



## Community College Gains Institutional Intelligence from SQL Server Data Warehouse

### Overview

**Country or Region:** United States

**Industry:** Education – Higher Education

### Customer Profile

Based in Cleveland, Ohio, Cuyahoga Community College (Tri-C) is the state's largest community college, serving more than 55,000 students a year.

### Business Situation

Tri-C needed a business intelligence data warehouse to support its leadership and staff in providing the best learning opportunities for its students.

### Solution

Tri-C created its One Institutional Intelligence data warehouse, building upon the Microsoft® Application Platform, including SQL Server® 2005 Enterprise Edition. SQL Server Analysis Server and SQL Server Reporting Services are used to provide easy data access and reporting.

### Benefits

- A single version of the truth
- Better decision making
- Ease of use
- Enhanced productivity
- Faster query processing

“We built our data warehouse on the Microsoft Application Platform to create a solution that was so easy to use that people would be empowered to do their own data exploration.”

Joe Smucny, Vice President of Information Technology Services, Cuyahoga Community College

Cuyahoga Community College (Tri-C), based in Cleveland, Ohio, is the state's oldest and largest community college, serving more than 55,000 students per year. The school, which includes three traditional campuses and more than 50 off-campus sites, needed to create a data warehouse to provide a consistent source of information across its operations and to support business intelligence analytics. Tri-C created its One Institutional Intelligence data warehouse using the Microsoft® Application Platform, including Microsoft SQL Server® 2005 database software. The data warehouse has given the college the consistent view into information it needed to support decision making. The solution also provides ease of use so faculty, administrators and staff can create and run their own queries. Complex queries that once took an hour to run are now performed in 4 seconds.

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Jennifer Spielvogel, Vice President of Planning and Institutional Effectiveness, Cuyahoga Community College

## Situation

Students at Cuyahoga Community College (Tri-C) might be surprised to learn that as hard as they study, administrators behind the scenes are studying as hard or harder—to keep alive the college’s motto of “Where Futures Begin™.”

Tri-C prides itself in analyzing data to best meet the needs of the more than 55,000 credit and non-credit students who each year take classes from the college which has three traditional campuses, two Corporate College® locations, more than 50 off-campus sites, and also offers distance learning options.

Opened in 1963 as Ohio’s first community college, Tri-C has provided high quality, affordable education and programs to more than 700,000 students over the years. It has grown to offer more than 1,000 credit courses in more than 80 career, certification, and university transfer programs. The organization operates under what it calls a “One College” system, so that students benefit from centralized registration, financial aid, and other support services regardless of which campus they attend.

Tri-C uses the SunGard HE Banner administrative system from Microsoft® Certified Partner SunGard Higher Education to support administrative functions including student records, financial aid, finance, HR, and other functions. However, the organization lacked a central data repository dedicated to reporting and analytics. Over the years, administrators and business users created their own reporting solutions, often using Microsoft Access™ database software.

“We have counted some 20,000 Access applications in our system,” says Joe Smucny, Vice President of Information Technology Services at Cuyahoga Community College. “To avoid running reports against the Banner production system, people would download

data and manipulate it to create the reports they needed.”

This individualized approach to reporting created problems, as different organizations could take varying paths to create what were supposed to be the same figures—with divergent results.

Even counting students per campus was confusing because all three campuses are within 10 miles of each other, and students often attend classes at more than one campus to assemble the best mix of classes to meet their academic needs. In cases like this, which campus counts the student?

The questions became more complex as individual programs and campuses, as well as the full Tri-C system, needed to assemble data for operational reporting, budgeting, forecasting, and accreditation and compliance needs. Additionally, Tri-C needed a central repository to support what the school terms institutional intelligence to help the organization continually enhance its operations and decisions.

“We needed a single view of the truth,” said Jennifer Spielvogel, Vice President of Planning and Institutional Effectiveness at Cuyahoga Community College. “We needed to augment our One College philosophy with a business intelligence (BI) solution that would provide a single source of truth across all of our operations.”

## Solution

Cuyahoga Community College created a BI solution that spans all of its operations. In keeping with its One College philosophy of unifying its multiple campuses, the data warehouse solution is called One Institutional Intelligence (OII). The OII data warehouse was deployed using the Microsoft Application Platform, including Microsoft SQL Server® 2005 Enterprise Edition database software

running on the Windows Server® 2003 Enterprise Edition operating system.

Smucny and Spielvogel worked closely with a cross-functional organization called the Intelligence Council, and an array of other stakeholders—including college executives, academic staff, institutional research analysts, financial analysts, and IT report writers—in designing and deploying the OII data warehouse. Christina Rouse, a solution architect, assisted Tri-C in the project.

“Working closely with Joe [Smucny] we could see that we would be creating more than just a tool,” says Spielvogel. “We knew that

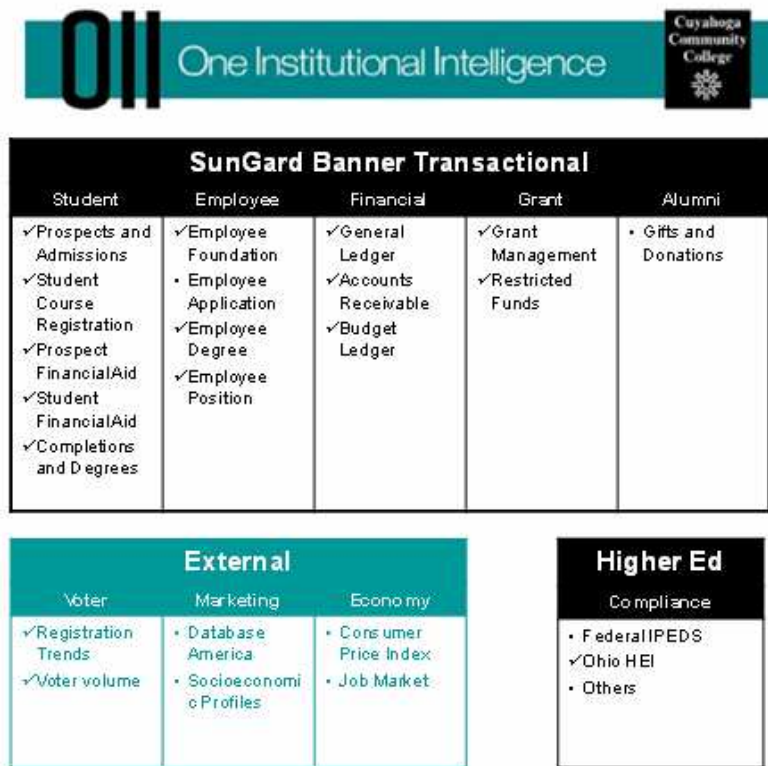
creating One Institutional Intelligence would require a cultural change, so we began our planning by going to the stakeholders who would be using this the most. We would ask them what they were accountable for in their position, and how they measured their progress toward meeting those accountabilities.”

The next step was to create a data warehouse to serve as a central repository for all the information required for reporting. In addition to importing a spectrum of data from the Banner application, the data warehouse also includes third-party data for marketing and economic analysis, and government information used in compliance and other reporting.

The OII data warehouse, deployed on HP ProLiant DL380 and HP ProLiant DL585 server computers, has a multi-tier architecture that includes:

- **Extract, Transform, and Load (ETL) and Staging Tier.** Information from the Banner application, Access databases, external feeds, and other sources is prepared for loading into the data warehouse using SQL Server 2005 Integration Services for ETL and staging operations. The Banner application is on an Oracle database hosted on an HP AlphaServer ES47 server computer running on the HP OpenVMS operating system.
- **Data Tier.** The data warehouse includes 11 years’ worth of historic data from the Banner application, as well as information from external sources. The relational database totals more than 300 gigabytes of information and grows at a rate of about 30 gigabytes a year. The largest table, the Daily Enrollment Fact Table, has 5.5 million rows of data.
- **Analytics Tier.** To support faster query processing, Tri-C imports information from the data warehouse into multidimensional

Figure 2 – Architectural layout of the One Institutional Intelligence solution



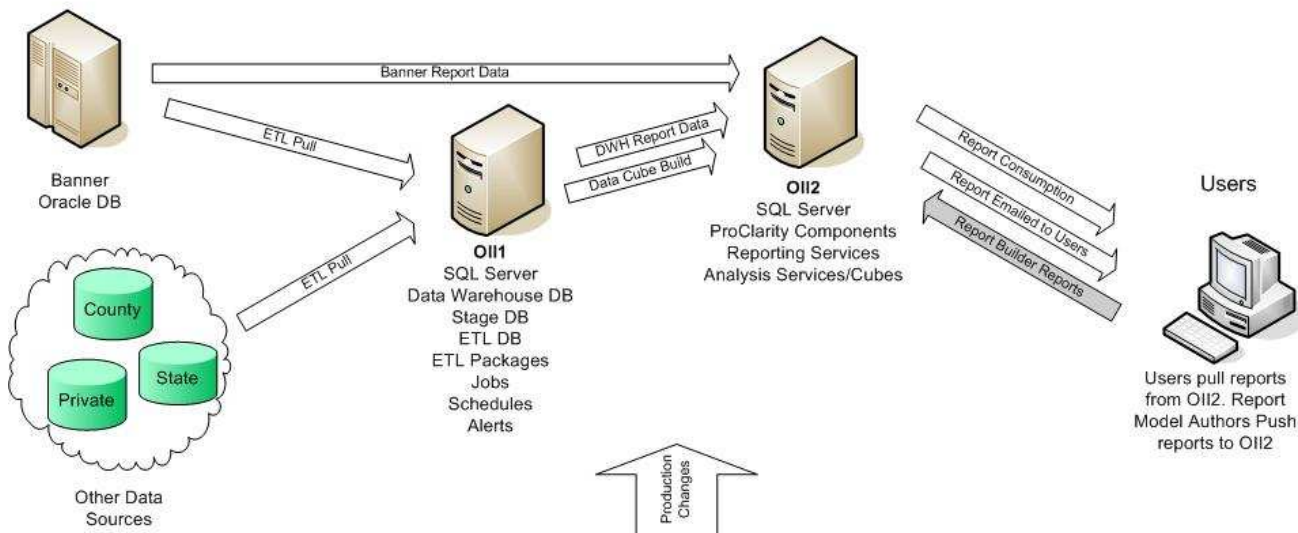
cubes, using SQL Server 2005 Analysis Services. Analysis Services is a component of SQL Server that supports the creation, maintenance, processing and querying of data cubes. Analytics is supported by 11 fact tables in 32 conformed dimensions, using a star schema. For example, a student is a derivation off the Person Table, because one person can be a student as well as an employee or a faculty member. (For instance a Tri-C HR employee might take computer classes as a student, and occasionally teach a class on music appreciation.)

- **Reporting Tier.** Executive dashboards and “heat map” visualizations are created

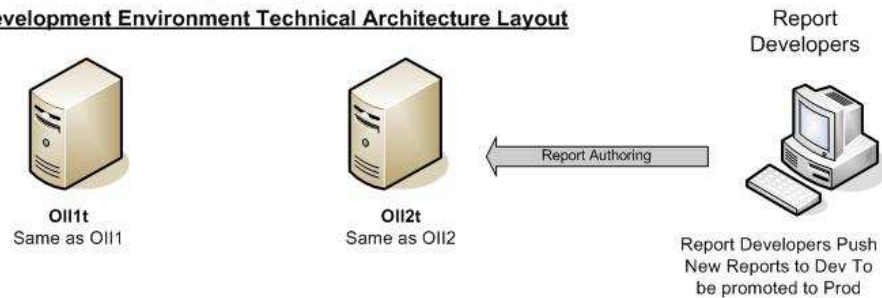
using Microsoft ProClarity® business analysis software. Ad hoc reporting is conducted using the Report Builder feature of SQL Server 2005 Reporting Services, a comprehensive, server-based solution for creating, managing, and delivering real-time information to support daily operations and decisions.

- **Portal Tier.** Tri-C created a portal for power users to access the data. The portal was created using Microsoft Office SharePoint® Server 2007 portal server software. The portal enables users to access data on a role-based basis, defined using Microsoft Active Directory® directory service.
- **Presentation Tier.** A Web-based user

### OII Production Environment Technical Architecture Layout



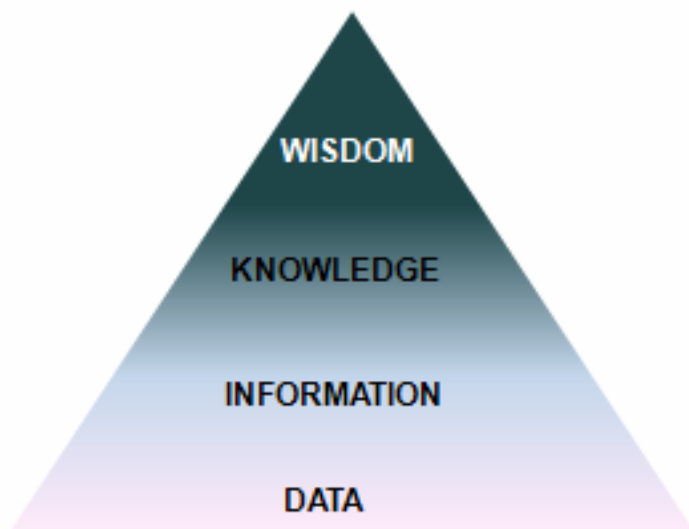
### OII Development Environment Technical Architecture Layout



“Creating the data warehouse was easy using the Microsoft Application Platform. ... The combination of Analysis Services and Reporting Services helps us make the data available directly to our users so they no longer have to request a specialist to run their queries.”

Joe Smucny, Vice President of Information Technology Services, Cuyahoga Community College

better decision making by helping to transform data into wisdom



interface is used to provide ubiquitous, yet secured, entry across the Web, while avoiding the need for downloading client-side applications. Web access is supported with Microsoft Internet Information Services 6.0, the Web server that comes with Windows Server.

“Creating the data warehouse was easy using the Microsoft Application Platform,” says Smucny. “SQL Server Integration Services provides all we need for ETL and staging. The combination of Analysis Services and Reporting Services helps us make the data available directly to our users so they no longer have to request a specialist to run their queries.”

### Benefits

Cuyahoga Community college gained the data integrity it first envisioned through its One Institutional Intelligence data warehouse. The data warehouse has also given the college the data access it needs to support better decision making, while providing ease of use, enhanced productivity for analysts and IT

specialists, and faster query processing.

### A Single Version of the Truth

The OII data warehouse gives Tri-C the data integrity required for providing the single version of the truth it sought from the beginning of the project. “The OII data warehouse helps ensure that when people come to the Executive Leadership Team meetings, they will all be able to work from the same set of defined data,” says Smucny. “In the past people could come to meetings with five different spreadsheets, and a lot of time was lost trying to determine who had the most accurate numbers.”

Spielvogel agrees with the benefits of gaining a single version of the truth: “People were trying to find the right information,” she says. “They would go to the Banner system, but three different people might ask for the same data in three different ways, and so get three different answers. Using Analysis Services to create conformed dimensions to standardize data definitions removed the ambiguity that used to create confusion. Everyone can now work with the same figures.”

### Better Decision Making

Tri-C values its OII data warehouse for providing the information required to make faster and better decisions. “The One Institutional Intelligence system is based on the philosophy that data is turned into information, information is brought together to create knowledge, and enhancing knowledge leads to wisdom,” says Smucny. “SQL Server and our data warehouse are at the foundation of all of this.”

An example of turning raw data into wisdom is the guidance the OII data warehouse provides for predicting the success of class offerings based on previous signup and retention data.

“People don’t want to base important decisions on their gut feelings. They want to work from a foundation of good information. That is what we’ve provided using SQL Server to create our OII data warehouse.”

Jennifer Spielvogel, Vice President of Planning and Institutional Effectiveness, Cuyahoga Community College

“When we build our schedule for next year, one of the areas we will be examining—because we now have the ability to do so—is how many of the courses that we offered last fall were canceled before they ever started,” says Spielvogel. “We can see how many courses had registration rates of 1 to 5 students, how many had 6 to 15 students, and how many had more than 16 students.”

It was possible, but difficult, to get this information in the past.

“Previously answering these questions required asking someone to write code to create a new query,” says Spielvogel. “Now the information is immediately available from our OII data warehouse. This information gives us the ability to look ahead and project how to make our class offerings more relevant. The same type of data can be explored as we continually look for ways in which to increase the success of our students.”

The OII data warehouse is helping the college to increase student retention by identifying the points at which students might become frustrated and drop out. This opens the door for intervention to help ensure students complete the studies required for their new career objectives.

“Cuyahoga Community College is all about student success,” says Rouse. “The OII design includes use of slowly changing dimensions for the data warehouse to give administrators the ability every day to monitor who has dropped from what class.”

For example, data might show a historical pattern that Psychology 101 has a high drop rate in the fourth week. Rouse says data like that makes it easy to time an intervention.

“Consider a scenario when, two days before historical student drop out days, the Dean of

Students or President of the campus comes in and tells students: ‘I know you all are under stress. Talk to me about your stress. We know you’re thinking about dropping. Here’s the historical pattern. What can we do to intervene and help you be successful by staying in this course?’”

Such intervention, in addition to letting students know that they aren’t alone or forgotten, could also help the school discover strategies for easing the stress. “Perhaps students need better day care options,” said Rouse. “Perhaps the exam dates need to be changed, or tutorial sessions should be offered. Once you know that an intervention is needed, you can begin to examine strategies that can be deployed to enhance student retention.”

The OII data warehouse also helps Tri-C as a participant in Achieving the Dream: Community Colleges Count, a multi-year national initiative to help more community college students succeed. The initiative is particularly concerned about student groups that traditionally have faced significant barriers to success, including students of color and low-income students. The organization notes that currently in the United States, fewer than half of community college students meet their educational goals. Achieving the Dream is working to help more students earn certificates or degrees that open the door to better jobs, further education, and greater opportunity.

“We were just at the national Achieving the Dream conference in Atlanta, using information we were able to pull from our OII data warehouse,” says Spielvogel. “We showed our calculations for enhancing student success rates, and we had administrators from other colleges tell us we provided the best data they had seen at the four-day conference.”

### **Ease of Use**

From inception of the project, ease of use was identified as a must-have because Smucny and Spielvogel were committed to providing a solution that enabled users to work directly with the data warehouse reports—without having to ask an analyst or IT specialist to design and run queries.

“In the past a specialist was required to run queries, and that could mean waiting hours or days for the query responses,” says Smucny. “We built our data warehouse on the Microsoft Application Platform to create a solution that was so easy to use that people would be empowered to do their own data exploration. The tagline we used for the project was providing data access “anywhere, anytime, and easy.”

Smucny, impressed by the ease of use of Report Builder, anticipates seeing great things from users who find new ways to use the information and reports from the data warehouse. “It will be interesting to see the innovation with which people draw value from this information,” Smucny says. “We are expecting to be happily surprised by what people are able to do when they have direct access to this wealth of information.”

Spielvogel concurs. “People don’t want to base important decisions on their gut feelings,” she says. “They want to work from a foundation of good information. That is what we’ve provided using SQL Server to create our OII data warehouse and reports. We are enabling faster decisions, while extending the benefits of the data warehouse to a lot more people. One goal of our OII data warehouse is to provide more access to more data by more people.”

### **Enhanced Productivity**

A side benefit of creating easy-to-use data warehouse reports is that the analysts and IT specialists who used to spend time fulfilling

query requests are freed to perform their own analytics, enhancing their productivity.

“We have great analysts, who are happy to be freed from the data fetching that used to dominate so much of their time,” says Spielvogel. “Instead of tracking down queries for others, they can help us better understand what the data means, and do their own explorations to help guide the college into the future.”

One example of freeing analysts from routine work is that prior to the OII data warehouse considerable analyst effort was required prior to the beginning of each semester just to stay on top of day-by-day changes in enrollment. “We had a staff member who would spend four to five hours a day tracking enrollment,” Spielvogel says. “That figure is now available immediately from the data warehouse reports.”

Rouse underscores the value provided by the easy-to-use data warehouse, with a quote from an analyst she worked with at the college. “Dwayne told me: “If I’ve heard the question before, it’s redundant. And if it’s redundant, it ought to be automated. I want people to give me the questions that I haven’t heard.”

### **Faster Query Processing**

The OII data warehouse has reduced processing time on complex queries from minutes to seconds. “Previously, if someone needed to know the names of all students signed up for Biology 101, for example, a query was run against the live transactional Banner application,” says Rouse. “Such a query could take 40 to 60 minutes to complete. With the OII data warehouse we get the same data set in about 4 seconds.”

### **Summary**

Creating its One Institutional Intelligence data warehouse using the Microsoft Application

## For More Information

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For more information about Christina Rouse, Solution Architect products and services, call (216) 849-8237 or send e-mail to: [crouse@dayhuffgroup.com](mailto:crouse@dayhuffgroup.com)

For more information about Cuyahoga Community College products and services, call (800) 954-8742 or visit the Web site at: [www.tri-c.edu](http://www.tri-c.edu)

Platform has enabled Cuyahoga Community College to achieve its vision of providing easy-to-use access to a wealth of information that provides a single version of the truth, and the analytics to support better decision making.

## Microsoft Server Product Portfolio

For more information about the Microsoft server product portfolio, go to: [www.microsoft.com/servers/default.aspx](http://www.microsoft.com/servers/default.aspx)

## Microsoft SQL Server 2005

Microsoft SQL Server 2005 is comprehensive, integrated data management and analysis software that enables organizations to reliably manage mission-critical information and confidently run today's increasingly complex business applications. By providing high availability, security enhancements, and embedded reporting and data analysis tools, SQL Server 2005 helps companies gain greater insight from their business information and achieve faster results for a competitive advantage. And, because it's part of the Microsoft server product portfolio, SQL Server 2005 is designed to integrate seamlessly with your other server infrastructure investments.

For more information about SQL Server 2005, go to: [www.microsoft.com/sqlserver](http://www.microsoft.com/sqlserver)

## Software and Services

- Microsoft Servers
  - Windows Server 2003 Enterprise Edition
  - Microsoft SQL Server 2005 Enterprise Edition
- Microsoft Office System
  - Microsoft Office SharePoint Server 2007
- Technologies
  - Active Directory
  - Microsoft Internet Information Server 6.0

- Microsoft ProClarity
- Microsoft SQL Server 2005 Analysis Services
- Microsoft SQL Server 2005 Reporting Services

## Hardware

- HP ProLiant DL380 and HP ProLiant DL585 server computers