GILBANE
Content Technology Works

Wachovia's CAS:
Harnessing the Value
of Multiple Content Repositories
Across a Large Enterprise

Wachovia provides seamless access to multiple document stores through enterprise-level content integration services.

Mark Walter
Senior Analyst, The Gilbane Report
November 15, 2004

Wachovia's Content Access Services (CAS) infrastructure is a layer of middleware that provides a unified programming interface to a variety of content repositories spread across multiple business units of a large financial services company. Developed over a series of projects, CAS illustrates the speed to market that an effective enterprise content integration strategy can bring to organizations that grow through mergers and acquisitions. It also shows how content integration eases the transitions that organizations face as they retire aging systems and bring in new ones. Lastly, CAS demonstrates how content-integration services provide ongoing payback, cutting development costs by enabling new capabilities that leverage at a corporate level the investments that individual business units make in content management. Wachovia's recipe for success includes a pay-as-you-go approach to developing the architecture, a noninvasive approach to deploying it, and a progressive approach to continually improving it.

WACHOVIA

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Introduction

Content Technology Works (CTW)

Content Technology Works is an industry initiative that is administered by *The Gilbane Report* to develop and share content technology best practices and success stories. The premise is that when given enough proven recipes for success, enterprise consumers will be able to adapt and replicate that success for themselves – increasing productivity and confidence.

Success stories are written by *The Gilbane Report,* with final editorial control resting entirely in the hands of the adopter. The result is that:

- Vendors do not control content
- Success stories are as opinionated and as jargon free as the adopter prefers
- Analysis is included from *The Gilbane Report* and invited contributors

CTW case studies provide organizations with best practices in content technologies and strategies for securing funding, measuring actual value, and driving adoption. For more information on the CTW program, see page 22 or visit http://www.gilbane.com/technology_works.html.

Overview of success story

Wachovia is the fourth-largest financial services company in the United States and the third-largest brokerage firm in the country. Following the First Union–Wachovia merger in 2001, Wachovia faced challenges in reconciling multiple content repositories so that employees from both of the previously separate firms could find digital documents regardless of where they were stored or had originated. This success story outlines how Wachovia pulled disparate sources together by developing a content-integration layer of middleware based on Venetica's VeniceBridge technology. The project paid for itself within two years and has since been extended to other business units and repositories. The infrastructure established by these early projects will provide even larger dividends in the future because the company continues to leverage and grow its new middleware for future projects.

Wachovia first began using VeniceBridge in 2001. IBM acquired Venetica in October 2004 and subsequently changed the name of the VeniceBridge product to DB2 Information Integrator (DB2 II) Content Edition. Because IBM has retired the VeniceBridge product name, references in this case study to the VeniceBridge technology have been changed to DB2 II Content Edition. To be historically accurate, where appropriate we have retained references to Venetica, which was Wachovia's vendor throughout the 2001–2004 period covered in this case study.

Acknowledgments

The Gilbane Report would like to acknowledge the generous contribution of time and intellectual property from Wachovia, IBM and Venetica. Specifically, they have allocated the time of talented and heavily committed staff to improve industry awareness and understanding of enterprise-content-integration strategies and technologies.

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In Their Own Words: Stakeholder Perspectives

"With CAS, business executives are making their decisions based on what they need to do, not based on whether or not we can hook up a new system."

> —Kay Harris, Senior VP Information Technology,
> Manager of Workflow and Imaging Technologies

"Wachovia's CAS greatly enhanced ease of development for my engineering team. It 'black-boxed' the image repository to my Java application developers. WIT [the Workflow and Imaging Technologies group] can put whatever they want to back there, and I can get to it. Without CAS, I would have needed many more specialized skills on my team to directly interface the desktop to the image repositories."

> —Matt Bach, Development Manager, Commercial Technology Solutions

"With such a new application rolling out to such a large group, this project went 100 percent better than we expected. . . . Looking ahead, we hope to move imaging up earlier in our business process, and this tool will play a key role in enabling that."

> —Julia Condrey, Imaging Project Manager
> Wachovia Commercial Loan Services

"CAS was less expensive than the alternatives and going forward it should give us more leverage and freedom than point-to-point integrations."

> —Jeff Loudermilk, Initiative Manager, Wachovia Securities

"CAS opens a whole new world to the line of business developers."

> —Randy Wilcox, Enterprise Content Management Architect

Wachovia Corporate Background

Headquartered in Charlotte, NC, Wachovia Corporation (www.wachovia.com) is the fourth-largest financial services company and the third-largest brokerage firm in the United States, serving more than 14 million households and businesses. It has a dominant presence in the Southeast, and it also operates retail brokerage offices in 49 states, more than 30 international banking offices, and online brokerage services that are available 24 hours a day, seven days a week.

Mergers and acquisitions have had a big impact on the financial services sector, and Wachovia is no exception. Although its roots date back to the opening of the first Wachovia Bank in 1879, Wachovia as we know it today was formed in September 2001, when the former Wachovia Corporation merged with First Union, another North Carolina bank that had grown from more than 80 mergers and acquisitions into a diversified financial services company. The following year Wachovia acquired Prudential's retail brokerage business, creating the nation's third-largest retail brokerage operation. This year Wachovia grew again when it merged with SouthTrust Corporation, based in Birmingham, Alabama. As a result of its acquisitions, Wachovia has grown from 21,000 employees in 2000 to more than 95,000 today.

Although the company continues to work on integrating acquired operations, its CEO, Ken Thompson, told shareholders last year that the company's attention will shift to "an intense focus on human capital development, technology investments and infrastructure enhancements." This case study details just one example of the many technology investments that Wachovia is making.

As a large corporation, Wachovia runs multiple businesses, each of which makes significant investments in technology. Each Wachovia line of business—Wealth, Capital Management, Corporate Investment Banking, Retail and Commercial Loans—has its own CIO and information technology staff that develop and support applications specific to its business. The lines of business also have their own content repositories of various kinds, including both static and authored content, that are separate from the enterprise repositories shared across the entire company. As is common in the financial industry, the digitization of static content, such as signature cards, scanned checks, print streams of brokerage statements and millions of legal documents, plays a critical role in helping Wachovia service its customers as efficiently as possible.

Wachovia also has several information technology groups that operate at the corporate level under the direction of Jim Ditmore, the company's chief technology officer. One of those groups, the Enterprise Architecture and Technologies Group managed by Richard Mattox, researches and develops enterprise-level technologies that will benefit the entire organization. EA&T has several teams focused on different areas, such as security, Internet and intranet technologies, and research into emerging technologies. EA&T also includes a team of about 40 people devoted to Workflow and Imaging Technologies (WIT). Led by manager Kay Harris, WIT grew out of an advanced technology group that had been at First Union prior to the merger. It acts as both a consultant and a supplier of component technologies to the lines of business, providing expertise in analysis and software development related to imaging, content management and business process management.

Project Overview

Problem definition

As part of their merger, Wachovia and First Union examined all of their operations to identify issues and opportunities related to melding the organizations, systems, and processes. As part of that, several of the units identified a critical need for unified access to scanned documents housed in different repositories managed by different software technologies.

From a technical perspective, the merger raised a number of interesting challenges. Because both Wachovia and First Union had grown by acquisition, the new company had inherited different content repositories across business groups resulting in a heterogeneous mix of data formats, applications, and APIs. Unifying them would be expensive and time-consuming. It wasn't practical, from either cost or time perspectives, to rip out all of the legacy applications at once. Recognizing that integration with multiple, diverse content repositories would be an on-going challenge for many business units, the WIT group decided to investigate the feasibility of an enterprise approach to content integration.

As a services organization, WIT has a limited budget for building infrastructure that is not tied to a line-of-business project. Rather than building an infrastructure first and then trying to sell it, WIT took a bottom-up approach. It would prove the strategy by implementing pieces of the architecture for specific line-of-business projects and then build on those pieces for future projects that would establish the enterprise infrastructure one piece at a time. The first three projects, outlined below, were for different lines of business, but all three shared a common problem: the need to unify content stored in different repositories. They illustrate the progressive steps WIT has taken toward implementing its enterprise content integration (ECI) strategy.

Retail Loans

Within the retail loan operations unit of the General Banking division, the merger meant that a new group of users (working in former First Union offices) would need access to Wachovia legal documents, which were housed in an IBM ImagePlus repository. Likewise, the staff servicing retail loans at Wachovia needed access to First Union documents, which were housed in FileNet. The merged business unit selected FileNet as the platform for moving forward. In order to deploy a single desktop application to the loan-servicing workforce, the technical team considered several options:

- *Conversion.* Move 20 million documents from ImagePlus to FileNet so that all of the documents would be in the same repository.
- *Partial conversion.* Move the indexes from ImagePlus to FileNet, but leave the images on ImagePlus and access them by interfacing the FileNet viewer with ImagePlus.
- *Point-to-point integrations.* Develop a desktop application that had direct, point-to-point connections to both FileNet and ImagePlus.
- *Integrate through ECI.* Develop a middleware layer that would present a single API for accessing FileNet and ImagePlus, and develop the desktop application by writing to that API.

In the past, the conventional approach to joining these separate repositories would have been to convert and migrate data from one system to another. In this case, the cost of conversion was prohibitive (upwards of $1.5 million), and, even more important, the proposed timeline (6 months) was too short to successfully pull off such a large conversion.

WIT took a hybrid approach. It decided to leave the images in ImagePlus but to migrate the ImagePlus indexes over to FileNet, which would enable a single application to manage security

for accessing the documents. Rather than write a point-to-point integration with ImagePlus for viewing the actual images, WIT interfaced the two systems to a single API, using IBM DB2 Information Integrator Content Edition.[*] That product included a prebuilt bridge to FileNet that was available out of the box; Wachovia built a simple bridge (retrieve and view) to ImagePlus. Even though it had to write its own ImagePlus bridge, that cost was less than a fourth of what Retail Loans would have spent to convert the data to FileNet.

Randy Wilcox, the WIT enterprise content management architect who served as project leader, explained the justification for writing their own bridge to ImagePlus. "It was clear that ImagePlus was not going away. We had other business units that used ImagePlus. If we could build a reusable bridge to ImagePlus, then other groups would be able to leverage that bridge if they wanted to provide unified access to documents housed in both ImagePlus and other repositories."

In its first implementation, WIT introduced the technology at the line-of-business level. The content-integration server was deployed as part of a complete application that was owned and operated by the Retail Banking unit.

Commercial Loans

WIT didn't have to wait long to discover that it was right. The commercial loan arm of the same Wachovia division had a similar need to consolidate and unify its document repositories. In the wake of the merger, Wachovia realized that it had four different filing centers, each of which housed 50,000 to 60,000 legal documents, and no easy, integrated way for more than 3,000 staff who are involved in servicing loans to view all of these files.

Challenges

Wachovia faced a number of obstacles that had to be overcome if it was to successfully merge both the content and its loan-servicing staff. Julia Condrey, Imaging Project Manager for Commercial Loan Services, characterized the challenges:

- *The file rooms were full.* First Union's commercial loan records were stored only in paper, which meant that any time personnel servicing a loan needed to see one of the documents associated with the loan, they would have to request that the original or a copy be sent to them from the file room. The file room was running out of space, and expanding the physical facility was prohibitively expensive. Unless they were digitized, some of the oldest records would have to be purged in order to make room for new ones.

- *The staff was already operating at capacity.* The size of the file-room staffs was appropriate to pre-merger levels of activity. Post-merger, each of the file rooms would be receiving many more requests. Unless service agents in the field were given a way to retrieve scanned images of the documents themselves, the file room would have to add more staff in order to maintain the same level of responsiveness.

- *Remote access to physical files was slower and higher risk than digital access.* Prior to the merger, many of the loan documents were stored on the same campus as the loan-servicing personnel. Post-merger, many of the staff who needed access to these documents were not on the same campus. Depending on whether the file room was on

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* At the time of this implementation, IBM DB2 II Content Edition was known as VeniceBridge. For further detail about IBM's acquisition of Venetica and its technology, see the Supplier Perspective on page 20.

site, the document would take a few hours to more than a day to arrive. During that time, not only was the customer not being served, but the company was at risk because the physical document was loose within the bank, rather than secured in the file room.

- *Desktop application needed upgrading.* Prior to the merger, the former Wachovia Corporation had digitized many of its loan documents, but only some of the staff had software to search and view the files. Those who did complained that the imaging application, built on top of IBM's ImagePlus, was slow and limited in its functionality. In particular, the imaging application did not show the relationship between multiple obligations of a single loan. Users had to search the accounting system to find the multiple obligation numbers for a single loan, and then run separate queries on the imaging system for each of those obligations in order to retrieve the scanned documents to their desktops. What the end users wanted was a single system that would enable them to quickly find and retrieve all of the documents associated with a single customer, and to see within one account the relationship among the different loan obligations. To do this without reengineering the ImagePlus database meant that the new application would have to interface in real time to both the accounting system and ImagePlus. The best way to integrate these two systems was via a Web application, but ImagePlus did not support a Web client.

- *IT wanted a Web client.* At the same time, the IT group for the commercial loan division had begun an initiative to migrate many of its desktop applications from thick-client Windows applications to thin-client browser applications. This pressure to migrate to Web applications dovetailed with the specific project requirement to separate ImagePlus from its desktop client.

In short, what Wachovia needed was a unified image repository and companion desktop application that would enable the staff in the field to access the legal documents themselves. Without such a self-service system, Wachovia would have to hire more staff in order to handle the anticipated increase in document requests.

Options and Issues

The business justification for the new system was made on the basis of scanning the paper loan documents into digital images and consolidating the number of file-room facilities from four down to one. Because Wachovia already had a system for some of its loan documents, the conventional approach would have been one of two choices:

- Scan and load the First Union documents onto the Wachovia ImagePlus platform and build a new web front end to ImagePlus; or
- Scan and load the First Union documents onto a new platform and build a point-to-point integration to the Wachovia ImagePlus database, so that the combined staffs could use a single application to see both repositories.

There were issues with both of these options:

- Wachovia plans to retire ImagePlus in favor of IBM's newer technology, DB2 Content Manager. If Wachovia built the loan-serving application to ImagePlus, it would be building a large, mission-critical application on top of a technology that is nearing the end of its life cycle.
- ImagePlus did not provide all of the searching capabilities that the end users wanted.
- ImagePlus did not have a Web client.
- The project was on a tight schedule; implementing a new back-end repository would delay implementation considerably.

- WIT anticipated that other repositories might have to be integrated in the future. For example, it expected that in the future it might be desirable to integrate with FileNet repositories because of the overlap between commercial and retail loan servicing. If Wachovia built the new application specifically for ImagePlus, then later it would be expensive and disruptive to modify the application in order to connect it to other repositories.

WIT proposed using DB2 II Content Edition to separate ImagePlus from the desktop client. That approach would make it easier not only to integrate the accounting system but also, should the need arise in the future, to plug the desktop application into other back-end repositories. As Kay Harris explained, "We knew we already had two imaging systems and that we might have others in the future. The Commercial Loan division wanted the integration capability right away, but we could see that other business units would want it as well. It didn't make sense to build it five or six times if we could build it once in a way that other groups could leverage."

Commercial Loans agreed to fund the initial enterprise implementation of the content-integration technology. In Wachovia's case, "enterprise implementation" meant that WIT would take ownership and responsibility for operating and maintaining the content-integration technology, but that the business unit would be charged for its construction and on-going use. In return for giving up some control, the business unit would receive a financial benefit: as other groups make use of the infrastructure that Commercial Loans paid for, Wachovia will spread the service charge across all users, thereby lowering the amount that Commercial Loans pays to "rent" the technology for its own purposes.

> *"It didn't make sense to build [the integration] five or six times if we could build it once in a way that other groups could leverage." –Kay Harris*

As part of the initial enterprise implementation, Wachovia took an additional step of abstracting the DB2 II Content Edition API to a Wachovia XML interface running on separate hardware that provided load-balancing of the queries. This new Wachovia layer further insulates the front-end application developers from the particular APIs operating underneath. Wilcox explained: "If we wanted to, at some point we could not only swap out a repository but also swap out VeniceBridge [DB2 II Content Edition] without bringing down all of the front-end applications developed by the business units." This Wachovia interface layer was named Content Access Services, or CAS (pronounced "kazz").

Retail Brokerage

In 2002–2003, following its acquisition of the retail brokerage business from Prudential Securities, Wachovia developed a new "broker desktop" to be used by all of its retail brokers and front-office personnel. The application, called SmartStation, is based on a financial services package from Thomson Financial that provides real-time access to financial markets. As part of that application, Wachovia wanted the brokers and their assistants to have desktop access to client documentation, such as trade receipts, tax statements and the monthly account statements that get mailed to brokerage customers. Many of the legal documents were stored in ImagePlus. The monthly statements, however, are created in AFP, a format specific to high-speed IBM printers, and stored in a repository managed by software from Mobius. The brokerage IT team came to WIT looking for assistance in connecting the new brokerage desktop to both the ImagePlus and Mobius repositories.

Once again, WIT faced a situation where it could develop a point-to-point integration from the brokerage desktop application to ImagePlus and Mobius, or it could take a content-integration middleware approach, interfacing the brokerage desktop to the newly created CAS middleware. WIT already had a bridge to ImagePlus that could be reused by the brokerage application. If it took the middleware route, it would also need a bridge from CAS to Mobius. When Mobius

declined to help build this bridge, WIT decided to build it, because it knew that the brokers would not be the only people in the company who would want to be able to access customer statements. Once the bridge was built, other IT organizations could easily plug into the Mobius repository by writing to the CAS middleware, and those departments would help bear the cost of maintaining the bridge that Brokerage had paid to have built. Indeed, in just the few months since the Mobius bridge has been deployed, WIT has been asked by five other IT organizations for assistance in reusing that component.

Criteria for success

Recognizing the common thread across all of the projects, WIT sensed that it needed to find a way to pull information in a seamless way from a variety of sources without affecting back-end operations and systems. Yet each project that WIT undertakes for a line-of-business client has its own success criteria and ROI analyses that are tied to the business unit's objectives and performance. For WIT's enterprise content integration strategy to be successful among its line-of-business clients, WIT had to show that content integration was cost effective and achieved an acceptable level of performance in each implementation. Further, for the strategy to succeed at the enterprise level, WIT had to show that it was effective across multiple back-end repositories in multiple front-end contexts.

In short, the ECI technology had to:

1. Meet the immediate needs of the line of business;
2. Allow flexibility in how ECI was deployed;
3. Allow line-of-business projects to fund development of reusable enterprise components and infrastructure; and
4. Result in components that were reused in subsequent projects.

WIT took a step-at-a-time approach to testing its strategy:

- *Retail loans.* The first project would test the viability of the ECI strategy and the selected technology in the context of a single business unit.
- *Commercial loans.* The second project would test whether the ECI technology could be cost-justified as an enterprise implementation within the budget of a line-of-business application. It would test whether ECI scaled and whether a single vendor's solution could be abstracted into a Wachovia API.
- *Retail brokerage.* The third application further tested the utility of the ECI interface for developers and also whether the ECI platform was sufficiently robust to handle connections to other back-end repositories.

At the business-unit level, for each of these projects, success would be measured several ways:

- Was it cost-effective compared to other alternatives?
- Did it save time in development?
- Did it provide acceptable performance?

At the same time that success would be measured by individual business-units, WIT would also judge the technology's effectiveness at the enterprise level. Looking across all three of these applications, criteria for success included:

- Improve time to market
  - More rapid development of new applications
  - Reuse content bridges rather than building new point-to-point integrations
  - Enable access to content without migrating data

- o Shorten the time it takes to integrate content systems following a merger or acquisition
- Cut development costs
  - o Remove need for every business unit to learn APIs of back-end repositories
  - o Reduce cost of integrating content repositories acquired through mergers
- Improve business efficiencies
  - o Enable integration of many content sources with new desktop applications and workflow
- Improve organizational flexibility
  - o Allow back-end repositories to be upgraded or replaced without disrupting users' desktops
- Improve customer service
  - o Provide Wachovia service agents with immediate seamless access to customer documents stored in a variety of places and systems
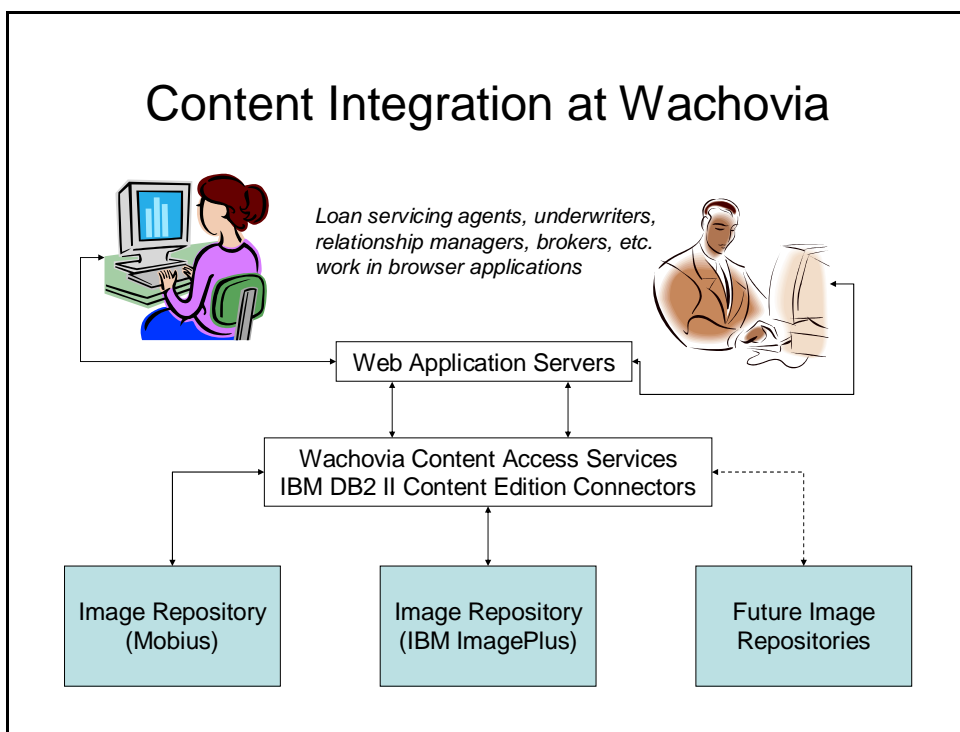
The bottom line for success would be increasingly rapid launches of new content-enabled applications. At the desktop, these applications should combine multiple sources of content into a single user interface that shields both developers and end users from the specific location and software of the underlying content repositories.

Solution Components

Product components and architecture

The result of WIT's efforts over the course of several projects is a still-evolving layer of software that insulates line-of-business applications from the back-end repositories that house the digital documents. Wachovia has labeled this layer of middleware Content Access Services (CAS). Written in vendor-neutral XML, CAS creates a single interface that developers use to invoke common desktop functions related to accessing scanned documents (search, display, print, store, save, etc.). Underneath, CAS relies on IBM DB2 II Content Edition to make direct connections to specific repositories.
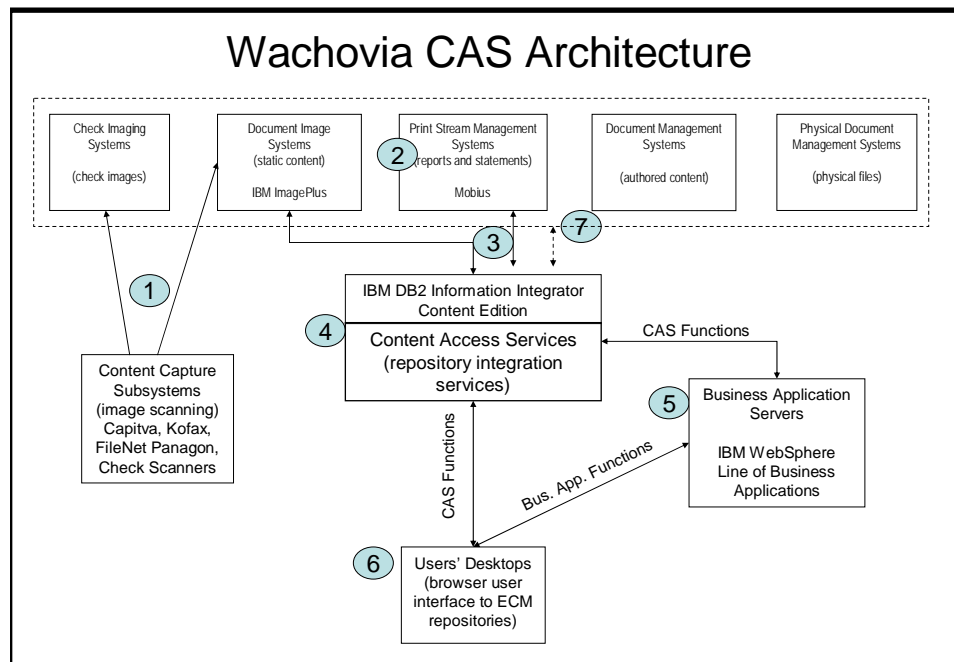
Figure 1 shows a high-level view of the software architecture.

Content Integration at Wachovia

Loan servicing agents, underwriters, relationship managers, brokers, etc. work in browser applications

Web Application Servers

Wachovia Content Access Services
IBM DB2 II Content Edition Connectors

| Image Repository (Mobius) | Image Repository (IBM ImagePlus) | Future Image Repositories |

Figure 1. Overview of initial Wachovia enterprise implementations of enterprise content integration (Wachovia "Content Access Services"). The desktop application, running in a browser, makes the request of the IBM WebSphere application server, which queries CAS (running on WebSphere). CAS filters the request for DB2 II Content Edition and balances the load of queries across multiple machines. DB2 II Content Edition (also running on WebSphere but on different machines) maintains the connections with the repositories, distributing queries and returning resulting hit lists or requested files. The complete solution stack is a combination of commercial off-the-shelf software (WebSphere and DB2 II Content Edition), integration code and custom application development (such as Wachovia-developed connectors and desktop web applications). The complete infrastructure of CAS is offered as a managed service by WIT to internal Wachovia line of business customers. Individual business units and IT groups handle development of the front-end clients that users see on their desktops.

The Commercial Loans application described earlier in this case study was the first implementation of Wachovia CAS at an enterprise level. It utilized the ImagePlus bridge that WIT had previously built for Retail Loans. In its second implementation, which served Wachovia Securities' brokerage business, WIT extended CAS by adding an additional bridge to the Mobius system that manages the monthly statements that Wachovia prints and mails to its customers. With this connection, front-office personnel can access customer documents as Acrobat PDFs, which can be viewed on-screen, printed or fax or emailed to customers.

In the future, WIT anticipates extending the CAS infrastructure with new functions and bridges to other repositories (see Figure 2).

Wachovia CAS Architecture

| Check Imaging Systems (check images) | Document Image Systems (static content) IBM ImagePlus | Print Stream Management Systems (reports and statements) Mobius | Document Management Systems (authored content) | Physical Document Management Systems (physical files) |

Content Capture Subsystems (image scanning) Capitva, Kofax, FileNet Panagon, Check Scanners

IBM DB2 Information Integrator Content Edition
Content Access Services (repository integration services)

CAS Functions

Business Application Servers
IBM WebSphere Line of Business Applications

Bus. App. Functions

Users' Desktops (browser user interface to ECM repositories)

Figure 2: CAS software architecture. *(1) Business units scan documents and load them into ImagePlus image repositories. (Other products, such as FileNet are also used but are not yet connected to CAS.) (2) Customer statements are stored as AFP print steams and managed in a Mobius system. (3) Bridges connect the different image repositories to IBM DB2 Information Integrator Content Edition. (4) Wachovia's Content Access Services (CAS) abstracts the vendor API into a Wachovia XML interface. (5) Line of business developers write their applications to the Wachovia CAS interface. (6) From their desktops, users get access to legal documents and account statements from within their browser-based application. Users are shielded from the specifics of different repositories and different back-end systems by the CAS infrastructure. (7) In the future, as additional bridges are brought online, CAS will provide a unified gateway to a variety of Wachovia image- and content-management systems.*

Project timeline summary

Jan.–Mar. 2001:	Needs analysis conducted: opportunity for Content-Integration technology identified (retail banking workflow application)
Mar. 2001:	Venetica selected as ECI Vendor (retail banking workflow application)
Jun. 2001:	Retail banking workflow application goes into production
Sept. 2001:	Wachovia and First Union consummate their merger
Jan. – Mar. 2003	Needs analysis conducted; opportunity for content-integration technology identified in retail loan operations
Jan.– Mar. 2003:	Funding obtained for Enterprise Content Access Services (first enterprise implementation of DB2 II Content Edition infrastructure)
Mar.– Jun. 2003:	Retail content-integration infrastructure enhanced with ImagePlus Bridge (following First Union–Wachovia merger)
Jun. 2003:	ImagePlus Bridge goes into production for retail loan application within General Banking division
Jun.– Dec. 2003:	CAS infrastructure implemented
Jun. 2003–Mar. 2004:	WIT and Commercial Loans business unit develop CAIRO application exploiting CAS infrastructure
Apr. 2004:	CAIRO goes into production
Jul. 2003:	Wachovia consummates acquisition of Prudential Securities
Jan.– Jul. 2004	Wachovia Securities and WIT jointly develop broker desktop application exploiting CAS Infrastructure following merger of Prudential and Wachovia brokerage businesses
Jul. 2004:	Brokerage desktop application goes live in production

Organizational changes

Wachovia's CAS represents a creative response to a familiar challenge facing many large organizations, especially those that acquire or merge with other businesses: namely, what is the best way for a corporate parent to leverage the content that already exists in multiple systems without completely roiling the daily operations of the departments running existing systems? A second challenge in implementing content integration as an enterprise resource lies in striking the right balance of ownership and control between corporate and business-unit technical teams.

Impact on business units

One of the strengths of enterprise content-integration technologies is that they enable IT groups to add functionality across the enterprise without necessarily disrupting the processes of the business unit that owns the source content. If enterprise content integration is done right, it not only makes both the developer and the end user blind to where data is housed but also does not require the department that creates and manages the content to be aware that other departments are pulling that information for their own purposes. In Wachovia's case, for example, its loan servicing agents and securities brokers can now retrieve legal documents pertaining to their clients without directly involving the department that scans and stores the documents. In some cases, like the Commercial Loan example above, content integration at the end-user desktop may be accompanied by changes in back-end systems and processes. But the ability to "leave well enough alone" is a key selling point of CAS—and enterprise content integration in general.

It enables the corporation to leverage content without requiring it to simultaneously reengineer the operation of the business unit that owns the repository.

Shifting control from the local to enterprise level
Two reasons that WIT has been successful are:

- It has been flexible in how it has deployed the technology; and
- It has approached the business units as a service partner, rather than foisting technology on those who aren't ready for it.

When any enterprise group suggests running a key part of an application that a business unit traditionally owns, it's not unusual for there to be squabbles over who owns it afterward. In its first implementation, WIT acquiesced to the business unit's demand that Retail Loans be allowed to keep ownership of its technology. This arrangement meant that the technology would not be directly shared by other departments. However, it enabled WIT to test the technology in a live production application, and it resulted in reusable code. WIT kept the long-term vision in mind but didn't insist on implementing its grand plan, when it had a customer willing to fund a first step on its own terms.

In the second stage, knowing that not all business units would want or be able to afford the responsibility of running this technology themselves, WIT created a financial incentive that rewards all of the business units for participating in enterprise deployments. WIT asks units that fund projects to base their ROI projections on the assumption that they will own the result. But if WIT builds part of the solution as infrastructure and rents it out, then when other customers reuse the same platform they pick up part of the original tab. The fees charged to other groups enable WIT to reduce the charge-back to the original funding group, which further improves that group's ROI and frees budgeted money that they can then apply to other projects. In effect, the financial incentive rewards the business unit that gives up control by giving them back a portion of the savings that the corporation realized from transferring the technology to the enterprise level.

Harris admits that giving up that control is an adjustment for some of the business units. A typical concern is that if the system goes down or performance suffers, the enterprise team will not be sufficiently responsive, and business unit IT staff may be blamed for problems they can no longer fix themselves. Recognizing those concerns, WIT has worked hard to make sure that its first reference installations have gone well. It has downplayed evangelical pitches and let the results of CAS projects speak for themselves. "What we've found is that once we put it in place and people can see that it's working, they begin to ask how can they get on board," Harris observed. Looking ahead, she plans to build an even better support structure, so that her staff can help more people within Wachovia become comfortable using CAS.

Best practices
CAS is an example of enterprise content integration specific to Wachovia, but some of the lessons that it has learned apply to any business facing implementation of this type of technology. The WIT group's approach to partnering as a service provider to individual business units is one example of a best practice that other firms can emulate. Wachovia identified several other ingredients that helped ensure its success:

1. **Pay as you go.** WIT did not build a complete infrastructure with corporate funding in the hope of adoption and payback down the road. Instead, it is building the infrastructure incrementally, with each piece showing a positive ROI for the business unit that funded it. Thus, even if the company decides to change course, the pieces that have been built have already paid for themselves. This ensures that Wachovia is not

left with a large corporate investment that turns into a dead end. On the upside, if Wachovia continues to leverage the CAS infrastructure as it intends, both the corporation and its individual business units will reap additional dividends as more departments take advantage of the technology. The financial discipline that WIT exhibited in implementing enterprise infrastructure within the company is consistent with Wachovia's public commitment to be a trusted steward of its customer's financial assets and investments.

2. **Make use of commercial technology.** Content integration is a relatively new type of technology, but the use of commercial products from suppliers like IBM can reduce costs and significantly speed deployment. Without a vendor that supplied underlying connections to multiple repositories, Wachovia would have had to build all of these connections itself. The project would have taken longer, cost more, and at the end of the process Wachovia would not have had a middleware layer that will be enhanced by a vendor committed to maintaining its bridges to popular commercial products.

3. **Adapt base technology to your needs.** Wachovia made use of an off-the-shelf product, but it didn't let the fact that it didn't find one product that met all of its requirements stand in the way of success. In Wachovia's case, it abstracted the vendor's API to a Wachovia XML interface in order to improve performance and to further insulate itself from the risks associated with selecting a small software developer. (IBM has since acquired Venetica, so the market has since mitigated that particular risk.) Wachovia made sure that the base technology would accommodate Wachovia-specific extensions, and then it built its own bridges to legacy applications that its suppliers were unwilling to write themselves.

4. **Work incrementally toward the final vision.** A fourth success factor was Wachovia's willingness to build its ECI framework incrementally rather than all at once. That has enabled it to become intimately familiar with the core technology (in this case DB2 II Content Edition), to understand and test its strengths and limitations, and to apply that knowledge at each stage of the ECI framework's evolution.

Results

CAS makes a variety of critical documents much more accessible throughout the corporation. For example, before CAS, Wachovia needed specific client software to query and retrieve scanned images of legal documents or client statements. With CAS, query and retrieval can take place in a web browser application that is integrated with a user's primary business application. As before, individual departments still keep responsibility for loading and maintaining their documents. The difference now is that other departments can view the documents as well, which improves the speed with which Wachovia can provide service to its customers.

The success of Wachovia's enterprise-content-integration strategy was proven first within individual lines of business, but now that it is being carried out at the enterprise level the company is seeing even better returns for its initial investments.

The difference that wider access makes at Wachovia can be seen in these areas:

- Financial ROI
- User acceptance
- Performance
- Time to market
- Organizational flexibility
- Organizational leverage

Financial ROI

At Wachovia, the financial results of its enterprise content-integration strategy have been impressive. The total investment in CAS to date, including the labor costs of writing the bridges, has been about $1.4 million. Within that two-year span, CAS has saved Wachovia $2.3 million, a 64% return. In the two cases where CAS has been deployed, the individual business units found that CAS was cheaper than alternative solutions yet was still able to meet performance and functionality targets.

Now that Wachovia has laid the groundwork, though, the payback going forward will be even more substantial. The WIT group conservatively estimates that CAS will save about $1 million for each new WIT customer (*i.e.*, technology department within a line of business) that takes advantage of the service.

User acceptance

For the commercial loan application, user adoption of the self-service query and retrieval tool, called CAIRO, has been dramatic. Since going live in January 2004, requests served through CAIRO have averaged over 140,000 documents viewed per month—more than 50 times the average volume of requests for physical documents last year. During the same time (the first 9 months of 2004), the volume of requests to the file room for retrieval of physical documents has been cut in half and continues to shrink. "Our number one measurement is based on customer satisfaction," said Julia Condrey, Imaging Project Manager. "Our experience so far is that [Wachovia loan servicing staff] are using it; they are happy with it; and they are no longer complaining that it takes them too long. Our group has been extremely satisfied; the project went 100 percent better than we expected," Condrey said.

The adoption by end users of key CAS-enabled applications is one measure of acceptance, but equally important is the adoption rate among IT staff of the Wachovia business units. This, too, has been quite positive. Since putting CAS up live in March 2004, WIT has fielded more than a dozen inquiries about reusing the three bridges that it has in place, and has already signed up four customers for future projects.

Performance

The commercial banking arm of Wachovia has 3,000 to 4,000 registered staffers authorized to access 20 million documents. CAIRO serves up 6,000 –7,000 images a day. "The CAS/CAIRO combination was much more robust compared to vendor-specific solutions," said Matt Bach, a vice president of technology solutions in the Commercial Loans division. "Because it was web-based, it was also easier to deploy," he added.

For the Wachovia Securities implementation, CAS is handling over 40,000 transactions and about 100,000 page images a day, but it is built to accommodate a peak load of about 20,000 transactions an hour. In response to queries for brokerage statements, it is generating PDF images on the fly from the AFP-formatted print files, and returning 15-page documents, on average, in under 7 seconds. ImagePlus documents, which are typically shorter but also get converted to PDF on the fly, get served up in less than half that time, on average. The response times are similar to what Wachovia and Prudential brokers had under their previous systems, but now they get seamless access to documents that originated in the other half of the business. In addition, the brokerage IT team is now in a position to leverage future CAS connections, such as access to check images.

Time to market

In its first content-integration implementation, Wachovia's WIT team saved several months compared to a data conversion and even beat by a month the aggressive schedule of a project that was on the critical path of the Wachovia–First Union merger. In the second implementation, the first for CAS, the ability to reuse the first ImagePlus connector saved several weeks. Yet the significant time-to-market advantages are still to come. As Wachovia completes its back-end connectors, the time it takes to connect new front-end applications to back-end repositories should fall sharply. The payback is obvious during a merger, but Wilcox believes it will have a much longer-lasting impact: "I see a lot more benefit from being able to provide access to all of our repositories from a common interface without having to learn specific APIs of the repositories. With CAS, we can develop applications more rapidly and bring them to market faster."

Organizational flexibility

By separating the back-end repositories from the front-end clients, CAS gives Wachovia considerable flexibility:

- It can add new capabilities to users' desktops, such as integrating scanned images into workflow, without necessarily changing back-end content systems.
- It can potentially swap out back-end systems without replacing front-end web applications. It could also bring up a new repository alongside the old one, and run both side by side until the old one is retired. As it moves forward with replacing ImagePlus with DB2 Content Manager, Wachovia will very likely exercise that flexibility in the near future. It now has the flexibility to minimize the disruptiveness of replacing older repositories, and it no longer feels pressured to load all content into one type of system in order to simplify programming for application developers.
- It can add new back-end repositories to existing front-end applications. For example, this fall Commercial Loans is considering an integration with FileNet, which is used by SouthTrust.

Kay Harris summed it up: "CAS buys us the potential for growth. We can hook up other back-end systems and still give developers a single method of accessing multiple content repositories. That means that we in IT [information technology] don't have to worry about technology dictating how we upgrade our front-end applications."

Enterprise leverage

By bringing the weight of the larger enterprise to bear on line-of-business activity, CAS also makes possible projects that would not otherwise be economically feasible. For example, its VISA Disputes group has to have access to both Mobius and ImagePlus repositories in order to see customer statements and records. The Mobius and ImagePlus applications run in their own windows on the desktop and are not integrated with the workflow solution used by the VISA Disputes team. The team would like to integrate the imaging applications with their workflow, and shed the nuisance and expense of running two additional applications on the desktop. Unfortunately, they are a small group of just 20 people. "They don't have the money or the ROI to build this themselves," Wilcox pointed out. "But now that we have these bridges already built, it's cost-effective for them to tackle a project that they would never have been able to do before."

A Supplier's View: IBM Shares Its Perspective

With most content initiatives managed at the departmental level, it is common for companies to have multiple instances of content repositories as well as repositories from multiple vendors. In fact, industry analysts indicate that over 75% of customers are managing their unstructured content in more than one repository and some 25% manage more than 15 repositories. Such fragmentation has implications for customer service, compliance and overall business efficiency.

This problem becomes even more acute in the context of mergers and acquisitions (M&A). Like most companies that look to M&A as part of their growth strategy, Wachovia's merger with First Union created a disparate mix of content repositories. This meant that customer invoices, statements, trade receipts, check images, and other documents were scattered across multiple systems and couldn't be accessed or acted on in any sort of complete or unified way; this had real implications for customer service, and processes associated with lending and brokerage operations.

Venetica's VeniceBridge platform, renamed IBM DB2 Information Integrator Content Edition following IBM's October 2004 acquisition of Venetica, provided the means to create a single bidirectional interface to all of these disparate content repositories within various departments across both organizations. As this platform is being rolled out, it is providing key customer service, brokerage and various workflow applications with a single point of access to key customer- and process-related content regardless of where the information is physically stored and managed. And, because acquisitions are generally a strategy rather than an isolated event, IBM DB2 Information Integrator Content Edition also gives Wachovia an "acquisition-ready" platform for future-proofing key applications and enabling newly inherited content sources to be quickly brought online with the next merger or acquisition without disrupting business processes.

IBM's recent acquisition of Venetica was in response to the growing need to gain access and control over the sea of content assets distributed across the enterprise. But the acquisition also enriches and extends IBM's broader portfolio of enterprise information integration offerings, which provides the industry's most complete middleware platform for federating access to all classes of distributed information—from transactional data to unstructured content—as part of a common data model.

Wachovia has witnessed significant business gains by integrating its distributed content assets across the enterprise, including a significant return on investment and impressive gains associated with process improvement, time to market and the overall flexibility and nimbleness of its content infrastructure.

Moving forward, companies like Wachovia will see opportunities for even more dramatic business impact as they look beyond their content infrastructure. Using IBM Information Integration software, companies will see the lines between the domains of content and data blur as powerful new ways for working with the combined lens of structured and unstructured information emerge.

Conclusions

Enterprise content integration (ECI) is still emerging as a distinct class of content technology, so it is perhaps too early to draw from individual cases firm conclusions about best practices that apply regardless of industry or type of content. Even so, the impetus that gave rise to ECI—the proliferation of digital content repositories—has not abated and shows no sign of easing in the future. Within large corporations it is nearly impossible, and seldom practical, to try to bring all types of content under the umbrella of a single system.

In the tug-of-war between selection of best-of-breed software versus vendor rationalization, ECI does not preclude reducing your set of vendors to a preferred one or two, but it clearly encourages a best-of-breed approach that enables each business unit to select repository technologies most appropriate to their data and their processes without compromising the organization's ability to access that content for use in other contexts. Philosophically, ECI proponents believe that the glue can be just as important as what is being bound together. If your own organization foresees innumerable content-integration projects in its future, then ECI is a strategy and class of technologies worth exploring.

ECI for mergers and acquisitions

The challenges of vendor rationalization are exacerbated by mergers and acquisitions. The mandate to quickly integrate and consolidate inevitably sparks debate and in some cases political battles over which legacy technologies to keep and which to abandon. Wachovia's case illustrates the time-to-market advantage than an ECI strategy can bring to bear following a merger or acquisition. Utilizing ECI technology, Wachovia was able to unify several back-end systems to coincide with the integration of staffs that followed the mergers with First Union and Prudential Securities. It is now in a position to leverage that infrastructure for future acquisitions; for example, this fall Wachovia expects to consummate its merger with SouthTrust Corporation, which will begin a 15-month integration effort. As the Venetica project manager observed, "This technology makes Wachovia acquisition ready."

ECI for managing on-going technology change

Wachovia's example also makes a sound business case for employing ECI as a strategy for managing technology evolution and change in the course of running everyday business operations. Regardless of the industry that an organization represents, ECI can produce tangible benefits. Among them:

- Extend the life of and extract additional value out of legacy applications;
- Reduce risks associated with new investments in content-management systems;
- Provide access to departmental content to other functional groups within the company;
- Make it easier and more cost-effective to integrate digital content into business processes;
- Create flexibility in application development by separating back-end repositories from front-end user interfaces;
- Lower dependencies on point-to-point integrations that add complexity and cost to upgrading systems over time; and
- Reduce the need for technical staff to carry specialized skills in vendor-specific APIs;

Wachovia's step-by-step approach to implementing ECI was motivated at first by a merger, but its champion, the WIT group, now sees the potential for even greater benefit to the corporation from utilizing the strategy and technology infrastructure on an on-going basis.

About Content Technology Works

Content Technology Works (CTW) is an industry initiative to develop and share content technology best practices and success stories. The premise is that when given enough proven models for success, enterprise consumers will be able to adapt and replicate that success for themselves—increasing productivity and confidence. CTW is administered by The Gilbane Report, a trusted source of high-quality information on content technologies.

CTW case studies are written by Gilbane analysts. Vendors do not approve content; final editorial control rests solely in the hands of the adopter. As a result, CTW case studies are free of marketing messages and vendor bias. They cover strategies for securing funding, measuring actual value, driving adoption and other business and organizational issues as well as technology.

Typically, the kind of valuable information included in CTW case studies is only available for purchase. CTW content is different because CTW partners subsidize the program to ensure that this information is free. Partners want to push as many best practices to as many organizations as possible with the expected result being an overall acceleration of content technology adoption. For more information on the CTW program, visit www.gilbane.com/technology_works.html.

Since the CTW program was first conceived in late 2003, we have sought out suppliers who were passionate about and committed to content technology as a game-changing force in the markets that they serve. Our CTW partners know that public, open and unfettered access to successful enterprise deployments, regardless of the technology mix, only benefit the commercial aspirations of organizations that offer material, dependable and predictable value. The Gilbane Report team wishes to thank these diverse and often competing organizations for their generous support and sponsorship of the development, promotion and distribution of CTW material. They are: Software AG (TECdax:SOW), Sun Microsystems (NASDAQ:SUNW), Artesia Technologies, an Open Text company (NASDAQ: OTEX), Atomz, Context Media, Convera (NASDAQ:CNVR), IBM (NYSE: IBM), ClearStory Systems (OTCBB: INCC), Trados, Vasont Systems, and Vignette (NASDAQ:VIGN).