

IBM Research Report

Challenges of Business Media

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Within the last few years audio and video have become standard data types in the business world alongside conventional text, numeric, and coded data. Because digital media is becoming acknowledged as a standard data type, it will become the medium not only for personal communications, but also for business-to-employee, business-to-business, and business-to-consumer applications.

The media and entertainment industries were the first to adopt digital media. Content creators, retailers, broadcasters, and service providers digitized their core assets such as music, broadcasts, film, and other entertainment programs to make them available on the Internet to a variety of consumers and businesses.

Since then, digital content creation devices such as digital cameras and camcorders, and tools such as audio and video editing and postproduction software have become affordable and easy to use. In addition, widespread broadband connectivity is now available at home as well as on the road through cable modems, digital subscriber lines, wireless hot spots, pervasive devices, the General Packet Radio Service, and the Universal Mobile Telecommunications System. This has led all kinds of enterprises—from e-tailers to brick-and-mortar stores—to use mixed, nontextual digital content in their businesses.

As the use of digital media improves the effectiveness and efficiency of business processes, it ultimately impacts the three Cs of the market—customers, competitors, and company. The first benefit of using digital media in an enterprise will be the reduction in costs in travel and administrative expenses as well as the savings in time for areas such as corporate communications, collaborative meetings, marketing, and e-learning. Next, companies in a broad range of business areas will use digital media to create new business and revenue opportunities. It is expected that 80 percent of Global 2000 enterprises will support live video and video-on-demand on desktops by 2006.¹

Characteristics of business media

Business media consist of company information, customer data, and media products as combinations of audio, video, images, animations, and other unstructured data. Collectively, these data types are known as *rich media*. By themselves or together with other data, they add rich detail to the description of products or services; they aid as recorded evidence of the real world in data analysis and reasoning; and they help computational tools become better adapted for human use. A few examples of business media applications include Webcasting for corporate communications, dynamic display boards for marketing with customized media and images, and voice over IP.

Business owners and managers are starting to view business media as assets. These assets are becoming mission-critical data for many content-centric and content-rich business applications. Because the amount of media content in company intranets is exploding, business media assets retained for reference and value are growing at a much faster pace than traditional data. Business media create value by expanding the functional and business scope of applications. Business media allow companies to rapidly repurpose valuable assets (such as brand asset management), as well as improve collaboration, communication, and efficiency that give them a competitive edge. To reap these benefits, digital media technology must become an integral part of the company's IT processes.

Digital media content is complex and, while it might be inexpensive to create, it's generally expensive to manage and distribute. Extracting business value from media can be difficult, depending on the application. Often, business media content is used in combination with traditional business data such as training records or inventory and invoice data.

Today, special-purpose media subsystems using proprietary technology are often treated as

weakly linked add-ons to applications, rather than well-integrated components in a company's IT architecture. This makes it difficult to integrate new rich media content models with existing legacy business data. It complicates the workflow in billing and commerce systems, customer service applications, and network infrastructures. Often, the add-on nature and use of proprietary technologies results in short-lived complex custom solutions. Finally, media data today is typically owned by individual applications such as news archive management, rather than being treated as common business assets. Unfortunately, this approach leads to isolated point solutions.

Business media scenarios

Here we describe a few scenarios that show how corporations are using digital media to enhance their employee and customer communications, improve the effectiveness and efficiency of business processes, and create new business and revenue opportunities.

Streaming media business applications

Timely dissemination of corporate information to employees, business partners, and customers is emerging as a critical success factor for global enterprises. Digital media has proven to have high impact and improve the retention of the messages transmitted. Often, the communication has to extend across multiple cities, countries, or even continents, and must support reliable, affordable, and private desktop-to-desktop communications for effective collaboration.

Live streaming broadcasts via corporate intranets let executives deliver critical business, financial, and personnel information across the entire organization. For speedy and effective product launches in the market, streaming media-based training applications reduce the time taken to educate the marketing and sales force, enable the channels, launch the products, and inform potential customers. Voice- and video-conferencing delivered to desktops enrich the level of communication and interactions provided by email and instant messaging and act as a viable alternative to face-to-face meetings that often incur high travel expenses. The regular use of digital media enhances collaboration efforts while reducing costs.

We see an evolution from earlier ad-hoc intranet streaming media deployments in companies to enterprise-wide content distribution

networks for controlled streaming media delivery that better manages increased network traffic. Centrally managed business media repositories can create knowledge assets out of transient communications such as Webcasts and support their effective reuse.

Customer relationship management

Enterprises increasingly require the capability to integrate structured data resulting from transactional applications such as enterprise resource planning and supply chain management with related, unstructured digital media such as graphics, sound files, video files, blueprints, and schematics as well as emails and document correspondences. Companies also need to improve customer interactions as part of their customer relations management.

For example, an important aspect of effectively managing a customer relationship is the ability to relate a voice conversation with a business transaction. In a typical call center today, customer calls are routinely recorded on tape, manually indexed, and archived in large tape libraries.

Likewise, in investment banking and other financial corporations, interactions between analysts and businesses such as conference calls are tracked and recorded as audio or video for regulatory compliance. If information discussed in a previous call is needed, it is slow and cumbersome today to find the recording of the call.

Digitizing this information and recording it along with associated metadata and business data will allow these data to be easily searched, retrieved, and shared. Integrating and correlating this business data with media data can facilitate customer service and satisfaction. This enhanced user experience can lead to increased sales and brand loyalty. Indexed recording of calls and conferences will also support enhanced information mining. For instance, financial services companies can analyze trades executed based on information callers have received.

E-learning media

Rapid adoption of broadband communications and advances in multimedia content streaming and delivery have led to the emergence of Web-based learning as a viable alternative to traditional classroom-based education. The Internet has changed the way universities and corporations offer education and training. It propels them away from conventional means for remotely distributing and delivering courses and

classroom lectures such as television networks, and steers them toward Web-based offerings.

Online learning, often called e-learning, has become an accepted means of employee training and education in enterprises because of its compelling advantages in personalization, focus, trackability, and reduction of travel cost. The *Wall Street Journal* predicted that the corporate e-learning market would grow to \$14.5 billion by 2004.² Streaming media over intranets and the Internet can deliver e-learning on a variety of topics any time to accommodate the learner's schedule and style. Solutions are therefore needed to make learning content management faster and easier to deploy across an organization, and to make learning content purchase and delivery efficient across businesses.

Recently, researchers in both multimedia and education have focused on building systems such as e-Seminar³ and the Berkeley Multimedia Research Center lecture browser (see <http://bmr.berkeley.edu/frame/projects/lb/index.html>) for classroom video acquisition, distribution, and delivery. Elsewhere, Rui et al.⁴ discuss the technology and videography issues in lecture capture and distribution.

Although we can automate media acquisition and distribution with such systems, challenges remain in the areas of educational and training video access, standards-compliant content annotation for search and sharing, and easy sequencing and interaction with the learning media content. Automated content indexing and annotation of learning media become key tasks in customized content delivery and consumption. Particularly in the context of e-learning, there's a large amount of material such as slides, whiteboard contents, and simulations associated with the audio and video streams of lectures.

A useful learning media management system must enable cross-referenced access to all the materials pertaining to a course's media in a synchronized manner. It should also facilitate searching for a topic, a slide, or a specific instance of captured whiteboard content within a course. Finally, it should support smart browsing interfaces based on the content of the captured media data and assist in semantically guided navigation via automatically structured and tagged course media.

Automatic indexing of learning media is a key technology needed for creating useful, easy-to-use access structures beyond today's simple storyboards. We still need research on parsing and

structuring media content that automatically establishes semantic relationships between the content's various elements (such as audio, slides, whiteboard, and video). We also need to develop joint audiovisual algorithms to deliver concise multilayered, concept-oriented content descriptions for search, in contrast to the low-level features such as shots, keyframes, or keywords from speech that are often used today. Finally, to foster sharing and reuse of learning content we must support data models that comply with e-learning standards such as the IEEE Learning Objects Metadata, Sharable Content Object Reference Model, and MPEG-7.

What's needed?

The full integration of digital media as a commonly available data type for business applications will cause a major transition in computing infrastructure and solution architectures. While many corporate uses of digital media can be handled with the current infrastructure, as the amount and file size of the digital media grows, more than simple capacity improvements need to be implemented. Other required improvements include technological changes to

- handle the increase in traffic and number of connections;
- satisfy latency, user response, and other quality-of-service demands;
- meet storage and caching requirements; and
- provide the infrastructure to intelligently manage huge amounts of digital media and deliver it efficiently.

Effective content management requires an enterprise-wide approach to facilitate

- content acquisition and archival;
- workflow;
- version control;
- meta-tagging;
- file conversions and transformations;
- security, permissions, and rights management; and

- integration with multiple repositories, applications, and delivery networks.

Software providers should embed support for digital media directly into their middleware and infrastructure products to support the creation of complete solutions. This support must address the scalability, complexity, and other unique requirements associated with large amounts of unstructured data in various formats. It should provide integration points necessary for seamless implementations of component products for solutions that manage the entire content lifecycle. Development and acceptance of media standards will be especially important to enable interoperability of both media and content, minimize technology investments, streamline operations, reuse and repurpose digital media, and deliver it securely to the widest audience possible.

The business needs for media are concrete; the problems we need to address are real. Our community needs to find real solutions too, for high-level semantic analysis, provisioning and management of mixed-media information, and distribution and delivery of media data to satisfy requirements dictated by business scenarios. **MM**

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2. R. Eure, "On the Job," *Wall Street J.*, 12 Mar. 2001, p. R33.
3. A. Steinmetz, "Media and Distance: A Learning Experience," *IEEE MultiMedia*, vol. 8, no.2, April-June 2001, pp. 8-10.

For More Information

There are several good sources describing standards and business media issues mentioned in this column:

- *Sharable Content Object Reference Model (SCORM)*: <http://www.adlnet.org/index.cfm?fuseaction=SCORMDown>
- *IEEE Learning Object Metadata (LOM)*: http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf
- *MPEG-7*: <http://www.chiariglione.org/mpeg/standards/mpeg-7/mpeg-7.htm>
- *Enterprise media applications*: http://download.microsoft.com/download/5/a/1/5a1e7a6b-8d48-4ca8-b3dd-751b0bc9d7ac/KPMG_EBM_Whitepaper_Final.pdf
- *Enterprise streaming media*: <http://www.streamingmedia.com/whitepapers/Enterprise-White-Paper.pdf>
- *Yearly amount of media creation*: <http://www.sims.berkeley.edu/research/projects/how-much-info-2003/execsum.htm#broad>

4. Y. Rui et al., "Automating Lecture Capture and Broadcast: Technology and Videography," *Multimedia Systems*, vol. 10, no. 1, June 2004, pp. 3-15.

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