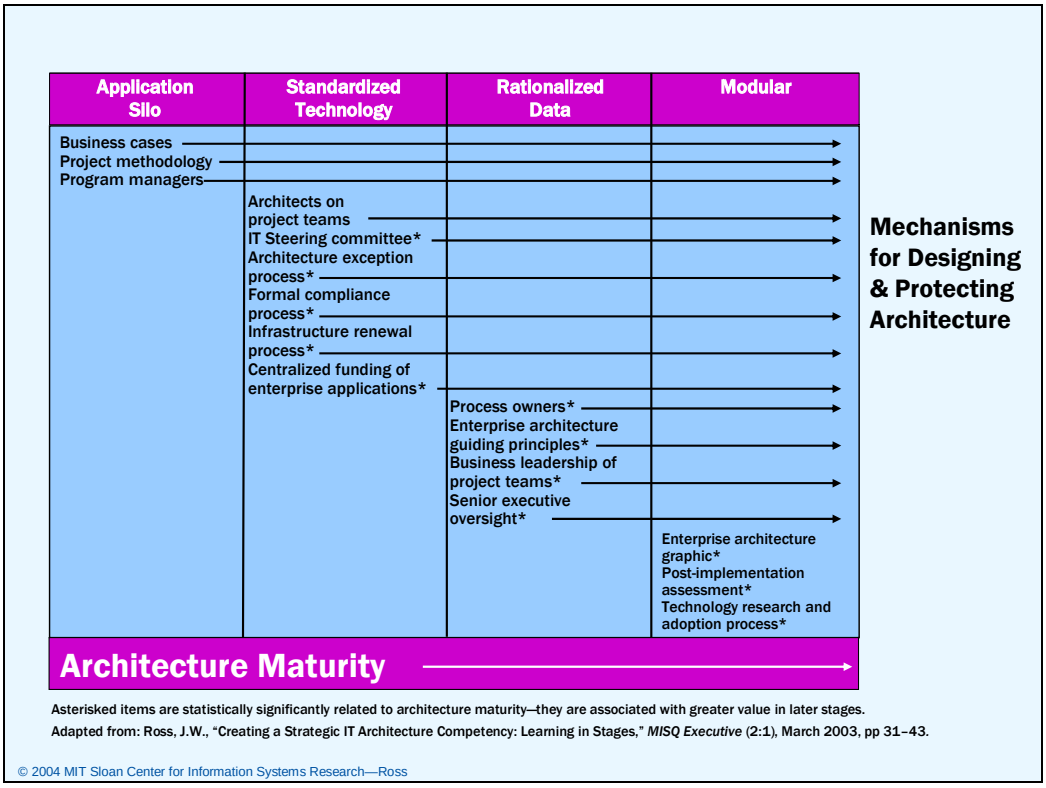


Figure 2: Evolving Management Practices



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RESEARCH BRIEFING

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BUILDING IT RISK MANAGEMENT EFFECTIVENESS

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Introduction

IT Risk Management is gaining visibility in the world's enterprises. Enterprises are considering not only technical risks, but also how IT risks influence enterprise-level risks. The executive's view of IT risk is moving beyond availability and access management to examine implications of information accuracy and strategic agility.

Effective risk management capability has a number of payoffs. Enterprises that manage risk effectively have a better handle on how they are addressing high priority risks and importantly, what risks they are choosing to "live with." They are confident that they are focusing money and effort on risks that really matter. And, they can go after opportunities that other enterprises would find too risky to undertake.

Unfortunately, few enterprises are mature in their ability to manage enterprise IT risks. Most enterprises use an intuitive approach to risk management: they address high-profile risks that get media attention (such as viruses or power outages or wireless), but subsequently miss many risks that are lower-profile (such as inadequate internal controls or aging, brittle applications).

Building Effective Risk Management

How can an enterprise build risk management capability? In interviews with more than 50 IT managers, we found that effective risk management is a cohesive combination of three core disciplines (see Figure 1):

- Risk governance process: complete and effective risk-related policies, combined with a mature, consistent process to identify, assess, prioritize, and monitor risks over time.
- Risk aware culture: skilled people who know how to identify and assess threats and implement effective risk mitigation.
- Effective IT foundation: IT infrastructure and applications that have inherently lower risk because they are well-architected and well-managed.

If a firm is severely lacking on any of the three disciplines, it cannot be effective at IT risk management. For example, no level of governance process or expertise can overcome a complex, overly-risky foundation. Similarly, heavy risk governance cannot be effective without the expertise to identify and reduce risks.

However, firms need not be world class in all three disciplines; rather, they can be world-class in one, with lower (but still acceptable) levels in the other two. Moreover, firms that have ineffective risk management cannot become effective overnight; they build capability over time by using one discipline very well to help the others grow to an effective level.

The remainder of this briefing describes the approaches taken by three global companies to build effective IT risk management. Each used a different discipline as the driver of its risk management efforts.

1. FinCo: Leading with Risk Governance

FinCo, a provider of services to financial services firms, was highly dependent on IT. Unfortunately, auditors were increasingly expressing concern about the state of FinCo's IT risk profile. Having grown very rapidly, FinCo had numerous application silos on a variety of platforms. Each of eleven business units had its own IT staff, with varying views of risk management. There was little internal expertise for IT risk management.

Risk management was one of the newly-appointed enterprise CIO's first initiatives. Since changing the installed base would require extensive time and effort, and since it would be difficult to build a large group of risk experts quickly, FinCo focused on implementing strong risk governance process. They established policies and plans for business continuity, access management, information retention, system development methodology, vendor management and other areas. They conducted risk identification exercises to identify and prioritize risks. They established a tracking process to show whether risks were being mitigated as planned. Finally, they implemented risk-related reviews throughout the project initiation process, so that new projects either complied with risk policy or were immediately noted as exceptions.

The result was a lopsided risk management "propeller" (Figure 2a), driven by the heavy blade of risk governance process. Over time, this is evolving to a more stable

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cohesive arrangement (Figure 2b). By participating in risk governance processes, IT employees have increased their risk awareness and senior management has begun to understand the importance of IT risk management. Meanwhile, the process identifies high-value risk reduction opportunities for the foundation, and ongoing project reviews ensure that the foundation doesn't get more risky over time.

Effective IT risk management has paid dividends by showing auditors how serious FinCo is about risk management, and by increasing the firm's credibility with potential corporate clients. It has also built business (and client) buy-in as FinCo revamps its entire applications architecture.

2. EquipCo: Leading with Awareness

EquipCo, a global supplier of telecommunications equipment and services, took a different approach to building IT risk management effectiveness. Its IT foundation was very complex due to the firm's diverse business units and global scope. Heavy centralized risk governance was not seen as an option because business units had strong IT groups and faced differing environments. However, EquipCo had a great deal of security expertise, since security was an important component of the value proposition for its products and services.

EquipCo decided to lead risk management through awareness, led by a core team of experts. It augmented internal security experts by recruiting experienced risk experts. The 30-person core risk group conducted risk assessments and provided risk mitigation expertise to the business unit IT groups. They also worked with each business unit IT director to prioritize risks and justify risk-related funding.

Instead of heavy enterprise-level risk management processes, the team established corporate policies (for example, in supplier connectivity) that business units can implement through customized local procedures. In addition, the corporate IT risk group actively communicates with business units to help them grow their own risk expertise. The initial risk exercises let by the core team, plus frequent advice and communication, has increased awareness in each business unit. Over time, the combination of strong awareness and lighter risk governance is improving the risk profile of the foundation.

3. ChipCo: Leading with Foundation

ChipCo's CIO has, during ten years in his position, taken a different approach to building risk management capability. He and his staff have created an IT foundation that is inherently less risky than other firms. A global semiconductor manufacturer, ChipCo has a single global instance of ERP, linked to standardized manufacturing systems in each fabrication site, all riding on a secure, redundant, standardized infrastructure for processing and networking.

By building a world-class IT installed base, ChipCo is able to use much lighter awareness and risk governance activities but still manage risk effectively. For example, there is no formal core of IT risk staff. IT staff members throughout the firm actively identify and prioritize emerging threats to the foundation, using trade press and their links with other firms.

Risk governance is focused on policy and monitoring, but not on formal risk management processes. ChipCo actively monitors its infrastructure and applications for availability and access issues. It has policies in place, such as a freeze on production software changes during a two-week window around quarterly financial close, to reduce the likelihood of an incident. It also has checkpoints in project initiation reviews to identify potential risk issues. The CIO sees no need for a formal, quarterly risk identification and tracking process: *"We take the lead to let the corporation know what we perceive as the biggest threats, and if we need a major capital expenditure or policy change, we bring it to them. But mostly, we're empowered to address the IT risks we see as most important."*

Conclusion

Effective IT risk management requires three core disciplines. First, a well-architected, well-managed IT foundation is inherently less risky than a more complex one. Second, a mature risk governance process includes policies and procedures to identify and assess risks and prevent risky behavior. Third, risk awareness helps everyone in the enterprise understand threats and mitigation opportunities.

Enterprises need all three disciplines to be effective at risk management, but they need not be world-class at all three. And, they can use one to evolve the others to effective levels. FinCo used regulatory pressure and management commitment to launch a strong formal risk governance process that improved awareness and foundation over time. EquipCo used its security expertise to improve awareness throughout the firm. It could establish risk governance that is less heavy than FinCo's but still effective for improving the foundation. ChipCo, with its very clean foundation, can focus lighter risk governance and awareness on addressing emerging threats. Over time, each of the three firms is evolving a cohesive, stable combination of the three risk disciplines to provide highly effective IT risk management.

Figure 1: Three Core Disciplines of IT Risk Management

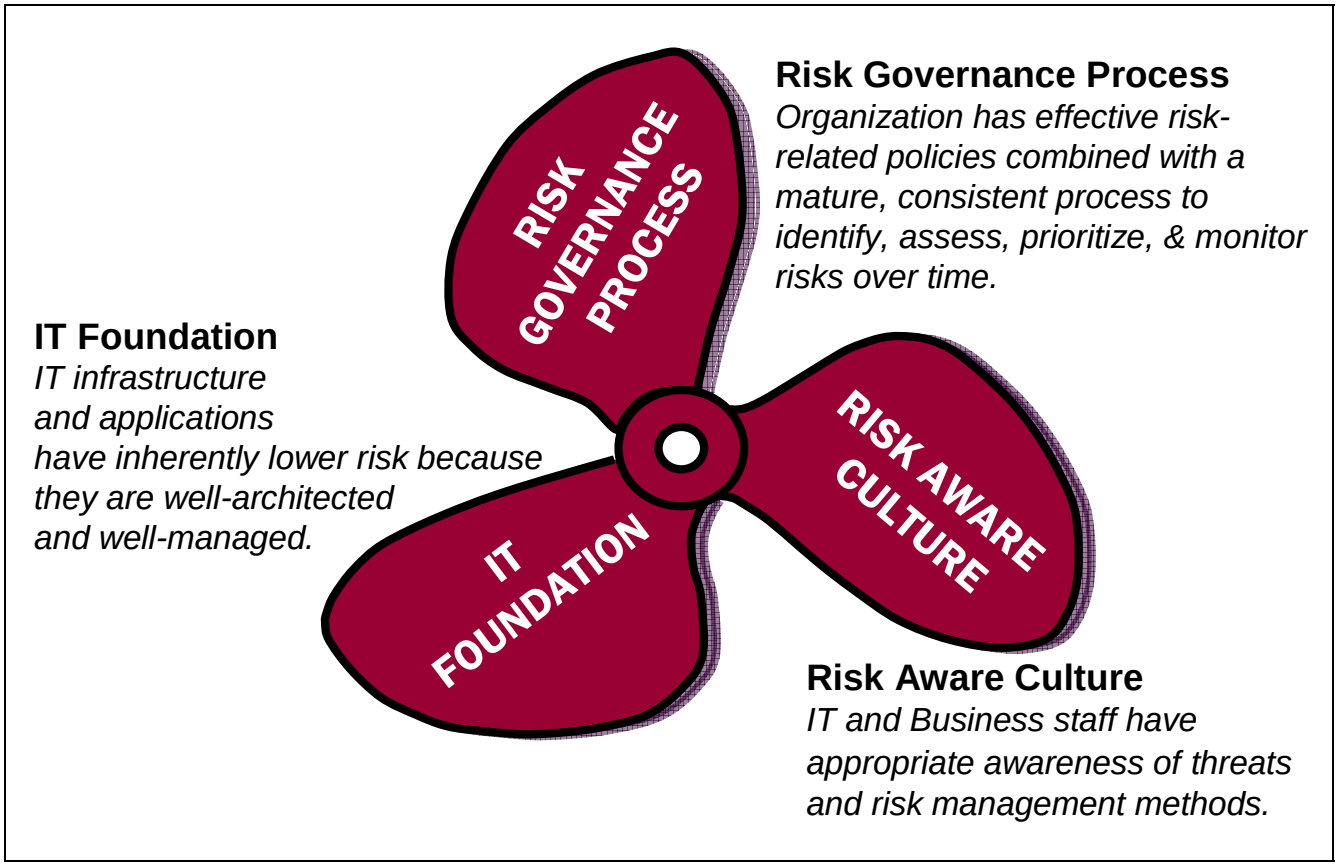


Figure 2a: FinCo's Risk Management Capabilities (at launch)

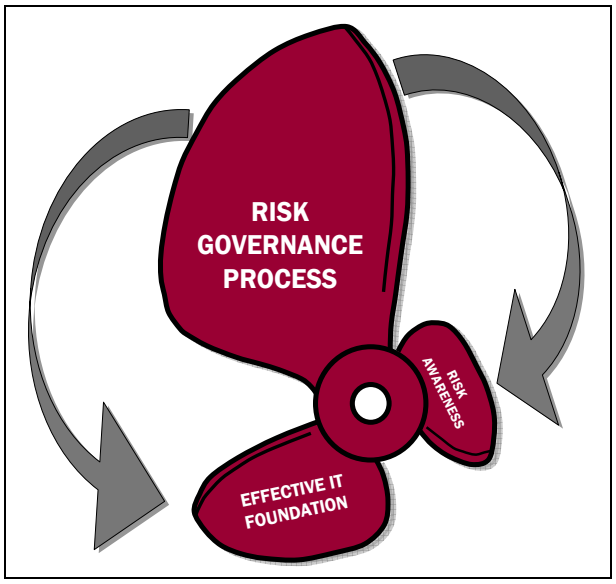
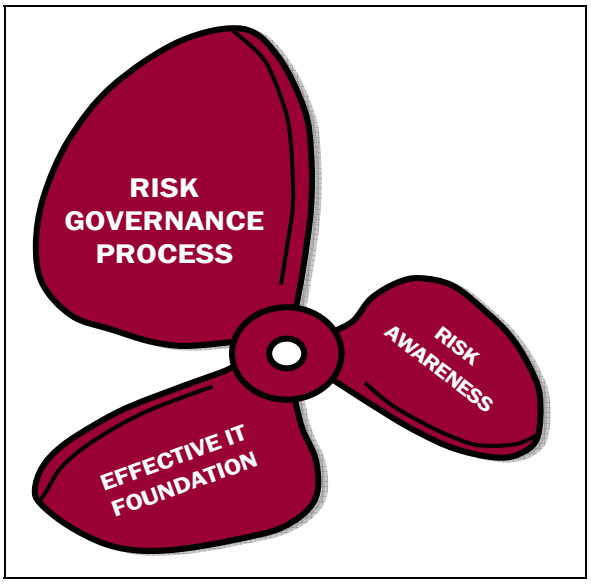


Figure 2b: FinCo's More Balanced Capabilities



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RESEARCH BRIEFING

MITSloan

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IS VIRTUAL EDUCATION AS GOOD AS A CLASSROOM? [1]

George Westerman, *Research Scientist, MIT Sloan Center for Information Systems Research*[2]

Large enterprises in a globally competitive environment increasingly need to share best practices among employees in different locations. In a world of HIPAA, Sarbanes-Oxley, and global sourcing, inconsistencies and coordination problems among people can be very costly. Whether training employees on new skills, rolling out new procedures, or periodically "syncing" a global team, it is important for employees to periodically come together and share information.

Unfortunately, traveling to corporate training courses is expensive and inconvenient. It often interferes with work and family schedules. Moreover, work doesn't slow down during training, so employees who return from training have to "catch up" with the work they missed.

Many corporations such as Intel and Hewlett-Packard (HP) are increasingly turning to virtual environments to address the cost and inconvenience issues of corporate learning. In general, virtual environments are seen as effective, but less satisfying than the "real life" experience. For example, Len Fehskens, HP Master Solution Architect who teaches extensively with HP's award-winning HP Virtual Classroom,[3] states:

"Satisfaction is consistently above 4 on a 5-point scale. Our people, who are very internet-capable, find it convenient to take the course from their offices. But some students wish for more face-to-face interaction with the instructor (as do the instructors). And, while we believe that the virtual learning space is effective, we're not sure whether the virtual environment lets students get the full range of knowledge they'd get from actual practice, especially for the most difficult concepts."

Many managers believe that the cost and convenience savings of virtual environments outweigh any potential loss in learning and satisfaction. But beyond quick surveys and experience-based intuition, there is little solid evidence of virtual learning's efficacy relative to traditional classroom training. What is the extent of the cost/quality tradeoff? How effective is the virtual environment relative to traditional classroom learning?

In this briefing, we describe a university study comparing the outcomes of teaching business concepts through online and in-person approaches. We find that students in a virtual classroom performed as well on test scores as students in a traditional classroom. However, virtual students were significantly less satisfied, largely because our random assignment process placed some students into the virtual classroom even though they lacked internet skills or found it highly inconvenient to use. These skill and convenience issues are less of a problem in many corporate settings, meaning that virtual learning can be an effective tool in many corporate learning applications.

Comparing Virtual and Face to Face Groups

In the university experiment, we compared learning outcomes for undergraduate economics students in a traditional classroom versus a distance-learning tool called Centra Symposium.® The Centra environment simulates a classroom environment in cyberspace. Each student's computer screen displays an image (usually a Powerpoint slide) in the center, a list of attending students down the left-hand side, and action buttons across the top. Instructor and students

[1] The researchers would like to thank Professors Mark Pingle and John Dobra of the University of Nevada – Reno, who agreed to host the study, and Paul Gudonis and Kathleen Collins of Centra Software for the use of and support on the Centra learning environment. We would also like to thank Len Fehskens of Hewlett-Packard, who gave valuable insight into the findings.

[2] This briefing is adapted from a study conducted by David Croson, Visiting Assistant Professor at MIT Sloan School of Management, and George Westerman, Research Scientist at MIT Sloan CISR in late 2003. The detailed study design and findings will soon be published in a CISR working paper.

[3] The HP Virtual Classroom received the American Society for Training and Development (ASTD) Excellence in Practice Citation in 2003 for a course entitled "Introduction to Solution Architecture and HP Global Method for IT Strategy and Architecture."

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interact via real-time audio, through the use of inexpensive headsets and through real-time text chat. The instructor can show slides and mark them up, much as a sports commentator does on television. The instructor can ask yes/no questions and see who 'virtually' raises their hands. A student can raise her hand to ask a question, and the instructor can 'virtually' pass her a microphone to speak. Students can even 'virtually' chuckle at a joke or groan at a comment. All of this is visible to the instructor and all of the students.

In the study, we randomly assigned 190 students to either a traditional classroom or to Centra. A few days before the study, all students answered a demographic questionnaire covering age, GPA, internet experience, credit load, and other factors that could influence learning performance. They also took a 10-question pre-quiz on the topic being taught.

The instructor taught the same material to the two groups independently, using the same slide presentation. Afterward, students in both groups completed a satisfaction-related questionnaire, as well as a post-quiz that measured learning. We analyzed the results to understand if the virtual environment could produce learning outcomes as good as (or nearly as good as) the traditional environment.

Result: Same learning outcomes in both environments

In all, 91 students (52 traditional, 39 virtual) provided sufficient data to assess their learning and satisfaction outcomes.[4] After controlling for gender and student ability (measured by score on the pretest and the score on the course's midterm exam), we found no difference in student post-test performance between the traditional and virtual groups on the core topics of the lecture.[5]

Result: Forced assignment resulted in lower satisfaction; self-selection will markedly improve satisfaction

The results were less clear for student satisfaction. Virtual students were significantly less satisfied than those in the traditional classroom, but the negative result does not tell the whole story. Over 60% of the students in the virtual classroom said that they either preferred the virtual classroom to the traditional one, or were neutral. Recall that we randomly assigned students to the virtual environment, regardless of their preference or internet skills. This forced choice of a new environment was an important driver of dissatisfaction. Our analysis shows that, in future sessions, allowing students to choose their learning environment can markedly improve online learning satisfaction.

In the online environment, two factors—internet enjoyment and perceived convenience of the online environment—were significant drivers of satisfaction. First, students who found the internet enjoyable and easy to use were significantly more likely to be satisfied in the online classroom. Secondly, students who found the virtual environment less convenient than the traditional classroom were significantly less satisfied.

Perceived convenience was negatively related with distance from home to campus, and positively related to clarity of the internet connection. Presumably students living on- campus could easily access high-speed internet from their apartments, while many off-campus students had the unenviable choice to attend from a noisy on-campus computer lab or to travel home and use a dial-in connection.

Perceived convenience was positively related with perceived fairness, signifying that, by allowing students to self-select the virtual environment, we could raise online satisfaction significantly. With more than 60% of students either preferring the online environment or neutral, the University can switch more than half of its students to the less-costly virtual environment at no loss in educational quality or satisfaction.

Corporations are a good environment for effective virtual learning

These results translate well to corporate training because, in many corporate settings, the experiment's drivers of dissatisfaction are not a problem. For example, white-collar workers in most global corporations have access to high-speed internet from their desks and are experienced at using it in their jobs. These employees would not face the inconvenience and internet skills issues experienced by some of the undergraduates. Hewlett Packard found that most of its employees prize the convenience of avoiding travel over any inconvenience of attending via internet.

[4] Half of the 190 students were randomly assigned to each session. Many students provided only partial data, so their information could not be fully used for the study. In order to have complete data on a student, the student needed to complete the demographic questionnaire and pre-quiz, attend the class, and then complete a post-quiz and satisfaction survey.

[5] None of the other controls from the demographic questionnaire were significant drivers of post-quiz performance.

Many corporate training contexts follow a format very similar to the experiment's setting. For example, corporate training on HIPAA compliance issues is often delivered in a single session to hundreds of employees. New accounting rules (such as changes to comply with Sarbanes-Oxley) or HR policies (such as sexual harassment awareness or workplace diversity training) are often introduced to large numbers of employees in short sessions. Many IT training courses, such as the rollout of a new expense reporting system or retirement/benefits portal, can be conducted through relatively short courses aimed at large numbers of people. Even courses on application development methodologies, IT standards or new IT tools involve lecture and practice over the span of a small number of sessions. Our study suggests that virtual learning may be just as good as in-person training for these contexts, at much lower cost.

There are many corporate conditions, however, to which this experiment's findings may not apply. In some courses (including CISR seminars), participants benefit from personal networking between classes in addition to the classes themselves. Virtual environments do not replicate this kind of unstructured personal interaction. These kinds of contexts would benefit from occasional face-to-face sessions in addition to online training.

Cultural and coordination difficulties in global enterprises may affect virtual learning effectiveness. Research studies have found that virtual environments can reduce inhibitions and social inequalities, so the difference between assertive- and less-assertive cultures may be diminished in the virtual environment. But language and learning-style differences may remain. Additionally, issues such as time zone coordination can be difficult in global companies. While some members of global executive teams willingly meet during early-morning or late-evening hours in order to resolve time zone difficulties, employees receiving mandatory training may be less willing to do so. To address both the time zone and cultural issues, corporations could offer sections geared to particular regions of the world.

Finally, the fit between the nature of the technology, the topic and course design can impact the effectiveness of virtual learning. The Centra environment we used in the experiment enabled a level of interaction similar to that in a traditional classroom, but many virtual learning technologies are more like a self-study tool or non-interactive lecture playback. The nature of the technology must be matched to the interactivity needs of the course design and students. Additionally, anecdotal evidence (at HP and other contexts) suggests that students in discretionary courses may be more satisfied than those in required courses, creating implications for the extent to which instructors wish to optimize online learning satisfaction in the two types of courses.

Conclusion

Global enterprises are increasingly turning to virtual learning as a cheaper, more convenient alternative to in-person training. But, enterprises have done little systematic evaluation of how much a student sacrifices, in terms of learning and satisfaction, by using virtual learning techniques.

In evaluating the cost/quality tradeoff of virtual learning, the acid test should not be to do better than real-life teaching. It should be to *do no worse* (or, in many settings, "*not much worse*"). Through a carefully-controlled experiment, we showed that virtual learning can be just as good as in-person training, in terms of both learning and satisfaction, while paying large benefits in terms of cost and convenience.

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RESEARCH BRIEFING

MITSloan

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GENERATING STRATEGIC BENEFITS FROM ENTERPRISE ARCHITECTURE

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MIT Sloan Center for Information Systems Research

Firms usually justify enterprise architecture initiatives by identifying cost benefits. While cost benefits may be the easiest to measure, many other benefits of enterprise architecture have been reported, including reduced development time, decreased IT-related risks, and increased business discipline. But the grand prize, when it comes to enterprise architecture, is strategic business benefits. Indeed, we would argue that enterprise architecture is such a long, hard journey that firms shouldn't undertake it unless they can envision how enterprise architecture will change the way they operate. Our study of 103 firms suggests that a strategic focus pays off. Firms that were most effective in achieving strategic objectives through enterprise architecture initiatives had greater profitability relative to their competitors.[1]

Our research focused on 4 strategic benefits:

- *Operational Excellence*, low cost provider, emphasizing efficient, reliable and predictable operations;
- *Customer Intimacy*, extraordinary customer service, responsiveness, and relationships, based on deep customer knowledge;
- *Product/Service Innovation***,** first to market with innovative products and services, usually dependent on rapid R&D to commercialization processes (e.g. market leader);
- *Strategic Agility*, the ability to respond rapidly to competitor initiatives and new market opportunities.

Since different firms have different strategic objectives, we computed a strategic effectiveness score for each of the 103 firms in our study, based on the contribution enterprise architecture was making to each of the above four objectives relative to the stated importance of that benefit. We found that firms who are most effective at generating strategic business benefits from enterprise architecture share three characteristics distinguishing them from firms generating fewer strategic benefits.[2] (See Figure 1.)

Greater senior management involvement. High performers on strategic effectiveness enjoy greater senior management involvement in enterprise architecture planning and implementation. In particular, respondents more often credited their senior management teams with explicitly stating the requirements for enterprise architecture. But senior management involvement did not stop at the planning stage. Senior managers in these high performers were more likely than their counterparts in other firms to be able to describe their firm's enterprise architecture. They also provided oversight on architecture initiatives.

Senior management involvement is typically built into well-designed governance processes. For example, ING Direct, the international direct banking unit of Dutch conglomerate ING, has a modular architecture that allows individual banks to introduce new products and processes by deploying reusable application modules. This modular architecture is a key strategic asset at ING Direct. The firm leverages its architecture by relying on its Information Technology and Operations Council (the CIOs and COOs of the regional banking units) to coordinate local business strategies with the firm's IT Plan. The outcomes of these meetings serve as input to the ING Direct Council, where international business strategy is discussed and defined. In this way ING Direct's senior management team regularly guides and reinforces enterprise architecture, allowing IT capabilities to influence business strategy just as business strategy influences IT.

Architecture built into project methodology. Firms realizing strategic benefits from enterprise architecture have project methodologies emphasizing the importance of architecture. These firms involve IT architects early in project design and typically demand that projects pass an architectural compliance review. The IT architect role is pivotal in these firms.

For example, at one financial services firm, an IT architect is assigned to every project. The architect

[1] We found a statistically significant relationship between the firm's reported profitability relative to competitors and a computed strategic effectiveness score that weighted the reported enterprise architecture benefits relative to the firm's strategic objectives.

[2] We compared the top 25% of firms on the strategic effectiveness score with the other 75% of firms.

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reviews requirements and identifies any needed capabilities that are inconsistent with architecture standards. The architect is authorized to take actions in the best interest of the company—which may involve forcing a compromise on functionality to maintain architectural integrity or, conversely, allowing an exception to standard to meet a unique business need. As in most firms that have established a key role for IT architects, the architects in this firm play the additional role of establishing architecture standards. This means identifying when standard technologies are outdated. It also means identifying the need for new infrastructure capabilities and defining a standard before a new project chooses one by default. Recently, the firm defined an IVR standard in anticipation of a set of initiatives that otherwise would each have sought their own solution.

Greater architecture maturity. In earlier research we identified four stages of architecture maturity.[3] As firms mature their architectures, they position themselves for greater strategic impact from IT because their focus shifts from technology standardization and integration to IT-enabled process standardization and integration. The process of maturing involves transitioning from systems and platforms that resemble "cold spaghetti," to modular architectures suited to a plug and play business model.

UPS CEO Mike Eskew notes that his firm's centralized package database and the set of well-defined IT-enabled processes that capture and access that data are highly standardized. As a result, the firm can use package information in creative ways. As the firm has turned its attention from operational excellence to increasingly focus on customer intimacy, IT leaders have regularly identified opportunities for new services based on existing IT capabilities. Eskew refers to the proposals from IT as "happy surprises." These happy surprises are a direct result of having a more mature enterprise architecture.

Five Key Management Mechanisms

The three characteristics distinguishing firms who receive the greatest strategic benefits from enterprise architecture result from multiple management mechanisms. We identified five specific management mechanisms statistically related to the strategic effectiveness of a firm's enterprise architecture. In Figure 2 we list these mechanisms in decreasing order of their impact on strategic effectiveness. We also note the relationships between the management mechanisms and the distinguishing characteristics of firms generating strategic benefits from enterprise architecture.

The most important management mechanism for generating strategic benefits from enterprise architecture is a clear statement of ***enterprise architecture guiding principles.*** Although an obvious prerequisite for architecture benefits, many firms lack clarity in their principles, thus making it difficult to design stable IT and business process capabilities in support of the firm's operating model. Not surprisingly, effective principles are correlated with all three of the distinguishing characteristics of high performing firms. We expect that the impact between senior management involvement and enterprise architecture guiding principles is mutually reinforcing. Similarly, architecture compliance reviews, architects on project teams, and the architecture maturity process, by virtue of applying principles, likely force their clarification.

A second management mechanism predicting strategic effectiveness is the writing of ***business cases for architecture investments.*** The main impact of the business case is seen in the architectural compliance review. For architects to determine when an exception is in the best interests of a firm, they need to understand the business case for the project. Good business cases force project teams to identify, in advance, exactly what strategic benefits they expect to derive from an investment in architecture. Articulating and measuring the proposed outcome helps to ensure its realization.

The third management mechanism is an ***IT steering committee.*** The steering committee has an impact on strategic effectiveness by virtue of engaging senior management in architecture. Steering committees are sometimes composed of senior executive team members. More often, a steering committee comprises senior IT leaders—typically divisional CIOs—who represent both local business interests and global IT interests in their collaborations. The members of high level IT steering committees work closely with senior executives, and the steering committee itself usually has overlapping membership with the senior management team in the person of the CIO.

A ***one-page graphic*** depicting high-level architecture is another valuable management mechanism. The graphic articulates expectations defined in the guiding principles, thus forming the basis for senior business executive architecture oversight. The graphic also supports the architecture emphasis of the project methodology.

Finally, a ***technology research and adoption process*** enables project architects to do their job. Technology research and adoption processes are characteristic of firms in more mature architecture stages, which may

[3] See Ross, Jeanne "Maturity Matters: How Firms Generate Value from Enterprise Architecture," MIT Sloan CISR Research Briefing, Vol. IV, No. 2B, July 2004.

explain why they are valuable to senior managers with responsibility for architecture oversight.

Conclusion

To justify the resources required to design and implement enterprise architecture, firms need to ensure they generate strategic benefits from their architectures. We have found that generating strategic benefits demands a sustained commitment to growing management's ability to define, implement, and leverage architecture. Firms should seize useful IT management and governance mechanisms to help them on their journey.

Figure 1: Differentiating Characteristics on Strategic Effectiveness of Enterprise Architecture

Characteristic	Low strategic effectiveness (n=78 firms)	High strategic effectiveness (n=25 firms)
Senior management involvement		
▪ Senior management explicitly defined architecture requirements	**25%** (of firms)	**44%** (of firms)
▪ Senior management oversees architecture initiatives	**45%** (of firms)	**60%** (of firms)
▪ Percentage of senior managers who can describe high level architecture	**19%** (of mgrs)	**39%** (of mgrs)
Architecture built into project methodology		
▪ Percentage of project teams with architects assigned	**49%** (of projects)	**81%** (of projects)
▪ Percentage of projects subjected to architecture compliance review	**60%** (of projects)	**80%** (of projects)
Median Architecture Maturity stage (1–4)	**2**	**3**

Figure 2: Management Mechanisms Supporting Architecture Effectiveness

	Senior management defines requirements	Senior managers oversee architecture	Senior managers can describe architecture	Project teams have architects	Projects subject to architecture compliance review	Median Architecture maturity stage
Enterprise architecture guiding principles	*	*	*	*	*	*
Business cases for architecture investments					*	
IT steering committee	*		*	*		
One-page graphic		*		*	*	*
Technology research and adoption process		*		*		*

* Asterisks indicate statistically significant relationship.

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RESEARCH BRIEFING

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IT SAVVY PAYS OFF[1]

Peter Weill, *Director*
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MIT Sloan Center for Information Systems Research

Firms with more firm-wide IT savvy have better payoff associated with all their IT investments.[2] We studied 147 firms over four years and found that top performers have more IT savvy comprised of clusters of value enhancing practices and characteristics. High IT savvy helped firms achieve greater than industry average returns from each IT dollar invested in their IT portfolio. Previous briefings have introduced the IT Portfolio and its four asset classes, provided benchmarks (March 2003 briefing) and identified the returns to the IT asset classes (March 2004). This briefing builds on the IT portfolio approach and presents the increased returns for high IT savvy for each of the four asset classes in the IT portfolio across several measures of firm performance.

Characteristics that Create IT Savvy

We found that business leaders of firms with high IT savvy have developed five mutually reinforcing characteristics described below. The first three characteristics are practices related to IT use. The last two characteristics are competencies needed for high IT savvy. The mutual reinforcement of both practices and competencies is necessary for high IT savvy.

- *IT for Communication*—high use of electronic channels such as email, Intranets and wireless devices for internal and external communications and work practices.
- *Digital Transactions*—a high degree of digitization of the firm's repetitive transactions, particularly sales, customer interaction and purchasing.
- *Internet Use*—more use of Internet architectures for key process such as sales force management, employee performance measurement, training and post-sales customer support.
- *Firm-wide IT Skills*—high capability of all employees to use IT effectively. There are strong technical and business skills among IT staff, strong IT skills among business staff and an adequate market supply of highly skilled IT staff.
- *Business Management Involvement*—strong senior management commitment and championing of IT initiatives. There is also strong business unit involvement in IT decisions resulting in a partnership between IT staff and business units to generate value from IT investments.

An example of a firm with high IT savvy is 7-Eleven Japan, the most profitable retailer in Japan with over 10,000 stores.[3] 7–Eleven's "total information system" connects 70,000 computers in stores, at headquarters and at suppliers providing a transparency of the entire value chain. For example, recent sales, weather conditions, and product range information are provided graphically to each store as input for ordering fresh food. Fresh food is ordered and delivered three times a day into stores. The

[1] This research was made possible by the support of CISR sponsors in particular CISR Patron Microsoft Corporation and the National Science Foundation, grant number IIS-0085725. This CISR briefing is the third in a series on IT portfolios. The previous briefings are: "Managing the IT Portfolio: Returns from the Different IT Asset Classes," Vol. IV, No. 1A, March 2004 and "Managing the IT Portfolio (update circa 2003)," Vol. III, No. 1C, March 2003. For more technical details see "Top Performing Firms Have Complementary Capabilities and IT investments," Sinan Aral & Peter Weill, MIT Sloan CISR Working Paper No. 343, August 2004. This research draws on and extends the material on IT portfolios in "Leveraging the New Infrastructure: How market leaders capitalize on IT" by Peter Weill and Marianne Broadbent, Harvard Business School Press, 1998.

[2] The total IT investment includes all centralized and decentralized IT spend (expenses and depreciated capital) both insourced and outsourced plus all people dedicated to IT services and management. The analysis based on 147 firms using data from 1999 to 2002. All results linking IT investments and performance presented in this briefing are statistically significant controlling for industry, firm size, R&D and advertising expenditure.

[3] For more information, see Kei Nagayama & Peter Weill "7-Eleven Japan Co., Ltd.: Reinventing the Retail Business Model," MIT Sloan CISR Working Paper 338, January 2004.

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result is that on hot days Tokyo's 7-Eleven stores have plenty of Bento boxes while on cold days there are lots of hot noodles for sale. But these practices alone are not enough; 7-Eleven Japan has worked hard to develop firm-wide IT skills and senior management involvement to conceive of and reinforce these practices. 7-Eleven Japan has company counselors who visit each store at least twice a week. The counselors work with the store franchisees or managers to improve the business, often by using data from their information systems to manage and order more effectively. The company counselors' visits increase the IT skills of the store operators while reinforcing the IT practices.

One of the reasons why 7-Eleven Japan's average daily sales are approximately ¥200 thousand ($1670) higher than competitors' is that each of the total 200,000 store owners and clerks, including part time workers, is expected to participate in managing ordering and inventory. The collaboration leads to the appropriate orders, optimizes employees' capabilities, and maintains their motivation—differentiating 7-Eleven Japan from its competitors. The reinforcement of practices and capabilities comprising IT savvy has also helped to steadily increase profitability with gross margins per store increasing from 5% to over 30% from 1977 to 2003. The impact is also apparent in store and supply chain efficiency with the average number of deliveries to downtown stores dropping from 77 to 10 per day over the same period while stock turn decreased from 25 to 10 days.

The Extra Returns from IT Savvy

The figure summarizes the average returns and the impact of high IT savvy on investments in the four IT asset classes in the IT portfolio.[4] IT savvy is measured by the strength of the five characteristics described above.[5] Firms with high IT savvy achieved higher performance than other firms when they invested in all four IT asset classes. For example, investments in infrastructure coupled with high IT savvy were associated with superior returns for a broad basket of performance measures—costs, profits, innovation and market capitalization. IT infrastructure is the shared IT services such as the network, customer databases, pc/laptops, help desk, data center, servers, security, middleware and excludes applications. IT infrastructure creates business value by enabling faster, more efficient application development. In average firms, the impact of IT infrastructure on profit is negative in the year following the investment. The often several-year lag between infrastructure investment and effective use, and the significant cash outlay and disruption typically required by major infrastructure investments, helps explain this negative impact. However, the reinforcing practices and competencies in high IT savvy firms convert the impact of IT infrastructure on short-term profit from negative to positive. The market highly values IT infrastructure investments in the average firm but attaches premium value to these investments in high IT savvy firms.

High IT savvy firms also had higher performance associated with transactional IT investments typically made to automate repetitive transactions, cut costs, and increase throughput. Not only does the market value transactional investments in high IT savvy firms but these firms also have higher profits and get more sales from innovative products. The average firm also has lower costs associated with their transactional investments, a tribute to the value transactional investments can bring to any firm. However, low IT savvy firms have much lower impact on innovation, profits or market value from transactional IT.

Strategic IT is investment to create new business value or growth and is thus historically a high risk-high return IT asset class. But firms with high IT savvy mitigate the risks associated with strategic IT investments and have higher than average profits, innovation and market capitalization. In firms like 7-Eleven Japan, senior management involvement, high firm-wide IT skills and a culture of IT use are necessary for more successful strategic (and in other firms, risky) IT investment.

Informational IT includes many types of investments ranging from reporting requirements such as Sarbanes Oxley to customer relationship management. Again IT savvy makes a big difference. We suspect firms with strong IT savvy demonstrate particularly strong profitability because of the disciplines (e.g., common standards, IT skills of managers) required to use information effectively. Interestingly, we see no impact from informational IT on innovation, cost or market capitalization in the average firm.

IT investments in firms with a low IT savvy were associated with lower returns from all four asset

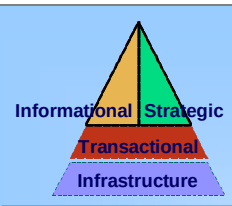
[4] The average firm studied weights its investments in its IT portfolio as: 13% Strategic, 20% Informational, 13% transactional and 54% infrastructure. The impact of IT savvy is described across four measures of firm performance.

[5] For example, the strength the characteristic—digital transactions—was measured as the percent of orders and total sales conducted electronically which averaged 22%.

classes in their IT portfolios. The situation for these firms is bleak with value leaking from most IT dollars they invest. These firms should reduce their IT investments to essential areas and reweigh their portfolios towards transactional IT until they improve their overall IT savvy. Otherwise, they will continue to leak value, particularly from the longer term and higher risk asset classes—infrastructure and strategic IT.

Firms with average or low IT savvy can increase their returns and reduce their IT risk without investing another cent in IT. Instead these firms should apply another scarce resource—management attention—to increasing their IT savvy. The superior results from IT savvy are effectively a return on superior management capability, one of the few long term sources of competitive advantage. We suspect that the aspects of strong IT savvy we measured are reflective of superior capability in all aspects of management, including IT. Firms with a strong IT savvy like 7-Eleven Japan have developed a firm-wide culture of IT savvy that impacts every employee and process. The instinct and discipline to use IT effectively is part of every manager's thinking and part of the firm's DNA. IT savvy can be learned and it pays off.

Figure 1: Average Returns from IT and the Additional Value from IT Savvy



Firm-wide IT Savvy (ITS) constitutes five mutually reinforcing IT practices and competencies: **IT for Communication, Digital Transactions, Internet Use, Firm-wide IT Skills, and Business Management Involvement**

	Lower Cost of Goods Sold			Profit[1]			Innovation[2]			Market Value[3]		
Firms[4]	Ave.	High ITS	Low ITS	Ave.	High ITS	Low ITS	Ave.	High ITS	Low ITS	Ave.	High ITS	Low ITS
Infrastructure – shared IT services such as the network, customer data-bases, pc/laptops, help desk, data center, servers, security, middleware but not applications		+[5]	- -	-	+	- -	-	+	-	+	+	- -
Transactional – applications to automate repetitive transactions, cut costs, increase throughput (e.g., trade processing, billing)	+				+ +	- -		+ +	-		+ +	- -
Informational – applications providing information to manage, account, control, plan, comply, report, communicate with customers				+	+ +	-						
Strategic – applications to support entry into a new market, development of new or customized products etc. (e.g., ATMs)					+ +	- -	+	+	- -		+ +	- -

[1] Profit is Measured by Net Margin = Income Before Extraordinary Items/Total Sales.
[2] Innovation is measured by Sales from Modified and Enhanced Products/Total Sales and Sales from New Products/Total Sales
[3] Market Value is measured by Tobin's q – the Market to Book value of company stock, in the same year the investment is made.
[4] Ave. = Average return for all firms, High ITS = additional return for firms in the top 5% of IT Savvy , Low ITS = additional negative impact on return for firms in the bottom 5% of IT savvy.
[5] +(-) = "High Impact" (50% or less of the highest positive (negative) impact for that variable, ++ = "Very High Impact" (Greater than 50% of the highest positive (negative) impact for that variable). All impacts are statistically significant controlling for firm and industry effects.

Center for Information Systems Research
Sloan School of Management
Massachusetts Institute of Technology

RESEARCH BRIEFING

MITSloan

Volume IV *Number 3C* *October 2004*

WHAT ARE THE KEY CAPABILITIES OF EFFECTIVE CIOS?[1]

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MIT Sloan Center for Information Systems Research

Gaining business value from IT requires more than great technology—it also requires firm-wide participation in conceiving, prioritizing, overseeing and implementing IT investments. An effective CIO makes a big difference. Highly effective CIOs are more than just good managers of the IT function. They also help their non-IT executive colleagues to understand how to play their part in gaining value from IT.

In this research briefing, we report findings from a study of non-IT executives' views of their CIO's, and their own, performance in generating business value from IT (BVIT).[2] Highly effective CIOs are not only better managers of the IT function, but also better managers of the interface between IT and business. Highly effective CIOs focus not on the broad idea of relationship management, but on specific processes that provide transparent oversight of IT. These CIOs aim not only for alignment, but also for a transparent, systematic process of prioritizing initiatives and building IT strategy. They are better at prioritization, infrastructure, architecture, and application development because they manage the IT/business interface better. Top CIOs also help their non-IT executives better oversee IT, prioritize their business needs and ensure effective use of IT assets.

Assessment by Non-IT Executives

MIT Sloan CISR faculty regularly teach a course entitled *IT for the Non-IT Executive* attended by CFOs, COOs, CEOs and other senior executives. This year we asked each participating executive to list the four most important tasks for the CIO, and then rate their CIO on each task.[3] We also asked the non-IT executives to list their own four key tasks in getting value from IT, and to rate themselves. For the firm as a whole, we asked how effectively IT delivers along four dimensions of business value. We then studied statistically how high performers differ from low-performers. Separately we interviewed eight high performing CIOs.

Many CIOs Were Assessed as Struggling with the IT/Business Interface

Non-IT executives assessed their CIOs as more effective at managing tasks the CIOs completely control, such as data center operations and other internal IT department tasks. (See Table 1a for a list of the ten most frequently mentioned CIO tasks). CIOs were assessed as less effective at tasks requiring high degrees of interaction with the business, such as business process reengineering, application development and relationship management.

Non-IT executives typically rated themselves good at supporting IT, but poor at tasks requiring active direction and decision making. For example, non-IT executives do a good job of identifying their needs, but a poor job of prioritizing those needs or providing strategic direction (see Table 1b).

Much of the difficulty in managing the critical IT/business interface arises from unclear expectations. Business executives are unclear on how they should interact with IT and CIOs have been unable to help them understand. For example, although non-IT executives rate their CIOs very poorly at application development, they rate themselves very highly at supporting implementation. In discussing this apparent dilemma with the group of non-IT executives, they commented "Are we really providing

[1] The authors thank David Fitzgerald of MIT CISR for helping with the data and Professor Cynthia Beath of the University of Texas at Austin for suggesting we study this group.

[2] We measured the business value from IT by asking non-IT executives to assess the effectiveness of their IT governance to deliver on four IT objectives weighted by importance: cost effective use of IT & effective use of IT for asset utilization, revenue growth & business flexibility. This measure has statistically significant positive relationships with several measures of long term financial performance (i.e., ROE, market cap growth) and is thus a reasonable predictor of IT value.

[3] Of the 137 executives participating in the study 81% reported their primary functions as non-IT.

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our best people for the IT tasks?" and "I don't really know how to effectively support implementation."

Similarly, business executives say that relationship management is their CIOs' worst-performing task, but rate themselves average at relationship management. These senior non-IT executives feel that relationship problems are due more to their CIOs' inability to manage or govern the relationship rather than any weakness in their own performance.

What High Performing CIOs Do Better

Figure 1 shows the CIO and non-IT executive tasks from Tables 1a and 1b, grouped into five areas along a spectrum from a technical to strategic focus. Firms getting high business value from IT are statistically significantly better at the green bulleted tasks, while about the same at performing the black bulleted tasks.

CIOs in high BVIT firms are better at the most visible function of IT—operations—but this is only the first step in being effective. They are also better at involving their non-IT counterparts in creating value from IT. For example, although higher-performing CIOs weren't better at relationship management, they have designed governance arrangements enabling their non-IT counterparts to better prioritize requests. These committees, budget processes, performance measures, service level agreements and other governance mechanisms provide clear processes and examples to help non-IT executives understand their role in getting BVIT. Business executives consequently feel they have better IT oversight and the firm makes more effective use of IT.

Where Should CIOs Start to Improve the Business View of IT?

There are two levers CIOs can use to improve their effectiveness: transparent service levels and clear governance. Transparent service levels provide clear information on how IT is performing its core tasks. By using clear metrics, CIOs can set realistic expectations with the business and help IT people identify areas which need improvement. By consistently delivering against the expectations, CIOs build credibility.

IT Operations is often where management problems are most visible, and where the CIO has most control. One CIO recalled a business chief telling him, *"Why should I let you help my business, when you can't even run your own?"* Effective CIOs can use IT operations to improve the business view of IT value and make business involvement in IT decision making more effective. CIO Steve Brown and his team at Carlson Companies routinely benchmark cost and quality of their internal IT services against external service providers. By transparently comparing price/performance of internal and external services, Brown both focuses his IT team on providing good service, and demonstrates the value of the IT organization to the business.[4]

CIOs can use IT operations to improve the alignment and prioritization process. For example, a business unit CIO in a major insurance company looks at actual downtime on key systems rather than average performance of infrastructure services like the network. This changes a technical discussion about improving infrastructure availability into a business decision about the value of a lost hour on a critical business process.

Showing value and improvement at execution is only one step in improving CIO effectiveness. The other is helping non-IT executives to effectively get involved in IT. Asking for business involvement is not enough; the executives need a clear process through which they can make decisions and give input. CIOs can do this by implementing effective IT governance arrangements.

Effective IT governance clarifies each party's role in managing IT by establishing who makes decisions and how are they held accountable. Effective governance is particularly important for decisions that span the boundary between IT and the business (e.g., architecture, prioritization, oversight and application development). By giving business executives clear processes, the CIO makes business executives more comfortable and capable of providing strategic and tactical inputs. In turn this interaction improves the IT organization's ability and visibility in generating BVIT. The CIO of State Street Corp. created new a governance committee called ITEC, including the heads of each business unit, to oversee prioritization in the newly created enterprise-wide IT budget. Every two months ITEC meets to assess where the corporation should direct its IT investment and what should be shared enterprise-wide or business unit specific. An IT activity tracking system provides input to ITEC to help identify opportunities to both reduce IT cost and increase impact.[5]

Effective CIOs do more than just execute well. They also effectively manage the business and IT interface by implementing specific processes that both show IT performance and educate business leaders how to effectively participate in creating value from IT.

[4 & 5] See Peter Weill & Jeanne Ross, *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*, Harvard Business School Press, 2004.

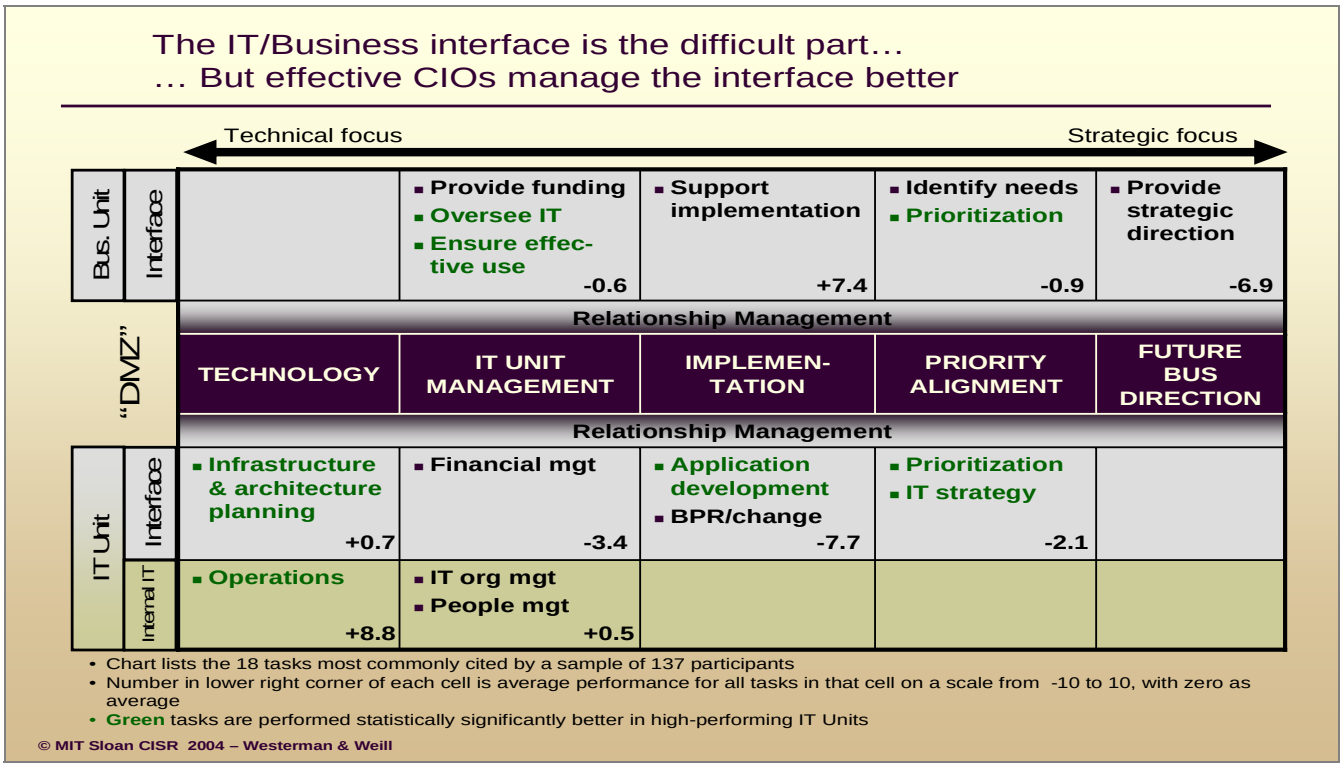
Table 1a. Ten Most Commonly Cited CIO tasks (in decreasing order)

Task	Description	Performance*
Operations	*Keeping systems and networks running, including disaster recovery & security*	**8.8**
Application development	*Acquiring, developing and maintaining application systems*	**-7.4**
IT strategy	*A plan for managing role of IT in the business*	**-0.8**
Infrastructure & architecture planning	*Planning, implementing, and refreshing infrastructure; includes technology / application architecture and standards*	**0.7**
Prioritizing	*Determining what tasks to do in what order*	**-1.4**
IT organization mgt.	*Leading the IT organization*	**1.3**
People mgt.	*Managing and developing IT staff*	**-1.7**
Financial mgt.	*Budgeting and managing IT spending*	**-3.4**
BPR / change	*Implementing change in the business processes*	**-7.6**
Relationship management	*Building trust, understanding and smooth interactions between business & IT*	**-10.0**

Table 1b. Eight Most Commonly Cited IT Tasks for non-IT Executives (in decreasing order)

Task	Description	Performance*
Provide strategic direction	*Help IT to understand how to support the goals of the business*	**-6.9**
Support implementation	*Provide expertise and leadership ensuring new initiatives are implemented effectively*	**7.4**
Provide funding	*Responsibly allocate funds for IT operations and initiatives*	**-2.6**
Prioritize	*Determine what initiatives to do in what order*	**-6.2**
Ensure effective use of IT	*Ensure the business unit uses systems appropriately effectively generating value*	**1.8**
Oversee IT	*Ensure the IT unit is operating effectively and efficiently*	**0.8**
Identify needs	*Identify what IT initiatives are needed to enable the business to meet its goals*	**3.4**
Relationship management	*Building trust, understanding and smooth interactions between business and IT*	**-0.1**

Figure 1. Highly Effective CIOs Manage the IT/Business Interface Significantly Better Than Their Peers



* Performance is the average self-rated performance on each task by 137 participants at MIT Sloan executive education sessions, *IT for the non-IT Executive,* in 2004, scaled from -10 to 10, with zero as the average.

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RESEARCH BRIEFING

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REALIZING IT-ENABLED CHANGE: THE IT ENGAGEMENT MODEL

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Realizing a new enterprise architecture is not easy for any IT group and is often difficult, expensive and risky.[1] The change involves the integration and standardization of data, business processes, and IT systems across an enterprise, often requiring previously independent business units to spend significant amounts to conform to the new architecture standards. This briefing introduces the concept of the IT engagement model, developed at MIT CISR after studying seven IT engagement models, to explain how successful IT organizations have realized IT-enabled change.

At BT plc, one of Europe's largest telecommunication services companies, the central architecture team faced the challenge of realizing an enterprise-wide architecture and more: by the time the central group began establishing a BT-wide architecture, each of its three major Lines of Business (LoBs) had begun implementing its own, unique IT architecture. Within BT, we studied four different enterprise architecture endeavors—some more advanced than others. Each endeavor was launched to support major transformation programs consisting of numerous projects. We interviewed over 25 senior IT managers from across BT, participated in several key strategy meetings and collected various internal and public documents and presentations. We concluded that a critical success factor to realizing an enterprise architecture is an organization's IT engagement model. We define the IT engagement model as a collection of governance mechanisms that an IT group uses to engage with key stakeholders to ensure that significant projects achieve their business goals and advance enterprise goals. An IT engagement model enables participants to align the interests and efforts of different stakeholders (e.g., align business and IT) and to coordinate the interests and efforts of different organizational levels (e.g., coordinate between project, LoB, and enterprise level efforts).

Understanding the Challenges

After the bursting of the technology bubble in 2001, BT had a set of fiercely independent LoBs, a lot of debt, and declining margins in its traditional businesses. In response BT replaced its CEO, changed its strategy from independence to integration and began fundamentally transforming its business processes. BT launched "OneBT" and a number of enterprise-wide initiatives to bring the different parts of the company together to provide a better experience for its customers, reduce redundancy, defend traditional streams of revenue, grow new streams, improve performance and cut costs.

One of these new initiatives was the Broadband Challenge: a challenge by the new CEO to sell and implement one million broadband connections within 18 months. The LoBs divided up their responsibilities and met the challenge with time to spare. However, the solution lacked sufficient integration and standardization to be adequately scalable, reliable, and efficient to meet the next challenge: four million connections in 24 months. Senior management realized that to deliver on Broadband and other strategic programs, they needed greater alignment between business and IT and coordination across different organizational levels. Developing a common IT architecture across BT was essential to address these challenges. A central group led by Chief Architect, Jim Crookes, was charged by senior management with designing and implementing a BT-wide architecture. By then, each LoB was well underway with developing its own enterprise architecture to support its own major transformation programs.

A fundamental challenge was not that an enterprise-wide architecture would be resisted, but that it would be ignored. As Crookes said:

> *"Architectures, like fondue sets and sandwich makers, are rarely used. We occasionally dig*

[1] We define *enterprise architecture* as the organizing logic for the integration and standardization of data, business processes, and IT systems in a company. To learn more about enterprise architecture, please see the latest research briefing by Jeanne Ross, "Maturity Matters: How Firms Generate Value from Enterprise Architecture" (Vol. IV, No. 2B).

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them out and wonder why we ever spent the money on them. BT's experience resonates with that of many other large corporations: architectures have emerged as erudite, elegant abstractions of the world, but they gain no momentum, unable to find traction in a world they profess to model."

Past enterprise architecture efforts failed, according to Crookes, because they did not engage key stakeholders. To realize their enterprise architectures, IT Groups at BT used two major approaches to engage key stakeholders, refine the architecture definition and ensure that each and every business project helped to implement the desired architecture.

Engaging with Key Stakeholders: Two Complementary Approaches

IT Groups at BT used two complementary approaches to engage key stakeholders. The first was to "ride waves"—use major business transformation programs to implement significant portions of the enterprise architecture. Crookes described the Broadband initiative, for example, as an important wave for realizing BT's enterprise architecture.

The second approach was what we have identified as the IT engagement model. The IT architecture group put in place a set of meetings with specific deliverables that served as gates in the project execution process. These mechanisms were used to learn from projects and ensure that projects advanced the implementation of the architecture. The IT engagement models in the different LoBs of BT used different mechanisms for achieving these goals, but had some common, effective elements that the central architecture group was able to leverage in designing an overall engagement model for all of BT.

The IT Engagement Model

Figure 1 depicts a simplified version of IT engagement models at BT consisting of a linked set of mechanisms (e.g., Transformation Boards) that managers considered critical to successful transformation. The model highlights which mechanisms bridged two key dimensions: 1) alignment between the business and IT groups (red) and 2) coordination between enterprise, business and project levels (in blue). Our MIT CISR diagram of the IT engagement model is designed to quickly analyze and communicate:

- How each mechanism fits together and which mechanisms a project must pass though in its life cycle; and
- How individual or sets of mechanisms contribute to alignment or coordination or both. For example, the position of the Exceptions Handling Process together with the LoB Architecture Group on the model indicates that if successful, the set both aligns business and IT and coordinates the business and project levels.

Looking across the different IT engagement models within BT, several mechanisms were particularly effective:

A ***certification program*** to train solution designers on how to design architecturally compliant solutions ("Accreditation Program") and an informal first review process ("Informal Feasibility Assessment") to engage owners as early as possible in the lifecycle of a project (e.g., during conceptual stage) to understand proposed project goals and solution approaches, and to redirect poorly designed solutions before they went too far. Both mechanisms provided IT teams opportunities for instilling a longer-term, enterprise-wide perspective early in the life cycle of a project, without creating unnecessary bottlenecks in the process. In one LoB, for example, the Accreditation Program was an effective mechanism for both getting designers "fluent" in the LoB's architecture and for diffusing decision-making bottlenecks by eliminating the need for senior managers to monitor the development process.

Periodic reviews involving penalties for projects that are not architecturally compliant ("Design Compliance Review" or DCP). Projects might get a "strike" or a "yellow card" if they had designs that violated the architecture. These wouldn't kill a project, but would prevent it from moving to the next phase or from receiving additional funding unless a better approach was adopted.

Links to funding, to accomplish two goals. First, extra funding was provided for some projects asked to take on additional tasks to implement some enterprise-wide architectural component. As Crookes noted "you can't tax the first car to cross a new bridge to pay for the whole bridge." Second, the architecture group could eliminate a project's funding when it was not compliant and showed no sign of moving toward compliance ("BT LoB Finance Committee").

An ***architecture exception handling process*** throughout the DCP that did not simply enforce but also was open to learning from participating stakeholders. This proved to be a valuable means of collecting insights for improving and refining the enterprise architecture.

Senior forums consisting of participants from different stakeholder groups (e.g., "Transformation Boards" consisting of enterprise and LoB level managers from both business and IT) where critical focused consensus-building and information gathering took place.

Organizational support for the mechanisms used in the engagement model (such as the "yellow card") so that

the decisions of the participants in the engagement model had authority and could be enforced.

IT Groups used these and other engagement mechanisms to collectively develop local solutions to immediate business problems and contribute towards longer-term enterprise-wide strategies. With their respective IT engagement models, IT Groups pushed forward several major transformation programs to advanced stages. These included: replacing legacy systems and business processes associated with service fulfillment and service assurance, implementing a new standard operating environment, and realizing a new customer relations management system. The IT Groups used their IT engagement models to change how projects were executed, without necessarily changing the shorter-term business goals of projects, and ensure that projects advanced longer-term enterprise and LoB goals. They also used the mechanisms to incrementally adjust the details of the macro-level architectural vision and business strategy while still implementing each project.

At the time of this writing, BT was moving to a new phase of engagement. Consensus was reached on the enterprise architecture. A new CIO arrived with a mission to accelerate business transformation by strengthening business-IT alignment and driving the execution of the architecture. As a result, BT's IT Engagement Model promises to change to one that becomes more directive.

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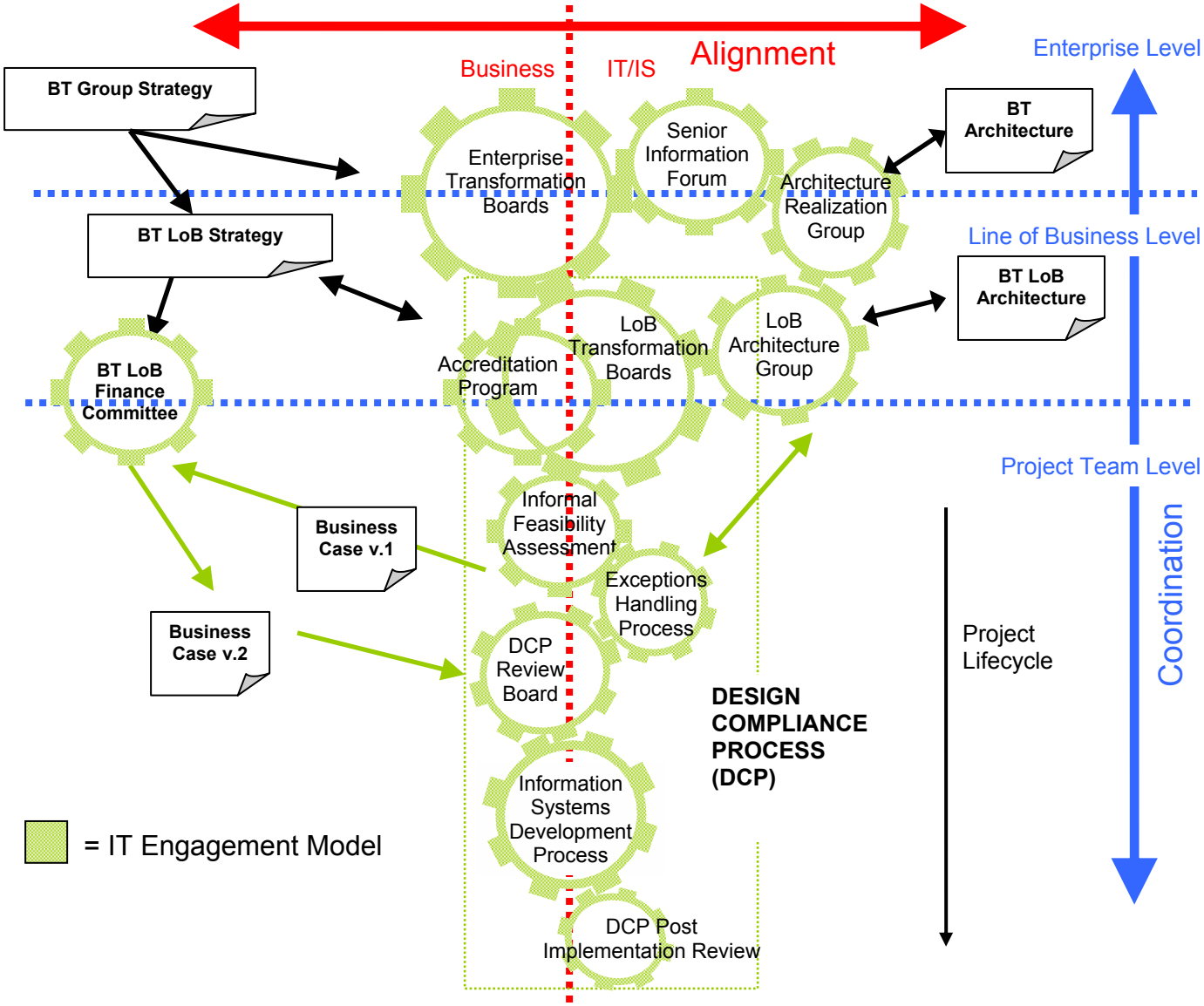
Figure 1: Realizing Change at BT



CISR Mission

CISR was founded in 1974 and has a strong track record of practice based research on the management of information technology. As we enter the twenty-first century, CISR's mission is to perform practical empirical research on how firms generate business value from IT. CISR disseminates this research via electronic research briefings, working papers, research workshops and executive education. Recent and current research topics include:

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- Managing IT Related Risks

2004 Projects

- Assessing the Performance of Alternative Business Models
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- Managing IT Architecture for Business Value
- Measuring IT-driven Risk
- Exploring the Role of the IT Unit in Leading IT-enabled Change

Since July 2000, CISR has been directed by Peter Weill, formerly of the Melbourne Business School. Drs. Jeanne Ross, George Westerman and Nils Fonstad are full time CISR researchers. CISR is co-located with MIT Sloan's Center for e-Business and Center for Coordination Science to facilitate collaboration between faculty and researchers.

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