



Update

Knowledge and Content Delivery for the Offline Worker

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INTRODUCTION

Access to technical or corporate information is as critical for personnel in remote and poorly connected sites as it is for personnel in well-connected locations. When problems arise, personnel in remote locations must have access to the expert knowledge and content typically located in major centers, because money or even lives can be lost if accurate, up-to-date information is not available. Far-flung organizations like oil and gas companies face special challenges in providing technical information to sites with poor or nonexistent connectivity. Most knowledge management (KM) solutions are Web-based; they require swift and dependable Internet support. In this *Executive Update*, we recommend evaluating and implementing content management solutions that include offline capabilities, and provide a list of candidate selection criteria.

WHY IS REMOTE ACCESS TO KNOWLEDGE NECESSARY?

Everybody wants up-to-date information, and most corporations acknowledge the value of KM, but it is difficult to demonstrate a definite relationship between knowledge sharing and business ROI. In the benchmarking studies of APQC (American Productivity & Quality

Center) [1], however, several corporations reported significant ROI from KM including these three oil and gas industry examples:

- BP — drilling cost reduction
- Shell — increased facility uptime
- Schlumberger — reduced time to resolve technical queries

More employees than ever are connected most of the time, due in part to advances in remote access technologies, including VPN and wireless networks. Therefore, it makes sense to offer corporate information through Web-based enterprise applications. E-mail was adapted to the reality of intermittent connectivity as far back as the early 1990s; for example, the Post Office Protocol (POP) allows users to download e-mail, process it offline, and then upload their replies. However, no such widespread solution exists for Web access, and not all users and locations have easy Internet access. Emerging wireless connectivity standards may solve some of the “last mile” issues related to access, but not in the remotest areas or with total reliability. Many users in physically remote locations must cope with this contradiction: the knowledge they need is of vital importance and requires durable high-speed connectivity, but all they have to work with is low bandwidth or intermittent connectivity.

This issue is often ignored by a software industry accustomed to ample bandwidth, but it is quite common in industries with widely distributed interests in very remote areas that have little or intermittent access to the Internet or to their organization's intranet. Among the organizations most affected by this issue are the military and relief

organizations, as well as oil companies and their service providers.

OFFLINE CAPABILITIES

Few enterprise content management (ECM) vendors have seriously addressed the need for replication for individual remote users, as opposed to remote facilities. While

this situation is slowly changing, it is important to work with vendors to understand whether the tools offer the capabilities needed by the organization in a cost-effective manner.

When evaluating an offline content access solution, a key question is whether one knows in advance which information will be needed. In a predictable environment, a user can selectively grab relevant information and download or copy that information to a portable device such as a laptop. This is common in applications such as legal discovery or field maintenance, where the information is finite and related to a specific case, trouble ticket, customer, or piece of equipment.

Many ECM engines offer a replication capability "out of the box" that in essence provides a duplicate offline system with all of the features and functionality of the primary system, including full text and indexed search in a secure environment that incorporates check-in and check-out capabilities.

When an offline replication capability is added to a content management system, it allows users to capture new information (such as best practices) while disconnected and upload it when their machine is reattached to the network.

No single solution suits all circumstances, but business and IT managers considering an offline solution should first determine their key requirements by answering the following questions:

Is It Known in Advance What Content Each User May Need?

If not, entire knowledge bases must be replicated, and search capabilities need to be quite sophisticated so that a user can locate rapidly, within this mass of information, the single knowledge "nugget" that can solve a problem or improve equipment performance. If yes,

REMOTE ACCESS TO INFORMATION: NEEDS AND EXAMPLE

As a global oil and gas services firm with workers all over the world, Schlumberger must provide access to its core knowledge bases to all of its employees. The Schlumberger online knowledge management system is called InTouchSupport.com. The complete solution includes: an online data repository with powerful classification and search capabilities; a real-time call center; and a workflow management function to escalate unresolved queries to a network of subject matter experts. MyInTouch Offline (MITO) is a PC-based module of InTouchSupport.com that allows users to subscribe to the knowledge and content areas germane to their activities. Based on these subscriptions, employees automatically receive updates from the global repository on their laptops for subsequent search and retrieval, using the same Web interface as connected users. Not only can users download data from the central repository when they connect to the network, but they can also synchronize with peers who have downloaded data more recently.

MyInTouch Offline on an Ocean Bottom Cable Vessel

Marine vessels, while at sea, have relatively limited connectivity; satellite links are expensive and suffer from high latency. To overcome this limitation, MyInTouch Offline was recently installed onboard three of the vessels making up WesternGeco's Marine Seismic Crew OBC-6 (Ocean Bottom Cable). Adrian Perkins, Positioning Specialist on the vessel Mugsy T, which operates off India and the Middle East, describes one success story:

As part of the OBC-6 operations we have to track the acoustic units attached to our cables. We use a RF (Radio Frequency) "tag" that is encoded and attached to the cable inside a carapace along with an acoustic "pinger." As the cable is spooled out, an antenna tells us which acoustic unit has been deployed.

When these "tags" fall out, we use a special interface box connected to a PC to program replacements. But we have three cable-laying boats and only two boxes, so we had to come alongside one of the other vessels and transfer the new tags by hand.

After browsing "Best Practices" through MyInTouch Offline, I discovered that these tags could be programmed using our back-deck reader. I had the software up in a few hours, and we now program our own tags. This saves 1.5 hours a week and decreases the need for tricky at-sea transfers, increasing efficiency in a high-cost environment while decreasing risk to the crew.

then object-level replication allows users to select the information they need rather than entire repositories. This greatly reduces system requirements (disk space, bandwidth) and replication time.

How Often Must the Information Be Refreshed or Replicated?

There may be inherent risks in the use of obsolete information, especially when the user deals with potentially dangerous equipment or environments. For Schlumberger, the decision was to incorporate peer-to-peer replication to ensure that personnel could receive the latest updates from other employees with more recent downloads.

Is the Replication One-Way or Two-Way?

If the user can make local changes that need to be uploaded to the central system, this may considerably improve the knowledge management capabilities of the organization, but it also complicates the technical solution. Two-way replication is required to ensure that any content added to the system is also updated to the primary repository when the user reconnects.

The data coming back from the field may be limited to new knowledge (e.g., candidates for new best practices), or it may include trouble tickets requesting help from experts. In the first case, the system must include a local offline application with forms that guide employees through the knowledge submission and classification process, since knowledge gathered from the field must align with corporate classifications or taxonomies. For this application to work, the classification itself must be replicated to the field system every time it changes (it is fairly rare to allow the field user to update the classification,

since resolving conflicting updates is almost impossible). In the second case, a workflow management tool must handle requests and replies reliably across the intermittent connection with the field users.

Is a Generic, Multi-Application Replication Architecture Required?

Is there a need to support multiple offline systems, or is the need limited to a single technical knowledge database application? A generic architecture that supports multiple applications, including some that may not have been deployed yet, is more complex and costly in the short term, but may be more economical in the long run.

Is a Search Engine Sufficient on the Remote System?

A simpler way to provide disconnected access to content is to copy the information from the master repository to the local system, and index it with a desktop search engine such as Copernic or Google. Though this is cost-effective, users lose the ability to utilize content and knowledge taxonomies. Rather than having directed search capabilities, full-text searches are the norm in this case, with their inherent limitations.

How Important Is Secure Content Storage?

Replicated content engines should also replicate security policies. As such, all content in the replicated system would carry the same access privileges as the primary content engine. Given the sensitive nature of information in industries such as energy or government, the security of a full content engine may be required — including encrypting the data so that it can be read only by the application. Access control rights may need to be propagated to the local systems. Check-in and

check-out procedures are necessary to ensure content integrity and provide audit trails for all content additions and changes.

Will Access Be Required from Multiple Types of Devices?

Intermittently connected users are, by definition, mobile users who increasingly wish to access content from a variety of devices — not only laptop PCs, but also PDAs, Tablet PCs, and smart phones. To support devices other than laptops, users may need to consider content access and delivery systems specifically designed for this purpose, such as Esker Software.

When examining specific products, the following technical characteristics should be studied:

Does the Solution Include Adequate Search Capabilities?

Desktop search engines typically implement full-text searches, which may provide users with many irrelevant results among which to find the information they need. A taxonomy and a thesaurus may be required to focus the search and narrow the results. For knowledge-based applications, classification systems are a must.

How Does the System Resolve Conflicting Updates?

Two people may update the same knowledge item in parallel. The replication system must resolve conflicts to ensure the integrity of the content within the repository. There are many ways to do this, including referring the updates to a human arbiter, or rejecting the second update and asking the user to resubmit it after looking at the modified data resulting from the first update. A certain policy may make sense to one organization, but not to another. A good replication system gives the client

choices as to which policy it will execute.

Does the System Recover Gracefully When the Connection Is Interrupted?

Unplanned disconnects are the rule not the exception in the kind of system we address in this *Update*. After the connection is lost, does the replication leave both the central and local databases in a coherent state, allowing continued use?

When the connection is restored, how does the system handle requests that were in progress and were not completed, given that both the local and the central knowledge bases have now changed compared to their state at the time of the earlier interruption?

Full-service ECM offerings provide additional features that may be important to an organization. For example, many ECM products

provide robust business process management (BPM) capabilities as well as integrated records management capabilities. These features should be considered when compliance, process automation, and audit are requirements.

REFERENCE

1. Vestal, Wesley. "Measuring Knowledge Management." APQC, August 2002.

APPENDIX: PRODUCTS

Below is a list of products that include offline replication capabilities for document and content management. This list is not exhaustive, and new products and capabilities emerge frequently. It is important to remember that no product is the best for every customer; an organization should perform a selection study and conduct a pilot project based on the priorities dictated by its own unique situation.

Full Service Offline Content Management Solutions

- **EMC Documentum enterprise content management platform** (www.documentum.com/solutions/content-management_solutions.html)

EMC Documentum provides content management capabilities in addition to collaboration. Replication allows users to create copies of content in offline repositories, providing the full capabilities of the content management product. Users not only have "take away" access to information but can continue to add to the content store to ensure synchronization with the primary server.

- **FileNet Content Services** (www.filenet.com)

FileNet provides replication and synchronization capabilities as well as integrated search. The integrated forms and BPM tools support KM-focused applications.

- **IBM Lotus Domino Document Manager** (www-306.ibm.com/software/lotus)

Domino Document Manager has offline repository capabilities that provide synchronization for full offline access to content repositories.

- **Microsoft Exchange** (www.microsoft.com/exchange)
- **Windows SharePoint Services** (www.microsoft.com/windowsserver2003/technologies/sharepoint)
- **Groove Networks** (www.groove.net)
- **InfoPath** (www.microsoft.com/office/infopath/prodinfo)

Microsoft offers multiple technologies for replication and synchronization of offline content, partially as the result of acquisitions. The company's recent acquisition of Groove Networks

increases its range of collaboration tools.

- **OpenText LiveLink ECM** (www.opentext.com/products/enterprise-content-management)

OpenText LiveLink ECM provides replication capabilities coupled with KM tools for best practice capture and collaborative review.

Desktop Search Engines

- **Copernic** (www.copernic.com)
- **Google** (www.google.com/enterprise)

Desktop search engines, which can search through files, e-mail, pictures, Web bookmarks, and other PC content, do not solve the issue of offline access to enterprise content, but they are useful when searching for documents downloaded to a PC without the index provided by the online solution.

Access and Delivery Software

- **Esker Software** (www.esker.com)

Esker provides transparent delivery for various devices and output formats, including mobile messaging on PDAs and smart phones, fax, e-mail, and other devices.

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