CHAPTER 1

IT Investment

Sticker Shock

Walking through the virtual IT "car lot," it is not hard to see why a CXO would challenge the Chief Information Officer (CIO) with respect to IT costs. Too often an IT Ferrari would be proposed when an IT Volvo could meet the required needs. The daunting task of justifying technology direction and spending variances, let alone the need for investment in the first place, is a challenge unto itself.

IT investments are becoming more than just business enablers or assets on the books; they are indeed a capability that can drive the business. IT thought leadership should transition from a traditional technology investment model to an information investment approach, getting a bigger bang for the buck from the "I" in IT and from the "I" in CIO. In today's world, the business impact of effective IT investments is potentially exponential and needs to be governed accordingly, not just as cost savings enablers.

IT costs typically constitute 2 percent of a company's revenue, but they can be as large as 12 percent, perhaps the single most manageable cost after labor. According to Gartner, this culminates in a global 2008 IT investment of some $2.6 to $3.0 trillion, with half spent on telecommunications and the rest on IT hardware, software, and services.[1] Such annual spending is comparable to the gross national product (GNP) of the United Kingdom or France, or nearly thrice that of India. In other words, globally we spend on IT nearly three times what India's 1,135 million people (20 percent of the world's population) spend on consumption, gross investment, government expenditure, and exports less imports. But the value of information is invariably unknown.

> Globally, IT spending is nearly three times the gross national product of India, where, unlike the case of India, the value is undetermined.

This chapter focuses on IT investment growth and trends. Six decades of IT investment are considered, from early computing to the World Wide Web. IT investments are classified according to a four "S" category model, which will be useful for IT evaluation further on in the book. Finally, future IT investment considerations are explored, which sets the context for IT value network measurement and management.

Six Decades of IT Investment

IT investment has consistently grown from the modern computing era in the early 1940s to the present information age. Spending on IT has expanded from fundamental computing and telecommunications infrastructure to enterprise application systems and to information and service management. Within just 60 years, IT investment went from a select few to the masses, from large organizational spending to individual spending.

Sixty Years of Growth

The modern computing era started more than 60 years ago with the advent of early digital technology. There is no one inventor who can lay claim to the first modern computer, as many contributed to today's foundation of basic computing. In 1941, the German technologist Konrad Zuse developed the Z3, which become the first functional program-controlled, all-purpose, digital computer. Subsequently, the British Colossus was created in 1943; considered the first electronic computing device, it was used in decrypting German World War II messages. A series of computing advancements then occurred in America, with the advent of the ABC, Harvard Mark I, and ENIAC I computers. The latter, designed by John Presper Eckert and John W. Mauchly, became the first all-purpose electronic computer in 1945. The design was based on John Von Neumann's report on unified storage of data and programs.

> "It would appear that we have reached the limits of what it is possible to achieve with computer technology, although one should be careful with such statements, as they tend to sound pretty silly in 5 years."
>
> John Von Neumann (ca. 1949)[2]

Arguably the first modern computer, evolved from the collective, was Federic Williams's and Tom Kilburn's Baby computer, built in Manchester, England. In 1948, 60 years ago, the components or characteristics of the

basic computer were complete, memory had been added, and programs could be stored. With a random access memory of 32 words (128 bytes) and a computer speed of just over one millisecond per instruction, it may not have been fast, but it could perform many applications. It was a far cry from today's fastest supercomputer, IBM's BlueGene/L, which can process 360 trillion transactions per second[3] or a 1GB DRAM chip, which can store 8 billion bits.

> "Where a calculator on the ENIAC is equipped with 18,000 vacuum tubes and weighs 30 tons, computers in the future may have only 1,000 vacuum tubes and perhaps weigh 1.5 tons."
>
> *Popular Mechanics*, 1949[4]

The Baby or Manchester Mark I eventually became the first commercial general-purpose computer, named the Ferranti Mark I.[5] In 1951, the UNIVAC (Universal Automatic Computer), a derivative of the ENIAC 1, became the first mass-produced computer, providing a memory of 1,000 words for a sizable $1 million investment. IBM entered the arena in 1953 with the 701 Electronic Data Processing Machine (EDPM)—the first mainframe. Then IBM developed Fortran, the first high-level computer programming language. The first generation of computing started to gain momentum. IT investment started to grow, moving from university and government institutions to commerce. But at $10,000 per megabyte for an IBM magnetic disk system (currently, one-fiftieth of a cent per megabyte), it was an expensive proposition. Many thought computing was for the limited few.

> "I think there is a world wide market for maybe five computers."
>
> Thomas Watson, Chairman IBM, 1943[6]

The second generation, triggered by transistors, started a wider commercial interest in more affordable computing. The vacuum tube was dead. Between 1960 and 1964, the IBM 1401 captured one-third of the world market, selling over 100,000 computers. The third generation, driven by integrated circuits or the "chip," further transformed computing application. Jack Kilby and Robert Noyce independently created the microchip, in 1958. Into the mid- to late 1960s, IBM introduced the System/360 mainframe, and Data General started selling one of the first 16-bit minicomputers, the Nova, for $8,000.

"Moore's Law states that the number of transistors on a chip will double about every two years."

Intel co-founder Gordon Moore, 1965

Intel has kept that pace for nearly 40 years.

The fourth generation exploded onto the market with the advent of the microprocessor, invented in 1971 by Ted Hoff, Federico Faggin, and Stanley Mazor at Intel. From the late 1960s, competition grew, with mainframe and minicomputer offerings from IBM, Data General, Hewlett-Packard, Sperry Univac, Olivetti, Burroughs Machines, and ICL. In the background, the ARPAnet and the original Internet were born in 1969. These were quickly followed by Robert Metcalfe's and Xerox's Ethernet computer networking in 1973. Packet switching and internetworking, using standard communication protocols, provided computing power across boundaries.

"There is no reason why anyone would want a computer in their home."

Ken Olsen, president of Digital Equipment, 1977

The personal computer revolution followed, from the early Scelbi and Mark-8 Altair, in 1974–1975, to the Apple I and II, TRS-80, and Commodore Pet in 1976–1977, followed by the IBM PC in 1981. Add Microsoft's MS-DOS operating system and Windows, and from the early 1980s computing became a commodity for the masses. The more recent exponential computing and telecommunication utility is, of course, associated with the growth of the World Wide Web. The introduction of the Mosaic Web browser in 1993 by a University of Illinois team, led by Marc Andreessen, sparked the networking revolution. Today, voice and date have been successfully merged over the network. New all-in-one handset devices are enabling mobile commerce and social networking (e.g., Facebook). Commercial applications are going virtual, through software as a service (SaaS) and managed services. The next generation is around the corner.

"We've all heard that a million monkeys banging on a million typewriters will eventually reproduce the entire works of Shakespeare. Now, thanks to the Internet, we know this is not true."

Robert Wilensky[7]

IT investment grew exponentially from the late 1950s as technology significantly advanced from the first computing generation. Global IT

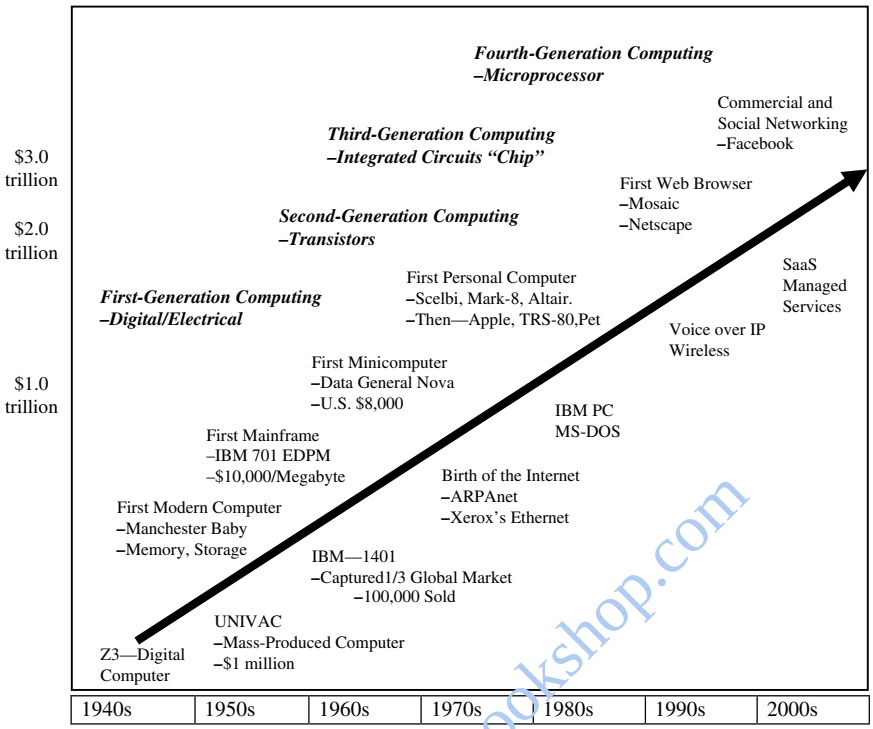

EXHIBIT 1.1 Six Decades of IT Investment

investment grew from tens of millions in 1950 to $2.6 to $3.0 trillion in 2008, as depicted in Exhibit 1.1 (nonlinear). Between the 1950s and the 1990s, annual global spending growth was averaging in the double digits. This changed with the Internet crash in 2001; subsequent growth in the 2000s has been modest, stabilizing around 2.5 to 5 percent, but with an increasing pace in developing countries. However, this still means that in absolute dollar terms, global IT investment grew from just under $2 trillion at the end of the 1990s to $2.6 to $3 trillion in 2008. According to Gartner, nearly one-third of all global IT spending is now outside North America, Western Europe, and Japan.[8] This continued growth will provide new capability and innovation within developing markets, and more competition to developed markets.

Global IT investment has grown from tens of millions in the 1950s to $2.6–$3 trillion in 2008.

Importance of IT Investment

IT spending consists of existing and new technology investments. Costs associated with technology hardware and software (e.g., support and services) should be included within IT investment management. Certainly from a capitalization perspective, labor costs that add value to the implementation of a technology asset can be booked and depreciated. Although ongoing operational support and services are not normally seen as an investment, our argument is that human (intellectual) capital is more important than the physical asset and should accordingly be treated as an IT investment. Therefore, in this book, all IT spending is considered as an investment in an organization, differentiating between existing and new.

IT investments increase both the tangible and the intangible asset value of a company. Traditionally, IT investment has been based on tangible costs and benefits. However, it is intangible assets that now create some 85 to 90 percent of shareholder value from IT investments, focusing on knowledge-based strategies, including business intelligence and database applications.[9] This claim is supported by empirical evidence that up to nine-tenths of the costs and benefits of computer capital are embedded in unseen intangible assets.[10] Intangible assets, generated by IT, can provide an explanation for excess returns, producing higher market valuation. But the tools for managing and measuring strategies have not kept up with the vision to create value.

Intuitively, we understand the importance of information, but investing in information is another matter. Where does a knowledge management system stack up against operational systems? The challenge is that data is underutilized with latent potential, often not transformed into information or knowledge creation. The past 60 years should therefore be called the data age and not the information age, as data remains unlocked in terms of realizable value.[11] Data can be aligned to business processes through informational maps and can then be optimized or rationalized through relational database integration, but who's the owner and sponsor of the investment? Better information behaviors will lead to improved business performance, creating visible intellectual capital and valued intangible assets.

IT investments are required both for short-term profitability, supporting the current business operations, and for long-term shareholder value, enabling new business opportunities.[12] The tendency is to focus IT investments on short-term profitability, with a focus on cost containment and tight investment controls on strategic initiatives.[13] Yet successful firms cannot afford to underinvest in valued future business opportunities or long-term growth. The challenge is to reduce IT costs from operational infrastructure and move spending to strategic investments for business growth. For instance, how can networking and computing infrastructure costs be reduced, reinvesting in customer relationship management (CRM) or

knowledge management systems? Competitive advantage grows out of company improvement, innovation, and change, where IT is a critical enabler. There is a need to invest in technology regularly, including associated human capital, building net worth through future capability of value, growth options, and competitiveness for shareholder value.[14]

> IT investments will become increasingly important in driving visible intellectual capital and valued intangible assets, enabling growth options that will build future enterprise net worth.

IT Investment Trends

During the next 5 to 10 years, the following IT investment trends will continue to gather momentum and become a priority for the enterprise.

Open and Service-Oriented Architecture

The value of open systems architecture is well understood, providing companies with cheaper and flexible nonproprietary protocols, languages, and operating systems. As governing standard bodies such as the World Wide Web Consortium (W3C) and the Organization for the Advancement of Structured Information Standard (OASIS) drive open access, more companies will be able to exploit standard electronic exchange for information and transactions. Strategic IT investments should include open infrastructure enhancements, alongside business-driven imperatives, considering middleware, standardized Windows, UNIX or Linux platforms, open networks, open database connectivity, Web services, and distributed computing. The importance of integrating open systems, as opposed to stringing together proprietary platforms, is key for business speed to market and agility.[15]

Service-oriented architecture (SOA) and Web 2.0 are still in their infancy, but they are growing in acceptance and commercial application. From the late 1980s to mid-1990s, SOA was focused on application programming interface (API), with J2EE type standards. Since the late 1990s, SOA has become more business focused, applying Web Service messaging (context rich) and registry (UDDI) for business applications. Exhibit 1.2 provides an architectural overview.

In designing an SOA architecture there is considerable debate as to whether to drive an enterprise-wide initiative, based on standard business processes and data schematics, or a bottom-up approach, focused on specific system integration challenges. Perhaps the compromise is to meet in

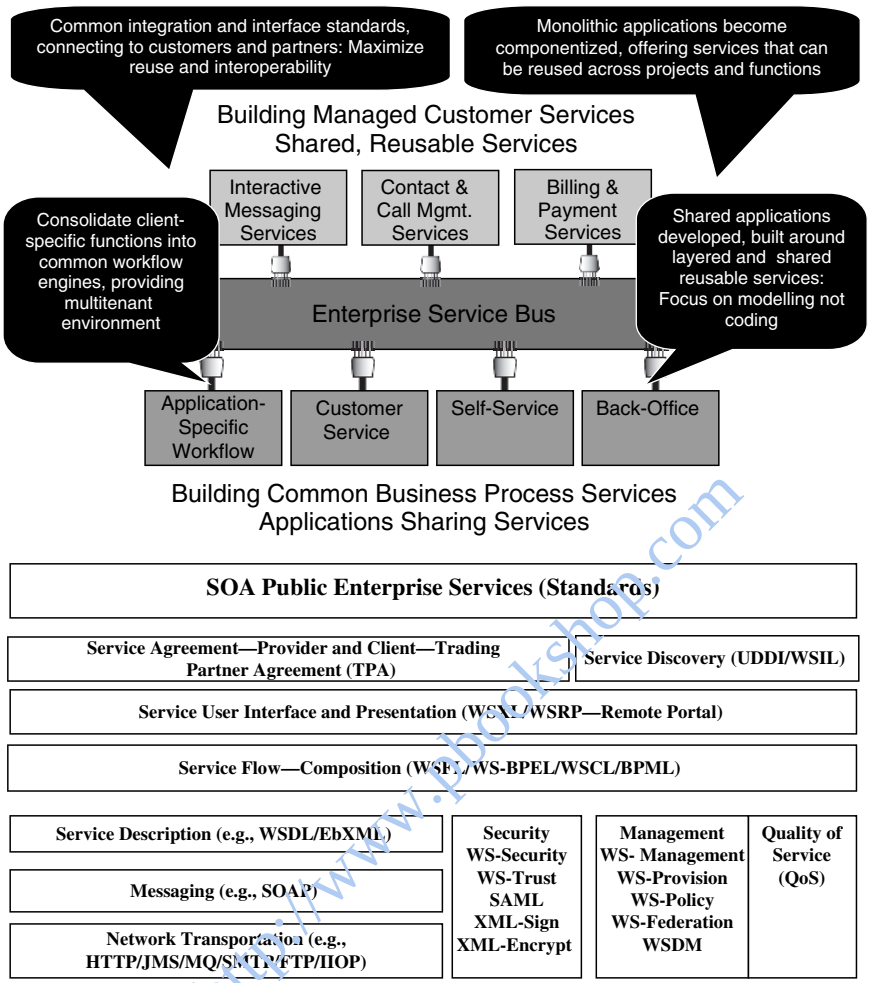

EXHIBIT 1.2 Service-Oriented Architecture Overview

the middle, focusing on an enterprise service bus (ESB), with attention to service definitions, integration, quality of service, service level agreements, security, message processing, modeling, communication, ESB management, and infrastructure intelligence.

The challenge to Web Services is separating the core legacy functionality across multiple tenants or systems to create a service interface that can be reused across multiple platforms. Thus, intermediary or aggregate services become important interfaces to basic business logic or data Web

Services. Basic services can then be wrappered together with legacy functionality. Thus, more popular Web Service applications are simple and consumer focused, including blogs, wikis, social networks, and peer-to-peer networking.

The benefits of moving to an open and interoperability service-based model include:

- **Improved returns.** Reduction of capex and opex investments
- **Personalized customer service.** Maximized lifetime value, cross-selling, up-selling
- **Real-time intelligence across business.** Liberating information for improved decision making
- **Data reliability and integrity.** Best-in-class service levels
- **Lower operational and technology integration costs.** Pay-as-you-grow utility pricing models and optimized total cost of ownership (TCO)
- **Time to market and profit.** Speed of system development and deployment, meeting business requirements
- **Business agility and flexibility.** Affordable, scalable, reliability, and global just-in-time solutions
- **System assurance and security.** Lower risk/reward trade-offs
- **Regulatory compliance.** Legislation, audit, and customer protection
- **Technology leadership.** First to market for competitive advantage, with integrated advanced technologies off the shelf

Service-oriented architecture and open systems will become mainstream to support just-in-time service provisioning and enterprise agility.

Virtualizing Everything

From the IT organization to the infrastructure, everything will be virtualized. The IT organization will be globally distributed, connecting competencies and capabilities through the network. Today, outsourcing significant portions of IT infrastructure, including telecommunications, is becoming a norm. As IT becomes more of a commodity or utility, outsourcing becomes a cost-effective option, moving assets off the balance sheet and becoming a predictable operational cost. Total cost of ownership becomes a moot point, as evergreen services replace legacy infrastructure.

System and process outsourcing continues to grow, deploying transaction processing onshore and offshore. While core IT competencies are internally retained, especially in support of company competitive advantage, IT departments are becoming virtual in partnership with outsourced

companies such as IBM, HP, and growing offshore outsourcers from India, China, and Romania. External IT spending consumes over 50 percent of total IT within the global financial industry and that is increasing as legacy systems are replaced.[16]

Even during the 1970s, virtualizing aspects of the computing infrastructure or raw computer processing was a serious option, due to the relative high cost of computers. Timesharing was an affordable business expense for large transaction processing. Today, server virtualization and storage area networks (SANs) continue to grow, optimizing infrastructure platforms and providing flexibility in support of applications and IT services. Enterprise management systems provide virtual control in the data centers. Principal players such as Microsoft and VMware are now advancing into the new frontiers of client or desktop virtualization. According to Gartner, an estimated 660 million PC desktops will be virtualized in 2011, from 5 million in 2006.[17] Thin-client computing and terminal services could be back, as in the days of timesharing and the dumb terminal, but hopefully without the green-screen look and feel.

A company can virtualize most of IT, whereby the virtual IT resource can now work at a virtual office, on a virtual desktop image connected to a virtual application on a virtual server.

Managed Services over the Cloud

Large software vendors such as Oracle, SAP, and IBM continue to acquire software vendors and to consolidate the software market, providing a one-stop shop and preserving licence and maintenance revenues. However, the traditional software model is seriously challenged and could well die with the advent of Software as a Service (SaaS) proposition. Why pay large one-time software investment costs and significant annual maintenance (18 to 22 percent of initial investment) plus ongoing support costs, when you can pay as you use? Managed service providers (MSPs) or application service providers (ASPs) offer a company business capability at a transactional cost, with minimal or no up-front investment. Not a bad alternative, if a company can accommodate a standard service.

Thus, vendors are creating clouds of capability through network connectivity. Consider consumer clouds such as Facebook, Google, or YouTube, which provide collaboration services such as instant messaging, whiteboarding, and content management. Consumers can move within vendor clouds and from cloud to cloud, depending on the required service or social network alliances. Taking even broader steps, Web retailers like

Amazon.com are now providing corporate managed services that leverage their vast computing power and data centers. Based on pay-as-you-use, for 20 cents per hour you can have the computing power to run your Web site. Amazon.com's cloud computing now has over 300,000 customers.[18] Google runs world-class data centers; it's not surprising that it has opened its infrastructure to software developers for managed services over its cloud.

Corporate-managed services extend from network and computing management to service desk to SaaS. Traditional telecommunication companies, (e.g., Telus, Bell Canada, Sprint, and AT&T) have all been successful in managing corporate networks, and in collaboration with the likes of IBM or HP, the managed service would extend to the data center on the network. However, until recently, corporations have been more cautious of the SaaS market, reluctant to give up ownership of core applications. This is about to change, as companies like Salesforce.com and NetSuite are starting to revolutionize the market under the watchful eyes of traditional application vendors such as Oracle and IBM. Salesforce.com has provided a managed CRM service for some time, but its cloud vision extends further, given the recent partnership with Google. Businesses of all sizes will have affordable on-demand business applications, from CRM to collaborative and office productivity tools. At Salesforce.com, one million subscribers now have "free" access to Google applications, now under the watchful eyes of Microsoft.[19]

Cloudy days ahead—the cloud will continue to absorb applications, content, and processing capability and to rain down new and highly valued on-demand services.

Integrated Customer Experience

Customer sales and service relationships are the top priorities for most companies. The expectation is that when high levels of customer satisfaction are sustained, customers will maintain company loyalty. Providing the customer with a consistent and valued experience could lead to a lifetime relationship and increased wallet share. To manage the customer relationship, over one-third of North American financial services firms purchased CRM applications in 2003, primarily from the then industry leader Siebel Systems (now part of Oracle), but also from Peoplesoft, SAP, Oracle, and E.Piphany.[20] Across all industries, CRM has been evolving, though in many cases it has not been fully successful to date. While call centers and marketing have derived value, sales processes have lagged. As an example, Bank of America implemented a CRM-based direct mail marketing program that increased response rate by

97 percent and the commitment rate by 21 percent. Further, Royal Bank of Canada (RBC) claims a 6 percent improvement in the marketing cycle, and a direct response that exceeds 40 percent, through product customization from its CRM implementation.[21] However, there is little evidence of similar benefits resulting from automating the sales processes.

Proliferation of delivery channels and the need for multichannel product offerings is driving strategic IT investments. New IT investments in channel integration include Web Services, speech recognition, integrated voice recognition (IVR), call center technologies, self-service, and live agent integration tools like computer telephony integration (CTI). Personal area networks have emerged, converging voice and data through multiple devices or appliances. For example, Internet and PC banking have evolved to include multichannel integration supported by Web Services technologies.[22] RightNow, a consumer-focused CRM application suite, has integrated Web 2.0 social networking capability with cross-channel integration (Web, voice/chat, e-mail). Ultimately, the customer will choose which channel to engage and yet expect a consistent and engaging experience. IT will need to provide a seamless integrated solution.[23]

Integration of customer information for a single view of the customer throughout the service delivery should be an IT focus. The objective is to achieve better customer service levels and improved business analytics for cross-selling (selling broader services) and up selling (selling premium services) opportunities. Strategic IT investments include CRM, data mining and integration, collaborative computing, workflow technologies, Web Services, and business analytics. Retailers have applied kiosk technology to provide customers with profile-specific information for an improved store experience. Customized or personalized decision-making information and analysis is a critical strategic driver for many companies.[24]

It's the experience that's remembered, not the product or service.

Information on Demand and Real-Time Business Intelligence

Information on demand is becoming the expected norm, shortening the life of fact-based printed materials like newspapers. Customers and consumers have information at their fingertips, whether through Google or vendor Web sites. Digital media is cheaper and faster to manage and disseminate. Document imaging and scanning continues to be a key back-office technology, evolving to integrated document and content management systems. Add business analytics to the mix and knowledge management systems are developing in support of digital scorecards and collaborative decision making.

Watch out for the growth in business modeling, where analytical models will be constructed to optimize business outcomes through the power of unleashing data.

While batched data processing continues to be the mainstay of most enterprises, Internet speed to market warrants real-time information. Monolithic data warehousing is still a driving force for data consolidation, but it has recently been challenged by alternative cost-effective approaches, such as data marts and enterprise information integration (EII).[25] Instead of managing enterprise data in one warehouse, an option is to manage by domain or context (e.g., sales or marketing), reducing complexity through the application of data marts and online analytical processing (OLAP) tools. But standardizing data continues to be a challenge within most companies; disparate legacy systems and commerce system constraints remain in place across companies due to a lack of implemented industry-standard protocols.

Real-time business intelligence builds from domain-specific analytics to integrated enterprise digital dashboards.

Mobile Networking and Social Computing

Whether you are an Apple iPhone or BlackBerry fan, mobile handsets will increasingly look to laptop/notebook capabilities for new functionality, in addition to new integrated voice and data applications. Mobile internet devices (MIDs) powered by Intel's Atom chips will provide low-cost, energy-efficient capability, enabling fast Web page downloads and video streaming.[26] Corporate applications will continue to grow with short-range radio frequency (i.e., RFID) hand-held devices. Rapid adoption of next-generation mobile handsets and phones will drive new financial services and payment methods, preparing the way for mobile commerce (m-commerce).[27] Smart cards will evolve to include secure transaction processing and identity protection, while potentially offering transaction tracking.[28] Growth in mobile networking will keep the telecommunications companies strong, driving wireless and wired broadband services. However, the first challenge is to improve voice-over IP (VOIP). Quality of Service (QoS) over the network will enable improved voice services. No time for dropped calls.

Social computing will provide advancements in online technology, including search engines, blogs, and community networks. Together with collaborative applications, new information-sharing channels will come to market. Consider Twitter's success in using Web 2.0 technology in support

of Barack Obama's hugely successful U.S. presidential campaign, providing micromessaging to millions of the electorate. Further, the business LinkedIn social network is about to expand, with recent additional funding for new capability.

> Integrating social computing and mobile networking could enable the next computer generation.

IT Investment Classification: The Four "S" Category Model

Understanding IT investments requires an appreciation of specific types of spending and their differentiating or unique attributes. Aligned to business drivers, such investments can be uniquely better managed and so valued. Exhibit 1.3 classifies IT investment into the four "S" categories, which include:

Shared—Infrastructure
Systems—Operations
Services—Stakeholder
Strategic—Informational

Shared—Infrastructure

Network and computing infrastructure continues to be a large portion of overall IT spending across industries, typically 50 to 60 percent.[29] The investment category includes all computers, servers, data centers, operating systems, and help desk support, in addition to data, video, and voice network facilities. To drive business operational efficiency, IT computing and network consolidation, integration, and standardization through a common shared infrastructure platform has proven to be a successful strategy for many large enterprises. Infrastructure outsourcing has been a growth industry as technology becomes commoditized and priced competitively. Growth in full-time IT staff lags overall IT budget growth, emphasizing contractual labor and outsourcing.[30]

The key is to leverage existing investments, minimizing "lights-on" operational costs and maximizing company productivity. However, shared infrastructure is impacted by company expansion and transaction or information volume. Together with technology refresh and upgrades, this warrants significant new investment. An overall investment strategy should focus on reducing cost of ownership and operating costs, while mitigating operational risk.

EXHIBIT 1.3 Classification of IT Investments—Four "S" Category Model

IT Investment—Four "S" Classification	Differentiating or Unique Attributes	Primary Business Drivers
Shared—Infrastructure ■ Telecommunications and network ■ Wireline and wireless ■ Computing servers, storage, and data center ■ S/W operating languages ■ Desktop/laptop ■ Productivity tools (MS) ■ Help desk ■ H/W maintenance and support ■ Adds, moves, and changes ■ Network operational center (NOC)	■ Base communications, computing and productivity tools ■ Shared across the enterprise ■ Volume sensitive ■ Standardized and consolidated ■ Infrastructure outsourced ■ Upgrades and refresh ■ Patch management ■ Vendor procurement	**Existing Investment** ■ Operating cost – Lights on – Cost of doing business ■ Productivity ■ Cost **New Investment** ■ Cost justification ■ Cost of ownership ■ Cost reduction ■ Risk mitigation
Systems—Operational ■ Application design and development ■ Vendor applications and contracts ■ Supply chain management (SCM) ■ Enterprise resource management (ERM) ■ Customer relationship management (CRM) ■ System support ■ Enterprise application integration ■ Quality assurance ■ Software as a service (SaaS)	■ Base systems capability ■ Transaction based ■ Business process and workflow aligned ■ Feature sensitive ■ Nonstandard ■ Integration challenged ■ Application rationalization ■ Process/application outsourced ■ Feature enhancements ■ Version control ■ Vendor licensing	**Existing Investment** ■ Operating Cost – Business sustainment – Cost of doing business ■ Productivity ■ Net margin **New Investment** ■ Cost/benefit justification ■ Cost reduction ■ Revenue increase ■ Margin improvement ■ Business process improvement ■ Customer/supplier/ employee experience ■ Risk mitigation
Services—Stakeholder ■ Managed services ■ Social and community networking	■ Services based ■ Business added value ■ Stakeholder requested	**Existing Investment** ■ Operating cost – Added value ■ Productivity

(*Continued*)

EXHIBIT 1.3 (Continued)

IT Investment—Four "S" Classification	Differentiating or Unique Attributes	Primary Business Drivers
■ Service-orientated architecture (SOA) ■ Web services ■ Service desk ■ Call center ■ Project/program management office (PMO) ■ Vendor management ■ Asset management ■ Procurement management ■ Alerts and monitoring ■ Reports and reporting ■ Digital dashboard or scorecard ■ Collaborative computing ■ Document imaging ■ Content management ■ Information security	■ Time and accuracy sensitive ■ Collaboration and content driven ■ Information security and privacy ■ Opportunistic	■ Service level agreements (SLA) or expectation **New Investment** ■ New service levels or expectations ■ Cost optimization ■ Margin improvement ■ Customer/supplier/ employee experience ■ Stakeholder satisfaction ■ Risk mitigation
Strategic—Informational ■ Business strategic initiatives *Any of the above can be strategic if enables business strategic goals, plus:* ■ IT Strategy, architecture, investment management ■ Business intelligence and analytics ■ Online analytical processing (OLAP) ■ Decision support ■ Predictive databases ■ Data mining ■ Knowledge management ■ Enterprise information integration (EII) ■ Integrated middleware ■ Distributed computing ■ Data warehousing ■ New or emerging technology (R&D)	■ Strategic business based ■ Informational based ■ Technology added value (Architecture) ■ Competitive advantage ■ Long-term returns (3 to 5 years) ■ High risk on returns ■ Higher probability of failure ■ Outcome (market) uncertainty ■ Disruptive breakthroughs ■ Options value	**Existing Investment** ■ Capital cost – Investment allocated – Internal rate of return ■ Investment management **New Investment** ■ Margin improvement ■ New customer value proposition ■ New channels to market ■ New products or services ■ New revenue ■ New market ■ Lower cost model ■ Business agility ■ Intellectual capital

Systems—Operational

IT systems are transactional in nature, supporting the business operational processes, providing software applications, quality assurance, and on-going support. In support of business processes, the continuous challenge is one of system integration, seamlessly connecting legacy, custom, and "off the shelf" applications. Version control and vendor licensing can create compatibility issues and constraints, especially in light of ongoing feature enhancements as demanded by the business. Rationalizing applications is a way of simplifying the base system capability.

Integration and scalability of multiple platforms increases complexity, especially with global mergers and acquisitions. A big issue for larger transaction-based companies, such as banks, is that their incumbent legacy operational applications are becoming obsolete and cannot keep pace with change and the speed of adoption of new technology implemented by new virtual entrants. Citizen Bank typifies the use of technology to reduce operational costs and to provide remote banking through telephones, PCs, and the Internet without incurring costly retail branches.[31]

Existing system investments sustain business operations, a cost of doing business. However, the "Internet" speed of market change dictates company agility and prompts provisioning of feature enhancements or enrichment. New investment is often justified by sound business returns in year, driven by increased revenue or cost reduction, from process improvements or enhanced customer experience. A key strategy should consider process and system simplification, driving best practice and lowering transactional costs.

Services—Stakeholder

Service-based IT investments are emerging, as IT organizations evolve to become service oriented. IT is moving from a support and enabler role to a service and business driver role, moving from the back seat to the front seat. Technology is embedded in all aspects of the business, so it is becoming the business, providing higher levels of stakeholder added value. Whether through new forms of customer engagement (e.g., social networking) or through internal facilitation of real-time scorecards, IT services are growing in stature. Service desk, alerts, and reporting provide the visible value of underlying systems or infrastructure. They also extend value by providing enterprise insights, through digital dashboards, content management, or information security.

Existing investments provide operational added value, driving productivity improvement, and in support of service level agreements (SLAs). With new internal and external demands for IT services, additional investments

will increasingly drive margin improvement. Stakeholder expectations and satisfaction are the principal drivers for new investment.

Strategic—Informational

The business strategy will define strategic IT investments, which can be extensions to investments in infrastructure, systems, or services. There are also strategic IT initiatives unto themselves, which formulate long-term IT direction, including architectural road maps, investment management, and integrated middleware. See Exhibit 1.4 for strategic IT investment

EXHIBIT 1.4 Strategic IT Investment Characteristics

Strategic IT Investment Examples	Attributes	Transformation Objective	Shareholder Value
Customer relationship management (CRM)	Customer service focus Cross-sell Up-sell Customer analytics	New customer service process New sales process	Increased revenue Increased market share
Supply chain management (SCM)	Supplier focus Procurement efficiency Less suppliers	New supply process New order process	Lower operating costs Economic profit
Enterprise resource planning (ERP)	Human capital focus Employee satisfaction Financial controls	New human resource process Improved financial process and controls	Improved net income Improved economic profit
E-commerce	Online transaction focus Transactional efficiency Global presence	New e-business model	Incremental revenue Increased market share Lower operating costs
Business analytics	Business knowledge focus Innovation	New marketing process New markets and products	Incremental revenue Innovation—New products and markets

Application rationalization	Application standards focused Middleware—connects Re-use and object coding	New application support processes Process and application streamlining	Lower operating costs
Infrastructure optimization	IT operational focus One common standard Cost of ownership Interoperability	New IT operational support processes Computing and networking streamlining	Lower operating costs
Information security	Customer and company protection focus Risk mitigation Regulatory compliance	New information security and privacy processes New operating risk processes	Capital reduction Risk reduction
IT investment management	IT investment focus Balancing investments across enterprise	New IT investment and portfolio management processes	Economic profit
Vendor management	IT Vendor focus Procurement efficiency Less IT suppliers	IT procurement	Lower operating costs Economic profit
Outsourcing	IT Partnership focus Reduce in-house sourcing Focus on core competencies	New IT provisioning and support model	Lower operating and net costs

characteristics. Strategic IT investments have specific characteristics that clearly identify them from other IT investments, and that necessitates a different approach to evaluation. They must contribute to a company's future earnings and to future shareholder value. Typically, these investments are spent over two to three years and would not be expected to start realizing

value until months later, fully benefiting in subsequent years. In times of technology, market, industry, and regulatory uncertainty, the longer the period to realize value, the higher the risk of investment. Strategic investments have a 50 percent chance of failure. Therefore, existing or allocated investments need to be closely managed, ensuring that they are still valid or justified over the period of implementation.

Strategic IT investments can also be information driven, supporting management decision support, business intelligence, and knowledge management. Business analytics is growing in conjunction with infrastructure data storage and mining, exploiting the latent potential of captured data. Predictive databases and analytical software have provided companies with sophisticated marketing and service strategies to aid in increasing customer wallet share (increasing customer spending through one company).

Strategic IT investments are instrumental in modifying competition, providing diversified services, and defining new market channels.[32] Examples are many. Telephone banking has grown from 1 percent of retail transactions in 1995 to 10 percent in 1998.[33] E*Trade is one of the largest and most profitable Internet-only banks, with a competitively low $12 billion in assets. The U.K.'s First Direct is that country's leading nonbranch financial institution and has been in business for only 10 years, achieving a 2 percent market share.[34]

Increasingly, these strategic IT investments are more likely to be in the hands of the business unit, where closer control and agility enables new customer propositions, product introductions, and market opportunities for future profits. Strategic IT investment in the hands of business units places closer control on key growth options for future business success, but such investments are prone to failure and may not bear fruit for several years.[35] However, certain strategic IT investments are likely to stay exclusively within the CIO's realm, as they are specific to the IT organization, such as outsourcing, information security, application rationalization or integration, and infrastructure consolidation or centralization.

Future IT Investment

Aligning new IT investment for future gain requires a focus on the business strategic direction. Essentially IT needs to be integrated into the business, not just aligned. But the future is unpredictable, with estimated or projected returns and outcome uncertain. Therefore, future IT investments must be flexible and adaptive to change. Agile platforms must be built to accommodate the unknown. This requires a keen investment review of risk and scenario planning, determining alternative value options. Such considerations require in-depth understanding of current-state operations and architecture, with a clear vision of future states and transitional planning. Invariably, this does not happen in reality; lack of understanding results in suboptimal

investments based on short-term justifications, incremental project-based approaches, and singular or isolated views.

Strategic Direction

Successful companies align IT investment to strategic business objectives. The ultimate goal is for IT to be strategically integrated into the business and to be effectively deployed to realize quantifiable returns. Yet Cutter Consortium found that 39 percent of firms do not have a formal IT strategy.[36] Further, even if an IT strategy exists, there is no guarantee that the strategy will successfully deliver the intended results. Organizational dynamics and complexities must be effectively managed for successful execution. Culture, politics, experience, and power-behavioral influence affect organizational decisions. Subsequently, strategies can mysteriously emerge and evolve rather than being well-planned and formulated. In one study, firms instigated development on only 24 percent of the strategically planned applications, based on a detailed postplanning analysis.[37]

Ernst and Young claim that impediments to strategic IT investments include:

- Lack of business leadership and commitment to revenue streams in driving the business case for IT investment
- Short-term focus on IT returns, affecting net margin and shareholder value metrics
- Scale of operations not large enough to justify the redistribution of funds for value creation opportunities
- Effectiveness of the business and IT partnership
- Availability of quality resources
- The pace of technology change and true open architecture
- The extent of data interchange standards
- Regulation restrictions, e-commerce activity, and information sharing[38]

Strategic IT investment for new channels, new services, and new customer value proposition has proved to be challenging. For instance, the banking industry struggles to make a profit out of its Internet channels; here, the banks have been unable to measure ROI. Identifying and isolating channel costs and revenue streams creates a huge problem for companies. However, there are examples of improvement; Wells Fargo, a leader in online banking (30 percent of its customer base use online banking), has been able to make a moderate profit, measuring activity-based costing.[39] Bank of America Corp. has succeeded in driving a channel profitability mentality by linking with customer costs and revenue. Customers have highly rated Bank of America's online program, which offers customers added value services such as account aggregation, bill payment, and online check images.[40]

Today, IT investment must be fully integrated into the business strategy, not just aligned, to achieve a company's strategic objectives.

Agility Considerations

As the business adapts and changes to new market or industry challenges, the company transforms. The business model may be revisited, business processes may be reengineered, new markets entered, subsidiaries sold—the business strategy evolves. As the pace of change quickens, IT executives often get chastised by their business partners as being autonomous and segregated from the business, unable to change with the business. CIOs must be more proactive in anticipating the business direction across the network footprint.

Firms with a business strategy that is based on agility and flexibility typically spend 10 to 25 percent more on IT than the industry average. Consider Dell Inc.'s strategy and significant IT investment in e-commerce and supply chain management (SCM). While firms with a business strategy based on business operations and cost reduction would spend 10 to 20 percent less on IT than the industry average.[41]

New IT investments should provide platform flexibility, based on best-practice business processes. Whether investing in infrastructure or systems, companies should pursue open architecture and standards. "Vanilla" (off the shelf) applications, with minimum customization, reduce the system cost of ownership and provide for less complex future upgrades. This is, however, dependent on standardizing business processes, which is a huge assumption to make. The CIO needs to be the best-practice ombudsman and should seek industry standard processes, unless company competitive advantage can justify unique practice.

IT investment must accommodate agility and flexibility for speed to market, especially under uncertainty.

Risk Management

Managing risk is a broad subject, but as applied to IT investments, it requires an awareness of controllable and uncontrollable risk, for existing and new investments.

Controllable risk includes cost risk (inputs, cost variables), benefit risk (outputs, return variables), operational risk (availability), organizational risk

(human resource change), project risk (on-time, on-budget), and technology risk (reliability and performance). Existing investments require risk assessments on operational and technology vulnerability or failure. Whether an inadequately supported legacy system fails or information security is exposed, current IT investments or assets need to be audited and assessed for company risk. The amount of risk the company wants to absorb will dictate the amount of allocated investment to remedy. Often, this kind of new investment is nonnegotiable and a priority. Typical new IT investments are fundamentally about risk and reward, over time. This involves applying cost/benefit analysis, with discounted values or probabilities to accommodate various risk profiles, and then, on approval, applying project and change management to manage or mitigate risk.

Uncontrollable risk includes financial risk (interest rates, cost of capital), legislative risk (sanctions, constraints), market risk (price and demand), industry risk (transformation), and competitive risk (new entrants, differentiation). When identifying strategic IT investments, early understanding of the uncontrollable variables is a necessity. This requires executive IT leaders to understand the relevant legislation and competitive positioning and to be engaged with corporate development regarding possible mergers and acquisitions.

The failure rate of strategic IT investments is high, as the business environment is constantly changing, especially when uncontrollable variables are prevalent. Moderating variables (e.g., an industry sector) and the intervening variables (e.g., government and competition) are key factors in strategic IT investment risk management. For example, specific banking regulations have significant impact on IT investments. Consider the Basel Accord, which requires that capital be allocated to hedge against risk. Banks need to apportion capital to offset operational risk, which reduces available investment funds. Further, during the past few years, the United States has toughened its privacy laws as they relate to financial services.

Intervening variables are more generic to industries; they include broad legislation with respect to corporations and strategic IT investments. New laws (e.g., the 1996 HIPPA, the 1998 COPPA, and the 1999 Gramm-Leach-Bliley Act) require comprehensive safeguards to protect the security and confidentiality of nonfinancial data, individual medical records, and the privacy of children on the Internet. Evolving legislation will inevitably have an increasing impact on (1) electronic cash; (2) PC/Internet banking; (3) writing requirements; (4) digital signature and the security of electronic financial transactions; and (5) document imaging and storage.[42]

IT investment should be treated as a value option, quantifying the risk and reward proposition.

Transitional Planning

Planning the future-state IT strategy and architecture requires proactively aligning to strategic business initiatives or imperatives. However, execution of new investments requires acute awareness of the current IT state. Existing shared infrastructure, systems, services, and project investments need to be mapped to a present-state IT architecture, determining business dependencies and drivers. An inventory of assets, processes, systems, and projects should include total cost of ownership (TCO), life expectancy, technology standards, and constraints. Knowing the current state of the IT portfolio provides the starting point for transformation to a new IT state. Trade-offs are required to meet short-term and long-term goals. The IT portfolio should be tailored to the firm's unique strategic objectives; it is a mark of the firm's future currency of unlocked hidden value as the company adapts to the future.[43]

Transitioning between the current and future state could take years, requiring intricate planning from short- to long-term considerations. The ideal end state considers the desired new technology architecture, which invariably will be compromised by shorter-term business requirements and capital constraints. Investments should keep in line with depreciated assets, ensuring that base infrastructure or operating systems do not become underinvested to sustain company operations. This outsourcing or managed services provides for a convenient, off-the-books, evergreen capability, paid as required through operating costs. As technology life cycles shorten, the focus should be on open architecture and interoperability, providing flexibility in design and options. Monitoring transition plans quarterly or biannually provides for a sanity check, evoking options or directional tuning as required.

> IT investments should be considered as a portfolio, balancing through transitional changes.

Operational Management

Existing enterprise investments in technology, people, and processes determine the current levels of operational and strategic capability. Future or new IT investments depend heavily on current-state operational capability. The design, development, and implementation success of a new IT investment or project are highly reliant on current IT processes, IT resources, and technology tools. Often, operational IT inadequacies constrain or prevent

new investment progress. Yet many companies manage new IT investments completely independently from IT operations. IT operational management needs to be fully aligned and signed up to new IT investments.

> Complete IT investment value depends on the underlying IT operational capability, not just the management of the incremental, project, or strategic investment.

Chapter 1 has explored the history and nature of IT investments. The four "S" category model will be applied later in the book, in aligning IT investment characteristics with appropriate measures of valuation. Future IT investment considerations will also provide a backdrop or context for appropriate IT value network management. Chapter 2 turns our attention to why IT investments have not fully realized their value. Despite six decades of continued growth in IT investment, the value remains questionable.