

REVIEW REPORT SERIES

Business Intelligence in Retail Banking (Review Report)

Business Intelligence across the enterprise

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OVERVIEW

Catalyst

Growth of data volumes in disparate sources, ongoing regulatory changes and growing technology capabilities are driving financial services organizations to increase investment in business intelligence technologies. Banks must align intelligent technology with data management techniques in order to improve their decision-making processes.

Summary

The theme provides in-depth analysis of the state of affairs in the global retail banking industry with regard to thriving business intelligence (BI) area. The market focus brief examines market drivers that contribute to the growth of BI. The strategy focus brief focuses on the main solution areas where BI capabilities are applied and further developed, explains how real-time delivery ability affects the decision making process. The technology focus clarifies the pros and cons of best-of-breed vs. best-of-suite BI solutions. Moreover, it identifies the main technology components of business intelligence in retail banking. Finally the market model includes detailed data on business intelligence technology spending, including breakdowns by geography, solution area and source.

- Business Intelligence in Retail Banking (Market Focus)
- Business Intelligence in Retail Banking (Strategy Focus)
- Business Intelligence in Retail Banking (Technology Focus)
- Business Intelligence Technology Spending in Retail Banking through 2012 (Databook)

EXECUTIVE SUMMARY

Introduction

This report combines all three briefs from business intelligence technology development in retail banking. The market focus provides an overview of current market drivers the retail banking sector. The strategy focus considers what are the key business requirements and associated solution areas, and finally the technology focus identifies the main technology. A databook showcasing relevant data from the interactive model is also included.

Business Intelligence in Retail Banking (Market Focus)

Business intelligence functionality has its roots in early decision support systems and is responsible for turning transactional data into actionable information. Compliance requirements, a competitive business environment and the need for stronger management will drive further development and promote business intelligence software into a decision automation system. This brief argues the following statements:

- Compliance requirement is keeping focus squarely on reporting and monitoring functionality.
- Sales and service effectiveness requires ability to predict customer requirements as well as fully understand customer relationship.
- Strong management necessitates deep insight and control of banking operations.

Business Intelligence in Retail Banking (Strategy Focus)

Given the enormous growth of data, banks are suffering from their inability to effectively exploit their data assets. As a result, banks must now capitalize on the capabilities of business intelligence (BI) software, particularly in areas such as customer intelligence, performance management, financial analysis, fraud detection, risk management, and compliance. Furthermore, banks need to develop their BI real-time delivery ability in order to respond faster to business issues. This brief argues the following statements:

- BI must be fully aligned with business processes.
- Ability to respond faster to customers, to regulators or to management generates need for real-time automation.

Business Intelligence in Retail Banking (Technology Focus)

Institutions that are interested in implementing efficient BI capabilities require much more than just the collection and storage of data. Banks and technology vendors need to bring many moving pieces together. This includes the right sourcing strategy, software applications, technology tools, business processes, collected data, company metrics, incentives, corporate culture and project management skills. This brief argues the following statements:

- The sourcing strategy must be aligned with needs and resources.
- Banks must develop a comprehensive end-to-end BI platform.
- Banks require a consistent and standardized approach to developing an integrated and fully automated BI platform.

Business Intelligence Technology Spending through 2012 in Retail Banking (Databook)

This report includes detailed data on business intelligence technology spending in retail banking in North America, Western Europe, Central and Eastern Europe, Asia-Pacific and the Middle East, including breakdowns by country and by solution areas. Furthermore, it has detailed historic, current and future statistics on internal and external IT spending.

- Solutions areas include customer intelligence, performance management, financial analysis, fraud detection, risk management and compliance.
- Sources include internal and external spending split by hardware, packaged software, systems integration, and services.

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BUSINESS INTELLIGENCE IN RETAIL BANKING (MARKET FOCUS)

Summary

Business intelligence functionality has its roots in early decision support systems and is responsible for turning transactional data into actionable information. Compliance requirements, a competitive business environment and the need for stronger management will drive further development and promote business intelligence software into a decision automation system. This brief argues the following statements:

- Compliance requirement is keeping focus squarely on reporting and monitoring functionality.
- Sales and service effectiveness requires ability to predict customer requirements as well as fully understand customer relationship.
- Strong management necessitates deep insight and control of banking operations.

Introduction to the market brief

The term “business intelligence” (BI) encompasses analytics as well as the processes and technologies supporting data management like collecting data from disparate sources, data cleansing or generating insightful reports. BI is generally defined as software applications that support organizational decision-making by turning historical and transactional data from various sources into actionable information. Such applications can be seen as sitting at the end (or front-end) of the value chain that originates in operational systems such as Core Systems, and other transaction processing systems, providing insight into issues such as customer profitability, corporate performance, risk and anything that is based on the collection and analysis of large amounts of data. Their purpose is to enable executives and other information users across the organization to gain a consolidated view of the data these operational systems produce, mostly in the form of reports and dashboards that need to be easy to understand and flexible at the same time. Business intelligence applications are the front-end and only part of the value chain that is visible to end-users.

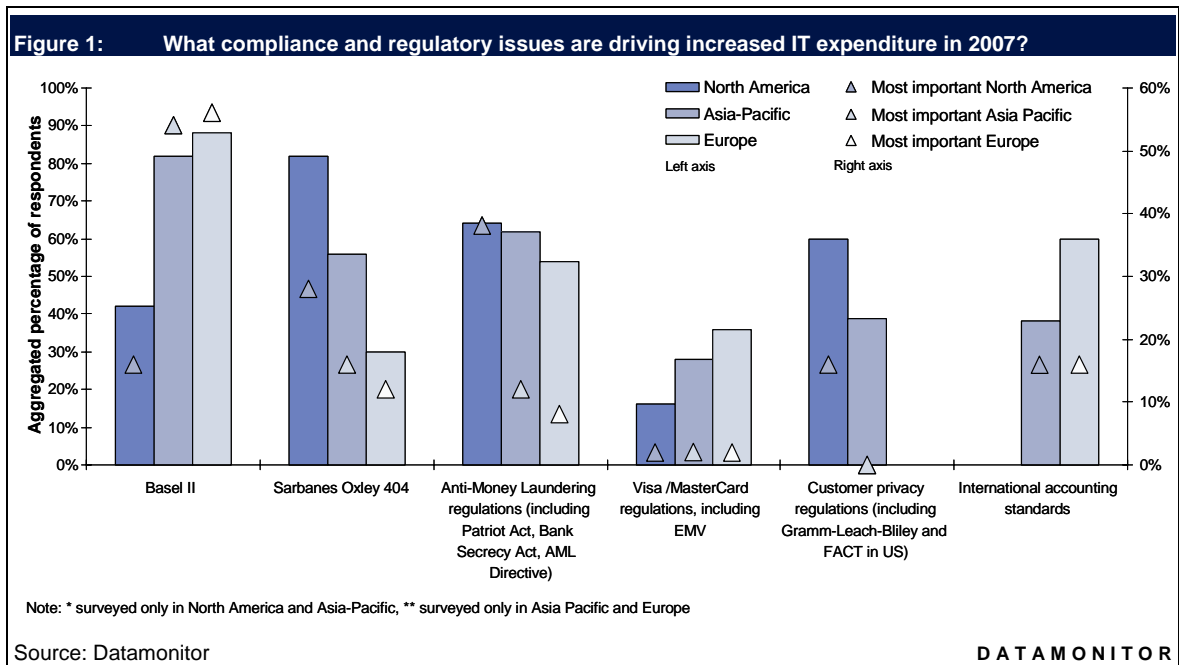
Although traditionally utilized by just specialists, there is a growing trend towards pervasive use of BI technologies. New approaches recognize the need to apply greater intelligence at both strategic and operational levels and make BI functionality available to a wider audience across all banking business units. This attitude has been influenced by the introduction of web technologies as an ever-present access mechanism and visual interface, the implementation of intelligent technologies into staff’s everyday tools, and the use of collaboration technology to support cooperative working environments across channels such as branches or call centers and divisions like bank-assurance, private banking or investment banking.

The BI market is rapidly growing among many segments, especially mid and lower-tier banks. Recent Technology Trends surveys conducted by Datamonitor in 2006 and 2007 indicate that adoption rates within small and medium retail banking institutions will grow on average in the range of 16-21% within next two years, while within largest banks the range is 6-9%. Given reasonable growth of IT budgets devoted to BI, many vendors from diverse backgrounds, such as reporting, analytics, data management, or operations have rushed to claim their stake by adapting their definition of BI to fit their offering. As a result, vendors now offer solutions such as customer intelligence, performance management, financial analysis, fraud detection, risk management, and compliance. For mainstream BI vendors, the Financial Services sector

currently represents between 15% to 35% of their BI revenue, and this market is widely expected to grow rapidly in absolute terms over the next couple of years. Banks are generally ahead of insurers, with the largest financial institutions taking the lead in terms of adoption rates of various BI solutions.

Compliance requirement is keeping focus squarely on reporting and monitoring functionality

The combined impact of Sarbanes-Oxley, the Patriot Act, anti-money laundering regulations (AML), the Data Protection Act, International Financial Reporting Standards (IFRS) and Basel II in particular on corporate data management practices is significant. Compliance and risk management is cited by retail banking institutions in North America, Western Europe and Asia-Pacific as one of the most important IT projects for the past two years. The main regulations driving IT spending within the mentioned geographies are presented in Figure 1. Among North American banks Sarbanes-Oxley provisions are gaining more attention, driving the need to improve effectiveness of internal controls. Consumer privacy protection still drives significant IT expenditure, however major investments have already been made in 2006/7. Basel II remains the dominant story for large banks, and investments are expected to accelerate due to recent approval by FDIC (The Federal Deposit Insurance Corporation) of the final rule implementing the Advanced Approaches of the Basel II Capital Accord. European banks are also putting particular emphasis on compliance with the Basel II regulation, especially lower-tier banks as they lag behind their upper tier counterparts. International Financial Reporting Standards are also driving increased IT expenditure in 2007. As in other regions, Basel II is a primary regulatory driver for technology investments in Asia-Pacific, with corporate governance also an important issue. APAC banks look to North America and Europe for best practices, such as independent rules implementation. Indeed, a number of anti-money laundering regulations are driving significant amounts of IT expenditure across all geographies with North American banks showing particular attention.



Although not all of these apply globally, the thrust of regulation everywhere is becoming increasingly clear: to restore public confidence. Financial services institutions providing any kind of advice or taking care of customers' financial resources are forced to make improvements in the way they manage data, tighten up internal procedures, and put systems in place to demonstrate that they are in control and complying with the existing law.

Need to retain accurate customer records and full transaction details

Given the recent wave of regulations, banks need to focus their attention on changes related to corporate governance, accountability, disclosure and risk management. One of the main consequences is that every bank needs to retain accurate customer records and full transaction details that can be reviewed on demand, together with copies of any associated communications. Moreover, financial services institutions have to document all the procedures and guidelines, and maintain evidence to demonstrate that these have been adhered to. The audit process is much less complicated and cost effective to maintain if the entire process is managed as an integral part of the system. Regulators expect banks to capture, validate, maintain, and use the right data about their customers, and control access to it as this enables institutions to give appropriate financial advice, respond promptly, and authenticate a customer's identity prior to every single transaction. Consequently, Know Your Customer (KYC) becomes a significant driver for data management activities and particularly in the reporting area.

Pressure to implement advanced monitoring and measurement systems

One of the most significant developments in the global banking industry is the ongoing implementation of the Basel II Capital Accord, which requires banks to implement sophisticated modeling systems to measure different types of risk in order to determine appropriate capital requirements. For the first time, operational risk is included, which requires risk models related to failures in IT systems, procedures and human errors. Changing the mission critical systems carries a degree of risk, and in order to manage this, audit processes are necessary. Risk management also requires bankers to track their transactional activity in order to maintain a complete and up-to-date picture of their financial assets. So this includes deficiencies in information systems and business processes, such as back-office failure, faulty transaction execution, and incorrect data entry. A number of the affected banking institutions are adopting the higher recommended standards (Advanced Internal Rating-Based Approach for credit risk and Advanced Measurement Approach for operational risk) in order to maintain a better reputation in the marketplace. Such companies are in fact looking toward a longer-term view of risk management than just Basel II, brought out by the recent crisis in the sub-prime lending market segment. The larger banks, and particularly those involved in major mergers and acquisitions, are being forced by regulators to adopt the higher standards.

Following the terrorist activity in 2001 in the US, new anti-money laundering regulations have been put into effect. The USA PATRIOT Act and most European regulators (e.g. FSA in the UK, and BaFin in Germany) impose significant pressure on the banking sector. As a result of AML regulations and additionally Know Your Customer policies, banks need to tighten account opening procedures, and to put in place more sophisticated systems to monitor transactions. Such projects require banks to monitor and detect suspicious activity across the business so the same information can potentially be leveraged and used for fraud detection purposes. Overall, retail banking organizations need to be able to respond faster to various

events (e.g. fraud), often on the same day, and in some cases in real time. International Financial Reporting Standards, for example, are moving towards 'fair value' accounting, and this will tend to increase the volatility of asset values.

Lack of comprehensive compliance strategy deteriorates the enterprise-wide visibility

The majority of banks used to perceive growing regulatory requirements as operational matters, and typically reacted by kicking off a separate compliance task for each new directive, or by enhancing existing systems on a step by step basis. Such an approach brings with it the risk of deteriorating the enterprise-wide visibility, and repeatedly wastes an opportunity to improve the running of the business by failing to take full advantage of the superior information that would become available. Given the evolving regulatory environment, compliance solutions must move with the times. Datamonitor believes that an effective compliance solution requires a strategic investment in infrastructure that embraces assimilating business intelligence with advanced analytic tools for risk modeling and other key technologies, such as business process, change and content management.

Sales and service effectiveness requires ability to predict customer requirements as well as fully understand customer relationship

Using business intelligence capabilities, a financial services institution is able to translate customer information into easy and functional selling advice for the front office staff or automated self-service channels. Apart from specialized private banks, credit unions or community banks, banks tend to have significant customer bases. While economies of scale help to minimize costs, they also make it more difficult for a financial services organization to provide relationship banking on a low-level basis. Banks are often preoccupied with trying to prevent customers from shopping elsewhere. In order to succeed, front line employees need to offer the suitable product or service at the right price for the customer. Such insight needs to be swift, easy, and functional.

Greater customer understanding requires detailed segmentation and analysis

Customer data files, transaction records or marketing databases are primary sources of information. The need to be faster and quicker in a commoditized industry, such as retail banking, or to predict customer requirements, requires appropriate data management techniques that can provide necessary customer insight. Banks need to enable translation of existing customer information into practical actions for the front line employees or self service channels in order to increase sales effectiveness. It is imperative for the sales force to distinguish mass market customers interested in low-cost products and delivery channels from those that require more resource-intensive banking services, such as local businesses or high net worth clients.

Accurate customer understanding requires in-depth customer insight, which can be enabled through detailed segmentation and analysis, and cleansing, linking, and grouping of customer data in more details. Customer data analysis is necessary to provide information to product development business units, maximize direct marketing efforts, and analyze customer risk. Moreover, in order to increase sales effectiveness, banks need to segment customers on the basis of 'propensity-to-buy' models. Such an approach allows greater customer understanding that can be used to set up a variety of approaches to sales targets, for example pre-approval of lending products or approaching expiration of fixed-term lending and savings products. Similar information is required in order to coordinate direct mail through both electronic channels and regular mail.

Sales forces need to be able to offer a quicker and more accurate decision making process than its competition

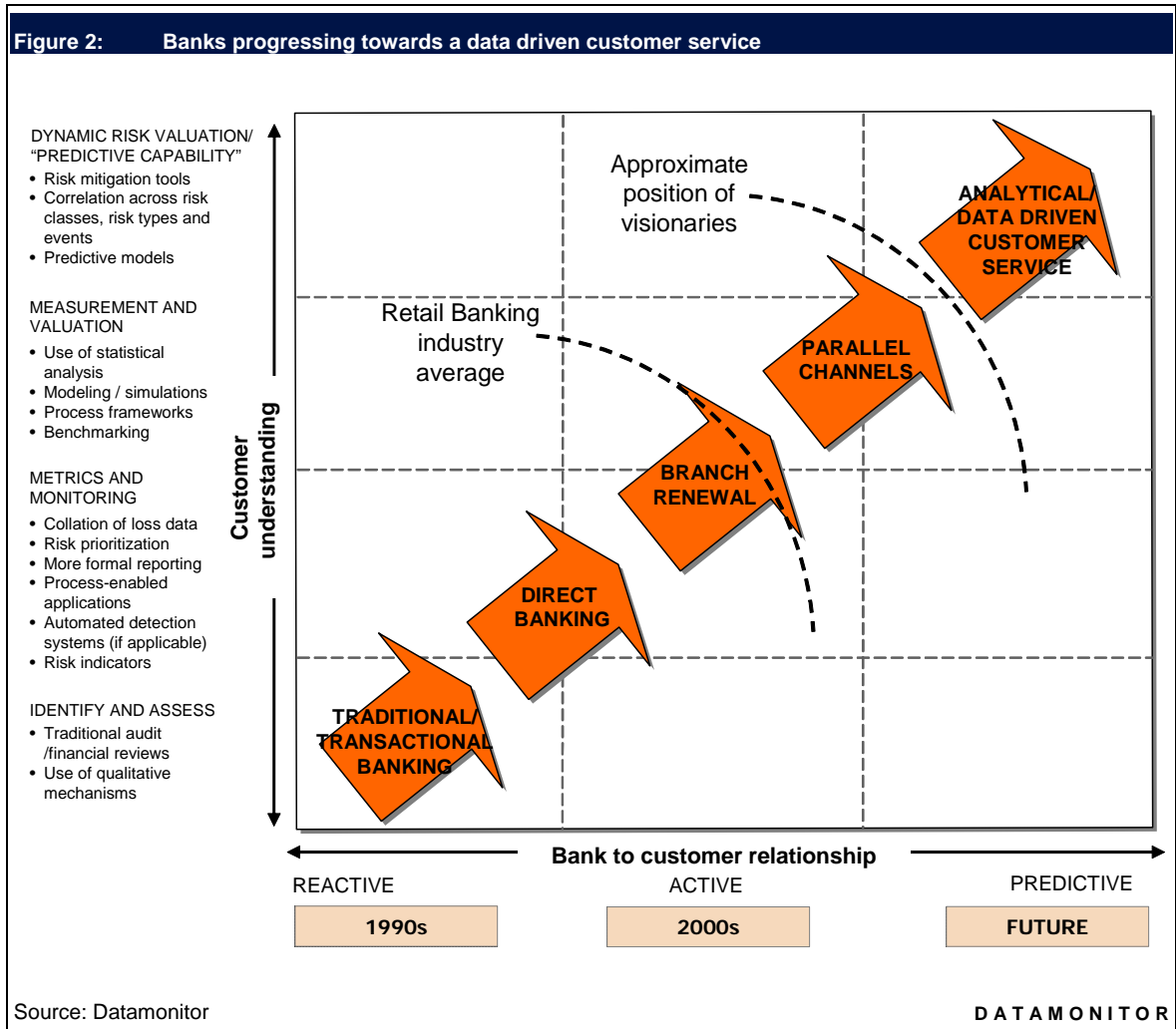
Sales teams are constantly forced to expand banking relationships to new or existing customer base. One of the key success factors in a commoditized industry is time-to-market. Front line needs to be able to react, adjust and satisfy client demands as soon as they arise. Customers now require faster and more accurate responses to their queries. As a result, a banking sales force needs to be able to offer a quicker decision-making process than its competition. At the same time, the response needs to be based on the right information that evaluates customer risk profile, matches offering with demand, allows cross and up-selling, analyzes referrals or relationships among existing clients, and finally closes the sale. As such, the combination of access to the right information delivered in real or near time becomes a must-have requirement for banks that compete in current business environment.

While banking branches are becoming financial services outlets, managers apply best practices from the retail industry. For example, most of the current leading retailers measure profit per square foot/meter or other sales related ratios, while banks are only just learning how to implement them. Creating a focus on sales effectiveness requires sales targets and their supporting performance information to be clear. In order to accurately determine raw sales target numbers, expectations from management, or effective product pricing, a numbers of factors need to be taken into consideration, such as existing sales per full time employee, historic sales performance, branch or channel contribution, or seasonally adjusted targets. All the data needs to be constantly analyzed with the sales performance evaluated. Therefore, in addition to customer information, financial analysis and performance management tools are also required.

Predictive bank to customer relationship entails coherent data for accurate and full customer analysis

One of the primary reasons why customer service departments drive increased sales is that a satisfied client is much more likely to be loyal and generate more recurring revenues. Moreover, client retention is typically cheaper than acquisition, and loyal clients are a great competitive advantage over competition. For example, the American Customer Satisfaction Index (ASCI) developed by the University of Michigan is used by many customers looking for banking services. The recent survey from 2007 indicated that Wachovia was the clear winner among customers for a sixth year in a row, followed by sharp gains in approval among Wells Fargo and JP Morgan Chase customers.

In order to be able to provide improved customer service, a bank needs sufficient visibility of its relationship with each individual client so appropriate and relevant banking products and services can be offered on demand, and on real-time basis. This necessitates customer data integration (CDI) to provide coherent data for accurate and full customer analysis, and reporting (e.g. my portfolio, an on-line service from Bank of America, aggregates internal and external accounts, and provides financial reporting or budgeting). The lack of consolidated customer information can create lapses in service quality or missed or repeated information, resulting in dissatisfied customers as well as inefficient processes. Figure 2 underscores the evolution of customer insight strategies that progress within the retail banking industry towards greater use of predictive analytics. Banks are developing beyond branch renewal activities by beginning to offer data-driven customer service. While the majority of retail banks are currently at the “active” stage of a customer service relationship, characterized by high degrees of customer/bank interaction, they are progressing towards a “predictive” bank to customer relationship, in which the bank can “anticipate” the needs of the customer and theoretically provide superior customer service and sales advice.



Strong management necessitates deep insight and control of banking operations

Banking executives have the strongest responsibility for the success or failure of the bank. Negative economic events, such as corporate accounting scandals at Enron or WorldCom at the beginning of 21st century or the recent risk management crisis in the sub-prime lending segment, significantly contribute to magnification of management responsibilities. Company executives will ultimately be held accountable for any ineffective monitoring of a company's assets. This has been highlighted with recent CEO departures at Citigroup or Merrill Lynch. Strong management necessitates the establishment of realistic goals and an effective communication strategy, as well as strengthening the organizational culture. Moreover, successful managers need to recruit senior talent, train new associates, and build teams. Additionally, management needs to decide how to allocate capital, especially when planning long-term priorities. While planning company targets, senior management need to take into consideration a number of focal points, such as risk management, corporate governance, or compliance. Datamonitor has identified key imperatives that enhance management strengths, and they are described below.

Improved business agility requires constant monitoring

Business managers need to respond to new and changing business challenges, such as fraud occurrence, compliance error, higher risk transaction, marketing campaigns from competitors, or others. However, in order to maximize opportunities and minimize threats, the management level must be able to identify, monitor and analyze main 'pain points' of the business process. Such activities require constant monitoring of sales, operational and financial performance.

Access to precise and reliable information enables accurate decision making processes

Stronger management, driven by regulatory pressures and market conditions, requires consistent, accurate, reliable, and relevant information to be made available at the right time and place, so that operational decisions are made on a sound basis. The information is then recorded and incorporated into an audit trail, thus demonstrating compliance with documented procedures. This has increased the need to maintain detailed customer records, transaction data and audit trails in order to measure, analyze and monitor business performance across all elements of an institution's operation, and to demonstrate that management is in control of every process. Furthermore, access to accurate and reliable information ensures that key performance indicators (KPI) are set correctly and can be confidently used to support decision making process.

Banks must closer control their business relationships

The analysis of existing internal data and information needs to be extended over traditional boundaries to give banks a greater understanding of the relationships they have with customers, suppliers (e.g. conducting business with companies that provide office supplies generates data that can be used for cost analysis), and partners (e.g. transactional data from other business units, payment processors, or back office outsourcing providers). As a result of this revenue generation focus, banks have invested into the development of cross- and up-selling functionality. For example, when a call center representative of a bank with existing BI capabilities receives a call from a customer to inquire about home loans, the operator can immediately pull up the customer's analysis (based on historic data) and decide how to respond with the right

information in line with the customer's needs, and additionally determine whether there are other up-sell or cross-sell opportunities. The ongoing control of business relationships in an insight-driven bank will trigger the next level of value creation and competitive advantage for financial institutions.

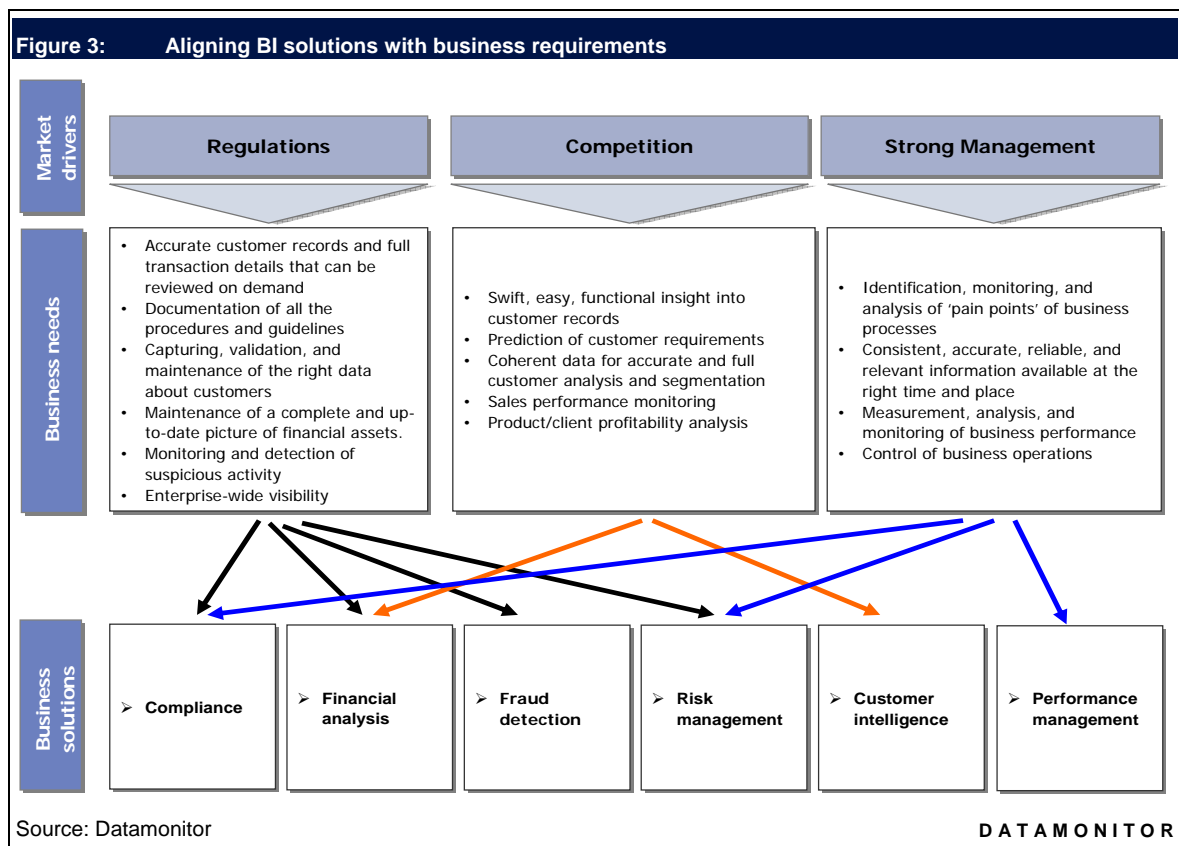
BUSINESS INTELLIGENCE IN RETAIL BANKING (STRATEGY FOCUS)

Summary

Given the enormous growth of data, banks are suffering from their inability to effectively exploit their data assets. As a result, banks must now capitalize on the capabilities of business intelligence (BI) software, particularly in areas such as customer intelligence, performance management, financial analysis, fraud detection, risk management, and compliance. Furthermore, banks need to develop their BI real-time delivery ability in order to respond faster to business issues. This brief argues the following statements:

- BI must be fully aligned with business processes.
- Ability to respond faster to customers, to regulators or to management generates need for real-time automation.

Introduction to the strategy brief



With more and more financial services institutions feeling the combined effects of a fierce competitive environment, and the need for stronger management, the need to support more formalized performance and risk management, financial analysis, and customer intelligence systems has become an important organizational imperative. Furthermore, financial services companies are also facing ever-increasing regulatory pressures, which make it all the more important for banks to have risk management, fraud prevention, and anti-money laundering systems in place. Many banks have already recognized the contribution that business intelligence (BI) technologies can make in these areas. However, most of them are still far from achieving the maximum effect. Figure 3 summarizes how market drivers translate into business needs and further implementation of business intelligence solutions.

The strategy brief examines the business intelligence area from a banking business solution perspective, as a number of BI related technology projects in the industry are increasingly driven by business needs rather than technology ones. Additionally, purchasing decisions are being made based on a direct business benefit and return on investment (ROI) applied to a respective business problem. That said, Datamonitor has identified six main BI solution areas that correspond to retail banking activities and have been driving business intelligence magnitude within the banking industry.

BI must be fully aligned with business processes

Current retail banking decision makers for technology investments are expected to demonstrate how new IT initiatives are affecting the bottom line of their lines of business. The new projects need to leverage or expand the customer base or defensive mechanisms such as fraud detection and the evaluation of credit risk, especially as a number of banks are in the shadow of the sub-prime credit crisis. As the majority of larger banks are public companies, the financial analyst community, private and institutional investors, and consequently banking executives drive the demand to have a constant and full view of financial and operational performance to enable tracking and monitoring of the business on an almost real-time basis. Furthermore, given the number of regulatory pressures, the industry now needs to face more stringent and sophisticated measures and requirements on financial reporting and risk assessment. Finally, all the new and future requirements necessitate the implementation of systems to support compliance efforts.

The significance of the business intelligence area is heavily growing within the retail banking industry and technology supporters will only benefit from these trends. BI has come a long way from its origins in the early decision support systems. It is currently in charge of turning transactional data into actionable information and delivering reports to an ever-growing number of information-hungry executives and managers across all lines of business. The six solution areas described earlier match the divisions of retail banking organizations that are the main budget owners and decision makers of the associated intelligence-led IT projects.

Business intelligence for revenue generation activities

Unclear macro-economic conditions and the growing maturity of the retail banking market have created an increasingly competitive environment for financial services institutions. This has resulted in focus on establishing efficient sales channels, improving the quality of customer service and maintaining high levels of customer retention. A front-office focus means that distribution channels and customer relationships - cross/up-selling and the ability to search for new potential growth segments - are becoming increasingly critical to a bank's success. This requires an improved and more complete

understanding of the end user, and the ability to act on that information. Business intelligence technologies will therefore be the key to future success and bankers find them useful in applying to the activities described below. However, the market is still far from total saturation, as only around 50% of retail banking institutions had the customer intelligence functionality in place at the beginning of 2007 (Figure 4 on page 19).

- **Customer profitability** – customer profiling techniques are usually based on historic data stored in data warehouses. Banks apply these data mining technologies to enable behavioral segmentation, as it increases ability to identify most profitable customers in order to focus servicing efforts.
- **Cross and up-selling** – this area has a direct relation to sales effectiveness. Financial services institutions enhance customer interactions within a customer relationship management (CRM) application using more and more advanced analytical functionality that can be applied to a wider set of data, which offers deeper consumer insight. BI functionality allows the use of records containing information on the customer's existing financial portfolio. This enables the bank to check a customer's current performance, apply a bank pre-defined decision rule, and present the advice either directly to the client (e.g. self driven investors using online channels) or display a message advising the teller, the call center agent, or the financial advisor which actions the customer should take in order to maintain a healthy portfolio.
- **Product customization** – while historically BI functionality was used to design products to target gaps in the market, evolving capabilities allow customization on an individual client level by offering more direct access to relevant information. The approach is especially useful in servicing highly profitable customers in the wealth management/private banking segment. However, the progressing development of Web 2.0 functionality enablers (e.g. Ajax) offers an increased level of customization that can be used for the mass market as well.

Increasing use of performance measurements techniques

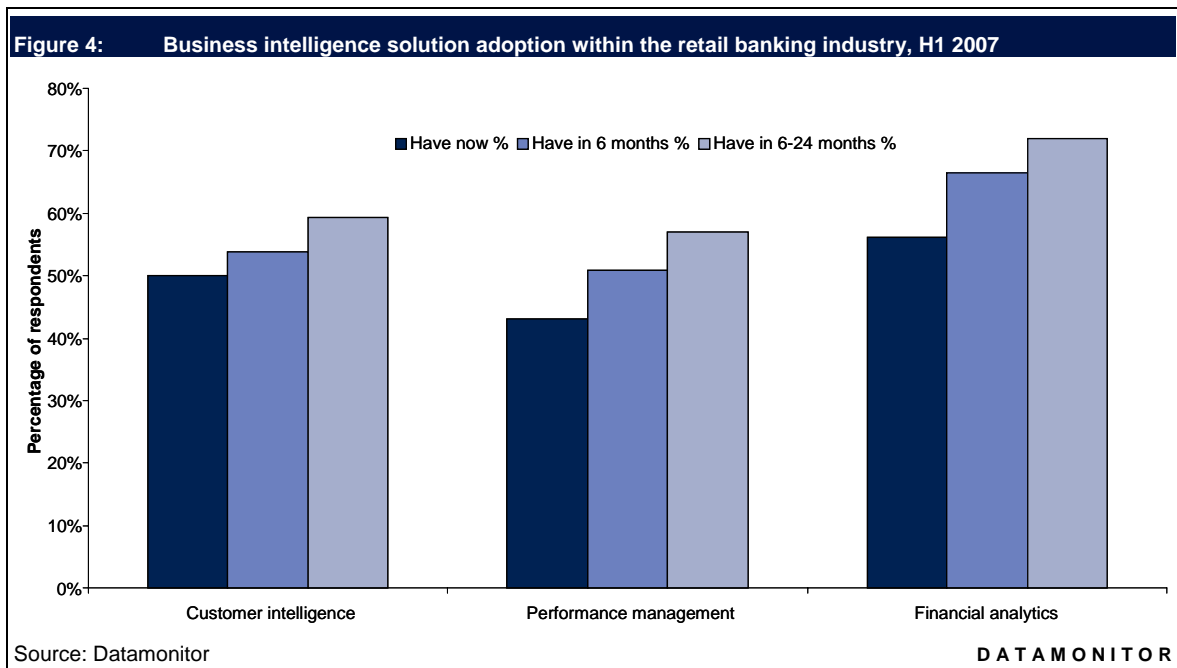
Growing demands to optimize revenues and minimize efforts have contributed to the development of various management techniques and supporting technologies. Corporate Performance Management (CPM) has become the widely accepted solution to support decision-making processes related to corporate management. Primarily CPM extends BI functionality into budgeting, planning and monitoring to provide a holistic view of bank performance across activities and business units. The main business case for implementing a CPM solution is to establish a link between strategy and associated performance metrics. It helps financial services institutions become more efficient, especially with their inherent processing and workflow capabilities. The demand for analyzing data and information from various business units and functions is increasing across entire organizations, and therefore the need for intelligence tools and technologies is growing in tandem. Top-line corporate strategies need to be split apart into actionable and more strategic instructions for each line of business, department, or business function and their individual progress has to be put back into the top-line strategic plan.

This demand is being addressed through CPM, the tool that spans traditional BI, corporate planning, score-carding, financial applications, and the supporting business processes needed to link these activities together. The goal of the solution is definitely to control the banking processes. It is fulfilled by providing staff and executives with an accurate and illustrative view of their specific performance measurements, coupled with the financial planning and budgeting requirements. Most solutions within this area offer comprehensive performance management functionality to manage and track key performance indicators (KPI), often supporting balanced scorecards and Six Sigma. CPM solutions are the standard

example for the power of dashboards—they offer simple template reports that give a large group of employees good insight into the contribution they are making to progress the whole business toward a set goal. At the beginning of 2007, around 43% of the banking community already had in place performance management solutions (Figure 4 on page 19). However, the ratio is expected to increase to about 60% within the next two years.

Business intelligence supporting financial visibility

Both shareholders and regulatory bodies are pressing for more detailed and comprehensive reporting standards. Given such regulations, executives are requiring immediate and on-demand access to top-line financial information and profitability analysis. Similarly to performance management, the need is to establish a consolidated view of financial performance and accounts. Furthermore, financial analytics is also considered a classic functionality of the discussed business intelligence area. The results of planning and budgeting activities, together with the actual outlook of various parts of the banking institution, are typically stored in dissimilar systems. Consequently, data management and business intelligence tools are required. Combined with CPM, the solution refers to the use of proactive management interventions to maximize total financial performance. It is based on the ability to track KPIs over time and forecasting capacity that anticipates the effect of major business events and alternative business strategies. Financial analytics are widely adopted by 56% of banking institutions, surpassing the use of customer intelligence and performance management. Saturation is expected to hit 72% within next two years (Figure 4).



Using business intelligence to fight fraudsters

The potential for fraud continues to represent a key danger associated with electronic processing in the retail banking industry. Electronic payment methods, web interfaces and automated teller machines (ATM) have introduced a completely new range of opportunities for fraudsters. Counter-fighting security techniques have become a fundamental necessity for banks of all sizes as clients entrust them with their security. For example, the credit card industry has responded with the introduction of "Chip and PIN" and regulators are demanding tighter procedures across the entire banking community. However, there are still basic issues that are a real cause for concern, such as poorly stored data (e.g. CitiFinancial had to notify 3.9 million customers when unencrypted data tapes were lost in transit in June 2005), incorrect data disposal or card skimming. Furthermore, anti-money laundering (AML) and know your customer (KYC) regulations are an equally hot area. The USA Patriot Act and similar regulations across the European Union and in other countries require all financial transactions to be monitored. Consequently, related behavior tracking and fraud detection tools are growing in demand.

Fraudsters aim to identify emerging patterns, driven by exploiting the ineptitude of mainstream solutions. BI based solutions can therefore be applied here as they can flag apparent fraud at the time of execution. Moreover, as banks are moving toward straight through processing (STP), the potential for implementing robust business intelligence solutions increases, especially in the area of detecting security breaches, fraud attempts and suspicious patterns. Given the move towards electronic processing and growing customer sophistication, users are demanding the ability to use cards in shops and ATMs and access online banking accounts around the world. As a result, the need for a bank to be able to detect whether such activity is likely to be genuine or fraudulent increases in tandem. Nevertheless, BI can only be seen as one of several options to fight against fraud.

Leveraging business intelligence to minimize risks

Managing risks is one of the foundations of the retail banking industry. Banks, consultants or vendors continue to develop credit and risk measurements and keep embedding the functionality into the existing technology assets. However, significant improvements usually occur after negative macroeconomic events, such as the economic downturn at the beginning of the 21st century. The renewed focus on risk management is currently primarily driven by the Basel II Capital Accord (Basel II) Pillar I, which demands that banks provide a more comprehensive view of their risk exposure, including market risk, credit risk, and operational risk.

One of the main requirements from the Basel Committee on Banking Supervision (BCBS) is to record and monitor risk, so the bank is always completely aware of its overall position. Therefore, banking organizations need to implement much more advanced systems to manage risks and capital. Classic business intelligence solutions are typically capable of handling the reporting aspects. However, this has to be extended into real/near real-time processing, closed-loop systems in order to give risk managers sufficient control. Internal IT departments or a variety of specialist software vendors already support the advanced modeling techniques required to measure risk. BI capability supports embedding these risk models into day-to-day risk management systems to provide intra-day risk reporting and capital allocations. Moreover, it is able to track

deficiencies in information systems and business processes, such as back-office failure, incorrect transaction execution, and inaccurate data entry.

A number of lenders are currently in the shadow of the subprime lending crisis. Financial markets institutions have introduced financial innovation and leveraged cheap capital in order to compete for mortgage credit risk with more conservative banks or mortgage insurers. They drove growth in risky lending and the share of high-loan-to-value and adjustable-loans increased. However, the short-term strategies caused risk to be undervalued in order to increase loan volume. As a result of an increased interest rate and a worsening economic climate, the subprime mortgage system is currently near breaking-point. Consequently, there are demands to implement more thorough enforcement of lending procedures. In parallel, business intelligence functionality is growing in demand as it tracks and monitors operational risk, and provides a more sophisticated and consolidated picture of risk exposure across all divisions. Risk assessment necessitates integration of data stored in a variety of disparate data warehouses as well as legacy applications across various lines of business. As a result, a data integration, metadata management, and data store infrastructure will be vital to create this comprehensive view, and BI solutions will be in demand to deliver it to the business users.

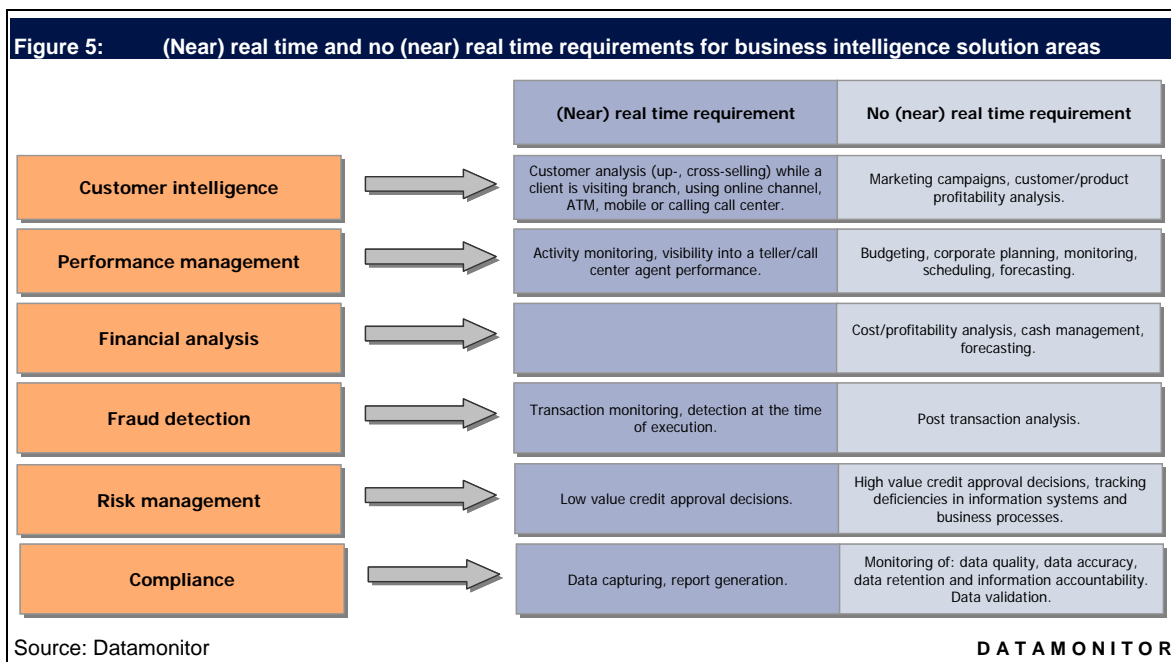
Achieving compliance requirements

The retail banking industry is experiencing an era of extensive re-regulation. The combined effect of Sarbanes-Oxley, the USA Patriot Act, anti-money laundering regulations, the Data Protection Act along with other acts of legislation, is significant. Institutions providing any kind of banking services need to make fundamental enhancements to the way they manage data, strengthen internal procedures, and put systems in place to prove that they are in control and complying with the law. The new rules require banks to investigate critical BI associated and BI controllable issues such as data quality, data accuracy, data retention, and information accountability. Moreover, banks need to retain correct client data and full transaction details that can be reviewed on request, together with copies of any related proof to validate that these have been adhered to. Given the ease of control, business process management (BPM) tools are expected to emerge as having significant capability in any compliance solution. Furthermore, as a result of KYC regulations, banks need to capture, validate, maintain, and use the accurate data about their clients, and to control access to it. Business intelligence solutions enable provision of a comprehensive view of disparate data. Therefore, the functionality ideally fulfills the requirements to track compliance-susceptible issues across the financial institution.

Ability to respond faster to customers, to regulators or to management generates need for real-time automation

'The need for speed' has necessitated real-time delivery functionality since the business intelligence area was born. Market drivers force decision makers to make quicker and more accurate decisions. For example, increasing competition requires faster time-to-market strategies, regulators require faster fraud detection or anti-money laundering capabilities, and management requires faster interventions to business issues. Therefore, IT departments, systems integrators (SIs) or independent software vendors (ISVs) work on turning raw data into useful information in an instant, as this functionality is an attractive offer to the market. The value of information decays over time, therefore real-time capabilities are promoting business intelligence tools from their status as decision support applications into the domain of decision automation. While traditional business intelligence presents historical information to users for analysis, real-time business intelligence (BI 2.0) compares current business events with historical patterns to detect problems or opportunities automatically. For example,

decisions made for credit card online applications are typically processed within approximately 60 seconds, unless a credit analyst is required to intervene. In the US market current credit scores, the credit history and a client's relationship with the bank are usually taken into consideration. Another example of real-time BI capabilities might be growing opportunities for personalized cross- and up-selling or partner advertising while using ATMs, contacting banking call centers or interacting with visual displays while visiting branches. Although real-time capability is an attractive offer, it is not always necessary. Therefore, delivery type and speed will vary across the various business intelligence solution areas. Figure 5 outlines the requirement for speed type depending on solution area.



Regardless of increasing technology abilities and speed of processing, there is still a significant gap between decision support and decision automation. Full automation requires the system to automatically feed back into an operational system in a closed loop, without any human intervention. This real-time processing functionality necessitates two critical elements: first of all the ability to integrate data in real-time, secondly the ability to analyze it and make decisions in real-time. Both these components require a supporting infrastructure and governance. That said, data integration, low latency operational data store, message broker and real-time analysis will be required as key supporting technologies for BI 2.0. It is important to note that moving towards a common infrastructure certainly brings benefits, however it is still imperative to have the flexibility to respond to delivery type and speed within this.

The growing appetite for straight through processing further contributes to developing the concept of real-time BI capabilities. Banks aim to accelerate and automate transaction processing to the point where the entire end-to-end process becomes a seamless, uninterrupted workflow with zero latency. However, the necessary real-time integration requires major re-engineering or replacing legacy of core systems, and the high risks associated with this type of change significantly slow down the entire transformation. Moreover, execution of complex queries on significant amounts of data takes time and the identification, tagging and the cleansing of data before it is loaded into the data warehouse in real-time without human intervention may cause bad data to be processed with significant negative impact on the business. Given these inhibitors, the road to full real-time decision automation remains unpaved.

BUSINESS INTELLIGENCE IN RETAIL BANKING (TECHNOLOGY FOCUS)

Summary

Institutions that are interested in implementing efficient BI capabilities require much more than just the collection and storage of data. Banks and technology vendors need to bring many moving pieces together. This includes the right sourcing strategy, software applications, technology tools, business processes, collected data, company metrics, incentives, corporate culture and project management skills. This brief argues the following statements:

- The sourcing strategy must be aligned with needs and resources.
- Banks must develop a comprehensive end-to-end BI platform.
- Banks require a consistent and standardized approach to developing an integrated and fully automated BI platform.

The sourcing strategy must be aligned with needs and resources

Historically, banking organizations tended to develop applications in-house. As a result, many systems, even those written in the 60s and 70s, continue to be in use. Given the significant competition and scale of their operations, top-tier banking institutions generally prefer building solutions from best-of-breed elements that most suit their needs. However, recent re-regulation trends in the financial services sector convinced many CIOs to look more for off-the-shelf BI solutions rather than developing the functionality in-house. For years, there has been a debate on best-of-breed vs. best-of-suite, and technology vendors who compete for banking IT budgets with internal IT departments have quite often exacerbated this.

Best-of-breed

The main arguments for best-of-breed are always customization and top of the line functionality. Top-tier banking institutions have very sophisticated needs due to differentiation strategies or due to unique existing technology assets. In such a scenario, clients usually prefer to start from scratch, and will work with selected vendors or consultants to design and deliver the desired solution. Therefore, vendor relationship management skills are becoming critical in order to succeed in building the expected business intelligence functionality. Consultants typically bring wide-ranging experience in a number of technology tools and technologies required for the BI projects. Additionally, they know when to support the technology from high-profile vendors, as quite often specific best-of-breed functionality from ISVs is required by the bank. In a situation where a bank already has BI elements or tools in place, these parts may need to be reused within the context of the BI solution or given an SOA design pattern. Therefore, customization-oriented building methods tend to be better suited, especially given the level of standards support that is widespread among the leading vendors.

Best-of-suite

Driven by regulatory pressures, a lack of internal IT skills, and the growing complexity of technology, the interest in buying off-the-shelf solutions has significantly increased in recent years, especially within lower and mid-tier banking institutions. The key advantage to off-the-shelf solutions is that packaged applications contain pre-configured templates, queries, reports, metrics, and data definitions specific to a particular operation or functional area within a business. Typically,

packaged analytics offer around 70-80% of the required BI functionality. Therefore, a quicker deployment time becomes a key selling point to packaged solutions, exacerbated by a regulatory environment and the banks' deadlines for meeting new standards. Nonetheless, few out-of-the-box solutions match every analytic requirement, but they are certainly a great start. Customization is still unavoidable, either in terms of getting the application working or subsequently extending it to address highly specific requirements. Many vendors have a good understanding of the market and now offer their packaged applications as part of their overall portfolio. Within medium and larger institutions, it becomes a starting point and then evolves into a hybrid build before becoming a fully customized solution. The most important benefits of the best-of-breed and best-of-suite as well as associated risks are described in Figure 6 below.

Figure 6: Best-of-breed versus best-of-suite strategies and associated risks and rewards.

	Best-of-breed	Best-of-suite
Rewards	<ul style="list-style-type: none"> ➤ Ability to re-use of existing technology assets, ➤ Ability to choose best-of-breed elements to optimize the final solution, ➤ Scalability corresponding to business growth, ➤ Strong customization capabilities matching closely with business requirements, ➤ Elements can be used to cope with a particular pain-point, 	<ul style="list-style-type: none"> ➤ Relatively short time for deployment, ➤ Already existing pre-defined analyses relevant to functional area, ➤ Solutions are already developed and tested by end-users,
Risks	<ul style="list-style-type: none"> ➤ Length of the deployment projects, ➤ Significant implementation and maintenance costs, ➤ Shortage of required specialist skills, ➤ Additional integration efforts with non-compatible elements, ➤ Centralization and standardization levels harder to achieve, 	<ul style="list-style-type: none"> ➤ Increased integration efforts, may require additional middleware to communicate with other packaged solutions, ➤ Customization required for non-supported functionality, ➤ Support for only pre-defined information requirements,

Source: Datamonitor DATAMONITOR

It is a necessity to start BI projects with a proper data foundation

Regardless of the route banking executives decide to choose, if the data foundations of the financial services institution are not reliable enough, either the best-of-breed or best-of-suite strategy may lead to equally unsuccessful results. Today's financial services institutions are collecting and storing a mind-boggling quantity of data, and the size of some banks' databases are approaching petabytes. In response to this growing amount of data, banks needed to improve their storage capabilities and associated technologies. However, many organizations still struggle to manage and efficiently analyze their data. Preparing an organizations' data structure to support business intelligence necessitates an enormous effort to integrate disparate data sources, load the data into a data warehouse and accurately manage metadata. The strategic decisions dictating buying or assembling the required functionality are typically based on how successful banks are with executing their data warehousing strategy.

Banks must develop a comprehensive end-to-end BI platform

During years of providing financial services, banks have gathered enormous amounts of data that is kept electronically as well as in paper form. The move towards electronic processing has resulted in the production of large volumes of transactional data on a daily basis. Furthermore, the introduction of electronic channels such as web interfaces or ATMs drives further expansion in the scale of data volumes. In order to more efficiently analyze the growing amount of data in disparate sources business intelligence solutions are being implemented across the retail banking sector.

BI tools are spreading out among various banking applications

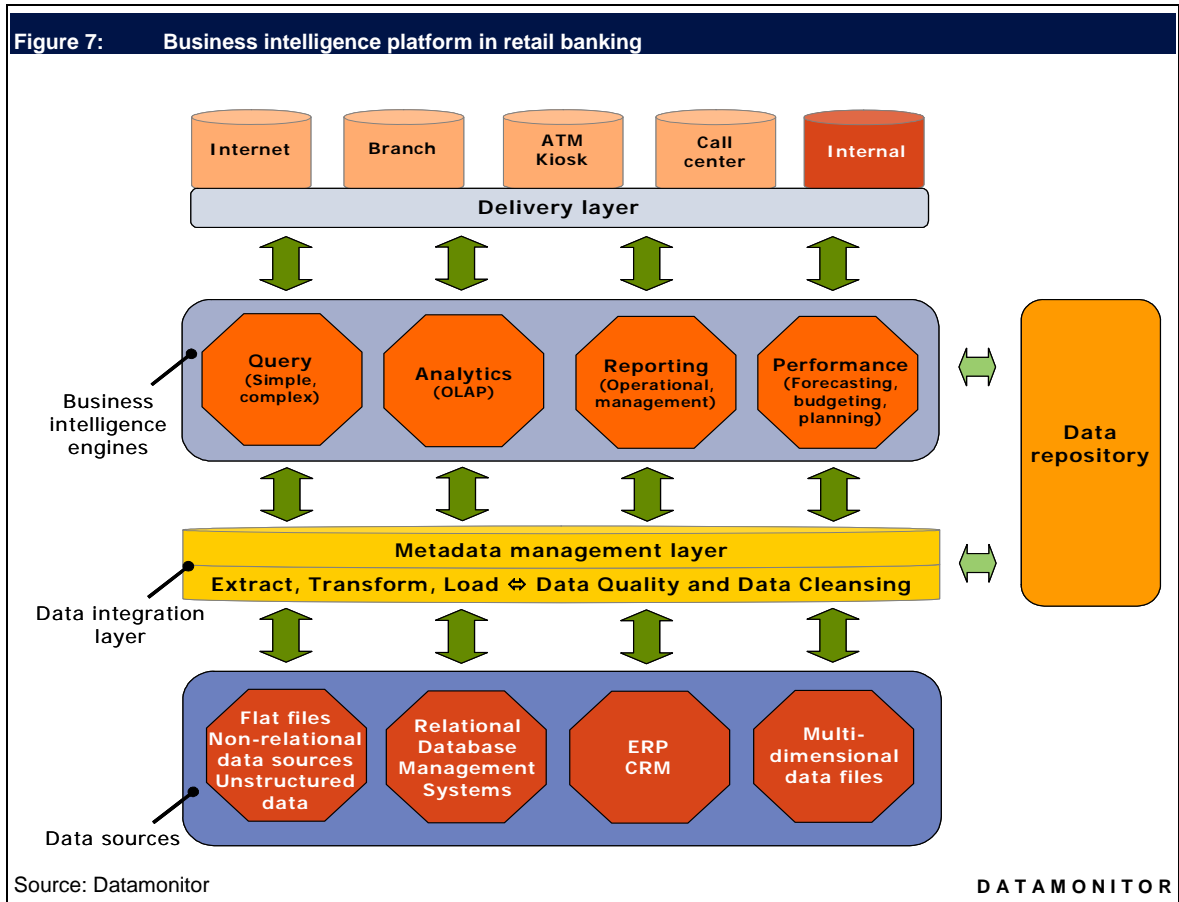
Banks are constantly looking to expand their user base for business intelligence technology, as the functionality becomes easier to use. Typically, the expansion starts internally, then expands to suppliers, intermediaries, and customers. Web technologies, which act as ever-present access mechanisms and visual interfaces, enable bankers to extend BI functionality across distribution channels. Moreover, the functionality can be used by applications sitting in front (e.g. online interface), middle (e.g. portfolio management) or in back office applications (e.g. core systems). Web-based reporting functionality is being applied either to enable employees on the Intranet to create ad hoc reports without engaging power users, or via the broader Internet, enabling clients to customize their online interface (e.g. using AJAX technology) and drilling down into accounts in greater detail.

The combined effect of a number of regulations requires, inter alia, a functionality that allows generating alerts, and delivering them (with accurate filtering) to the appropriate officers automatically. For example, fraud detection solutions are dominated by such rules that are supported by business activity monitoring (BAM) engines, and detect fraudulent activity. These rules can be entered manually or predefined using predictive modeling, statistical analysis, and data-mining tools, which are capable of generating and maintaining rules automatically. The recent multifactor authentication focus has accelerated the adoption of behavior detection tools that prevent fraud, but also enhance anti-money laundering solutions or customer profiling applications. Furthermore, as compliance requires access to all communication between employees and customers, scanning and text mining technologies that allow monitoring and generate structured data from digital or paper-based documents, are gaining traction.

End-to-end business intelligence platform becomes a necessity

BI functionality is designed to help banks and their employees understand more about banking operations and customers. Furthermore, it enables more accurate and effective decisions, based on a combination of historic data and behavioral patterns. However, BI in its present, largely departmentalized state offers just a limited view of its real potential. The main challenge for bankers is to move away from the function and silo-based approach to BI product selection. The key drivers are business requirements within most "BI-friendly" areas, such as customer intelligence, performance management, financial analysis, fraud detection, risk management and compliance. Creating a business case can extend the use of BI information services and look at offering a more user-friendly approach to how the technology can expand employee and client interaction with business information. As banks are willing to maximize the use of BI functionality, it is imperative to examine the technology that is expected to underlie the future banking BI platform.

An ideal end-to-end business intelligence platform is a solution that enables data access, data management and the presentation of information services. The platform should ensure that all core tools and services are included in the vendor's product suite. The solution needs to interact with all business elements, supporting technologies and with the BI infrastructure. Functionally, it has to be able to read data from disparate sources and make the data available to core BI data management facilities, such as analytics, performance metrics, query and reporting, and other tools that turn data into information. At the end, the solution needs to deliver information to a bank's information customers. The business intelligence platform evolves to a point where it has the role of controlling and unifying data collection and information services. In order to sell, vendors need to convince banks that their individual solutions can be used to deliver an extensive range of enterprise data capture, data management and information delivery services. Moreover, the functionality needs to be deliverable with centralized management capabilities. The ideal BI platform should include all or most of the following tools, products and services (Figure 7).



- **Data Access and Source Data Management** – the integration and data access layers create a foundation to enable the successful implementation of business intelligence functionality. Any BI solution needs to have the ability in place to manage any source data in whatever form it is presented. The functionality needs to include accessing and extracting subsets of selected data from all the different data sources that exist within data warehouses. Once the data is extracted, the tool needs to prepare the data into a form that can be further fed to BI processing engines. Usually data sources consist of:
 - Flat files, unstructured data, and non-relational data sources – can still be found in older applications, for example written in the 60s or 70s using Common Business-Oriented Language (COBOL). Scanning and text mining technologies are currently used to generate structured data from documents or emails (unstructured data) usually through content management systems.
 - Relational Database Management Systems (RDBS) – designed for the purpose of managing databases - currently the most common approach for data management (e.g. MySQL, PostgreSQL, Oracle, Microsoft SQL Server, Ingres).
 - Operational systems that do not use relational databases.
 - Multi-dimensional data sources – used in online analytical processing applications (OLAP). Can be generated from other analytical applications or be a part of a data warehousing systems (e.g. IBM DB2 OLAP Server or Hyperion Essbase).

- **Extract, Transform, and Load (ETL)** – the solution provides back-office facilities to transfer source data. It allows selected subsets of data to move from the source into dedicated BI data repositories. Additionally, the tool converts the source data into an understandable resource for the BI engine to be further processed and presented as information capable of supporting business decisions. ETL is delivered as a three-stage process:
 - Extraction – the selection and capture of required data segments.
 - Transformation – the conversion of extracted data sets into a structured resource.
 - Load – the delivering of restructured data to BI data repositories, data marts or data warehouses.

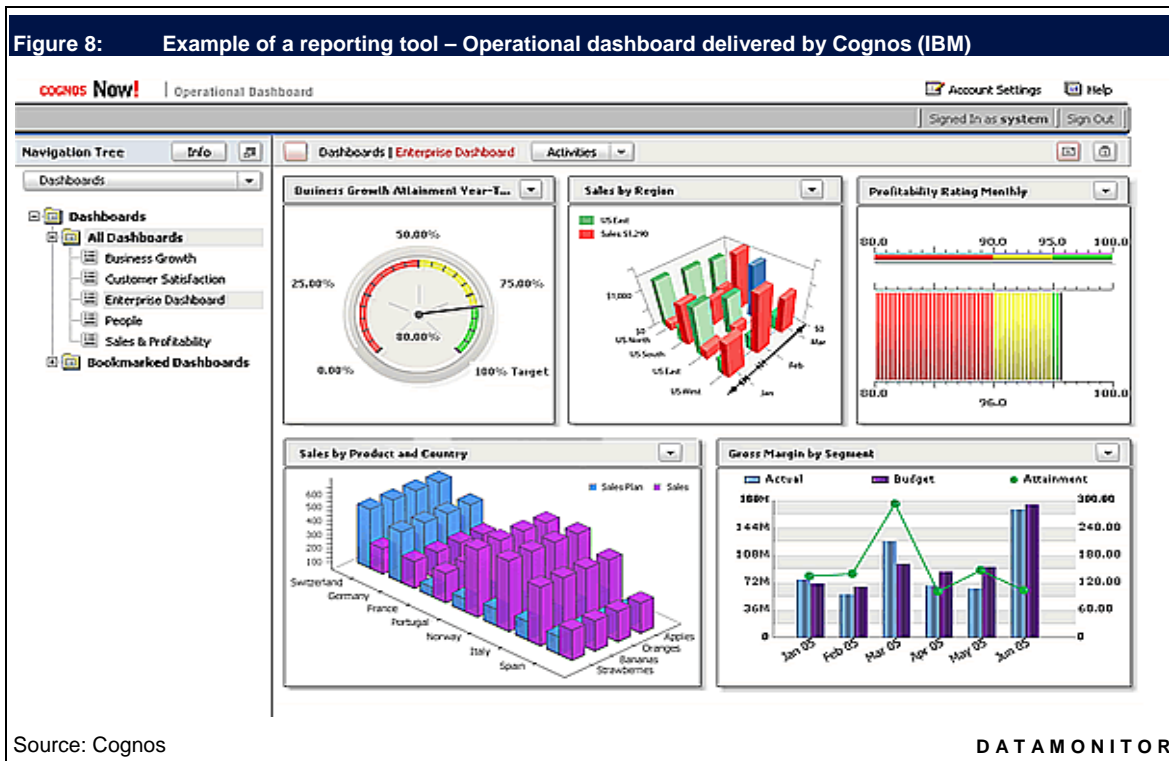
- **Data Quality and Data Cleansing** – the tool assures continuity and consistency of data when being extracted from the data source, transferred and loaded into a BI data repository. There are typically two stages:
 - Investigation – the process in which the extracted data from the data source is analyzed using rules-based parameters to highlight discrepancies.
 - Correction – the follow up actions, typically rules-driven, that are using parameters specified by an individual bank such as the deletion of fields, creation of fields using specified default values, or values derived from existing fields.

- **Metadata** – the tool that is used to provide descriptions of data in disparate sources. Metadata is a database schema that describes a database in terms of an individual datum, or content item, or a collection of data including multiple content items. Moreover, it contains information about when data was last refreshed, where it came from and what other changes were made to it along the way.
- **Data repository** – data storage that supports bulk loading of structured data. The tool has to be optimized for the support of large, complex, and read-only queries. The repository also needs to support sequential scanning, to handle data proliferation, and to provide automatically updateable and refreshable indexes on data loading. Such tools typically control all types of processing, including providing support for the storage, integration, and manipulation of multi-dimensional data.
- **Query** – the tool enables employees to gain an interactive view of the data, and build their own queries. Different levels of skill and knowledge may be required to build a query. Therefore, the query services are being simplified through the use of Graphical User Interfaces (GUI) that are supported by query creation Wizards and drag-and-drop technology. Query can be divided into two categories:
 - Simple queries – these are designed to run a simple query against a single database.
 - Complex queries – these enable accessing multiple databases in a single query, performing cross-database calculations, and combine multiple queries into one report.
- **Analytics** – The tool is used for exploring large amounts of data in order to discover patterns. It includes a broad assortment of techniques, such as online analytical processing (OLAP), “what if” modeling, forecasting, statistical analysis and data mining in general. Portfolio management history or credit risk analysis are techniques developed purely by the banking industry. Furthermore, these techniques are constantly being enhanced through improvements to the Graphical User Interface for better accessibility and ease of use, and by enabling delivery through Web browsers.
 - **OLAP** – online analytical processing - is one of the most popular analytic techniques available. OLAP enables users to easily and selectively extract and view data from different angles. It is embedded into a number of applications in the banking industry, such as:
 - consolidation and reporting;
 - planning and budgeting;
 - customer and product profitability analysis;
 - compliance reporting;
 - risk and exposure management.
- **Reporting** – the service is designed to deliver all types of information and make it available to users through the channels of their choice, such as spreadsheets, dashboards, alerts, emails, or web-based services (Examples presented in Figure 8 on page 29). There are two different uses to which reporting services are typically applied:

- Operational reporting – usually pulling data from a single source system, focused on the activities of a particular department.
- Management reporting – typically pulling data and draws summary level from more than one system.

- **Performance** – the services are used to align technology with the needs of finance, corporate governance or regulatory compliance areas. There are three main categories into which the services can be divided:
 - Forecasting;
 - Budgeting;
 - Planning.

- **Delivery layer** – a service that interfaces business intelligence engines and reporting tools with delivery capabilities, typically web-based. The functionality is typically utilized internally or among banking distribution channels such as:
 - Internet (e.g. online interface for managing customer accounts), Intranet, Extranet (e.g. financial advisors' CRM, portfolio management or financial planning systems through a web interface);
 - ATMs, kiosks (e.g. reporting tools or automated cross/up sell analysis);
 - Branches (e.g. BI tools used internally by tellers or financial advisors);
 - Call centers (e.g. customer analysis utilized by customer service representatives);



Banks require a consistent and standardized approach to developing an integrated and fully automated BI platform

The main benefits business intelligence systems bring to any bank are their abilities to provide a deep understanding of past and current operations, and forecast future events. BI functionality has evolved, and consequently, moved on from being the data digestion tool of power users, to the stage where information customers are seeking to utilize the powerful and flexible information flows that the functionality can provide. As banks are looking to gain synergies from the wide coverage of BI functionality, there is a growing need for the BI tools and services earlier described, and which can be entirely integrated with the bank’s other IT infrastructure and core operational systems. Such consistency offers the capability to deliver up-to-date information to information-hungry end-users. Therefore, both technology consumers and vendors should look at the bigger picture, and consider BI integration as a closed-loop requirement and an end-to-end platform.

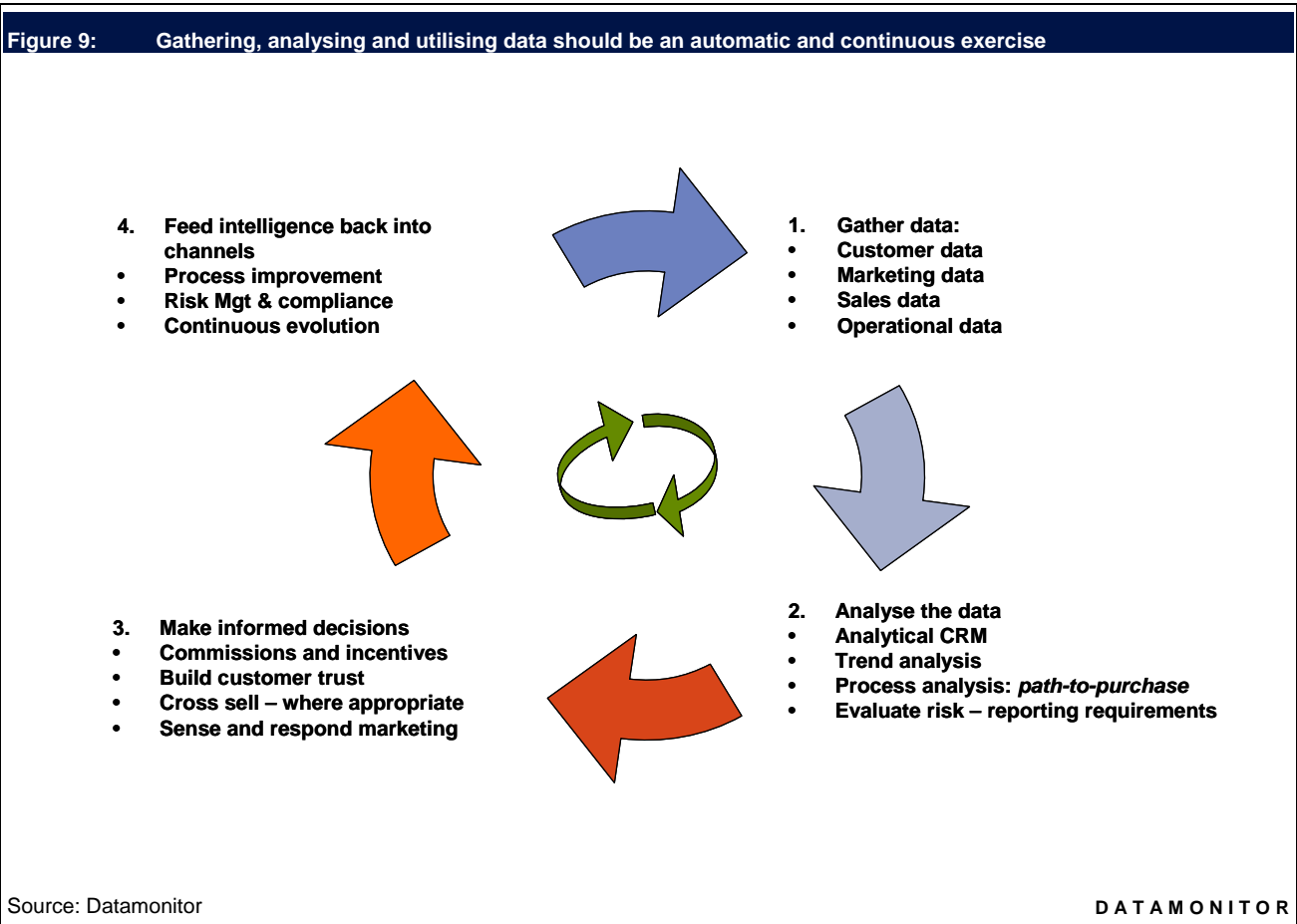
Required architecture for automated delivery

The never-ending ambition to shorten and automate account opening or transaction processing necessitates improvements to loans origination, funds transfer or card payment systems. The main goal of these enhancements is to achieve full straight through processing (STP). BI technologies that allow the integration of additional and relevant information into the banking processes can significantly contribute to seamless processing. However, a more complex, real-time architecture,

which uses a middleware layer, is required to enable communication between applications for more efficient and seamless processing. Moreover, the architecture needs to support real-time processing and closed-loop BI applications.

The communication between BI components is still evolving, although data foundations need to be reliable enough in order to enable the expected connectivity, and consequently the right BI functionality. Therefore, metadata management is still one of the key issues that needs to be resolved. A lack of synchronization in importing and exporting one another's database schemas make it extremely difficult to create a transparent, end-to-end, information supply chain. In addition, data cleansing needs to be automated and manual intervention must no longer exist. A unified metadata repository that is available to every element within the overall enterprise architecture is a critical foundation for further development of business intelligence solutions. Standardization remains imperative with banks increasingly using best-of-breed components from ISVs and other tools developed by SIs or independent consultants. The combination of the common warehouse metamodel (CWM), which helps to ensure interoperability between applications and extensible markup language (XML) that creates adaptors to make the necessary links, decreases incompatibility issues.

The (near) real-time platform requires closed-loop business intelligence functionality that is more advanced than just an exchange of data between various systems. It requires bi-directional communication of BI solutions within the entire IT infrastructure and core operational systems. As such, the data taken from original data sources needs to be analyzed and fed back into other applications, in the form of alerts, requests for action, commands, and automated demands for systems activity (as presented in Figure 9). Hence, closing the loop remains the key imperative for technology providers to deliver completely integrated BI solutions.



End-to-end integration

Given the fact that IT departments are pressured to centralize data infrastructure and core processes, and reduce the number of vendors they work with, the proposition of end-to-end BI solutions sounds appealing to end users. Furthermore, end-to-end implementation can act as a vehicle for the introduction of a central infrastructure strategy and data mart consolidation, driving out legacy and patchwork systems, not to mention that it can offer a cost effective approach. Apart from the benefits of an end-to-end offering, technology consumers need to take into consideration that de-centralized data and project ownership makes an enterprise-wide BI infrastructure hard to achieve.

The need for an end-to-end offering has resulted in mergers and acquisitions among many technology segments. Database vendors willing to strengthen their position either develop BI functionality organically or look for prospects to acquire (Oracle and Hyperion, IBM and Cognos). An integrated application, including required BI engines remains an ideal solution. However, it is clearly not yet an off-the-shelf proposition. The trend is toward offering a tool that offers integration across performance, content, change and process management within a single, enterprise-scale environment.

Conclusion for vendors and banks

Integration of BI with IT infrastructure and core operational systems brings benefits for both vendors and the end-user community. For vendors, it provides the opportunity to offer an enterprise-wide solution, rather than point-based deployments. Consequently, this is a chance for vendors to increase the user bases for their offerings and increase revenue streams, such as licensing, maintenance, or professional services. For end-users, an integrated platform offers the opportunity to make more effective use of their information assets. However, technology providers need to completely understand the bank's information flows in order to provide the right information, to the right person, at the right time, and in the right context.

BUSINESS INTELLIGENCE TECHNOLOGY SPENDING THROUGH 2012 IN RETAIL BANKING (DATABOOK)

Introduction

This report includes detailed data on business intelligence technology spending in retail banking, including breakdowns by country and by solution areas. Furthermore, it has detailed historic, current and future statistics on internal and external IT spending.

Global Business Intelligence IT Spending, 2006-2012, by regions (\$m)

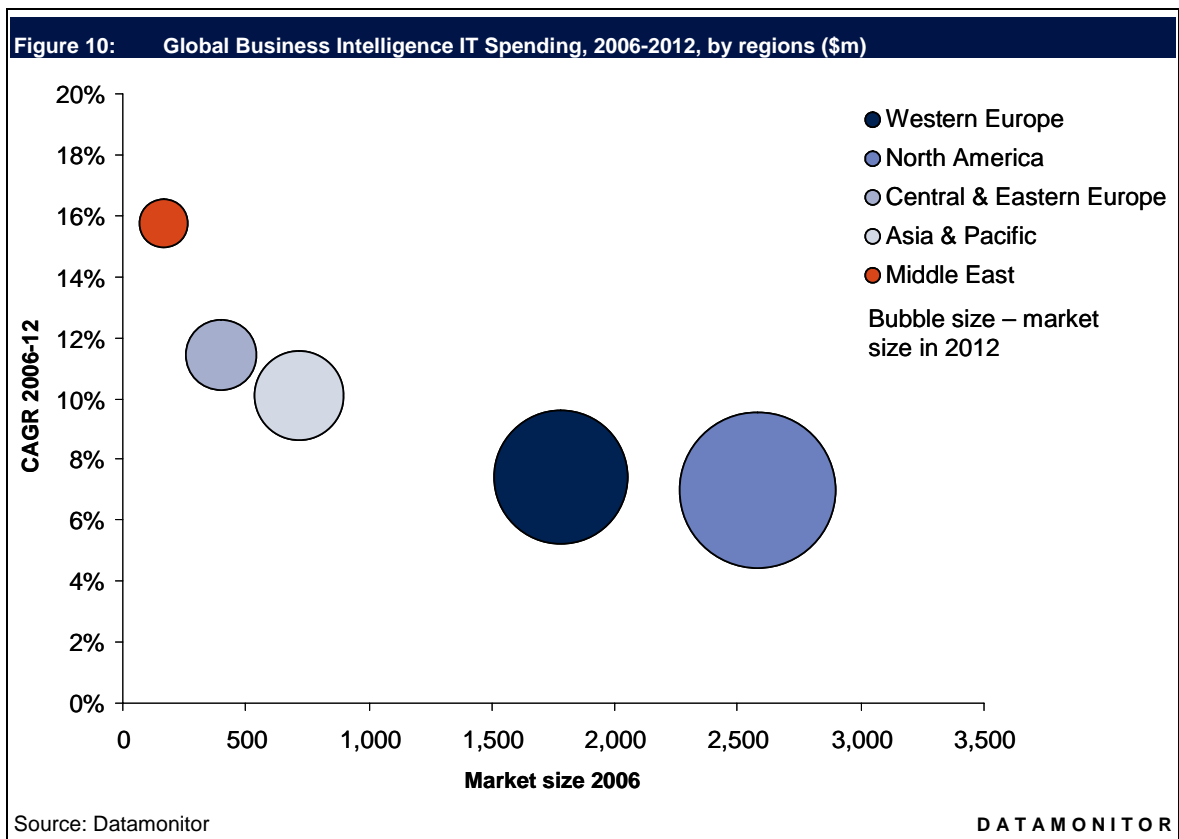


Table 1: Global Business Intelligence IT Spending, 2006-2012, by regions (\$m)								
Region	2006	2007	2008	2009	2010	2011	2012	CAGR
Western Europe	1783.6	1958.8	2149.3	2323.9	2477.3	2616.3	2744.3	7.4%
North America	2578.4	2803.8	3060.0	3262.0	3474.1	3673.5	3862.1	7.0%
Central & Eastern Europe	400.4	460.5	523.9	588.1	647.0	707.8	767.0	11.4%
Asia & Pacific	713.9	787.8	873.7	966.1	1065.2	1165.4	1269.1	10.1%
Middle East	167.1	195.9	230.9	270.6	310.5	354.4	401.7	15.7%
Total	5643.4	6206.8	6837.9	7410.6	7974.1	8517.3	9044.2	8.2%

Source: Datamonitor DATAMONITOR

West European Business Intelligence IT Spending, 2006-2012, by countries (\$m)

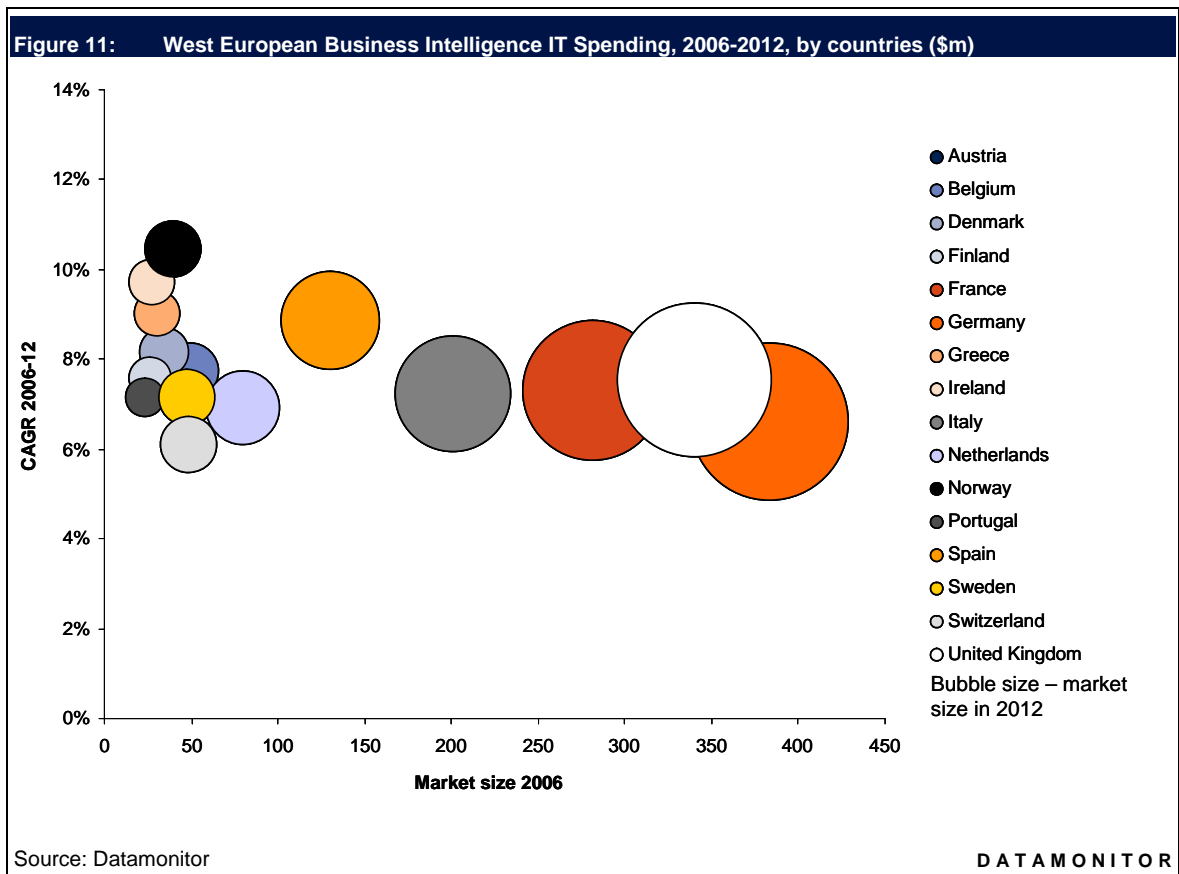


Table 2: West European Business Intelligence IT Spending, 2006-2012, by countries (\$m)								
Country	2006	2007	2008	2009	2010	2011	2012	CAGR
Austria	41.1	45.2	49.7	53.9	57.6	60.9	64.0	7.7%
Belgium	49.5	54.6	60.1	65.1	69.6	73.7	77.5	7.8%
Denmark	34.6	38.3	42.4	46.1	49.5	52.5	55.4	8.2%
Finland	26.1	28.7	31.5	34.1	36.4	38.5	40.4	7.6%
France	281.5	310.7	336.4	362.2	385.5	408.3	429.9	7.3%
Germany	383.9	417.7	452.3	486.5	516.3	541.4	563.2	6.6%
Greece	30.1	33.8	37.7	41.4	44.7	47.8	50.7	9.0%
Ireland	27.4	31.0	34.9	38.5	41.9	45.0	47.9	9.7%
Italy	201.0	219.1	239.9	259.0	276.1	291.5	305.6	7.2%
Netherlands	79.8	87.0	94.9	102.1	108.4	114.0	119.1	6.9%
Norway	39.6	45.3	51.3	57.1	62.4	67.4	72.0	10.5%
Portugal	23.2	25.4	27.8	30.0	31.9	33.6	35.1	7.1%
Spain	130.3	145.6	164.6	179.2	191.8	204.0	216.9	8.9%
Sweden	47.7	52.2	57.1	61.6	65.5	69.0	72.2	7.2%
Switzerland	48.3	52.1	56.4	60.2	63.4	66.3	68.8	6.1%
United Kingdom	339.6	372.1	412.3	446.8	476.5	502.6	525.6	7.6%
Total	1783.6	1958.8	2149.3	2323.9	2477.3	2616.3	2744.3	7.4%

Source: Datamonitor **DATAMONITOR**

West European Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

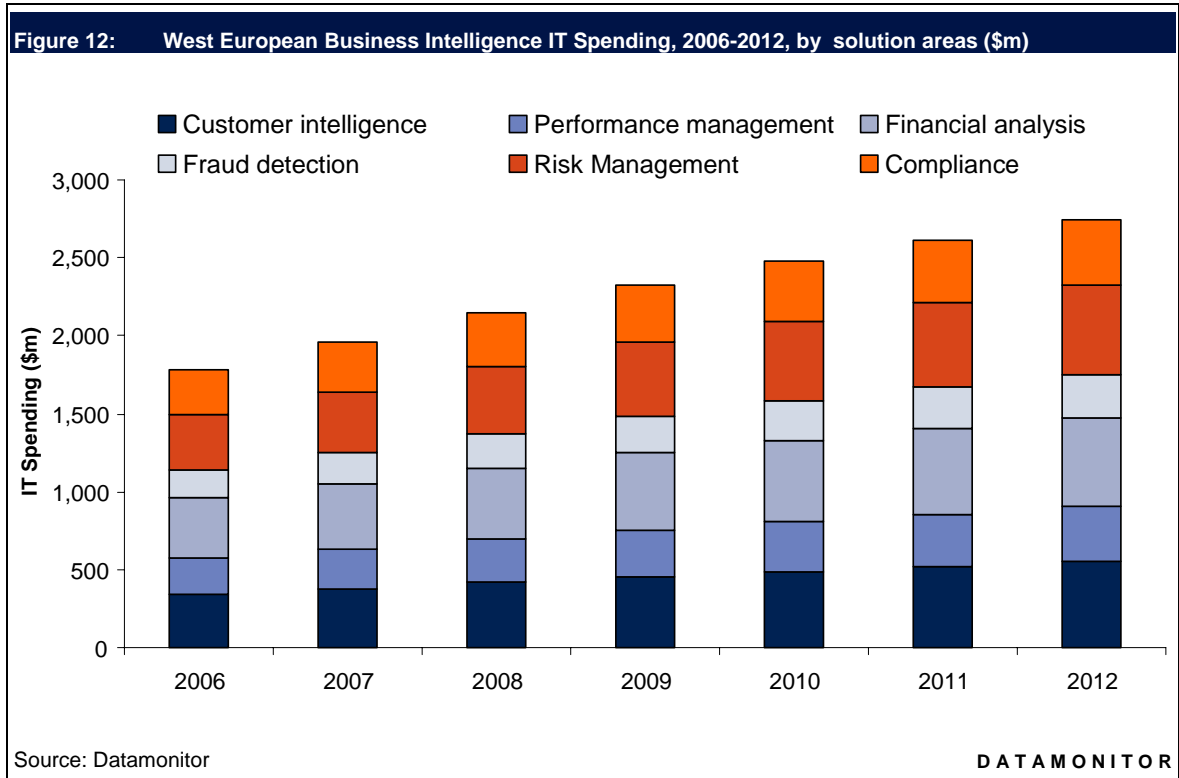


Table 3: West European Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

Solution area	2006	2007	2008	2009	2010	2011	2012	CAGR
Customer intelligence	348.6	378.2	415.5	451.9	487.4	521.8	553.3	8.0%
Performance management	231.3	254.3	279.2	300.0	318.7	336.0	352.3	7.3%
Financial analysis	379.0	420.1	460.7	494.9	523.1	544.4	562.6	6.8%
Fraud detection	183.9	201.9	220.7	239.0	254.1	267.8	281.0	7.3%
Risk Management	351.7	388.8	430.4	470.8	507.0	543.4	578.3	8.6%
Compliance	289.2	315.5	342.9	367.4	386.9	402.8	416.8	6.3%
Total	1783.6	1958.8	2149.3	2323.9	2477.3	2616.3	2744.3	7.4%

Source: Datamonitor DATAMONITOR

West European Business Intelligence IT Spending, 2006-2012, by sources (\$m)

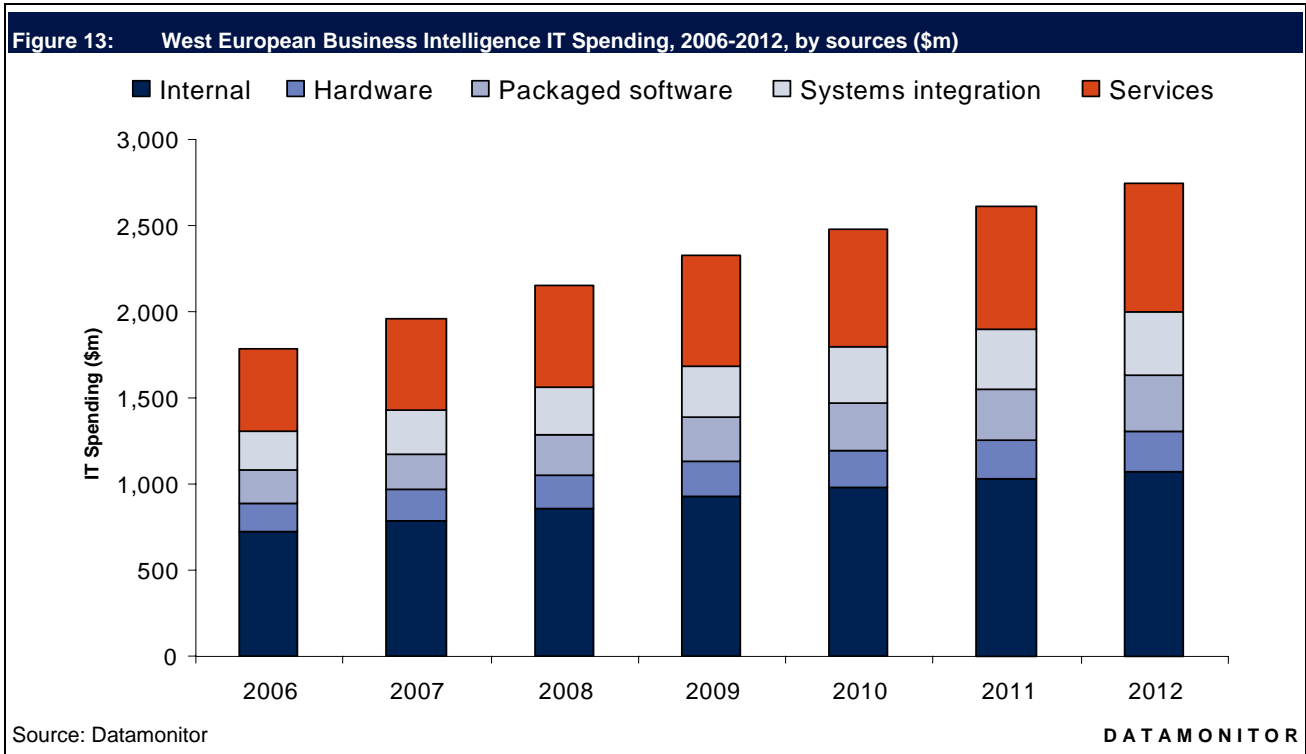


Table 4: West European Business Intelligence IT Spending, 2006-2012, by sources (\$m)

Source	2006	2007	2008	2009	2010	2011	2012	CAGR
Internal	722.6	789.8	862.1	927.4	978.5	1028.2	1073.2	6.8%
Hardware	161.0	176.4	190.1	205.0	215.7	225.0	233.5	6.4%
Packaged software	194.3	211.3	230.1	250.6	273.1	297.8	324.7	8.9%
Systems integration	227.1	251.4	279.2	303.9	326.0	345.6	365.4	8.3%
Services	478.6	530.0	587.9	637.0	683.9	719.6	747.4	7.7%
Total	1783.6	1958.8	2149.3	2323.9	2477.3	2616.3	2744.3	7.4%

Source: Datamonitor DATAMONITOR

North American Business Intelligence IT Spending, 2006-2012, by countries (\$m)

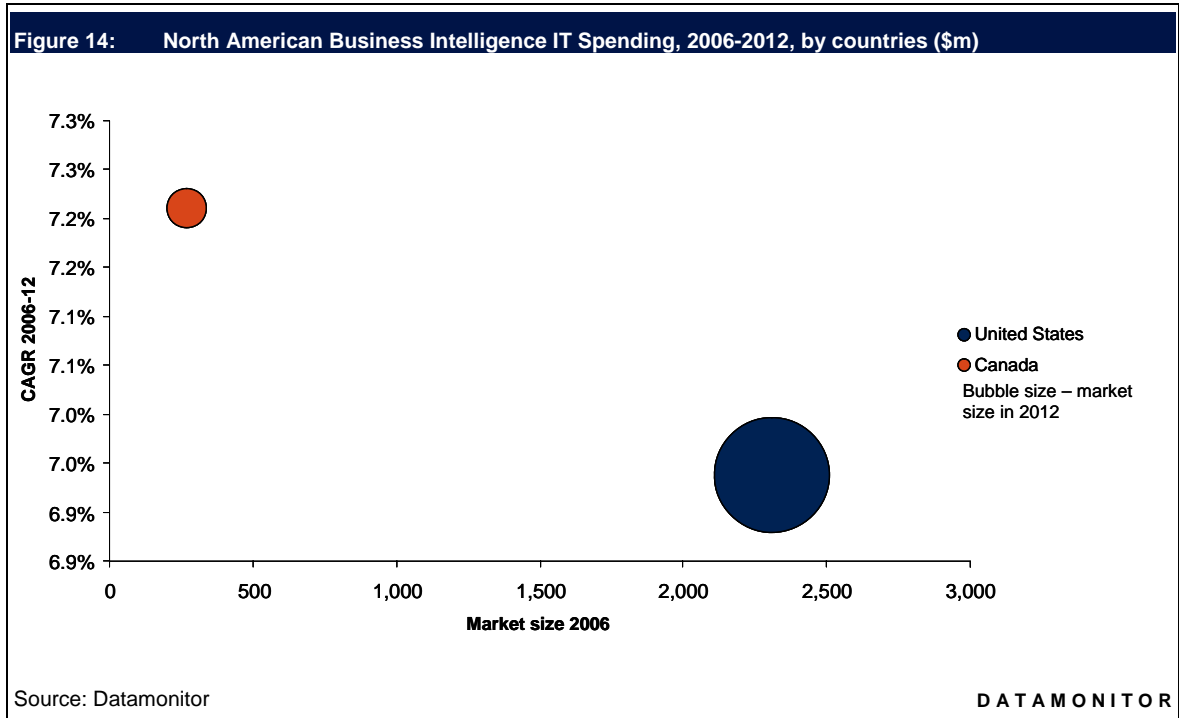


Table 5: North American Business Intelligence IT Spending, 2006-2012, by countries (\$m)

Country	2006	2007	2008	2009	2010	2011	2012	CAGR
United States	2310.5	2511.7	2743.2	2921.3	3112.5	3289.6	3455.3	6.9%
Canada	267.9	292.1	316.8	340.7	361.6	384.0	406.8	7.2%
Total	2578.4	2803.8	3060.0	3262.0	3474.1	3673.5	3862.1	7.0%

Source: Datamonitor DATAMONITOR

North American Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

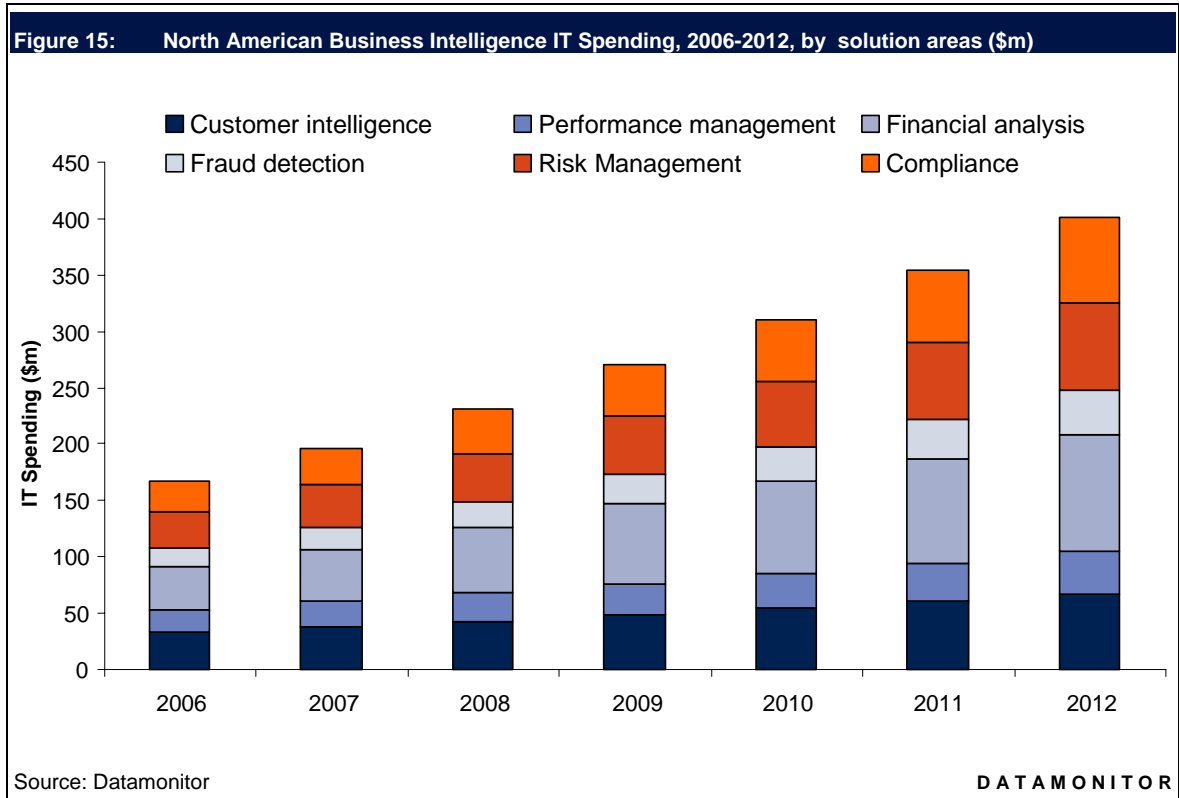


Table 6: North American Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

Solution area	2006	2007	2008	2009	2010	2011	2012	CAGR
Customer intelligence	517.0	548.3	602.6	656.8	709.0	758.6	811.7	7.8%
Performance management	312.1	331.5	357.8	386.3	419.9	456.3	491.6	7.9%
Financial analysis	491.2	526.4	558.3	586.5	607.3	626.2	639.4	4.5%
Fraud detection	355.6	391.4	426.8	461.1	491.6	515.8	540.0	7.2%
Risk Management	468.1	537.3	610.2	631.7	668.9	709.8	747.6	8.1%
Compliance	434.2	468.9	504.3	539.6	577.4	606.8	631.7	6.4%
Total	2578.3	2803.8	3060.0	3262.0	3474.1	3673.5	3862.1	7.0%

Source: Datamonitor DATAMONITOR

North American Business Intelligence IT Spending, 2006-2012, by sources (\$m)

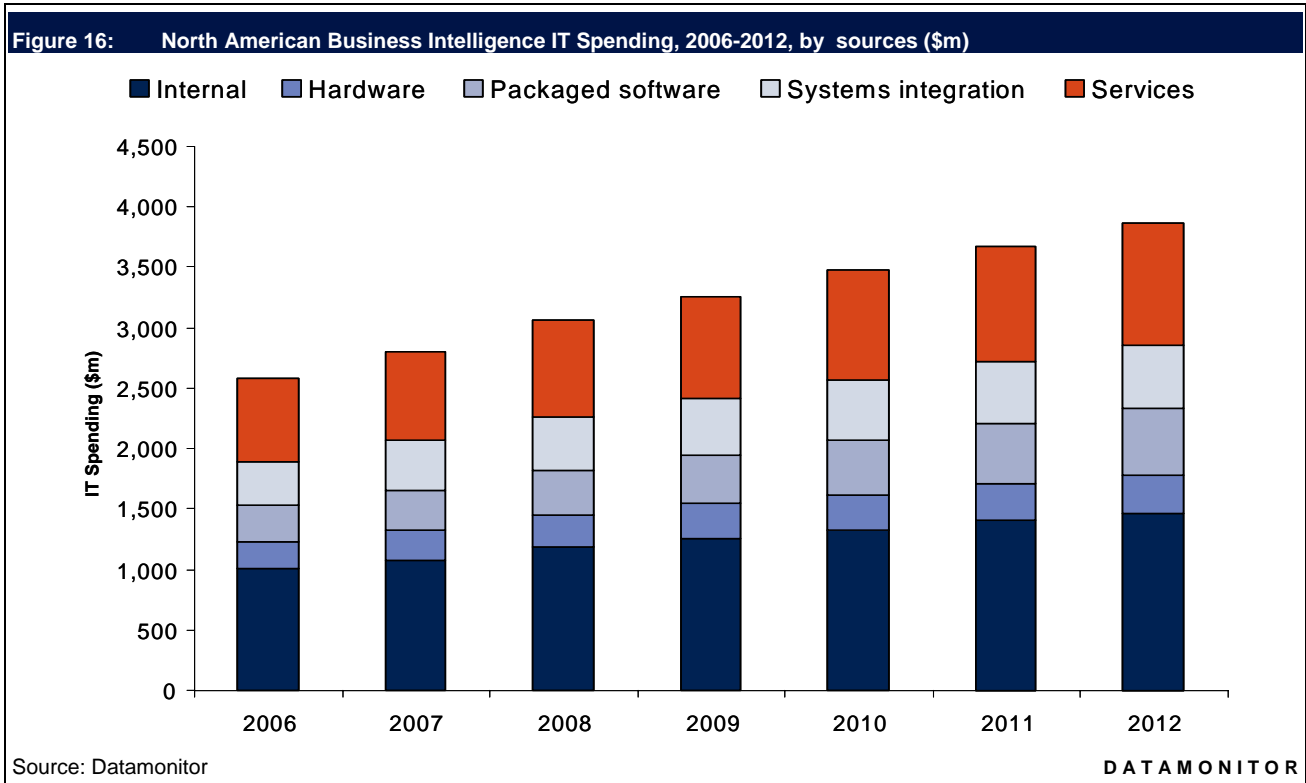


Table 7: North American Business Intelligence IT Spending, 2006-2012, by sources (\$m)

Source	2006	2007	2008	2009	2010	2011	2012	CAGR
Internal	1004.2	1078.3	1181.2	1256.8	1324.6	1401.6	1463.5	6.5%
Hardware	220.5	244.8	269.9	283.1	295.3	310.3	322.8	6.6%
Packaged software	308.1	339.0	372.9	410.0	450.5	494.8	543.2	9.9%
Systems integration	356.9	407.2	445.3	471.1	498.5	512.9	528.0	6.7%
Services	688.7	734.5	790.8	841.0	905.1	953.8	1004.5	6.5%
Total	2578.4	2803.8	3060.1	3262.0	3474.0	3673.5	3862.1	7.0%

Source: Datamonitor DATAMONITOR

Central and Eastern European Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

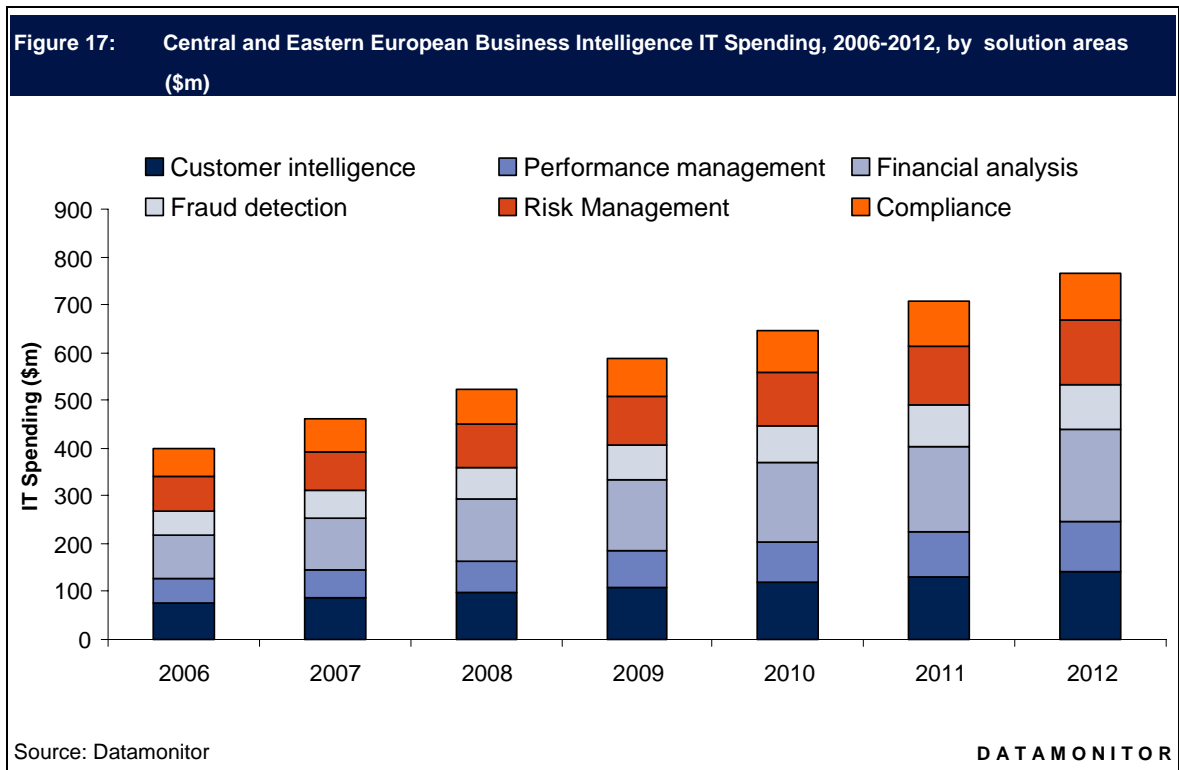


Table 8: Central and Eastern European Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

Solution area	2006	2007	2008	2009	2010	2011	2012	CAGR
Customer intelligence	76.1	86.7	97.1	107.8	118.6	130.2	141.8	10.9%
Performance management	52.0	59.9	68.0	76.4	85.4	94.8	104.8	12.4%
Financial analysis	88.1	107.5	127.9	149.6	164.8	179.6	192.2	13.9%
Fraud detection	52.0	59.7	66.2	72.7	79.2	86.2	93.5	10.3%
Risk Management	72.1	80.0	91.0	101.1	111.9	123.3	135.4	11.1%
Compliance	60.1	66.7	73.7	80.4	87.2	93.7	99.4	8.8%
Total	400.4	460.5	523.9	588.1	647.0	707.8	767.0	11.4%

Source: Datamonitor DATAMONITOR

Central and Eastern European Business Intelligence IT Spending, 2006-2012, by sources (\$m)

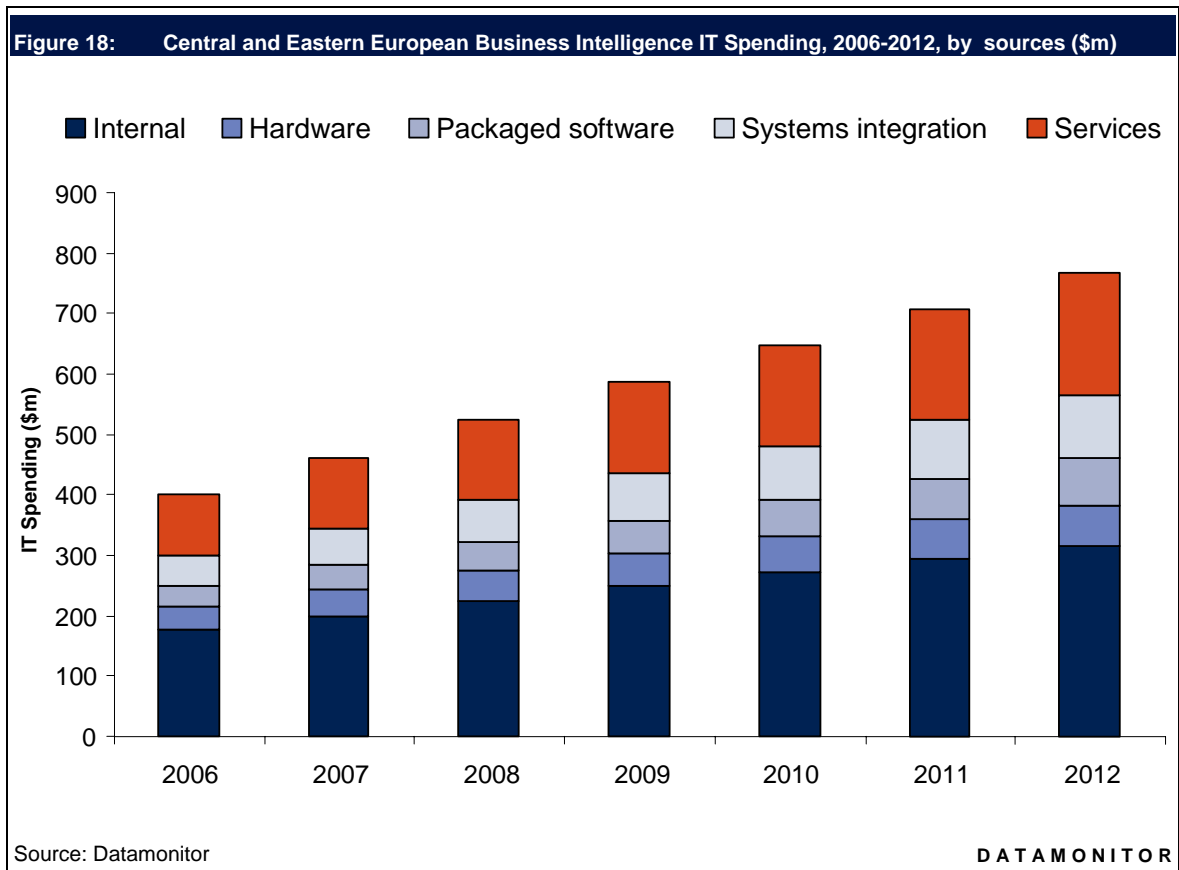


Table 9: Central and Eastern European Business Intelligence IT Spending, 2006-2012, by sources (\$m)

Source	2006	2007	2008	2009	2010	2011	2012	CAGR
Internal	176.2	200.3	225.3	249.9	271.7	293.7	314.5	10.1%
Hardware	38.0	43.7	49.8	54.4	59.8	65.5	69.0	10.4%
Packaged software	34.0	39.9	46.2	52.9	60.2	68.2	76.8	14.5%
Systems integration	52.0	60.1	70.2	77.9	87.3	95.6	105.5	12.5%
Services	100.1	116.4	132.6	152.9	167.8	184.9	201.2	12.3%
Total	400.4	460.5	523.9	588.1	647.0	707.8	767.0	11.4%

Source: Datamonitor DATAMONITOR

Asia & Pacific European Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

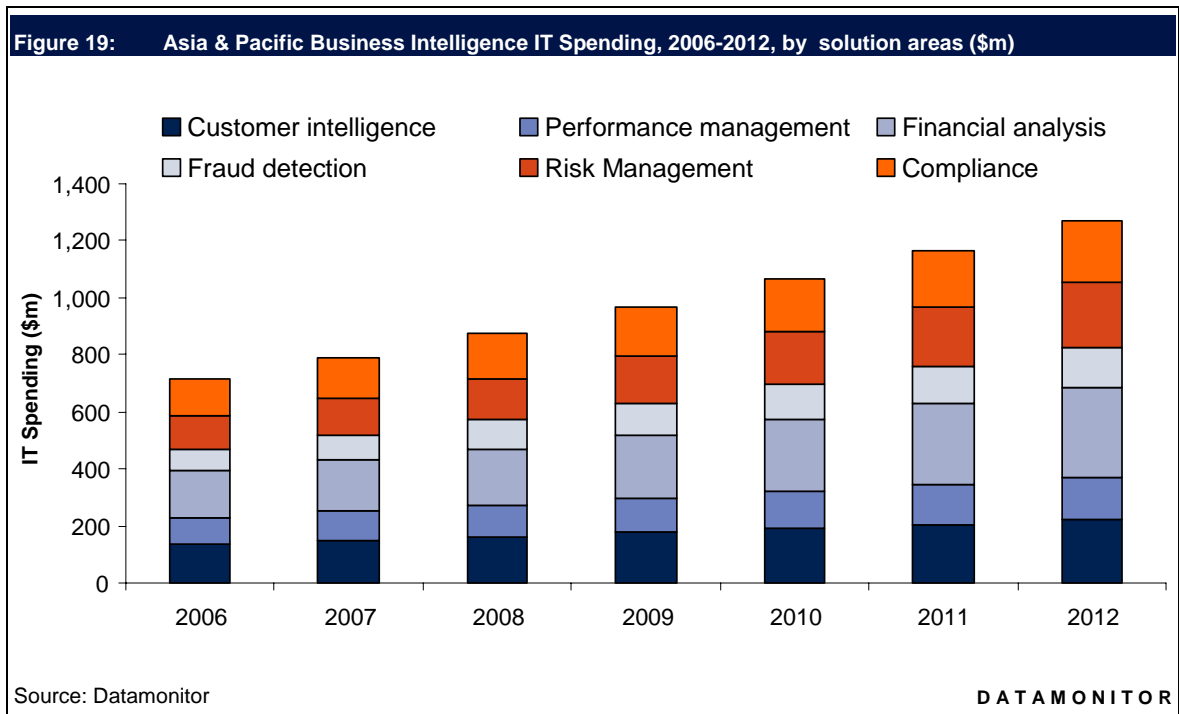


Table 10: Asia & Pacific Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

Solution area	2006	2007	2008	2009	2010	2011	2012	CAGR
Customer intelligence	135.6	148.7	162.0	175.8	189.9	204.3	219.0	8.3%
Performance management	92.8	101.9	111.3	120.8	130.8	141.0	151.5	8.5%
Financial analysis	164.2	178.1	197.8	224.2	254.3	284.8	316.1	11.5%
Fraud detection	78.5	88.5	100.0	110.5	120.5	130.9	142.1	10.4%
Risk Management	114.2	127.9	145.6	165.2	185.9	204.9	224.9	12.0%
Compliance	128.5	142.6	156.9	169.5	183.9	199.5	215.4	9.0%
Total	713.9	787.8	873.7	966.1	1065.2	1165.4	1269.1	10.1%

Source: Datamonitor DATAMONITOR

Asia & Pacific European Business Intelligence IT Spending, 2006-2012, by sources (\$m)

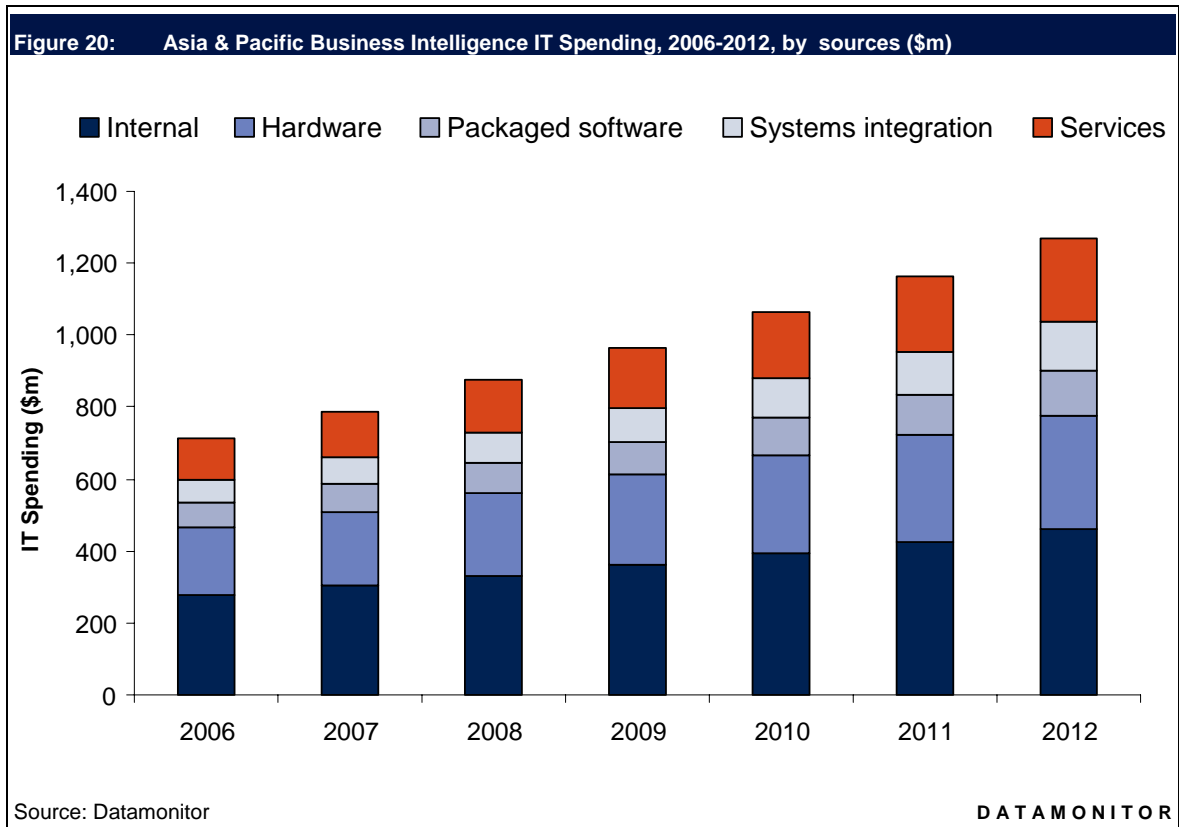


Table 11: Asia & Pacific Business Intelligence IT Spending, 2006-2012, by sources (\$m)

Source	2006	2007	2008	2009	2010	2011	2012	CAGR
Internal	277.2	303.3	332.0	362.3	394.1	427.0	460.3	8.8%
Hardware	189.7	206.8	227.2	248.8	271.6	294.3	317.3	9.0%
Packaged software	69.0	76.5	84.7	93.7	103.5	114.1	125.8	10.5%
Systems integration	64.6	72.9	83.0	94.2	111.5	119.5	133.3	12.8%
Services	113.5	128.3	146.8	167.1	184.5	210.5	232.5	12.7%
Total	713.9	787.8	873.6	966.0	1065.2	1165.3	1269.2	10.1%

Source: Datamonitor DATAMONITOR

Middle East Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

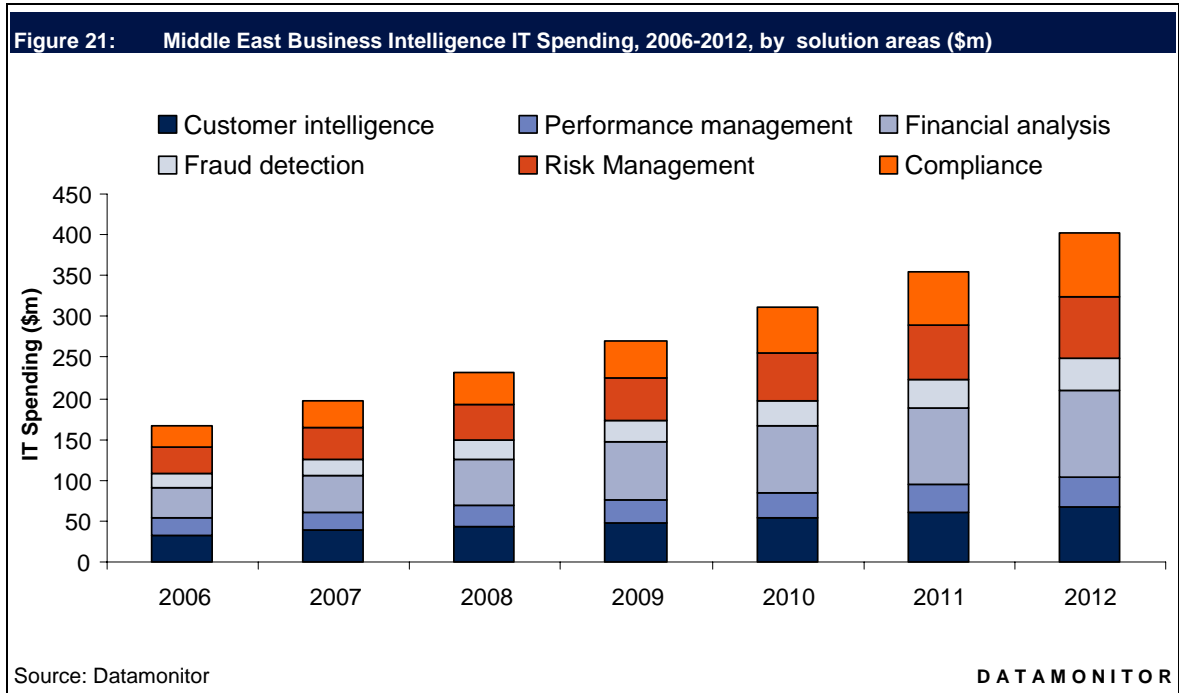


Table 12: Middle East Business Intelligence IT Spending, 2006-2012, by solution areas (\$m)

Solution area	2006	2007	2008	2009	2010	2011	2012	CAGR
Customer intelligence	33.4	38.1	43.2	48.6	54.4	60.6	67.3	12.4%
Performance management	20.1	22.6	25.3	28.0	31.0	34.1	37.4	11.0%
Financial analysis	38.4	46.0	57.4	70.7	81.6	93.0	104.2	18.1%
Fraud detection	16.7	19.5	22.9	26.7	30.5	34.7	39.3	15.3%
Risk Management	31.8	37.3	43.5	50.5	58.4	67.2	77.2	16.0%
Compliance	26.7	32.3	38.7	46.1	54.7	64.7	76.3	19.1%
Total	167.1	195.9	230.9	270.6	310.5	354.4	401.7	15.7%

Source: Datamonitor DATAMONITOR

Middle East Business Intelligence IT Spending, 2006-2012, by sources (\$m)

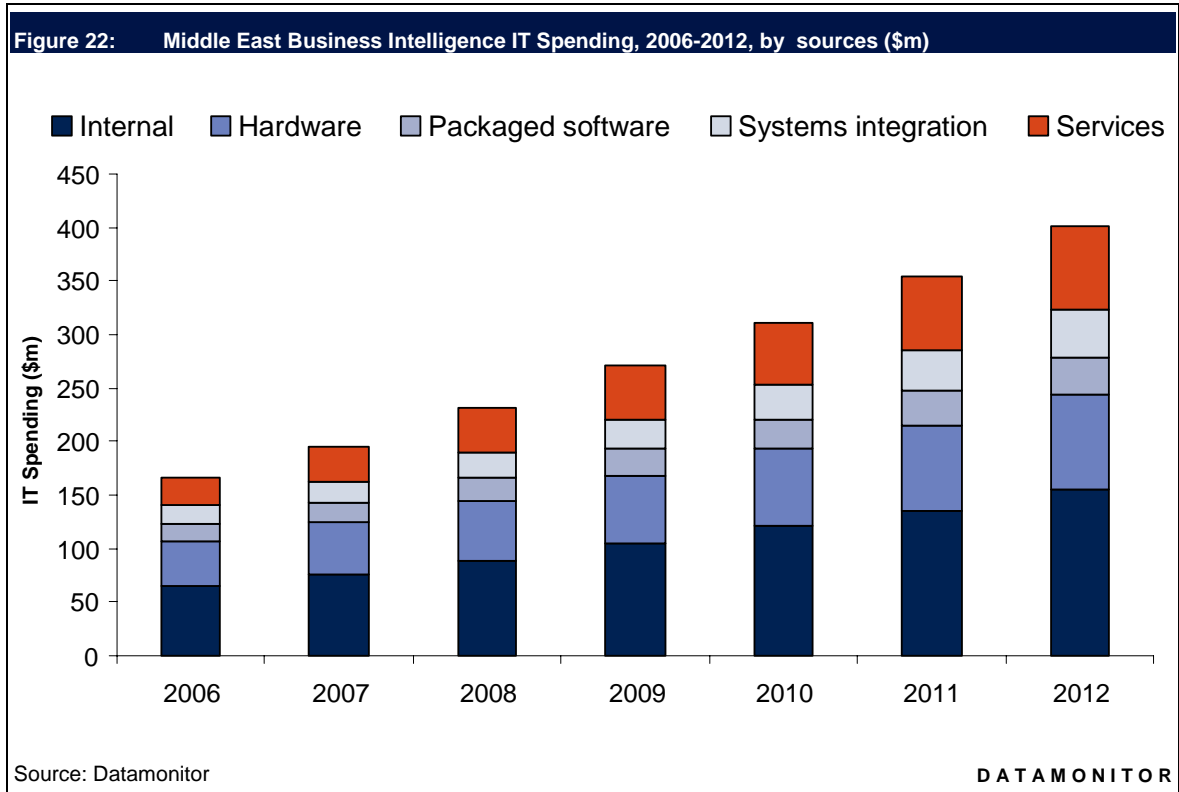


Table 13: Middle East Business Intelligence IT Spending, 2006-2012, by sources (\$m)

Source	2006	2007	2008	2009	2010	2011	2012	CAGR
Internal	65.2	75.9	88.9	104.5	121.2	136.1	154.8	15.5%
Hardware	41.8	48.0	55.4	63.6	71.4	79.7	88.4	13.3%
Packaged software	16.7	19.2	21.9	24.7	27.9	31.3	35.0	13.1%
Systems integration	16.7	19.6	23.1	28.4	33.4	39.0	45.2	18.0%
Services	26.7	33.2	41.7	49.4	56.7	68.2	78.3	19.6%
Total	167.1	195.9	231.0	270.6	310.5	354.3	401.6	15.7%

Source: Datamonitor DATAMONITOR

Definitions: Sources

Internal

Internal expenditure includes in-house expenditure by end-users on IT. It therefore excludes any third-party IT expenditure by financial services end-users. Internal expenditure includes:

- permanent IT staff costs;
- individual IT contractors;
- internal systems maintenance and development.

Hardware

Expenditure figures for hardware specify the cost of purchasing complete hardware systems by the financial services end-user. This therefore includes the charge for the hardware and the operating platform required for it to be used as a system, but excludes software applications and any installation costs involved, which may be provided as part of a packaged solution. Basic peripherals and telecommunications hardware costs are also excluded. More precisely, systems hardware expenditure includes the following:

- computing equipment:
 - PCs;
 - workstations;
 - servers;
 - mainframes;
 - computing add-ons;
- network hardware:
 - LAN hardware;
 - WAN hardware;
 - server-based network systems;
- storage:
 - storage drives and disks;
- operating platforms:
 - NT, Unix, S390, MVS, AS400, VMS;

- operating systems upgrades;
- hardware maintenance:
 - mainframes and mid-range;
 - desktop;
 - network (excluding telecommunications).

Systems hardware expenditure excludes the following:

- peripherals:
 - printers;
 - photocopiers;
 - toners;
 - disks;
- telco hardware:
 - PBX;
 - telephones;
 - telco infrastructure;
 - telco maintenance.

Packaged software

Packaged software expenditure consists of the license fees paid by end-users for the use of vendor software created for a non-exclusive market. This will include the initial purchase fee plus any annual or per-user license costs. It will exclude any customization charges and implementation or integration costs, as well as license fees for software delivered as a service (i.e. ASP).

The software types included within the packaged software definition are as follows:

- tools – e.g. SAS tools, data warehouse loaders;
- transaction engines – e.g. CICS, TX series;
- account aggregation software;

- middleware / EAI – e.g. MQ series, TIB range, transformation hubs;
- application development;
- RAD:
 - development programs;
 - enterprise applications;
 - network management software.

Systems integration

Systems integration expenditure covers the technical element of developing IT systems, including the costs involved in the implementation of new or existing hardware and software and their integration into the end-user's IT environment. It includes any IT development required for integration at a technical level (e.g. application interfaces), but not for business processes (e.g. development of applications for straight through processing). This would be included within professional services expenditure.

Systems integration figures include expenditure on:

- analysis of technical systems / assessment of technical requirements;
- hardware selection (not provision);
- software selection;
- systems implementation;
- systems implementation;
- application tuning;
- interface development.

Services

Services expenditure includes the added-value and institution-specific services provided by vendors to the financial services sector, which are typically project-based. This category focuses on the business rather than purely technical element of IT, creating or adapting IT processes to meet business requirements. Services also include outsourcing expenditure, which constitutes spending by financial services end-users on third-party provision of operational IT services and / or business processes on an ongoing basis (the outsourcing contract may, however, have a specified time period). It does not include third-party provision of specific IT solutions (e.g. software development or implementation), unless this is a specified component of an ongoing business process or IT service outsourcing agreement.

The following areas are included within services spend:

- systems and process consulting:
 - system auditing;
 - IT strategy & tactics;
 - IT planning;
 - process redesign;
 - process redesign;
- custom software development:
 - bespoke application development;
 - customization of packaged software;
 - customization / re-engineering of existing systems;
 - Internet content integrators (web shops);
- software maintenance;
- coding:
 - systems maintenance;
- training and education:
 - application training;
 - programming training / education;
 - computer operations training.
- outsourcing expenditure:
 - data center – e.g. hardware maintenance, application maintenance;
 - desktop management – e.g. PC support, software upgrading and maintenance;
 - network management – e.g. network support / monitoring / maintenance, fault-finding / rectification;

 - application development outsourcing – referring to long-term application development contracts, typically offered by mass application development providers in India.

Definitions: Solution areas

Customer intelligence

Customer intelligence includes internal and external technology spending on technology offerings from across the spectrum of CRM, BI and Statistical Analytics that typically offer some or all of the following functionalities: Customer Behavior Analysis, Customer Spend and Value Analysis, Customer Portfolio Analysis, Customer Scorecard and Rating Applications.

Performance management

Performance management includes internal and external technology spending on technology offering related to a set of processes that help organizations optimize their business performance. It is a framework for organizing, automating and analyzing business methodologies, metrics, processes and systems that drive business performance.

Financial analysis

Financial analysis includes internal and external technology spending related to an assessment of the viability, stability and profitability of a bank, or a particular business unit, line of business etc. Typically it includes the following functionalities: customer credit, cash inflow, key financial ratios, financial performance or vendor accounts.

Fraud detection

Fraud detection includes internal and external technology spending related to a review of historical transactions to identify indicators of a non-conforming transaction. It includes the proactive identification and removal of the casual and enabling factors of fraud.

Risk Management

Risk management includes internal and external technology spending related to recognition of risk, risk assessment, developing risk strategies to manage it, and mitigation of risk using managerial resources. Typically, risk management covers decision areas such as credit risk, operational risk and market risk.

Compliance

Compliance includes internal and external technology spending related to conforming to a specification, standard or law that has been clearly defined. Typically, it covers technologies that allow integrating data from existing source systems and automating the consolidation, reporting, audit, and compliance functions in a controlled environment.

Definitions: Geographies

- North America: United States and Canada;
- Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, the Netherlands, Norway, Portugal, Spain, Sweden Switzerland, and the UK.
- Central and Eastern Europe: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, and Ukraine;
- Asia-Pacific: Afghanistan, Armenia, Australia, Azerbaijan, Bangladesh, China, Cambodia, Georgia, Hong Kong, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, North Korea, Pakistan, Papua New Guinea, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Tajikistan, Thailand, Turkmenistan, Uzbekistan, and Vietnam
- Middle East: Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen

Methodology

Sources used for the purposes of developing this document include:

- Previous Datamonitor research;
- End-user survey results obtained from a panel of 177 CIO executives;
- Interviews conducted with major business intelligence technology vendors;
- Recent financial results for the largest business intelligence technology vendors.
- Recent financial results from retail banking institutions.
- Financial analysis made by Financial Services team from Datamonitor
- All figures in USD thousands

APPENDIX

Definitions

- AJAX - Asynchronous JavaScript and XML - a web development technique used for creating interactive web applications,
- AML – Anti-Money Laundering,
- ASCI - the American Customer Satisfaction Index,
- ATM – Automated Teller Machine,
- BaFin – Bundesanstalt für Finanzdienstleistungsaufsicht (The Federal Financial Supervisory Authority - Germany),
- BAM - Business Activity Monitoring,
- Basel II – Basel II Capital Accord,
- BCBS – Basel Committee on Banking Supervision,
- BI – Business Intelligence,
- BI 2.0 – Real Time Business Intelligence,
- BPM – Business Process Management,
- CDI - customer data integration,
- COBOL - COmmon Business-Oriented Language - one of the oldest programming languages still in active use,
- CPM – Corporate Performance Management,
- CRM - Customer Relationship Management,
- CWM - Common Warehouse Metamodel - specification for modeling metadata for relational, non-relational, multi-dimensional, and most other objects found in a data-warehousing environment.
- ERP - Enterprise Resource Planning,
- ETL - Extract, Transform, and Load,
- FDIC - The Federal Deposit Insurance Corporation (US),
- FSA – Financial Services Authority (UK),
- FSI – Financial Services Institutions,
- GUI - Graphical User Interfaces.

IFRS - International Financial Reporting Standards,

ISV – Independent Software Vendor,

KPI – Key Performance Indicator,

KYC – Know Your Customer,

Metadata - an item of metadata may describe an individual datum, or content item, or a collection of data including multiple content items.

MOM - message oriented middleware,

OLAP - Online Analytical Processing Applications,

RDBMS - Relational Database Management System – a system in which data is stored in the form of tables and the relationship among the data is also stored in the form of tables.

ROI – Return on Investment,

SEPA - Single Euro Payments Area,

SI – Systems Integrator,

SOA - Service Oriented Architecture,

STP – Straight Through Processing,

The USA Patriot Act - The Uniting and Strengthening America Patriot Act,

XML - Extensible Markup Language - a general-purpose markup language, designed to facilitate the sharing of structured data across different information systems, particularly via the Internet

Methodology

- **End user research** - Interviews with CIO Executives
- **Industry opinion research** - Interviews with relevant technology solutions and services vendors
- **Financial Data** - Financial data obtained from banks and vendors

Further reading

DMTC2090 Building a Technology Platform for the “Ultimate Offering” (Review Report)

DMTC1143 Core system outsourcing in North American Retail Banking (Review Report)

DMTC1339 Creating a future banking platform (Review Report)

DMTC2075 Emerging Asia Pacific Markets (Review Report)

DPTC0015 North and Latin American Retail Banking Technology Spending Strategies 2008 (Customer Focus)

DPTC0009 European Retail Banking Technology Spending Strategies 2008 (Customer Focus)

DMTC1689 Retail payments in the global economy (Review Report)

DMTC1315 Developing a Distribution Dynamic (Review Report)

BFCT1868 Business Intelligence in Retail Banking (Market Focus)

BFCT1870 Business Intelligence in Retail Banking (Technology Focus)

IMTC0280 Business Intelligence Technology Spending through 2012 in Retail Banking (Interactive Model)

Ask the analyst

The Financial Services Technology Knowledge Center Writing team

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Datamonitor consulting

We hope that the data and analysis in this brief will help you make informed and imaginative business decisions. If you have further requirements, Datamonitor's consulting team may be able to help you. For more information about Datamonitor's consulting capabilities, please contact us directly at consulting@datamonitor.com.

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