Utilizing the Content Management Lifecycle to Create Effective Online Relationships

Considerations and Capabilities

White Paper
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Table of Contents

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Overview

At its core, information is required to enable two things: decision and action. Examine any business or organization process and you will observe that information is required to evaluate situations, plan direction, and execute action. And it follows that the more relevant, timely and precise the information — the more efficient and effective are the decisions and actions. This holds true for any action or process whether it be checking news headlines, receiving the latest product specs from a distributor, comparing catalog items, checking product availability or order status, or just searching for a quote. The relevance, speed and accessibility of information are directly related to its value in a decision/action process.

Given this, it is imperative for organizations seeking to compete (or possibly just survive) in an online economy to effectively manage, target and deliver relevant content to any constituents making decisions or taking actions. These constituents may be inside or outside the organization, employees, partners, suppliers, customers, or any party with direct or peripheral interests. Relevant information may exist in or be generated from a wide range of sources that may include (but not be limited to) content in applications, data, documents, business processes, graphics, photographs, scanned-in hardcopy, metadata, forms, workflow, binary files, multi-media files, e-mails, Web pages, ERP systems, inventory applications, human resource applications, customer relationship management systems, financial applications, and other data sources as well as the contents of databases and file systems that organizations create and maintain for use by employees, customers, partners, suppliers, prospective customers, and the general public.

The challenge becomes how to effectively and securely organize, categorize, manage, deliver, and present content so that content consumers see what they want, when and where they need it using the most effective presentation methods. In addition, since this non-trivial task is subject to content evolution and the changing needs of consumers, there must also be a systematic approach to continuous adaptation and refinement for keeping content current and relevant.

The Internet and Web technologies provide a unique medium that enables this advanced content management. Physical location, content format and accessibility are no longer limitations to the aggregation and viewing of information. The Web browser has become a universal client with users able to quickly and seamlessly access personalized and relevant content from various sources and locations.

Vignette is a pioneer of this technology and the leading provider of content management applications. Vignette applications and solutions are used by the most successful organizations in the world to interact online with customers, employees, suppliers and partners. By combining content management with integration and analysis applications, Vignette enables organizations to virtually deliver personalized information wherever it is needed, integrate online and enterprise systems and

provide real-time analysis of the content consumer experience. Vignette technologies enable content management that helps ensure relevant information will reach the right person, in the right place and at the right time.

This white paper outlines the issues that every organization should consider when evaluating a content management solution. The "content management lifecycle" is relevant to all information whether it be an online retail catalog item, a press article, a personnel directory, mainframe statistical data or any of thousands of other content elements that are combined in online applications. The first section of this paper outlines the collection, production, delivery and analysis elements of the content lifecycle and details the capabilities that should be considered in each of these phases.

The second section of this paper outlines required architectural considerations when analyzing a potential content management solution. Key factors are scalability, manageability, reliability, security, modularity, flexibility, ease of integration, distributed capabilities and openness.

The third section of this paper describes the technologies, solutions and components available from Vignette that address the content management lifecycle and create effective online relationships across organizational and physical boundaries and across all online initiatives for any organization.

A content management solution from Vignette will provide the following capabilities:

- Create content using standard desktop applications
- Aggregate content from virtually any source
- Streamline, simplify and automate the management of this content from "raw materials" to "finished goods" using intuitive interfaces and applications
- Re-purpose and personalize content for consumption by virtually any constituent, application or device
- Personalize content based on preferences or behavior for greater impact
- Deliver content to virtually any electronic touch point
- Analyze the use and effectiveness of content and provide dynamic recommendations
- Enable rapid modifications and enhancements based on observation and analysis

The benefits of a Vignette solution can provide significant and quantifiable value along the following lines:

- **Increased satisfaction** – faster, more relevant, satisfying and timely information can increase loyalty and efficiency and lower costs
- **Improved productivity** – with relevant and timely information, decisions and actions can be expedited
- **Competitive advantage** – superior content management enables superior service with increased customer focus, streamlined processes, and lower cost of business
- **Lower IT costs** – Vignette technologies help reduce management and integration costs, alleviate the need to replace legacy and disparate systems, and lower hardware costs through better scalability
- **Quality site development** – enable business managers, content creators and site administrators to create seamless workflow for rapid site creation and deployment while maintaining brand identity across all Web initiatives
- **Reduced training** – simplified content creation with existing applications and processes leverages current systems and expertise

According Meta Group, "By 2003 the ability to effectively leverage business critical content will become a recognized differentiator." Put more succinctly, organizations that ignore the benefits of content management will be at a disadvantage. Effective content management should be a major consideration for any organization seeking to expedite decisions and actions while providing a rich, content-relevant user experience.

Content Management Lifecycle

Content has a life — it originates, evolves, is consumed and often ages. Like many organic life forms, content requires the electronic equivalents of inception, growth, cultivation and consumption in order to be of value. Static Web content without the ability to update, inherit, evolve, be transmitted, or be consumed often becomes useless — in a short period of time. A quick sampling of the world's most highly trafficked Web sites will reveal vibrant, continuously evolving and relevant content. Whether content is today's top news story with consumers all over the world or the shipping status of a single package for a single customer, it exists through a lifecycle.

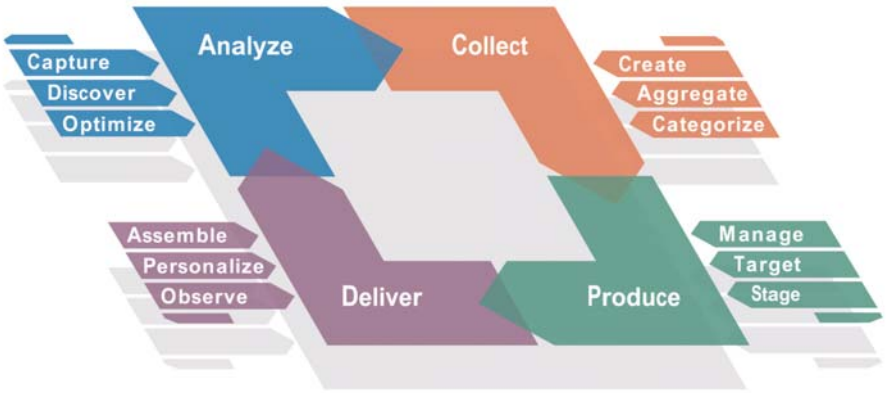
When analyzed in detail, the content management lifecycle consists of four general activity phases with various sub processes and activities contained in each. These four phases are: *collection, production, delivery* and *analysis*. Each phase includes several possible activities that pertain to the management, development and evolution of content. Vignette enables organizations to comprehensively and effectively manage enterprise content on a global scale through the entire content management lifecycle using a collection of applications, tools and components. These applications allow companies to manage all types of content, inside and outside the organization and to establish and enhance relationships with customers, suppliers, partners, employees and other interested constituents.

Although Vignette technology makes it possible to enter the content management lifecycle at any point and implement solutions, the following descriptions will examine each phase of the content management lifecycle beginning with content inception in the collection/creation phase.

Content Collection

Consider the sources of content that eventually end up on a Web page or Web-enabled device. The origination possibilities are vast with a short list including:

- Word processing documents
- Spreadsheets
- E-mail
- Database records
- News articles
- Audio files
- Video files
- Photographic images
- Animations
- Graphics
- Application output
- Applet/servlet output
- Query results
- Order status
- Online shopping components
- Directory information
- Personnel information
- Customer information



Content Management Lifecycle

- Manufacturing/processing information
- Inventory information
- Customer information
- Financial information
- Quantitative results
- Education/course work
- Much, much more…

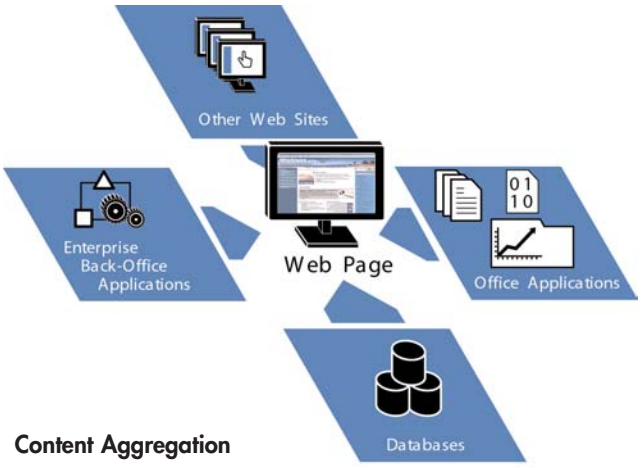
Content can consist of the many terabytes of existing Web sites, data, documents, business processes, graphics, photographs, scanned-in hardcopy, desktop application output, metadata, forms, workflow, binary files, multi-media files, e-mails, web pages, ERP system information, inventory data, human resource applications, customer relationship management systems, financial applications, and other data sources as well as the contents of databases and file systems, that organizations create for consumption by individuals, processes and applications. Although there are vast differences among content types, there are many similarities in the issues surrounding content creation and management.

The process of content collection can generally be organized by three activities: *creation, aggregation*, and *categorization*. *Creation* includes the initial process of originating content — usually through the writing or creation of documents or text or the resultant output of content from applications. *Aggregation* is the pulling together of content from multiple origination sources. In a personalized portal for example, content may be aggregated from a news site, a weather site, a financial stock site, and information pulled from an HR database, project database, or an online company document store. The *categorization* process consists of organizing content so it can be easily searched and personalized providing content consumers a more optimized and satisfying end-user experience. When assessing an organization's content collection needs and environment, the following issues should be considered.

Creation: How does content originate? Content often originates with desktop applications. People work in word processors, spreadsheets, and illustration, desktop publishing and photo image applications. The list of common content creation tools is long and familiar and should remain as part of any creation/management solution. Vignette allows users to create content using the tools and applications that are in place and established as part of a business production cycle.

A key consideration is determining in what structure or recognizable format the content exists. Common sources include desktop applications as well as output from existing mainframe or legacy applications, line of business applications for human resources, finance, customer relationship management, enterprise requirements planning and others. Content can also originate from other Web applications with news feeds, stock quotes, weather, as well as compiled content around topics or categories.

The challenge associated with content creation from disparate sources is in providing accurate conversion from the original format to a format that can be consumed correctly by the intended party or application. Vignette includes a comprehensive collection of "adapters" that accommodate origination formats from virtually any source. Vignette solutions also support eXtensible Markup Language (XML), an



Content Aggregation

open specification for the definition of data and content elements that enables a flexible conversion to any format. Vignette allows multiple disparate sources to leverage a common framework or conversion engine so that integration of content can be simplified and streamlined.

Integration and Aggregation: Where does content originate? Industry analysts have estimated that 80 percent of content needed by Web applications already exists either within the organization or with its partners. Given that methods are in place for generating and converting content, the question is, can it be integrated dynamically and cost effectively?

Integrating content to a central or monolithic data store for conversion is not always the preferred approach. Significant advantages are available with on-the-fly conversion from the direct content source to the display destination. Dynamic content sourcing provides flexibility when adapting to changing content and enables valuable intelligence about change events to be included for analysis or personalization.

Integration issues may also exist around geographical boundaries, organizational boundaries, security barriers and differing technical protocols. The infrastructure of the Internet eliminates physical separation as a restriction when integrating and aggregating content but bandwidth can be a limiting factor.

Organizational boundaries can also hinder the integration and aggregation of content. Firewalls may exist between organizations or there may be authentication or security procedures required before access to content can be granted. Vignette's content management solutions are based on standard protocols and include mechanisms for unattended authentication and access by individuals or authorized processes. Vignette supports Lightweight Directory Access Protocol (LDAP), MS Active Directory and database authentication for access authorization.

Information repositories and applications that generate content must also be capable of embedded intelligence so that resources are discoverable and able to interact with other resources or processes. Today's standards for service location and interaction are Simple Object Access Protocol (SOAP), Universal Discovery, Description and Integration (UDDI) and Web Services including Web Services Description Language (WSDL). These standards are focused on enabling resources and services to be located, integrated and interacted with — even with other services. Vignette supports these protocols and initiatives enabling solutions that are viable long term and integrate with other new services. The timing of the integration and aggregation is also a factor for consideration; Vignette supports real-time/on-demand/dynamic integration and aggregation as well as batch integration and aggregation on a periodic or scheduled basis.

And finally, content sources may often include other Web sites or Web applications. Information packets, articles, price quotes, process output, quantitative results — all may exist online with the requirement to integrate and aggregate them from multiple points across the Web. Vignette's comprehensive content management solution provides the ability to pull information and results from other online sources for redistribution and syndication.

Categorization: What is the "context" of the content? Categorization involves the organization or referencing of content in "context" — i.e. in reference to other data, information or resources — so that content has meaning. Multiple methods exist for categorization such as sort ordering, referencing, placing in a hierarchy or taxonomy, and assigning relevance or time attributes. Content may be categorized at its point of origin or the need may exist to categorize and classify content in conjunction with other integrated data. Regardless of data type or origin, Vignette allows content to be automatically categorized as part of a hierarchy or taxonomy, classified, or instrumented with intelligence so that immediately or at some future point it may be referenced in context.

Content found throughout an organization may exist at different levels of categorization spanning the spectrum from completely unsystematic to highly ordered. Many repositories are random collections of documents with only

file names or dates while others may be completely structured with descriptive attributes such as key words, taxonomies, and structure as well as creation dates, authors and authorized viewers. Content is often organized in relational databases or configured in hierarchical structures. The content structure may be unknown or it may be irrelevant to the desired content use. Vignette enables the categorization of information in hierarchies and taxonomies and the ability to instrument content with intelligence for advanced levels of classification and search. Vignette's solution adapts to disparate levels of existing categorization while providing a framework for structured access and use. It also provides for comprehensive search capabilities on virtually all types of data with standard Boolean logic and operators. Categorization is key to the ability to precisely target relevant content.

Vignette technology imposes categorization while preserving the integrity of the content source. Integration and consolidation can take place, re-purposing information for multiple audiences, while at the same time preserving the original data in its primary format.

Content Production

Rarely is content ever collected or generated in a format that is Web-ready for the intended target audience. Possible production processes include formatting, versioning, editing, approving, customizing, targeting, language localization, preparing for delivery, and testing or staging before deployment. Content production can include a series of automated processes as well as a sequence of manual interventions. The three phases of content production include managing, targeting and staging.

Manage: How is content produced? Content production involves taking created content and preparing it for its intended end use. In simplest terms, it is taking the raw content materials and submitting them to one or more finishing or presentation processes before distribution and delivery. Vignette enables the following list of content production processes and more.

- Workflow capabilities for the creation, preview, editing, approval and expiration of content
- Support for using traditional content authoring tools such as Microsoft Office and Adobe
- Support all common presentation formats including multiple image types, animations, audio, and video
- Enable content to be versioned for security, accountability, rollback and error correction
- Centralize management for multiple sites maintaining branding and commonality

The production management of content must also take into account the reality that most organizations have more — often many more — than one Web site. Consistent branding and navigation patterns as well as common look and feel must be maintained across multiple sites that often span global audiences in multiple languages. Vignette provides tools and a flexible architecture that leverages centralized corporate sites for global reach.

The process of content management also involves the storage, archival and even the discarding of content as it progresses through the content management lifecycle. Vignette integrates with established databases, XML-based repositories, backup systems, and archival storage to help ensure that relevant content continues to live and is protected while expired content is discarded. "Aging" of content is also accommodated with access or delivery options changing over time. A news article for example, automatically moves from a "headlines" to "archives" category as it ages.

Target: How does the right content reach the right person? The concept of targeted content is simple — it necessitates getting the right information to the right individual at the right time through the right channel. Implementing this concept however, can be complex. Getting the right content to the right person can be controlled at two phases of the content management lifecycle: the production phase and the delivery phase. Vignette provides tools and methods for targeting content in both phases.

In the production phase, targeted content is created explicitly. That is, content is produced with some foreknowledge of who

— an individual, role, group, organization or targeted demographic — may be receiving it. Pre-delivery preparations can include personalization and customization, language localization and unique groupings of content based on identity or need. If the consumer of content is a Web service or application, the targeting process can include conversion, formatting, or schema mapping.

Non-technical line-of-business managers are provided tools and processes that enable them to target content and application results to appropriate recipients. Targeting is critical to realizing substantial value from the content and the more targeted, precise, relevant and accurate the produced content, the more valuable it is to the consumer. The easier the process of controlling content targeting logic, the more likely it is that content will be effectively communicated.

Staging: Helping to ensure successful live implementations. Many organizations prefer that before content actually goes live or online, it should be staged in a safe and secure environment and then tested to help ensure that content collection and production phases have been successful and that applications and processes are functioning properly. Factors that should be considered when evaluating an advanced deployment system are security, scalability, staging flexibility and deployment capability.

Vignette helps ensure protection through a contained area or "sandbox" and through secure connections while content and site applications are being transmitted to remote destinations. Vignette's staging and deployment solutions help ensure that a system is capable of quickly deploying massive amounts of content.

Content often originates from multiple sources and must be deployed to multiple destinations. Content creators, for example, may exist in one location and application developers in another. Finished content must then be deployed to several other global sites. A Vignette solution can accommodate distributed development and deployment from multiple locations to multiple sites while maintaining a virtual quality assurance and testing environment that is safe and secure. Vignette staging supports N-tiered development environments as well as all content types including database records, applications, campaign rules, XML files, etc.

Vignette's deployment process is simple and satisfies rapid content management lifecycle requirements so that a successfully staged system can be deployed with one operation. Vignette also supports rollback or return to a previous version if errors are discovered. Flexible staging, protected testing and simple deployment are necessary services provided by Vignette that are often overlooked when evaluating content management systems.

Content Delivery

In the delivery phase of the content management lifecycle, the collected and produced content is served up to the intended consumer. This important "presentation" stage influences the overall value of content. If content is delivered in a personalized format that creates a comprehensive and satisfying end-user experience, the chances of inducing a desired behavior (such as return visits, stickiness, purchases, efficient or effective interactions, etc.) are greatly increased.

Well-planned content production and delivery can actually emulate the personal acquaintance process. When people first meet, they exchange names and introductory information. The more they interact, the more information is exchanged and a profile of identity characteristics and needs is generated. Through an ongoing interaction process, communication can be refined to the point that only needed information is transmitted in the most efficient way.

If content has been properly prepared, produced and instrumented, intelligence about the consumer and the interaction will be generated and captured. This intelligence is required to discern the needs of the consumer and establish an environment that provides personalized content. Through the delivery phase, as content is assembled, personalized and presented, the information exchange is observed to determine the characteristics of the interaction. The three processes of the delivery phase are *assembly, personalization* and *observation*.

Assembly: Creating the right content presentation. A good example of an assembled content environment is the common portal page. A personalized page contains multiple sections with multiple types of content, often sourced from multiple locations. Screen layout content types include text, articles, quotes, charts, database records, query results, application output, etc. Content can come from other Web sites, Web applications, enterprise applications, syndication subscriptions, news feeds, and include collaboration applications like instant messaging, chat and e-mail.

Key assembly considerations are openness, flexibility, scalability and ease of management. Content delivery mechanisms must be able to accommodate all of the available sources of content including XML files, Java Beans, ASP, JSP and other content available from application servers. Vignette solutions support the open standards of the Internet, leading development platforms such as Microsoft COM and J2EE, and integrate with leading portal infrastructure providers such as IBM, BEA and Sun.

Vignette also provides real-time retrieving of content from other Web locations as part of the delivery stream. Assembly of these content types for presentation is easy and automated through the use of templates, pointers and assembly routines. Vignette also provides for syndication or the automatic distribution of assets to a limited or large number of internal and external subscribers. Syndication encompasses the collection of content from various sources, the packaging of it for particular audiences and the delivery. Syndication examples include: online suppliers that distribute catalog content to distributors or buyers; media organizations that distribute content to subscribers; distributors that inform affiliates of discounted inventory or promotional items; online retailers that regularly update merchandising partners; and enterprise organizations that periodically distribute company information from headquarters to remote or branch offices.

A key content delivery consideration is the delivery vehicle. While much of content is accessed through a standard Web browser, there is growing demand for alternate devices such as pagers, Web-enabled mobile phones, personal digital assistants, and all types of wireless devices. Personalized content not only includes targeted information but accommodates delivery device preferences as well. Vignette provides advanced and personalized delivery options through pagers, cellular phones and wireless devices.

Personalization: Presenting relevant content to targeted consumers. Personalization of content can be accomplished explicitly and implicitly. Explicit personalization requires that the consumer be specifically identified. This is accomplished through queried demographics or the presentation of credentials that link an individual to a known identity profile. Vignette gathers demographic information by supporting self-registration, interactive interrogation and automatic retrieval of identity information such as e-mail or IP address during a session.

With identity or roles established, personalization engines can apply business rules to govern appearance of and access to content. Based on a role or identity, specific content is or is not available to an individual or group. Business rule logic can dictate the presentation format, level of detail and any peripheral or related content.

Personalization is achieved *implicitly* by observing the behavior of a consumer while they are accessing content. Vignette monitors a consumer's traffic patterns, click sequences and application use to provide valuable insight into personal preferences and content needs. Meaningful personalization information can only be gathered if content has been properly prepared in advance to yield useful information. Vignette solutions provide the ability to instrument content to include tags, trigger processes, and measurable touch points that help generate and track a consumer's content consumption.

Implicit personalization can also be inherent in a Web page design. Two basic forms of personalization are enhancing the characteristics of a page to automatically suit the capabilities of the incoming browser and surfacing content that is related to what the end user is reviewing. An example of surfacing content is providing a "related stories" section with links to

content similar to the featured page content. Vignette provides this capability through an interaction database and powerful affinity analysis.

It is important that "personalization" features be manageable by those with direct interest or responsibility without the requirement for technical or IT intervention. With Vignette, explicit definition of targeting logic is possible through an intuitive, graphical interface by business users.

Another significant element of personalized delivery is self-serviceability. Consumers that are able to self-register, self-subscribe and access content or initiate a repeating sequence of processes can get information "when they want it" and "how they want it". Self-service capability can include specifying types and levels of content, preferred delivery devices as well as schedule preferences. Self-service has become an expected requirement for customers, employees and partners and organizations must provide precise personalization in order to remain competitive and effective.

Observation: What happens during content consumption? As mentioned, being able to dynamically monitor a consumer's content consumption is key to progressively enhancing personalization. It is also required to continuously refine content relevance and accessibility. An example of observation would be monitoring the fact that after clicking on specific content on page one, 85% of those consumers eventually retrieved another piece of information on page four. This observation indicates that the content on pages one and four are related and possibly could be presented in closer proximity. This understanding of the user's needs is developed through observation that reveals behavior patterns and affinities.

Observation in many cases also requires an interactive element where consumers respond to queries or provide feedback. Vignette supports capture of preferences and responses through interactive dialog making it possible to further personalize and precisely target the next round of content. An example would be capturing a response that indicates the consumer is operating from a two-way pager so that the next communication is briefly formatted and responses are limited to 'yes/no' answers. A Vignette solution observes content consumption intelligently and acts on that intelligence when needed.

Vignette features include the recommending or referring of content based on observed behavior. For example, a system observing a search or navigation to a particular topic will be able to recommend similar topics with the referrals becoming more specific and targeted as more observations are made. Observation only enhances success if the system has the ability to adapt to observed patterns. Vignette supports adaptive content and adaptive navigation as part of a continuously learned and improved process that significantly increases the quality and satisfaction of an end-user experience.

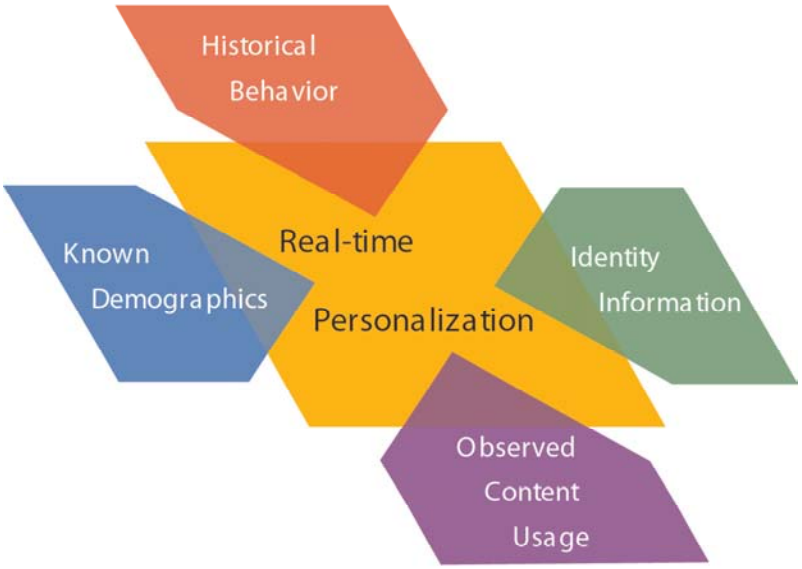
Content Analysis

Intelligence from observation is rendered even more valuable when coupled with in-depth and sophisticated analysis. The results of scientific and mathematical algorithms applied to traffic patterns and content consumption behavior can indicate needed modifications for optimizing a Web site. Through capturing and analyzing content consumption behavior, a Web site can be refined to help increase traffic and efficiency while enhancing stickiness and loyalty. With the solid *capture, discovery* and *optimization* capabilities provided by a Vignette solution, organizations can help ensure rapid continuous improvement.

Capture: Combining Behavior and Context. Observation is partially enabled through standard Web logs — records of page, page element, image and application hits. These are common Web server services and are captured as sequential events in log files. A second tier of intelligence is available through log aggregators that stitch together the serial log events into meaningful user sessions. Vignette assimilates log information from multiple sites, across multiple sessions — even across load-balanced environments where the log events for one user are spread across mirrored sites — and stitches them into meaningful histories.

Vignette also supports the embedding of intelligence in content that will further aid in analysis. Support for

Intelligent Content



instrumentation and taxonomy is important. Instrumentation supports the inclusion of meta information that describes the "meaning" of content. Examples include tags and taxonomies. Tags are non-visible text that describe a piece of content such as a tag indicating that a particular paragraph is a summary or that a name is the author. Taxonomies are hierarchical classification schemes for content. For example, "activities" could include a category called "sports" which could include "winter sports" which includes "skiing" which includes "cross-country", etc. The ability to support or automatically generate taxonomy instrumentation for specialized information is valuable for many organizations.

Behavior and context intelligence can be augmented with known profile information about the user. Demographic data is often found and can be made available from customer relationship management systems, point-of-sale logs, tech support databases, marketing data systems and partner systems. Vignette supports integration of this information from external sources.

Discovery: Finding Trends in User Behavior. Discovery consists of automated data mining and report analysis to detect trends in user behavior. A valuable discovery tool is affinity analysis. Content is often related at a virtual "distance" meaning that some content is closely related while other content is distantly related. Affinity analysis helps determine how closely information should be placed in proximity for access. For example, analyzing click patterns against intelligent content using an affinity analysis engine can quickly reveal what information is most relevant to the consumer. Steps can be taken to reduce irrelevant content or reposition important content closer to the beginning of the click path.

Vignette supports real-time discovery and analysis and content instrumentation with events and triggers as well as tags. Content that is tagged and embedded with triggers can provide a wide variety of intelligence about what is consumed and in what order. Also important is the ability to correlate and analyze content intelligence in conjunction with consumer attributes or characteristics. Knowing "what" content is viewed by "who" provides powerful insight into information needs of individuals, roles and groups. Vignette provides a library of tailored, time-sensitive intelligence services.

Optimization: Rapid continuous improvement. Intelligent feedback enables improvement. With Vignette's instrumentation and analysis, sites can be optimized for more efficient and targeted presentation of content. Optimization may include categorization changes, content formatting, navigation modifications, information collection

mechanisms — even visual presentation.

Optimization also includes the ability to quickly "remodel" content based on received analysis. Vignette provides the processes and tools to help rapidly modify or update content — complete with editing, authorization and any presentation changes as part of the workflow — and redeploy it. The results are used to make real-time recommendations on-the-fly so that the most likely, desirable and probable content can always be available.

Content Management Lifecycle Summary. With a successful enterprise Web application management solution, content can experience rapid content management lifecycle iterations at multiple levels of complexity. Changes may be as simple as modifying a piece of text or a graphic. Business users or content creators will be able to make these changes and deploy them quickly, inserting changes into an approval workflow if needed, and deploy them with changes cascading to multiple, global sites. If content requires dramatic alterations with new collection sources, retargeting and personalization changes — that process is relatively simple and rapidly implemented as well. Comprehensive management and process modularity enable repackaging and modifications or the initialization of changes at any point in the content management lifecycle.

Vignette supports the complete content management lifecycle with applications, components and prepackaged services for each activity and phase of collection, production, delivery and analysis. Without feedback and a rapid update cycle, Web sites are operating in the dark and are unresponsive to consumers. An efficient and rapid content management lifecycle is necessary to create and sustain vibrant and effective online communication.

Solution Architecture

The diversity of Web sites and Web applications for unique and different companies precludes a single, simple solution. Often, in order to be effective, a Web solution will need to be as unique as the company, audience or business purpose it serves. An enterprise Web solution can include multiple types of hardware along with multiple platforms, application servers, databases, portals, specialty services, connections, back-office processes and be linked to hundreds of content sources. While it may be possible to reduce complexity by limiting the number of vendors involved, the challenge of integration still must be addressed.

When evaluating a comprehensive content management solution, there are several architectural issues that should be considered in light of the probable complexity of the system. These issues are scalability/modularity, ease of integration, comprehensive management and openness. Modularity enables reuse making it possible to replicate or cascade capability in one to many relationships. Ease of integration and flexibility are absolutely critical as the major expense for any integrated system is the integration development cost. Solutions that are easily integrated and flexibly altered are malleable enough to fit the needs of virtually any organization whether it be centralized or distributed. Vignette's management architecture is accessible, provides a comprehensive view, and allows administration and management to occur at multiple levels across a distributed network of creators. All components of the architecture are based on market leading technology and open standards for compatibility with any common current or future systems.

Vignette's content management solutions are based on a robust, flexible and open architectural design. Vignette solutions enable organizations to rapidly implement a powerful and successful solution based on organizational and business strategy using leading technology. Vignette provides an innovative content architecture combined with a comprehensive collection of content management applications, utilities and services that are the foundation for many of the world's most trafficked Web sites.

Scalability and Modularity

Scalability through load balancing, fail-over, reuse and redundancy for high-availability solutions is also a requirement. A scalable solution must be able to add extra hardware, application servers, databases, etc. while at the

same time scaling content management services. Vignette provides a flexible yet powerful architecture consisting of an innovative content management engine and a comprehensive collection of application modules. These modules are cross platform, adhere to the industry standards of Java and Windows, and easily scale to accommodate the harshest traffic conditions.

Why is modularity important? Most online implementations are an evolving conglomeration of mix-and-match components that often cobble together legacy systems with state-of-the-art access mechanisms and distribute them using a dissimilar collection of infrastructure and application services. Since no single vendor can provide everything, modularity and scalability are critical.

It is important for a content management system to easily "plug-in" functionality where needed while at the same time operating harmoniously with other applications and services that are in place and functional. Modularity combined with portability can be integral to success when working across multiple platforms. A solution that operates multi-platform on Windows, Solaris or AIX can greatly simplify integration in mixed environments or accommodate the challenges of IT differences that are results of acquisitions and mergers.

Ease of Integration

Modularity is a key part of integration. Application servers running on Solaris, working with databases running on AIX, being served up by Web servers running on Windows 2000 — all modular and communicating through standard protocols make for a plug-and-play, meet-your-needs content management system. Integration is simplified by being able to connect processes, services and data repositories over industry or open standard protocols.

An even more important aspect of integration is being able to leave existing back-office and legacy services in place without the need to re-architect. An easily integrated system will accommodate and enhance existing investments while at the same time providing new levels of access and functionality.

In light of the fact that tens and even hundreds of different components, applications and services must be integrated to create an enterprise content management system, the process of integration must be simple. An ideal solution will have an intuitive graphical interface for connecting dissimilar content types and underlying connection mechanisms that seamlessly convert and connect. Vignette® V6 Content Suite includes a graphical integration workbench that is a visual connector and application builder for content management. Connections between disparate systems and data repositories are easily made by arranging graphic icons and connecting inputs and outputs. Disparate systems with dissimilar schemas can be aggregated by simple dragging and dropping.

Since different content sources do exist with no dominate information exchange standard, a successful system must include a comprehensive library of content adapters to ease the process of content transformation. The task of displaying content from a PeopleSoft HR record in conjunction with payroll information from an Oracle Financials database can be overly complex without a library of adapters and an integration engine that repurposes content in a common and accessible form. Vignette provides over 70 ready-made adapters for aggregating content from business and desktop applications, databases, back-office systems and enterprise management software in a two-way exchange of information both inside and outside the firewall.

Management

Once a content aggregation and publishing system is implemented, there is a need for simplified and powerful management. Important considerations include accessibility, security, and the ability to distribute management.

Accessibility at minimum means that administrative interfaces are Web based with the ability to access administrative functions from any point on the Internet. Also, management applications should provide a holistic view of content, its location, state, position in a workflow, and use.

In addition, the ability to distribute administration while maintaining strong security is important for sharing management tasks. Business managers should be able to

manage processes and logic; content creators manage aggregation and filtering of content; site administrators manage the look and feel of multiple sites; and customers or consumers control their workspaces — all while maintaining security and access control.

Vignette provides comprehensive management at multiple levels with an array of easy-to-use interfaces for all participants of the content management lifecycle. Management of powerful tasks like precision targeting, campaign management, content instrumentation, content aggregation, syndication, etc. all have intuitive, graphical interfaces.

Openness

In the realm of content management, openness implies the ability to work in conjunction with as much of the existing environment as possible. Vignette has defined the standard in this area with the ability to work with all of the major Web application and component players. Vignette provides compatibility with content from virtually any source — inside or outside, old or new — including eXtensible Markup Language (XML).

XML provides powerful content conversion capabilities. XML and document type definitions (DTDs) or XML schemas provide the ability to define content organization in one format and then convert or repurpose it for to another. Vignette's content adapters can utilize XML to take content from virtually any source (legacy applications, back-office sources, databases, Web sources, business applications, etc.) and repurpose it for online access in a large number of formats. XML technology provides significant flexibility and can be ideal for creating, packaging, distributing and delivering content.

Openness also implies the ability to integrate with other Web infrastructure components including application servers and portal servers. Vignette applications and services can seamlessly work with leading application servers and Web portals such as BEA WebLogic and IBM WebSphere which provide clustering, fail-over, load balancing, security through single sign-on, view management and high availability if needed.

Localization and the ability to accommodate foreign languages is another aspect of development that is enhanced through openness. Vignette supports Unicode and double-byte enabled characters making it possible to easily substitute character sheets for different languages. For organizations with a global presence that require a consistent look and feel across multiple languages, this functionality is mandatory.

Supporting evolving industry standards also affects the ability to integrate successfully. Vignette supports the emerging Web services standards at whatever standard level an organization wishes to implement them. Support for the Microsoft COM, ASP, and forthcoming .NET environments allows Vignette technology to run in a Microsoft-only shop if needed, or be integrated to virtually any level in a mixed environment. Applications created using Vignette solutions can be exposed inside or outside the firewall as Web Services.

The Vignette Content Management Solution

Vignette is the leading provider of content management applications. By combining content management with integration and analysis applications, Vignette enables organizations to deliver personalized information virtually wherever it is needed, integrate online and enterprise systems and provide real-time analysis of the content consumer experience. Vignette technologies enable content management that helps ensure relevant information will reach the right person, at the right place and at the right time.

All of the core functionality needed for effectively managing content throughout the content management lifecycle is included in the Vignette V6 Content Suite. The Vignette V6 Content Suite is a collection of applications and components that facilitate management of the complete content management lifecycle. Included with the Vignette V6 Content Suite base offering is a content management engine, a comprehensive collection of over 70 content adapters and Web analytics that enable the collection, production, implicit and explicit personalization, delivery and analysis of online content for enterprise and globally distributed sites.

In addition to the Vignette V6 Content Suite, Vignette provides several content "extensions" that extend the functionality for content management and delivery. Brief descriptions of these content extensions are listed below. Vignette V6 Content Suite provides the core functionality needed for all extensions and must be included as part of any extension implementation.

- **Vignette® V6 Multisite Content Manager.** Provides a collection of pre-built online applications that help quickly enable content management and provide for multi-site management for Web sites and portals
- **Vignette® V6 Advanced Deployment Server.** Enables multi-site development with staging capability for quality assurance and testing
- **Vignette® V6 Relationship Management Server Advanced Edition.** Extends the personalization and targeting services of the Vignette V6 Content Suite to include campaign management and real-time recommendations

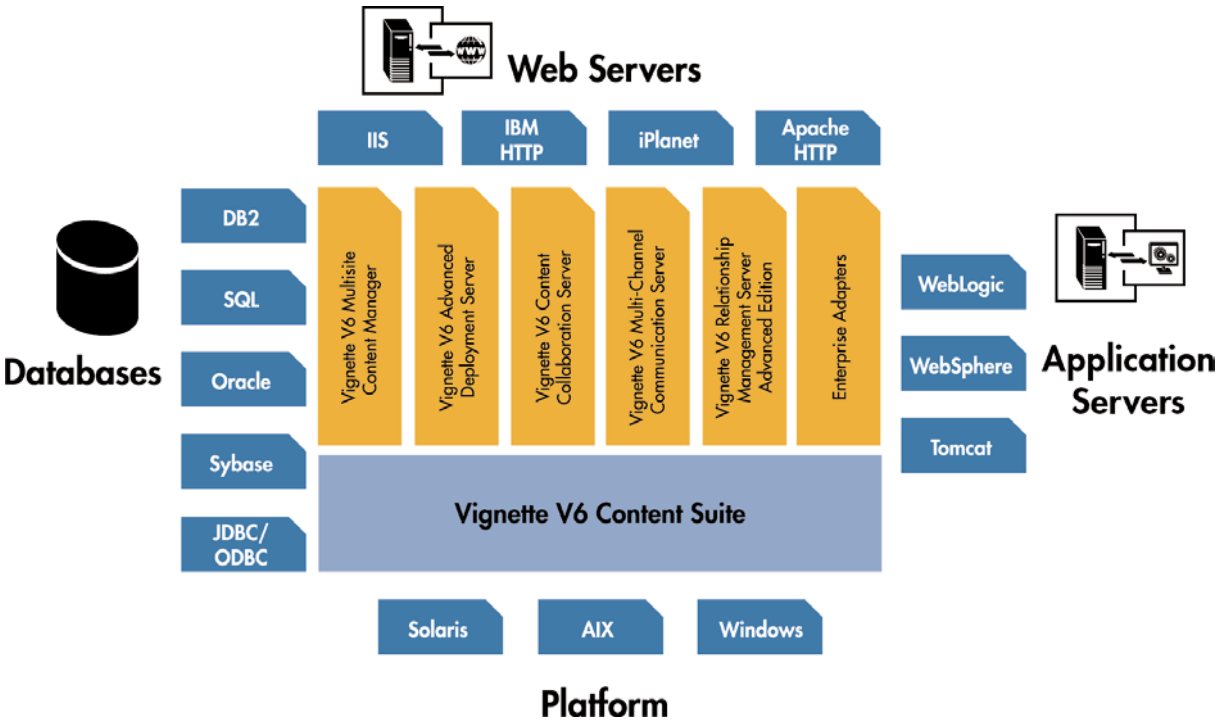


Fig. 1 Vignette product architecture with common infrastructure components

Vignette Content Management Solution

Web Application Component	Compatible Products
Platform Operating System	Sun Solaris, IBM AIX, Microsoft Windows NT/2000
Web Server	Sun iPlanet, IBM HTTP Server, Microsoft Internet Information Server (IIS), Apache HTTP Server
Application Server	BEA Systems WebLogic Server, IBM WebSphere, SunONE Application Server, Apache Tomcat
Database	Oracle, Microsoft SQL Server, IBM DB2, Sybase
Portal Server	IBM WebSphere Portal Server, BEA WebLogic Portal Server, Sun SunOne Portal Server
Web Browser (for management interfaces)	Microsoft Internet Explorer 5.5
Portal Server	IBM WebSphere Portal Server, BEA WebLogic Portal Server, Sun SunOne Portal Server
Java	J2EE support for servlets, Java Server Pages (JSP), Enterprise JavaBeans (EJB)
Development Tools	Integrates with standard Web development tools such as Macromedia DreamWeaver, Microsoft Interdev and source code management environments such as Rational

- **Vignette® V6 Content Collaboration Server.** Enables organizations to manage and establish specialized, personalized and secure communication methods and channels for content exchange with partners and distribute content to affiliates and subscribers quickly and easily
- **Vignette® V6 Multi-Channel Communication Server.** Extends the reach of content in the Vignette V6 Relationship Management Server Advanced Edition to include supported pagers, PDAs, WAP-enabled phones and other wireless devices

In addition, there are currently four enterprise content adapter libraries that extend the Vignette V6 Content Suite to tightly integrate with the industry's leading enterprise software solutions. These adapters enable the collection and management of content and two-way interaction with existing data sources.

- Vignette Enterprise Adapters for SAP
- Vignette Enterprise Adapters for PeopleSoft
- Vignette Enterprise Adapters for Siebel
- Vignette Enterprise Adapters for J.D. Edwards

Vignette V6 Content Suite provides the processing engine, management tools and adapters to create a complete content management lifecycle solution. Combining Vignette V6 Multisite Content Manager with the Vignette V6 Content Suite provides comprehensive content management plus delivers several prepackaged applications that speed implementation and deployment for organizations with content management needs. The other Vignette content extensions provide specialized features and services at different phases of the content lifecycle and for organizations with specific requirements for content delivery and analysis.

Since Vignette products are based on open standards, support and integration is available for standard Web application components as shown below. The Vignette V6 Content Suite and the Content Suite Extensions can work on or be integrated in conjunction with the Web application components noted on the chart above.

To clarify the how the Vignette V6 Content Suite and content

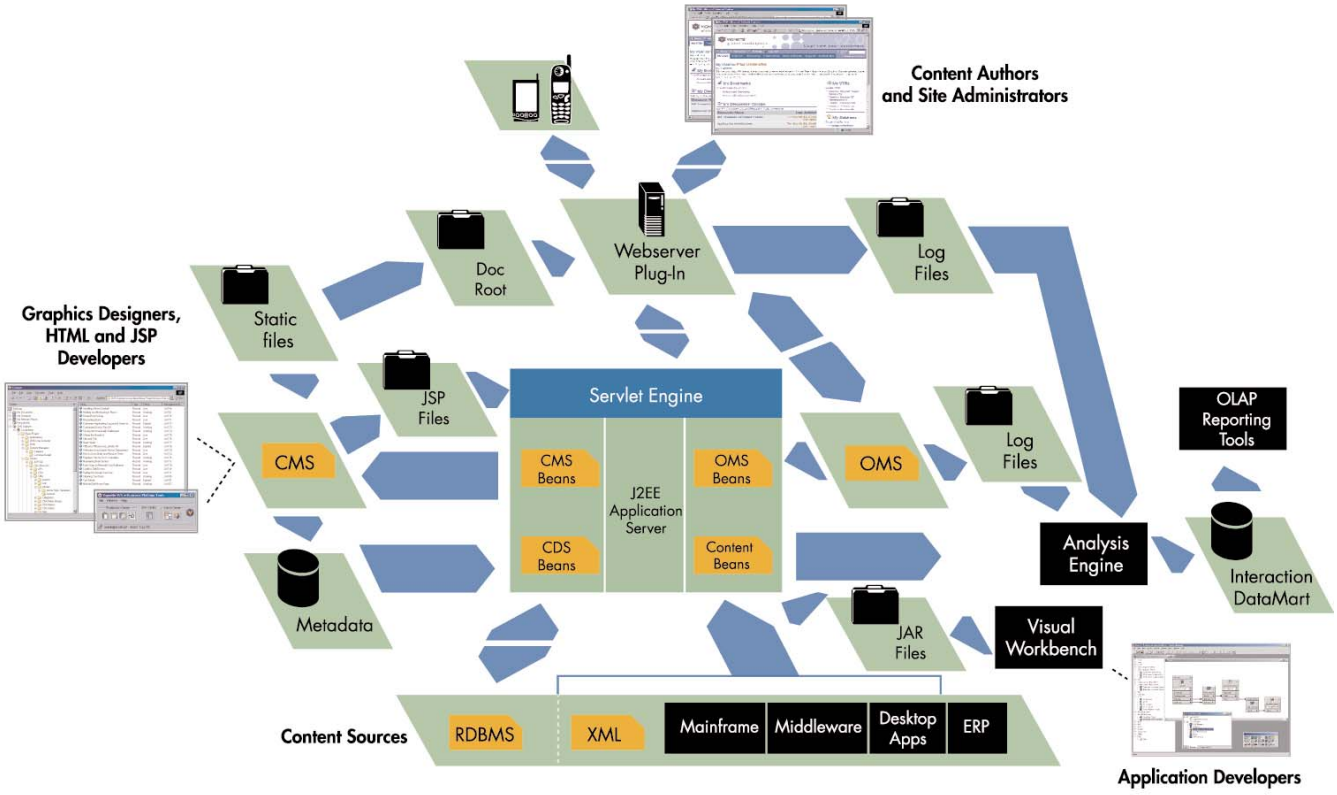


Fig. 2 Vignette V6 Content Suite architecture

extensions can work together, the architecture and features of each product will be described below.

Vignette V6 Content Suite

Architecture. The Vignette V6 Content Suite architecture consists of several components. These components can be duplicated and distributed to accommodate massive scaling but for the sake of clarity, this discussion will be limited to a single instance of each component. At the heart of the Vignette V6 Content Suite is the Vignette V6 Content Management Server with primary responsibility for coordination and management of all associated services.

Vignette services are roughly separated into the following four categories:

- **Content Collection** – provides content collection and production services
- **Content Production** – provides management, targeting and staging of content
- **Content Delivery** – provides dynamic delivery, performance enhancements and cache management
- **Content Analysis** – provides profiling, personalization, analysis and reporting services

Using the components and tools available with Vignette V6 Content Suite, content management applications can be developed with the features and functionality required for effective content management. The Vignette Content Extensions are a collection of pre-built applications and components that leverage the flexibility and capability of the Content Suite.

A significant and powerful component of the Vignette V6 Content Suite is a graphical application assembly tool for collecting and integrating content from a wide selection of sources. Vignette V6 functionality allows site developers and business managers to easily and dynamically map content from unlike schemas and remote repositories and applications to an aggregated destination. Using Vignette V6 for example,

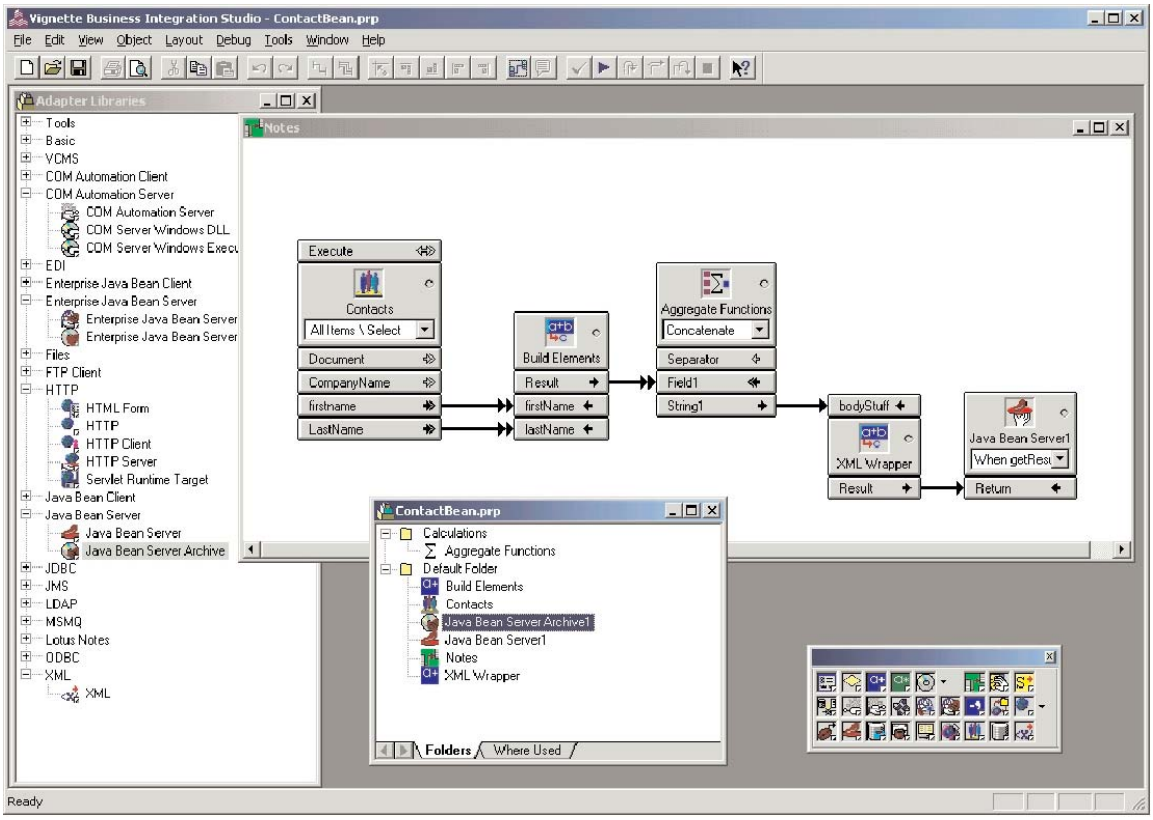


Fig. 3 Vignette V6 Business Integration Studio interface used to assemble content sources.

a business user or content creator can graphically map content from a contact database in MS SQL Server and combine it with data from Lotus Notes for display as part of a Java servlet on a portal page.

Vignette V6 Business Integration Studio also provides seamless integration of business applications and content management at the process level. A content creator who produces a document in Microsoft Office can work the way they are used to working and still take advantage of powerful content management functionality in a non-intrusive, non-burdensome way.

Vignette's existing content adapter library is vast and includes the ability to connect and map data from common enterprise content sources. A powerful feature of Vignette V6 Business Integration Studio is the ability to discover and connect to sources in real time. Selecting a Siebel adapter for example, establishes a live link to the Siebel system where business objects, database, schema and records are enumerated from the actual content source. This capability combined with the visual mapping interface can drastically reduce development time. Actual customers have been able to cut development time from several months to less than a week using Vignette V6 Business Integration Studio.

Vignette V6 Content Suite also includes advanced workflow capabilities. With the key to vibrant, fresh Web sites being continuously updated content, it's important that a system for fast and orderly creation, aggregation and approval be available. The workflow features of Vignette V6 Content Suite provide a content creation path with automated steps for approval and editing and automatic insertion or deployment. Vignette's workflow process includes automated processes as

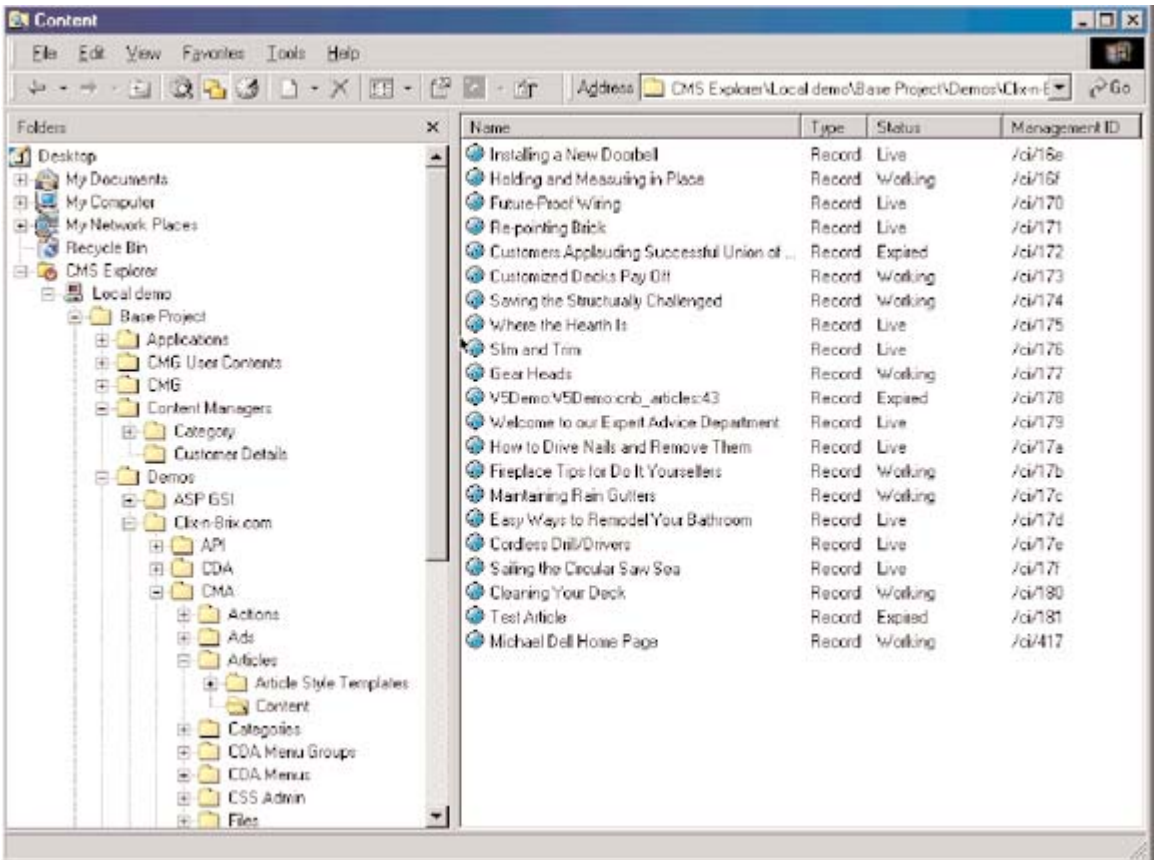


Fig. 4 Vignette V6 Content Management Server Explorer interface.

part of the flow. For example, if one of the workflow steps is to gather data from another system such as an order system or HR database, the workflow process waits until that information is captured and formatted and then integrates it with other content for deployment. Vignette V6 Content Suite's workflow capabilities are flexible and can be designed to accommodate aggregation, development, refinement and deployment through a complex number of steps if required.

Vignette V6 Content Suite also includes intuitive tools and interfaces for the management of content. Content organization, location, format, and type as well as owners and other descriptive information can be useful when managing Web information. A powerful development component of the Vignette V6 Content Suite is the Vignette V6 Content Management Server Explorer interface. Vignette V6 lets users organize Vignette managed directories and elements by category on classification directly in Microsoft Windows Explorer. Both of these features provide a visual level of abstraction with the ability to isolate content creators from the underlying code. Site development is easy and proceeds visually in a manner similar to the way that people think.

Vignette V6 Content Suite also includes the Observation Management Server. The Observation Management Server collects intelligence on consumer behavior by recording information on content viewed and navigation paths. Information on individual click paths is stitched together with data from the standard Web server log files and stored in an "interaction datamart" where it is available for analysis. The Observation Management Server provides the ability to "learn" a user's preferences and understand their content consumption behaviors and then dynamically alter the flow of information to create a richer, more satisfying user

Vignette V6 Content Suite

Feature	Description
Content Technology Adapters	Vignette V6 Content Suite adapter library includes accessibility to content from over 70 different source types. A short list of technology adapters includes: COM, CORBA, EDI, IBM 3270/5250, IBM MQSeries, Java Beans, Enterprise Java Beans, JDBC, ODBC, Flat file, JMS, LDAP, Microsoft MSMQ, SMTP, Web/HTTP, FTP, SNMP, XML, Lotus Notes, Microsoft Exchange, Microsoft Office (Word, Excel), Microsoft Project, and many, many more. For a summary list of included adapters, see the appendix. For a complete list with descriptions see the Vignette V6 Business Integration Studio Adapter Library white paper.
Program Logic Adapters	Comprehensive visual application development capabilities with the following program logic: calculations (if/then, formula, decision table, aggregate functions), error handling (control, exception), events, logging, looping, management, user interface, values and sorting (list, variable)
Visual Integration Tool	Vignette V6 Business Integration Studio – Visual application builder tool for connecting and formatting content from various sources
Application Server Support	Compatible with leading J2EE and Microsoft compliant application servers
Interaction Data Mart	Repository for tracking online behavior. Includes reporting and analysis tools and also hooks for other OLAP systems
Interaction Analysis Engine	Application that creates seamless session logs across multiple, load-balanced servers to provide comprehensive navigation histories. Analyzes logs to discover affinities and navigation patterns
Templates	A collection of templates for content formatting and presentation
User Profiles	Define profiles with descriptive attributes that define relationships, identity information, security rights, associations, access, permissions, etc.
Instrumentation	Automated and manual content categorization though taxonomies and tags and creation of application events
Reporting	Configurable reporting with pre-defined reports to analyze effectiveness of Web applications; reports include site analysis of visitors, sessions, page views, arrivals, departures, download files, content, clickstream, campaign analysis, site usage and site metrics
Internationalization	Applications are double byte enabled (Unicode) to accommodate multiple language character sets and are localization ready
Workflow	Creates workflow processes with creation, editing, approval, information acquisition and delivery steps for rapid and effective content preparation, editing and delivery. Integrates other automated systems as segments of the workflow process
Real-time Recommendation	Makes real-time recommendations on-the-fly based on navigation paths, behavior analysis and the context of smart, active content
Cache Management	Patent-pending cache management system provides superior performance with caching occurring at the page component level or at the page level

Functionality. The Vignette V6 Content Suite enables organizations to develop an integrated content management solution with the following functionality:

Vignette V6 Content Suite

Functionality	Description
Content Aggregation and Integration	Selectively pull content from a wide range of data sources including office applications, back-office processes and Web locations—inside or outside the firewall
Content Creation	Create content using a collection of pre-defined and customizable templates; Integrate content developed with standard content creation tools
Version Control	Provide version management and compare different versions of an asset or template visually
Workflow	Establish processes with definable and automated steps for progressing content through its lifecycle with approvals and automatic insertion
Content Categorization	Automatic and manual categorization of content according to user-definable taxonomies. Provide access to content based on categories as well as by function, product line, or source
Content Delivery	Coordinate the collection and correlation of display content with dynamic personalization and customization
Content Personalization	Deliver content to the right person at the right time based on profiles, preferences, and observed behavior
Content Analysis	Capture usage intelligence associated with known and unknown consumers for optimizing relevancy of content and delivery
Scalability	Accommodate large scalability through modular design, caching and integration with fail-over and load balancing solutions

experience. Vignette's powerful analysis engine correlates navigation history with known viewer information and also provides links to tie in OLAP tools such as Cognos and Hyperion, or SQL reporting tools.

Vignette V6 Multisite Content Manager

The Vignette V6 Multisite Content Manager provides an added layer of pre-built functionality to the Vignette V6 Content Suite. Features are included that enhance several of the content management lifecycle processes including creation, categorization, management, staging (Vignette V6 Advanced Deployment Server required), personalization and optimization. Vignette V6 Multisite Content Manager enables organizations to rapidly create and deploy online solutions using a collection of pre-integrated applications and services for Web sites and portals. Included with Multisite are predefined content types,

Vignette V6 Multisite Content Manager

Feature	Description
Aggregation	Stage and centralize management of distributed content. Centrally manage content and metadata from many sources. Control deployment through staging with good reporting and monitoring. Vignette V6 Advanced Deployment Server is required for staging functionality.
Inheritance	Create child sites that inherit all or part of the characteristics of a parent site. Rapidly deploy to hundreds of sites while maintaining a consistent look and feel. Reinforce branding and messages, preserve product or corporate identity and maintain standards and quality.
Content Usage Reporting	Predefined content tagging and site instrumentation; out-of-the-box reports based on site, channel, content categories, user segmentation, provider, content type, and content item; predefined interaction data analysis
Workflows	Control the routing of content through the preparation process from conception to final approval and posting. Established workflow cycles with pre-defined participant roles provide quality assurance and control during the development of content. An online and automated workflow system also make it possible to rapidly update existing content or produce additional content in a very short cycle. Can dramatically reduce time and cost to deploy small or large amounts of content.
Pre-defined Roles	Roles such as creator, editor, approver and others control workflow
E-mail	POP and SMTP mail capabilities simplify online communication between multiple participants. Pre-packaged applications make it possible to easily provide collaboration capability out-of-the-box.
Threaded Discussion Groups	Automatic organization of online discussions and responses to a posted question or subject
Pre-defined Content Types	A collection of common content types, including pre-built schema and input forms
Pre-defined Taxonomies	Predefined taxonomies are included for the general business terms, financial, healthcare/biotech and high tech
Pre-integrated Search Engine	Search engine capabilities with standard Boolean search operations
Virtual Team Room	Online collaborative workspaces with bookmark sharing, calendar, screen sharing, and file viewing
Collaborative File Management	Group file sharing for online collaboration and sharing of files
Calendars	Create online calendars with shared viewing and management

Functionality: Vignette V6 Multisite Content Manager

Functionality	Description
Distributed Content	Manage content across multiple Web sites, Web applications and portals
Multi-site Creation and Management	Create new “child” sites that inherit common characteristics (visual presentation) from a pre-existing "parent" site
Standardization	Control and manage multiple sites maintaining a common look and feel for consistent branding
Personalization	Instrument content with pre-built taxonomies and tagging schemas for content analysis and personalization
Online Collaboration	Facilitate online communication and collaboration through the use of calendaring, chat, and messaging
Enhanced Content Accessibility	Quickly locate information through taxonomy or search
View Management	Manage the look and feel of Web page components while maintaining consistency and gaining efficiency through reuse
Rapid Staging and Deployment	Provides for rapid site creation and deployment using pre-defined templates, pre-built components and pre-integrated applications; establishes a secure process for deploying content and assets across a multi-staged environment without endangering the live site

roles, taxonomies, search engine capabilities, reports and a series of wizard interfaces for quickly creating and deploying content. Also included are collaboration services providing a virtual team room and e-mail, threaded discussions, calendaring, shared files and other group applications.

Vignette V6 Advanced Deployment Server

Vignette V6 Advanced Deployment Server is an enterprise-wide development, testing and production system that adds value to the content management lifecycle through the production phase. Vignette V6 Advanced Deployment Server is a powerful application staging and deployment system that enables businesses to coordinate the production efforts of geographically distributed teams of application developers, content contributors, quality assurance personnel and administrators to create, test and deploy content and other digital assets through a secure staging environment.

Successful deployment of enterprise applications often consists of several teams in different physical locations. The logistics of manually constructing, coordinating and transporting content and assets can often compromise the integrity of a system. Vignette V6 Advanced Deployment Server coordinates

Vignette V6 Advanced Deployment Server

Feature	Description
Distributed Content Management	Manages templates, database records, XML files and more among multiple groups in different locations
Single Step Deployment	Transfer staged content to multiple sites with a single operation
Management Interface	Web-based interface to administer deployment process
Multi-tiered Staging	Content and applications can be staged in multiple encapsulated environments
Sandbox Security	Sandbox provides development, testing and QA in an encapsulated environment
Open APIs	Includes robust APIs for extensibility
Transfer Security	Deployment over secure SSL with strong (128-bit) or weak (40-bit) encryption, depending on version licensed
Versioning	Support for versioning of deployed systems
Rollback	Support for rollback to previous versions if necessary

Functionality: Vignette V6 Advanced Deployment Server

Functionality	Description
Staging	Provides an environment for comprehensive staging of systems before going live
Distributed Development	Coordinate production efforts of geographically distributed teams of application developers, content contributors, quality assurance personnel and administrators
Testing	Provide a secure sandbox for testing and quality assurance
Deployment	Powerful deployment to multiple locations with strong security
Versioning and Rollback	Resets deployment to earlier version if needed

development efforts and automates large-scale deployment.

Vignette V6 Advanced Deployment Server also provides for versioning and rollback. If errors are discovered after deployment of new changes, the changes can be "undone" and the site restored to its previous state. Vignette V6 Advanced Deployment Server also integrates with leading code development platforms so that organizations can leverage existing source-code management tools, training and expertise.

Vignette V6 Relationship Management Server Advanced Edition

Vignette V6 Relationship Manager Server Advanced Edition is a comprehensive personalization solution that gives business managers the ability to define and maintain personalization rules and enables custom personalized interactions. The capture and analyze processes of the content management lifecycle production phase are enabled through observation and assessment. Vignette V6 Relationship Management Server Advanced Edition includes a campaign manager component

Vignette V6 Relationship Management Server Advanced Edition

Feature	Description
Rule Definition	Explicitly define rules that assemble content from multiple sources based on identity and business logic
Graphical Interface	Management interface provides graphical view of sources, content items, and available delivery channels
Target Selection	Define who, how, and when content consumer will receive specified content items
Real-time Analysis	Monitor and analyze new behavior in real-time using advanced algorithms and affinity models
Real-time Response	Real-time adaptation to unplanned consumer behavior with on-the-fly content recommendations

Functionality: Vignette V6 Relationship Management Server Advanced Edition

Functionality	Description
Business User Functionality	User interfaces allow line-of-business users (no IT required) to define logic and create rules for targeting and relationship management
Real-time Behavior Analysis	Monitor real-time behavior in conjunction with personal profile and against defined rules and logic
Historical Behavior Analysis	Compare current behavior against historical behavior for analysis
Recommendations	Provide real-time content recommendations based on current and historical behavior
Quick Response	Modify and create content delivery rules to quickly respond to changes in consumer demands in real time

that allows managers to define and maintain rules for personalized content delivery. With rules implemented, Vignette V6 Relationship Management Server Advanced Edition can capture interactive behavior in real time, compare that behavior against past interactions, and then make relevant content recommendations.

The Vignette V6 Relationship Management Server Advanced Edition includes two major components: the campaign manager and the real-time recommendation server. The campaign manager provides an intuitive graphical interface for personalization that assembles multiple types of content based on business rules and logic. The campaign manager precisely targets information through explicit personalization by knowing beforehand who the target is and what content they may need. Business managers with content responsibility can explicitly control the design of personalized content.

The real-time recommendation server uses current activities and historical interaction data to generate highly customized recommendations for each consumer in real time. It implements complex real-time analysis by comparing current user behavior with historical behavior across the entire user base. The proprietary Vignette recommendation algorithms use probability inference and affinity models for high prediction accuracy. Real-time recommendation server enables implicit personalization by gathering intelligence on unknown consumers and monitoring behavior. Consumers are recommended specific content items that should be the most appropriate for the current user for that session. Using Vignette V6 Relationship Management Server Advanced Edition, organizations can create tighter one-to-one relationships with consumers that are both known and unknown.

Combining the capabilities of Vignette V6 Relationship Manager Advanced Edition with Vignette V6 Content Suite provides for powerful possibilities. For example, using affinity analysis, it may be discovered that there is a high correlation of traffic between sports content and information on intimate apparel. Using Vignette V6 Relationship Management Server, a campaign for intimate apparel can be targeted to viewers of sports content around Valentine's Day.

Vignette V6 Multi-Channel Communication Server

Vignette V6 Multi-Channel Communication Server enables proactive distribution of personalized content via e-mail, pagers, mobile phones, PDAs and other wireless touch points. Working in conjunction with Vignette V6 Relationship Management Server Advanced Edition, Vignette V6 Multi-Channel Communication Server adds value to the delivery stage of the content management lifecycle by explicitly targeting subscribers and enabling a closed-loop interaction from remote locations. Possible content includes notifications, alerts, e-mail and simple programmatic interactions that provide approval and allow response.

Vignette V6 Multi-Channel Communication Server provides precision personalization and targeting of communications. Content consumers can have information delivered via their supported device of choice. Communications can be interactive to provide request/response capabilities for applications. Combined with Vignette V6 Relationship Management Server Advanced Edition, Vignette V6 Multi-Channel Communications Server enables the proactive distribution of personalized content to multiple types of remote devices.

Vignette V6 Multi-Channel Communications Server also enables the tracking of recipient responses for analysis resulting in enhanced personalization and relationship management. For example, e-mail messages can be automatically embedded with instrumentation to trigger responses when read.

Sample uses of Vignette V6 Multi-Channel Communications Server include: providing pager subscription to sports scores, weather, etc.; providing notification of programmed events from virtually any content source (i.e. updates from back-office applications, triggered changes in inventory, manufacturing processes, etc.); and account status and transactions.

Vignette V6 Multi-Channel Communication Server runs as two daemons that run on Unix or as two services on Microsoft Windows NT.

Vignette V6 Multi-Channel Communication Server

Feature	Description
SMTP E-mail	Provides communications through most SMTP e-mail servers
LSMTP E-mail	Schedule bulk e-mail mailings through L-Soft's LSMTP server
PDA Support	Leverage PDAs such as Palm VII using e-mail delivery
Skytel	Communicate with two-way pagers through the Skytel Network Operation Center
WAP Support	Wireless phone Web access to applications through WAP (wireless access protocol) enabled phones through Openwave's Mobile Access Gateway
FAX Support	Couple e-mail broadcast with fax gateways for fax service bureau capabilities (RightFax, Expedite, Faxination)
Flexible Device Support	Remote touch points include any PDA or wireless devices with an e-mail address such as Palm, RIM Blackberry devices, two way pagers, etc.
Open Architecture	Open architecture for easy integration with third-party event processing, profiling and user subscription applications
High Availability	High-availability architecture that allows load balancing, fail-over and recovery

Vignette V6 Content Collaboration Server

Vignette V6 Content Collaboration Server provides the ability to establish customized and personalized relationships and to distribute Web-based content such as text, graphics, audio, video, applets and more to affiliates, customers, and internal constituents. Vignette V6 Content Collaboration Server is an effective solution for organizations that seek to securely exchange complex content according to predetermined criteria and customized relationship profiles which define what content is to be exchanged, how it is to be transferred, who can view or what can access it, and under what conditions or events the exchange will take place. Vignette V6 Content Collaboration Server provides solutions through the delivery phase of the content management lifecycle enabling organizations to leverage the value of content to hundreds or even thousands of other interested parties with a minimum of management effort.

Vignette V6 Content Collaboration Server manages these relationship profiles as well as transforms content and enforces any related exchange policies. Content to be shared with partners often has different format requirements and Vignette V6 Content Collaboration Server abstracts the transformation and exchange requirements to a level that is automated and easily managed by business users. Companies can expose and syndicate content stored in enterprise application systems and databases and original content can be managed (relational databases, application output, query results) or unmanaged (Web site scans, document directories, data mining).

Examples of how Vignette V6 Content Collaboration Server may be implemented include: delivery of content from a vendor to individual distributors based on distributor preferences; sharing of inventory and product availability information with channel partners; distribution of aggregated catalogs; the collaborative development of product

Vignette V6 Content Collaboration Server

Feature	Description
Profile Manager	Establish individual and unique profiles for every partner with customized terms and requirements for content exchange; profile information can include terms of exchange, authorized recipients, scheduled delivery, format preferences or requirements, security keys, etc. The following management options are available: • Manage thousands of subscribers simultaneously • Add, delete, change or update subscriber logs • View subscription and business terms for subscribers • Review package status • Search, display and create reports on syndication activity • Modify subscription parameters and schedules
Content Exchange Engine	Automates machine-to-machine exchange of content based on defined rules and preferences
Offer Management	Provides the ability to extend subscription offers with variable duration and terms; make multiple offers with different business terms
Syndication Modes	Supports three types of syndication modes: on-demand (at request of receiving party), scheduled (periodic or set time), event-driven (triggered by a business rule or programmatic event)
Custom Delivery Rules	Customizable delivery rules for individual subscribers or groups based on business rules or relevant events; unpacks and resolves content based on subscriber preferences including unZipping, ICE, copy to relative path, removal of old content, etc.
Delivery Modes	Supports two delivery modes: request/reply based on ICE, and HTTP and FTP push
Incremental Updates	"Update on request" delivers only what is new since last query
Syndicated Content Source Support	Supports virtually all types of content for syndication including Vignette templates, content aggregation agents, content integration adapters, databases, flat files, HTML pages, XML documents, and any Content Suite content including back-office applications
Syndicated Content Format Support	ICE, XML, cXML, HTML, applets, multimedia files, database records, flat files, PDF, CIF, CUP, e-mail and more
Content Packaging	Package generation management including packing, unpacking and resolution
Protocol Support	Provides support for standard information exchange solutions including RosettaNet, HTTP, FTP, cXML, and BizTalk
Messaging Service	Enhance the reliability of content exchange solutions with two-way messaging services based on Java Messaging Service (JMS)
Automated Recovery	Help guarantee content exchange events with automated recovery in the event of outages or disruptions
High Performance Client	Optional lightweight client provides enhanced functionality with syndication automation, detailed logging, security, transaction notification and better performance

Functionality: Vignette V6 Content Collaboration Server

Functionality	Description
Automated Communication	Streamline and automate communication and sharing of content between businesses and their channel partners
Subscriber Management	Provide content to associates based on customized preferences and preferred methods of delivery including delivery format, desired protocols, and security; easily administer subscriber setup and subscription management as well as subscription offers
Content Exchange	Exchange virtually any type of content (inventory status, back-office application output, database records, transaction information, etc.) from any supported format to any other supported format
Rapid Deployment	Vignette V6 Content Collaboration Server tools, templates and adapters provide for rapid deployment; content exchange solutions for new partners with customized preferences can be established in a matter of days
Source Syndicated Content	Pull content for syndication from a wide selection of sources
Deliver Syndicated Content	Distribute virtually all forms of Vignette managed content to a wide selection of destinations with flexibility in management and delivery options

specifications and documentation; and the distribution of documents and other content to applications within a large organization. Vignette V6 Content Collaboration Server provides the ability to aggregate rich, relevant, dynamic content and distribute it on a large scale.

Vignette V6 Content Collaboration Server is extremely flexible and provides the framework and tools to quickly develop virtually any kind of inter-business content exchange solution. Vignette's content packaging and delivery solutions are tried and tested and have been developed according to best business practices. Vignette V6 Content Collaboration Server enables organizations to improve sales channel effectiveness by automating the delivery of customized content.

Vignette V6 Content Collaboration Server provides extensions to the Vignette V6 Content Suite with a series of customizable adapters. These adapters are configurable in the Vignette V6 Business Integration Studio and provide the ability to define content sources, content destinations and any content transformation that must take place during the exchange.

Vignette V6 Content Collaboration Server also includes a graphical subscription/profile manager that allows business users to define the conditions, terms, and rules of a relationship. The profile manager includes options for delivery schedule, content format, authorized access and messaging exchange.

Vignette V6 Enterprise Adapters

Enterprise companies throughout the world rely on business application software solutions such as PeopleSoft, SAP, J.D. Edwards, and Siebel for mission-critical operations. Vignette provides separate enterprise adapters for each of these leading software providers. When integrated using the features and functionality of the Vignette V6 Content Suite, Vignette V6 Enterprise Adapters for PeopleSoft, SAP, J.D. Edwards or Siebel expose existing content for management and Web

Vignette V6 Enterprise Adapters

Feature	Description
Integrated Visual Workbench	Graphical user interface with powerful workbench enables business users to easily assemble content management Web applications from various sources with virtually no programming.
Intelligent Adapters	Flexible adapters enable exchange of content and access to information contained in enterprise software applications. Leverage pre-built and existing components, queries, and security mechanisms that simplify development. Web applications support two-way exchange of content for wider exposure and easier access by customers, suppliers, partners and employees. Capitalize on existing systems, and can reduce costs, shorten time-to-deployment and increase revenue through more efficient and profitable online interactions.
Integrated Content Management	Enable enterprise software information to be holistically managed with generally all other content and Web initiatives. Provides unified and comprehensive management of content throughout the lifecycle. Streamline access to information and provide tools to personalize and tailor content based on observed behavior and usage.

applications for use throughout the content management lifecycle. The Vignette V6 Enterprise Adapters provide powerful and flexible Web application deployment through a graphical interface that simplifies integration, that helps speeds time to market and helps enhance online relationships with customers, employees and business partners.

The Vignette V6 Enterprise Adapters leverage the visual workbench development capabilities of the Vignette V6 Content Suite. Business users can easily access, query, publish and modify information that resides in common existing enterprise systems. The intuitive, graphical user interface allows users to visually map content flow and connect disparate information sources by simply dragging and dropping components and connecting attributes. Enterprise application data can be aggregated with other content and application logic adapters for fast, flexible content aggregation, transformation and automation.

Business Benefits

Implementing Vignette solutions can provide direct and often dramatic advantages in several areas of business. At a minimum, organizations can increase efficiency and enhance content access for partners, customers and employees. At the other end of the spectrum, complete new industries have been launched by taking advantage of the revolutionary online relationship management capabilities that Vignette's technology provides. A summary list of the business benefits that organizations implementing Vignette solutions can experience is as follows.

- **Rapid Time to Market:** Vignette enables a compressed content management lifecycle. Not only can systems be designed, developed and deployed in a short period of time but the cycle to create and deliver modified content on an ongoing basis can be dramatically streamlined to shorten delivery time.
- **Lower Development Costs:** Modular architecture and reuse, use of familiar tools and development environments, ease of integration with existing and industry standard components, rapid application development tools — all of these factors can contribute to better implementations for less money.
- **Effective Online Relationships:** Personalization, targeting, analysis—these factors and more make it possible to establish relationships at a much deeper level and provide content that is needed, when it is required, in a format and through a touch point that is most convenient.
- **Reduced Operating Costs:** Lower management and administration costs and at the same time reduce the steps and manual effort required to create and deliver content.
- **Empower Consumers:** Provide the ability for customers, employees, suppliers and partners to control and access specific content through self-service and subscription mechanisms.
- **Empower Business Users:** Give line-of-business managers the ability to analyze, define, target and deliver value without the need for technical or specialized assistance.
- **Increase Consumer Satisfaction and Loyalty:** Providing a rich, satisfying user experience with content when, where and in a format that is desired can increase propensity to return and continue relationships.
- **Enhance Revenue:** Increase sales with existing customers through targeting and affinity analysis. Create new sales channels and simplify distribution to new markets.
- **Leverage Existing Investments:** Utilize existing back-office and legacy applications and leverage them through online access. Avoid the cost of ripping and replacing existing infrastructure and investments.
- **Accommodate Future Needs:** Using Vignette's modular, open technology provides a foundation that enables organizations to accommodate the unpredictability of new technologies and future requirements with simple integration.
- **Leverage the Value of Existing Content:** Exposing and distributing content to wider audiences makes it possible to stretch its value. Quality content that is useful to one organization can now easily be leveraged to many organizations providing a greater return on the original development investment.

Summary

Given the nature of today's evolution towards online content creation and accessibility, what must an organization desiring to compete (or at minimum show up) have the ability to do? If reduced to simplest terms, they must meet the following requirements:

- **Give What Consumers Want:** Provide content consumers with relevant information in a desirable format and available through multiple touch points
- **Share Information Inside and Outside:** Aggregate content from multiple internal and external sources and be able to safely share it internally and externally with customers, partners, suppliers, employees, subscribers and other content consumers
- **Integrate with Existing Systems:** Leverage existing business processes and investments in applications and infrastructure as well as work with other industry standard solutions to reach the desired solution effectively and without undue expense
- **Effectively Manage Content:** Effective content management consists of superior management of information about content — knowing what it is, where it is located, how it is formatted, who is authorized to access it, and what it can be used for
- **Work With a Leader:** Select a content management partner that has experience, technology and a success record

Vignette is the leader in content management applications because of superior technology, experience and expertise in all facets of the content management lifecycle and a success record with the world's leading online organizations. From its inception as a company, Vignette has focused on solving real business problems. It has been relentlessly committed to uncovering the issues at the core of a content management task and then providing the technology and services to address those issues. Vignette provides real solutions that enable interactive, online and personalized relationships; solutions that get out the door or off the ground and really work. Vignette's company culture is one of vision combined with practicality and the end result is … Vignette clients get results!

Glossary

Application Server: A computer in a Web network that provides application processing, data processing or enforces business logic. Application servers such as BEA WebLogic, IBM WebSphere, and Tomcat provide high reliability through load balancing, failover, and redundancy.

CIF: (Common Intermediate Format) A video conferencing standard that helps ensure common resolution.

CXML: (Commerce XML) An XML format that is used for e-commerce with tag specifications for purchase orders, changes, payments, order status and shipping information.

DTD: (Document Type Definition) Templates that specify how XML and SGML documents are to be interpreted or displayed.

EJB: (Enterprise JavaBeans) The component level elements of the Java architecture. Enterprise Java Beans are encapsulated with layers that provide a consistent interface and security and transaction functions.

ICE: (Information and Content Exchange) A specification for the exchange of information between one Web site and another. ICE is based on XML. Vignette co founded the ICE standards group and developed the first production implementation.

J2EE: (Java 2 Platform, Enterprise Edition) The latest Java platform from Sun. J2EE was designed for building enterprise-class, Web-based applications and includes a Java server engine for processing EJBs, servlets. J2EE is the basis of many application servers.

JSP: (JavaServer Page) Similar to the Active Server Page, JSP is Java technology that provides development capability for displaying dynamic online content. Web pages are embedded with source code that can be executed on an application server.

Portal: A Web site that aggregates content from multiple sources to a common view. The view is often personalized to accommodate the needs of a particular user, group or role.

Portal Server: An application server that provides the service of hosting a portal.

Portlet: Portlet are pre-packaged components of a portal that provide various specialized functions. A "calendar portlet" might provide a calendar in a portal view.

Repurpose: The taking of data, information or content that has been created for one purpose and repackaging it through reformatting and modification for another purpose.

RosettaNet: A standards group that focuses on standardizing interfaces for e-commerce for supply chain partners.

SOAP: (Simple Object Access Protocol) A message-based protocol for accessing Web services that uses XML as its basis.

Syndication: The process of taking content from one source and distributing it to on or many destinations or subscribers, often automatically.

Taxonomy: The science of classifying or arranging objects (content, words, descriptions, etc.) in a hierarchical, related order. Classifications can be by group, function, physical properties, similarities, and a host of other categories.

UDDI: (Universal Description, Discovery and Integration) A specification that enables organizations to find and consume services on the Web. UDDI establishes a catalog or directory of services that are provided on a Web site so that services can be automatically discovered and integrated.

XML: (eXtensible Markup Language) XML is an open, self-describing, vendor-neutral markup specification for designing a markup language for use with content and data. XML enables the conversion and formatting of data in different formats and schemas to be automated through custom developed markup specifications.

Appendix: Vignette V6 Content Suite Adapters

Appendix

Adapter Category	Adapter Name
XML	XML
COM	COM Automation Client
	COM Automation Server
Data Integration	Buffered File
	File
	Flat File
	JDBC
	ODBC
Desktop Applications	Microsoft Exchange
	Microsoft Excel
	Microsoft Word
	Microsoft Project
	Lotus Notes
	WinFax Pro
FTP	FTP Client
HTTP	HTML Form
	HTTP Client
	HTTP Server
	Servlet Deployment
Integration Tools	Basic
	SNMP
	Calculations (Aggregate, If/then, Decision Table, Formula)
	Error Handling (Exception, Control, Stop)
	Events (Timer)
	Logging (Log)
	Looping (Counter, Loop)
	Management (Instrument)
	System (Clipboard, Command Line, System, SMTP Mail)
	User Interface (Dialog)
	Values/Sorting (List, Variable)

Appendix (continued)

Adapter Category	Adapter Name
Java Bean	Java Bean Server
	Java Bean Client
JMS	JMS
IBM	MQSeries
Legacy Access	3270
	5250
MSMQ	MSMQ
CORBA	Orbix Client
LDAP	LDAP
EDI	EDI
	EDIFACT Envelope
	X12 Envelope
Enterprise Java Bean	EJB Server
	EJB Client

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