

CASE STUDY

The Path Toward Pervasive Business Intelligence at Cornell University

Sponsored by: Tableau Software

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SUMMARY

The trend toward evidence-based decision-making is taking root in commercial, non-profit and public sector organizations. Driven by increased competition due to changing business models, deregulation or, in some cases, increased regulation in the form of new compliance requirements, organizations in all industries and of all sizes are turning to business intelligence (BI) and data warehousing (DW) technologies and services to either automate or support decision-making processes.

An increasing number of organizations are making BI functionality more pervasively available to all decision makers, be they executives or customer-facing employees, line-of-business managers or suppliers. IDC defines pervasive BI as follows:

Pervasive BI results when organizational culture, business processes and technologies are designed and implemented with the goal of improving the strategic and operational decision-making capabilities of a wide range of internal and external stakeholders.

Despite the fact that the term Business Intelligence was first coined in 1958 and the first BI software tools emerged in the 1970's, BI is not truly pervasive in any organization. As organizations identify more stakeholders who can benefit from improved decision-making capabilities, they are choosing to deploy BI and thus come increasingly closer to achieving pervasive BI. For organizations struggling with changing organizational structure and culture, business and IT processes and technologies, several lessons can be learned by examining the best practices organizations employ on their path toward achieving pervasive BI.

METHODOLOGY

In 2008 IDC launched a global market research project with the goal of uncovering best practices in expanding the use of BI and analytics processes and technologies. The research project was underwritten by eleven competing BI software, services and hardware providers. The project methodology, which was developed by IDC and contributors from Boston University School of Management Information Systems department included both a survey of over 1100 private and public sector organizations in 11 countries and in-depth interviews with 22 of these organizations resulting in a series of case studies on best practices in achieving pervasive BI. One of the organizations interviewed was Cornell University.

ORGANIZATION

Cornell University (Cornell) was founded in 1865 and today is composed of 11 undergraduate, graduate, and professional colleges. 20,000 students on the university's Ithaca, New York, campus can choose among 4,000 courses. Like many large organizations, Cornell operates under a complex structure that combines centralized and decentralized functions – information technology being one such function. The BI technology support at Cornell is performed both centrally and in the individual colleges.

SITUATION OVERVIEW

Business Drivers

Like all organizations that took part in IDC's research project, Cornell was influenced by both external and internal factors that triggered a need to re-evaluate its decision-making processes and the supporting BI and analytics technology architecture. In the case of Cornell, these business drivers were both strategic and operational.

Strategic

In 2002, the top business officers of each of Cornell's colleges created a steering committee to identify the key performance indicators (KPIs) needed for ongoing management of the university. Cornell had an ad-hoc metrics-based reporting environment with little consistency. KPIs were determined differently among colleges and between the colleges and central administration. In addition, there was a lack of cross-functional KPIs to provide strategic decision support to top-level managers and trustees of the university. Decision making was hampered and resources wasted because there wasn't always a clear understanding of the KPIs or agreement about which KPIs should be monitored.

Operational

Cornell's BI staffing resources are composed of a centralized team and localized staff supporting each of the university's colleges. In the past, much of the BI technology was supported primarily by the central IT staff. However, generally, the decentralized IT staff at each of the colleges had a better understanding of the local BI requirements needed to support daily operations. The resulting imbalance between the decentralized operations and centralized BI management and support had in the past prevented Cornell from effectively addressing all the BI needs of management and IT at the individual colleges.

SOLUTION

Towards Pervasive Business Intelligence

To address its BI and analytics needs, Cornell embarked on a path toward pervasive BI that would require changes to the organization's culture, technologies, and business and IT processes.

Organizational Culture

In 2002, the steering committee decided to identify and re-evaluate the metrics that had been used to support strategic and operational decision-making for several years. This top-down approach to data governance was a departure from the previous practice of allowing the individual colleges to determine

which KPIs to use. The result of this initiative was an extensive list of KPIs aggregated from each of the colleges. However, the initial goal of KPI rationalization, and technology deployment to support monitoring, analysis and dissemination of KPIs, did not materialize immediately. Shifting business priorities forced the KPI project to stay dormant until the fall 2006.

At that time some of the officers reconvened the steering committee to document the meaning of KPIs with the goal of automating the tracking of these KPIs through BI technology. The data governance initiative lasted for a semester. The project was funded under the newly defined “small projects” guidelines, which is a collaborative environment that makes central IT resources available to college projects. Under this model, the steering committee created a technical team staffed with BI experts from individual colleges and central IT. By 2007 the KPI initiative became one of the highest priority business and IT projects at Cornell.

Technology

Several IT vendors provide the software to support the information management and BI needs of Cornell. Like most universities, Cornell enjoys substantial discounts that these IT vendors provide their non-profit client-base. Among Cornell's technology portfolio are Oracle products such as its database, and PeopleSoft, Hyperion, and Brio applications. Also widely used are Microsoft products such as the SQL Server database, MS Access, and MS Excel. The range of software is not atypical for an organization of Cornell's size. Each tool and application serves a specific function. For example, Brio is used effectively for operational reporting against the PeopleSoft data models.

The BI team initially felt that none of the existing software products provided sufficient support for ad-hoc query and analysis. The newly formed BI technology team spent 9 months trying to create a more effective ad-hoc query and analysis solution with existing technology. The realization that this effort was not going to result in fulfilling the steering committee's requirements left the BI team with the choice of either scaling back the project or restarting it with a new software tool. The BI team made the latter choice.

The IT department's practice of avoiding reliance on a single software vendor allowed Cornell to evaluate multiple software products. The 3-month functional software selection process narrowed the available choices to one of Cornell's existing applications and a tool from Tableau Software, a provider of highly visual and interactive end-user query and analysis software, based in Seattle, WA. Tableau Software was selected as the overall best product in November 2007.

Business and IT Processes

Cornell's BI systems have been managing a wide range of data from applications that support processes such as student enrollment and performance, human resources, facilities management, alumni relations, and financial performance management. There are over 2,700 end-users with access to various BI assets of the university.

Following initial development and testing of Tableau's technology, the first new BI applications were deployed in February 2008 with ad-hoc query and analysis support for three functional areas and cross-functional KPIs. The responsibility to deploy Tableau fell on a team lead by Cindy Sedlacek, Director of Data Administration and Reporting in the College of Arts and Sciences, the largest within Cornell. By March 2008, Cornell had an unlimited server license and dozens of Tableau desktop licenses to be deployed among the colleges.

Deployment of Tableau for ad-hoc query and analysis did not mean the elimination of other tools used to support BI needs. Leading users of BI technology recognize that one tool is highly unlikely to fulfill the varying needs of all decision makers. Cornell continues to deliver production reports using Brio (now part of Oracle) to its 2,700 users. These reports are based on fixed templates for parameterized reporting, while Tableau software supports ad-hoc and exploratory query and analysis.

BENEFITS

Sedlacek and her team are keenly aware that any BI technology architecture is only as good as the quality of the data it provides to decision-makers. However, a highly interactive and visual interface of the end-user BI tool plays a key role in the broader adoption of BI technology and processes throughout the organization. Referencing the use of Tableau Software, Sedlacek said "using Tableau is fun, people are now excited by business intelligence." With the new BI technology Cornell is well on its way to providing the right information to the right people at the right time using the right tools.

The Right Information

- ☒ For Cornell, having the right information does not simply mean having reports or dashboards from all the disparate operational systems. As Sedlacek put it, "traffic lights are nice, but solid metrics behind them are the key to successful BI solutions." The KPI project resulted in a consistent set of cross-functional and localized metrics understood by all stakeholders. In the first phase of the project, human resources reports with up to 20 years of data were deployed using Tableau Software. In the second phase of the project, Cornell planned to offer the capability to analyze course information and accounting data.
- ☒ The new KPIs used by Cornell, such as the number of students per faculty, per staff, or per expenditure, are derived from data resident in multiple applications. Tableau Software is used to present data from Oracle, MS SQL Server, MS Access and MS Excel data.

The Right People

- ☒ Cornell had always provided most of the organization's decision-makers with some level of access to BI assets. However, it wasn't necessarily delivering the right information through the right tools to all stakeholders. Today, college-level decision-makers have access to both standard reports and exploratory query and analysis tools. Recently the university trustees requested access to the KPIs provided by the new BI application.
- ☒ As of March 2008 Cornell had 80 users, a number that is growing rapidly, on the new BI application. The wide variety of users and the range of their technology skills have made Tableau's intuitive interface a good match for Cornell's ad-hoc query and analysis needs.

The Right Time

- ☒ The biggest benefit Cornell has derived from using Tableau Software has been the transition to a self-service query and analysis architecture that frees end-users from having to rely on IT for each new request for information. Instead of building custom reports, IT can now focus on managing data integration and data quality. There is also a decreased need to export data from operational reports into MS Excel for further analysis since the new BI application provides the necessary flexibility to perform such ad-hoc analysis.

- ☒ In cases where IT's involvement is required, its responsiveness to end-user requests has increased substantially. The result has been decreased time-to-decision for end-users. A recent example involved a request, with a four hour deadline, for salary information by one of the university executives. Using Tableau, the requested information with interactive charts was available in two hours. "There would have been no way to do this with any of our other tools" said Sedlacek.

The Right Tool

- ☒ An effective BI tool needs to provide a balance of benefits to end-users and IT staff. With Tableau, end-users have been given a tool that mimics their techniques for exploratory query and analysis. The tool's interactive, visual interface has eliminated the need for training, even for users such as Deans who are used to having static reports delivered to them. Furthermore the tool has almost eliminated the need for users to come to IT with new questions.
- ☒ The BI team has found the new BI tool easy to deploy (e.g. it took about one hour to set up the Tableau server), enhance, and maintain. The built-in functionality to show both aggregates and detailed data and automatic cascading filters are just a couple of the examples that have eliminated the need to develop such functionality manually. Although the initial cost of Tableau's software was equivalent to that of offers from existing vendors, Cornell was able to use less than half of a full time equivalent staff member to support the KPI project and claims overall deployment time reduction of 75% for any new BI projects.

In addition, Cornell feels it has received great technical support from Tableau Software. In response to Tableau's fast development cycles to accommodate initially missing features, Cornell's Sedlacek said, "I have never had this type of response from a software vendor in the past 20 years of being an IT professional." Cornell has also found Tableau to have very high quality code with almost no bugs – an uncommon occurrence in the software industry. Cornell has also been very pleased with Tableau's technical support. The latter two characteristics regularly rank high as the reason organizations select a particular BI vendor according to IDC's regular surveys of end-users. In the case of Tableau, the ability to deliver superior service is partly due to the size of the company and narrow scope of the software's functionality as compared to larger, more complex applications. However, this does not change the positive experience Cornell had with this vendor and its software product.

Cornell's BI technology group has not been asked to conduct a formal return on investment (ROI) analysis for the deployment of Tableau Software, or that of its other BI technology providers. However, it has received steering committee confirmation about the success of the project in its current stage.

LESSONS LEARNED

IDC's goal in interviewing Cornell was to identify best practices that other organizations can apply in their efforts to make the use of BI and analytics processes and tools more pervasive. Neither Cornell nor IDC would claim that Cornell has fully achieved the goal of having pervasive BI. Nevertheless, there are several important lessons that the Cornell case highlights:

- ☒ Any new BI initiative that looks to overcome existing shortcomings should not be viewed only as a technology replacement project. Given executive support, organizations should take the opportunity to also re-evaluate their decision processes and performance metrics. Cornell did not simply deploy a new BI software tool, but deployed new KPIs enabled by a rigorous data governance process.

- ☒ There is a difference between having a lot of data and having the right information – that which is actionable. Cornell had always been oriented towards data-supported decision-making in its management practices, but realized that to make BI more pervasive, it was not enough to simply maintain long-standing KPIs. Rather, a re-evaluation of the meaning of the data was necessary to assure data consistency or a common language to describe data across the university when measuring and managing performance.
- ☒ One software tool will rarely support the needs of all decision makers for all use-case scenarios. Cornell recognized that there is value to having both production reporting tools and ad-hoc query and analysis tools as long as the organization operates on a consistent set of well-defined and commonly understood data and metrics. In addition to functional differences, these two BI components also have performance differences. Operational reports have very strict availability requirements resembling those of operational applications. The technology supporting the KPI project at Cornell doesn't necessarily have to have the same availability standards. Knowing these specific technical requirements helps IT departments optimize the use of scarce resources.
- ☒ Cornell's approach of including decentralized business and IT resources in a centralized project played a key role in gaining organization-wide support, which was further evidenced by collaboration among the colleges to fund the BI project.
- ☒ It is rare to see an immediate organization-wide deployment of a new BI tool. In fact, an iterative deployment approach, such as the one used by Cornell, can help spur adoption by the end user community. Initially, Cornell gave access to the new BI tool to a small group of users who were then able to share their experience with other users. The latter then requested further demonstrations of the new BI solution and access to the new BI tool. For example, both vice presidents of human resources and finance requested access to the new BI solution immediately after it was first shown to them. Cornell continues to use this approach to spread the use of the BI solution to the wider user population. In March 2008, there were over 200 new users requesting access to the Tableau server.
- ☒ Given the opportunity, organizations should try to get involved as a partner of the software provider to influence product development. When working with relatively small software vendors consider that "good enough" technology at the right price will likely fulfill 80% of your organization's needs, but will require patience as missing functionality is identified and the product enhanced. As an example, in Cornell's case of using Tableau Software, some features that were missing from the software during the initial implementation, were rapidly added during subsequent updates.
- ☒ New end-user BI tools may trigger a need to re-evaluate and improve the underlying architecture of data warehouses and/or marts. For example, Cornell had to address some database partitioning and indexing on one of its SQL Server databases to provide data for the Tableau software.
- ☒ After deploying BI software for query, analysis and reporting needs, organizations may discover additional unintended benefits. At Cornell, the new exploratory BI tool highlighted outlying data points and has been used to uncover data quality problems that would've gone unseen with traditional reporting tools. The data quality issues are being fixed at the source as they are identified.

- ☒ Finally, it is important to recognize that sunk costs should not influence future investment decisions. Cornell spent a substantial amount of time trying to develop a user-friendly ad-hoc query and analysis application with existing software. When it realized that this approach was not feasible, Cornell's BI team had the conviction to shift course and employ a new software tool to fulfill the decision-support requirements set by the steering committee.

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