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☐ **Research Article:** a completed research article drawing on one or more CISR research projects that presents management frameworks, findings and recommendations.

☐ **Research Summary:** a summary of a research project with preliminary findings.

☑ **Research Briefings:** a collection of short executive summaries of key findings from research projects.

☐ **Case Study:** an in-depth description of a firm's approach to an IT management issue (intended for MBA and executive education).

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

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HOW IT SAVVY IS YOUR ENTERPRISE? SELF ASSESSMENT AND BENCHMARKING [1]

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IT savvy is a set of practices and competencies that add value to each IT dollar invested. We studied 147 organizations over four years and divided the firms into high, average and low IT savvy. Firms with high firm-wide IT savvy had better payoff associated with every asset class in the IT portfolio (see Figure 1).[2]

The returns from IT infrastructure—the largest IT asset class and often the most difficult to cost-justify in advance—strikingly illustrate the impact of savvy. Companies ranking in the top five percent on IT savvy earn, on average, $250 on each dollar invested in IT infrastructure in the year following the investment. High IT savvy firms' IT infrastructure investments were also associated with superior results on other key performance measures, including innovation and market capitalization. By contrast, companies ranking in the bottom five percent on IT savvy have, on average, approximately $900 lower net profits the next year per dollar spent on infrastructure—controlling for industry, size

and other investments such as R&D and advertising expenditures.

IT savvy is a mutually reinforcing set of practices and competencies including:

- **IT for communication**—extensive use of electronic channels such as e-mail, intranets and wireless devices for internal and external communications and work practices.

- **Digital transactions**—a high degree of digitization of the company's repetitive transactions—particularly sales, customer interaction and purchasing.

- **Internet use**—more use of Internet architectures for key processes such as sales force management, employee performance measurement, training and post-sales customer support.

- **Company-wide IT skills**—almost all employees have the skills to use IT effectively. There are strong technical and business skills among the IT staff, strong IT skills among business staff and an adequate market supply of highly skilled IT staff.

- **Constant involvement of management**—senior managers are strongly committed to effective IT use; they champion the important IT initiatives. Business-unit managers are heavily involved in IT decisions, strengthening partnerships between IT staff and business units to help generate value from IT investments.

Previous briefings have introduced the concept of the IT portfolio and its four asset classes (March 2003), identified the returns from each IT asset class (March 2004), demonstrated the impact of IT savvy on financial performance (October 2004) and illustrated the differences between high and low IT savvy via two case studies (July 2005). In response to strong interest in assessing IT savvy of firms and business

units, we have developed an IT savvy self assessment tool tested in several MIT CISR executive programs.

A simplified self assessment tool for IT savvy follows and takes only a few minutes to complete—then a perceived IT savvy score can be determined. Please enlist at least ten business leaders and ten IT professionals within your firm (or business unit) to complete the assessments and compare results.

Your scores can be interpreted as:

Score	Assessment	% of Firms
60+	High IT Savvy	16%
45–59	Average IT Savvy	65%
<45	Low IT Savvy	19%

See earlier briefings for more information on interpreting your self assessment (particularly the October 2004 and July 2005 briefings) plus the article in the January 2006 issue of *Sloan Management Review*. Please use this tool and provide feedback to the authors on its effectiveness to validate or improve your organization's IT savvy.

Related Publications:

- "Generating Premium Returns on Your IT Investments," P. Weill & S. Aral, *MIT Sloan Management Review*, Vol. 47 No. 2, Winter 2006.
- "IT Savvy: Achieving Industry Leading Returns from your IT Portfolio," Vol. V, No. 3B, July 2005.
- "IT Savvy Pays Off," Vol. IV, No. 3B, Oct. 2004.
- "Managing the IT Portfolio: Returns from the Different IT Asset Classes," Vol. IV, No. 1A, March 2004.
- "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," S. Aral & P. Weill, MIT Sloan CISR Working Paper No. 343, August 2004.

Figure 1: Enterprise-wide IT Savvy Impacts Performance

IT Investment (Firms[4])	Lower Cost of Goods Sold			Profit[1]			Innovation[2]			Market Value[3]		
	Ave.	High Savvy	Low Savvy	Ave.	High Savvy	Low Savvy	Ave.	High Savvy	Low Savvy	Ave.	High Savvy	Low Savvy
IT Infrastructure		+[5]	--	-	+	--	-	+	-	+	+	--
Transactional IT	+				++	--		++	-		++	--
Informational IT				+	++	-						
Strategic IT					++	--	+	+	--		++	--

[1] Next year's Net Margin
[2] Next year's sales from New and Modified Products/Total Sales.
[3] Market to Book value in same year as investment. [4] Ave. = Average return for all firms, High (Low) Savvy= additional positive (negative) return for firms in the top (bottom) 5% of IT Savvy. [5] +(-) = "High Impact" 50% or less of the highest positive (negative) incremental impact for that variable. ++(--) = "Very High Impact" Greater than 50% of the highest positive (negative) incremental impact for that variable. All impacts are statistically significant controlling for firm and industry effects from 147 firms.
Source: "Generating Premium Returns on Your IT Investments," P. Weill & S. Aral, *MIT Sloan Management Review*, Vol. 47 No. 2, Winter 2006
NSF Grant Number IIS-0085725

IT Savvy Self Assessment

1.	**Electronic Communication…**Please rate on a scale of 0–5 (0 = "Not Important" to 5 = "Extremely Important")		Rating (0–5)
	How important are email, intranet and wireless devices for internal communications?	a) Email	+
		b) Intranet	+
		c) Wireless	+
	Sum of internal Electronic Communication Scores	*Subtotal:*	+
	How important are email, Internet and wireless devices for communications with customers & suppliers?	a) Email	+
		b) Internet	+
		c) Wireless	+
	Sum of supplier Electronic Communication Scores	*Subtotal:*	+

2.	**Human Resource Capability…**Please rate on a scale of 0 – 5 (0 = "Significantly Inhibits," 3 = "No Effect," 5 = "Significantly Facilitates")	
	Rate whether the **technical skills** of **IT people** facilitate or inhibit effective IT use at your enterprise.	+
	Rate whether the **business skills** of **IT people** facilitate or inhibit effective IT use at your enterprise.	+
	Rate whether the **IT skills** of **business people** facilitate or inhibit effective IT use at your enterprise.	+
	Rate whether **your ability to hire new IT staff** facilitates or inhibits effective IT use at your enterprise.	+
	Sum of Human Resource Capability Scores *Subtotal:*	+

3.	**Management Capability…**Please rate on a scale of 0 – 5 (0 = "Significantly Inhibits," 3 = "No Effect," 5 = "Significantly Facilitates")	
	Rate whether the degree of **senior management support** for IT projects facilitates or inhibits effective IT use at your enterprise.	+
	Rate whether the degree of **business unit involvement** in IT decision making and projects facilitates or inhibits effective IT use at your enterprise.	+
	Sum of Management Capability Scores *Subtotal:*	+

4.	**Digital Transaction Intensity…**Substitute with your two key business processes if these are not appropriate	% Digital
	What percentage of **purchase orders** are executed electronically?	+
	What percentage of **sales orders** are executed electronically?	+
	Sum of Digital Transaction Intensity, divided by 40 *Subtotal÷40:*	+

5.	**Internet Capability…**Please rate on a scale of 0–5 (0 = "Significantly Inhibits," 3 = "No Effect," 5 = "Significantly Facilitates") To what extent does your enterprise use Internet (or open standards based) technology to perform:	Rating (0–5)
	Sales or service force (or agent or representative) mgmt?	+
	Employee performance measurement?	+
	Employee training?	+
	Post sales or service customer support?	+
	Sum of Internet Capability Scores *Subtotal:*	+

Sum of Individual Scores…   **IT SAVVY SCORE=**

THE HIDDEN BENEFITS OF IT CHARGEBACK

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Most managers characterize IT chargeback as a necessary evil. In fact, CISR research identified chargeback as one of the few commonly applied governance mechanisms that CIOs did *not* consider useful for improving IT decision making. Nonetheless, almost two-thirds of companies have IT chargeback systems. Ongoing discussions about the value and appropriate application of IT chargeback have led us to revisit and update the findings from a 1999 CISR study on the potential benefits of chargeback.[1]

IT chargeback mostly fulfills financial reporting needs in organizations. The underlying rationale for allocating any shared cost is the expectation that exposing the resource requirements of running individual businesses will lead to better decisions and ultimately better firm-wide performance. Because allocations of shared services are never perfect, chargeback can create concerns about fairness and reasonableness. For this reason we did a study to identify the circumstances under which chargeback enhanced business value as opposed to circumstances in which chargeback led to dissatisfaction with IT.

The study involved interviews at 10 large, divisionalized companies, including each company's chargeback manager, as well as a number of managers responsible for the IT charges in their business units. In total, we interviewed 10 IT chargeback managers and 22 business unit managers. In this briefing we identify practices that enable IT chargeback to enhance the business value of IT.

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[1] For a full discussion of the primary research on which this briefing is based, see J.W. Ross, M.R. Vitale, and C.M. Beath, "The Untapped Potential of IT Chargeback," *MIS Quarterly*, Vol. 23, No. 2, June 1999, pp. 215–238.

Two Impacts of IT Chargeback

IT chargeback can have impacts in two ways (Figure 1). First, in consort with business managers' efforts to economize, chargeback can directly influence IT investment and usage decisions. Second, chargeback has impacts on business managers' attitudes towards IT, particularly with regard to whether their charges are fair and controllable.

IT investment and usage decisions. Many firms expect IT chargeback to result in better IT investment and usage decisions. The risk, of course, is that chargeback will change behaviors in ways that lower business unit costs while maintaining or even increasing firm-wide IT costs. For example, one IT manager found that IT charges for a central help desk persuaded some business units to create their own help desks, which offset the potential for firm-wide economies of scale. At another firm, charges on desktop machines intended to cover support costs led business units to call their desktops "lab equipment," to avoid the support charge. This practice did not change total IT costs, but it did change the allocation of charges, and probably degraded support quality.

In some firms, however, chargeback has helped lower IT costs. Sometimes the savings are small. For example, one computer manufacturer found that the greatest impact of chargeback occurred during the first couple of months, when business unit managers identified painless ways to economize, such as discarding unused desktops and disconnecting phones they didn't need.

Other firms have reported saving as much as 20% of total IT costs from architecture changes that chargeback helped to motivate. Standardized technology platforms can significantly reduce IT support and maintenance costs, but they also limit system choices. Some IT units have used chargeback to expose the benefits of standardization. In doing so, these IT units win converts to more disciplined, and lower cost, IT environments.

Business managers' attitudes toward IT. By design, chargeback will inevitably have an impact on the

performance assessments of individual managers. Thus, managers' perceptions of the fairness of allocated IT charges will affect their perceptions of the value of IT and the competence of the IT unit. Clearly, business unit managers are interested in decreasing their IT charges. Because many IT costs are not variable, however, their attempts to control costs may not bear fruit. The business unit finance manager at a large manufacturing company described the frustration resulting from his lack of control over IT's prices:

> *"The problem is that IS prepares a price list and then my department chooses what it wants. There are huge discussions among local IT staff that [the central IT unit] is inefficient. Nobody is asking what should be cut."*

Other business unit managers in our study were much less concerned about the fixed cost nature of IT. These managers indicated that having control over IT spending was less important than feeling that *IT spending was under control*. In at least some companies, IT chargeback increased the credibility of the IT unit. A business unit IT controller at a high-tech company explained:

> *"My sense is that IT charges are reasonable and fair. This stems from three things. First, I understand them. Second, the current allocation methods are rationally developed. And third, [central IT] communicates with us regularly about our costs."*

The ability of the IT unit to establish credibility—rather than frustration—through IT chargeback invites business units to appreciate IT and the value it can generate.

Policies Distinguishing Effective IT Chargeback

Firms shape these impacts of IT chargeback—both positive and negative—through three types of policy decisions: (1) policies about requirements for cost recovery; (2) policies about how those costs are allocated to business units; and (3) policies about how those charges are communicated. Each type of policy embodies opportunities for making chargeback a valuable management tool.

Cost recovery. Most companies look for full cost recovery in their IT chargeback policies. The IT unit's goal is to break even by allocating its total costs to business units. The danger of full cost recovery, of course, is that IT is not adequately motivated to control costs. Benchmarking can be a valu-

able tool for counteracting this tendency by helping to establish target prices and showing whether underlying costs are reasonable. IT chargeback garners respect for IT when it motivates the IT unit to consistently lower IT unit costs. Respondents in our study noted that evidence of declining unit costs enhanced IT's credibility and stimulated investment in IT.

Cost allocation. Participants in our study preferred cost allocations tying charges to usage. Such cost allocation techniques require that the IT unit understand the major drivers of IT costs. For example, one large manufacturing firm found that almost half of its centralized costs were driven primarily by the number of employees in a business unit. This clear, simple allocation helped business units understand and accept charges. Service level agreements can also help companies tie charges to services. However, most companies have identified only a subset of infrastructure services in which specific alternatives have different real costs to the firm.

IT chargeback managers have noted that once they understand their cost drivers, they can shape charges to encourage desirable behavior. For example, one IT unit pushed business units to adopt open systems by not charging for the consulting or software costs associated with that move—the actual cost was recovered in higher charges on technologies they intended to retire. Top IT units also help business units understand the costs of going off-standard by directly charging them the incremental support costs incurred.

One key to effective chargeback is to develop charges for major organizational units, rather than lower level departments. The business unit managers who receive chargeback statements should be sophisticated customers responsible for significant amounts of IT spending. These managers partner with IT to make complex investment and governance decisions. Moreover, business unit managers are not interested in long, itemized IT statements. The best IT chargeback systems we studied offered four to ten line items grouped by major categories of expenses (and cost drivers).

Cost Communications. At firms struggling with IT chargeback, business unit respondents indicated that they were "tired of paying for something we don't understand." Indeed, one IT unit felt that the business units should focus on "winning in the marketplace" and leave IT spending decisions to the central IT unit. This attitude, which led to expressing IT charges in a single line item, served merely to alien-

ate business units and reduce their enthusiasm for IT as a management tool.

In contrast, other firms use chargeback as an opportunity to explain costs—and to stimulate discussions about how to control costs. The best firms engage in regular negotiation. These negotiations typically begin as systems are designed—not when charges are allocated. For example, business unit IT managers at an insurance firm noted that negotiations with core IT begin with discussions around design alternatives and their different support costs. In addition, the central IT unit proposes migrating old systems to new platforms when it has the effect of lowering support costs. Most business unit respondents who boasted of effective negotiations mentioned that IT-business unit negotiations were sometimes contentious, but they valued the constructive tension.

Recommendations for Generating Benefits from IT Chargeback

In our study of IT chargeback we found that four of the ten firms reported positive outcomes from IT chargeback. These firms, all strong performers in their industries, suggest three critical success factors for IT units attempting to develop value-added IT chargeback processes:

- Work hard to understand IT costs;
- Communicate your understanding of IT cost drivers to the business units and identify ways business units can control their IT charges; and
- Work with business unit managers to establish mutual responsibility for IT costs and benefits.

In many firms, IT is the source of organizational angst, but a good chargeback process can instead foster strong IT-business partnerships. Both IT and business managers learn the costs of technology capabilities and the business benefits they deliver.

Figure 1: A Model of IT Chargeback
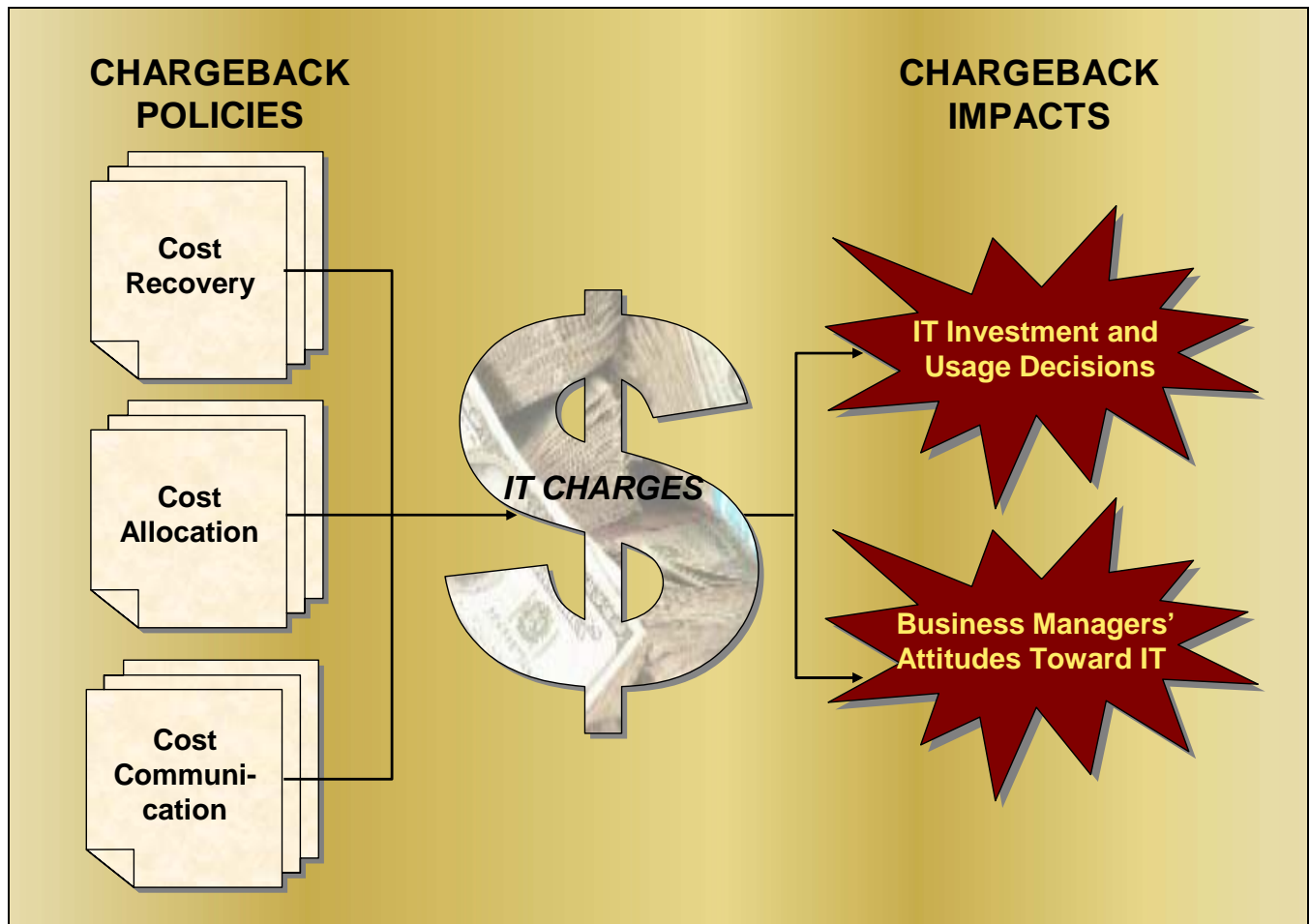
ENABLING AGILITY:
PEOPLE, PROCESS, AND TECHNOLOGY

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Rapidly changing market conditions, industry boundaries, customer demands, and technologies have made business agility a critical success factor for long-term growth and profitability. Agility is an elusive concept. Chuck Paul at Allstate has observed that agility is particularly important when executives fail to clarify their strategic direction and thus must be able to respond to any possibility. He contends that "IT can best support business agility by understanding the business direction—even participating in setting that strategic direction—and helping to define the degree of IT agility necessary to support that direction."

In that spirit, we define agility *as the set of possible business initiatives a firm can readily implement leveraging pre-determined competencies with managed cost and risk.* Based on surveys of IT executives at 55 companies and interviews with 23 of those executives, we identified seven types of business agility. These seven types of agility grouped into three categories: business efficiency; market responsiveness; and boundary spanning. Each category of business agility requires a different combination of reusable IT, business process, and people capabilities (Figure 1). Firms differ in their agility requirements and, thus, in their requirements for reusable IT, business process and people capabilities.

Business Efficiency Agility

One approach to increased profitability is to persistently find ways to cut costs while enhancing the quality and reliability of business operations. Business efficiency agility attempts to identify repetitive processes and extract unnecessary cost and time. Companies pursue two types of business efficiency agility: (1) continuous improvement and (2) scalability.

Commodity businesses pursue efficiencies in the form of continuous improvement initiatives. For example, one consumer product manufacturer was focused on optimizing its global supply chain, while a petroleum company executive said his company constantly seeks process improvements that enhance safety and reliability. The agility to rapidly implement continuous improvement initiatives accelerates profitability while simultaneously reducing business risks.

A second type of business efficiency agility is the ability to rapidly scale up or down in response to changing business volumes. Many companies have predictable scalability requirements. For example, an automotive sales financial company knows to expect a processing peak at the end of each month. In contrast, property and casualty and home insurers have more dramatic requirements for scalability. Following major storms or natural disasters they have extraordinarily high demand for claims processing. The timing of this type of scalability is less predictable but the company nevertheless must accumulate a competency for scaling up to address disaster needs when they occur.

Reusable process and technology competencies contribute to business efficiency agility (Figure 1). In particular, a *standardized technology environment* allows companies with high transaction processing requirements (e.g., Wal-Mart, Capital One) to smoothly grow their operations. (Respondents noted, however, that scaling down and volatility are problematic, and thus often lead to outsourcing.) Business efficiency also depends on *standardized operations processes, systems, and data*. The standardization allows both greater consistency in how customer-facing personnel interact with customers and greater automation, which facilitates scalability. Many firms are also finding efficiencies in *shared services*, such as finance, purchasing and HR.

Manufacturing firms demonstrating business efficiency agility often achieve technology and process standardization through the implementation of enterprise systems. Senior executives, in the role of *enterprise-wide process owners,* play a critical role

in the design and implementation of process improvements embedded in those systems. Dow Corning management found that the payoff from its enterprise resource planning system depended on senior leaders taking responsibility for enterprise-wide process improvements. Finally, *strong metrics* are characteristic of business efficiency agility. Metrics reinforce improvement efforts and track scalability requirements.

Market Responsiveness Agility

The onset of e-commerce, globalization, and a variety of other business trends forced many companies to rethink how they deliver goods and services to customers. The speed with which they must respond to new customer demands and competitive challenges has heightened the importance of market responsiveness agility, including: (1) product innovations; (2) process reengineering; and (3) new business models.

New technologies and global competition have accelerated product innovations in a wide variety of industries. Media firms see new technologies creating new opportunities for distributing their content; global food companies find consumers open to products from other countries; financial services firms attempt to lure customers with product and service innovations. One high-tech company noted that 80% of its sales result from new products each year. The agility to innovate involves developing a core capability to design, manufacture and launch new products and services.

Firms facing volatile business environments regularly reengineer processes to present a single face to the customer, respond to vendor pressures, or adapt to new channels. For example, a financial services company learned that a focus on customer service meant integrating all its product lines. A media firm had to develop synergies across independent business units to more effectively share content and advertisers. The agility to reengineer processes involves building new competencies and then leveraging them quickly. An organization's overall ability to manage change, including its ability to quickly launch enabling technology, is key to this type of agility.

Market changes force some firms to rethink their entire business model. Many high-tech firms, for example, are moving from a product to a service orientation. Some financial services companies are moving from a distributor or intermediary model to a direct to customer model. Others are going the other way. For example, Merrill Lynch just separated its funds business from its wealth management business. Like companies that are reengineering processes, companies adopting new business models need to build and roll out new competencies.

Whereas business efficiency agility improves on existing competencies, market responsiveness agility disrupts, builds, and reuses core capabilities. Not surprisingly, market responsiveness involves a narrower set of standards. Interestingly, even if processes must change, companies benefit from developing clearly defined, *standard operations processes and related data*. For example, a financial services firm noted that highly standardized call center processes, systems, and data were critical to delivering its new concept of a single face to the customer. *Technology standards* also prove valuable—laying the groundwork for new processes and customer interactions. In place of more extensive process standards, market responsiveness depends on the adaptability of people. Most notably, *matrixed management* structures are characteristic of firms that respond to their markets. Matrixed management structures allow companies to introduce new capabilities (e.g., enterprise-wide process standards) without discarding old capabilities (e.g., functional expertise).

Boundary Spanning

Sometimes firms find that the key to growth lies outside their own boundaries. Boundary spanning agility enables two types of growth strategies: (1) acquisitions; and (2) partnerships. Firms with boundary spanning agility have competencies enabling profitable growth through their acquisitions and partnerships.

Firms pursue different paths in their acquisitions. Some firms purchase competitors. Marriott's growth strategy, for example, includes acquisition of existing hotels. Other firms absorb smaller companies to expand their product lines. Pharmaceutical companies, for example, sometimes purchase small firms that have developed—but do not have the scale to manufacture and sell—an innovative drug. Other firms purchase companies in complementary markets, as was the case when Deutsche Post purchased DHL. Firms with acquisition agility have competencies to quickly consolidate or rationalize business process, product lines and facilities.

Partnerships and joint ventures offer a more dynamic approach to growth through boundary spanning. Firms can generate additional value from their established competencies by combining them with the

competencies of another firm. Dow Chemical is involved in over 100 joint ventures, most of which leverage its core competencies in R&D or operations. Starbucks has partnered with Barnes & Noble to mutually attract customers to their businesses. Many companies view partnerships as an alternative to an acquisition—a faster and lower risk approach to realizing synergies. The challenge of making a partnership work, however, may be no less demanding than an acquisition. Partnership agility requires competencies in establishing technology and process alignment with partners.

Boundary spanning agility is based less on technology than other types of agility. In fact, a standardized IT environment was negatively correlated with profitable acquisitions. The capabilities of people emerge as particularly important for successful boundary spanning. Having *incentives aligned with business objectives* helps focus employees on achieving the goals of boundary spanning efforts. *Strong metrics* bolster these incentives. And finally, the *heroic actions of individuals*—often frowned upon in firms introducing process standards— apparently enable boundary spanning.

The Tradeoffs

Most firm in our study told us that two—or even three—categories of agility were important to their success. For example, one firm was redefining its business model from a product to a services company (market responsiveness), while attempting to increase discipline in transaction processes (business efficiency), and buying up other firms at the rate of three per year (boundary spanning).

Some agility-enabling competencies can provide value across categories. For example, standardized technology and business operations environments were critical to both business efficiency and market responsiveness agility. Business efficiency and boundary spanning both benefit from strong metrics. In general, though, pursuing agility in multiple categories requires managers to make tradeoffs. Additional research may well reveal that tradeoffs arise not only across categories but between different types of agility within the three categories.

The tradeoffs force companies to be clear about the types of agility they are pursuing. Most great companies succeed because executives have been very clear about the capabilities they intend to build and leverage. They also do something even harder. They walk away from juicy opportunities that do not leverage established capabilities in order to focus on driving value from the capabilities they have developed. Agile firms know their limits.

Figure 1:

Type of Agility*	Strategic Objective	Key Organizational Characteristics*
Business Efficiency • Continuous improvement • Scalability	Exploit capabilities to improve efficiency, security, reliability	• Standardized IT environment • Standardized operations processes/data • Enterprise-wide process design • Strong metrics • Shared services
Market Responsiveness • Product innovations • Process reengineering • New business model	Expand capabilities to enter new markets, deliver new products/ services, open new channels	• Standardized operations processes/data • Standardized IT environment • Matrixed management structures
Boundary Spanning • Acquisitions • Partnerships	Develop capabilities to grow profitably through acquisitions or partnerships	• Aligned incentives • Strong metrics • Individual heroics

*The organizational characteristics were statistically correlated with the associated categories of agility in a survey of 55 firms.

LINKING MECHANISMS AT TD BANKNORTH

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In late 2001, John Petrey became the new CIO of TD Banknorth, a financial services company that would be named *Forbes* magazine's best managed bank in the United States in 2004. By early 2006, TD Banknorth managed over $40 billion in assets and included 590 branch offices, 750 ATMs and 10,000 employees, more than double when Petrey joined the organization.

When Petrey arrived, his mandate was clear: significantly improve IT service levels, enhance business-IT relations and integrate acquisitions more effectively and efficiently. A fundamental challenge was also clear: how could he pursue those company-wide strategic objectives given the hundreds of local demands from project teams spread across the firm's five lines of business?

To address these competing demands, Petrey implemented an IT engagement model. We define an IT engagement model as *the system of governance mechanisms that brings together key stakeholders to ensure that projects achieve both local and company-wide objectives*. Figure 1 depicts the three components of an IT engagement model:

- Company IT governance that provides business units common goals and rules for how to use IT;

- Project management that ensures that each project solution meets local objectives and is developed on time and within budget; and

- Linking mechanisms that ensure that project-level decisions are connected to higher-level goals.

By linking company-wide IT governance with project governance, a firm can resolve the distinctive objectives of six key stakeholder groups, consisting of IT and business managers at the senior, business unit and project levels.

In this briefing we describe each of the components of TD Banknorth's IT engagement model and how they work together to deliver strategic enterprise-wide objectives of the company even as they address many of the individual banks' local demands.[1]

Company-wide IT Governance and Project Management

Petrey initially focused on improving company-wide IT governance and enhancing alignment between IT and the rest of the business. He became a member of TD Banknorth's corporate strategy planning committee and developed a series of decision-making bodies that brought together IT and non-IT executives. For example, he set up an Enterprise Technology Executive Steering Committee (ETESC) made up of IT and non-IT executives to define IT principles and make strategic IT decisions. These executives also participated in the Enterprise Projects Committee (EPC) that focused on investment and prioritization decisions of large project activities. The IT group also introduced several business-IT relationship managers—people dedicated to developing a strong business understanding of specific business lines with responsibility for accelerating the value of IT to the business line.[2]

Petrey next set out to improve project management. The IT group initially created two "tiers" of projects (based on capital expenditure size, required IT resources and operating costs for five years) and introduced a standard project management process for each tier. The process for the large projects consisted of eight life cycle phases (Concept, Proposal, Requirements, Design, Build, Test, Implementation and Closure). Small projects went through fewer life cycle phases (e.g., Proposal and Requirements phases

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[1] In previous research briefings, we have discussed engagement mechanisms ("Engaging for Change: An Overview of the IT Engagement Model." Vol. V, No. 1C, March 2005.) and engagement and change at BT ("Realizing IT-Enabled Change: The IT Engagement Model." Vol. IV, No. 3D, October 2004).

[2] To learn more about how John Petrey introduced a new company-wide IT governance at TD Banknorth, read Gonzalez-Meza Hoffman, F. and Weill, P "Banknorth: Designing IT Governance for a Growth-Oriented Business Environment". CISR Working Paper No. 350; Sloan WP. 4526-05 (2004).

were combined). In 2005, the IT group introduced an additional tier of projects and project gates, where a project could not proceed on to the next phase unless it received approval at the gate.

These changes to project management improved the effectiveness and efficiency of solutions development for projects. However, they did not ensure that project solutions also advanced company-wide objectives. To accomplish that, the IT Group introduced and enhanced a series of linking mechanisms

Linking Mechanisms

Linking mechanisms are roles, processes and decision-making bodies that ensure that throughout their life cycle, project teams remain coordinated and aligned with higher-level strategies. We found three types of linking mechanisms: *business linkage mechanisms* link projects to company-level and business-level strategies; *architecture linkage mechanisms* link projects to enterprise and business unit architectures; and *alignment linkage mechanisms* link IT with the rest of the business, particularly at the business unit level.

Figure 2 summarizes the linking mechanisms at TD Banknorth. *Business linkage* is maintained by four mechanisms:

- Before a project can proceed from the Concept Phase to the Proposal Phase, it must receive approval from either the Enterprise Projects Committee (EPC) or the Business Line Advisory Committee (BLAC), depending on project size. In these committees, IT and non-IT executives and managers share the responsibility of examining and prioritizing projects according to how well the projects meet either company or business line objectives. This also provides IT an opportunity to promote communications about the projects and for the rest of the business to make more informed prioritization decisions.

- Projects must go through a series of gates. To "get through" a gate, a project must receive a sign-off from both a business line sponsor and Core Project Team and stay within a defined variance for resources and cost. At these points, the business line sponsor checks that the project remains in synch with the business unit's strategy.

- Business linkage also occurs every month, when the company-level Operational Risk Management Committee (ORMC) reviews all Tier 1 and selected Tier 2 projects from across TD Banknorth.

If there are any conflicts, they can get escalated to the EPC or BLAC.

- Finally, every quarter, the EPC reviews all Tier 1 projects.

Architecture linkage is supported by two mechanisms.

- At the initial project kickoff, each project is assigned to a six-member project team of IT stakeholders (Core Project Team), several of which also participate in company-wide committees. The Core Project Team includes a project manager; a relationship manager, who represents both business line and enterprise business strategy; an architect; an information security expert; a service delivery integration manager; and a solution delivery team manager, who participates in the corresponding BLAC committee. This team manages the project as it evolves through the subsequent phases. The architect, service delivery integration and information security members ensure that the project follows the firm's enterprise infrastructure and security architecture. They also provide an important opportunity for architecture to influence the project solution early in its life cycle.

- At the conclusion of a project, the IT group conducts a post-implementation review (PIR) soon after implementation, to assess how the project process functioned. For Tier 1 projects, another PIR is completed by the Business Line Sponsor to determine if the benefits have materialized. The company is working on improving the PIR process by holding business owners accountable to the results and by also including company-wide business value metrics.

Alignment linkage is primarily accomplished by the relationship manager. At the Conceptual Phase, the relationship manager working with the business line sponsor develops a basic idea for a project. The relationship manager is responsible for ensuring that the business line needs are clearly articulated and understood by the Core Project Team and that the project solution meets the business line needs.

Outcomes from Engagements

The size of TD Banknorth enables it to get a lot of value from just a few linking mechanisms (larger firms in our study had many more linking mechanisms). A small set of specific roles (e.g., relationship manager), committees (e.g., the Core Project Team), and processes (e.g., monthly corporate-level reviews of projects) work together to bring together groups that otherwise may not engage.

As these groups engage over time, they get smarter about how to use projects to achieve both local and company-wide objectives. As a result, TD Banknorth's IT engagement model is constantly evolving. For example, the IT group gave the business lines control and funding to manage Tier 2 and Tier 3 projects, thereby giving the business lines more of the autonomy that they craved.

After four years of developing their engagement model, the payoff has been significant. The IT group has mastered acquisitions, improved relations with the rest of the business and increased service—all while implementing twice as many projects in 2005 than prior years. In addition, the IT group has been able to reduce the amount it spends on "run the business" work (production management and support) and increase the amount it spends on "grow the business" work (business line sponsored projects) by almost ten percent.
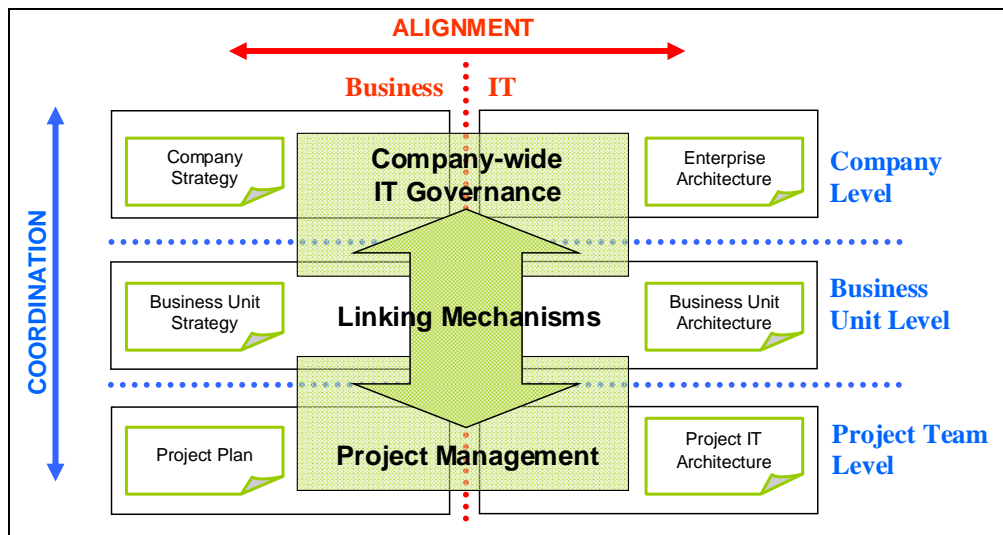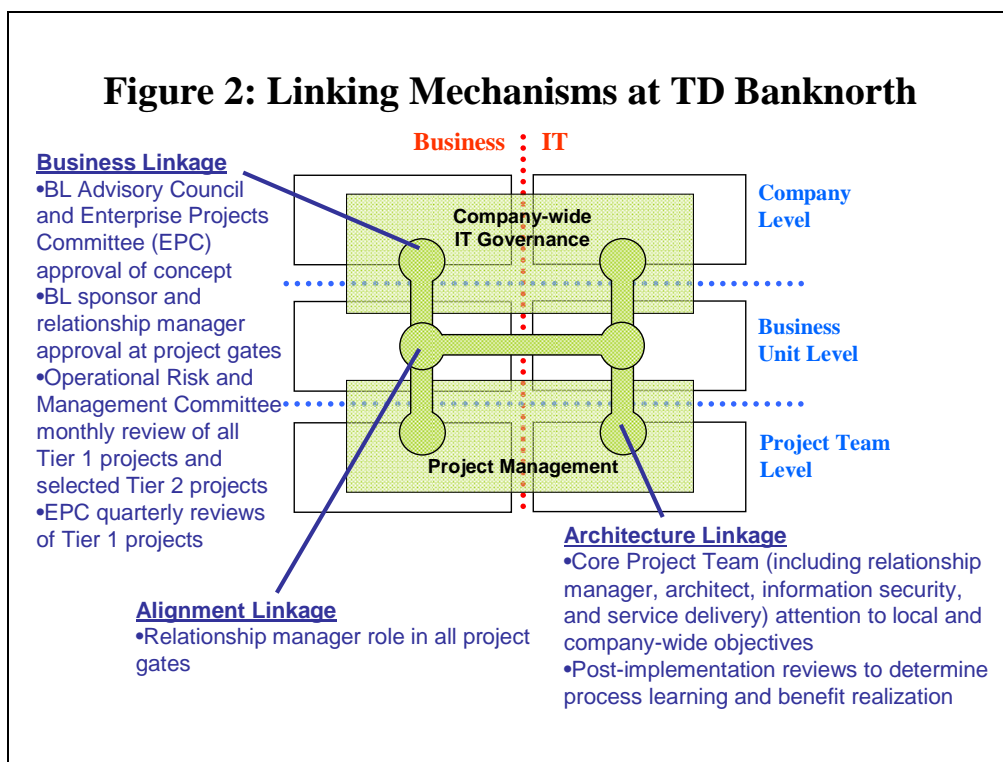
Figure 1: IT Engagement Model

Figure 2: Linking Mechanisms at TD Banknorth

Figure 2: Linking Mechanisms at TD Banknorth

BUSINESS AGILITY AND IT CAPABILITIES[1]

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Strategic demands on the CIO and IT unit are changing. In addition to the ever-present cost-cutting mandate, CIOs are increasingly being asked to help the firm be agile. CIOs are improving IT capabilities and processes to enable their firms to adapt rapidly and grow through new products, markets and services.

We studied how IT leaders build IT capabilities enabling business agility through a survey of 1400 CIOs. We found that delivery of reliable low cost IT services is the foundation for three further IT capabilities—project delivery, governance and relationships—that are necessary for business agility. Although firms can take different development paths, they must build all enabling IT capabilities to be agile relative to competitors.

Four IT Capabilities and Business Agility (Figure 1)

Service Delivery is the ongoing provision of basic IT services such as infrastructure services, help desk support and applications. Services are the most visible contribution IT provides to the business and also where the CIO has the most direct control and accountability. When service delivery is effective, IT delivers on its uptime and security commitments, user satisfaction with basic services is high, and unit costs compare favorably to benchmarks.

Measurement is an important step in improving service delivery. Intel, for example, conducts extensive benchmarks to show how well its infrastructure services compare to similar firms on unit cost, quality and customer satisfaction.[2] Benchmarks improve the

CIO's managerial credibility with the business while showing IT executives where improvement is still needed.

Project Delivery is successfully implementing application development projects. Although successful project delivery requires business involvement, IT has responsibility for much of the technical and managerial effort. Just building the technology is not enough—projects must deliver business results. Firms with effective project delivery capability have better budget and schedule performance and higher business returns on each project.

Project delivery capability uses standard processes and tools, built on well-defined infrastructure and architectural components, IT business knowledge and mechanisms for business involvement. For example, Raytheon CIO Rebecca Rhoads modeled new IT review processes on processes already used by executives for major business investments. *"It's no different than any other gate review they go to…same structure, same language, same players…they feel like they're involved and they know how to be involved."*

Governance/Alignment is effective decision making, oversight and accountability for IT. Typically IT and business people jointly determine the role of IT in the firm, what investments will be made, who is accountable for results and how IT is performing. Effective governance enables fast decision making with clear accountabilities, new investments are aligned with strategic objectives and business executives have transparent oversight of IT. Effective governance also ensures that enterprise-wide investments such as infrastructure, that may not have clear ROI for any single business unit, are implemented.

When UNICEF's senior managers recognized that IT was playing an increasingly strategic (and expensive) role in enabling the organization's mission of delivering services to children, senior management took responsibility for ensuring that IT met organizational goals. They held division directors accountable for implementation of global systems and the CIO was held accountable for delivering key infrastructure services. Over the past few years, IT

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[1] Thanks to the CIOs who participated in the 2005 Gartner CIO Survey, and to Jeanne Ross of CISR for her helpful suggestions on the writing of this research briefing.
[2] Information Technology Annual Performance Report 2003, http://www.intel.com/IT.

has fundamentally transformed the way UNICEF operates.[3]

CIO/CxO Relationship is effective partnership between business executives and IT executives and thus the glue that helps the other capabilities interoperate. When relationships are strong, IT executives know the business, are seen as key advisors on process and technology issues, and often participate in strategic decisions. For example, Solectron CIO Bud Mathaisel also holds the title chief process officer. Bringing together process management and IT management in a single role helps ensure focus on business outcomes.

CIOs build solid relationships and trust through excellent managerial performance and productive one-on-one discussions. According to Celanese CIO Karl Wachs, "*If you start new in a job or in a function, you have some credit. But that's gone after four weeks. Then, you have to start delivering.*"

Business Agility is *the set of possible business initiatives a firm can readily implement leveraging predetermined competencies with managed cost and risk.* Agility is not doing everything fast. Rather, it's doing the right things at the right speed and generating the right returns. IT enables agility by understanding necessary changes, implementing effective solutions and helping the business to change its own processes.

We measured business agility by combining survey questions about effectively entering new markets or gaining new customers, expanding products/services to existing customers, growing revenues and using IT for competitive advantage. Firms that are higher on our agility measure have statistically significantly higher industry adjusted financial performance in 2004, using publicly-reported measures of ROA, gross margins, ROIC and profitability.

IT-Enabling Business Agility

Firms can simulate agility for a short time through shortcuts or heroic efforts of key people. Unfortunately, relying on short-term fixes is not sustainable. Our analysis shows that achieving reliable business agility requires a set of enabling IT capabilities that form a hierarchy (see Figure 2).

The base of the hierarchy (lower left) is Service Delivery. A CIO who cannot "keep the trains running" does not have the credibility to tackle difficult challenges of project delivery and governance/

alignment. According to Mathaisel: "*It's founded on the basics. An ineffective set of operations, an ineffective set of deliverables and missed dates or broken budgets is a very poor ground work on which to build any kind of strategic conversation.*"

Building on a foundation of service delivery, the CIO can start to improve three IT capabilities that enable business agility. First, effective governance identifies necessary changes. Second, fast and dependable project delivery implements the changes. Third, strong CIO/CxO relationships enable IT and business executives to identify strategic opportunities and work as a team.

For example, global engineering, construction and maintenance firm Washington Group International(WGI) attains agility by being "*one company, one way of functioning,*" based on the enabling IT capabilities. Five years ago, it was 13 legacy companies, which led to bankruptcy. Today, with record profits and no debt, the firm truly works as one company. CIO Andy Snodgrass implemented IT governance processes to ensure that all IT initiatives are aligned with enterprise strategy. Projects are executed in one "Washington Way" around the world and monitored for performance. Through his senior team relationships, Snodgrass can balance innovation and standardization, including sometimes making the case for inefficiencies that enable creative problem solving.[4]

Business outcomes such as agility should be part of every CIO's incentive performance measures. CIOs enable superior business agility by starting from a base of reliable IT services then building a core of governance, CIO/CxO relationships and project delivery that outperform competitors.

About the Research

This study is based on analysis of 1400 responses to the Fall 2004 Gartner CIO survey. Using theoretical and practical insights, we statistically constructed four measures of IT capability and one of business agility. Each firm was coded as having a particular capability if it was above the median on that capability's measure. Then, we examined how firms with different capability configurations performed on measures of IS effectiveness, CEO view of IS and publicly-available financial performance. All results reported are statistically significant. We supplemented the statistical analysis with case studies and 17 CIO interviews.

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[3] "A Matrixed Approach to Designing IT Governance," Peter Weill and Jeanne Ross, *MIT Sloan Management Review*, Winter 2005, Vol. 46, No. 2, pp 26–34.

[4] "Driving Enterprise Agility," Gartner EXP CIO Signature Report, Dave Aron and Patrick Meehan, April 2005.

Figure 1: Four IT Capabilities Drive Business Agility

IT Capability	Definition	Key Factors
Service management	*Ongoing delivery of basic IT services*	▪ Service levels meet expectations ▪ Systems deliver on current needs ▪ IT has the right skills in place
Project delivery	*Successful project implementations*	▪ Projects generate value and enable new opportunities ▪ IT positioned to manage business change
Governance/ alignment	*Effective oversight and prioritization*	▪ Project pipeline aligned ▪ Performance clearly measured ▪ Business participation in governance
CIO/CxO relationships	*Developing effective partnerships*	▪ CIO and IS valued by business ▪ CIO knows the business ▪ CIO participates in strategic decision making
Business Agility	*The set of possible business initiatives a firm can readily implement leveraging pre-determined competencies with managed cost and risk*	▪ Growth ▪ New markets and customers ▪ New products/services to existing customers ▪ Advantage through use of IT

Figure 2: IT Capabilities Form a Hierarchy Enabling Business Agility
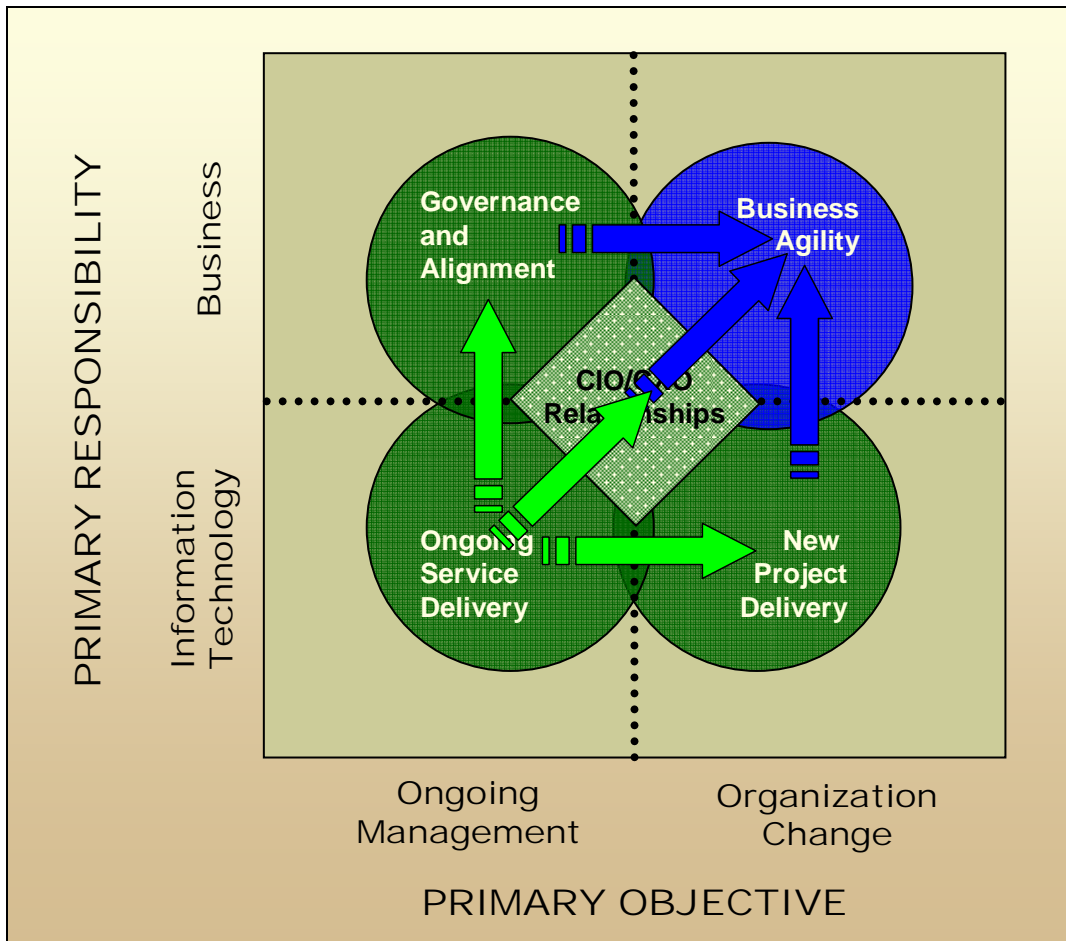
WHAT ARE THE BUSINESS MODELS OF US FIRMS?[1]

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Few concepts in business today are as widely discussed—and as seldom systematically studied—as business models. Many people attribute the success of firms like eBay, Dell, GE, 7-Eleven Japan, Southwest Airlines and Amazon to their innovative, often technology-enabled business models. In spite of all the discussion there have been very few large-scale systematic empirical studies of business models. We do not know, for instance, how common different kinds of business models are in the US economy and whether some business models have better financial performance than others. This is the first of a series of briefings to present a business models framework developed at MIT. Using the framework and a combination of manual and automated analysis techniques, we classified the business models of all publicly traded firms in the US economy. We then explored a series of questions, including:

- What is the distribution of business models in the US economy?
- How have these business models changed over time?
- How does a single firm's business model mix evolve over time?
- Do some business models perform better than others on various measures of financial performance?
- How do the key capabilities of each business model vary?
- How do IT portfolios vary by business model?
- Are IT portfolios of top performing firms different?

At the broadest level, a business model may be defined as how businesses appropriate value from the products or services they create. For a systematic study of business models, we need to define business models more precisely and distinguish their different types. We use an operational definition, based on two fundamental dimensions of what a business does. The first dimension considers what types of rights are sold. On this dimension, we classify the revenues a firm receives from *selling ownership* of assets—either transformed significantly (creator) or minimally (distributor)—or *selling the right to use* assets (landlord), or *matching buyers and sellers* (broker).

A *Creator* buys raw materials or components from suppliers and then transforms or assembles them to create a product sold to buyers. This is the predominant business model in manufacturing. Examples of firms with a predominately Creator business model include GM, Bethlehem Steel, and Intel.

A *Distributor* buys a product and resells essentially the same product to someone else. The Distributor may also provide additional value by, for example, transporting or repackaging the product, or by providing customer service and convenience or variety. This business model is ubiquitous in wholesale and retail trade. Examples include Wal*Mart, Amazon and Macy's.

A key distinction between Creators and Distributors is that Creators design the products they sell. We classify

a firm as a Creator, even if it outsources all the physical manufacturing of its product, as long as it does substantial (more than 50% of the value of) design of the product.

A *Landlord* sells the right to use, but not own, an asset for a specified period of time. We define this business model to include not only physical Landlords who provide temporary use of physical assets (like houses and airline seats), but also lenders who provide temporary use of financial assets (like money), and contractors and consultants who provide services produced by temporary use of human assets. This model highlights a similarity among superficially different kinds of business: all these businesses, in very different industries, sell the right to make temporary use of their assets and they have some common processes and capabilities. Examples include Marriott, Hertz, Microsoft, New York Times, Federal Express, Accenture, Citibank, Delta and MetLife.

A *Broker* facilitates sales by matching potential buyers and sellers. Unlike a typical Distributor, a Broker does not take ownership or custody of the product being sold. Instead, the Broker receives a fee (or commission) from the buyer, the seller, or both. This business model is common in real estate brokerage, stock brokerage, search firms and insurance brokerage and examples include Schwab and eBay.

The second dimension considers the type of assets involved. Here, we distinguish among four fundamentally different asset types: *physical, financial, intangible,* and *human*.

The four asset types are described as:

- *Physical* assets—include durable items (such as houses, computers, and machine tools) as well as nondurable ones (such as food, clothing, and paper).

- *Financial* assets—include cash and securities like stocks, bonds, and insurance policies that give their owners rights to potential future cash flows.

- *Intangible* assets—include legally protected intellectual property (such as patents, copyrights, and trade secrets), as well as other intangible assets like knowledge, goodwill, and brand value.

- *Human* assets—include people's time and effort. People are not "assets" in an accounting sense and cannot be bought and sold, but their time (and knowledge) can be "rented out" for a fee.

The combination of these two dimensions—asset types and asset rights—leads to 16 possible business models. Any firm can generate revenues in one or several of the 16 business models.

Using this framework, we classified the business models of all publicly traded firms as reported by Compustat. For the top 1,000 firms by revenues in 2000, we did manual classifications of every revenue stream. For the rest of the firms and years in our sample, we either used a rule-based computer program to do the classifications automatically or manually did the classifications (both with 97% accuracy). Figure 1 presents the distribution of business models for US publicly traded companies averaged across the years 1997 to 2004. Some remarkable patterns emerge.

Despite the growth of attention to the service economy, 77% of the revenues of all listed firms are derived from physical products (creator, distributor, landlord and broker) and 53% from creating those physical products. Over 30% of total revenue of US listed firms is derived from selling the use of assets (landlords) with nearly an even split between three assets types—physical landlords, financial landlords and contractors.

As we will see in later briefings the revenue derived from the different business models by listed US firms changed slowly over the eight years studied. This slow change masked some dramatic changes in business models of individual firms. For example IBM's business model evolution is presented in Figure 2. When IBM CEO Louis Gerstner spoke at an annual analyst conference in 2001 about the company's new strategic initiatives, he concluded that the strategy "makes more sense given the current business environment and IBM's business model." He was referring to the dramatic changes in sources of revenue for IBM during that time period.

IBM's business model has changed dramatically, moving from a heavily creator (manufacturing) based business to more of a contractor (services) based business with important revenue streams from the financial landlord (financing) and intellectual property landlord (software) business models. The percent of revenue generated from operating as a creator has dropped from 57% (1991) to 27% (2005) while total revenues grew from $64.7B to $91.1B. The percent of revenue from contracting grew from 20% to 52% over the same period.

Business models provide a useful view of how a firm generates revenues. While different competencies are required to succeed with each type of business model, many of the same competencies are needed to implement the same business models (e.g.,

landlords) in different industries. As industry boundaries blur and firms look for increasing synergies between their business models (e.g., IBM's creator, contractor and financial landlord businesses are more than the sum of the parts), understanding the structure and performance of business models will become more important.

Business models can help explain how value is created, what competencies are needed and what future opportunities are available for firms. Future briefings will discuss other aspects of business models including financial performance, relationship to industries, evolution over time, and synergies.

Figure 1: Business Models of Publicly Traded US Firms, 1997–2004[*]
(% of revenue of all firms —no. of firms with any participation)

What is being sold?	Asset Type				Total by Asset Right
	Financial	**Physical**	**Intellectual Property**	**Human**	
Creator	Entrepreneur (~0% — 7)	Manufacturer (51% — 4324)	Inventor (0% — 0)	Human Creator* (0% — 0)	(51%— 4331)
Distributor	Financial Trader (~0% — 61)	Wholesale / Retail (15% — 933)	IP Trader (~0% — 1)	Human Trader* (0% — 0)	(15% — 995)
Landlord	Financial Landlord (12% — 656)	Physical Landlord (8% — 960)	IP Landlord (3% — 973)	Contractor (10%— 1810)	(33%— 4399)
Broker	Financial Broker (1% — 81)	Physical Broker (~0% — 13)	IP Broker (0% — 0)	HR Broker (~0% — 7)	(1% — 101)
Total by Asset Type	(13% — 805)	(74% — 6230)	(3% — 973)	(10%— 1817)	100% — 9827

(Row label "Asset Rights" spans Creator/Distributor/Landlord/Broker.)

*Eight year average business model data (1997–2004) for all US publicly traded companies as reported by Compustat. On average 7964 firms per year over the eight years. Percent is the model's percent of total revenue of the firms and totals to 100%. Number is the average count of firms with that model and totals greater than number of firms since many firms have multiple models. *Selling humans is illegal and unethical and these business models are only included for logical completeness.
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Figure 2: IBM 1991–2005

Legend: ▨ Manufacturer   ▨ Contractor   ▨ IP Landlord   ■ Financial Landlord

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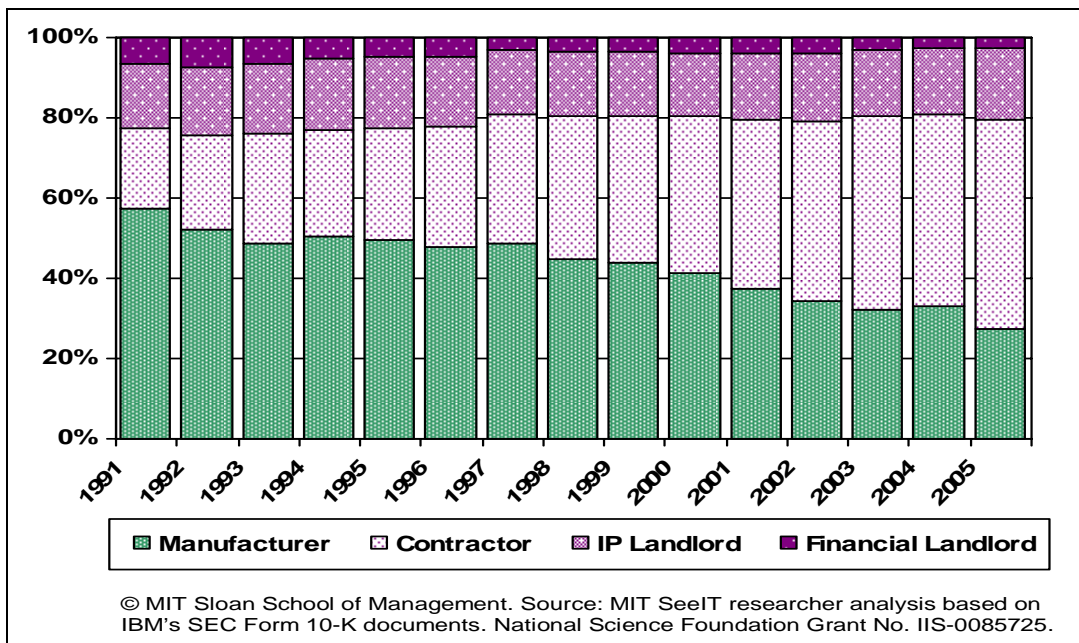
ENVISIONING THE IT ORGANIZATION OF THE FUTURE

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As IT units prepare to meet the heightened expectations of a tech savvy generation of managers, they are also attempting to meet the demands of an information-based economy. For example, customer expectations increasingly require IT innovations embedded in products and services; new business relationships often involve integration across organizational boundaries; and government regulations call for greater transparency. Meanwhile, more mature vendor services permit outsourcing of a wide range of IT tasks and business processes. These pressures are forcing changes in the role, structure, and operations of IT units. How will current market trends shape the IT unit of the future?

We explored this question in a series of phone interviews with 18 visionary CIOs and three forward looking business executives in which we discussed how the IT organization might change over the next three to five years. As respondents commented on the nature of the changes confronting companies and the resulting transformation of the IT organization, both common themes and contradictory scenarios emerged. This briefing takes a look at what is likely and what is possible for the future IT organization.

Four Models of the IT Organization

Our interviews revealed that executives don't share a single vision of the role of IT over the next three to five years. They all note that IT must manage costs, but they have very different ideas of how IT—and the IT unit—will enhance competitiveness. Perspectives on the future of IT diverge on at least two dimensions: (1) the value proposition of IT and (2) the focus of the IT unit.

At some companies the **value proposition of IT** will continue to emphasize the role of IT in reducing business operating costs. At other companies, the IT value proposition will focus more on the role of IT

as a driver of innovation and growth. The **focus of the IT unit** may result from IT's traditional technical expertise or from its growing role in process design. A technical focus means the IT unit's unique contribution to the company is its ability to understand how technology can deliver value to the firm. A process focus means the IT unit's unique contribution is to enable new processes and integrate business capabilities.

These two dimensions (IT value proposition and IT unit focus) define four IT models, which distinguish alternative paths for the IT unit of the future: Technology Services; Technology Innovation; Process Improvement; and Process Integration (see Figure 1).

Technology Services Model
Some IT units are focused on developing technical capabilities for generating business savings. Despite (and perhaps because of) increased IT savvy within their user communities, these IT units assume that non-IT managers want to apply technology to their tasks, but they rarely have the interest or knowledge to build a strong IT foundation. Thus, the IT unit is focused on delivering low-cost systems and services.

The most traditional of the four alternative models, the Technology Services model is particularly concerned with infrastructure services. The best IT units in this model will excel at engineering low cost environments, defining and pricing technical services, and managing service level agreements. In most cases, application development responsibilities will rest with local businesses or be outsourced—although some IT units will offer development as a service. IT is likely to adopt a philosophy of operating like a business. One government CIO, for example, noted that IT's role is more and more that of a third party service provider. He must find ways to motivate agencies to use the services of the centralized IT organization even though they are not required to do so.

The responsibilities of IT units in this quadrant may expand to include operations and other functions where business processes have been highly automated. A financial services CIO, for example, noted that he

already has responsibility for operations—a natural extension given the IT unit's expertise in managing the quality, reliability, and cost of highly automated processes. Due to their operational excellence, these IT units usually find that outsourcing IT services does not lead to cost savings. For IT units adopting a Technology Services model, the biggest challenge may be effective communications with an internal client base that does not understand—and largely doesn't care—what they do. The CIO of a health insurance company observed, "The distinction between IT and business will be clearer as we move [toward this model]. The business requirements piece becomes even more important."

Technology Innovation Model
A smaller set of companies looks to technology as a driver of research and innovation. These companies rely on the IT unit to introduce new technologies—even bleeding edge technologies—in ways that will distinguish them from competitors and create new products and services.

Companies in the Technology Innovation quadrant need a solid IT platform and low cost operations, but those may be outsourced. The unique contribution of the IT unit is the delivery of new capabilities. For example, the CIO of a media company sees IT's role as creating new ways to make the company's content more accessible and interactive. Some investment banks are most concerned with the speed with which IT can deliver new investment products—introducing a new product can mean millions of dollars a day until competitors replicate it. The CIO of a hospital group noted that IT professionals are becoming actively involved in identifying ways to diagnose and treat disease. At his organization, the IT unit is working with subject matter experts to determine how digitizing genomic information can offer significant opportunities for improved health care.

Companies adopting a Technology Innovation model should expect to pay more for IT services. They will hire and develop top technical talent and, when necessary, will compromise efficiency for creativity. These companies are likely to foster partnerships with technology companies to co-develop valuable new technologies. The CIO of the hospital group noted that, when IT drives innovation, the politics change: "You get deeper into the bowels of what it means to be a doctor. You become more invasive—IT becomes much more prominent."

Process Improvement Model
Some visionaries see the role of IT as evolving toward process rather than technical expertise. In the

Process Improvement model, this process expertise involves introducing efficiencies into existing and redesigned business processes. Cost reduction results from increased digitization of standardized processes both within the enterprise and with customers, suppliers, and partners.

In the Process Improvement model, business and IT executives view IT as a commodity but anticipate that effective implementation of IT-enabled processes will lead to lasting business benefits. IT will lead enterprise systems implementations, often deploying packaged systems. Centers of excellence organized around key business processes will be staffed with both IT and business people. As a result, the Process Improvement model, in contrast with the Technology Services model, will blur the distinction between IT and business. The IT unit will increasingly take responsibility for business outcomes. The CIO of an insurance company noted that she hopes to introduce a metric—to be tied to staff bonuses—related to the number of customers who use the online customer service center. She said that staff will object to a metric over which they feel they have no control, but she is confident they will then look for ways to exert some influence over this metric by working closely with business staff to improve the usability of the website.

The Process Improvement model looks to IT to help design more effective business processes. For example, the CIOs of a group of retailers and manufacturers are meeting to work on the problem of data synchronization across their firms. One of the CIOs said, "The CIOs are leading on this. The rest of the company will adopt processes accordingly." Rather than invest in technical expertise, companies in the lower right quadrant will likely outsource significant responsibility for their IT operations. If the IT unit's process design responsibilities become embedded in business units, the IT unit could cease to exist.

Process Integration Model
In the Process Integration model, the IT unit enables new business process capabilities in response to changing market conditions. Companies in this quadrant expect to plug and play internal and external business processes. IT acts as the glue enabling integration of dynamically changing business processes.

In the Process Integration model the IT unit supports business transformations, knowledge sharing and business process experiments. IT and business people sit together at the strategy table to define the capabilities that will make the company more competitive. Although Process Integration companies

will find value in a low-cost infrastructure, they are more concerned with enabling process innovation. For example, one technology company is focusing on the development of tools for collaboration among its engineers and service providers. A health care insurer is looking for ways to partner with health care providers to improve delivery of health care. One of the insurer's initiatives explores how to integrate, in real time, payment information from multiple insurance companies, government agencies, and other sources, so that patients can know, at the time a medical procedure or medication is recommended, the exact amount they will be required to pay. As IT enables this level of integration, the CIO said, "IT will be at the forefront in deciding what the company's competencies will be."

Companies in this quadrant are more interested in business process innovation than in technology innovation. Nonetheless, they rely on integration capabilities and thus will face significant technology challenges. A key challenge will be developing a modular architecture from a company's legacy environment. They will readily outsource commodity business processes so that they can focus on the leading edge processes that are key to their competitiveness. And they may co-source some development responsibility as a way to learn unfamiliar technologies that can enable new processes.

Choosing a Future

CIOs might argue that their IT unit must operate in all four quadrants in Figure 1. But the requirements for success in the four quadrants comprise different IT staff and CIO skills, organizational structures, compensation, incentive systems, and outsourcing arrangements—just to name a few. The IT unit will become more complex and less focused as a company attempts to incorporate aspects of various quadrants. Thus, choosing multiple models is likely to be expensive. We believe most companies should develop real expertise in one of the quadrants while pushing other services to business units and vendors. In choosing one model in which to excel a company will articulate a strategic choice that has the potential to distinguish it from competitors.

Figure 1: Alternative Visions of the IT Organization of the Future

IT Value Proposition		Technical	Process
Drive innovation and growth		**Technology Innovation Model** Technology innovation is key to business success ***Main responsibility:*** Discovery of new technologies and the business opportunities they create ***Key IT Skills:*** IT R&D, creative thinking, rapid development methodologies ***Outsourcing Philosophy:*** Avoids outsourcing technology innovation but may strategically partner to develop technology	**Process Integration Model** IT responds to new business opportunities ***Main responsibility:*** Design and integration of new business capabilities ***Key IT Skills:*** Architecture, technical integration, process expertise ***Outsourcing Philosophy:*** Outsource commodity business processes; may co-source development to learn new technologies
Reduce business operating costs		**Technology Services Model** Operational excellence in IT provides reliable, efficient business scaffolding ***Main responsibility:*** Ensure operational excellence of the IT environment and expand IT environment to include IT-dependent operations ***Key IT Skills:*** Services engineering; operational discipline; IT financial management; business relationships ***Outsourcing Philosophy:*** Outsource some application development for staff augmentation; selectively outsource commodity services	**Process Improvement Model** IT digitizes business processes to increase efficiency ***Main responsibility:*** Take out cost through process improvement; play leadership role in enterprise process design and standardization initiatives ***Key IT Skills:*** Business knowledge; process expertise; project management ***Outsourcing Philosophy:*** Strategic partnership to outsource operations and possibly large enterprise projects
		Technical	Process

IT Unit Focus

Expanding the Value From Outsourcing: The Role of Engagement Mechanisms

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Organizations are drawn to outsourcing for many reasons, from immediate benefits, such as cost savings, variable capacity, and on demand-access to expertise, to longer-term benefits, such as IT process improvement, agility, and sharper management focus. Effective governance of outsourcing is critical for realizing any of these benefits. We conducted eleven in-depth case studies, and examined what distinguished firms that used outsourcing to achieve both immediate and long-term benefits from firms that only achieved short-term benefits.[1] We found firms that achieve both types of benefits govern their outsourcing relations with a system of *engagement mechanisms*—mechanisms that bring together key decision makers from both the client and vendor. With effective engagement mechanisms these firms increase the strategic value of IT by strengthening three inter-related areas of internal management of IT:

- **Improving IT processes** – Outsourcing requires that the Client's IT group be clear and specific about IT service definitions (e.g., help desk, systems development, prototyping, etc.). In many of the organizations that we studied, IT groups used outsourcing as an impetus to develop and improve their IT process discipline.

- **Maturing enterprise architecture** – Handing over responsibility for certain IT services to one or more vendors shifts an IT group's responsibilities from managing and executing those services to ensuring they are effectively and efficiently integrated with the rest of the infra-

structure. To improve their integration capabilities, many of the IT groups we studied focused their energies on designing, strengthening, and implementing their enterprise architecture.[2]

- **Sharpening IT management focus** – Relinquishing control over some IT services also enabled IT management to focus on achieving and sustaining alignment with the rest of the business, and ensuring IT resources met strategic priorities.

Effectively governing significant outsourcing entails more than simply appropriate contracts and SLAs. A system of key engagement mechanisms enables both parties to learn from each other, identify and address unanticipated challenges, and adapt their respective sides accordingly.

A System of Engagement Mechanisms

Prior MIT CISR research found that an effective internal IT engagement model enables key stakeholder groups to sustain alignment between IT and the rest of the business and coordination across organizational levels.[3] The engagement model should be extended to outsourcing, enabling alignment and coordination between a client and vendor.

Our research identified four mechanisms distinguishing effective outsourcing relationships. Figure 1 highlights these mechanisms and how they interact to support alignment and coordination.

Regular Strategic-Level Meetings
A critical engagement mechanism is regular strategic-level meetings between key decision makers from both parties. These meetings enable participants to develop common understanding and trust—a necessary foundation from which participants

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[1] This research draws on data on outsourcing relations collected by Cynthia Beath, Nils Fonstad, Jeanne Ross, and Peter Weill. In each company, we interviewed at least three IT executives and collected internal documentation. For additional MIT CISR research on outsourcing, please visit http://mitsloan.mit.edu/cisr/.

[2] To learn more about enterprise architecture stages of maturity, read "Maturity Matters: How Firms Generate Value from Enterprise Architecture," MIT CISR Research Briefing. Vol. IV, No. 2B, July 2004.
[3] To learn more about IT engagement models, read "Linking Mechanisms at TD Banknorth," MIT CISR Research Briefing. Vol. VI, No. 1D, March 2006.

collaboratively address unanticipated problems, before they escalate out of control.

For example, a prominent international financial services firm works with a single vendor. Every month, the two parties convene an Offshore Steering Committee meeting. Participants include the firm's CIO, three of his direct reports, and four equivalents from the vendor. Initially, the committee was set up to focus on strategic issues; however, participants discovered they needed to first sort out several problems at the tactical level. The firm had little process discipline and a lot of resistance from staff to outsourcing; the vendor had not fully developed capabilities it needed and was reluctant to be forthright about its own limitations and those of the client. The committee enabled key decision makers to work together to identify problems, figure out who was responsible for different aspects of them, and develop long-term solutions. As a result, the firm resolved internal pockets of resistance to outsourcing and improved internal IT processes, which in turn, enabled the vendor to be more effective and efficient.

Dedicated Relationship Manager

A relationship manager serves as a facilitator between a client and vendor. Effective relationship managers must accurately represent their organization's interests, understand the interests of their counterparts, and be able to influence any necessary changes in their organization.

In the financial services firm above, the delivery manager plays the critical role of relationship manager. He is a key participant in the Offshore Steering Committee, and in general, serves as a facilitator and change agent for both his firm and the vendor. As he explained, to be effective, he is equally tough on both his colleagues and the vendor, "In order to get people to overcome significant hurdles, it requires a tremendous amount of pressure, which means somebody has to be willing to be the bad guy. In this case, it will be me and perhaps [the CIO]." The relationship manager focuses his energies on increasing the transparency of delivery and management processes so accountability is clear and participants perceive the processes as fair.

As their relationship strengthened, the financial services firm involved the vendor in more sophisticated projects. This in turn placed greater demands on the firm's capabilities and internal processes. During an Offshore Steering Committee meeting, the relationship manager and committee participants worked together to solve a crisis. They realized that it was due to the inability of the firm's enterprise architecture team to integrate the outsourced project into the firm's legacy system. They convinced the firm's enterprise architecture team that they really did not have an effective enterprise architecture and set about helping the team develop one. They also arranged a three-week visit by the firm's chief architect to the vendor's Indian HQ, where he saw the vendor use its own enterprise architecture to integrate and get value from hundreds of client accounts.

Post Implementation Reviews
of Outsourcing Projects

Post-implementation reviews (PIRs) offer opportunities to bring together key stakeholders from the project team level and tactical level and collectively evaluate the progress (or lack thereof) of projects. To avoid perceptions of unfairness and scapegoating, PIRs are best conducted transparently by an independent party (e.g. auditors), consist of objective and subjective metrics, examine project and relational outcomes, and include feedback from a variety of stakeholder groups.

To govern relations with its "strategic" suppliers, a global consumer goods manufacturer relies on Quarterly Relationship Meetings—an engagement mechanism similar to the financial services firm's strategic-level committee. With each strategic supplier, executives from the manufacturer meet with supplier equivalents and discuss operational performance. These discussions are anchored around data collected from the PIRs of all outsourced projects. At the manufacturer, all projects, whether or not they rely on IT and whether or not they involve external parties, go through a standard project management process that includes an evaluation of the project three months after it has "gone live." The PIR involves participants from both the manufacturer and the supplier and, in addition to asking them about overall project performance, it asks them to reflect on how the relationship has evolved.

Metrics

Metrics are critical for linking organizational levels, creating transparency, assessing an outsourcing relationship, spotting emerging problems, and building trust. At the manufacturing firm above, PIRs of outsourced projects collect metrics on quality, cost, on-time delivery, and other service-level agreements, as well as metrics for constructing a customer satisfaction index. Participants are asked to evaluate relational aspects such as communication between team members, the business knowledge demonstrated by the supplier team, and opportunities for all project members to effectively participate in decisions.

Data from the PIRs are collected into scorecards. Multiple audiences then draw on the scorecards for different purposes: the manufacturing firm's IT group to improve internal IT operations, and every 18 months, to develop a broader perspective for business planning; the firm's executive management and business units to assess the IT group's performance; and participants in the strategic-level meetings to discuss their sourcing relationship. Using a standard set of metrics to capture participants' perception of the quality of the relationship has helped both the firm and its strategic suppliers "take the emotions out" of joint problem-solving by surfacing problems in a manner that participants perceive as fair.

The manufacturing firm sought to mature its process capabilities by working with strategic suppliers that were "very process rich." Using PIR data during its strategic-level meetings enabled firm managers to identify deficient capabilities, learn from its suppliers how to improve them, and advance its strategy of becoming a more standards based organization.

Outsourcing providers like Tata Consultancy Services have a three level process for engaging clients across all three organizational levels. This process relies on metrics appropriate for each level: at the operations level, metrics focus on formal SLAs; at the tactical level, pre-defined, mutually agreed upon milestones are designed to compare programs; and at the strategic level, metrics focus on issues such as customer satisfaction with the relationship and the types of problems

that require corporate level involvement. Relationship managers from both sides use these metrics to communicate with their counterparts and with their colleagues from different organizational levels.

Within organizations, the delivery of reliable low cost IT services is the foundation from which an IT group can effectively align and coordinate with other stakeholders and increase the strategic role of IT.[4] Similarly, before an outsourcing relationship grows in strategic value to both parties, its governance must, at a minimum, enable the vendor to provide the IT services it is contracted to provide. Clear and precise contracts and service levels are essential. However they may be insufficient to even achieve short-term benefits due to unanticipated impediments, such as immature management practices, internal politics and cultural differences between client and vendor.

A manager from the financial services firm recalled: "We discovered over the last two years that, in order to really effectively offshore, you cannot offshore your problems. You have to address them." A system of engagement mechanisms enables clients and vendors to build enough common understanding and trust to spot problems early on and collaborate on long-term solutions. In the process, they expand the benefits each receives from the relationship.

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[4] "Business Agility and IT Capabilities," Westerman, Weill and McDonald. MIT CISR Research Briefing. Vol. VI, No. 1E, March 2006.

Figure 1: Client-Vendor Engagement Mechanisms for Governing Outsourcing
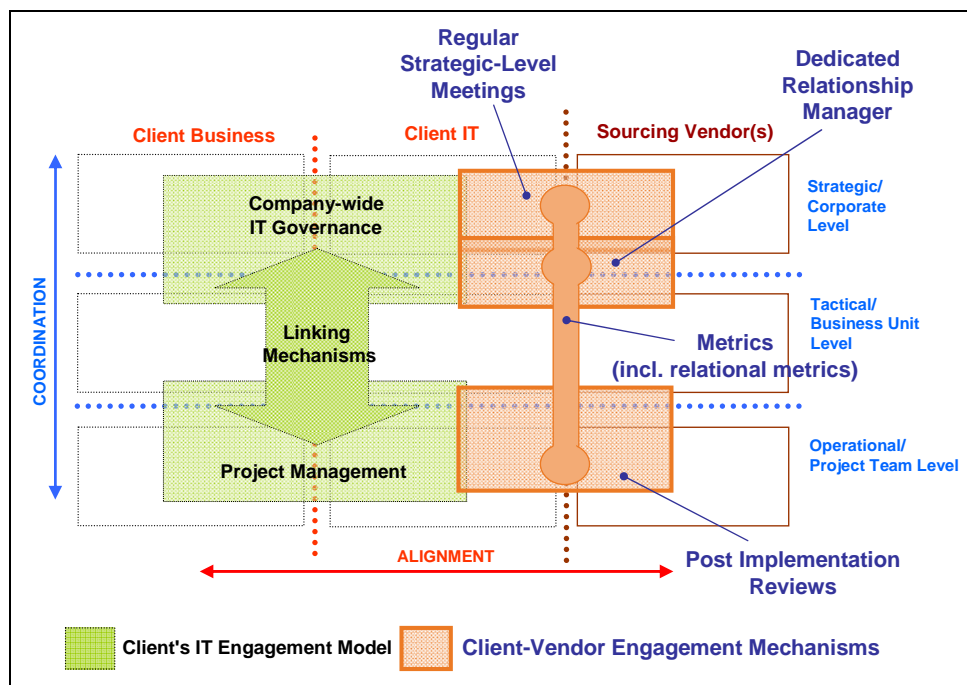
AN IT VALUE BASED CAPABILITY MATURITY FRAMEWORK[1]

Martin Curley, *Senior Principal Engineer, Director, IT Innovation & Research, Intel Corporation and Adjunct Professor, National University of Ireland, Maynooth*[2]

This briefing introduces an IT Capability Maturity framework (IT-CMF) which can provide a way to help manage and provide a roadmap of maturity paths for value provisioning for CIOs and IT Directors. Using the IT-CMF, CIOs can adopt four inter-related strategies and associated maturity curves to help deliver more value from IT. The IT-CMF is illustrated in Figure 1 and consists of four integrated strategies:

1. Managing the IT Budget
2. Managing the IT Capability
3. Managing IT for Business Value
4. Managing IT like a Business

The IT-CMF has been developed using an inductive theory building approach and is the result of the synthesis of leading academic research and industry best practice, based on the author's experience in helping drive the transformation of the Intel IT capability. The framework was developed iteratively with pilot workshops and solicitation of best practices from CIOs and IT directors. The IT-CMF has been analyzed in workshops with more than 60 managers and is currently undergoing empirical testing using data from many firms.

CIOs can use this framework as a discussion document with their CEO and CFO as a key input to the role IT should play in the organization. Then, using the IT-CMF, CIO's can help their IT organizations move from being perceived like a utility or technology supplier to become a core competency of the firm as appropriate. The IT-CMF can help the organization move from a scenario where the IT

budget is apparently out of control to where there is a sustainable economic model for IT. A mature company has a budget where increasing demand for IT is met, while avoiding a runaway budget. The framework can provide a roadmap to help the organization move from being barely able to compute the total cost of ownership (TCO) of their infrastructure to being able to deliver and demonstrate optimized value from their IT investments. Finally the IT-CMF can help the IT organization move from being perceived as a cost center to that of a value center with a high level of IT and Business alignment.

Five Maturity Levels

In the framework there are four inter-related strategies and each strategy can exist at one of five levels of maturity (unmanaged, basic, intermediate, advanced, and optimized). The maturity framework draws on the structure of the CMMI model from SEI at Carnegie Mellon, but instead of focusing on process maturity also takes into account outcome maturity. At level 1 maturity there is no formal process and critical processes are executed in an ad-hoc manner whilst at level 5 the critical processes and related outcomes are continuously optimized both within the process area and in the context of other related critical processes.

CIOs should decide which level of maturity they are aiming for and then try to drive improvements in parallel across each of the four strategies. These improvements come in many forms such as the adoption of a new management practice/process, adoption of a new management technology or aspiring to a more mature outcome from a particular process.

Four Strategies

Managing the IT budget is crucial as pressures on IT budgets continue. The seemingly permanent state of constant change could force adoption of better IT budget management practices industry-wide. Many IT organizations are only able to fuel new innovation and solutions through aggressive cost reduction of existing operations and services. The Managing IT

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[1] For more information see *Managing Information Technology for Business Value: Practical Strategies for IT and Business Managers*, M. Curley, Intel Press, 2004.
[2] Martin Curley was a visiting scholar at MIT CISR in the summer of 2005 & 2006.

Budget maturity curve involves a systematic approach and set of practices and tools which can be used to manage the IT budget. These practices include approaches such as service level adjustment, supplier renegotiation as well as nurturing so called "disruptive" technologies which can deliver new or equivalent services often at much lower cost than existing products or services.

From 2002 to 2004 Intel IT was able to support rapid growth of IT services whilst maintaining a flat IT budget. Exploitation of Moore's Law and introducing a set of management practices around IT budget management and cost reduction were critcal. Intel's use of Linux running on Intel Architecture computers as a disruptive replacement technology for a RISC/Unix platform for the design of its microprocessors is an example of a spectacular success with a systematic cost reduction. As Intel continued to deliver faster microprocessors to meet the challenge of Moore's Law, the computing demand for the design of these processors was growing at more than 100% annually—faced with an increasingly unsustainable IT capital budget the CIO authorized exploration of the use of a disruptive technology to help solve this problem—following an accelerated pilot the computing environment was completely transferred to a Linux/Intel Architecture platform from a RISC/Unix platform; the result was a $700+ million savings for Intel over a four year period.

Managing the IT capability on an ongoing basis is crucial to delivering sustainable competitive advantage from IT.

The "IT Capability" is simply defined as what IT can do for the business. This involves a systematic approach in managing different but related objects, including IT's assets, the value chain that creates business value from IT, the core competencies that the IT organization requires to deliver IT business value and the ongoing and complete workflow through the entire IT value chain. The premise of managing the IT capability is that sustainable competitive advantage from IT comes not from individual stove-piped solutions but from an IT capability effective at delivering new strategic applications faster and better than at competing companies. The IT capability maturity curve builds on the assets/value chain model first introduced in the MIT Sloan CISR Working Paper No. 290, "Developing Long-Term Competitiveness through Information Technology Assets" by Jeanne Ross et al., published in 1995.

Assessing the maturity and effectiveness of the IT Capability requires multidimensional views. At Intel IT we regularly survey senior executives as well as end users to measure and then identify actions to improve customer satisfaction. We also use SAM-lite based on the Malcolm Baldridge quality award to assess our IT capability and identify priority improvement actions. Using SAM-lite we were able to effectively double our capability by continuously prioritizing and assessing improvements over a four year period. Also we regularly surveyed IT employees on the effectiveness of the IT organization which produced an honest insider view on the maturity and effectiveness of our IT Capability.

IT-CMF advocates taking a *Managing for IT business value* or benefits realization approach. IT investments and projects are managed not as technology projects but are managed based on the benefits expected to be delivered. This approach corresponds to the "Begin with the end in mind" mantra that Stephen Covey advocates as part of his *Seven Habits of Highly Effective People* book. This benefits realization approach includes adoption of core business practices including basic return-on-investment measures supported by firm-wide investment coordination, business case discipline and continuous portfolio management and reprioritization.

In 2002 Intel's CEO Craig Barrett set a target for the Intel IT organization to deliver $100 million in new value without any incremental spend in IT budget. Intel IT developed and evolved a set of new management practices and processes which two years later in 2004 created forward looking value of $400 million. Included in these practices was a business value program office to help drive a cultural change in the way IT business cases were developed and measured and a business value index, which is an options management tool, to help select from competing speculative investments.

ING Groep and Deutsche Bank are examples of two firms that have particularly mature approaches to managing IT for Business Value. In ING's case they apply the same financial analysis techniques that they use to help manage the group's financial assets to their IT investments and report value returned in excess of $100 million Euro from this approach.

Finally *Managing IT like a business* advocates taking a business-like approach to managing the IT capability. This involves applying professional

business practices to the IT function. For example using account managers, using charge back methods to manage demand, and institutionalizing governance processes. This approach helps ensure that the IT capability delivers a value output commensurate with the level of IT budget. A critical modulator of the value ultimately delivered is the IT governance arrangements in the firm—IT governance in this context is defined as specifying the decision rights and accountabilities for IT spending and use in the firm.[3]

In 2001 Intel IT made a significant shift in the way that we implemented chargeback—Intel IT replaced a coarse IT allocation methodology (which was calculated by simply dividing the total IT spend by the number of employees) with a much more specific chargeback report which directly identified the charges and consumption associated with a particular business. This change gave Intel division General Managers visibility of what IT services they were consuming and what they were being charged

as well the control to increase, decrement or stop a particular IT service. This process not only produced more efficient use of IT resources but also increased the level of Business-IT alignment. Since 2001 Intel IT has published an annual IT report similar to the company annual report a firm typically publishes. This report has been a key tool in summarizing macro IT performance and outlook and has enabled better communication with the business. Leading companies such as BP, Det Norske Veritas and Northrop Grumman have also followed this approach.

The journey to maturity is an ongoing one with the goalposts often shifting as business conditions shift, company priorities change and executive leadership changes. At Intel change and fast change is a constant—this means we need to be able to rapidly change our IT priorities whilst maintaining a constant focus on investing in maturing our IT capability. Getting that balance right is hard and we use the maturity model as a roadmap.

Figure 1: IT Business Value Maturity Framework

Maturity Levels	Major Strategies			
	Managing the IT Budget	**Managing the IT Capability**	**Managing IT for Business Value**	**Managing IT Like a Business**
5. Optimizing	Sustainable Economic Model	Corporate Core Competency	Optimized Value	Value Centre
4. Advanced	Expanded Funding Options	Strategic Business Partner	Options and Portfolio Management	Customer/ Service Focus
3. Intermediate	Systemic Cost Reduction	Technology Expert	ROI & Business Case	Customer/ Service Orientation
2. Basic	Predictable Performance	Technology Supplier	TCO	Technology/ Product Focus
1. Initial		Beginning		

Source: Martin Curley, Intel/National University of Ireland

[3] For more information see: IT Governance: How Top Performers *Manage IT Decision Rights for Superior Results*, P. Weill & J. Ross, Harvard Business School Press, 2004.

BUILD SPECIFIC IT CAPABILITIES FOR BOTH CURRENT PERFORMANCE AND BUSINESS AGILITY

George Westerman, *Research Scientist*
Peter Weill, *Director & Senior Research Scientist*
MIT Sloan Center for Information Systems Research
Mark McDonald, *Group Vice President, Gartner EXP*

Sustained financial performance requires both strong financial performance today and business agility to respond to future market opportunities. Four core IT capabilities affect both business agility and current performance in different ways. IT executives who understand the relationships between IT capability and financial performance can prioritize capability-building efforts to meet the most pressing financial goals of the enterprise.

Current performance and business agility enable sustained financial performance

Sustained financial performance requires the ability to manage effectively today (current performance) and to change the business for the future (business agility). Using data from 1,400 CIOs (see "about the research"), we developed indicators of both current performance and business agility. These indicators are significantly correlated with different measures of financial performance in publicly listed U.S. firms, controlling for industry.

<u>Current Performance</u> is delivering value to stakeholders today. Firms with strong current performance have effective management teams delivering on current business objectives. IT enables current performance by improving business processes, increasing efficiency, and providing executives with accurate information for decision-making. Firms with higher scores on our current performance indicator have statistically significantly higher revenue per employee, income per employee, and return on invested capital (ROIC).

<u>Business Agility</u> is the set of possible business initiatives a firm can readily implement leveraging predetermined competencies with managed cost and risk. Agility is *not* doing everything fast—it's doing the right things at the right speed and generating the right returns. IT enables business agility by understanding necessary strategic changes, implementing effective solutions quickly and helping the business change processes to meet competitive conditions. Firms with higher scores on our business agility indicator have statistically significantly higher revenue growth, gross margins, and return on assets (ROA).

Sustained financial performance comes not from high business agility or high current performance, but from both simultaneously. But, this represents a paradox for many firms. Traditionally, research has described a 'productivity dilemma:' organizations tend to be good at either current performance or agility, but not both.[1] Structures and processes that are good at exploiting existing resources and driving efficiency—highly structured problem-solving strategies implemented using well-defined, methodical procedures and driven by careful analyses of existing processes and customers—can be very rigid, even to the point where they reject useful innovations. Conversely, structures and processes that enable agility and exploration—loose organization cultures and flat structures accustomed to identifying and quickly implementing new possibilities with little regard for standards and formal planning—can be highly inefficient.

Our study shows that IT has begun to break the agility/current performance paradox. More and more firms are finding that, as they standardize IT infrastructure and rationalize applications, they become not only more efficient but also more agile. They perform well in the short term and dynamically change their business to stay ahead of the competition. Being simultaneously agile and efficient is at the heart of sustained financial performance.

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[1] The difficulty of improving current performance while being agile (or exploring new capabilities while exploiting ones) has a long history of research. See for example, Abernathy, W., *The Productivity Dilemma* (1978) or Benner, M. and M. Tushman, "Process Management and Technological Innovation: A Longitudinal Study of the Photography and Paint Industries," *Administrative Science Quarterly*, 47(2002): 676-706.

No wonder firms that are high on both our indicators of business agility and current performance have statistically significantly higher net income and price-to-book ratios than their competitors.

IT capabilities enable business agility and current performance

In a previous briefing, we identified four core IT capabilities that form a hierarchy:[2]

- Service Delivery is the ongoing provision of basic IT services such as infrastructure services, help desk support and applications to meet business requirements for quality and cost.

- Project Delivery is successfully implementing application development projects that deliver business results.

- Governance/Alignment is effective decision-making, oversight, and accountability for IT.

- CIO/CxO Relationship is effective partnership where business executives believe the CIO knows the business, ask for the CIO's views on process and technology issues, and include the CIO in strategic decisions.

Although both agility and current performance build upon all four IT capabilities, each is most dependent on only two of the four IT capabilities.

- Business Agility is most dependent on having effective project delivery and CIO/CxO relationships. CIO/CxO relationships help the organization identify useful IT applications, and project delivery ensures that the applications are built quickly and effectively.

- Current Performance is most dependent on governance/alignment and service delivery. Service delivery keeps business processes running smoothly, and governance/alignment identifies the most effective uses for limited IT resources.

Figure 1 summarizes the relationships between core IT capabilities and financial performance.

What does this mean for CIOs?

CIOs have limited resources, and no CIO has the full attention of business executives all the time. To improve IT capabilities and business value from IT, most CIOs need to choose their targets, driving a sequence of clear and coherent messages and initiatives.

The first step in any IT capability improvement is to ensure basic service delivery meets business re-

quirements. This gives the CIO managerial credibility to tackle the challenges of project delivery, governance, and CIO/CxO relationships.[3]

Once service delivery is 'good enough,' the CIO can chart a transformation agenda that builds the IT capabilities most relevant for the firm's key financial priorities:

If the firm values profitable growth above efficiency, the CIO should focus on project delivery and CIO/CXO relationship, since these two IT capabilities are most important for business agility. Then, once IT has begun to enable business agility, firm builds sustained financial performance. India headquartered automobile conglomerate Mahindra and Mahindra (M&M) has a strong agility imperative based on organic growth, joint ventures, and globalization of markets. IT first needed to the CIO can shift focus to governance so that the stabilize service delivery through standards and service level agreements. This provided the credibility to embark on a broader agility initiative. IT improved project delivery capabilities, but needed to do more. Implementing knowledge management and knowledge communities improved CIO/CxO relationships, enabling faster business planning cycle times and more responsiveness in rapidly changing markets.

Alternatively, if the firm most values efficiency-oriented financial measures such as revenue per employee, the CIO should focus first on IT governance. Governance helps the business make better decisions about how IT resources and investments are used and can help the business improve the efficiency of IT and core business processes. Later, once IT enables current performance, the CIO can shift focus to relationships and project delivery so the firm can sustain its financial performance. At Danish pensions company Sampension, CIO Hans-Henrik Mejloe led a transformation to improve IT performance, including a new technology platform, new staff skills, and stronger strategic sourcing capabilities. The improvements were instituted through a governance process that included a clear set of 13 principles for architecture, standards and sourcing, and an IS balanced scorecard. The transformation-reduced infrastructure spending to less than 35 percent of IT budget and halved IT fixed costs over three years while improving business process effectiveness. The efficiency and infrastructure improve-

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[2]"IT Capabilities and Business Agility," MIT CISR Research Briefings VI(1E), March 2006

[3] For more on the importance of service delivery in the IT capability hierarchy, see "IT Capabilities and Business Agility," MIT CISR Research briefings VI (1E), March 2006.

ments set the stage for further changes that improved business agility and competitiveness.

Finally, if the firm's highest priority is sustained financial performance, the CIO needs to enable both agility and current performance. Our research suggests that doing both simultaneously is challenging. Many CIOs choose to focus on either agility or current performance first. Others move back and forth between the two, incrementally improving one and then improving the other in an ever-increasing spiral. USAA, a diversified financial services firm, has iteratively developed IT capabilities for sustained financial performance.[4] The company has been incre-
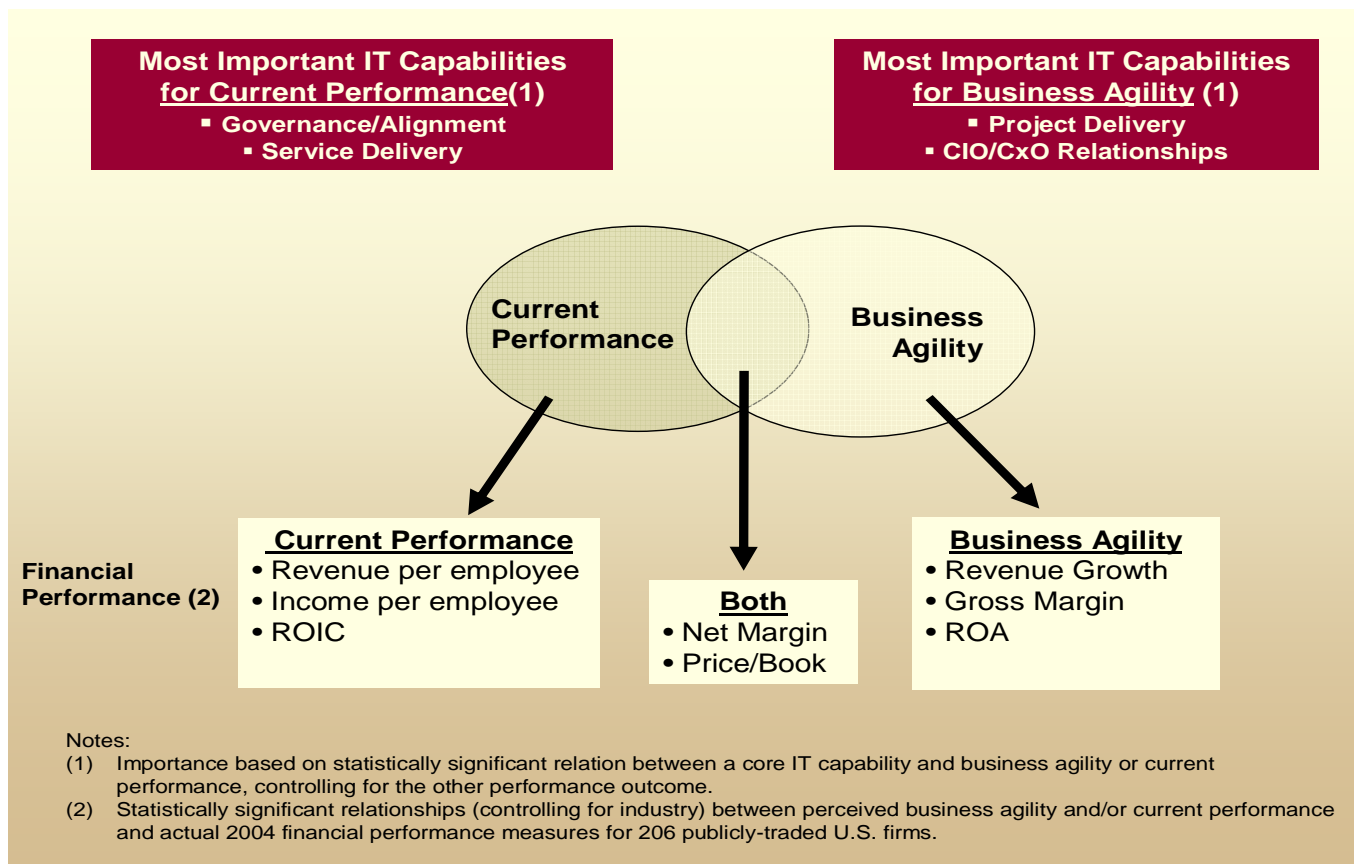
mentally building a platform for greater synergies across its operating units since 2000. To build and leverage the platform, USAA has relied on a strong governance process for funding key projects and monitoring outputs. The company has also implemented a disciplined project management methodology to ensure that every project is completed on time and budget and meets its business objectives. Together the IT capabilities contribute to business performance by enhancing services to customers, while also providing the agility to introduce new products and services.

About the Research

This study is based on analysis of 1400 responses to the Fall 2004 Gartner CIO survey. We statistically constructed four indicators of IT capability, as well as measures of business agility and current performance. Since the indicators were subjective—based on self-reports from the CIOs—we tested their validity by comparing to publicly available financial data for the 206 firms that are publicly traded on U.S. markets. Business agility and current performance are statistically significantly related to key measures of 2004 and 3-year average financial performance after controlling for industry effects. This showed that CIO self-report of business outcomes is a reliable measure of actual financial outcomes.

Next, we examined how firms with different configurations of IT capability performed on current performance, business agility and financial performance measures. All results reported are statistically significant. We supplemented the statistical analysis with case studies and 17 CIO interviews to gain insights into how firms build IT and business capabilities.

Figure 1: Prioritize the IT Capability That Is Most Important to Your Firm's Financial Goals

Most Important IT Capabilities for Current Performance(1)
- Governance/Alignment
- Service Delivery

Most Important IT Capabilities for Business Agility (1)
- Project Delivery
- CIO/CxO Relationships

Current Performance

Business Agility

Financial Performance (2)

Current Performance
- Revenue per employee
- Income per employee
- ROIC

Both
- Net Margin
- Price/Book

Business Agility
- Revenue Growth
- Gross Margin
- ROA

Notes:
(1) Importance based on statistically significant relation between a core IT capability and business agility or current performance, controlling for the other performance outcome.
(2) Statistically significant relationships (controlling for industry) between perceived business agility and/or current performance and actual 2004 financial performance measures for 206 publicly-traded U.S. firms.

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[4] See "Project Governance at USAA," MIT CISR Research Briefing, Vol. IV (1D), March 2004.

GETTING HIGHER BUSINESS VALUE FROM IT: THE NON-IT EXECUTIVE VIEW

George Westerman, *Research Scientist*
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What are the most important tasks for getting business value from IT? We surveyed 153 senior non-IT executives about ten IT and eight non-IT management tasks and statistically identified which were most important (see *About the research* on Page 3). We then interviewed 16 experienced CIOs to find out how they achieved these tasks effectively. Firms who get higher business value from IT (BVIT) perform a set of four tasks better than other firms. The results provide IT executives with strong evidence to help prioritize objectives and their daily schedules.

What High BVIT Firms Do Better

Figure 1 shows performance for the 18 tasks as rated by senior non-IT executives. Notable are the different rankings of funding IT, using IT effectively, and IT oversight. Although the senior executives believe they are good at spending money on IT, they are not achieving the best returns they can, and are unsure how to increase those returns.

Firms with higher BVIT perform statistically significantly better on these four tasks (see Figure 1):

- **Needs Identification**: Identifying what initiatives are needed to enable the business to meet its goals.

- **Application Development**: Acquiring, developing, and maintaining application systems.

- **Business Process Redesign (BPR)/Organization Change**: Implementing change in the business processes.

- **IT Oversight**: Ensuring the IT unit is operating effectively and efficiently.

The four tasks' relatively low performance ratings provide a strategic opportunity for CIOs. Since most firms execute these tasks poorly, even a small performance increase on these tasks can give the firm a BVIT edge over competitors. Improving these tasks

requires CIO leadership to build effective governance mechanisms and enlist business executives. Although non-IT executives classified two tasks (Needs Identification and IT Oversight) as business responsibilities, CIOs cannot expect non-IT executives to improve these tasks on their own. Instead, IT leaders must create mechanisms to help business leaders identify needs and oversee IT more effectively.

The Four Critical Tasks for BVIT

The four critical tasks form a virtuous cycle of BVIT in which three tasks continually change the business in an environment of effective IT oversight (Figure 2). First, IT leaders work with their business executive counterparts for **Needs Identification.** This is more than just taking orders. Effective IT leaders engage in ongoing conversations to not only understand what business executives want, but also suggest how IT can improve business performance. For example, Solectron and Biogen identify needs through formal IT roles that face off against particular business units or functions. These formal roles are often supplemented or substituted by one-on-one conversations between the CIO and business executives (the case at Celanese and Novartis) and committees of the most senior business executives (used at State Street Corporation). Novartis CIO Jim Barrington notes, *"I really to want to find out what their real business issues are—what works well in the business; what doesn't work well in the business. And, then, perhaps, try to figure out from an IT perspective how we can address some of those areas, particularly the ones that don't work well, or to understand their top three strategic drivers..."*

Application Development is the first step in delivering on business needs. CIO interviews identified two important elements of application development for BVIT. First is an effective project launch and review process. Crucial to the process is ensuring that business executives can comfortably ask the right questions and make the right decisions. Raytheon CIO Rebecca Rhoads, for example, tied IT system development milestones to the review processes executives already used for the 8000 engineering programs underway at any moment in the firm.

"*…Same structure, same language, same players. And when you get to that point, then they feel like they're involved, and they know how to be involved. Because if you invite them to the meeting and then you talk IT language, they're not sure how to contribute, which is going to frustrate them. They want to spend their time effectively. But if you bring them to a gate review that is structured in a way the person knows why we're there, what we're supposed to do with that particular gate and what role they play, then you've got them as a teammate.*"

The second important element is ensuring that each project is managed effectively. The project must use the right methods, have the proper staffing and business involvement, and deliver results. According to BT CIO Al-Noor Ramji, *"We've got to make sure every one of [the projects] delivers every 90 days, and if it doesn't deliver, the post implementation review process will cut it off."* Selectron CIO Bud Mathaisel charged his Project Management Office (PMO) not only to monitor project status, but also ensure the business is playing its part. *"Our PMO is such a valuable entity that it's now being emulated by other groups in our company and we have lost people to other groups as they've hired them away (at our encouragement) to go and take program management mindsets into those other organizations."*

BVIT also requires **BPR/Organization Change**. Solectron's Mathaisel is also the firm's Chief Process Officer, responsible for IT effectiveness and business process effectiveness. Even without formal process responsibility, CIOs can foster business change—IT governance processes at UNICEF require business executives to ensure all new systems meet organizational goals, including process change. And BT's Ramji uses a "hothouse" concept at the start of major projects *"For three days we build three prototypes with six to eight competing teams. It's not a question of IT guys—every professional skill set has to turn up and do it. And that's been a huge revolution because working your own pieces and doing your own thing accurately doesn't help when the customer is at stake. And no department is sufficient to give the customer an end-to-end service. All of us are necessary."*

The virtuous cycle of needs identification, application development, and BPR / Organization Change operates in an environment of effective **IT Oversight**. CIO interviews identified two key oversight components shown in Figure 2. The first, **transparent investment**, directs resources to the most important projects in the enterprise through a clear, coherent process. State Street and Biogen allocate funds top-down, designating a particular percentage of the budget for each business unit or function, while reserving a fund for enterprise infrastructure. Intel, on the other hand, has a systematic rating process to identify what projects across the enterprise have highest potential return and closest alignment with IT and business strategy.

The second element of oversight is **measurement.** Most organizations use a mix of hard and soft measures, and some firms measure both spending and performance more completely than others. All firms aim to track IT spending transparently and concretely, but many now calculate year-by-year changes in IT cost structure to show where IT savings came from (e.g., consolidation and vendor management) and where increases went (revenue growth, global expansion). Many firms measure infrastructure in terms of basic service levels, but increasingly firms are tracking unit costs, and some like Intel also benchmark service quality. According to Celanese CIO Karl Wachs, *"My favorite slide is the downward trend in spending and the upward trend in service level."*

Measuring application development and BPR performance is more difficult than infrastructure performance. Many firms track project budget and schedule performance, but some such as Intel track and publish business value achieved. Novartis, a highly performance-measurement-driven company, jointly sets goals with relevant executives for all IT units and people, and then negotiates performance evaluations against those goals with the same executives.

Essential to measurement is to keep the number of measures—and the number of items being measured—to a reasonable number. According to BT's Ramji, *"When I got there, I found 4300 projects going on, and your average person was doing 5.3 projects each."* BT reduced and consolidated projects to a set of 29 larger programs, for which they discuss ROI and performance with executives. *"When it's 4300, you can't have that conversation with the CEO because you can't see it."*

The Schedule Test

One practical check for a senior IT executive is to review your daily schedule for the last six months. How much of your time was focused on the four key tasks? What changes can you make via delegation, organizational changes and outsourcing to focus more energy on the key tasks?

Figure 1: What CxOs Say About IT Management Performance

IT Tasks	Effectiveness	Business Tasks	Effectiveness
Operations	8.0	Funding	7.0
Financial Management	6.7	Prioritizing	7.0
Infra./Arch. Planning	6.5	Relationship Management	6.9
Application Development	*6.3*	Strategic Direction	6.7
IT Organization Management	6.2	Implementation Support	6.4
IT Strategy	5.9	*Needs Identification*	*6.3*
People Management	5.8	Using IT Effectively	5.8
Prioritizing	5.8	*IT Oversight*	*5.5*
Relationship Management	5.5		
BPR/Organization Change	*5.5*		

NOTES:
• Table summarizes responses from a study of 153 senior non-IT executives.
• Scores are averages on a scale from 1 (Not Effective) to 10 (Highly Effective).
• Firms with higher Business Value from IT (BVIT) perform statistically significantly higher on the four tasks in white type. The other 14 tasks do not statistically distinguish high from low BVIT firms.

Figure 2: The Virtuous Cycle of Business Value from IT (BVIT)
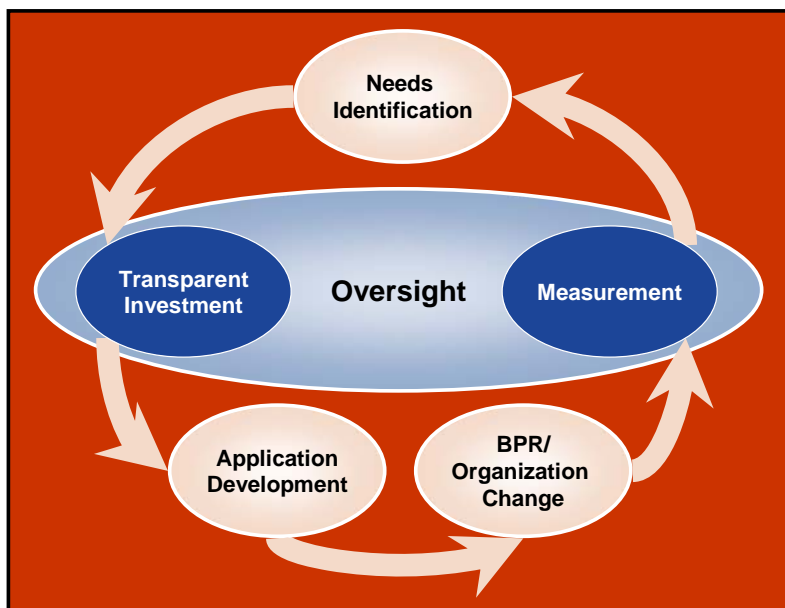
About the research:

We asked 153 senior non-IT execs to complete a survey rating their CIO and themselves on ten IT and eight non-IT tasks. We also asked them to rate their CIO's overall performance and how well their enterprise's IT delivers business value (BVIT). We then studied statistically how high performers differed from low-performers. For more on the study, see our July 2005 research briefing. Separately we interviewed 16 high performing CIOs to understand more about their IT management experiences and techniques. Respondents assessed BVIT by rating the effectiveness of their IT governance to deliver on four IT objectives weighted by importance: cost effective use of IT and effective use of IT for asset utilization, revenue growth & business flexibility. This BVIT 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.

IT ENABLED BUSINESS TRANSFORMATION: THE AETNA CASE

Cyrus (Chuck) Gibson, *Senior Lecturer*
MIT Sloan Center for Information Systems Research

From 2001 to 2006 Aetna, a leading health insurance company, experienced a dramatic business turnaround. Net earnings went from a loss of nearly $280 million to positive $1.63 billion. The stock price went from a low of $5.81 to $47.15. By 2006 annual growth rates of earnings and revenue were 26% and 15%, respectively. The turnaround was led by executives new to Aetna but experienced in the industry, including Dr. John Rowe, CEO and Chairman, Ronald A. Williams, Executive Vice President and head of operations, Wei-Tih Cheng, CIO, and others.

During the turnaround Aetna made significant investments and changes in IT, even in the face of operating losses and pressure to contain costs. Changes were made in each of the three "IT assets": technology, business and partner relationships, and human resources.[1] While some changes yielded near term business benefits, the company also invested in transformational changes in the nature and level of the assets, with benefits yet to come. Key to initiating and executing the changes in all three IT assets was senior management leadership.[2]

Building Technology: Executive Information, Infrastructure, and Strategic Innovation

One of the first and most visible IT initiatives by Ron Williams in his role as head of business operations was to champion an executive management information system (EMIS). The system was up and running in five months. The EMIS provided more consistent and comparable financial information on the profit-centered divisions, enabling more efficient

management discussions and decisions. The EMIS also enabled shortening the monthly closing of the books from over 20 to seven days. Expanded to include many other operational measures, the EMIS drove the cleanup of data and its management. Better information then led to new business applications, such as improved pricing of Aetna's core product, employee health insurance coverage plans to customer organizations. One observer said better use of this data asset enabled Aetna to begin making "surgical decisions" on prices for bids of plans. For a while Aetna lost on some competitive bids for plans, and total membership dropped. Nevertheless, profitability grew as a result of a more selective mix of customers.

Another visible improvement was data center operations. Through systematic monitoring and persistently raising targets significant improvement in reliability and cost controls were achieved. By 2006 performance by most key metrics reached the six sigma quality level, despite increased volume and systems complexity. One indicator of business value was that by 2005, 80% of claims were processed within 4.4 days of receipt, compared to 8.4 days in 2001.

Ron Williams envisioned a new, flexible architecture and transformed infrastructure that would underlie new business processes, enabling Aetna to be more flexible, responsive, and competitive. Aetna undertook a major program to improve its systems architecture from legacy-based, hard-coded applications and point-to-point systems to modular, user table-driven applications.

Later in the turnaround period a totally unprecedented system was initiated, this time by Chairman Jack Rowe. He charged CIO Wei-Tih Cheng to come up with a system that, as he put it, "would get strategic value from IT, to differentiate us in the marketplace, to create a preferred view of us by the consumer…" Developed secretly, the result was an online medical self-diagnostic tool for individuals, known as the "Aetna Navigator." In a comparison in 2006 with two similar offerings, *BusinessWeek* magazine judged Navigator "the richest of the three by far…"[3]

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[1] For description of the IT assets, see Ross, J.W., Beath, C.M., & Goodhue, D.L., "Develop Long-Term Competitiveness through IT Assets," *Sloan Management Review*, Fall 1996, Vol. 38, No. 1, pp. 31–42.

[2] For the full case study see Gibson, C.F., "Turnaround at Aetna: the IT Factor," MIT Sloan CISR Working Paper No. 362, July 2006.

[3] Weintraub, A., "How Good Is Your Online Nurse?" *BusinessWeek*, Feb 20, 2006.

Building Relationships: IT Governance with Business Accountability

In parallel with attention to its technical asset Aetna introduced new IT governance. Particular emphasis was placed on increasing business responsibility in delivering IT projects. Two years into the turnaround, by 2004, IT budgets for capital and operations expenses were included in the three-year business strategic plan and within the annual plan of each business profit center. In quarterly business reviews managers reported on the progress of their IT projects and implementations. Achieving project benefits was included in managers' balanced scorecards. Each line of business had an IT "portfolio manager" reporting to the head of the business. Portfolio managers helped identify new systems opportunities and interfaced with ongoing projects in IT. From 2002 all systems development project teams included one or more business representatives. The project governance process which evolved followed a highly structured series of four levels of issues-driven project review meetings. Unresolved issues at one level escalated to the next, and ultimately to the IT Steering Committee consisting of Ron Williams, the CIO,[4] and other senior business executives.

IT governance principles and mechanisms continued to evolve during the turnaround. For example, business leaders found they required not only more enhancements and applications supporting existing business processes, but also more new and rapidly deployable IT-enabled business innovations. To accomplish this investment, decisions increasingly included buying solutions as well as building from within. An example was the purchase of the firm ActiveHealth Management in 2005. The acquired company's system enabled a more robust clinical care evaluation and provided analytics for benchmarking the performance of medical providers and plan members.

A new "co-sourcing" agreement with IBM began in 2003. This agreement was one of the largest single initiatives in the transformation and was aimed at both near and long term benefit. Focused on upgrading internal systems development, the contract introduced uniform methodologies and metrics and provided on-the-job training and delivery by several hundred of IBM's staff working on site with Aetna developers. The contract represented a new form and scale of vendor relationship for Aetna. More significant was its impact on IT human resources capability.

Building Human Resources: IT Skills and Culture Change

Executives at Aetna were explicit about building IT skills and changing the broader Aetna culture to embrace IT. The agreement with IBM directly addressed raising IT people's skills for systems development and project management. Assessed at CMMI level 1 for systems development, Aetna committed to achieving CMMI level 3.[5] In late 2006 the achievement of that target seemed assured.

In addition to training within IT, executives were committed to shifting Aetna toward a more IT savvy culture. One of the key decisions in increasing Aetna's IT savvyness was the choice of a CIO. Chairman Jack Rowe reflected on this decision:

> *"Aetna when I came was not a meritocracy. People had lost their pride. I told them I wanted to help them restore their pride, to be part of making Aetna great again. In IT there was the lack of a service culture. To turn that around was the most important criterion I used in looking for a CIO."*

Ron Williams' personal championing of the EMIS was motivated by more than an interest in improving decision making. Williams saw EMIS as a means to demonstrate better collaborative behavior with IT, and as a tool for a better management process. As he put it,

> *"The creation and ultimate success of EMIS was a defining event in the organization. It showed people a new collaborative approach to working together with IT. It was particlarly important to a company that had a history of a different approach. The new style was, 'Let's work together to understand barriers to getting things done, and help invent solutions.'"*

> *"EMIS epitomized standardization of key data and information. When we have a pre-agreed set of numbers presented in a uniform way you can train the company how to think about problems. It gives you the context for making choices."*

To complete the transformation, Williams believed all executives should be IT savvy:

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[4] In 2005 Meg McCarthy, hired in 2003 to head the solution delivery function, became CIO upon Wei-Tih Cheng's retirement.

[5] "CMMI" is "Capability Maturity Model Integration," a set of standards for several levels (1 to 5) of processes for producing software and other IT-related activities. Achievement of levels is accomplished by a firm being judged by independent assessors.

"I say to our managers, 'If you want to be a senior executive around here you need to understand IT to have much of a future. We will help you, we will train you on the job, we will put you in assignments where you get exposed. But if you don't understand how technology impacts your business, how to be a good partner with the technology side, you may be a strong, high-performing functional specialist but you won't be a general executive.'"

What Is Required for Successful Transformation?

Over the five years of financial turnaround, Aetna demonstrated that a business in crisis can nevertheless invest in IT for both near and long term business value from IT assets. Aetna's comprehensive approach to transformation required making significant changes in all three IT asset categories (see Figure 1).
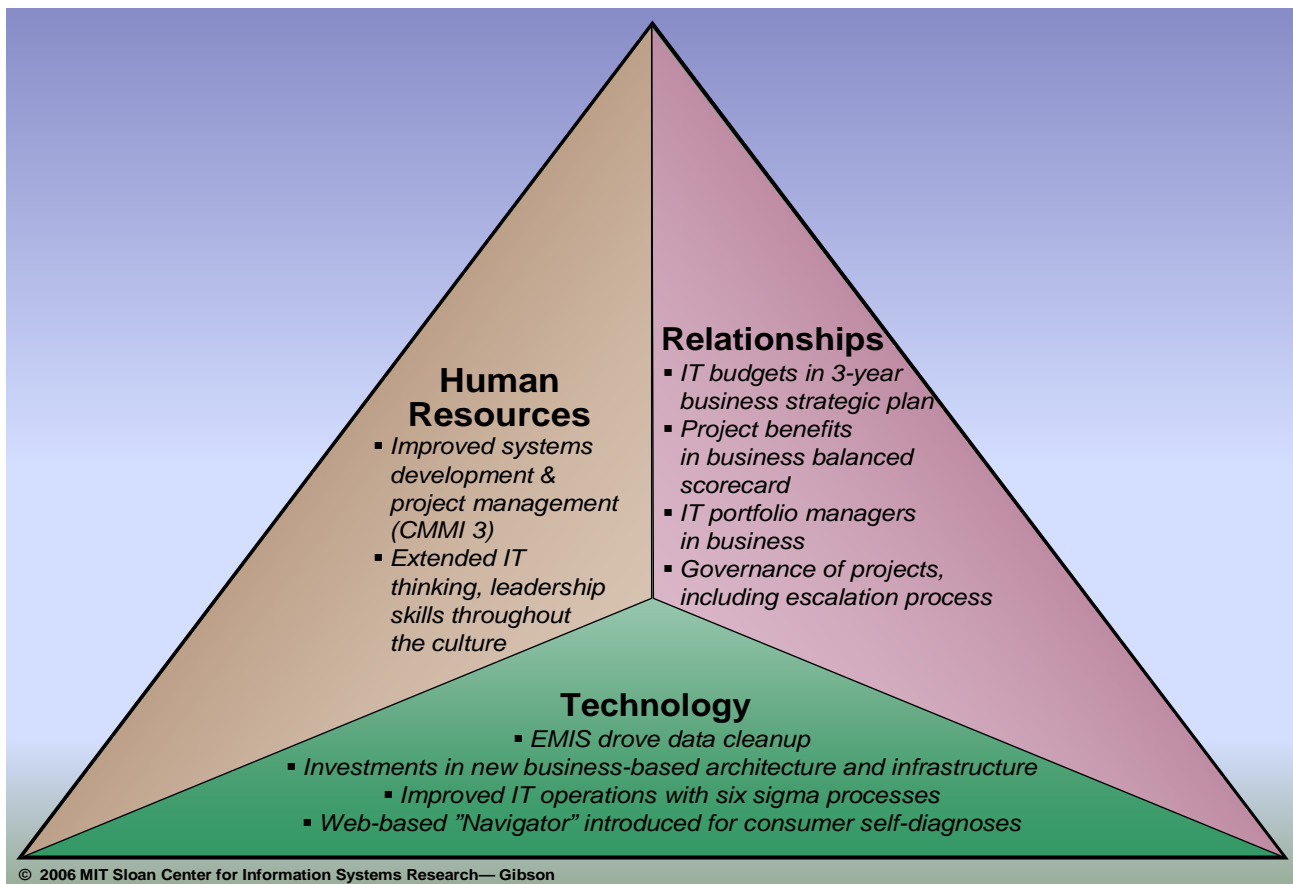
The case also illustrates the importance of a fourth ingredient for IT enabled transformation: the vision and execution of change by top management. The new leaders at Aetna envisioned a future business with IT playing a central role in competitive success.

They changed the name of the game and the rules for executives by making them responsible for IT. They invested beyond near-term payback and placed bets on a new architecture and a new IT development human capability. They got personally involved not just in advocating the vision, but in demonstrating the value of technology through the EMIS and the Aetna Navigator consumer tool. They talked the talk and walked the walk with a persistence that made the message of the new and long-term importance of IT in the business loud and clear to all.

CIO Meg McCarthy summed it up as follows:

"In my experience of consulting to and working in large organizations I have not seen anywhere the level of business commitment to IT. Aetna is committed to improving people skills, work processes, and architecture. There is a senior management commitment to improve the overall operating capability that requires stamina and leadership from our senior team."

Figure 1: Transformational Change Management at Aetna, 2001–2006

Human Resources
- *Improved systems development & project management (CMMI 3)*
- *Extended IT thinking, leadership skills throughout the culture*

Relationships
- *IT budgets in 3-year business strategic plan*
- *Project benefits in business balanced scorecard*
- *IT portfolio managers in business*
- *Governance of projects, including escalation process*

Technology
- *EMIS drove data cleanup*
- *Investments in new business-based architecture and infrastructure*
- *Improved IT operations with six sigma processes*
- *Web-based "Navigator" introduced for consumer self-diagnoses*

IT CAPABILITIES:
ONE SIZE DOES NOT FIT ALL

Ritu Agarwal, *Professor of Information Systems Smith School of Business, University of Maryland & Visiting Scholar, MIT Sloan CISR*

Firms with superior and targeted IT capabilities more readily extract value from investments in IT than their competitors. Developing IT capabilities, however, is expensive. Thus, firms need to target capabilities that will readily convert their IT investments into business value. Our study of 64 firms[1] in different industry sectors pursuing different strategies shows that a firm's IT capability requirements vary according to its strategy. Firms that align their IT capabilities with their business strategy also have greater market share. This briefing describes the IT capabilities best suited for five different strategy types. We suggest using these results to determine the optimal portfolio of IT capabilities for your firm.

Balancing Demands for Innovation and Stability

Prior research has shown that firms can be divided into five groups based on their strategy for addressing the competing pressures for innovation and stability.[2]

- **Prospectors** focus strongly on innovation by constantly searching for market opportunities and experimenting with potential responses to emerging trends. Embracing risk and emphasizing growth, prospectors forgo short-term efficiencies in their quest for innovation.

- **Analyzers with Innovation** tend to be creative and entrepreneurial, but they take fewer risks

than Prospectors. They simultaneously operate in a turbulent domain rapidly adopting promising innovations, and in a stable domain, working toward operational efficiencies.

- **Differentiated Defenders** compete in stable markets offering higher quality products, services, or brand image at premium prices. They balance innovation (targeted at finding new ways to differentiate existing products and services) and stability (by focusing on the needs of niche markets).

- **Analyzers without Innovation** are late adopters, moving into new products or markets only after their viability has been demonstrated by other firms. They focus on process rather than product innovation, regularly adopting the best practices demonstrated by other firms.

- **Low-Cost Defenders** typically compete in stable markets and focus on internal efficiency and control to produce reliable products at low cost. They aspire to maintain a stable position in the markets they serve, and are less concerned with identifying opportunities for new products or markets.

Aligning IT Capabilities with Strategy

We define IT capability as *the ability to execute stable and repeatable patterns of IT management activities.* We have identified eight different IT capabilities, as shown in Figure 1. Each capability reflects a distinct way that IT supports business activities and processes. For example, a renewal capability enables knowledge to flow both within and into the firm. A vendor capability supports electronic linkages, contract negotiation, and information sharing with vendors. A firm's strategic positioning (as described above) dictates a portfolio of IT capabilities. Figure 2 summarizes the most valuable IT capabilities for each strategic positioning. We illustrate the strategy-capability alignment with examples.

Prospectors benefit most from four critical IT capabilities: entrepreneurial, customer, competitor, and visioning. Prospectors rely on a top management

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[1] We studied 64 US based Fortune 2000 firms using a survey of senior business executives. We matched this data with objective measures of market share. Results reported are based on patterns of IT capabilities that, when aligned with business strategy, are statistically significant predictors of market share (after controlling for firm size, industry sector, and diversification).

[2] See V. Ramachandran, R. Agarwal, and A. Mishra, "Business Strategy and IT-Enabled Business Capabilities: Fits, Misfits, and Firm Performance," Working Paper, University of Maryland, Smith School of Business, 2006.

team with the capability to envision a strategic role for IT. Amazon, in its early days, acted as a prospector. Senior management embraced a vision for an internet-based company. Amazon relied on an entrepreneurial capability to introduce a constant flow of innovations, which it then honed by exploiting its customer capability that enabled it to really understand customers' needs. IT-captured customer feedback gave shape to management's vision and helped define the company's ever expanding market. As competitors emerged, management developed a competitor capability. Amazon monitors competitor initiatives and prices, enabling quick response to market innovations—in those rare circumstances when it doesn't lead the innovation.

Like Prospectors, **Analyzers with Innovation** benefit from entrepreneurial, competitor, and visioning capabilities. But Analyzers with Innovation emphasize a renewal capability rather than the customer capability that Prospectors rely on. This renewal capability supports internal knowledge sharing, thus allowing these firms to introduce efficiencies even as they innovate. For example, UPS is driven by management's focus on its goal of offering "total solutions to customers' global commerce needs."[3] While UPS regularly introduces innovations to better service customers, management relies less on developing a customer capability than on a renewal capability that allows the company to nurture and exploit strong internal IT-enabled process capabilities. UPS developed its competitor capability in the 1980s to fend off the challenge Federal Express posed when it entered UPS' space with superior technology. UPS has three times the industry average margins in its highly competitive market by exploiting an entrepreneurial capability. Innovations include both strategic experiments to identify new market opportunities and continuous improvements to introduce efficiencies to its package delivery business.

For a **Differentiated Defender**, a relational capability that enhances IT-business communication is critical. These firms seek to continually enhance their existing products and services and rely on market-facing executives to bring in the needed knowledge. The differentiation in products and services is often information and technology based and close communication between business and IT for knowledge transfer is critical. A high-tech company we studied in the information aggregation and

provision business positions itself as the "partner of first choice" in fulfilling its customers' specialized information needs. It differentiates itself in a business that is becoming increasingly commoditized by its customer-centric focus and responsiveness to customer needs through customization on an IT platform. The firm has instituted three levels of IT-business teams to ensure that the information flow from customers to IT is continuous and real-time. The strong connection between business and IT has been a critical contributor to the firm's ability to regularly and rapidly introduce product enhancements and to thrive in a commodity market.

Like Analyzers with Innovation, **Analyzers without Innovation** need a renewal capability. Because these firms take a more cautious approach to the market, they rely less on the entrepreneurial, competitor, and visioning capabilities that innovation demands. But renewal capabilities ensure a regular flow of external knowledge about "tried-and-tested" innovations that have been successfully used by others. A logistics company we studied is responsible for moving spare parts inventory to various warehouse locations for its customers. It was challenged with coordinating this complex and highly uncertain process, and developed a sophisticated web-based application that provides total visibility at the part level detail for each link in a customer's supply chain. The insight for this offering came, in part, from the benchmarking that the company did with a set of leading logistics firms. A separate business group is now tasked with the responsibility for regularly infusing external best practices. Since launching this offering, sales have increased by over 18% with more effective movement of repair parts for auto manufacturers from parts suppliers to distribution centers.

Low Cost Defender firms rely on a unique set of capabilities involving integration, customer, vendor, and relational capabilities. These firms emphasize routine, reliable, low-cost operations that are best served by IT that reduces costs of linking together vendors and suppliers, and integrating internal operations to eliminate inefficiencies. Cemex is a leader in the commodity cement industry. Cemex has built a strong integration capability by establishing nine teams, each with responsibility for defining business process standards for one functional area. These teams, each comprising business, process, and IT experts, enabled Cemex to rapidly integrate over 30 acquisitions in 10 years. For the most part, Cemex deployed a rip and replace strategy, but the teams were charged with recognizing and adopting key process innovations of acquired companies.

[3] See Ross, J.W., "United Parcel Service: Delivering Packages and E-Commerce Solutions," MIT Sloan CISR Working Paper No. 318, May 2001.

For example, Cemex has integrated a concept from an acquisition in Spain that allows a construction customer to pull up to a Cemex facility, punch a button, and fill up a truck with cement.[4] The company's nine functional teams have fostered close IT-business relationships. This relational capability has helped the company provide simple electronic service extensions. Cemex's customer and vendor capabilities provide end-to-end supply chain information, which the company converts into enhanced customer and vendor experiences.

Building Capabilities

For every firm, the first challenge is in committing to a strategy for balancing innovation and stability. Top performing firms' strategies typically followed one of the five approaches described above. Firms that followed combinations of the strategies generally had lower performance. A dilution of strategic focus leads to a dilution of capabilities and thus lower performance. However, because the strategy may change over time, the company will likely need to evolve its IT capabilities to maintain the fit. A second challenge is ensuring that executive attention remains focused on those IT capabilities that are most important for the firm's strategy, rather than on imitating the actions of competitors, who may be using a different approach to balancing innovation and stability. Staying the course of developing and then exploiting a small set of critical IT capabilities is difficult, but the payoff is substantial.

Figure 1. Key IT Capabilities[5]

Entrepreneurial	IT enables the identification and exploitation of entrepreneurial opportunities and aids in the rapid development of new products
Integration	IT enables modularization, integration, and reorganization of business processes to support operations
Renewal	IT enhances knowledge flows within the organization, knowledge flows from external sources, and enables information sharing
Customer	IT enables electronic linkages with customers, product/service customization, and the development of closer customer relationships
Vendor	IT supports electronic linkages with vendors including sharing information and monitoring performance
Competitor	IT enables the capture of information about competitors' strategies and actions, including new products and pricing strategies
Visioning	Top management has the ability to clearly envision and value the role of IT in the firm and understand its effects on business processes
Relational	Processes exist in the firm that enhance IT-business communication and help bridge the 'gap' between business and IT managers

Figure 2. Capability-Strategy Alignment

Capability / Firm Strategy	Entrepreneurial	Integration	Renewal	Customer	Vendor	Competitor	Visioning	Relational
Prospectors	○│○│○[6]			○│○│○		○│○│○	○│○│○	
Analyzers with Innovation	○│○│○		○│○│○			○│○│○	○│○│○	
Differentiated Defenders								○│○│○
Analyzers without Innovation			○│○│○					
Low-Cost Defenders		○│○│○		○│○│○	○│○│○			○│○│○

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[4] M. Austin, "Global Integration the Cemex Way," *Corporate Dealmaker,* March 1, 2004, pp. 26–29.

[5] The capabilities are categorized into three groups based on the type of business activity they support and enable. For more details see Ramachandran et al., 2006, op cit.

[6] Firms with high capabilities in these areas had statistically significantly higher market share when following this firm strategy.

DESIGN PRIORITIES FOR THE IT UNIT OF THE FUTURE

Jeanne W. Ross, *Principal Research Scientist, MIT Sloan Center for Information Systems Research*

Firms regularly face competing demands for their IT resources. Prior MIT CISR research has discussed two of these competing demands: (1) the need to deliver both business efficiencies and business innovation, and (2) the need to provide both technology and process expertise.[1] At MIT CISR Sponsors Board this past November participants discussed alternative models for the future IT unit and their implications for IT organization design. This briefing incorporates the data collected and analyzed at Sponsors Board into our prior research on this topic.[2]

Four Models of the IT Unit of the Future

As CIOs balance the tradeoffs between competing demands, they should migrate toward one of four alternative models for IT: Technology Service, Process Improvement, Technology Innovation, or Process Integration (see Figure 1). Many CIOs sense they must simultaneously operate in all four quadrants of the figure. But the need to focus on critical business objectives argues for clarification of priorities. Recognizing the different organizational demands of efficiency versus innovation and technology expertise versus process expertise can help a CIO articulate and respond to business priorities. The following descriptions highlight differences in the four emerging models for the IT organization.

Technology Service Model
In the Technology Service model, IT's job is that of a technology expert delivering business efficiencies. In this model, IT resources are shared across the

organization. In many cases, IT acts like a business selling services to business units. To make this model work, strong relationship managers or business unit CIOs help define IT services and convert those services into business value. IT product managers take responsibility for the cost and quality of delivering individual services, which can include infrastructure, applications, and data services. When vendors can offer better quality, service, or price, IT outsources, usually on a product-by-product basis. World-class operations are a high priority of IT units adopting the Technology Service model. The desire to provide more services valuable to business leads some to offer consulting services on IT-enabled business processes.

The Technology Service model is well-suited to information-intensive firms where competitiveness depends on efficiency. CARE USA, a not-for-profit, humanitarian organization has adopted this model. Three organizational units report to CIO Richard Prather: (1) Business Solutions delivers strategic planning and architecture as well as solutions; (2) Technology and Operations handles infrastructure and applications operations and customer service; and (3) Global Operations Improvement includes a process improvement consulting group and financial management assistance. By applying a Technology Service model, IT at CARE USA cuts administrative costs and supports the organization's efforts to fight global poverty.

The Technology Services model is also well-suited to the shared services units of larger, more diverse firms. The shared services unit can focus on low-cost, world class IT operations, while allowing other IT organizations to adopt one of the other three models.

Technology Innovation Model
The Technology Innovation model is valuable for firms depending on IT to develop IT-based products and services for the marketplace. In this model, IT solutions emphasize products over process. IT units in these firms are designed to support new product development by organizing around technology or product categories. In addition, IT R&D is a

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[1] Ross, J. and Sverdlova, I., "Envisioning the IT Organization of the Future," MIT CISR Research Briefing, Vol. VI, No. 2B, July 2006.

[2] This briefing is drawn from 22 interviews of IT and business leaders, analysis of 20 IT organization charts, 35 surveys of IT unit design preferences, and small group discussions at MIT Sloan CISR's May 2006 research workshop and November 2006 Sponsors Board.

high profile responsibility, supporting the need to innovate with technology. IT architecture is important for defining the product platform and ensuring interfaces with new products. To enable focus on technology products, core operations may be outsourced to either a shared services unit or a vendor applying a Technology Service model.

The Annuities and Mutual Funds business of a financial services company provides an example of the Technology Innovation model. The IT unit is organized around sales technology and analytics, e-commerce, web solutions, and administrative systems. An enterprise shared services organization provides core networking and related services. The business, however, retains responsibility for client-server applications, because providing systems integration and help desk support is important for building a flexible, integrated product platform.

The Technology Innovation model has enabled this financial services firm to seize opportunities for new products and to exceed customer expectations. The company has chosen to forego some potential economies of scale across its divisions in order to maximize the flexibility of its Annuities and Mutual funds business.

Process Improvement Model

Firms emphasizing global business efficiencies—particularly in commodity manufacturing and service industries—can benefit from the Process Improvement model. These firms emphasize the need for IT to provide process, rather than technical expertise, often with the goal of introducing IT-enabled enterprise-wide business processes. Firms in this quadrant often outsource their operations to an internal or external strategic partner who can provide world class service at a reasonable cost. This arrangement permits IT to focus on the process needs of the business without compromising the quality of IT operations.

The IT unit in Process Improvement firms often makes use of matrixed reporting relationships. The matrices help IT meet the sometimes conflicting demands of geographies, business units, and functions, as well as the enterprise as a whole.

Architectural initiatives establish enterprise-wide technology, process, and data standards and establish criteria for exceptions to those standards. Most firms establish a separate unit within IT to handle the process and technology needs of major enterprise initiatives. For example, some firms have an SAP competency center, where IT and process experts

design, implement, and support both the technology and the operations of SAP-enabled processes. Other firms introduce an enterprise project management office to enforce enterprise standards even in local implementations.

Dow Chemical provides an example of the Process Improvement model. The CIO heads a shared services organization with responsibility for information systems and four enterprise-wide processes: global purchasing, global supply chain, customer service, and six sigma. These four organizations are staffed with both IT and business process experts. The information systems unit is organized around four functions: (1) Operations and Services, which are largely outsourced to IBM, (2) the Dow and Accenture Alliance, which provides application development and support, (3) strategy and architecture, which provides IT planning and oversight, and (4) business unit IT organizations, which are aligned with major businesses. To ensure effective linkages between the business unit IT organizations and IT shared services, IT leaders typically have responsibility for both a shared service and one or more business units.[3] Allowing IT operations people to focus on delivering low-cost IT, while the rest of IT focuses on low-cost business processes, aligns IT with Dow's objective of global efficiency and continuous improvement.

Process Integration Model

The Process Integration model enables business process innovation through loosely coupled integration of business functions. Firms in this model are often experiencing transformational changes in their businesses so they choose not to create the type of end-to-end business processes typical of the Process Improvement model. Instead, they allow for continued change and growth by establishing standardized interfaces between key capabilities. Data management is often high profile in these firms, because shared information can be a critical link between related processes. Data management may be part of an analytics unit to enhance the availability and value of data as a valued business asset.

Process Integration also requires functional expertise in IT architecture, quality, and risk management to support the need to link process and function components. These firms are likely to rely on emerging

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[3] For more information on Dow's IT organization, see Ross, J. and Beath. C., "The Federated Broker Model at the Dow Chemical Company: Blending World Class Internal and External Capabilities," MIT Sloan CISR Working Paper No. 355, July 2005.

technologies to support business needs and system integration. Architecture initiatives include designing standardized interfaces, ensuring the architecture compliance of individual projects, and performing proof of concept with new technologies.

Biogen Idec, a global biotechnology company, has adopted a Process Integration model to facilitate the seamless flow of information across its research, development, manufacturing and sales functions. CIO Patrick Purcell has three solutions groups: (1) technical systems, which supports major laboratory, manufacturing, and clinical development business process; (2) business and integration systems, which supports commercial and financial business functions; and (3) research informatics, which reports jointly to the Discovery Research organization and provides IT support for analytical needs. Three other IT groups provide planning and oversight: an IT architecture team, an IT quality team, and a planning, resource and performance management team. CIO Purcell also has an IT operations unit providing shared services under a Technical Service model. With the operations unit taking responsibility for

low-cost, high quality shared services, the rest of IT at Biogen Idec can focus on meeting the fast-changing information demands of a biotechnology company.

Reconciling Competing Demands

CIOs in most organizations feel pressure to adopt all four IT models. But each model places different demands on organization design. As they map out the structure of their IT units, CIOs face tradeoffs in the cost of IT, the benefits it generates, and the ability to develop valuable, reusable expertise. We have seen firms isolate IT operations under a different model than other parts of IT. But integrating the pieces of IT (and, of course, integrating IT services with business processes and products) is one of the most difficult and important tasks of the IT unit. Attempting to be all things may lead IT to suboptimal IT organization design decisions. The conflicting pressures on IT argue for ongoing discussions about the role of IT in a firm.

Figure 1. Design Priorities of the IT Organization of the Future
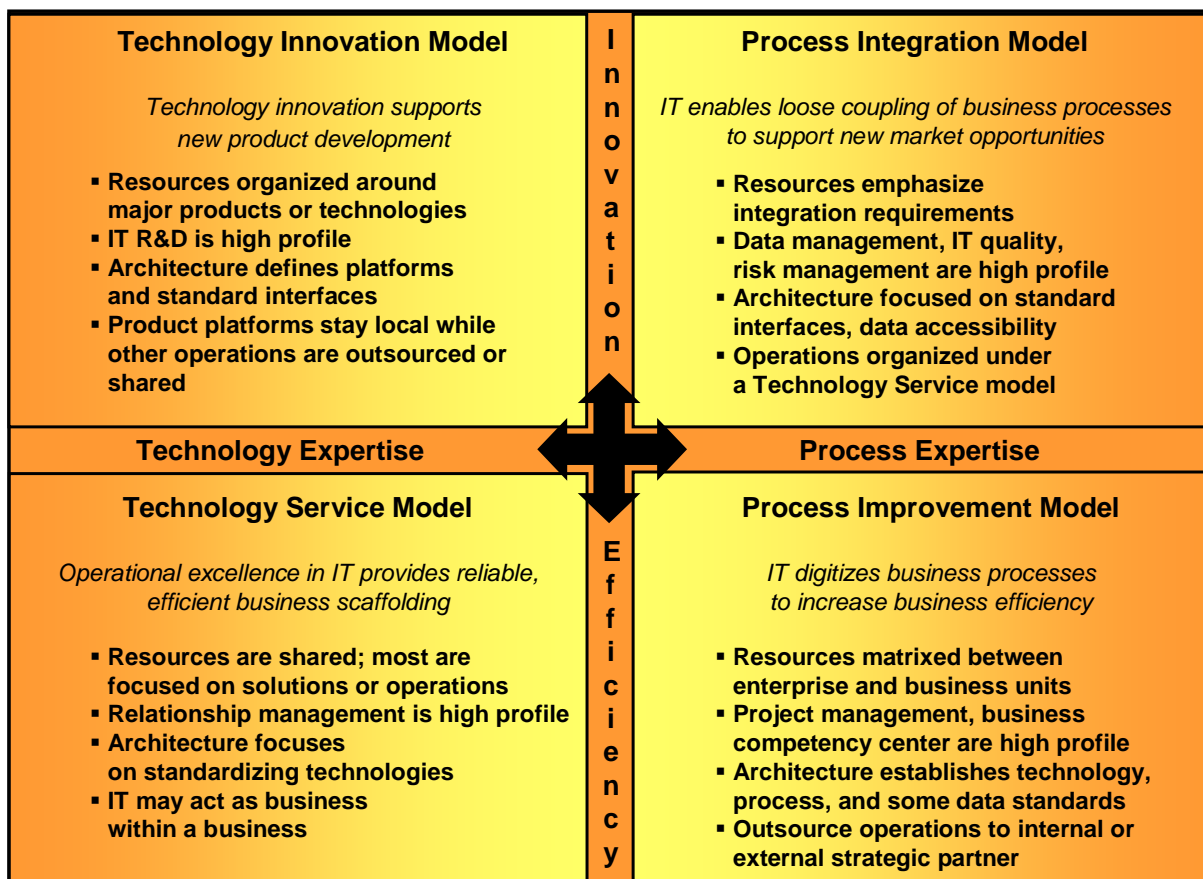
ENGAGEMENT MATTERS: ENHANCING ALIGNMENT WITH GOVERNANCE MECHANISMS

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Prior MIT CISR research has found that achieving and sustaining business value from IT requires effective engagement between six internal stakeholder groups, consisting of IT and non-IT managers at the corporate, business unit and project levels. To structure this engagement, organizations typically rely on a system of governance mechanisms that we have described as the *IT engagement model* (see Figure 1). Effective engagement consists of both *alignment* between IT and non-IT stakeholders and *coordination* across organizational levels and groups.[1]

This briefing focuses on how organizations achieve greater alignment.[2] It draws on a survey of 32 organizations and their use of governance mechanisms (roles, processes and decision-making bodies) to enhance mutual understanding between IT and non-IT stakeholder groups and the influence of each group on the other's decisions. We found that firms with stronger levels of alignment distinguished themselves from weaker firms by engaging IT and non-IT stakeholders in three areas:

1) Establishing and maintaining a daily level of conversation between IT and non-IT peers;

2) Ensuring that different projects link to corporate goals and share resources; and

3) Assessing and learning from project performance.

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[1] In previous MIT Sloan CISR research briefings, we have discussed the IT engagement model (Fonstad, N. and Robertson, D., "Linking Mechanisms at TD Banknorth," Vol. VI, No. 1D, March 2006) and examples of engagement mechanisms (Fonstad, N. and Robertson, D., "Engaging for Change: An Overview of the IT Engagement Model," Vol. V, No. 1C, March 2005).

[2] A future briefing will examine linking mechanisms used by organizations with stronger coordination.

Firms with strong alignment had a key mechanism for structuring engagement in each one of these three areas. These were, respectively: 1) business-IT relationship managers; 2) program management offices; and 3) post-implementations reviews. The more extensively organizations applied these mechanisms throughout their organization— from the corporate level to the business unit level to the project team level—the stronger they were on alignment.

Business-IT Relationship Managers

A business-IT relationship manager is a formal role in which an individual engages with IT and a specified part of the business. Eighty four percent of the firms we surveyed use relationship managers. Two distinctions between how firms use relationship managers are 1) whether or not they are accountable to IT *and* non-IT stakeholder groups or simply to IT; and 2) the number of organizational levels at which they are accountable to both IT and non-IT stakeholder groups (from none up to three, see Figure 1).

Forty percent of the firms had relationship managers accountable only to the IT group. In these cases, relationship managers serve as ambassadors for the IT group, regularly interacting with non-IT stakeholders, soliciting their needs and complaints, promoting the IT group's services, and building common understanding and awareness of each group's interests and capabilities. The dominant role of these relationship managers is communicating between IT and non-IT stakeholders.

In other firms, relationship managers are accountable to both IT *and* non-IT stakeholder groups. In addition to serving a communication role, these relationship managers play a strategic partnership role, participating in and influencing key *non-IT* decisions. TD Banknorth, for example, has five business-IT relationship managers, one per business line, who are involved in business decisions. The CIO increased the strategic role of the relationship managers within their respective business lines by giving them a formal role at key points in the project management process. Relationship managers work to ensure that significant projects meet both IT and non-IT objectives, as well as business line and

company-wide objectives. Both the relationship manager and the business line manager are responsible for signing-off projects at each stage in the project management process. Relationship managers are also key members of the Core Team (a six-member project team of IT stakeholders that manages major projects from concept approval through implementation). Within the Core Team they are responsible for ensuring the business line's needs are understood and met.

The effectiveness of TD Banknorth's relationship managers results from their joint accountability to IT and non-IT executives. In addition, TD Banknorth's relationship managers operate at *two* organizational levels: the business unit and project team level (see Figure 2). Our survey showed that alignment mechanisms have significantly more impact when they involve pairs of IT and non-IT stakeholders at a greater number of organizational levels (see Figure 3).

At TD Banknorth, an important measure of success for relationship managers is the number of times they are invited to business line strategy meetings. Linking relationship managers to project management has enabled many of them to earn a seat at strategy meetings.

Program Management Office

Another fruitful mechanism for fostering alignment was the program management office (PMO). PMOs typically consist of a central group that coordinates resources across projects, ensuring they collectively contribute to corporate level objectives. PMOs were used in 78% of surveyed firms. Similar to relationship managers, the more pairs of IT and non-IT stakeholder groups engaged in the PMO, the stronger the business-IT alignment (see Figure 3).

At USAA, a diversified financial services firm, a key linking mechanism of their IT engagement model is the Enterprise Business Operations (EBO) unit. The EBO defines and implements enterprise projects (both IT and non-IT) reflecting organization-wide objectives specified by the Executive Committee. Participants include IT and non-IT staff representing all three levels of the organization: the EVP for EBO and the VP of IT for Enterprise Applications, business unit sponsors (IT and business), and project team members. There are about a dozen program managers, each responsible for coordinating multiple projects related to a single business process (e.g., customer relationship management).[3] Each enter-

prise project uses business unit, as well as EBO, staff and engages staff at multiple organizational levels. As a result USAA enterprise projects regularly achieve their targeted business objectives.

Post Implementation Review

PIRs typically consist of a group that assesses a project's key targets and deliverables at the conclusion of a project or project cycle. Most of the firms we surveyed (91%) used PIRs. However a third of those had only a single stakeholder group involved in the process. These firms had lower levels of alignment than firms who involved pairs of IT and non-IT stakeholder groups. And as with relationship managers and PMOs, firms that had more pairs from different organizational levels reviewing projects had even greater alignment (see Figure 3).

At BT, PIRs are managed by a central group and tightly integrated into an agile delivery process that all programs must go through, every 90 days. Almost half of the total time spent by program teams on PIRs occurs at the start of the 90-day cycle, at a "PIR handshake session" that follows an intense three-day rapid prototyping event. During the PIR handshake, participants define and agree on PIR targets and measures for the 90-day cycle and write them into a "90-day targets document." Targets cover five areas: internal investment and benefits; end-to-end customer experience; business partner satisfaction; transformation; and lessons learned. Participants include at least one business partner, the program director, a representative from the market-side CIO, a PIR team member, and a representative from finance. The PIR reviews a program's achievements over the past 90 days against the "90-day targets document" and identifies lessons learned and additional metrics to be acted upon in the following cycle. Finally, the central PIR team examines PIRs from across programs and develops best practices for conducting future PIRs.

Implementing Alignment Mechanisms

We examined a range of governance mechanisms that organizations draw on to bring together IT and non-IT stakeholders and to foster alignment.[4] For mechanisms not included here, simply involving

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[3] See Ross, J., "Project Governance at USAA," MIT Sloan CISR Research Briefing, Vol. IV, No. 1D, March 2004.

[4] Mechanisms that we studied included: prioritization process; program management office; business cases for projects; early-stage prototyping; project gates tied to organization-wide objectives; early influence of enterprise architecture; enterprise architecture conformance process; business-IT relationship management role; incentives tied to organization-wide objectives.

more stakeholder groups in decisions related to each mechanism did not ensure greater alignment. Organizations need to pick carefully when and how they want to engage IT with non-IT stakeholders. Our survey data suggests two important forms of engagement and mechanisms for structuring both: everyday engagement enabled by business-IT relationship managers and engagement around projects, enabled by both program management offices and post implementation reviews.

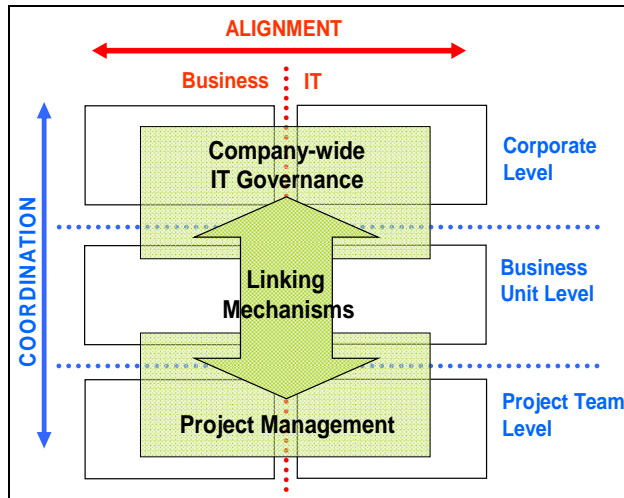**Figure 1: Structuring Engagement —
The IT Engagement Model**

**Figure 2: Using Governance Mechanisms to Engage
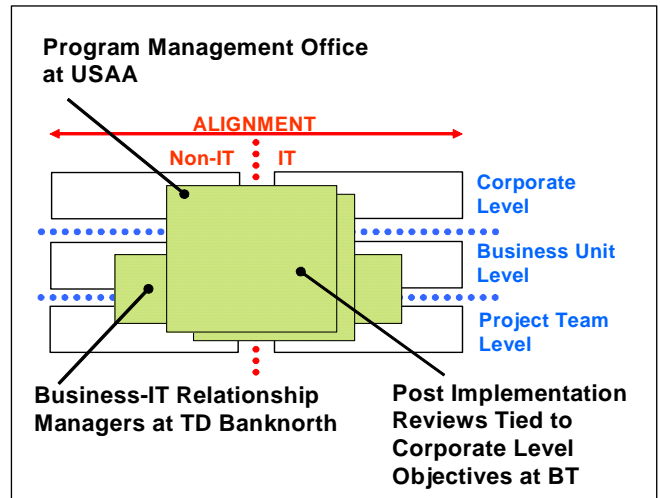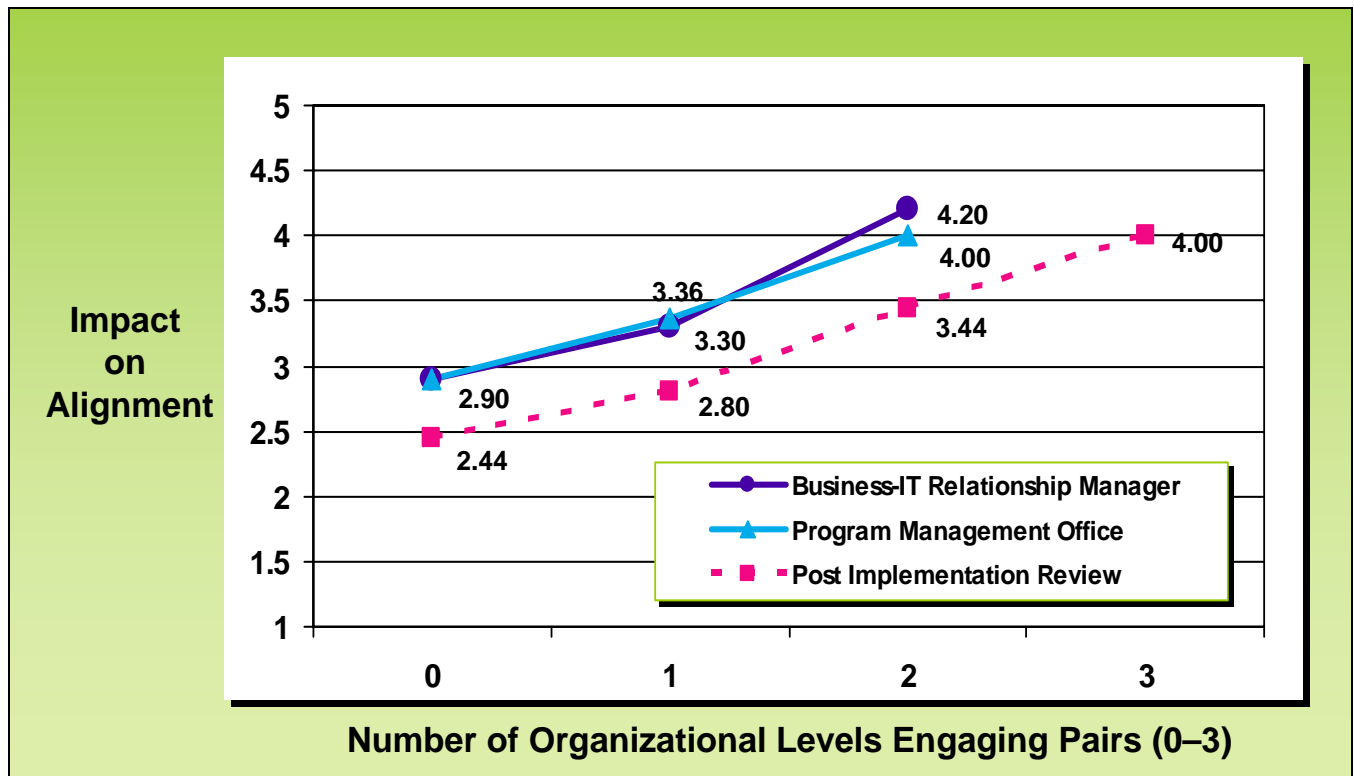Pairs of IT and Non-IT Stakeholder Groups**

Figure 3: Three Opportunities for Engaging IT and Non-IT Stakeholders and Enhancing Alignment

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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 the MIT Center for Digital Business and Center for Collective Intelligence to facilitate collaboration between faculty and researchers.

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