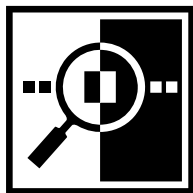


Vertical Market Opportunities in Commercial Banking



Industry Trends

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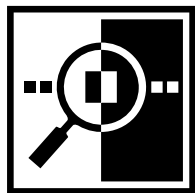
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Chapter 1

Executive Summary

Study Objectives

This report reviews and analyzes current demand-side dynamics within the commercial banking market. Emphasis is placed on the rapid emergence of the Internet, electronic delivery of financial services, and trends affecting the delivery of financial services to large and small business customers. Dataquest's analysis is multidimensional and includes the following components that collectively influence investment levels and receptivity to technology-enabled business solutions:

- IT products and related IT services
- Customers, including channels to customers
- Economic, technical, and competitive environment
- Key trends and issues in the financial services industries
- Opportunities and recommendations for providers of information technology and related services

Methodology

Data Sources

Data for this report was obtained from a number of primary and secondary sources. Survey questions addressed the following topics:

- Customer wants and needs
- Major challenges and critical success factors
- IT investment plans and budget
- Relationships between business strategy and IT strategy
- Buying intentions for IT-related solutions, including IT products and professional and systems integration services
- Vendor selection

Additional research supplemented our initial primary research efforts, including extensive topical interviews with commercial bank IT managers and vendors, as well as topically focused secondary source material.

Forecast

Dataquest's vertical market sizing for all IT is primarily based on gross domestic product (GDP) sizing, since these statistics reflect the production value of finished goods and services produced in the United States. Further detail on methodology is included within the Market Trends report titled *Vertical Market Opportunities: State of the Industries—1997* (PSVM-NA-MT-9701). Updates to the financial service market size and forecast for information technology-based solutions that are included within this report will be available in *Vertical Market Opportunities: State of the Industries, 1998*, scheduled for release during the fourth quarter of 1998.

Key Findings

IT providers are busy trying to help banks meet a wide range of challenges: preparing for a world of ubiquitous, networked e-business; collecting, disseminating, and applying knowledge; achieving year 2000 and European Monetary Union (EMU) compliance; and meeting staffing, training, and service needs. The following key business drivers influence technology trends within the commercial banking industry:

- Electronic commerce
- Financial electronic data interchange (FEDI)
- Knowledge management
- Workflow automation
- Back-office/front-office integration
- Consolidation
- Nonbank competition
- Disaggregation
- Disintermediation (avoiding the intermediary)
- Capital market development
- Risk management
- Customer relationship management
- Regulatory compliance
- Year 2000/euro compliance
- Services for small/medium-size customers
- Profitability management
- Staffing/training

The Internet as a Retail Counterpart

Business Trend—Electronic Business

Although electronic business has its roots in the commercial sector as EDI, it has assumed a distinctly consumer cast with the stunning popularity of the Internet and the Web. Commercial/wholesale banking, however, faces similarly golden opportunities and equally grave stakes on the Internet as its retail banking counterpart. In particular, the Internet/Web is emerging as the mechanism to deliver fee-based cash management services to small and medium-size organizations. Published studies indicate that 85 percent of companies already participate in electronic financial services to some degree. In the past, these services were primarily provided to large corporations because of the cost of delivering these services. Using the Web, banks will be able to automate the delivery of business cash management services and provide them on a self-service basis. Also, the growth of Internet-based commerce is creating completely new opportunities for banks.

These opportunities may include merchant aggregation, where banks organize groups of merchants under the bank's Web-based transaction processing infrastructure to provide merchants with a range of Web transaction processing, or digital certificate authorization. Digital certificates have evolved as the preferred solution to the problem of providing secure, private, authenticated business (transactions, the execution of contracts, various types of agreements) over the Internet. Digital certificates require a trusted third party to issue and authenticate the certificates, a natural role for commercial banks, even though the role of digital certificate authority will not automatically fall to banks. Similarly, the issue of payment processing on the Web has not been resolved. There is a tremendous opportunity for banks, but it will likely require banks to partner with technology companies to produce competitive payment processing offerings. To take advantage of these opportunities, banks must move quickly to explore electronic business, hone their electronic business skills and expertise, and develop appropriate partnerships and alliances.

Technology Impact—New Network Infrastructure, Systems, and Alliances

Internet-based e-business definitely falls into the "new-world" category because it is a completely different way of doing business. Not since the introduction of television has a technology arrived with the potential to radically change the way we live and conduct business. Since banks already are so thoroughly computerized, the adoption of e-business should come naturally. Almost everything a bank does over its internal systems and networks can be extended to the Internet. Regardless, preparing for e-business represents a significant undertaking. It requires revamping the network infrastructure, Internet-enabling existing systems, building new systems, implementing new security systems, and partnering with a variety of technology and service providers. Pointing the way, Citibank teamed with AT&T in a five-year deal to prepare the bank's network worldwide for e-commerce. Similarly, Cenit Bank Corp. is folding its existing networks into a fast Internet Protocol (IP)-based network that will leave the bank Internet-ready when the two-year project is completed. In terms of alliances, five banks (Banc One, First Chicago, Michigan National, NationsBank, and PNC) have begun testing IBM's Integrion alliance for e-commerce, while Scotia Bank and Zions Bancorp pioneer the digital certificate authority market.

Financial EDI as a Competitive Advantage

Business Trend—Electronics Payments Compliance

The Federal Reserve has ordered the federal government to make all payments via financial EDI (FEDI) by January 1, 1999. The National Automated Clearing House Association (NACHA) has targeted September 1998 as the date for conversion to FEDI. FEDI is a payment transfer protocol that includes a rich stream of information about the payment, making it possible for automated systems to recognize and process this additional information. Banks that do not comply with FEDI will still be able to receive FEDI payments, but they will be unable to automatically process the value-added information.

Technology Impact—FEDI Software and Training

The Federal Reserve is distributing 12,000 copies of FEDI software to financial institutions to ensure they can meet the federal FEDI payment deadlines. The PC-based software is provided by Bottomline Technologies, although numerous other vendors also offer FEDI software as part of their various payments and EDI solutions. It does not matter which FEDI software an organization uses. According to the Federal Reserve statement, only 15 percent of financial institutions were FEDI-capable in the first quarter of 1998. Although failure to become FEDI-capable will not prevent a bank from processing payments, it will put the bank at a competitive disadvantage by making it unable to process the value-added information.

Profitable Customers and the 80/20 Rule

Business Trend—Leveraging Knowledge Assets

In the new information-based economy, knowledge is a valuable asset. Banks are centrally positioned to capture and disseminate information and turn that information into valuable knowledge. Specifically, knowledge about the customer is invaluable in cultivating and expanding profitable customer relationships. In an industry where the 80/20 rule applies (20 percent or fewer of the customers deliver 80 percent or more of the profits), the ability to identify and cultivate profitable customers is critical to success. From the call center to the loan officer, knowledge of the customer must be readily available. Strategies such as mass customization (market-of-one) require extensive information and knowledge of the customer to be successful. As the commercial bank competes with other banks and nonbanks for the commercial customer, managers must be able to more effectively leverage the knowledge banks have historically had about the customer.

Technology Impact—Data Warehousing, Data Mining, and Knowledge Management

To meet seemingly insatiable demands for information and knowledge, banks such as Fleet Financial Group or Bank of Montreal are turning to data warehousing, data mining, and a host of knowledge management technologies that help to capture information, convert it into knowledge, and disseminate it to those in the bank who need it. Groupware such as Lotus Notes, push technologies like Marimba, document management systems, contact management systems, and workflow systems speed the distribution of knowledge throughout the bank. Loan officers at Bank of America, for example, bring information with them about each customer on laptops as they make their calls. Data mining enables banks to identify profitable customers and the most likely ways to expand relationships. Knowledge of the customer is being applied at all levels of the bank, from strategic planning to customer service call centers. Banks are enhancing their own knowledge of the customer by combining their traditional information with information culled from a variety of internal and external sources. Almost every major bank and most smaller ones have a data warehouse or data mart (a smaller, special function data warehouse) initiative under way. New tools are taking data mining out of the hands of the mathematicians and putting it into the hands of bank managers in order to improve market segmentation and the ability of the banks to target opportunities.

Small/Medium-Size: Underserved Markets

Business Trend—Capturing and Serving Small/Medium-Size Customers

Where are the banks that served the small and medium-size businesses? Unrelenting bank consolidation since 1988 has steadily reduced the number of banks, leaving fewer but larger banks. Small and medium-size businesses, which depended on the now-consolidated banks, find themselves as an under-served market. With nonbanks gladly willing to provide many of the services banks once provided to small and medium-size businesses, newly consolidated banks are finally recognizing the importance of this market. They are developing products, services, self-serve approaches, and fee structures that enable them to profitably deliver sophisticated financial services to small and medium-size companies.

Technology Impact—Leverage the Internet/Web and PC

The emergence of the Internet/Web and the pervasive use of the PC enable banks to profitably deliver an array of cash management and commercial banking services to small and medium-size companies. These companies have been shut out of such services in the past because they have not had the typically large, proprietary systems required to access such services. Increasingly, banks are using the Internet to deliver financial services to PC-based small and medium-size businesses. Similarly, the availability of low-cost PC server platforms, such as Windows NT, allows smaller banks to provide the kinds of sophisticated funds transfer, cash management, and commercial banking services that previously were available only to large corporate customers of large banks. Small technology companies such as Fundtech Ltd. and Politzer & Haney and platforms like Microsoft Corporation's NT, combined with the Web, level the playing field for large and small customers.

Year 2000/The Euro

Business Trend—Year 2000 Compliance/Euro Conversion

There will be no regulatory relief for the year 2000 problem or the inexorable march toward the end of the century. While the major systems of the major banks will be ready, and a relatively few banks will be completely year 2000-compliant, the others are questionable. How bad will the fallout be? For most, it will be an inconvenience requiring costly exception handling. Still, the potential for extensive lawsuits regarding liability for problems resulting from year 2000 glitches that impact financial transactions looms large. There are no "magic bullets." The solution involves careful identification of problems, remediation, and testing. It will be costly, amounting to hundreds of billions of dollars worldwide. In the banking industry, recent surveys suggest over half the banks are still assessing the state of their systems, while 20 percent are actively implementing a solution. Meanwhile, the year 2000 countdown continues. On the other hand, there is more flexibility and less at stake with the euro conversion, as the EMU nations adopt a single currency to rival the dollar as the world's benchmark currency, but the costs and the risks remain too great to ignore. The euro changeover begins January 1, 1999, just months away, and will continue into 2003 and beyond.

Technology Impact—Assess, Fix, and Test

Banks must assess their systems, establish priorities for fixing the most critical systems first, and test the repaired code to ensure their systems are ready. Some banks are taking the crisis as an opportunity to upgrade to new, packaged, year 2000-compliant systems, although time is running short for those hoping to complete and test major new implementations. Others are turning to outside vendors that will take on the task for a considerable fee (which rapidly increases as the deadline draws near). The task is monumental, expected to impact IT staffing, hiring, and new project initiation. At least one bank, First National Bank of Omaha, is capitalizing on the problem by selling its home-grown fix, a tool that automatically finds and flags dates that require fixing and tracks changes created by the fix. Complicating the year 2000 solution is the need to prepare many of the same systems to handle the new euro currency, which adds another burden for an already-beleaguered IT staff and stretches already-thin resources.

Toward Financial Storefronts

Business Trend—Disintermediation and Disaggregation

Disintermediation is the process of going around the middleman. In the financial world, the middleman typically is the bank that has been the target of disintermediation for years. Disaggregation is the breaking apart of monolithic operations into their constituent parts. Banks have increasingly adopted disaggregation, in part, as a response to threats of disintermediation. Through disaggregation, the bank breaks up the total banking process, keeping the parts the bank can handle profitably and turning the rest over to an assortment of third-party service providers or spin-off operations. Disaggregation allows the bank to focus its activities while still retaining a measure of control over and a piece of the rest of the action. The customer does business with the bank, which behind the scenes is coordinating the efforts of its own units and multiple service providers to deliver the complete banking service. At the extreme of disaggregation, the bank becomes little more than a financial storefront marketing under its own name a host of financial services provided by others. Disaggregation has contributed to the blurring of traditional distinctions between banking segments. For example, it enables small community banks to offer many of the services, such as funds transfer, once available only from large, commercial banks.

Technology Impact—The Need for Open Interfaces

The key to disaggregation is the integration of the disaggregated pieces back into a seamless whole from the customer's standpoint. Disaggregation requires that the bank support and maintain open interfaces to facilitate such transparent integration. This in turn will require the bank to adopt *du jour* and de facto standard communication protocols and platforms, such as TCP/IP and Windows NT and UNIX. The role of IT shifts to one of establishing and maintaining the interfaces rather than building and operating the various production systems, which will now be the responsibility of the third parties. Disaggregation is often applied to the IT function itself. In this case, specific IT functions, such as desktop support, help desk, or LAN management may be disaggregated. In the case of IT, disaggregation becomes outsourcing.

Skill Shortfall/Alternative Solutions

Business Trend—Staffing Shortage

COBOL programming skills are relentlessly pursued by headhunters desperate to round up staff to fill year 2000 projects. Freshly minted C++ and Java programmers are being recruited at stunning salaries to take on e-commerce initiatives. On the help desk, in the call center, and throughout the bank, trained people are in short supply. Although a few banks are laying off staff as part of streamlining, restructuring, or consolidation efforts, many more are seeking experienced personnel in key areas. Even those that are laying off people continue to hire for business imperatives, such as year 2000 compliance or euro conversion.

Technology Impact—Training and Outsourcing

Crestar Bank turned to multimedia software running on its intranet to provide training to the bank, just one of a growing number of banks betting that technology can help them solve the staffing squeeze by training people better and faster. Computer-based training, Internet/intranet-based training, and third-party training services are all being tapped as banks scramble to staff initiatives and meet service level commitments and deadlines. In other cases, the solution will come through outsourcing and third-party service providers. High on the list of areas being turned over to others is Web-based banking, which requires the new skills and new technologies that are experiencing the highest demand.

Electronic Images

Business Trend—Paperless Banking

The idea of the paperless bank had receded as banks optimized check handling to reduce costs to levels that appeared untouchable by electronic imaging technologies. Also, customer reluctance to relinquish paper has resigned many bank managers to paper handling for years to come. The vision of paperless banking, however, continues as banks struggle to streamline workflow and reduce costs. Loan file folders, customer service documents, and many other low-volume pieces of paper can still be eliminated, enabling workflow improvements in the process.

Technology Impact—Check Image/Archiving and Electronic Presentment

Check imaging has languished, applied only to relatively light volumes. But Chase Manhattan Bank hasn't given up the vision of high-volume check imaging. It has initiated a check processing project that scans checks into a document management system where they are archived and subsequently processed into electronic images. Chase projects processing up to 12 million checks per day, which will reduce the handling of checks to a single person and cut the four- to five-day check transfer process to a single day. Huntington Bancshares Inc. announced plans to follow suit. Projected industrywide savings could reach \$2 billion to \$3 billion annually. On the low-volume front, bill presentment promises to take paper out of the bill paying process with banks processing electronic invoices on behalf of customers. Imaging continues to allow banks to streamline loan processing and other workflow by enabling parallel workflow of document images.

Risk Management

Business Trend—Managing Risk

The commercial banking environment becomes riskier by the day as interest rate option risk is embedded into more and more products through such features as variable rates and no-penalty prepayment options. An unexpected change in interest rates by the Federal Reserve Board, however, can cause the profitability of a carefully crafted deal to evaporate. The same kinds of risk can impact the bank's internal transfer pricing, making it difficult to determine the value of assets. Unable to fix pricing and value with certainty, bank managers are hindered in their ability to effectively plan for growth and manage risk.

Technology Impact—Enterprise Risk Management Systems

The solution calls for enterprise risk management—applying the sophisticated risk management techniques and technologies used on the trading room floor to managing portfolio risk across the entire commercial bank. A small group of highly specialized companies, such as Fair Isaac's RMT division, are applying portfolio-risk management to the commercial bank itself. These systems typically involve highly sophisticated mathematical engines running on powerful multiprocessor systems with the ability to crunch thousands of complex calculations very quickly. The results of these calculations must be combined with other data from the bank's data warehouse. Through easy-to-use front ends, bank business managers and strategic planners can access and understand the results of the risk calculations in the full context of the bank's business.

Toward Capital Markets

Business Trend—Capital Markets Development

To counter the movement into banking by investment firms and others from the capital market side of the business and to seize new opportunities in the increasingly deregulated integrated financial service market, commercial banks are developing or acquiring capital market capabilities. Capital market capabilities enable the bank to help customers raise capital and create wealth outside traditional commercial bank interest-based lending. Savvy commercial banks are using their capital market capabilities to expand their relationships with their commercial banking clients, allowing them to leverage their traditionally strong position with the customer.

Technology Impact—Investment and Trading Systems

To be effective in the capital markets, commercial banks must completely revamp, modernize, and expand what has, in the past, been generally modest trading and investment capabilities. This will require investments in portfolio management, investment, and various trading systems (derivatives, fixed income, foreign exchange, emerging markets, and others). It will also require new risk management systems and practices. Finally, the new capital market systems will have to be integrated with the worldwide capital market trading networks.

Enabling Technologies

With the emergence of e-business as a major business direction, technology has moved to the forefront in the commercial banking industry. Almost everything that commercial bankers do for and with their customers can be done electronically over the Internet. As a result, technology must be regarded as a critical enabler for the commercial banking industry and the financial services industry in general. In the e-business world, however, technology goes beyond being an enabler. It becomes the new business opportunity itself. Commercial banks are vying for a role in the e-business payment processing market. They are developing as merchant aggregators, gathering merchants under their umbrella e-commerce Web sites. Some are taking the initiative as digital certificate authorities, a key role in the use of public key encryption for e-business security, authentication, and nonrepudiation. Smart card technology, which is widely accepted in Europe, continues its attempts to penetrate the U.S. market, while commercial banks try to determine their role in the smart card market.

Outside the e-commerce market, some commercial banks such as Citibank, are integrating their financial services with those of their clients' enterprise resource planning (ERP) and integrated core business systems, such as SAP R/3. Integration with these increasingly popular systems (SAP and Baan, two leading providers, each experienced growth last year of about 60 percent) for comprehensive supply chain management, distribution management, and resource planning will serve to solidify the banks' position as a financial partner and further increase the banks' hold on their largest corporate customers.

Moving forward, the following enabling technologies will be of interest to financial services companies:

- IP-based network infrastructures
- Electronic commerce architectures
- FEDI software
- Web-back end integration
- Secure electronic transaction (SET) and other electronic transaction security protocols
- Digital certificates
- Public key encryption
- Capital market investment and trading systems
- ERP and packaged customer business application integration
- Enterprise risk management
- Web-call center integration
- Voice-IP integration
- Euro conversion tools
- Open interfaces

The following represent technologies of continuing interest to financial services companies:

- 32-bit and 64-bit architectures
- Client/server computing
- Compliance monitors
- Dynamic data exchange
- Electronic currency
- Electronic data interchange
- Frame relay and ATM for network backbone protocol
- Graphical user interfaces (GUIs)
- Imaging (document and item)
- Internet:
 - Access servers and client browsers
 - Development tools
 - Transaction and electronic commerce servers
- Intranets
- Middleware
- Multidimensional data analysis tools, data mining
- Object database management systems
- Online analytical processing (OLAP)
- Open systems architectures
- Relational database management systems
- Remote service access (point of sale, ATM)
- Smart cards
- Smart network software
- Standardization for better network connectivity
- Thin-client devices
- Virtual networks and extranets
- Workgroup computing

IT Services

Commercial financial institutions must increasingly rely on outside IT service providers in a wide range of areas as they attempt to establish themselves in Internet-based electronic commerce and race to complete year 2000 and euro conversions. Banks are increasingly willing to turn over the construction and operation of their network infrastructures, as evidenced by the five-year, \$750 million Citibank-AT&T deal to rebuild and consolidate the bank's worldwide network and make it ready for e-business. Similarly, banks are turning to outside vendors to design, build,

host, and manage their electronic commerce sites. Involving new technologies and new skills, e-business represents a prime area where banks must partner with others if they are to keep up with the rapidly changing market.

Knowledge management, encompassing everything from data warehousing and data mining to groupware and push technology, will require a combination of in-house skills and technologies and the services of a range of outside partners. Credit Suisse is teaming up with Thinking Machines Corporation to develop data mining capabilities as part of an initiative to increase customer retention. Sun Microsystems Inc., Deloitte & Touche Consulting, and SAS Institute Inc. joined together this past year to offer banks a comprehensive data warehousing/data mining solution.

Disaggregation also is driving banks into a variety of IT outsourcing and partnership arrangements. For example, Bank of New York is outsourcing custody management of \$42 billion in investment assets to Gartmore Investment Management plc, a British company. Mellon Bank Corp. has turned to MCI Systemhouse to outsource accounts payable and accounts receivable processing. Mercantile Bank Corporation teamed up with ALLTEL Corporation for loan production and origination. Meanwhile, more conventional IT outsourcing agreements continue to be executed worldwide: Australia's Commonwealth Bank signed a \$3.7 billion strategic partnership agreement with Electronic Data Systems Corporation (EDS) encompassing IT, desktop systems, and application development. South Africa's Nedcor Bank turned to Computer Sciences Corporation (CSC) to implement a transition to an advanced, integrated IT platform. Japan's Daiwa Bank Ltd. enlisted IBM in a strategic outsourcing agreement focusing on system operations, application development, and maintenance.

Moving forward, the following services will be of high interest to financial service companies:

- Web development
- Web management
- Development and deployment of e-commerce systems
- FEDI systems and training
- Web-back office integration
- Internet security
- Network implementation, operations, and management
- Voice and data integration
- Web, call center, data warehouse integration
- Year 2000, euro conversion services
- Data warehousing, data mining knowledge management services
- Capital investment and trading systems design, implementation, and integration
- Application development

- Application and systems integration
- Web-enabling of legacy systems
- Legacy systems conversions

IT-related services that continue to be of interest to financial service companies are as follows:

- Business process re-engineering (and related management consulting services)
- Call center outsourcing
- Client/server architecture and design
- Cross-platform data warehouse architecture and design
- Object-oriented programming (OOP)
- Custom systems designing
- Data center operations
- Database marketing outsourcing
- Desktop installation, management, maintenance, and end-user support
- Development and integration of reusable components/objects
- Disaster recovery and contingency planning
- End-to-end system integration
- Front- and back-office integration
- Risk model development
- Systems/network integration
- Telecommunications design and planning
- Transitional outsourcing
- Web masters (contracted resource/education and training)
- Workflow redesign consulting (focused on imaging and groupware)

Recommendations

The year 2000 and euro conversion threats have moved into the foreground as the deadlines of both approach, with year 2000 posing more risk and offering less flexibility, assuming much more importance. Similarly, deadlines to adopt FEDI are putting pressure on banks to adopt the systems quickly. These represent primary areas of focus.

At the same time, commercial banks cannot stop everything to focus only on year 2000. The financial world is moving at Web-speed with significant business change occurring in time measured in weeks and months. Banks no longer have the luxury of spending years to roll out a new generation of banking products. New products now appear within months, not years. Specifically, banks must continue to develop and deploy Internet/Web capabilities and introduce Web-based products and services. Otherwise,

by the time January 1, 2000, rolls around, the bank will find itself four to six generations behind in electronic business. Networks must also be upgraded for business in a ubiquitously networked world.

Despite the changes, the customer will remain the commercial bank's primary focus. Electronic business will enable commercial banks to expand their target markets, efficiently able to deliver sophisticated services over the network to small and medium-size banks. Here the challenge will be to leverage vast amounts of information about the customer and the market to effectively cultivate and expand profitable customer relationships.

Given a banking environment that moves increasingly at Web speed, the need for risk management will continue to expand. With the interest rate option risk that is part of many bank products, banks will need to apply sophisticated portfolio risk management across all the bank's products and the bank itself. As interest rates fluctuate and customers and markets respond, bank managers will need to adjust strategies as they scramble to capitalize on sudden opportunities or protect against unexpected threats.

The banking business overall has become increasingly volatile with continued consolidation and growing competition from a wide range of nonbanks, including investment and insurance firms, telecommunications firms, and software companies. Also, disaggregation and disintermediation remain critical issues. Shortages of skilled staff, the need to reduce overhead to remain competitive, training, and resource allocation in the face of looming deadlines are forcing banks to manage more intensively than ever before. Entry into the capital markets area opens a range of opportunities for vendors that can transfer their investment and trading solutions and experience to the commercial banking sector.

Given the heightened dynamics of the commercial banking market in 1998, providers of IT solutions with the requisite insights, skills, and experience will find a ready market in assisting commercial banks in areas ranging from year 2000/euro/FEDI compliance and staffing to knowledge management and electronic commerce. Vendors that want to prosper in the financial services market should address the following issues and concerns:

- Year 2000/euro fixes (planning, assessment, implementation, testing, deployment): Pressure mounts as commercial banks near the deadline of year 2000 and euro conversion and require additional resources and expertise.
- Electronic business: Commercial banks will require partnerships that help them identify and secure a role in the evolving world of Internet/intranet-based electronic commerce.
- FEDI capabilities: Software and training are needed to enable banks to participate in FEDI-based transactions.
- Knowledge management: Providers of data warehousing, data mining, groupware, decision support, executive information systems (EIS), and end-user data access solutions must help commercial banks use those solutions to leverage volumes of information to get closer to the customer and serve more profitable customers.

- **Web-enabled computer-telephony integration (CTI):** Commercial banks will need to deliver sophisticated products over the Internet, supported by integrated call centers, information-enabled call centers, and voice-over-IP to enable real-time, online customer interaction across the Web.
- **Network infrastructure:** To participate in the world of e-business, banks require new IP networks capable of supporting Internet, intranet, and extranet applications, including multimedia and voice-over-IP. Voice-over-IP enables some exciting possibilities, particularly in the area of customer service, but consumes bandwidth that may be required for new multimedia applications. Vendors will need to help banks sort through a variety of network technologies, particularly switching technologies, to ensure the banks have the network capacity they will need.
- **IT staffing:** Banks must increasingly look to outside providers for the experienced, advanced technical staff they require. This staff can be delivered on a contract or outsourcing basis, or the provider can help develop the staff inside the bank through advanced training techniques and technologies. Some staffing will be targeted to specific projects, such as year 2000 and euro conversion.
- **Disaggregation support:** Banks pursuing disaggregation strategies will need extensive support in the development and maintenance of open interfaces and the integration of diverse systems from an array of third-party partners.
- **Capital markets:** Commercial banks entering the capital market area will need to upgrade, revamp, expand, and integrate a complete set of advanced capital market systems and technologies.
- **Component-based development:** Commercial banks are looking for third parties to provide off-the-shelf, vertical components to reduce the cost of application development and speed the introduction of new software-based products and services.
- **Integration middleware:** Faced with the need to integrate diverse systems to create a single, logical system, financial companies seek effective middleware.
- **Web standards development:** Banks will need assistance in navigating the emerging Internet/Web standards for e-commerce, with particular attention to security, such as SET.
- **Consolidation:** Prompted by a desire to gain market share, institutions will need advice on combining operations, integrating systems, and choosing the best strategies for gaining economies of scale.
- **Electronic opportunities:** New opportunities are emerging for commercial banks, particularly in the area of merchant aggregation for e-business and as a digital certificate authority. Banks will require new tools, technologies, and expertise to enter these arenas.
- **Technology complexity:** In general, commercial banks will need help in handling increasingly complex and rapidly changing technology.
- **Cost management:** Banks need to leverage technology to streamline operations and become more cost-efficient. Major banks have announced staff reductions amounting to thousands of positions. Imaging, workflow, and other systems can help banks face the demands of increasingly competitive markets characterized by tight margins.

- **Risk sharing:** Both banks and investment companies will increasingly look toward vendors to share the risks of their investment in IT.
- **Legacy-Web system integration:** Banks need to enable their existing systems for use over the Internet/Web. Through the use of Java, component technology, multitier deployment schemes, and object/component architectures, banks can leverage their investments in existing systems by extending those systems to the Internet.
- **Risk and security:** The Internet increases risk and vulnerability by making financial systems and information accessible to more people. Also, the financial markets must feature more embedded risk in the form of interest rate option risk, as interest rate options are built into more and more banking products.

Chapter 2

Organization and Overview

Organization of Report

This report is organized as follows:

- Chapter 1 contains study objectives, a brief synopsis of methodology, and the key findings of this report, including a list of recommendations.
- Chapter 2 presents an overview and scope, industry structure, and an industry forecast.
- Chapter 3 discusses various trends and forces shaping the financial services market (with an emphasis on commercial banking) and the related impact on IT opportunity.
- Chapter 4 offers an update on the industry-specific activities of IT solution providers.
- Appendix A is a glossary of financial services terminology. A detailed glossary of terminology for technology and professional services is available in *Vertical Market Opportunities: State of the Industries—1997* (PSVM-NA-MT-9701).

Overview and Scope

This report identifies the requirements (user wants and needs) of U.S. banking institutions as related to IT. Collectively, commercial banks are chartered financial institutions that are addressing customer needs in the following areas:

- Electronic commerce
- Funds transfer
- Investment, trading, custody/settlement
- Private banking
- Long-range financial planning, retirement programs
- Commercial banking (deposits, checking, commercial and consumer lending and credit, commercial and consumer financial services)

In practice, commercial banks also increasingly serve the needs of their customers in retail banking areas and nonbanking areas by providing capital markets access, investment opportunities, and insurance. Similarly, investment companies are providing more retail banking capabilities, while the insurance industry offers products with investment dimensions along with conventional insurance. The proposed merger of Citicorp and Travelers may finally end the distinctions between banking, investments, and insurance. The announced merger of Bank of America and Nations-Bank creates the first coast-to-coast bank. With the advent of the Internet, small business banking, and high-end retail/consumer banking share many of the same features, with banks offering both small business customers and high-end retail customers access via the Web to sophisticated services, such as cash management services, once reserved for large corporate customers.

Industry Structure

Standard Industrial Classification Codes

Subsegments of financial services are traditionally grouped by standard industrial classification (SIC) code and provide the basis for Dataquest's industry market size and forecast. SIC codes for banking are as follows:

- 602: Commercial banks
- 603: Savings institutions
- 606: Credit unions
- 608: Foreign banks, branches, and agencies

The traditional SIC segmentation of banks increasingly makes less sense as banks in various segments offer services previously provided by banks in a different segment. For example, commercial banks offer extensive retail banking services once provided primarily by savings institutions. Credit unions, despite recent regulatory setbacks, offer services previously provided by banks. This report focuses on commercial banks; it restricts its emphasis mainly to those functions and activities that are traditionally associated with the commercial bank, mainly financial services to businesses. Today's commercial banks, however, participate in the full range of banking activity, as do savings institutions and thrifts. Disaggregation makes it increasingly easy for any bank to provide any banking service (and many nonbanking services) to its customers. These services will be provided transparently through partnerships with other banks.

Emerging Segmentation

Table 2-1 identifies a more accurate framework for viewing the evolutionary change within the banking industry, with a visual representation of change also illustrated in Figure 2-1. The services offered by various segments are represented in Figure 2-2. Missing from this segmentation is the kind of entity such as the merged Citicorp-Travelers, should that merger be concluded, and the Bank of America-NationsBank merger. The Citicorp merger would result in a global integrated financial services provider that transcends banking altogether. It is not clear at this time that such a merger will work from either an operational standpoint or a regulatory standpoint. These two mergers suggest that two new segments be added to the banking segmentation Dataquest is currently using (credit union, savings, regional, super regional, and money center). The new segments would be coast-to-coast and global diversified bank, as represented in Figures 2-1 and 2-2.

Cross-Industry Opportunity

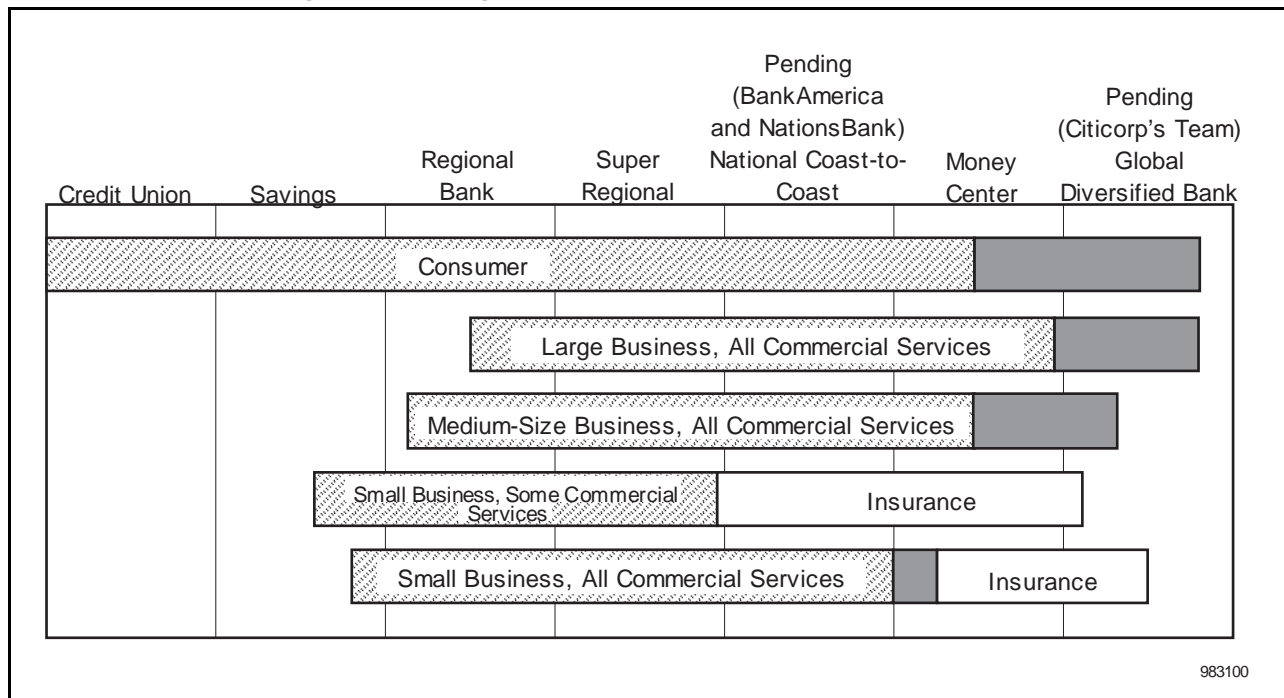
Although market user data and size/forecast span multiple segments of financial services industries, primary emphasis in this report will be on commercial banking. Dataquest's published market size and forecasts, however, are still based on vertical SIC segmentation and include corporate revenue from all associated activities, such as capital financing. Specific market activities identified in Figure 2-3 represent key leverage points for new business opportunities in related financial markets.

Table 2-1
A New View of Market Segmentation: Commercial Banking

Bank Segment	Typical Customer	Services
Money Center Bank	Large international corporations, large and medium-size regional companies, consumers	All commercial banking services, capital markets capabilities, consumer credit
Super Regional Bank	Large and medium-size companies, small business, consumers	All commercial banking services, capital markets capabilities, consumer credit
Regional Banks	Medium-size companies, small business, consumers	Most commercial banking services, some capital markets capabilities, broad consumer services
Community Banks	Small business, consumers	Some commercial banking services, some capital markets capabilities, broad consumer services
Savings Institutions	Consumers, small business	Limited commercial banking services, limited capital markets capabilities, broad consumer services
Credit Unions	Consumers	Consumer banking services

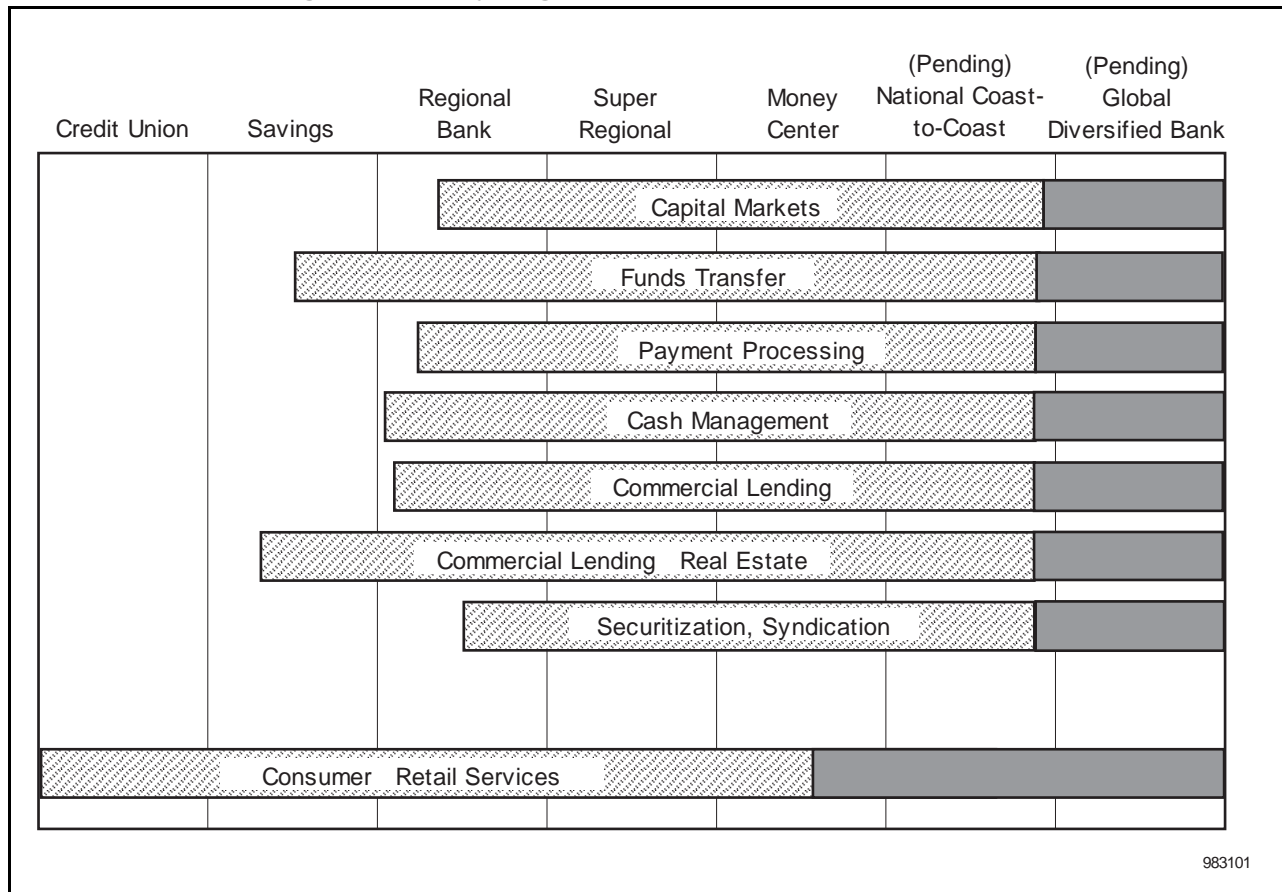
Source: Dataquest (May 1998)

Figure 2-1
Commercial Banking Market Segmentation



Source: Dataquest (May 1998)

Figure 2-2
Commercial Banking Services by Segment



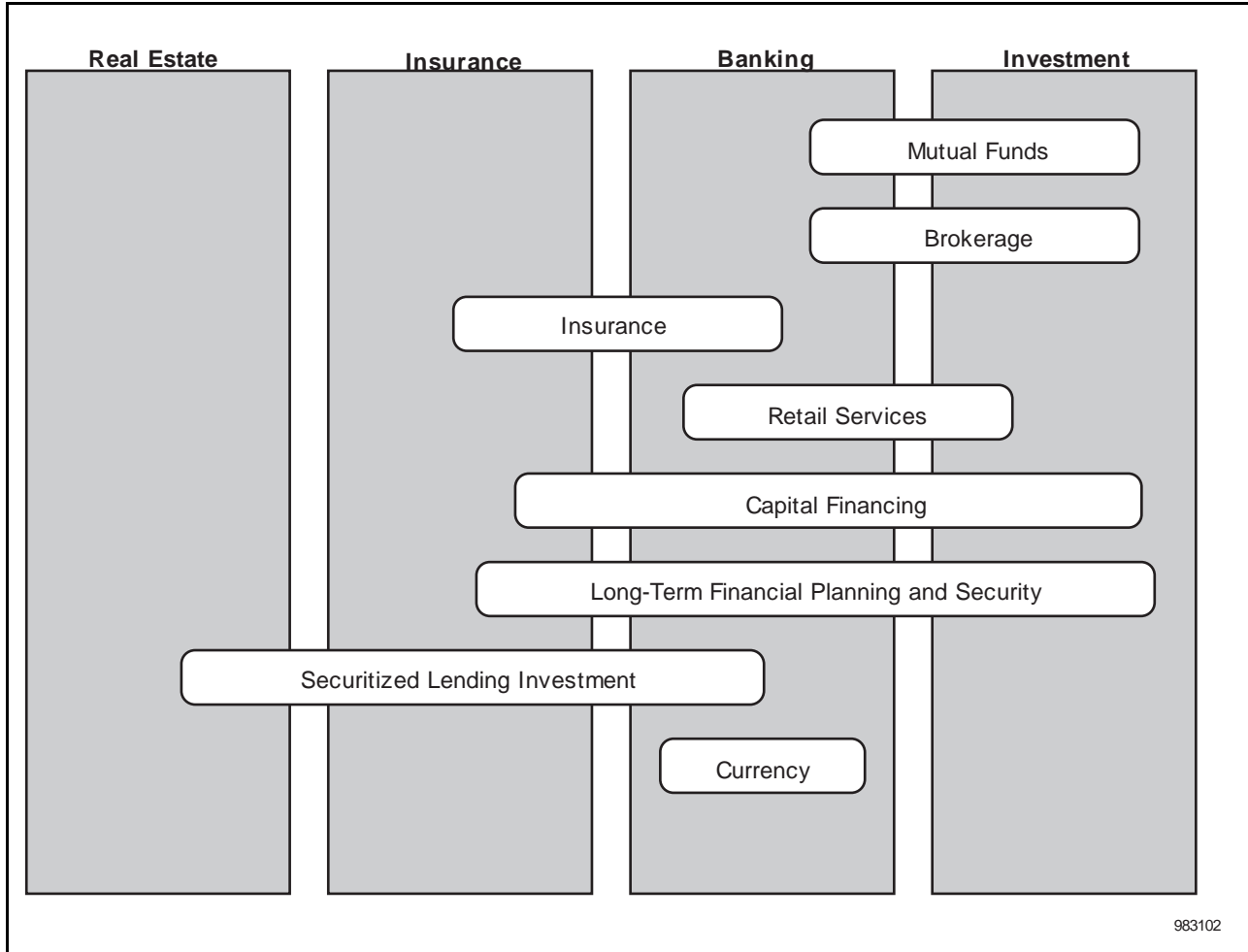
Source: Dataquest (May 1998)

Market Size and Forecast

Total U.S. IT Market

Dataquest estimates the total size of the IT market for financial services (including banking, finance, and real estate industries) for 1998 at \$51.8 billion, up from \$45.9 billion in 1997. This sizing represents about 16 percent of the \$325 billion U.S. IT market in 1998. Dataquest projects bank IT spending to continue to grow at an 11.6 percent compound annual growth rate (CAGR) for the 1996-to-2001 period. Dataquest's top-level IT market size and forecast are illustrated in Figure 2-4 and detailed in Table 2-2. (The size and forecast for related and intersecting markets, such as insurance, were published in the December 1997 report, *Market Trends: State of the Industries—1997* [PSVM-NA-MT-9701]).

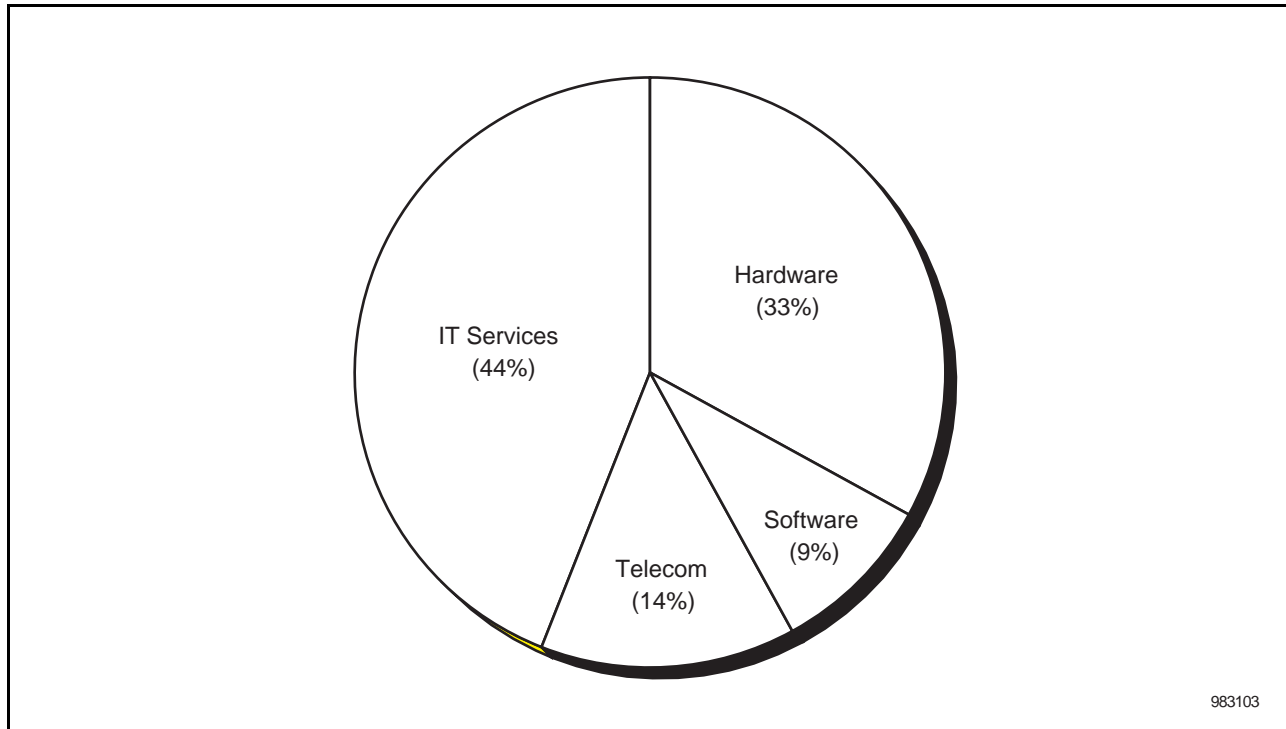
Figure 2-3
Cross-Industry Opportunity: Financial Services



Source: Dataquest (May 1998)

All IT-Related Services

Table 2-3 identifies the market opportunity for total IT services (including both traditional maintenance, or availability services, and professional services) in the financial services industry of the United States. This industry segment is growing at a 13.6 percent overall CAGR from 1996 to 2001. Among the numerous professional and systems integration services tracked by Dataquest in the financial services segment, asset management is experiencing the highest growth with a 27.5 percent CAGR, followed by business strategy at 22.7 percent and application management at 19.4 percent. At the other end of the spectrum, transaction processing services is experiencing one of the slowest growth rates, a paltry 6.2 percent; other comparatively slow-growing services are hardware maintenance and business continuation.

Figure 2-4**Total U.S. IT Market Size (Millions of Dollars): Financial Services, 1998 (SIC 60-62, 65, 67)**

Source: Dataquest (May 1998)

Table 2-2**Total U.S. IT Market Size and Forecast (Millions of Dollars): Financial Services, 1996 to 2001(SIC 60-62, 65, 67)**

	1996	1997	1998	1999	2000	2001	CAGR (%) 1996-2001
Dataquest Hardware IT	13,820	15,484	17,123	19,386	21,912	23,585	11.30
Dataquest Software IT	3,937	4,380	4,866	5,209	5,633	6,250	9.70
Dataquest Telecom IT	5,984	6,601	7,399	7,873	7,827	8,336	6.90
Dataquest Services IT	16,925	19,429	22,416	25,400	28,819	32,217	13.70
Total	40,666	45,894	51,804	57,868	64,192	70,388	11.60

Source: Dataquest (May 1998)

In the area of operations management services, asset management is the fastest growing, at a 27.5 percent CAGR, followed by application management at a 19.4 percent CAGR. These are followed by help desk management (18.3 percent) and business continuation (12.4 percent). Consulting will continue to represent an important component of IT-related services opportunity in the financial services sector, with business strategy consulting experiencing the highest growth rate for consulting services, at 22.7 percent CAGR for the five-year period spanning 1996 through 2001. IT consulting, on the other hand, is experiencing a 16.6 percent CAGR.

Table 2-3
U.S. IT Services Model (Millions of Dollars): Financial Services (SIC 60-62, 65, 67)

	1996	1997	1998	1999	2000	2001	CAGR (%) 1996-2001
U.S. Maintenance Services							
Hardware Maintenance and Support Services	4,562	4,964	5,658	6,011	6,568	6,945	8.77
Software Maintenance and Support Services	1,245	1,488	1,724	1,985	2,330	2,733	17.02
Total U.S. Maintenance Services	5,807	6,452	7,381	7,996	8,898	9,678	10.76
Consulting							
Business Strategy	368	470	580	705	847	1,022	22.69
IT Consulting	1,054	1,279	1,499	1,731	1,978	2,274	16.63
Total Consulting	1,421	1,750	2,080	2,436	2,825	3,295	18.32
Development and Integration							
Application Development	2,289	2,693	3,158	3,716	4,280	4,815	16.04
Integration	1,082	1,288	1,527	1,817	2,117	2,407	17.35
Deployment	791	934	1,099	1,298	1,501	1,694	16.44
Total Development and Integration	4,162	4,915	5,785	6,832	7,898	8,916	16.46
Education and Training	732	819	912	1,011	1,116	1,226	10.88
IT Management Services							
Operational Services	2,207	2,534	2,884	3,270	3,691	4,130	13.35
Application Management	311	377	453	540	642	755	19.40
Help Desk Management Services	217	260	309	366	431	503	18.32
Business Continuation	280	319	360	405	454	503	12.44
Asset Management	93	123	159	203	255	315	27.51
Total IT Management Services	3,108	3,614	4,165	4,785	5,473	6,205	14.83
Business Management Services							
Business Process Management	366	431	505	590	687	798	16.88
Transaction Processing Services	1,097	1,165	1,237	1,313	1,395	1,481	6.19
Total Business Management Services	1,463	1,596	1,742	1,903	2,082	2,279	9.27
Total U.S. Nonmaintenance Services	10,886	12,693	14,684	16,967	19,393	21,922	15.03
Total U.S. IT Services (Maintenance and Nonmaintenance)	16,693	19,145	22,065	24,963	28,291	31,600	13.60

Source: Dataquest (May 1998)

Related Research

Related research is located in the following publications:

- *Vertical Market Opportunities: State of the Industries* (PSVM-NA-MT-9601 and PSVM-NA-MT-9701).
- "Investment Industry" (PSVM-NA-DP-9803)
- *Vertical Market Opportunities in Retail Banking and Securities* (PSVM-NA-IT-9701)
- *Vertical Market Opportunities in Insurance* (PSVM-NA-IT-9702)
- "1997 End-User IT Expenditure: Vertical Markets" (PSVM-NA-DP-9705)
- "1997 End-User IT Expenditure: Industry Subsegments—Part 2" (PSVM-NA-DP-9709)

Chapter 3

Impact of Information Technology

Financial Performance

Earnings

Weathering the Asian financial crisis and record levels of consumer debt and default, U.S. banks continue to enjoy near-magical prosperity. Insured commercial banks reported record net income of \$15.3 billion in the fourth quarter of 1997, up \$511 million (3.5 percent) over the previous quarter, which held the previous net income record, according to the FDIC. Full industry earnings reached \$59.2 billion, up \$6.9 billion (13.1 percent) over 1996. Commercial banks enjoyed a record 1.23 percent return on average assets (ROA) in 1997, up from 1.19 the year before and beating the previous record of 1.20 percent established in 1993. Industry assets now exceed \$5 trillion. The drivers behind the improved annual profits were higher noninterest income (fees) and net interest income.

By comparison, the U.S. savings institutions earned \$2.4 billion in the fourth quarter of 1997 for an average ROA of 0.95 percent. Earnings were \$352 million in the previous quarter. The savings and thrifts also enjoyed strong noninterest income of \$125 million, up 7 percent over the previous quarter. As a result, the thrift industry set a record for net income in 1997, with \$8.8 billion, up \$1.8 billion from the year before. The ROA for the year was 0.93 percent, the highest since 1946.

Despite reports of glowing financial performance, 1997 witnessed the first commercial bank failure in 15 months. Overall, the number of commercial banks continued the steady decline that began in 1988. The total number of commercial banks stood at 9,143 at the end of 1997. During the year, 599 commercial banks were absorbed by mergers (190 were interstate) and 188 new banks received charters, the largest number of new commercial bank charters since 1993. The mergers are continuing in 1998 with the blockbuster mergers of Bank of America and NationsBank (valued at \$60 million), BancOne and First Chicago NBD (valued at \$30 billion), and Citicorp and Travelers Insurance (valued at \$85 billion), which may finally lead to the complete dismantling of the Glass-Steagall Act. Veribanc, the bank rating service, sees increasingly thin interest margins, rising calls by regulators for tighter loan underwriting, worsening credit quality at banks in eight states, diminishing loan loss reserves as a percentage of outstanding loans, record consumer delinquencies, and the Asian financial crisis as good reasons to suspect that the banking boom of the past few years may be coming to an end.

Ranking

There were significant changes among the top commercial banks over the year. Chase, which acquired Chemical last year, moved into first place from third. Citibank dropped to second, and Bank of America dropped to third. Wells Fargo fell from fifth to seventh, while Morgan Guaranty Trust Co. and NationsBank moved up from sixth and seventh, respectively.

Bankers Trust was new to the list this year, along with First Union and KeyBank. Bank of New York retained the tenth spot, but it took nearly twice the deposits to do so (\$57.5 million compared to \$30.7 million last year). Similarly, top-ranked Chase boasted over \$100 million more in deposits than last year's first place position, an amount (\$163 million) that would only earn fifth place this year. Table 3-1 presents the overall top 10 financial services companies based on data from June 30, 1997.

Table 3-1
Top 10 Banking Institutions (U.S. Dollars)

Rank	Bank	Size in Deposits
1	Chase Manhattan Bank	280,709,000
2	Citibank NA	254,497,000
3	Bank of America NT and SA	224,342,000
4	Morgan Guaranty Trust	188,738,977
5	NationsBank, NA, Charlotte	159,015,234
6	Bankers Trust Co.	98,871,000
7	Wells Fargo Bank, NA, San Francisco	91,547,188
8	First Union National Bank, Charlotte	83,899,690
9	KeyBank NA, Cleveland	65,938,033
10	Bank of New York	57,514,958

Note: This table does not reflect recent mergers.

Source: American Banker

Business Climate

Commercial Banking Markets

After several years where the banking action focused primarily on the retail banking sector and rapidly expanding retail delivery channels, commercial banking once again is attracting attention. E-business opens a host of new opportunities for commercial banks, as well as presents significant challenges and threats. In terms of new opportunities, virtually every product and service the commercial bank delivers can be delivered electronically over the Internet. This opens up the possibility of providing sophisticated financial services once reserved for large corporate accounts to small and medium-size companies. The commercial bank will also discover opportunities as a merchant aggregator on the Web and as a digital certificate authority, using its position as a trusted financial intermediary to authenticate parties to transactions over the Web. Commercial banks will find intensive competition in the e-business world from nonbanks, competitors ranging from telecommunications and technology companies to investment firms. In more conventional market segments, the continuing deregulation of financial services markets, particularly banking, investments, and insurance, has created more nonbank competition in the commercial bank's traditional markets, while enabling commercial banks to venture into new areas, notably capital markets. Banks are acquiring investment companies and partnering with investment systems providers as they ramp up for competitive battle in the new, diversified financial services market.

Electronic Commerce

E-commerce, e-business, e-banking, e-investment, e-everything—whatever you call it, doing business electronically over the Internet, a corporate intranet, or a private extranet between groups of businesses is dominating the planning for almost every aspect of commercial banking. Companies as diverse as Dell Computer, Amazon.com, and Cisco Systems have demonstrated that e-commerce is viable. E-commerce has moved beyond static Web pages, the electronic equivalent of brochures, to encompass commercial as well as consumer banking. In cash management, payments processing, loan origination, and a host of commercial banking services, the goal is to leverage the capabilities of the network. IBM designated electronic business in all its forms as one of its key strategic initiatives. Large and small banks, such as Citibank, Chase, Bank America, Cent Bank Corp., Nations Bank, and Zions Bancorp are jumping on the electronic business bandwagon, offering everything from online cash management services for small and medium-size businesses to electronic bill presentation and payments processing. In addition to enabling existing lines of business for the electronic market, banks are looking at new businesses and new roles, such as merchant aggregating through bank-hosted, Web-based, e-commerce sites, or as a digital certificate authority.

For all banks, payment processing is going electronic. The Federal Reserve has determined that financial EDI (FEDI) will be the payment processing system for all federal government payments by January 1, 1999, and is distributing 12,000 copies of FEDI software to financial institutions to ensure they meet the deadline. NACHA, the national clearinghouse organization, is moving even faster, with a FEDI goal for September 1998. Failure to become FEDI capable will not prevent banks from transferring funds electronically, but it will prevent them receiving the valuable information that accompanies each FEDI transfer.

With the Federal Reserve endorsing e-business with its support for FEDI, the message should be clear to every bank: E-business is the future of banking. Payment processing funds transfer and cash management services are quickly moving to the Web. It is apparent that commercial banking services over the network will be more widely adopted, and more quickly, than retail banking services, since companies have strong cost incentives to automate business transactions over the Internet. Banks must now begin Web-enabling all their products and services.

Small Business Banking

The loss of many smaller banks to mergers has resulted in a void in the market serving small businesses. Filling this void has long presented a problem. It is expensive to deliver sophisticated business banking services to small commercial accounts. Electronic banking, however, suggests a way for the newly consolidated banks to leverage their economies of scale and provide sophisticated banking services, such as cash management, to small and medium-size companies. Using the Internet, extranets, and e-commerce, a number of banks are ramping up new small business banking initiatives. Wachovia Bank, for example, is testing a concept called SMART Check that will enable it to provide financial management information to both small businesses and retail customers via an automated process. Similarly, Chase Manhattan Bank is implementing electronic bill

presentment, which it is targeting toward small businesses, middle market companies, large corporations, and institutions, but with particular emphasis on the small and medium-size market. Electronic bill presentment promises savings of 30 percent to 60 percent over paper-based billing. Vendors such as IBM, CheckFree, Fundtech, OnTrack Management Systems, and more are assisting banks in leveraging electronic systems and networks to drive down the cost of providing fee-based services to small and medium-size businesses.

Year 2000, Euro Conversion Imperatives

However eager banks may be to race ahead with new electronic banking initiatives, they must first resolve the year 2000 problem that threatens to divert massive amounts of resources from their new initiatives while posing serious dangers to a bank's competitiveness and even its survival. The year 2000 problem, which refers to the difficulty many computer systems will have properly handling two-digit date representations after December 31, 1999, and the conversion to the new euro currency in the EMU next year represent "must-complete" initiatives for banks. Without successfully completing the euro conversions, banks will be unable to conduct business efficiently with the ECC and without achieving year 2000 compliance, the bank may not be able to conduct business. Although horror stories of planes falling out of the skies as a result of year 2000 problems are clearly exaggerations, banks do indeed face grave problems if critical systems are not made year 2000-compliant. Just the litigation resulting from these problems may rival the hundreds of billions of dollars organizations may spend worldwide to fix the problem. Although a few banks, such as Bank Boston N.A. and First National Bank of Omaha, report having the year 2000 problem under control, recent surveys by industry associations suggest most banks have a lot left to do. The Federal Reserve has begun issuing increasingly frantic warnings and alerts on the issue. The euro problem is somewhat less critical than the year 2000 problem, but both need attention now. At the same time, bank managers must be planning beyond January 1, 2000. Surviving the century change is not enough. The bank must be prepared to immediately move forward with new products and services.

IT Staffing Crisis

Faced with the opportunities and challenges of the Internet-enabled electronic age and the threats and dangers of year 2000 and euro conversions, banks face a monumental IT staffing crisis. There simply may not be enough capable people to do the year 2000 conversion and the euro conversion and enable the bank's systems for the world of e-commerce. At the same time, banks are under pressure to maintain profits in the face of stiff competition, which prevents them from wholesale hiring even if people were available. Ironically, several major banks have initiated sizeable layoffs, even while complaining of staffing shortages in key areas. Service providers and outsourcing vendors of all varieties are filling the gaps as banks look outside for year 2000 help, network infrastructure assistance, and Internet-enablement. Training vendors are also jumping into the fray offering everything from Internet-based training to multimedia training to help banks ramp up staffing.

Capital Markets

Although the deregulation of banking, specifically the breakdown of barriers between banking and other financial services (investments and insurance), initially erected by the Glass-Steagall Act, has not been completed, the process continues. As a result, commercial banks are moving into the capital markets area, both as a defensive effort to counter inroads into banking being made by traditional capital market players, such as investment houses, and as part of a general strategy to expand the role of the commercial bank. Capital markets include loan syndication, securities trading, underwriting derivatives, fixed income trading, corporate finance consulting, and private debt placement. Once capital market activity was restricted to the very largest commercial banks or highly focused banks that specialized in this area. Now super regional and middle-market commercial banks are venturing into capital markets directly or through partnerships and alliances. In other cases, banks are acquiring companies in the capital markets area.

Network Infrastructure

The saying "the network is the bank" was never more true. Visions of electronic banking in all its forms are utterly dependent on fast, reliable, secure IP networks. Banks that have built large, proprietary networks have to rethink and rebuild their entire approach to networks in light of the Internet. The entire network architecture of the bank, from its voice telephony to its call center and data networks, must be revisited. Capabilities such as integrated voice and data or the integration of call centers with the Web or the integration of call center with the data warehouse will change the way banks conduct business in the future. Funds will be moved, payments processed, and loans tracked from origination through closure without ever leaving the network. Banks such as Citibank Corp. and Citibank have grasped the critical nature of the network and are moving to create new network infrastructures. AT&T Corporation, IBM, Tandem Computers Inc., and others are ready to deliver the new network infrastructure.

Existing legacy (systems network architecture) networks are not sufficient for the Internet-centered business environment. Banks must upgrade their network infrastructures to support high volumes of IP data, multimedia, and voice traffic. Existing legacy networks must be incorporated into new IP networks through techniques such as tunneling. Computer-telephony integration is being extended to include the Web and voice-over IP, as well as integrating the call center with back-end data sources and transaction systems. New applications that take advantage of multimedia and real-time voice and video already are being developed. It will not be long before a commercial banker and a client are holding teleconferences via the Web while sharing applications, data, and images in real time.

Knowledge Management

In banking, it all comes down to who controls the customer. However, in the emerging age of electronic business, the customer can be anywhere. How does the bank own and manage a customer who may never walk into the bank's office? The customer may speak to a bank representative only occasionally (or never). In this virtual environment, how do banks find and retain their most profitable customers and efficiently service less

profitable customers? The solution increasingly comes down to information and personalization. Banks increasingly are tapping the vast amounts of transaction and customer information available to them internally and through outside sources to identify and win top accounts—those accounts that provide the bulk of the bank's profits through the balances they maintain and the fees they generate. Commercial bankers must become storehouses of information about their customers, their customer's industries, their customers' competitors, and the economy at large as well as experts in the financial and banking business. Witness the rush to build vast data warehouses and leverage that information through data mining by banks such as Fleet Financial, Capital One, Credit Suisse, and First Chicago NBD. Dozens of technology suppliers are rushing to provide data warehousing, data mining, decision support, and a vast array of knowledge management products, such as IBM, Tandem, and Oracle.

Success in commercial banking comes to the one who controls and leverages the customer relationship. Knowledge management in all its forms—data warehousing, data mining, decision support—provides commercial bankers with the key to leveraging the customer relationship to the fullest. Commercial banks are ideally suited to control the customer relationship. Through their production systems, banks have amassed more information about their customers than most businesses ever can. This information can be supplemented with additional information from outside sources to give bankers information they need to identify and cultivate profitable customers and grow promising business relationships. The present challenge is how to tap customer information to better manage and build the customer relationship using techniques such as database marketing and data mining.

Three chief obstacles that continue to prevent commercial banks from capitalizing on this opportunity are as follows:

- Lack of a management culture and skills to analyze, uncover, and apply insights gained from this information
- Lack of effective tools for collecting, analyzing, and disseminating knowledge about the customer to where it can be used
- An array of incompatible databases, platforms, and technologies that prevent users from finding, accessing, and sharing the requisite information

Virtually all of the top 100 banks have data warehousing and data mining initiatives under way at some stage. Technologies ranging from groupware to push/pull solutions to document imaging and management promise to help banks address the last two obstacles. Combining the technical solutions with the development of an information-oriented management culture, banks can overcome these obstacles and solidify their relationships with the customer, making it unlikely that they can be disintermediated in the future. The more effectively that banks collect, access, analyze, and use customer data to personalize and extend the relationship with their customer, the less likely the customer will be to abandon the bank. For the banks, the key is to use customer information to understand and address individual customer preferences in terms of product, pricing, packaging, services, and convenience.

Competition and Consolidation

Consolidation has reduced the number of banks. Top bank mergers include Bank of America and NationsBank (\$60 billion), BancOne Corporation and First Chicago NBD (\$30 billion), First Union's purchase of CoreStates Financial for \$17 billion, NationsBank acquisition of Barnett Banks for \$15 billion, and First Bank System's purchase of U.S. Bancorp for \$9 billion. Despite fewer banks, competition is more fierce than ever before as banks compete against fewer but larger rivals and an increasing array of nonbanks, including investment firms, insurance companies, telecommunications companies, software vendors, and specialized start-up ventures. With the Dow Jones average continuing to surge to the 9,000 mark, up from 6,000 little more than a year ago, the equities industry and mutual funds remain a tantalizing alternative to banks, not only for retail customers but for the bank's largest, most attractive commercial accounts that continually search for sources of capital. Banks have been slow to enter the capital markets business, but that appears to be changing. Acquisitions and investments in new systems signal that not only the largest money center banks but super regional and medium-size banks are preparing to enter this market in an effort to retain their existing customers as well as capture new customers. Also, the announcement of a merger between Citicorp and Travelers Insurance, an \$85 billion deal, if completed, will signify a new stage in mega-, cross-sector mergers. (The Citicorp-Travelers deal will require Congress to substantially dismantle the remaining financial services regulations in the next five years.)

Enterprise Risk Management

With interest rate option risk embedded into many bank products and new capital market risk, commercial banks need to re-examine their approaches to risk. They need to adopt rigorous portfolio risk management while applying interest rate risk management across the entire enterprise. Also, they must use risk management in a proactive way as bank managers develop strategies to grow various business lines and increase profitability. The Federal Reserve has joined in this effort by calling on banks to improve risk management to reduce both institutional and systemic risks. Although many of the concerns about risk management focus on rising consumer debt and personal bankruptcy, with larger forays into capital markets and embedded interest rate options, the risk issue must be addressed throughout the entire bank.

Controlling Desktop Costs

Attempts to control desktop computing costs have stumbled as various desktop management initiatives, administrative reduction efforts, and thin-client technology have so far failed to deliver any significant, widespread payback. With the three-year total cost of ownership (TCO) of distributed computer systems (PC/LAN) continuing to hover at nearly \$40,000, five times the initial capital outlay, the cost of desktop systems remains a top concern. Although the much-hyped network computer (NC), a thin-client device, failed to materialize in numbers this year, the threat of its arrival drove PC makers to introduce capable conventional PC systems for under \$1,000. Although this is a welcome reduction, the initial hardware outlay represents only a small part of the total cost over time. In an industry like commercial banking, where nearly every worker must be equipped with a desktop system, more must be done to reduce the cost of deploying and supporting desktop systems.

Business Solutions

Table 3-2 details the needs of various commercial banking functions. Table 3-3 outlines the IT solutions specifically being offered to commercial banks today and those likely in the near future. Table 3-3 also provides a perspective on leading technologies associated with specific applications or business functions. These tables show the link between technologies that are key to implementing technology and services solutions that address the business issues of financial service managers. The emphasis on advanced communications such as the Internet, client/server technology, and commitment to implement more distributed solutions is evident.

Table 3-2
Key Business Objectives: Commercial Banking

Commercial Bank Area	Business Goal	IT Solution
Funds Transfer	Facilitate the electronic movement of funds quickly, securely, and efficiently	Funds transfer systems, including software to ensure compliance with funds transfer regulations
Payments Processing	Facilitate electronic processing of payments securely, quickly, and efficiently	FEDI; electronic bill presentment
Loan Origination	Automate the origination and processing of commercial loan applications	Lender workstations; loan origination and processing system; document imaging; and workflow systems
Loan Syndication	Automate the packaging, marketing, and management of large loans for syndication among multiple funding sources	Loan syndication systems
Corporate Financing	Assist customers with corporate financing strategies	Knowledge management tools
Cash Management	Facilitate efficient electronic cash management for commercial customers	Web-enabled cash management tools; self-service cash management systems
Foreign Exchange	Facilitate efficient electronic foreign exchange transfers	Multicurrency accounting tools; multicurrency funds transfer system; management and compliance tools
E-Business	Enable customers to access banking products and services over the Internet and extranet	Web-enabled transaction processing systems; Web hosting (for aggregators); Internet-based transaction management and processing; Internet-enabled back end systems
Capital Markets	Enable the bank to compete effectively in capital markets	Investment systems; trading systems; portfolio management systems; and risk management systems
Customer Service	Customer retention and relationship development (cross-selling)	Web-CTI integration; integrated data warehousing Knowledge management; voice-over-IP
Risk Management	Automate enterprisewide risk for more accurate view of risk exposure and profitability.	Enterprise risk management systems; portfolio risk management systems

Source: Dataquest (May 1998)

Table 3-3
IT Solution Matrix

Organizational Needs	Application Areas	Service Priorities	Technology (Now)	Technology (Future)
Year 2000/Euro Conversion	Information systems, bank business processes	Meeting critical deadlines, speed, efficiency, and accuracy	Assessment tools, testing tools, and limited automated remediation tools	Fully automated assessment, remediation, testing
Internet/Web Readiness (E-Business)	All commercial banking products and services	Security, time-to-market, and integration with existing applications	Web servers, Web development tools, and Web middleware	Advanced Java tools, enterprise-scalable Web transaction tools
Skills Shortage	IT, sales, customer support	Just-in-time skills	Computer-based training, Web-based training, and multimedia CD-ROM	Internet/intranet-based training, multimedia DVD
Knowledge Management	Customer service, sales, and marketing	Develop customer relationships, build profitability, and identify target segments	Data warehouses, data marts, DSS/EIS, data mining, and document management	Groupware, push/pull solutions
Disaggregation	IT, select back office functions, and select adjunct services	Seamless integration, transparent customer presentation, flexibility, and cost efficiency	Open interfaces, open platform architectures, and standard communication protocols	Standard interfaces, interchangeability, and components/objects
Small Business Support	All commercial financial services	Self-service, efficiency, and low cost	Web/Internet, PC platform	Java, components

Source: Dataquest (May 1998)

The challenges facing the commercial banking segment are similar to those facing retail banking and other industries: year 2000 compliance, the rise of the Internet/Web, the emergence of practical e-business, increased global competition, tight margins, the need to reduce time to market, the need to control costs, and the need to improve quality and customer satisfaction. Also, commercial banks face a number of other problems, including banking and IT staff shortages in key areas, euro conversion, FEDI implementation, disaggregation and disintermediation, and continuing (and thus incomplete) deregulation that progressively breaks down barriers between banking and other financial services. Customer development and retention have emerged as key challenges. Bank managers recognize that just having a customer is not sufficient over the long term. Commercial banks need to cultivate profitable customer relationships that will grow in value and use fees and packaging to turn less profitable customers into profitable ones. Banks must also deploy self-service automation to cost-effectively deliver services to small customers. Risk management

continues to be a concern, although more in the consumer banking segment than in the commercial segment. Yet, risk management at the portfolio level becomes critical as banks wade more deeply into the capital markets, spurred by the continuing movement toward the deregulation of banking and investments. With embedded interest rate option risk increasingly a part of bank products, enterprise risk management strategies are required as well. Finally, commercial bank managers will have to prepare to move quickly to take advantage of fast moving opportunities created by the Internet and customer interest in integrated supply chain management and other advanced business strategies. These areas present exciting potential for banks prepared to move quickly.

Key business challenges that have moved to the forefront during the last year include the following:

- Implement a year 2000 program
- Implement a euro conversion plan
- Implement FEDI
- Develop e-business capabilities
- Develop a knowledge management program
- Identify opportunities for effective disaggregation
- Implement data warehousing and data mining
- Implement enterprise risk management
- Develop capital markets capabilities
- Integrate the call center with the Web and voice-over-IP
- Initiate self-service programs for small and medium-size customers
- Explore opportunities for extranets
- Find economies through IP applications

Continuing emphasis on business challenges for financial services institutions that have developed over recent years include the following:

- Track digital money, smart card strategies
- Implement image-enabled workflow redesign
- Reduce costs and streamline operations
- Develop a strategy for consolidation and acquisitions
- Create an enterprisewide data access architecture
- Anticipate increased nonbank competition
- Develop strategies against disintermediation
- Cultivate a sales-oriented culture
- Align the information systems with the bank business strategy
- Plan for changing regulations

IT Infrastructure

Business Applications

Fundamentally, commercial banks are in three basic businesses: interest-based lending, fee-based financial services and processing, and capital markets facilitation. Also, banks have begun to explore other businesses, including merchant aggregation on the Web, which entails setting up a Web transaction site that makes full transaction services available to Web merchants; digital certificate authority, which entails establishing the bank as the trusted third-party to authenticate, verify, and validate transactions over the Internet; and supply chain management. They must also manage, monitor, and report compliance to regulatory authorities and manage risk and security. The industry also performs conventional administration functions and needs to provide productivity tools to its workers. To meet these needs, the industry turns to a wide range of systems and applications. In general, the commercial banking side tends to be more transaction-oriented and account-oriented, while the capital markets side of the business tends to be more oriented toward trading, portfolio, research, and compliance. Applications for predicting investment portfolio risk exposures are similar to those of banks for enterprise risk management, with many in both areas using Monte Carlo simulation. Also, many front-end financial software packages are finding their way to the treasury departments of banks. Both commercial and retail banking are moving toward a customer-centered focus.

Almost all of commercial banking application are being redeveloped for electronic channels and can be divided into the following groups:

■ Core retail business processing applications

- ❑ Deposit processing
- ❑ Check processing
- ❑ Loan processing, loan origination
- ❑ Payments processing
- ❑ Cash management
- ❑ Revolving credit, credit card processing
- ❑ Image processing
- ❑ Trade confirmation and settlement
- ❑ Margin accounting
- ❑ Credit management
- ❑ Risk monitoring, assessment, and reporting
- ❑ Regulatory compliance
- ❑ Client reporting
- ❑ Portfolio processing
- ❑ Enterprise risk management
- ❑ International exposures

- ☐ Global communications
- ☐ Portfolio management and accounting
- ☐ Asset management accounting and monitoring
- ☐ Relational database management
- ☐ Annuities services
- Additional services processing
 - ☐ Funds transfer
 - ☐ FEDI
 - ☐ Electronic commerce
 - ☐ Web transaction processing
 - ☐ Digital certification
 - ☐ Supply chain support
 - ☐ Custody
 - ☐ Trust
 - ☐ Private banking
 - ☐ Asset management
 - ☐ Clearing and settlement
 - ☐ Branch communications
 - ☐ SEC compliance
- Customer service and marketing applications
 - ☐ Statements
 - ☐ Reporting
 - ☐ Compliance
 - ☐ Client account monitoring problem resolution
 - ☐ Decision support and EIS
 - ☐ Knowledge management (data mining, database marketing, online analytical processing)
 - ☐ Profitability analysis
 - ☐ Segmentation analysis
- General business, workgroup, workflow, and productivity systems
 - ☐ Accounting, general ledger
 - ☐ Human resources, payroll
 - ☐ Groupware/workflow
 - ☐ Office automation
 - ☐ Personal productivity applications (word processing and spreadsheets)

- Application development and IT system/network management
 - Year 2000 compliance and euro conversion
 - Systems management
 - Network management
 - Web management
 - Web-enabled network applications
 - Component/based development, object-oriented programming
 - Rapid application development
 - Modeling and simulation
 - Project management

Applications of Technology

Major commercial/wholesale banking applications and related technologies are listed by application and then by technology as follows:

- Electronic business facilitation
 - Electronic transactions (authentication, certification, verification, validation, transaction processing)
 - Merchant aggregation
 - Digital certificate authority
 - Relationship management
 - Data access, multidimensional data analysis, and data mining
- Capital markets capabilities
 - Securities trading
 - Investment/portfolio management
 - Foreign exchange
 - Loan syndication
 - Private debt placement
 - Corporate finance consulting
- Payments processing
 - Electronic bill presentment
- Funds transfer
 - FEDI and EDI
- Internet-enabled financial applications
 - Small and medium-size business self-service
- Document imaging
 - Lending and customer service
- Data warehousing
 - Customer service, DSS, and EIS

- Automated voice response/CTI
- Web-integrated CTI
 - Customer service and new delivery channels
- High speed networking
 - New delivery channels and remote/branch access
- Client/server technology
 - Sales, customer service, DSS, and EIS
- Multimedia
 - Enhanced ATM, kiosks, training, and Internet
- Components/objects
 - Trading systems, all new development
- Mobile computing
 - Commercial banking, sales, and service
- Groupware
 - Sales and marketing and all workgroups and departments
- Interactive videoconferencing
 - Customer service and retail services delivery

IT Expenditure Allocations

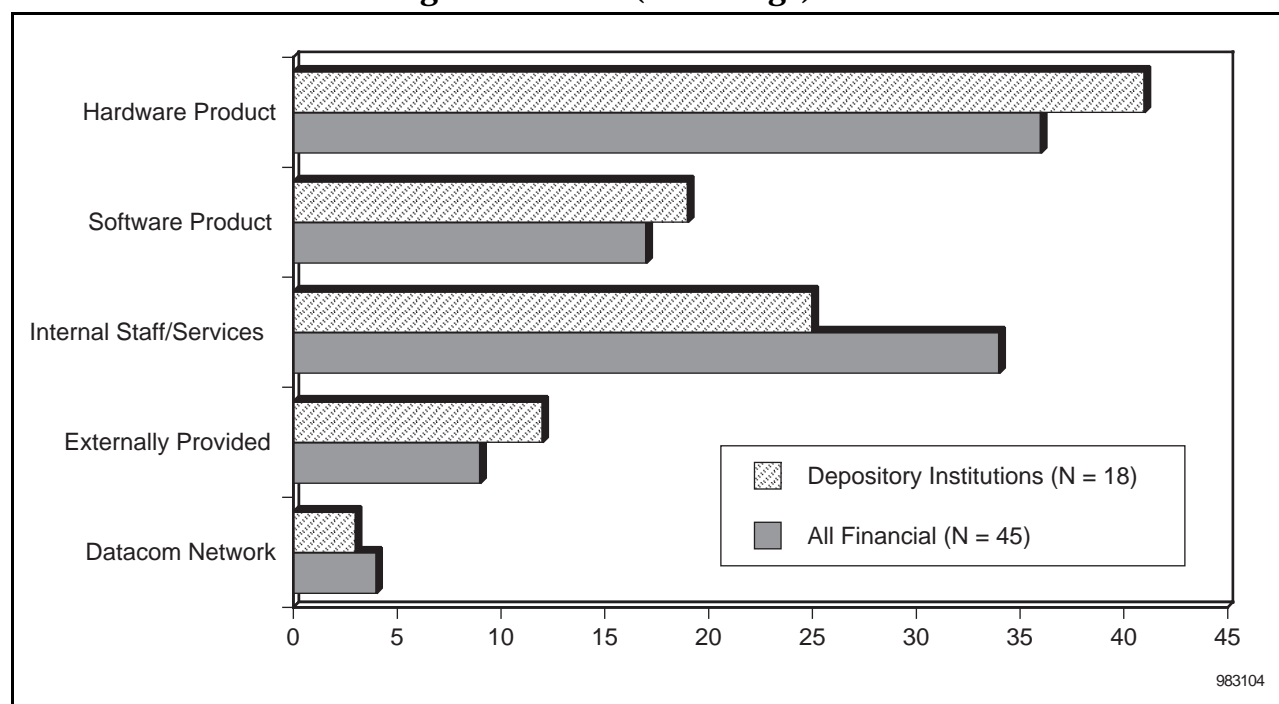
Dataquest research suggests that the depository institutions continue to spend the most heavily on hardware and internal staffing and services. Software products and externally provided services also drew significant spending. This study does not yet reflect recent bank interest in revamping the network (datacom) infrastructure. This can be attributed to the nature of the sample, which was weighted toward small and medium-size banks. These banks would be slower to upgrade their networks.

Depository institutions are allocating more on external services than their financial services counterparts and allocating slightly less on networks. The results must be considered in light of the sample that is dominated by smaller banks, which are less likely to have large internal staff. Figure 3-1 shows estimated IT budget allocation for financial services.

Major IT Projects/Business Initiatives

Among the top initiatives for IT investment (see Table 3-4), depository institutions are focusing their efforts on the Internet, year 2000 remediation, electronic messaging, and business recovery—confirming the leading trends identified elsewhere in this report. Although data warehousing attracted relatively light interest, the lower percentage reflects the smaller size of institutions participating in the study.

Figure 3-1
Estimated Total 1998 IT Budget Allocation (Percentage): Financial Services



Notes: All financial excludes insurance; it includes real estate, depository, and nondepository institutions.

Survey sample for financial services = 25 percent from medium-size institutions with greater than 400 employees supported by the IT expenditure; the remainder of the sample represents IT expenditure associated with organizations under 400 employees.

Source: Dataquest (May 1998)

Table 3-4
Top Five Business Initiatives (Major IT Projects)

	All Financial (N = 49)	Depository Institutions (N = 20)
Internet	55	75
Electronic Messaging	47	45
Year 2000	37	50
Business Recovery	35	45
Intranet	33	35
Application Management/Maintenance	26	30
EAP	26	30
Security	26	30
Help Desk	22	20
Data Warehousing	18	15
Mobile Computing	18	5
Customer Management System	16	20
NT Migration	16	10
Asset Management	14	10
Electronic Commerce	12	5
Collaborative Computing	6	5

Source: Dataquest (May 1998)

Opportunity Assessment

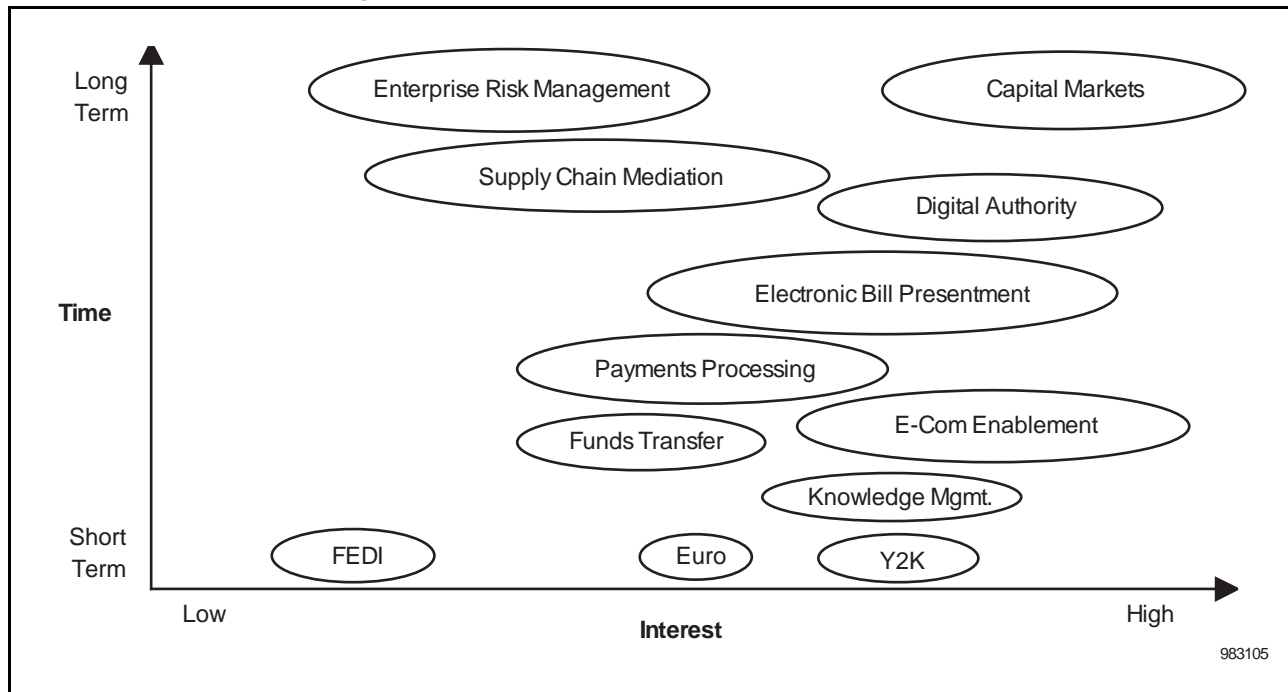
In summary, significant opportunities for vendors of IT solutions in commercial banking are as follows:

- Assisting with year 2000 compliance
- Assisting with euro conversions
- Facilitating electronic business (validating, authenticating, certifying, payment processing, and management)
- Implementing FEDI
- Implementing knowledge management systems (data warehousing, data mining, DSS/EIS, document imaging, and information access)
- Integrating bank services with supply chain management/ERP systems
- Implementing enterprisewide risk management
- Implementing electronic cash distribution, processing, and management
- Establishing and maintaining Internet presence
- Building corporate intranets and extranets
- Development of reusable financial software components
- Computer-telephony integration for the universal call center and direct bank, including call center outsourcing
- Call center-Web integration
- Implementing voice-over-IP for customer service

The positioning of these opportunities is illustrated in Figure 3-2, in relation to the time and interest level within the commercial banking industry.

In addition to these primarily technical opportunities, opportunities exist in helping banks assess, develop, and implement disaggregation strategies, in which banking processes identified as noncore competencies are outsourced. Other opportunities revolve around helping banks meet staffing requirements through supplemental staffing, temporary staffing, recruitment, and training.

Figure 3-2
Comparative Positioning



Source: Dataquest (May 1998)

Chapter 4

Competitive Trends

The financial services industry continues to be a large opportunity for computer systems and related IT services. Dataquest market projections for IT opportunity (as defined by Dataquest) exceed \$51 billion in 1998. This chapter explores the market activities of leading IT providers in the financial services industries. Table 4-1 lists overall trends for each market segment.

Table 4-1
IT Provider Trends in Commercial Banking

Commercial Bank Function	Provider Trend
Electronic Business	Internet/Web-enabling existing banking applications Developing new Internet/intranet/extranet applications Implementing transaction processing solutions Implementing security and authentication capabilities
Funds Transfer, Payments Processing	Implementing FEDI Internet-enabling funds transfer systems
Cash Management	Web-enabling cash management applications for self-service Deploying cash management in Internet, intranet, and extranet environments
Customer Service	Web-enabling the call center Integrating voice-over-IP into the call center Implementing knowledge management
Capital Markets	Developing trading systems Developing investment management systems Developing foreign exchange systems
Regulatory Compliance	Implementing year 2000 fixes Performing euro conversions Implementing FEDI
Bank Infrastructure	Develop new IP-based network architecture Develop distributed, multitier, component-based application architecture

Source: Dataquest (May 1998)

A variety of vendors, both newcomers and established players, are addressing the technology needs of financial services companies. A sampling of the specific players are identified by category as follows:

- Electronic transaction facilitation, electronic commerce, and electronic banking—Tandem, IBM, Harbinger Corp., Premenos, AT&T, Banker's Trust, CheckFree, Reuters, GTE, HP, Integriion, Intelisys, Intuit, Excite, Actra, Commerce One, Digital Boardwalk, EDS, iCAT, Netscape, Pandesic, Sterling Commerce, Microsoft, Open Market, RSA, Terisa Systems, MasterCard, VeriSign, Vertigo Development Group, Visa, and Wells Fargo
- Electronic cash/payment—Bottomline Technologies, SSE (Siemens Nixdorf), CertCo, CyberCash, CyberGuard Corporation, DigiCash, MasterCard, Mondex, and Visa

- Knowledge management; data mining, warehousing, access, and delivery; database marketing—Oracle, Tandem, Sybase, IBM, Informix, Microsoft, DataMirror, Cognos, Carleton, Computer Associates, Information Builders, SAS Institute, Business Objects, NCR, Pilot Software, Red Brick, Thinking Machines, Early Cloud, Fusion Marketing Group, HarteHanks Data Technologies, Hogan Systems, HP, MPI, OKRA, Platinum Technologies, Profit Management Group, and Unisys
- Year 2000 compliance—IBM, ADS, Ascent Logic, Bellcore, Cayenne Software, Computer Associates, Data Dimensions, Intersolv, Liant Software, Millennium Dynamics, Platinum Technology, Software AG, and Viasoft
- Systems and network management—BMC Software, Boole and Babbage Inc., Cabletron, Computer Associates, Compuware, HP, IBM/Tivoli Systems, McAfee Associates, Platinum Technologies, and Seagate Software
- Object/component technology—Computer Associates, IBM, Iona Technologies, Microsoft, ObjectDesign, Sun, and Visigenic Software Corporation
- Supply chain management, ERP integration—Crossworlds, CrossRoute, Oberon, Active Software, New Era of Networks, SAP, Baan, PeopleSoft, J.D. Edwards, Oracle, Tibco, and Vitria

This is not comprehensive. Many companies operating in these areas are not listed. Many of the companies listed in one area are operating in more than one area. New companies are entering the market every week. This information provides a snapshot to convey where vendor interest is falling and who the competition in a given area will include.

Players

This section offer a brief commentary on the market activities of a selection of hardware vendors, software vendors, and electronic commerce and professional services (including systems integration) companies.

Hardware Vendors

Sun continues to promote the Java language and application environment and position Java as an alternative to Microsoft Windows. Despite cracks in the Java alliance and setbacks, Java is attracting astounding interest from both developers and business managers. Sun is also leading the charge for NCs, thin-client devices akin to graphics terminals that suggest a possible (but not certain) way of reducing the cost of desktop computing. IBM and Oracle have joined Sun in supporting a standard that would allow software portability among the new network computers.

Compaq Computer Corporation has emerged as a force to be reckoned through acquisitions of Tandem and Digital Equipment Corporation. No longer can Compaq be regarded simply as a major provider of desktop PCs and workgroup and departmental PC servers. With Tandem, it offers high-volume, fault-tolerant transaction processing, Web commerce, CTI, and data warehousing. Its acquisition of Digital Equipment supplements its Tandem-based enterprise capabilities. How well Compaq is able to absorb both Digital Equipment and Tandem will greatly determine its impact on the industry. The potential exists for the combined entity to become a powerhouse within the industry.

IBM has embraced electronic business and Java with a vengeance, boasting more Java developers than Sun itself. It has also renewed its interest in data warehousing and data mining, lining up numerous partners in the area. As a services provider, systems integrator, and outsourcing vendor, IBM continues to rack up financial industry contract wins.

NCR Corporation is aggressively applying its Terradata parallel technology in the area of data warehousing and data mining. It is also delivering enhanced, image-capable ATMs that can be equipped with smart card readers.

Dell Computer Corporation, the direct marketing computer vendor, has emerged as a leader providing low-cost desktop systems and servers. Its direct sales and configure-to-order approach has revolutionized the desktop industry and left rivals from Compaq to Apple scrambling to reproduce its success. Dell's Web site has become a model for electronic business and high-volume Web transactions.

Cisco Systems Inc. has emerged as the clear leader in the networking communications industry, providing a wide range of hubs, routers, and switches. At the same time, rivals Bay Networks Inc. and Cabletron Systems Inc. have stumbled. Cisco's Web site offers another example of high volume electronic commerce over the Internet.

Software Vendors

Microsoft continues its ambiguous approach to the banking industry, unsure of whether it is a competitor or a partner. The likely resolution is that Microsoft is both competitor and partner. As a partner, it offers a range of products within the Windows NT architecture to facilitate Web commerce. As a competitor, it has the potential to win transaction processing business and perform merchant aggregation, areas of emerging opportunity for banks. The banking industry already relies on Microsoft technology at the desktop, and Windows NT is pushing deeper into the IT infrastructure. Despite Microsoft chairman Bill Gates' commitment not to compete with banks, bankers are wary.

Oracle represents itself as an alternative to Microsoft in a variety of areas. Although best known for its highly scalable relational database technology, Oracle has been one of the leaders in promoting the NC and thin-client architecture that presents a potential alternative to Microsoft Windows. NCs, after considerable delay, are finally arriving on the scene; however, the initial economics are not as attractive as they originally appeared, even though the concept continues to attract believers. Oracle is also a key player in the data warehousing/data mining arena.

Computer Associates continues to drive its Unicenter management environment in addition to offering software products in a range of areas. The most significant event, however, is something that didn't happen: the acquisition of CSC. Although CSC avoided the hostile takeover attempt of CA, the rationale behind the effort—the need to drive its products into the enterprise on the coattails of a major systems consultant and integrator—remains. CA is likely to continue hunting for a suitable partner.

Electronic Commerce

Bottomline Technologies has emerged as the FEDI leader, providing the software for Federal Reserve distribution.

First Data Corporation, in an alliance with Microsoft, has emerged as a leader in electronic bill paying and presentment. Whether banks buy into the resulting service or it serves to further disintermediate banks remains to be seen.

Integrion acquired Visa Interactive and teamed with CheckFree to provide an electronic banking infrastructure to the banking industry.

Visa and MasterCard have finally rolled out SET, despite considerable questioning of the need for the protocol. Spurred by incentives built into the fee structure, merchants should begin adopting SET over the next year.

Mondex, MasterCard, and other smart card companies have gone back to the drawing boards and come up with yet another rationale for smart cards, a multiapplication smart card platform that promises versatility. Although smart cards have taken off in Europe, they continue to lag in the United States.

AT&T has teamed up with Hewlett-Packard Company to get its Secure-Buy e-commerce services to the market through integration with HP's Domain Enterprise Servers. A host of other e-business providers have been invited to come along, such as iCAT and Open Market.

Professional Services Companies

EDS continued to rack up financial industry contracts and develop alliances. It teamed with the Chicago Clearing House to provide e-commerce services to banks, and it teamed with HP and VeriFone on another e-commerce initiative. It joined with BA Merchant Services to offer credit card federal tax payments. It also won an outsourcing contract from Sumitomo Bank of California.

F:serv continues its acquisition binge. It acquired AdminStar Communications, Interactive Planning Systems, and FIS Inc. It teamed up with Unisys on a data warehousing solution and added Pine Cone Systems as data warehousing partner. It also acquired BHC Financial Inc., a provider of security processing for bank-affiliated broker-dealers.

IBM remains the banking industry vendor leader with numerous contract awards, alliances, and partnerships covering nearly all aspects of banking and financial services. It launched a Web search engine for banking and finance professionals and teamed with Dow Jones and Infinity to provide stock portfolio risk management over the Web. The company entered into agreements with M&I Eastpoint and F:serv for, respectively, UNIX-based banking software and retail banking on the AS/400. It also teamed with Chase Manhattan Bank and First Data on an e-commerce initiative.

ALLTEL was very active in the commercial banking sector over the past year, picking up contracts with Colonial State Bank, Republic Bank, First National Bank & Trust, First Tennessee Bank, Tucker Federal Bank, and others.

Contract Trends

Driven by the need to meet year 2000 and euro deadlines, demand for knowledge management and data warehousing, and the rapid acceptance of the Internet/Web and e-business, banks turned to an array of contracts and partnerships to prepare (from a systems standpoint) for this new electronic banking environment. The following is a sampling of recent bank contracts and technology acquisitions:

- Bank of America joined with Intuit and Tele-Communications Inc. in a TV banking deal, specifically related to home banking via cable TV.
- Citibank outsourced the consolidation of 11 data networks to AT&T in a deal expected to save \$250 million.
- Bank of New York acquired 20 percent of Financial Models Corporation.
- Shenzhen City Union Bank turned to Bull for smart cards.
- Zions First National Bank introduced digital signature products through a division called Digital Signature Trust.
- National Australia Bank began Mondex trials early in 1998.
- Chekiang First Bank of Hong Kong selected the Informix Dynamic Server as the database for its e-commerce Web banking system.
- Crestar Bank purchased Pathlore Software's Phoenix for Windows multimedia authoring.
- Wachovia Bank adopted SMART Check from OnTRACK Management Systems.
- Commonwealth Bank of Australia signed up EDS for a 10-year, \$3.8 billion outsourcing deal.
- KeyCorp. adopted CMSI's Credit Connection for electronic auto loan origination from auto dealers.
- Chase Manhattan Bank adopted IBM's high-volume check imaging/archiving solution.

The commercial banking segment has moved into the limelight as Internet/Web interest shifts from establishing a presence on the Internet to conducting a full range of e-commerce and e-banking activities. Commercial banks and their clients are positioned to more quickly adopt e-commerce and e-banking than consumers because of the network infrastructure already in place. Businesses have long conducted some level of e-commerce through EDI. It is not a big leap from there to Web-based e-commerce and FEDI. As a result, commercial banks are preparing to "Web-enable" virtually every existing product and service, as well as add new products and services. Also, the networked world opens up new business opportunities for commercial banks in a range of e-commerce areas, from payments processing to authenticating and validating transactions. It also opens an opportunity for commercial banks to establish varying roles as financial partner in the rapidly emerging supply chain management/ERP market. More than ever the commercial bank's information systems and networks will play a key role in how well the bank responds to customer demands and capitalizes on new opportunities.

Meanwhile, disaggregation will give bank managers a way to focus on their core competencies while continuing to deliver full service to the bank's customers. Bank managers recognize that technology, as witnessed by the Internet/Web and the stunning emergence of e-business, is changing so fast that the banks cannot handle their information technology and network infrastructure needs alone. This situation ensures that commercial banking will represent a primary opportunity for technology product and service providers for years to come.

Appendix A

Glossary and Acronyms of Financial Services Terms

ACH—Automated clearinghouse

ALM—Automated loan machine

Arbitrage—Purchasing a commodity or security in one market for immediate sale in another

ATM—Automated teller machine (or Asynchronous Transfer Mode)

Capital markets—Investment and trading activities

Cash management—A set of account information services that help commercial clients handle accounts payable/receivable, cash flow, payment processing, invoicing

Derivative—Instrument with value derived from the movement of the underlying asset or debt

Disaggregation—The practice of breaking up large, complex banking organizations into their discrete functions for the purposes of streamlining operations, focusing on core competencies, and spinning off or outsourcing services

Disintermediation—The process of going around the middleman, traditionally the role of the bank in the financial services area

EC—Electronic commerce

EMU—European Monetary Union (the euro currency)

ERM—Enterprise risk management

Financial EDI (FEDI)—A structured method of making and receiving financial payments and exchanging financial billing and payment information automatically over a network

Hedging—Offsetting transactions that mitigate one or more types of risk

NC—Network computer (thin-client device)

POS—Point-of-sale terminal

Risk—An adverse change

TCO—Total cost of ownership

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