

Achieving Active Business Intelligence: A Real-World Study

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1. Foreword

The human and technological aspects of Business Intelligence are finally maturing, leading to an increasing number of successful deployments—implementations that improve decision-making on a daily, tactical basis. That’s the key message of this important study conducted by Dr. Richard Hackathorn.

Business Intelligence is a complex undertaking that requires a broad, interdisciplinary set of skills—from database design and system administration to organizational development and end-user training. Richard’s research shows that companies who learn how to manage the process systematically are best positioned to prevail over the inevitable technical and social challenges that arise. At Sagent, our goal is to provide a robust, flexible BI platform that helps developers and end-users work together to rapidly adapt to changes in project scope and to new sources of information. By helping our customers become resilient, we reduce the risk of failure and increase the likelihood of a long-term return on investment.

We’re pleased to have sponsored this research and thank the customers who participated in the study for contributing their time and their stories.

Dave Henry,
Vice President, Marketing



2. Executive Summary

A series of interviews were conducted with people who have pioneered advanced implementations of data warehousing and business intelligence. This whitepaper summarizes these interviews and then synthesizes the common themes and lessons learned. We interviewed persons associated with 7 companies, the details of which are found in an appendix (in Section 9).

These interviews revealed the following common themes (in Section 3):

- Informed decision-making
- Cross-functional data integration
- Automating workflow
- Real-time analytics

...With the following factors contributing to their success (in Section 4):

- Securing executive support
- Working together
- Establishing data credibility

...Facing the following technology challenges (in Section 5):

- Security concerns
- Complex join paths
- Data transformations
- Real-time data loading

...Recommending the following best practices (in Section 6):

- Executive champions
- Business meaning of data
- Managing expectations

...Realizing the following benefits (in Section 7):

- Timely and accurate information
- Easily accessed information
- Competitive advantage
- Flexibility for responding to customer demands
- Performance improvements

*Companies are
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tangible benefits.*

Companies are implementing data warehousing systems successfully and reaping tangible benefits from these implementations. The application of this technology to day-to-day business problems is now part of normal business for the companies interviewed.

The themes of informed decision-making and cross-functional data integration were the most prevalent among the companies. However, these themes still require a leap of faith for business people. To them, it feels too much like technology for technology's sake. Over time (and with these cases), there are emerging many solid examples of tangible benefits from informed decisions and data integration. The conditions for tangible benefits are:

- Close involvement of management throughout the effort
- Clear business objectives with strong teamwork
- Establishing and preserving the credibility of the data

The Business Intelligence (BI) profession is on the verge of a new generation of enterprise systems, one in which BI takes center stage rather than an extract-and-run appendage. Future enterprise systems will evolve through advances in analytics that drive critical improvements in business processes.



3. What is Active Business Intelligence?

Intelligent enterprises are leveraging their business information to respond effectively to business demands.

At GlaxoSmithKline (GSK) Mexico, the Mexican unit of the world-leading, research-based pharmaceutical company, they are improving the accuracy and delivery of product sales analyses. “We were spending 80% of our time manually consolidating data each month and only 20% actually analyzing it...We are determined to turn this situation around...”

As companies adopt current data warehousing (DW) and BI solutions, situations like the above are occurring frequently. Instead of following simple business rules (like first-in/first-out), these companies are analyzing the impacts of their decisions and choosing wisely.

At the heart of being an Intelligent Enterprise is Active Business Intelligence. It is using BI systems as an active (rather than passive) tool in performing the business of the corporation. Active BI produces tangible impacts to the quality of day-to-day business transactions. Active BI creates real differences in serving customers, delivering products, manufacturing goods, and securing supplies—across the entire value chain.

The shift from a passive role to an active role is the key differentiator of Active BI with traditional BI. From Webster’s dictionary, the term ‘active’ implies ‘to take action’, rather than just thinking about or contemplating the situation. With traditional BI systems, the initiation of actions was a hope but not a design of traditional systems. Responsibility sadly ends with the pixels on the screen.

3.1 Toward the Intelligent Enterprise

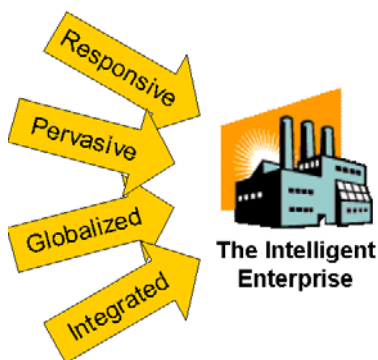
We are using the intelligent enterprise as a framework for understanding the current practices and future trends of BI/DW and for focusing upon Active BI.

An intelligent enterprise is defined as a company that pursues the goal of transforming insightful intelligence into effective action. Although abused over the years, James Brian Quinn appropriately utilized the term as the central theme in his 1992 book.¹ He argued that an intelligent enterprise would derive sustainable competitive advantage from service-based competencies that maximize the focus and effectiveness of intellectual assets. Companies should leverage their information resources through service offerings enhancing the usefulness of their product lifecycle.

An intelligent enterprise exists within a value chain. Any enterprise (company, government agency, and the like) does not operate in isolation, but in a matrix of relationships. Michael Porter² best expressed this matrix as a value chain—a flow of activities that add value to raw materials, eventually terminating in the consumption of goods or fulfillment of services by the ultimate consumer. The focus is the incremental addition of value (or wealth) along the flow of the value chain.

The intelligent enterprise exhibits the characteristics of being:

- **Responsive** to its business environment. Most businesses fly on autopilot until a serious crisis develops. However, excellence this week may be stupidity next week in these turbulent times.
- **Pervasive** in its business interactions by doing business anywhere with anyone at anytime. All interactions with your business should be consistent, coherent, and concise.
- **Globalized** in its business scope by dealing with employees, customers, suppliers, and other partners across the world—in any language, culture, currency, date/time format, character set, and time zone.
- **Integrated** across its business processes so that there is a single point of contact for a customer across any business process. Customers and partners should feel



that their interaction with your company has been tailored to their unique requirements.

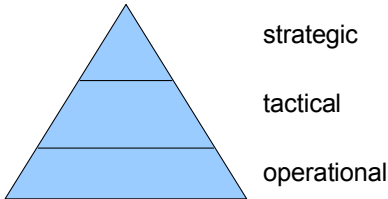
The intelligent enterprise transforms insightful intelligence into effective action and thereby becomes more responsive to its business environment, pervasive in its business interactions, globalized in its business scope, and integrated across its business processes.

3.2 Supporting Tactical Decision-Making

The first characteristic of Active BI is the emphasis on tactical decision-making that guides minute-by-minute business activities. This is an extension to, not elimination of, the focus upon strategic decision-making of traditional BI. Instead of being confined to executive suites for use by managers and business analysts, Active BI has a presence on the shop floors, branch offices, and even customer desktops.

The most important characteristic of Active BI is that it impacts the tactical and operational levels of management, in addition to the strategic level. These levels of management activity are classic concepts in the IT industry. In 1965, R.N. Anthony defined three categories in his book on *Planning and Control Systems* as follows:³

- **Strategic planning**—Definition of goals, policies... Determination of organizational objectives.
- **Management control and tactical**—Acquisition of resources, tactics... Establishment and monitoring of budgets.
- **Operational planning and control**—Effective and efficient use of existing facilities and resources to carry out activities within budget constraints.



These definitions seem antiquated with their emphasis on manufacturing industries. However, the Anthony framework has endured for almost 40 years and has contributed key concepts to the IT profession. The framework is often shown as a management pyramid, in which a few are engaged at the strategic level, while many more are involved at the tactical and lower operational levels.

The tactical and operational levels are often considered the same in modern organizations because the classic hierarchical (Theory X) organizational structure is not as prevalent today. In older manufacturing firms that were the core of the Industrial Revolution, the tactical level refers to middle managers who interpret the strategic directions of top management and convert them to rules and procedures. The operational level refers to first-line supervisors who interpret the rules and procedures and insure that workers conform. Roughly speaking, the two levels imply white-collar and blue-collar. With the knowledge workers of today's service industries, these two levels tend to be blended in practice.

The Anthony framework also gave us a way to specify the information requirements by management level, as summarized in the following table.⁴

	Operational	Tactical	Strategic
Data Source	Internal	<<< >>>	External
Data Scope	Certain & Narrow	<<< >>>	Vague & Broad
Aggregation	Detailed	<<< >>>	Summarized
Time Horizon	Historical	<<< >>>	Future
Data Currency	Highly Current	<<< >>>	Quite Old
Required Accuracy	High	<<< >>>	Low
Frequency of Use	Very Frequent	<<< >>>	Infrequent

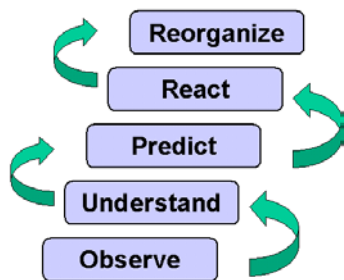
BI efforts have traditionally focused more on the right side with summarized analyses directed toward future business activities. Active BI enables us to move toward the left and extend coverage across all three levels.

Information provided by Active BI must be more detailed, current, and accurate to properly support the tactical and even operational levels. Active BI systems often support a larger and more diverse user base, possibly extending externally to customers, suppliers, and other partners. The workload required by Active BI systems will increase significantly, both from an increased number of users and from a diversity of analysis requirements.

3.3 Leveraging Actionable Intelligence

The second characteristic of Active BI is that it enables a complete spectrum of BI activities that bridge the gap from data to action. A ‘complete’ BI system supports the following five functions:

- *Observe*—What is happening?
- *Understand*—Why has it happened?
- *Predict*—What will happen?
- *React*—What should we do now?
- *Reorganize*—How can we do it better?



The *observe* function captures the history of the business and is the bread and butter of data warehousing. The *understand* function comprehends the dynamics of the business, as inferred from the data. The *predict* function forecasts the future state of business variables, based on a model of business dynamics. The *react* function decides and executes a course of action based on an understanding of the business dynamics and predictions about future trends. The *reorganize* function learns to improve business processes by refining best practices. Improving a single decision is not sufficient; improving the decision process is the ultimate objective.

Traditional BI often stops with the first three stages. Its responsibility often ends at the pixels on the screen or the beeps on the pager, failing to insure sustainable benefits for the business.

In contrast, Active BI moves us beyond those initial stages into the fourth and fifth stages. Active BI enables us to react to the current business demands, threats, and opportunities based on our observations, understanding, and predictions. And, Active BI enables us to reorganize to meet future demands, threats, and opportunities.

4. Common Themes

Based on interviews with 7 companies, the next sections synthesize the ‘lessons learned’ from those cases, organized as common themes, success factors, technology challenges, best practices, and benefits realized. These sections conclude by summarizing the lessons learned and offer recommendations in Section 8. The detailed descriptions of the 7 case studies follow as an appendix in Section 9.

Pay close attention; the project that you save may be your own.

Company	Interviewee	Lessons Learned
Blood Systems	<ul style="list-style-type: none"> William Lachenauer, VP Info. Resources & CIO 	Have executive champions Extending existing transactional system with BI systems Provide query tools for remote users Get buy-in of business knowledgeable executives Add value by providing timely information to executives Leverage predictive analysis, which are accurate and invaluable
California State Department of Justice	<ul style="list-style-type: none"> Judy Candlish, Data Processing Manager Pramod Dash, Senior Consultant, R. Systems 	Expect faster queries Expect improved data quality Provide data access from anywhere Expect that development takes more time than planned Emphasize the setting expectations and training as critical Work together as a group with a common goal
Customer Management Solution Provider	(Anonymous)	Use metrics based on the business perspective Expect that normalizing time zones is a common transformation Using real-time data assists in managing business processes Leverage workflow automation using alerting analytics Expect to use Sagent tools as a ‘Swiss army knife’ Expect performance improvement Leverage billing consistency for cutting costs Focus on eliminating manual reporting, which is a key selling point Know your skill set; compensate for your weakness through good training Make wise decisions about product purchases Develop incrementally Secure a strong sponsor at the project start and throughout the project Establish credibility for the data
Glaxo-SmithKline Mexico	<ul style="list-style-type: none"> Gloria Muñoz, eProcess Manager Alberto Esparza, DW Project Leader 	Establish strategic goals like assuring a competitive advantage Proactively use information for informed decision-making Strive for Information with high accuracy and fast delivery
International Data Management Company	(Anonymous)	Automate data integration to speed analysis Use dedicated line to increase security for remote access Train users on the business meaning of data
MarketSoft	<ul style="list-style-type: none"> Jim Aucoin, Senior Product Manager Cindy O’Connor, Software Developer 	Provide complete lead management Emphasize closed-loop collaboration and continuous improvement Focus on real-time analysis
OPAM	<ul style="list-style-type: none"> Carlos Valdés, IT Director 	Understand the value of ad hoc queries Understand the business and especially the customer

4.1 Informed Decision-Making

Muñoz of GSK Mexico made a clear argument that better information results in better decision-making.

... the proactive use of information to support informed decision-making.

We believe that it was necessary to concentrate data in a database to explore information and access from a single source, thus assuring better decision-making. Its objective is “to supply information for informed decision-making.” MATRIX, our BI project, will be used in all aspects of the business, but it is first applied in the pharmaceuticals division.

The objectives for the GSK project are:⁵



- Apply business experience and analysis to proactively use information as a competitive weapon
- Empower business users with self-service access to timely information
- Provide a consolidation and consistent information baseline for use by management

...consistent and accurate information about business reality.

4.2 Cross-Functional Data Integration

A common theme through many interviews was information integration across enterprise functions. This implies that the data warehouse contains consistent and accurate information about the whole business. By analyzing this integrated warehouse data, the best understanding of the business, both its historical performance and current characteristics, can be obtained. Often, a success indicator is the universal opinion that the warehouse is the only place to go for business information.

Information integration also implies a trust, in both directions, between business users and IT staff. Business users must trust the IT staff to deliver accurate and consistent information about their business. Inaccuracies and inconsistencies must be few and resolved quickly. Likewise, IT staff must trust business users to utilize the data warehouse in a proper manner, achieving real business benefits.

The systems manager at the International Data Management Company explained that the source data for these custom databases is complex.

There typically are many sources of data that get used as inputs to a marketing database. Due to the number and types of sources, we must be flexible enough to work with multiple input systems and have the ability to understand that data so it can be applied correctly. We take all of these sources and combine them to create one unique picture for each of our customers.

Lachenauer of Blood Systems, the nation's oldest and second largest blood service provider, explained that the objectives are to provide an enhanced reporting environment beyond that available from their manufacturing system. To do so, the warehouse is integrating data from multiple sources (primarily from Oracle Financials) to provide analysis on cost structures and revenue generation.

Aucoin of MarketSoft, a software company focused on Marketing Process Management, highlighted their complete lead management, which involved a close integration of sales and marketing activities.

MarketSoft is best known for complete lead management as our core product. We link together marketing with sales. We have a sophisticated routing system among direct or indirect sales. We determine the top performers by giving them more leads, along with various carrot-and-stick mechanisms. For instance, if one distributor has not processed a hot lead within 24 hours, the system can automatically pull the lead and send it to another distributor. In other words, we have a really rich system around lead management.

4.3 Automating Workflow

A common theme emerging from the interviews is workflow automation driven by analytics from the data warehouse. Automation strives toward functional specialization (i.e., doing a small task in a uniform manner). If we fully understand a business process and are able to control (or anticipate) the environment, then we can efficiently standardize products and services. Automation also implies that the human element is minimized or even eliminated, perhaps resulting in large cost savings.

The Customer Management Solution Provider is investigating various ways of automating this workforce management through alerts.

Workforce management ...monitoring performance in real-time.



There is a different initiative in our company. If an agent is not logged into the system by 8:00 am, then an alarm goes off in the manager's computer. The idea is to have the manager call into the center to correct the situation. This is not part of Business Insight, our BI system, but it is planned to be. It will also be another data source.

4.4 Real-Time Analytics

Data warehousing systems usually operate on a daily or weekly cycle for extracting data from operational systems. This implies that analyses are always looking backwards at historical data, rather than incorporating the current data from operational systems.

For traditional purposes, this is adequate for two reasons. First, analytics are often over a specific reporting period, driven by the fiscal calendar for quarterly or monthly reports. Second, analytics require days or weeks before a group decision is reached and specific actions are taken.

Situations where real-time analytics become critical are those where action should be taken immediately (within minutes or hours, rather than days or weeks). Quality improvements in customer care centers and eBusiness websites are typical examples. Making the most of touch-points with customers is another example.

MarketSoft is at an interesting turning point with their DemandMore-Metrics product, as O'Connor observed.

A year ago, clients were checking their reports maybe once per week. That has changed because we have upgraded the quality and ease-of-use of the reports. Clients are now checking their report daily, rather than weekly. They get their coffee and review the morning report, rather than getting a summary report for the monthly executive meeting. Some customers are even asking to see real-time streaming reports.

To achieve higher productivity through the organization, the frequency of updating data and generating reports is ever increasing, as the director of the Customer Management Solution Provider explained.

The reason is that executives want their subordinates to watch it more in real-time. Executives look at the utilization of our agents, staffing, people on duty, and expected calls. Low-level management people are looking at agent performance, such as call length per agent, after call work time, logged into an inbound query rather than outbound. If our agents are more effective and efficient, then we are providing the best value to our customers. ... Then, we want to increase the frequency by which we loaded the operational data.

5. Success Factors

We asked about the factors that made the project successful. Answers varied from common industry wisdom to lucky coincidences to new insights. Sort through the following list and determine which ones are relevant to your situation. Then, make sure that these factors are working for, not against, your project.

5.1 Securing Executive Support

It is industry wisdom to have strong executive support for any IT project, and data warehousing projects are no exception. Lachenauer of Blood Systems emphasized the buy-in of executives who are knowledgeable in the business.

... You absolutely need that top commitment to the project.

It is critical to get the buy-in of the people who understand the business operation and strategic directions. You absolutely need that top commitment to the project along with the understanding of its business impacts.

Likewise, the Customer Management Solution Company noted the need for a strong sponsor throughout the project.

Our effort has been very successful. The COO has seen how the data warehouse has progressed. He has deemed the data warehouse a top priority, along with workforce management. We have had a strong sponsor at the highest level to fund the project and, more importantly, to use the system.

5.2 Working Together

When asked about success factors for their project, Dash at the California State Department of Justice offered that it was the entire group working closely together.

It is actually the group working together, starting with the manager to the end users. People pulled together for a common goal.

5.3 Establishing Data Credibility

At the Customer Management Solution Company, the emphasis was placed on the credibility of the data in the data warehouse.

If anyone starts to doubt the data, they will not use the DW. My manager has said that our company has been the poster child for MBE—Management by Excel.



6. Technology Challenges

In the early days of data warehousing, life was relatively easy. Simply buy a server platform; choose a database; extract legacy data from a few magnetic tapes; load the warehouse; generate some Excel charts; and receive praise from the executives. Today, life for the data warehouse staff is much more difficult, in part, because of the following challenges.

6.1 Security Considerations

For the International Data Management Company, access to the database is via dedicated lines with client-server tools, primarily for security reasons.

We do not currently offer Web-based access to the marketing databases. Primarily this is for security reasons. There are laws that govern how a name and address can be used for promotional purposes and who has the legal right to use the name and address. For this reason, publishers want to make sure they take all possible precautions in protecting their files. Opening up their databases to the Internet just makes it easier for unauthorized people to get in. The use of dedicated data lines takes care of this concern.

6.2 Complex Join Paths

For the International Data Management Company, the marketing databases vary greatly in size and complexity. Join paths among tables depend on the proper matching of names and addresses to identify unique individuals or households. This is not your simple CUST-ID to CUST-ID join.

A big marketing database is around 400GB; the smallest database is 2GB; and the average is around 40-50GB. There are around 8-10 core tables that most databases have in common. Then, there are additional auxiliary tables, up to 40-45 secondary tables that are customized for each client. Part of the update process is the matching of join paths using name/address patterns across multiple tables.

6.3 Data Transformations

The director of the Customer Management Solution Provider explained that the data is transformed, primarily on time zones, as it is loaded into the data warehouse.

Most of the transforms deal with time zones to correct to the Eastern Time zone. The dimensions are such that you can get a report in your local time. But for executives, we translate everything into Eastern Time to assure consistency. Transforms also perform various basic things, like correcting the format of text strings, which are not really complicated.

6.4 Real-Time Data Loading

The challenges of loading the data warehouse more often than every 2 hours are being investigated, as the director of the Customer Management Solution Provider explained.

The nature of the business is that some activities are lumpy. Even loading data every 2 hours does not track those activities properly. We do loads based on time zones. We start at midnight and go to 4:00 or 5:00 in the morning. We could load the data but are not sure of the performance. We have to index and aggregate the data. We need to focus on the delta—what has changed in the last 2 hours. Then,

keep that in a separate table. And so on... I know what the challenges are, but I'm not sure of the solutions.

The reason is that executives want their subordinates to watch it more in real-time. Executives look at the utilization of our agents, staffing, people on duty, and expected calls. Low-level management people are looking at agent performance, such as call length per agent, after call work time, logged into an inbound query rather than outbound. If our agents are more effective and efficient, then we are providing the best value to our customers. ... Then, we want to increase the frequency by which we load the operational data.



7. Best Practices

Toward the end of the interviews, the question was asked, “If a colleague asked for advice on a similar project, what would you suggest?” The answers were varied and insightful, sparking some interesting discussions.

7.1 Executive Champions

Lachenauer of Blood Systems emphasized the importance of data warehousing efforts being championed by a combination of executives.

I developed a proposal for executives in which I said that we will need something like this in the future—a strategic tool to help us be more competitive and to be more understanding of the efficiency and effectiveness of the organization. The COO and CEO are the executive-level people from the business standpoint, and I am the executive from the technical standpoint. As with other successful DW projects, it is typical to have the vote of someone whose vote is more equal than others stating: Here is what we will do. We will fund this and move it ahead.

7.2 Business Meaning of Data

It is easy to get lost in the technology, given the immense size and complexity of data warehouses. However, the best practice is always to explain and emphasize the business meaning of data.

The International Data Management Company highlighted the training of users on data from the business perspective.

The most important hurdle to cross is learning the data. Take the time to understand your data, its relationships, and its business purposes, before putting any tool on top of it. Also, the business and technical aspects/issues around the data are critical. Often, the end user [falsely] concludes that the tool is broken, when the user does not understand the data. It is extremely easy to get an incorrect answer back from the database if the question wasn't structured properly. Knowing your data really helps minimize this problem.

Valdés of OPAM, the financial services company, offered the following advice.

I am a technical guy with a lot of business experience. It is very important that IT people must be involved and be allowed to operate with some freedom. Only by understanding the needs of each customer can a large company grow. The company must create several niches, customized to each of our customers by listening and knowing their needs. The company must then be efficient and ready to supply those needs to our customers.

At the Customer Management Solution Provider, a special team is focused on understanding customer needs and designing metrics that lend insights into those needs.

The performance management team members are the evangelists for the data warehouse. They explain the warehouse from the business perspective [to the customer]. They get feedback from the accountants on what the metrics should be. They defined the metrics and then create reports for those metrics. They are the business analyst unit for what we do.

Finally, the director at the Customer Management Solution Provider offers these three suggestions.

First, examine your resource pool to determine the people who know data warehousing. We did not, but we had engineers that learned it. Learned from our mistakes. At one point, we engaged some consultants but they did not really help. They knew DW at a high level; they didn't add a lot of value. We joined The Data

Take the time to understand your data, its relationships, and its business purposes.



Warehousing Institute and bought Ralph Kimball's books. If you have someone who has done it before, it goes a lot faster. You need a good DBA, a good data modeler, and a good developer to make it accessible to the user population.

Do not try to do everything at once.

Second, look at your budget. These tools are quite expensive. There is a broad range of ETL tools, such as DataJunction. We definitely want a tool like Sagent that can manage that for us and automate the process.

Third, start small, with simpler software, hardware, and scope of the project. Do not try to do everything at once. Pick something important. Make sure you understand your business.

7.3 Managing Expectations

Dash noted that it always takes more time than planned.

It always takes more time than planned.

Big question! First of all, we need to realize just how much time it takes to do test migration of data in a development environment. In our project it took four months. Nobody planned for this time framework for acceptance testing.

Second, the management of the project from the user perspective is important. We have to set the proper expectation and training of users.



8. Benefits Realized

This section summarizes the benefits that have been realized by the data warehousing projects. This is where the ‘rubber meets the road’—applications of data warehousing technology that generate real business benefits.

8.1 Timely and Accurate Information

With the MATRIX project at GSK Mexico, product analytics improved from low accuracy and slow delivery to high accuracy and fast delivery. A manager at GSK summarized the benefits as follows:

Providing the executive group with information on a timely basis is the biggest benefit.

We were spending 80% of our time manually consolidating data each month and only 20% actually analyzing it. ...We are determined to turn this situation around with MATRIX.

Lachenauer of Blood Systems pointed out that “providing the executive group with information on a timely basis is the biggest benefit.” He noted that the Sagent predictor module proved to be quite accurate for their operations.

One of the modules with Sagent is the forecaster transform module, which proved to be a very accurate predictor. When we did the proof-of-concept trial, we ran the forecasting for 3 months into the future. The COO saved that prediction. Three months out at the end of the month, he called up the centers to estimate for the current month. The forecasting program was closer than the center predictions within 4 days of the end of the month. The analysis tool looks at the collection activities on a Monday versus a Tuesday. People in the blood business intuitively knew that, but it was surprising to see the analysis results. An ongoing prediction of blood donation is one of the future things that we will do.

The Sagent forecaster transform proved to be quite accurate for their operations

Likewise, Dash at the California DOJ noted improved data quality would save money and time in many ways.

The data [from the old transactional system] has been cleansed, along with elimination of data duplication. In addition, we have provided data for a migration project to upgrade the transactional system. This will save a lot of money and time. No more COBOL programming will be required.

When asked about Sagent’s role in supporting their business, Valdés of OPAM stated:

It is an essential part. There are three key players: technology (such as communications), a database (which is consistent and reliably resides in Oracle), and all production work using Sagent. By using the Sagent WebLink tool, we are able to explore where we want to go. For example, salesman can check all the transactions by company and by employee and obtain the details.

Finally, the Customer Management Solution Provider listed two benefits from their data warehousing efforts: centralizing billing and eliminating manual reporting.

First, the system has centralized the billing. Before we had to bill from each call center, with little consistency to our customers. Also, our auditors are much happier now since the billing is under the central control of the accounting department.

Second, the system has eliminated a huge manual reporting effort. Imagine all these call centers like an Army-type management hierarchy. There was a reporting headache. The middle managers spent all their time pulling reports for our customer, rather than spending time with their subordinates. They knew what was going on, but nobody above them would know. They would pull the data into Excel spreadsheets, but there would always be some cut-and-paste errors with data in the wrong column, decimal points in the wrong place, and so on. The whole reporting flow was slow and inconsistent. By the time the reports reached

the executive level, they were late and inaccurate. We took human error out of the process. In one account, 25 hours of reporting per day was eliminated. Timeliness. Human error eliminated. Managers can manage, instead of doing reports.

8.2 Easily Accessed Information

Dash at the California DOJ touted the benefit that “users can browse and analyze the data from anywhere.” In addition, Lachenauer of Blood Systems stressed the importance of an easy-to-use query/report tool for remote users at the various centers.

8.3 Competitive Advantage

The director at the Customer Management Solution Provider remarked that their data warehousing efforts give them a unique competitive advantage.

A side benefit is as a neat sales tool because our competitors do not have this service. Our salesperson can argue for our services because we have this advantage.

8.4 Flexibility for Responding to Customer Demands

When asked about the various ways that they are using Sagent products, the director of the Customer Management Solution Provider used the analogy of the Swiss army knife.

We used Sagent like a Swiss army knife.

We used Sagent like a Swiss army knife for a database, for anytime we want to move data around. We are outsourcers, which implies that we have data that belongs to someone else, or we are using a system for [owned by] the customer. We are a global company that supports the same customer in Europe, Asia, Africa, etc. They want a report. Take all the data from everywhere and then centralize it here in the warehouse. It is ‘ad hoc ETL.’

We also use Sagent for another customer who sends us a huge amount of data to be loaded into their CRM system with customer records. So that, when agents make outbound calls, they know the latest information about that customer.

8.5 Performance Improvements

In several instances, the performance improvements using the new technology were dramatic. At the California DOJ project, Dash told of their initial experiences with query performance.

Over the last month, people did a few queries. On the old system, the query would take a full day; now using Sagent Information Studio, the query takes only a few seconds. In another case, a report was taking a half-day; now the report is produced in half an hour. However, it [the data mart] is still a baby! It needs grooming. The database requires a lot of tuning, with creating the proper indexing depending on usage.

At the Customer Management Solution Provider, the director told of an interesting benchmark involving the upgrade of a Visual Basic application.

We had legacy code in Visual Basic that ran every other week, on a payroll week. I did not know about it, and I have been around for 5 years. Also, none of the developers who worked for me knew about this application. One developer knew some VB and studied the application. The application could take almost 3 days to run. Then, he learned Sagent and reprogrammed it in Sagent. Now it runs in Sagent in 5 minutes! The original developer did not know how to properly design it. The application is now on standardized code that can be learned by any of my staff. Sagent is all graphical visual flow to plan the UML (Unified Modeling Language) for the application.



9. Conclusions

Companies are implementing data warehousing systems successfully and reaping tangible benefits from these implementations. The application of this technology to day-to-day business problems is now part of normal business for the companies interviewed.

The themes of informed decision-making and cross-functional data integration were the most prevalent among the companies. However, these themes still require a leap of faith for business people, feeling too much like technology for technology's sake. Over time (and with these cases), there are emerging many reliable examples of tangible benefits from informed decisions and data integration. The conditions for tangible benefits are:

- Close involvement of management throughout the effort
- Clear business objectives with strong teamwork
- Establishing and preserving the credibility of the data

Automating workflow and real-time analytics are in the early adoption stage. There is no doubt that these themes will be mainstream in the future. The issues are how and when. How should we approach automating workflow and deploying real-time analytics? When should we allocate resources?

The technology challenges that were noted by the companies are 'under control.' In other words, the technology to resolve these challenges is steadily improving and becoming more cost effective. We did not hear that the technology was too expensive or too complex. It did deliver as promised.

In general, active BI is, however, in its early stages. The discernment of business opportunities appropriate to this approach is difficult but getting better as we learn from more successful examples. The barriers are often not technological but organizational. To realize the benefits of active BI, we may have to change the way we do business.

Over time, active BI will be accepted as common practice because the demands of our global economy require ever better ways of doing business. In our world, change may be the only constant. But in our business environment, continuous improvement may be the only viable goal. Being an intelligent enterprise is not an option; it is now a requirement.

The BI profession is on the verge of a new generation of enterprise systems, one in which BI takes center stage rather than an extract-and-run appendage. There is a convergence of BI with transactional systems, with enterprise application integration (EAI), with eBusiness architectures, and the like. Future enterprise systems will evolve through advances in analytics that drive improvements in business processes.

Being an intelligent enterprise is not an option; it is now a requirement.

...on the verge of a new generation of enterprise systems.



10. APPENDIX: Case Study Descriptions

Each company described below has uniquely leveraged data warehousing technology in a variety of ways. The study interviewed 7 companies to distill those insights. The companies are customers of Sagent Technology, who sponsored this study. The companies were approached independently of Sagent to participate in an objective study of BI/DW trends. In all cases, the persons were knowledgeable about BI/DW technology with many years of experience, were familiar with the specific business situation, and were open and honest in sharing their experiences.

A 45-minute structured questionnaire used in the interviews is listed in the following appendix. The emphasis was on their conception and experiences about data warehousing, especially at pushing the boundaries on globalization, data freshness, data consolidation, and operational-level applications.

The following table lists the companies and the persons interviewed.

Company	Interviewee
Blood Systems	William Lachenauer, VP Info. Resources & CIO
California State Department of Justice	Judy Candlish, Data Processing Manager Pramod Dash, Senior Consultant, R. Systems
Customer Management Solution Provider	(anonymous)
GlaxoSmithKline Mexico	Gloria Muñoz, eProcess Manager Alberto Esparza, DW Project Leader
International Data Management Company	(anonymous)
MarketSoft	Jim Aucoin, Senior Product Manager Cindy O'Connor, Software Developer
OPAM	Manuel Morán Cárdenas, Director General Carlos Valdés, IT Director

10.1 Blood Systems

Founded in 1943, Blood Systems is the nation's oldest and the second largest blood service provider. It has 2600 employees nationwide at 20 centers spread across 72 locations. The company provides blood and blood components to patients in more than 500 hospitals in 18 states. Blood Systems Laboratories specializes in high-volume blood donor testing and infectious disease reference work. Their two national laboratories in Phoenix and Dallas test more than 1.5 million blood donations each year for more than 50 blood and tissue collection sites.

Bill Lachenauer, VP of Information Resources and CIO at Blood Systems, is responsible for their data warehouse. He explained that the objectives are to provide an enhanced reporting environment that augments their blood manufacturing system (Progesa by Mak Systems located in Paris).

To do so, the warehouse integrates data from multiple sources (primarily from Progesa and Oracle Financials) to provide analysis on cost structures, revenue generation, and budgeting. The data is batch loaded at midnight. The next system to be integrated is data from their clinical lab to monitor testing results.

The data warehouse current contains about 3 million donors with 2 million donation records, which are captured in 15 to 20 tables.

Lachenauer explained that the data warehousing system was championed by a combination of executives.



I developed a proposal for executives in which I said that we will need something like this in the future—a strategic tool to help us be more competitive and to understand the efficiency and effectiveness of the organization. The COO and CEO are the executive-level people from the business-standpoint, and I am the executive from the technical-standpoint. As with other successful DW projects, it is typical to have the vote of someone whose vote is more equal than others, stating: Here is what we will do. We will fund this and move it ahead.

Lachenauer described the development process and the reason for selecting Sagent. From proposal to production, the project took about two years; however, the actual development time was only about 7 months.

We developed a proposal about two years ago and started development about 14 months ago. We decided to do a proof-of-concept study with Cognos and Sagent. We explained what we wanted to do, as a preliminary version. We wanted to do two or three things right, rather than do a broad shotgun approach. We compared the resulting prototypes from both companies. They gave presentations to the executive group and the key people who would use the system. We felt that Sagent was the better product. The key determinates were system performance, ease of use, import capability, and support level.

We used the prototype developed with Sagent tools as the basis for the production version. Over 6 or 7 months, we developed the ability to do daily updates. We are updating the DW as of midnight, to give us fairly current reports.

Lachenauer did not want to turn the data warehouse “into a production system, reporting on things that they needed by 8:00am for critical operational reports.”

We stayed away from a true production system used in daily operations. It [the data warehouse] is a strategic information system to produce information relative to the success of our campaigns. Progesa supplies most of the critical operational reports, which ... runs separately and is adequate.

People who understand the blood business know what information they need. And, one analysis usually generated the need for more information.

When I was writing the proposal, I talked to the COO and asked about the information needed to run the business. His answer was that he had only 50% of the needed information, and it was probably less than that. As he got into it, it [reports from the data warehouse] has generated more and more ideas and questions. It [Sagent] is easy enough so that they can experiment with it. Later, I want to put some data mining tools in DW and see what the correlations are. It should surprise people.

Lachenauer described that their focus was on two sets of customers: donors and hospitals.

We need to recruit [donors] continuously. We have some donors who give regularly every few months, but most donate 1.2 times per year. People are continuously falling off the donor ranks. There are many restrictions, such as traveling to England because of Mad Cow disease. There are also tattoos and body piecing that eliminates a donor for one year.

We sell the products to hospitals. We have a division called Bio-Care that sells the rare blood products and another division that uses European fractioners to break it down to its components.

The key application is to analyze the performance metric for the centers in their recruitment campaigns for blood donators. Lachenauer remarked, “It is a fairly big operation.” Their analyses were revealing.

We have pretty extensive calendar analyses for the day-of-week and day-of-month. We can see trends of donators giving and hospitals needing [demands]. Then, we can develop campaigns to focus upon getting certain types of donations at certain times. You have probably read in the newspapers to appeal to collect more blood.

We are trying to smooth that process from the utilization side to the collection side.

Blood Systems implemented the Sagent predictor module, which proved to be quite accurate for predicting their operations, as Lachenauer related.

One of the modules with Sagent is the forecasting module, which proved to be a very accurate predictor. When we did the proof-of-concept trial, we ran the forecasting for 3 months into the future. The COO saved that prediction. Then, a few days before the end of the 3 months, he called up the centers to obtain estimates for the current month. Surprisingly, the forecasting program was closer than the center predictions within 4 days of the end of the month. [This is because] the analysis tool looks at the collection activities on a Monday versus a Tuesday. People in the blood business intuitively knew that, but it was surprising to see the analysis results. An ongoing prediction of blood donation is one of the future things that we will do.

Lachenauer plans to extend this analysis to predictions of hospital distributions.

Taking some historical data, hospitals need certain blood products on certain days. If we do it right, we can do the distribution aggregated across hospitals, which will help our inventory management. There is always difficulty with blood inventory because some products expire in as few as 4 to 5 days. We cannot have those around that much. We hope to cut inventory loss through accurate prediction, which can have a huge impact because some products cost \$500 or more.

Lachenauer described their analysis support in terms of staff and tools. He stressed the importance of an easy-to-use query/report tool for remote users at the various centers.

We have 2 people on our IT staff doing query and analysis tools. I tried to stay ahead of the power curve because, when it is successful, demand will come out of the woodwork. We are using the Sagent tool and evaluating Forest & Trees from Computer Associates for ad hoc queries. We will set up base views for users.

Lachenauer described their use of the data warehouse to analyze the effectiveness of donor campaigns and to eventually customize messages to donors.

In April to July, we sent out 30,000 postcards from donator databases. We are tracking which campaign was more effective. We posted back into the DW the date of the campaign and donator ID. After a 30-day period, we are comparing return rates (i.e., when they actually show up and donate blood). We can then compare the donor rates for sending them a postcard versus not sending the postcard. We are also going to experiment with different groups and changing messages. So, there will be many studies on factors affecting donor rates. If we are low on a certain blood type, we can say that this group is eligible as donors and send them an email request.

Lachenauer summarized the business benefit from the data warehouse as timely information to the executive group.

The ability to provide exec group information on a timely basis is the biggest benefit. We also have provided editing on data, which has improved it [quality of the data].

Lachenauer stressed that the lesson he learned was the buy-in from knowledgeable business executives.

It is critical to get the buy-in of the people who understand the business operation and strategic directions. You absolutely need that top commitment to the project along with the understanding of its business impacts.

10.2 California State Department of Justice



The California Department of Justice carries out the constitutional responsibilities of the Office of Attorney General through 10 main divisions.⁶ Located in Sacramento, the Division of Criminal Justice Information Services (CJIS) provides criminal justice intelligence, identification, information, and technology services to law enforcement, regulatory agencies, and the public.

There are a number of different systems within the CJIS, one of which is the Criminal History Data Mart (CHDM) hosted at the Hawkins Data Center Bureau. CHDM is the responsibility of the Bureau of Criminal Identification and Information (BCII), which provides criminal data and identification services to the law enforcement community, applicant regulatory agencies, and the public. The primary users of the data mart are the analysts in the BCII department, less than 50-60 people, who service numerous law enforcement agencies, both state and federal.

We interviewed Judy Candlish, Data Processing Manager for the CJIS Application Development Bureau and past president of DAMA, Sacramento chapter. Also interviewed was Pramod Dash, Senior Consultant with R. Systems, Inc.,⁷ which is an application development consulting company. Dash has over 12 years of experience in the computer software and information technology sector, with expertise in data warehousing and data modeling.

Candlish outlined the need for their data mart as “easier and faster access to data.” CJIS is a 24x7 shop that interfaces with over 30 systems and other departments, both federal and state. The normal demand for production processing placed a heavy strain on their legacy systems resources, both hardware and staffing. This resulted in delays in responding to requests for criminal history data of up to several weeks. With the new data mart, they are always within 24 hours of accessing current information. “New uses are popping up all the time,” remarked Candlish.

Dash explained that this is their first data mart and the most complex database used by the California DOJ. The data mart has 6 to 7 fact tables, about 20 snowflake dimension tables, and about 25 description tables (such as date-of-birth). The 400-million rows require about 175GB of data, which includes indexing.

The source data comes from an initial load and then daily incremental loads from a legacy transaction system running on the Unisys 2200, which is 30-40 years old. Dash explained the effort:

The initial load extracted all the old data from Unisys. The initial load took 40 days by dividing the 400-million rows into smaller loads, started in June of 2002. Areas for staging, the operational data store (ODS), and the star schema are also contained on the SUN Solaris platform with Oracle 8i.

The incremental load is continuing with a daily batch load from Unisys. Using Sagent automation, we schedule a job to run at night. Taking about 3 to 4 hours, it loads the data into a staging area on Oracle 8i, which is organized as a simple flat file with no indexing or constraints. It is then loaded into the ODS area, which does have all the indexing and constraints. In the star schema, we had to design some snowflake tables because of the complexity of the data.

Dash described the role of the Sagent products in this loading process.

Sagent is a wonderful tool. It manages all the data flows. Each batch extracts 200,000 rows in one batch, which eventually creates more than 1 million rows. Sagent Dataflow Services is a wonderful tool for doing this.

There are many transforms that we use, such as various SQL commands, flat file source transform, column report, batch comparison, conditions, splitter, joins, column select, column add, percentage of total, key totals, time lookup, and the like. The business requires many of these transforms.

We just started Stage I by creating the database. With Stage II, we will be using Analysis, Reports, Portal, and Information Studio products from Sagent. We will begin Stage II in a month or two from now, around November of 2002. We are targeting 4-5 people at first, but it could go to 100 users.

Although the data mart has only recently become operational, Dash offered the following insights into future business benefits:

Over the last month, people did a few queries. On the old system, the query would take a full day; now using Sagent Information Studio, the query takes only a few seconds. In another case, a report was taking a half-day; now the report is produced in a half an hour. However, it [the data mart] is still a baby! It needs grooming. The database requires a lot of tuning, with creating the proper indexing depending on usage.

The data [from the old transactional system] has been cleansed, along with eliminating duplicate data. In addition, we have provided data for a migration project for research purposes for converting a legacy COBOL-based application to a Java-based application. This will save a lot of money and time. No more COBOL programming will be required.

The users can browse and analyze the data from anywhere, which was not in the scope of Stage I of the project.

Dash described the lessons that were learned through this project as: it takes more time than you planned; and project management.

Big question! First of all, we needed to realize just how much time it takes to do test migration of data in a development environment. In our project it took 4 months. Nobody planned for this time framework for acceptance testing.

Second, the management of the project from the user perspective is important. We had to set the proper expectation and training of users.

When asked about success factors for the project, Dash offered that it was the entire group working closely together.

It is actually the group working together, starting with the manager to the end users. People pulled together for a common goal.

10.3 Customer Management Solution Provider

NOTE: This is an anonymous case study, referred to as the DEF Company.

The DEF Company is “a global leader in providing customer management solutions and services to external and internal customers of companies primarily in the technology/consumer, communications, and financial services markets”.⁸ The company operates over 40 support centers and 4 fulfillment centers throughout North American, Europe, South American, Asia, and Africa. Services are delivered through multiple communication channels encompassing phone, e-mail, web, and chat.

The Director of Systems Development was interviewed. He is responsible for all development in America and Asia Pacific for their call tracking system, systems interfaces, and the data warehouse. His responsibilities are complicated because the development is for 3 different reasons: supporting internal use, providing services externally, and selling software externally.

The system is called *Business Insight*, which is used internally to support their service offerings and is also sold externally. The development on the system was started about a year ago, in August of 2001. Since December, their internal teams have been using Business Insight. The account team consists of the account managers (about 5-6 per client) and the executive team (about 8-10 persons), along with their performance management team (4-8 persons). And since April, 4 of their largest accounts have also had direct access to Business Insight.

The system development director explained the roles of the team.

The performance management team members are the evangelists for the warehouse. They explain the warehousing from the business perspective. They also get feedback from the accountants on what the metrics should be. They define the parameters for the metrics and then create reports for those metrics. They are the business analyst unit for what we do.

He continued with:

The data warehouse supports 24 centers for which we extract telephony data from the phone switches. We use that data to bill our customers and to create reports for customers. That is what we store in the DW, and we use Sagent for that.

We have Avaya telephony equipment in each call center, which has an Informix database. We connect to those databases daily and extract the data with Sagent into the main data center. The staging tables are running under Windows 2000 and SQL Server 2000. Sagent is used to transform and load into our permanent DW tables. We use Erwin 4.0 from CA for data modeling.

The other sources of data for the data warehouse are their ERP system, payroll, and various manual data files, as the director continued to explain.

The ERP and Payroll data is used to correlate information with the switch data. You log into the switch with an agent ID. The manual data (such as headcounts and forecasted revenues) is collected from each call center via an internal website, which is then loaded into the DW.

The director explained that the data is transformed as it is loaded into the data warehouse.

Most of the transforms deal with time zones to correct to the Eastern Time zone. The dimensions are such that you can get a report in your local time. But for executives, we translate everything into Eastern Time to assure consistency.

Transforms also perform various basic things, like correcting the format of text strings, which are not really complicated. Once we load the data, we have a couple of other servers that house Microstrategy. That has a web-based front-end that supports all of our performance metrics. Reports are defined on that server, from canned to ad-hoc.

We also use the DW information for all of our billing. Sagent has other plans to flow back to the ERP system for invoicing.

He also explained the frequency by which the data warehouse is loaded.

We update on a daily basis, which is what our clients and account managers want. But, our executive team would only look at it on a monthly basis. However, our direction is to approach more of a real-time system. We have been challenged to get the data load down to a target of every 2 hours.

Even when they achieve a 2-hour loading of source data, some business activities will require an even shorter time interval, as the director explained.

The nature of the business is that some activities are lumpy. Even loading data every 2 hours does not track those activities properly.

We do loads based on time zones. We start at midnight and go to 4:00 or 5:00 in the morning. We could load the data but are not sure of the performance. We have to index and aggregate the data. We need to focus on the delta—what has changed in the last 2 hours. Then, keep that in a separate table.

The reason is that executives want their subordinates to watch it more in real-time. Executives look at the utilization of our agents, staffing, people on duty, and expected calls. Low-level management people are looking at agent performance, such as call length per agent, after call work time, logged into an inbound query



rather than outbound. If our agents are more effective and efficient, then we are providing the best value to our customers.

In a similar way, they are investigating ways of automating this workforce management through alerts.

There is a different initiative in our company called workforce management. They are monitoring performance in real-time. If an agent is not logged into the system by 8:00am, then an alarm goes off in the manager's computer. The idea is to have the manager call into the center to correct the situation. This is not part of Business Insight but it is planned to be. It will also be another data source.

When asked about the various ways that Sagent products are being used, the director used the analogy of the Swiss army knife.

We use Sagent like a Swiss army knife for a database, for anytime we want to move data around. We are outsourcers, which implies that we have data that belongs to someone else, or we are using a system for the customer. We are a global company that supports the same customer in Europe, Asia, Africa, etc. They want a report. Pull all the data from everywhere and then centralize it here in the warehouse. It is 'ad hoc ETL.'

We also use Sagent for another customer who sends us a huge amount of data to be loaded into their CRM system with customer records. So that, when agents make outbound calls, they know the latest information about that customer.

We also use it internally to automate data flows from our ERP system to vendors that handle our 401K and benefits programs.

For another interesting benchmark, the director offers the following example.

We had a legacy code in Visual Basic that ran every other week, on a payroll week. I did not know about it, and I have been around for 5 years. Also, none of the developers who worked for me knew about this application. One developer knew some VB and studied the application. The application could take almost 3 days to run. Then, he learned Sagent and reprogrammed it in Sagent. Now it runs in Sagent in 5 minutes! The original developer did not know how to properly design it. The application is now on standardized code that can be learned by any of my staff. Sagent is all graphical visual flow to plan the UML for the application.

When asked about benefits, he offered the following.

First, the system has centralized the billing. Before we had to bill from each call center, with little consistency to our customers. Also, our auditors are much happier now since the billing is under the central control of the accounting department.

Second, the system has eliminated a huge manual reporting effort. Imagine all these call centers like an Army-type management hierarchy. There was a reporting headache. The middle managers spent all their time pulling reports for our customer, rather than spending time with their subordinates. They knew what was going on, but nobody above them would know. They would pull the data into Excel spreadsheets, but there would always be some cut-and-paste errors with data in the wrong column, decimal points in the wrong place, and so on. The whole reporting flow was slow and inconsistent. By the time the reports reached the executive level, they were late and inaccurate. We took human error out of the process. In one account, 25 hours of reporting per day was eliminated. Timeliness. Human error eliminated. Managers can manage, instead of doing reports.

In addition, a side benefit is as a neat sales tool because our competitors do not have this service. Our sales person can argue for our services because we have this advantage.

When asked about the lessons that were learned, he offered the following.



First, examine your resource pool to determine the people who know DW. We did not, but we had engineers that learned it. We learned from our mistakes. At one point, we engaged some consultants but they did not really help. They knew DW at a high level; they didn't add a lot of value. We joined the TDWI and bought Ralph's books. If you have someone who has done it before, it goes a lot faster. You need a good DBA, a good data modeler, and a good developer to make it accessible to the user population.

Second, look at your budget. These tools are quite expensive. There is a broad range of ETL tools, such as DataJunction. We definitely want a tool like Sagent that can manage that for us and automate the process.

Third, start small, with simpler software, hardware, and scope of the project. Do not try to do everything at once. Pick something important. Make sure you understand your business.

When asked about the success factors, he offered the following.

Our effort has been very successful. The COO has seen how the data warehouse has progressed. He has deemed the data warehouse a top priority, along with workforce management. We have had a strong sponsor at the highest level to fund the project and, more importantly, to use the system.

What are the next steps in the system evolution?

The next step will be to finish the scalability plan. Then, we want to increase the frequency by which we load the operational data. Beyond that, we want to tie into our workforce management system. Finally, we want to create a financial data mart and then help our HR department. For example, we want them to answer questions like, "What happens to our agents if we adopt a certain HR policy."

If anyone starts to doubt the data, they will not use the DW. My manager has said that our company has been the poster child for MBE—Management by Excel.

10.4 GlaxoSmithKline

GlaxoSmithKline (GSK) is a world-leading, research-based pharmaceutical company delivering strong growth in today's rapidly changing healthcare environment. The Mexico group of GSK was the focus of our interviews and consists of two divisions: commercial and pharmaceuticals, along with GMS that is the manufacturer and supplier in Mexico.

Gloria Muñoz, the eProcess Manager, was interviewed along with Alberto Esparza. She is not in the IT group but is part of the business unit. She has responsibility for the planning of various processes and business needs and implementing them on the ePlatform. In contrast, Alberto Esparza is the Data Warehouse Project Leader from the IT group and is responsible for developing and maintaining the data warehouse.

The project is called MATRIX (Main Analytical Teamwork from Relevant Information X) and has the objective of "BI Triggering the Business" that seeks to:

- Apply business experience and analysis to proactively use information as a competitive weapon
- Empower business users with self-service access to timely information
- Provide a consolidation and consistent information baseline for use by management

Muñoz summarized the goal as providing better information for informed decision-making.

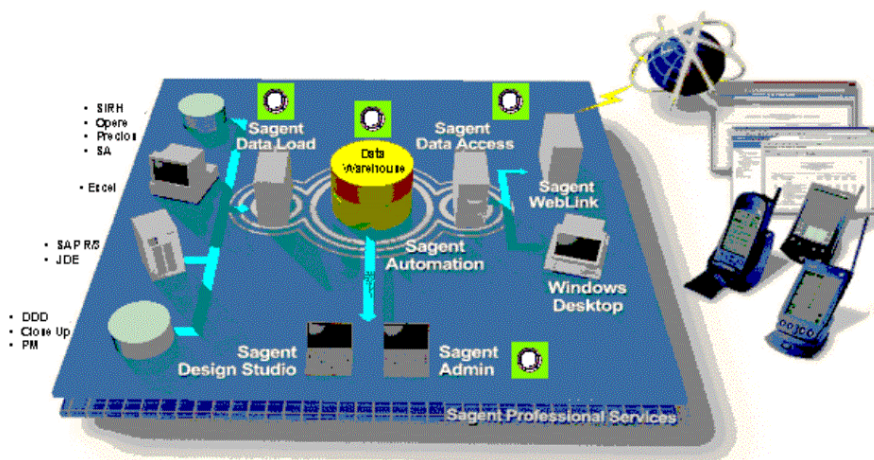
We believe that it was necessary to concentrate data in a single database to effectively access and explore information, thus enabling us to make better decisions. Our motto is "to supply information for informed decision-making." MATRIX will



be used in all aspects of the business, but it is first applied in the pharmaceuticals division.

The MATRIX project will be systematically applied throughout GSK Mexico.

The first stage includes dealers and government sales for the pharmaceuticals division. In September, the next stages will go operational and include market research (analytic information about patents) and information about the productivity of the business (distribution of the drug with the dealers, prescriptions, doctor visits by patents). In the future, with this information we will see the performance of our sales force.



The development required only one year.

We finished the first stage in September 2001. The development period was one year. There were three developers and one development manager, all from Sagent, along with a business project leader from GSK. Alberto coordinated with the Sagent people in the construction of reports and analysis.

The users of MATRIX during this first stage were primarily in the sales area.

In the sales area, there are the sales manager plus 5 other persons. They access information with the Sagent Analysis tool, using the historical data of sales area, geographical region, customer, etc.

Muñoz shared that data cubes were generated as the typical analysis to users.

A typical report shows a data cube that can pivot data between rows and columns. You can see measures by whatever you want. The report consists of sales by region and customer, with Pesos or units, by year or month. It is a daily scheduled report.

The data for the data warehouse came from a variety of sources.

ERP with JD Edwards, SAP R/5, Oracle database, Microsoft Excel files, text TXT files. You need very different techniques to access these diverse sources. Examples from ERP tables: different kinds of tables from ERP, such as dimensions (regions) and facts.

Internal		External	
System	Function	System	Function
• SAP R/3	Implementation of R/3 modules MM, QM, PM, CO and PP	• DDD	Country wide drug distribution data
• SIRH	Human resources integrated system	• Close Up	Measurement and analysis rules for doctor prescriptions
• OPERE	Medical visit registration system	• PM	Market size data by product and product units
• JD Edwards	Contains modules of sales, finance and distribution	• Inte	Analysis of diagnosis data
• Precios	Flat files that contain lab costs and competitor information	• Marketing Service	Comparison of medical visits to the pharmacy vs. competition
• SA	Sales Forecasting		
• BPCS	Manufacturing Processes		

The data warehouse was updated on a daily basis.

We have 24-hours data freshness, with the analysis of data from the previous business day by refreshing on a daily basis in the evening.

The expected benefit from the MATRIX project is achieving competitive advantage, although it is too soon to determine the actual benefits.

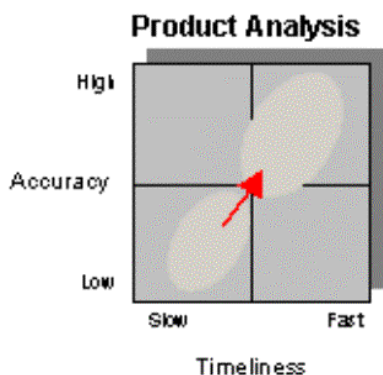
There have been some predictions for benefits, but we have not started a formal evaluation yet. We expect feedback from the users in one month, after we finished our month-end reporting.

A manager affirmed the benefit of timely intelligence used proactively.

As stated by the general director, "We now have critical information about our products, sales, forecasts, and market share consolidated for making both tactical and strategic decisions. It is my belief that having this timely intelligence and the willingness to act on it is our key competitive advantage."

With MATRIX, product analyses improved from low accuracy and slow delivery to high accuracy and fast delivery.

A manager summarized the benefits as follows: "We were spending 80% of our time manually consolidating data each month and only 20% actually analyzing it. ...We are determined to turn this situation around with MATRIX."



10.5 International Data Management Company

NOTE: This is an anonymous case study, referred to as the ABC Company.

ABC Company is an international data management company, serving the world's largest magazine publishers and direct marketing firms. In business since the 1970s, ABC is backed by the stability and experience of a larger parent company. ABC provides order fulfillment services for more than 400 accounts, including national magazine titles and direct marketing firms. ABC maintains data representing the names, addresses, order information, and demographic information of over 120 million active magazine subscribers, which is more than one-third of the U.S. population.

ABC describes itself as the "connection" between our clients and their customers.⁹

ABC receives orders—either over the phone, through the mail, or via the Internet—on behalf of magazine publishers and direct marketers. Those orders are entered; the customer information then resides on one of the ABC fulfillment computer systems. ABC uses the information to mail magazines, products, bills and renewals and to handle customer service at the direction of the client. In addition to magazine, product, and Internet fulfillment, ABC also performs item

processing, marketing services, new media services, and printing services for our clients.

We interviewed the Senior Systems Manager and the Database Administrator. They are responsible for the relational marketing databases, which is a custom service offered as an enhancement to their normal fulfillment services.

We host the data and provide access to clients for use for database marketing. Each marketing database is customized to the client's marketing needs and requirements. But, we do have a common design methodology. It is a service, not a product. ... The marketing database service is hosted at our data center, and we provide the tools to access the database.

I have a group of programmers who write all of the data preparation and update code in a variety of languages. We are pretty home-grown; we write our own code instead of using third-party ETL tools.

I have two DBAs on my staff and several data analysts who analyze the data and design of the database. They also design the procedures for quality control and cleansing the data. I have a senior systems consultant who has many years of experience with our company to assist in shaping our service, like that of a product manager.

The systems manager explained that the source data for these custom databases is complex.

Typically there are many sources of data that get used as inputs to a marketing database. These sources can include in-house fulfillment data, out-of-house fulfillment data, third-party overlay demographics, survey demographics, and Internet data to name a few of the possible sources. Due to the number and types of sources, we must be flexible enough to work with multiple input systems and have the ability to understand that data so it can be applied correctly. We take all of these sources and combine them to create one unique picture for each of their customers.

The marketing databases vary in size and complexity. Join paths among tables depend on the proper matching of names and addresses to identify unique individuals or households.

A big marketing database can be around 400GB; the smallest database is 2GB; and the average is around 40-50GB. There are around 8-10 core tables that most databases have in common. Then, there are additional auxiliary tables, up to 40-45 secondary tables, which are customized based on the client's sources and needs.

We take all sources and combine them using name and address to determine a unique customer and to group unique customers into a household. Once individuals and households are grouped, we assign a customer account number and a household account number. These account numbers are then maintained in each database update to allow for the addition of new data to existing customers and the addition of new customers.

The access to the database is via dedicated lines with client-server decision support tools.

At this time we do not offer web-based access. There are several reasons for this decision. The first and most important reason is security. Each publisher owns millions of names and addresses that get used for direct mail purposes. There are laws that govern how a name and address can be used for promotional purposes and who has the legal right to use the name and address. For this reason, a publisher wants to make sure it takes all possible precaution in protecting their files. Opening up their databases to the Internet just makes it easier for unauthorized people to get in. The use of dedicated data lines takes care of this concern.

Clients and our people installed the client-side piece of the Sagent access tool on their workstation. Possibly next year, we may use the web-based version of the Sagent Analysis tool.

The type of users for the marketing database varies with each client, as outlined by the systems manager.

There are usually 1 to 3 database analysts per client site, for a total number of 15 analysts across our clients. There are a few large publishers who may have 10 or more analysts, but that is unusual.

Most of the clients have analysts whose job is to provide analytical services to their company. For example, they could be analyzing the performance of specific mailings. Every year, publishers do a significant amount of testing new offers. The responses to the new offers are compared to the control offer to determine how to market to the end customer. The clients are looking at the renewal percentages, especially between the first and second renewals. It is important that clients improve or maintain renewal percentages.

Other analysts do statistical analyses to target cross-sell for other magazines that they may own. They do reactivation models to identify the best person for a mailing of a reactivation offer. Of course, the analysts may do straight reporting of percentage of readership by various dimensions.

The frequency of use and data freshness also varies considerably.

Analysts usually access their databases on a daily basis, although a few clients are more infrequent, maybe once a week. A few others may only use it [the marketing database] around their mailing campaigns, maybe once per month.

Clients are usually updating their database every month. Several clients are updating only 6 times per year, or every other month. A cutoff for a database update can happen at anytime during a month. Each client chooses a time that coordinates with their promotion schedules.

The database administrator explains his role with the marketing databases.

As a DBA, I am mostly involved with the physical creation of the database with DB2/UDB under AIX. Our programs load the database directly, so we are not using the load utilities. I am responsible for daily performance of all databases and constantly monitor indexes, table space, SQL efficiency, database security, and design. I am also responsible for the daily support of our decision support tools and their access to the marketing databases.

When asked about what lessons they have learned, both agreed that user training on the business meaning of data in the marketing database was critical.

The most important hurdle to cross is learning the data. Take the time to understand your data, its relationships, and its business purposes, before putting any tool on top of it. Also, the business and technical aspects/issues around the data is critical. Often, the end user [falsely] concludes that the tool is broken, when the user does not understand the data. It is extremely easy to get an incorrect answer back from the database if the question wasn't structured properly. Knowing your data really helps minimize this problem.

We also advise that the analysts learn basic relational database concepts, along with a basic understanding of SQL. It will make them a better user.

The use of marketing databases has evolved over the past several years, from flat files to complex analytics.

In the early versions, processing was done with flat files and canned batch reporting. Back then, it was used for mailing selection. Now we have much more flexibility in the analysis. With the move to relational databases, clients are now able to do analysis for themselves. We have taken the IT group out of the middle. The

turnaround time on data for updates is quicker, which means that analysts are getting fresher data to work with.

10.6 MarketSoft



Started in 1998, MarketSoft is an enterprise software company focused on Marketing Process Management (MPM). MarketSoft offers vertical industry solutions focused on specific revenue opportunities, such as cross-sell, agent-driven marketing, and partner loyalty. These solutions are built on an innovative, distributed architecture specifically designed for the extended enterprise and an award-winning product platform that increases marketing effectiveness, reduces operating costs, accelerates revenue conversion, and improves visibility across organizational boundaries. MarketSoft customers include Cisco Systems, IBM, GE, FleetBoston Financial, American Express, Fidelity Investments, MetLife, and Allstate.¹⁰

To investigate MarketSoft's data warehouse, we interviewed Jim Aucoin, Senior Product Manager, and Cindy O'Connor, Software Developer. As Aucoin summarized, MarketSoft goes beyond the typical sales force automation systems to automate the entire marketing activity for a company.

We are in the marketing automation space, which includes applications that help marketers manage and simplify the marketing process. Some marketing automation application examples include campaign management, email marketing, database marketing, and marketing analytics.

MarketSoft's products automate and synchronize the three major steps of Marketing Process Management: creating demand, fulfilling demand, and measuring effectiveness. Likewise, its product portfolio—called the 'DemandMore' suite—is comprised of three products:

- *DemandMore·Programs improves marketing effectiveness and efficiency*
- *DemandMore·Leads drives leads from capture to close*
- *DemandMore·Metrics measures marketing results*

An example of one of MarketSoft's core products is its DemandMore·Leads product, which was described by Aucoin.

MarketSoft is recognized as 'best of breed' for its lead management solution, DemandMore·Leads. This product links marketing with sales. A big part of a marketer's job is generating sales opportunities. But sales leads often fall through the cracks. They get lost, the sales force judges them 'cold' or that they're not worth the trouble of pursuing. Finger pointing abounds.

In traditional marketing automation systems, once responses turn into leads, they are typically passed off to Sales Force Automation systems, like Siebel, to manage the leads from a sales perspective. There is nothing in the middle to manage what is happening with leads. Are the marketing campaigns successfully generating an adequate volume of leads? Are they being followed up on by sales? What does sales think about the quality of the leads they are receiving? Once the leads are turned over to sales, marketing does not know what happens to them, and, therefore cannot adjust its marketing activities to maximize productive lead generation.

MarketSoft's DemandMore·Leads product tackles this problem by creating closed-loop marketing processes that unify marketing and sales functions, evaluate sales opportunities, drive sales leads to closure, increase revenue, and measure everyone's success. Hard numbers reduce finger pointing and promote productive collaboration. Collaboration in turn sustains continuous improvement.

Aucoin gave some examples of how the DemandMore·Leads product enables this.

In our customers, the users of DemandMore·Leads are typically both marketing and sales personnel, along with managers in both areas. Marketing is looking at

the volume and quality of leads, and Sales is looking at the performance of its sales reps.

As a joint decision between Marketing and Sales, lead qualification rules are easily set up and maintained that identify the leads that qualify as 'hot,' versus 'warm,' versus 'cold,' and any other ranks that the two disciplines decide to assign to leads. This eliminates a lot of finger pointing among the parties about what constitutes a 'hot' versus 'cold' lead, along with providing executives with the ability to watch over both organizations. The rules can be easily modified by sales or marketing personnel, and so the qualification process can be fine-tuned based on the results that are being seen as far as lead closure.

DemandMore·Leads also offers a sophisticated routing system among direct or indirect sales. Top performing sales reps are rewarded by giving them more leads, which is called the 'carrot' approach. Alternatively, the 'stick' approach can be used. For instance, if one distributor has not accepted a hot lead within 24 hours, the system could automatically pull the lead and send it to another distributor.

DemandMore·Metrics is the focus of MarketSoft's data warehousing effort, as explained by Aucoin.

DemandMore·Metrics tracks results through the entire sales cycle by closing the loop with sales force automation and order entry systems to see which leads convert to sales. The reports determine which activities to cut and which to invest more in, by reviewing historical campaign data and marketing ROI and then drilling down to track by lead, channel, offer, and sales performance. Users can drill down to evaluate leads by the specific channels through which the lead was generated, by the specific marketing campaign and message, by the sales rep that is working the lead, and so forth. Such analytics provide visibility into marketing activities by predicting ROI performance and suggesting changes to marketing processes.

The DemandMore application includes a data mart, which contains information about the marketing process. For example, DemandMore·Leads feeds the data mart with process information about leads. The MarketSoft data mart is not intended to be the data warehouse of record for the corporation, but rather a repository of summarized data about marketing and sales processes.

Aucoin describes Sagent's role with the DemandMore·Metrics product.

We use Sagent primarily for reporting in the DemandMore·Metrics product, rather than as a separate DW tool. We use Sagent's Data Access Server, Weblink Server, Design Studio, and Automation in our DemandMore·Metrics solutions. We create a Sagent repository for each of our customers that extracts data from our data mart to be used in a series of reports that we provide 'out-of-the-box.' Our customers can also develop their own reports, using Sagent Design Studio. The users access the reports directly from our UI (which runs in a standard browser) by hitting a 'Reports' button, which links the user to Sagent's Weblink. We have customized the Sagent Weblink environment to match the MarketSoft 'look-and-feel' (colors, etc.).

The reports associated with the DemandMore·Leads product focus upon lead management. One report is called 'lead rank-and-status' that shows each sales organization and sales rep that has been sent the lead and the lead rank (such as, cold, warm, hot). Lead status is time stamped as the lead flows through its processing steps. When you send a lead to a sales rep, its status is 'waiting.' When a rep accepts the lead, the status is 'accepted.' Other status conditions are: called, left message, presented, deliver RFP, closed with either a win or loss with a reason, and so on. You can quickly drill down in your organization to see the performance of the sales reps. For instance, who has had leads waiting for 10 days or more? Then, ask why have you not accepted leads. In addition, we can query the leads closed by sales organization and then drill down on which leads won or lost. These are just a couple of examples of the reports offered for DemandMore·Leads.



In the DemandMore-Programs, we have a similar set of tools based on Sagent for managing campaign programs or projects. Within this product, there is a module called Projects that does marketing project management. It tracks tasks and who has the responsibility, and so on. It is like Microsoft Project, but it is all web-based and uses email for interaction. Finally, there are suite reports that summarize across multiple products.

The following screen shot is an example of a report from the DemandMore-Leads product.

Leads Closed by Sales Organization						
Sales Organization:	Leads Accepted	Leads Closed	Won	Lost	Avg. # of Days to Close	% of Leads Won
Capital Bank - FL1	13	201	119	82	5.28	59%
Capital Bank - GA1	7	79	45	34	14.00	57%
Capital Trust	53	195	159	36	9.21	82%
Midwest Agency	29	130	37	93	0.20	28%
Western Trust - FL1	21	100	44	56	8.24	44%
Western Trust - GA1	3	79	59	20	0.00	75%
Western Trust - GA2	5	6	4	2	0.00	67%
Total for all Sales Organizations	131	790	467	323	5.28	
Average for all Sales Organizations	18.71	112.86	66.71	46.14		

The issue of data freshness is evolving for the reporting and analysis requirements.

On the operational side, as soon as leads come in, they are distributed immediately, in real-time. However, on the reporting side, which we call the 'DSS' data mart, it can vary from daily to hourly.

Invoked by a command line, operational data is aggregated and uploaded into the DSS tables to drive the reports. Users can schedule the command line to update hourly, daily, or whenever. It is up to them how fresh they want the data.

We are at an interesting turning point with the DemandMore-Metrics product. A year ago, clients were checking their reports maybe once per week. That has changed because we have upgraded the quality and ease-of-use of the reports. Clients are now checking their report daily, rather than weekly. Some customers are even asking to see real-time streaming reports.

The need for real-time analysis depends on business processes supported, as Aucoin explained.

We have spent a lot of time with customers, and there is not a big need [for real-time analyses]. Most companies have campaigns that span days and even weeks, so reporting is every few days at the most and reporting to management is usually monthly. As the campaigns are extended and expanded in those weeks, daily reports do become important from a process standpoint. They want to make sure that the leads are going well, how many leads are being generated, how effectively are the sales people jumping on those leads, and so on. We do support real-time in the operational side, for instance, by delivering leads via pager in real-time.



10.7 OPAM

OPAM is a financial services company based in Mexico City. Their primary partner is Wal-Mart Mexico, which offers a broad range of retail services from 593 locations in 54 cities across Mexico. In particular, Wal-Mart Mexico operates residential supermarkets (Superama), large department stores (Wal-Mart Supercenter), discount

warehouse stores (Sam's Club, Bodega Aurrerá), clothing stores (Suburbia), and restaurants (Vips, El Porton, Ragazzi).

OPAM's customers are large and medium corporate employers who provide a Wal-Mart credit-debit card to their employees. The benefit to the employee is a way of purchasing low-cost goods and services, with the convenience of payment through payroll deduction, with up to 45 days of credit, without financial costs.

We interviewed Manuel Morán Cárdenas, Director General, and Carlos Valdés, IT director for OPAM, about their data warehouse system called *Canasta Garantizada*. Valdés explained their processing flow that provides these services.

OPAM developed and operates the system for processing all the Wal-Mart credit-debit cards of employees. OPAM is the link between the credit card and Wal-Mart.

For the employee who wants a card, OPAM obtains the payroll information from the corporate employer and applies for a credit card number from Wal-Mart. OPAM gives the employee the credit card to purchase goods in any Wal-Mart store throughout Mexico. The credit limit is determined based on salary. The monthly charges are applied as a deduction to the employee's payroll or charged to the bank account in which the employee receives his or her salary, and is paid to Wal-Mart.

Valdés argued that their approach provided many benefits to the employees and to Wal-Mart.

OPAM is focusing on CRM—the customer relationship between large companies and their employees as consumers. The consumer has the benefit of saving on their purchases. Wal-Mart has insights into the demographics of their purchases.

The credit card uses two techniques [for identification]. On the front, the card uses a bar code. On the back, there is a magnet stripe. With the bar code, the employee can check their current balance right in the store. To Wal-Mart, paying with this credit card is like cash, thus the employee obtains any discounts as if they paid in cash.

Also, our credit card has two boxes for signatures, for the employees and their wives. Since the wife makes most of the purchases in Mexico, a credit card with both signatures is of great convenience to families. OPAM links the credit card with their IRS number. Therefore, we cannot issue two cards to the same person.

It is a help to employees who have low wages and are not applicable for credit with banks. There is no annual financial fee or transaction charge to the employee for this service. It is based on the good faith between Wal-Mart and the companies. This is a different arrangement than is normal in the US.

For instance, a tire manufacturer signs a contract with OPAM. The manufacturer is committed to notify OPAM every two weeks (i.e., every pay day) which employees are valid (i.e., any new employees and any employees who have left). OPAM gives the employee a line-of-credit to pay their charges within two pay periods.

The economy in Mexico is more closely tied to the US now. Inflation is very low. Salary raises are difficult, currently only 5-6% per year. Previously, salary increases were typically 30%. The transition of merging our economies is painful. OPAM has developed this service to encourage Wal-Mart to make an investment in continuous productivity increases. Companies are starting to do selling tactics, like offering a 'hook' product (i.e., very cheap product to entice people into the store). Wal-Mart has also consolidated the distribution channels by using only 10 warehouses for 600 stores, thus having an efficient distribution. There is synergy among the parties.

Valdés described the processing from the Wal-Mart transactional system running on Tandem.

OPAM had to do mixed integration because our system cannot operate inside of Wal-Mart. Using the Sagent Data Flow Server, we link into the Tandem server at Wal-Mart every morning and obtain the new credit card charges by employees of our customers. At the end of two weeks, Wal-Mart tells us the aggregated amount that each company should pay for their employees. OPAM will then deposit 50% of this amount to Wal-Mart within 14 days, while receiving the payroll deductions from each company.

OPAM does the cycle each week and is now processing charges from 280,000 accounts per month.

The system was developed over the past two years and went production this spring.

OPAM began as a business two years ago and started system development in March of 2001. We finished the integration between Sagent, Oracle database, and PDX, going production in April of this year.

Valdés was asked about Sagent's role in supporting their system.

It is an essential part. There are 3 key players: technology (such as communications), a database (which is consistent and reliably residing in Oracle), and all production work using Sagent. By using the Sagent DataLink tool, we are able to explore where we want to go. For example, salespeople can check all the transactions by company and by employee and obtain details.

The corporate employers can call OPAM's call center to check all the credit card usage by their employees. The individuals can also call OPAM's call center to know the details of their purchase.

Valdés offered the following advice.

First, I am a technical guy with a lot of business experience. It is very important that IT people must be involved and be allowed to operate with some freedom.

Only by understanding the needs of each customer can a large company grow. The company must create several niches, customized to each customer by listening and knowing their needs. The company must then be efficient and ready to supply those needs.



11. APPENDIX: Interview Questions

This appendix lists the questions used in the structured telephone interviews. Not all questions were asked of all interviewees, given the 45-minute time limit.

1. Company Background (prior to interview)
 - 1.1. Company Name:
 - 1.2. Company Profile, Industry, Product/Services
 - 1.3. Geographic Location:
 - 1.4. Major Merger or Acquisitions:
 - 1.5. Financial/Stock Performance, Trade Press Buzz, Relevant Press Releases:
 - 1.6. Competitors:
2. Interview Introduction
 - 2.1. Interviewee Name:
 - 2.2. Interviewee Title and Job Responsibilities:
 - 2.3. Interviewee Contact Info:
 - 2.4. >Explain study objective and methods
3. System Characteristics
 - 3.1. How do you refer to your system or project?
 - 3.2. What are the primary tasks supported?
 - 3.3. Describe the general architecture.
4. Business Drivers
 - 4.1. What were your key business objectives?
 - 4.2. Who were the main champions/sponsors?
5. Implementation
 - 5.1. When did the first version go into production?
 - 5.2. How long did it take to implement the first version?
 - 5.3. Rough estimate of total development resources required.
 - 5.4. What difficulties did you experience during implementation?
 - 5.5. Did you use outside services during implementation?
 - 5.6. How much training and education was required?
 - 5.7. Did you prototype the solution? Impacts on warehouse?
6. Experiences
 - 6.1. What are the various groups that use the system?
 - 6.2. Which analytical components (transforms) are most useful?
 - 6.3. Have you embedded analytics into LOB applications? Interfaces?
 - 6.4. Who drives the evolution of analytics? Business or IT?
 - 6.5. Was warehouse data combined with operational data? Examples?
 - 6.6. Were there changes to the data model of the warehouse? Examples?
 - 6.7. Are you able to respond rapidly to changes in business requirements? Examples?
7. Business Benefits
 - 7.1. What has been the biggest benefit to your company?
 - 7.2. What changes occurred in the general business processes?
 - 7.3. How did the system provide cost-reduction savings?
 - 7.4. How did the system provide value-added benefits?
 - 7.5. Did analytics provide competitive differentiation or time-to-market advantages?
8. Lessons Learned
 - 8.1. If a colleague at another company asks for advice on a similar project, what would you share with him/her?
 - 8.2. What were the major factors that ensure success?
 - 8.3. What were the major risk factors to watch for?
9. System Evolution
 - 9.1. How are you continuing to enhance the system?
 - 9.2. Will you expand usage to other groups? Who? Why?
 - 9.3. Will you expand to other business processes?
10. Interview Conclusion
 - 10.1. >Thank interviewee; offer advice and assistance
 - 10.2. Are you willing to clarify your responses via email?



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Richard has published numerous articles in trade and academic publications, presented regularly at leading trade conferences, and conducted professional seminars in eighteen countries. He writes for DM Review with a monthly column entitled The BI Watch that reaches over 75,000 IT professionals. He has written three professional texts, entitled Enterprise Database Connectivity, Using the Data Warehouse (with W.H. Inmon), and Web Farming for the Data Warehouse.

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