UC San Diego’s Business Intelligence Competency Center (BICC)

Submitter’s Information
Jerry Singer
Director, Data Management Services
Administrative Computing & Telecommunications
UC San Diego
858-534-9777
jwsinger@ucsd.edu

Project Team Members
Jonathan Whitman, Project Sponsor
Bobb Barile, Project Sponsor
Sylvia Lepe, Project Sponsor
Min Yao, Project Sponsor
Jerry Singer, Program Manager
Lori Barry, Project Technical Lead
Jerry Flanagan, Cognos Architect
Kevin Gao, Project Team Member
Ling He, Project Team Member
May Xu, Project Team Member
Roque Obusan, Project Team Member
Sanford Beattie, Project Team Member
Cynthia Paulas, Project Team Member
Maria Obtera, Project Team Member
Cathy Sweet, Project Team Member

Summary
Responding to campus needs for better Business Intelligence (BI) coordination, Administrative Computing & Telecommunications (ACT) strengthened its service catalog by creating a Business Intelligence Competency Center (BICC). A center of excellence, the BICC coordinates UC San Diego’s BI activities and encourages campus cross-functional collaboration in sharing tools, tips, and techniques. Our strategy is to provide a self-service resource that guides and supports the way the campus community makes decisions. The program delivers on the goal of BI—improving outcomes, efficiency, and effectiveness through a spectrum of capabilities including historical trending, current-state performance indicators, predictive analytics, and more.
Project Description

Background
For almost 20 years, ACT has provided the campus with a Data Warehouse, a rich resource that currently contains over 22,000 tables and over 500 load/update processes reflective of transactional systems. It is primarily queried via in-house tools and serves as an extraction source for many departmental systems. Currently, however, requests to add or extend pre-built queries may take up to four months.

Faced with an abundance of data and increasingly complex business and reporting needs, ACT purchased a site license of IBM’s primary BI tool—Cognos—in 2011 to offer a comprehensive top-tier, off-the-shelf product that would give users a powerful, easy-to-use tool to create dashboards and reports that better inform and improve decision-making. Initially, Cognos was targeted for two major deployments:

1) Reporting and analytics requirements for the migration to Blackbaud CRM for Advancement.
2) Migration from proprietary code supporting high-usage financial reporting, FinLink.

The BICC was formed in February 2013 as a means to accelerate and govern the rollout of Cognos. As we developed the BICC charter, we realized a successful Cognos rollout would require a comprehensive approach not only to meet current BI needs but also to address future challenges.

Along with the Cognos purchase and BICC charter, UC San Diego is participating in UCPath, a project which introduced the concept of an Operational Data Store and a dimensional Data Warehouse. We determined that implementation of these services would help modernize our data infrastructure and improve our BI offering.

Detail
With the technology framework defined, we began to address other foundational components of BICC: the processes and people. We identified and developed processes that balance defining requirements alongside quick delivery and that use modified, agile BI development methods as our core approach.

The success of BICC is dependent on collaboration with ACT and with functional areas as well as on the adoption of self-service BI. We have trained BICC members in Cognos capabilities by using their data models to accelerate and personalize learning. Training also included the use of a data model tool (Framework Manager) and report development. This has enabled BICC members to achieve independence from central IT in meeting self-service goals and these early adopters are now training their colleagues.

The functional areas that are engaged with BICC are listed below (see BICC Engagement). Three teams were early adopters:

1) Student Data (composed of representatives from the Provost office, graduate student services, registrar’s office, and colleges)
2) Campus Budget Office
3) Academic Affairs

Working with the early adopters, we refined our processes for requirements gathering, storyboarding, targeted training, and collaborating. The early adopters all made progress toward achieving their goals in automating manual processes, reducing latency in information delivery, and providing drill-down-to-detail reporting that was not available before. The
Student Data team created a data glossary that clarified definition and is now the framework for the shared data model. The Campus Business Office improved data quality through data model redefinition and migration to the Operational Data Store. Academic Affairs reduced redundant data stores and simplified business rules used for data transformation.

Cognos has proven to be an excellent enabling toolset that has allowed us to achieve the core goals of self-service BI, accelerated development, data visualization, and collaboration. We have also succeeded in using Cognos as the report engine for application embedded reporting for Advancement and Financial functionality. BICC will allow us to provide and manage advanced Cognos capabilities, such as mobile BI, dimensional cube (OLAP) support, and big data readiness.

BICC and the data modernization program have positioned us to easily accept the requirements of UCPath. The key building blocks—integrated ODS, new Data Warehouse, ETL capabilities, and Cognos—provide the foundation for our Data Management services. We have actively collaborated with our Tier 3 consumers to understand their HR and Payroll data usage and have trained a subset of them to fully use Cognos so that UCPath-related reporting can follow standard BICC self-service processes.

As BICC matured, we looked to add BI capabilities to further enhance its value. We had the ability to support hindsight through historical trending and insight through operational drill downs, but lacked the ability to support foresight. This led us to look at predictive analytics capabilities. IBM has consistently added functionality and usability to their related toolset—SPSS—as well as integrating it with Cognos. In collaboration with IBM and the UC San Diego undergraduate colleges, we identified a use case around the four-year graduation rate, which is approximately 58%. While considered a high rate measured against national average, it is in the lower half of campuses across the UC system. The Dean of Academic Advising cited the negative effects of extended graduation rates in terms of student (and student’s family) costs, class size and scheduling pressure, higher university support costs, taxpayer dollars, and impact to university ranking and reputation.

The undergraduate colleges, in coordination with the Registrar’s Office, provided raw data that was then used to assist in understanding correlations via SPSS. The toolset helped guide the data mining process that identified a clear relationship between a GPA below 2.10 at the end of the student’s 9th quarter and low likelihood of graduating in four years. This finding was unexpected and revealing and spurred follow-up discussions regarding an early warning system for students at risk, engagement of advisors at the appropriate time, and potential remediation resources including additional tutoring services.

BICC continues to work with the vendor to finalize the use case and build additional use cases around student retention and admissions. We envision that predictive analytics will soon become part of the standard offering.

**BICC Engagement**

The following campus functional areas are actively engaged with BICC:

- **Academic Affairs** – Resource Profile reporting rolled out to approximately 125 users. The Resource Profiles are a tool for managers and other staff to assist in planning, to conduct analyses, and to chart changes over time. The Cognos Resource Profiles provide expanded reporting capability, most notably the ability to drill down to detail data for many of the Resource Profile data points.

- **Campus Budget Office** – Completed rollout of Total Budget Report to a user group representing all VC areas. This project was a cross-functional team effort to produce a monthly Total Budget Report (TBR) that extracts actual and budget data from campus financial systems and replaced a manual process. The benefits of using Cognos reporting to generate the TBR include reducing potential data integrity issues and efficiencies that allow monthly instead of annual reporting.

- **Advancement** – Completed initial build and user acceptance of approximately 85 reports covering all Advancement subject areas relating to Blackbaud CRM and Financial Edge. Completion of all reports scheduled for June as part of full system testing and training.
• **Financial** – Completed build of 15 of 40 reports that are being converted to Cognos from Perl. These are heavily used FinancialLink reports (some exercised over 60k/month) providing operational financial information covering a wide variety of information including expense, budgeting, operating ledger, chart of accounts and payroll. Targeted go-live is July 2014.

• **Student Data** – completed training, report requirements and initial data model development. Working with a functional team to complete data sourcing with first report rollout in June.

• **Business and Financial Services (BFS)** – Working with BFS Analytics team, BICC has completed five report requirements, report development training and initial data model. Further storyboarding, training and report development is scheduled with expected report rollout by late summer.

• **Research Affairs** – Completed initial training with three new analysts, two of whom are dedicated to Cognos report development sourcing ERAP data. They will also develop specific Cognos reporting for Visiting Scholar scheduling.

• **Marine Sciences** – Completed initial training, report requirements for five reports and data modeling with SIO IT resources.

• **Health Services** – Provided Cognos overview and scheduled follow-up meetings to develop report requirements and targeted training.

### Technologies and Processes Used

The following are key technologies and processes upon which BICC is built:

- **IBM Cognos** – Full BI suite including report development and analytics toolset.
- **IBM SPSS** – Data mining and predictive analytics product used to support four-year graduation rate case study.
- **DB2 LUW (Linux)** – Supporting database management system holding new data stores.
- **Operational Data Store (ODS)** – New integrated data store representing current data primarily as reflection of transactional systems.
- **Dimensional Data Warehouse (DW 2.0)** – New integrated data store built specifically for optimized queries.
- **Informatica PowerCenter and Data Virtualization** – PowerCenter is the extract, transform, load (ETL) tool that facilitates quick and reusable source system extractions and loads to the ODS and DW 2.0. Data Virtualization provides the ability to build a logical layer of data so that disparate data sources can be viewed as a single entity and data does not require movement to a central physical repository.
- **IBM DB2 Replication (Change Data Capture)** – Ability to identify changes at the source of record so that the delta changes can be applied to ODS and DW supporting near real time requirements.
- **Self-service BI** – Core objective that enables functional teams to develop reporting without central IT involvement reducing delivery times and improving flexibility.
- **Agile BI Development Processes** – Methodology that supports focused, short duration development and implementation of BI capabilities.
- **Data Governance** – A formal structure that will centrally define and govern enterprise data.

### Success Factors

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<td>Wide-spread adoption</td>
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<td>Improved BI delivery times</td>
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<td>Strengthening campus collaboration</td>
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<td>Reduced total licensing and development costs with enterprise licensing and reuse</td>
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<td>Reports/Dashboards empowering users to move from anecdotal to fact-based decisions</td>
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<td>Increased BI customer satisfaction</td>
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Institutional Value
BICC’s value to the institution can be derived in hard-dollar savings, calculated savings (including cost avoidance), and intangible benefits. Hard-dollar savings include cost reduction in the site license versus individual licensing ~$200K/yr (we are not now able to attribute labor cost reduction). Calculated savings include net savings of localized training v. offsite training, collaborative development v. independent development, automated v. manual processes, site license cost v. competitive product purchase, data quality improvements, latency improvements, data and process redundancy reduction, value of data governance, reduced need for data movement and transformation, and improved data discovery of ~$1M/yr. Intangible benefits include a net positive impact of changes implemented based on operational KPIs, implementation of processes improving outcomes based on predictive analytics, and accelerated response to exceptional conditions highlighted by BI revealed information.

Customer Satisfaction Responses

“The value of combining big data with predictive analytics cannot be underestimated in the next generation of student service systems. Having the information to intelligently guide students throughout their academic careers will impact everything from time to degree, to retention, to major and career choices; providing the best academic advising possible in ways that were unimaginable before.”

—Technology Director, Provost Office

“Our vice chancellor area had been looking for several years for a tool that would allow our managers to easily drill down to the detail of resource data we collect annually on all our units. Working as part of the BICC and utilizing the COGNOS tool, we’ve realized this goal. Our business users can now access much more refined data with significantly greater ease, enabling them to conduct deeper and stronger analyses.”

—Director Organizational Development, Academic Affairs

“This project was a cross-functional team effort consisting of staff from ACT, RMP-IT and CBO to produce a monthly Total Budget Report (TBR) that extracts actual and budget data from campus financial systems. This automated report replaced a manual process of downloading data into shadow databases and reporting through Excel spreadsheets. The benefits of using the Cognos reporting tool to generate the TBR include: 1) reducing potential data error and integrity issues associated with manual data manipulation, and 2) creating efficiencies that allow monthly reporting instead of annual reporting.”

—Director, Campus Budget Office

“The product that the group has now rolled out to our departments and other units is superb. I know it was a lot of work and probably resulted in some hair loss along the way. Thank you to the ACT team for sticking with it to end up where we did.”

—Assistant Vice Chancellor, Academic Affairs

References
• Blink: http://blink.ucsd.edu/sponsor/ACT/services/bicc.html
• BICC SharePoint site: https://teamwork.ucsd.edu/sites/act-iti-dw/BICC/SitePages/Home.aspx