Tom Jenkins

Behind the Firewall

BIG DATA AND THE HIDDEN WEB:
The Path to Enterprise Information Management

ABOUT THIS BOOK

Wikileaks offered but a glimmer into the hidden Web. It's a world that exists behind the firewall, yet it's essential to the operation of the world. The enterprises of today depend on the intranet (also known as the hidden Web)—and all its information—to run their organizations.

We take for granted that today we can access enormous amounts of information and collaborate with others within our organization and on the Internet. We'll examine how Big Data and Enterprise Information Management (EIM) developed over the last 40 years and how the Web has made the demands, and the possibilities, explode.

Technologies are evolving at a rapid fire rate, putting us much further ahead than we earlier anticipated. We have already advanced well beyond Web 2.0, which only just arrived as a phase in Internet development. This book traces this technological evolution from the early days to the current shift in computing and the delivery of content and services to users. Behind the firewall, where the database and application suite remain critical core components to an enterprise infrastructure, the future belongs to the combination of Customer Experience Management, Enterprise Content Management, and Business Process Management.

THIS BOOK IS DEDICATED TO

John Shackleton

President and Chief Executive Officer
of Open Text Corporation 1998 - 2012

John's strong leadership and focus on collaboration amongst all the participants, from users to architects to software developers, systems integrators, and user support has been a great benefit to the Enterprise Content Management industry. John introduced many industry firsts in education, first-time integrations, and above all the integration of content management information into ERP systems and desktop GUIs. His contribution has positioned the industry for continued growth into the future into even more integrated enterprise applications using all aspects of business information.

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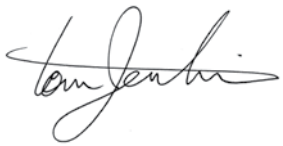
FOREWORD

WHAT'S PAST IS PROLOGUE.
(WILLIAM SHAKESPEARE. *The Tempes T*)

Our future is rooted in our past. To understand what lies ahead for OpenText and Enterprise Information Management (EIM), an appreciation of the last 20 years is required as the industry has grown, changed, and continually re-invented itself. This book chronicles this tremendous evolution, following content in its many forms that some 500 million people, or about one third of Web users across the globe have created, shared, stored, and managed over the past 20 years since the birth of the modern Internet. As society is continually impacted by the combination of content and technology, the future implies a necessary agreement on standards among enterprise users throughout the world.

This book is as much about the future as it is about the past. Ten years ago, we wrote the Enterprise Content Management (ECM) trilogy in which we defined the ECM market, described technologies, and provided a proven methodology for implementation. An encyclopedia of ECM, this set of books consists of over 1,000 pages of information on all major aspects of ECM. Reading these books will give you the basic knowledge needed to discuss ECM and its solutions, technologies, and bench-marking practices for successful deployment. This is a key base from which to understand the future of Enterprise Information Management.

A subsequent book, **Managing Content in the Cloud**, addresses the future of information management. It provides a beginner's guide to understanding the Cloud and ECM and how to develop and manage enterprise applications. And that brings us to this book, **Behind the Firewall**, which outlines how Big Data and the Hidden Web (behind the firewall) was built by OpenText and other companies, and how and why the core technologies were developed. The standards of today were built on the infrastructures of the past. By understanding this past, we can see that it provides signposts to many of the solutions to the challenges of the future.



Tom Jenkins
Executive Chairman and Chief Strategy Officer,
Open Text Corporation

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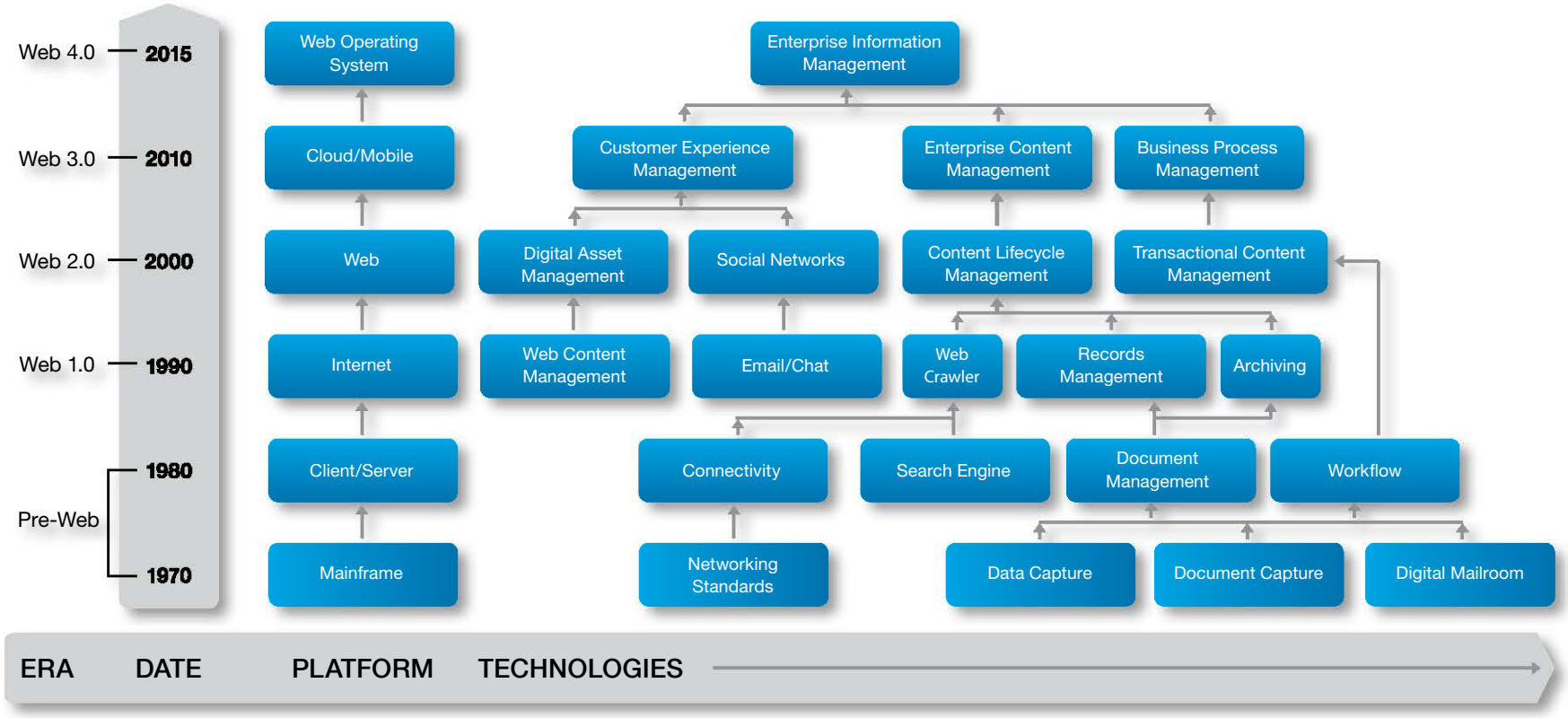
HOW THE HIDDEN WEB WAS BUILT



NAVIGATING BEHIND THE FIREWALL

HOW TO FIND YOUR WAY THROUGH THE BOOK

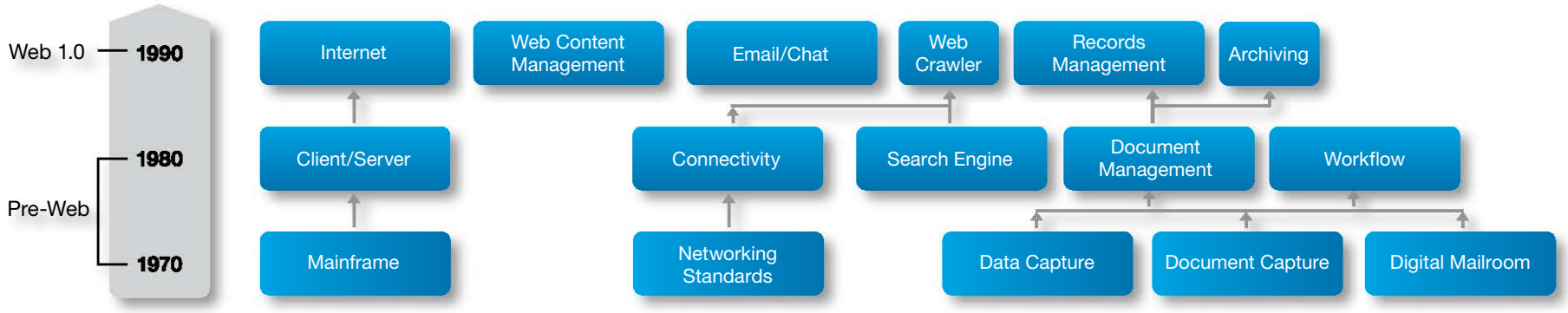
Since the 1970s, there have been extraordinary innovations in the technology industry. The use of mainframe computers in large organizations initiated the trend of using computers to help organizations work more efficiently. Early commercialization in the computing industry laid the groundwork for later developments in Web technologies and the resulting proliferation of content in all formats, both within and outside of the enterprise.

The journey described in this book begins with these technologies, many of which were in development before OpenText existed. It winds its way through stories about how technology impacted the enterprise, how the enterprise affected technology, and how consumers have brought technologies inside the firewall to influence how they are used inside the enterprise. The journey is marked by eras and the evolution of Enterprise Information Management (EIM) is progressive; the core technologies developed in each era are dependent on their predecessors.

	1970s	1980s	1990s	2000s	2010s
Who	IBM®	Microsoft®	SAP®	OpenText	Various
Why	Clerical Productivity	Personal Productivity	Departmental Productivity	Org. Compliance & Productivity	Mobility
How	Data Processing	Email; Desktop Publishing	ERP	ECM	EIM
Computing Environment	Mainframe	Personal Computer	LAN	Ubiquitous Computing	Web as an operating system

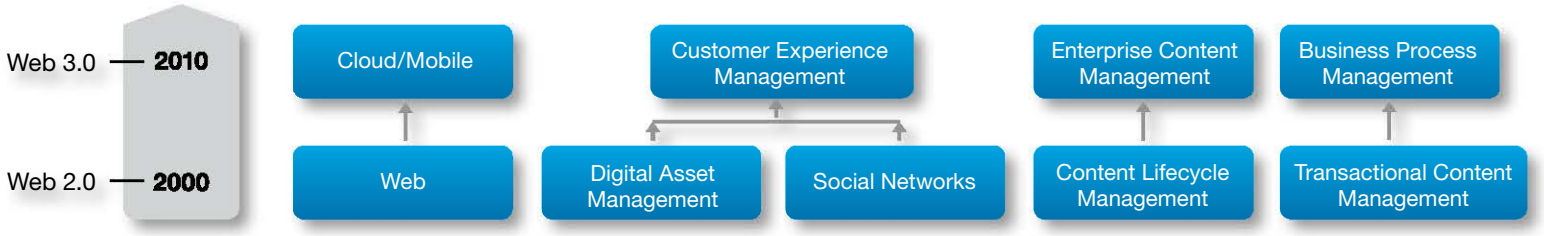
ERAS OF COMPUTING

The era that describes early technology development and the beginnings of EIM is called **PRE-WEB**. Chapter 1 examines this era and the technologies that were required in the 1970s and 1980s to automate systems in the enterprise, on-ramp content that only existed in paper format, and store, manage, and make this content accessible for future use.



WEB 1.0, introduced in Chapter 2, covers the 1990s and mainstream use of the Internet. It describes the tools that were needed to develop content for the Internet and to search the overwhelming proliferation of pages and information. Basic workflow technologies emerged over the Web as users wanted to perform repeatable tasks and this evolved as efficiency tools inside the enterprise were created so the content and people could be brought together within a set of business rules.

With the millennium came **WEB 2.0** and many of the Web 1.0 technologies converged and matured. Chapter 3 follows how the Web evolved. With it, technology emerged to manage not only digital assets, but interactivity behind the firewall that allowed knowledge workers to engage with others inside and outside their organization. This enabled the conversations that led to online management of transactions through a lifecycle that connects people, processes, and content across an organization.



WEB 3.0 is described in Chapter 4, and this era bears witness to the revolutionary blend of mainframe and Web technologies to produce cloud computing. This, when combined with mobile devices, not only improves customer experience, but gives both consumers and organizational users the ability to access applications and content at any time, in any place. During this era, ECM becomes a required solution to help many organizations securely control the burgeoning amounts of content behind the firewall. Organizations are impacted by the "Consumerization of IT" as users demand that applications have the ability to use their personal mobile devices within a cloud computing environment and the need to securely manage content outside the firewall becomes apparent.

All of these technologies culminate in the final era, **WEB 4.0**, described in Chapter 5 of this book—Web Operating System and Enterprise Information Management. Without cloud technology, mobile applications, or "apps", and their associated content could not be accessed securely within the enterprise. And the secure repositories of ECM have paved the way for the future development and management of enterprise applications. Chapter 5 examines the use of the Web as an operating system, and mobile apps and Enterprise Information Management in detail.

The core technologies of the past have led us well into the future. Future technologies are rooted in innovations of the past. Internet technology is advancing at an accelerated pace, as reflected by the volumes of content produced by emerging Internet technologies. When applied behind the firewall, the effective use of these technologies—from the desktop and the Internet to mobile devices and the Cloud—helps organizations continue to evolve and innovate.

OUR FUTURE IS ROOTED IN OUR PAST

A LOOK BACK TAKES US FORWARD

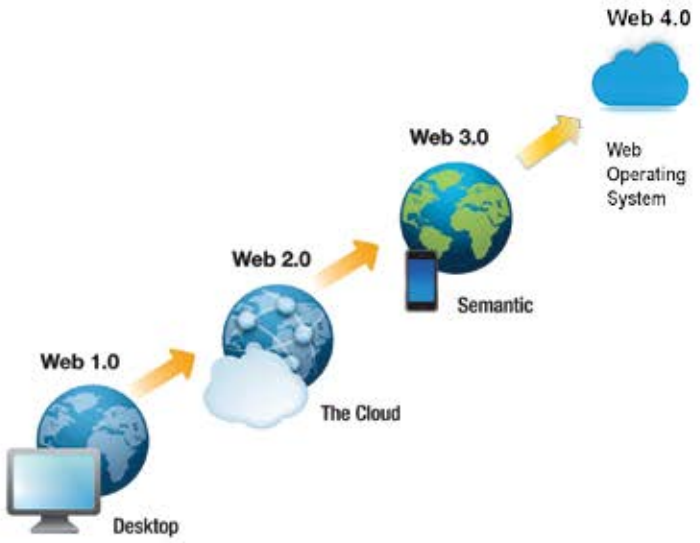
As the consumer Internet evolves into its "fourth generation", or Web 4.0, innovations are radically changing how people use technology. The distribution and interaction of very specific applications or "apps" on personal mobile devices promises to have a huge impact on the enterprise.

That impact has been called the "Consumerization of IT". It refers to how employees will become consumers of technology and describes a new relationship between enterprise users and the IT department. As consumer products like smartphones and the tablets drive technology adoption inside the enterprise, the IT department will evolve into a distribution platform for a variety of mobile apps.

While the social impact of Web 4.0 is substantial and well understood by most Internet users and society at large, the enterprise has yet to grasp the profound economic impact of these new capabilities. From 1992 to 2012, the Web has undergone a series of evolutionary steps as shown in the following diagram:

- Web 1.0 is the original GUI network which provided access to content (e.g., Google®).
- Web 2.0 is the social Web which allowed people to share items with each other (e.g., Facebook®).
- Web 3.0 is the Semantic Web and takes advantage of prior knowledge about things to permit more accurate and accelerated access to people and content (e.g., LinkedIn® suggested jobs).
- Web 4.0 is generally referred to as the Web operating system and this provides a simple way for people to access other people and content through specific "apps" (e.g., Apple® App Store®).

Using a Web operating system (like Apple iOS or Google Android™), would not be possible without the foundations provided by Web 1.0, Web 2.0, and Web 3.0. From a corporate or organizational perspective, the translation of these innovations behind the firewall requires a subtle, but important, rethinking of how apps are provided to users.



ERAS OF THE INTERNET

The essential translation is this: the public Internet assumes that everyone and everything is open and willing to be "found". The private Internet, on the other hand, requires that "finding" be on a selective basis that is situation-specific. In other words, permission is required to access certain content behind the firewall. That makes the application of public Web technologies inside the enterprise, by nature, more complex.

This book tells that story by navigating the reader through the various evolutionary stages of the Web to deliver a baseline understanding of the evolution of technologies to Web 4.0 inside the enterprise (also referred to as Enterprise 4.0). Having an understanding of the difference between the public and private network requirements is fundamental to applying the innovations from the consumer market to the business market.

BIG DATA: DIVING BELOW THE SURFACE

An interesting aspect of the "Consumerization of IT" is that the adoption of new technology by IT departments is typically led by the business and government communities. This was the case for many decades and was how organizations adopted mainframe technologies, client/server, mini-computers, and early smartphones and tablets.

As the Internet matured, the consumer market grew and channels became more efficient, increasing the pace of innovation. The resulting transfer has been reversed with innovations flowing from the consumer market to the corporate market. This has substantial implications for organizations in making long-term decisions about architectures to adopt and allocating resources in the most competitive way.

The content on the public, or consumer, Internet is only the tip of the iceberg. The vast majority of the Web is not available to the public. In fact, only one to two percent of the entire World Wide Web is available to the public. More content is created every day on the Web by organizations behind their firewalls. Like an iceberg, the majority of this Web content exists below the surface (or behind firewalls) stored inside the archives of large organizations. This information dominates the world's electronic content and this means almost all of the knowledge on the Web is accessible by permission only. This content is sometimes referred to as Big Data.

THE DEEP WEB

ORGANIZING THE WEB BEHIND THE FIREWALL

Before examining the key differences between the consumer Internet and the Deep Web, it would prove helpful to examine how the Web is organized behind the firewall. Companies are typically structured by department around specific lines of business—accounting and finance, legal, marketing, sales, information technology, research and development, and so on. Over the years, software applications have been designed to meet departmental requirements. These solutions are typically targeted at helping people complete certain tasks, but generally help the enterprise improve efficiency or save money.

Each of these departmental systems works well in isolation. In an enterprise context, however, they create silos between departments, resources, and content. Many of these departmentally-focused applications were first written on client/server architecture, meaning that they had to be installed onto client desktop computers and communicate with a server. The Internet changed all this by introducing a flexible infrastructure that allowed for applications to be Web-based. Just as the

desktop provided users with seamless access to the applications they needed on their desktops to do their jobs—the Web promised to move beyond the interface to encompass the entire enterprise and work across applications, processes, and systems.

SILOS: DEPARTMENTS WORKING IN ISOLATION

A Web-based application is a program that is accessed over the Internet, or an intranet, and is usually coded in a browser (Internet Explorer® or Firefox®) supported language. In other words, the application relies on a Web browser to run. Web-based applications were popular out of the gate due to the convenience and ease of accessing programs using a Web browser as the client. IT departments were liberated from complex and lengthy upgrade procedures as they could update and maintain applications without installing the programs on any number of client computers. Developing Web-based applications resulted in lower total cost of ownership and faster implementation times.

Along with higher returns on technology investments, the Web as a platform also offered support for cross-platform development. Behind the firewall, the Web created the infrastructure support required by organizations to run and integrate a series of applications. Collaborating across departments is essential for many critical business operations and the introduction of the Web behind the firewall to run applications enabled people to collaborate more effectively, breaking down geographical and organizational boundaries. Behind the firewall, the Web created a common infrastructure for many different applications. But the enterprise had to make access to these programs, and the data produced by them, secure.

LOOKING FOR PERMISSION

Amongst many other factors, it is difficult to imagine the global acceptance of a Web operating system and app stores without the foundational infrastructure and technologies of Web 1.0 and Web 2.0, which gave people secure access to content and to each other to collaborate. This point is relevant for the public Internet as well as for the private Internet. Behind the firewall, however, the enterprise protects knowledge and people as assets and permission is required to access both.

Many of the most popular apps that can be downloaded in the consumer Internet make two critical assumptions of access:

- Content (e.g., Google)
- People (e.g., Facebook)

Without content and people, an app will not work. These two aspects give “life” to an app by bringing together like-minded people and providing contextual content for discussion. This is no trivial point. This is why Enterprise Apps require “permissioned” access to content and people. In order to better understand what is possible with Enterprise Apps, an appreciation of the current state of access within an organization is required, along with how this has evolved in parallel between the enterprise private and commercial public Internet.

Behind the firewall, organizations built private versions of Web 1.0 (intranets) and used internal search engines to help locate documents. This was especially helpful for litigation, to provide evidence of compliance testing, or for helping employees find answers to customer questions. These technologies gave knowledge workers access to content. In the late 1990s, organizations began to introduce social media tools (social networks), allowing users to share ideas by “blogging” (short for Web-logging). These sites were gathered into Communities of Practice sites and wikis, giving users shared access to knowledge,

people, and resources. A good working example of this is Motorola global intranet, Compass, which is combined with the company's social media portal and offers many features like blogs, wikis, and tagging alongside document management functionality.

FINDING PEOPLE AND CONTENT BEHIND THE FIREWALL

Internet users started "Googling" information in the late 1990s. Several early search engines existed before that. In 1994, the OpenText Index (OTI) was an example of an early version of Google technology. As the original search engine for Yahoo!®, OTI marked the arrival of the early Web. Tom Jenkins, CEO of OpenText at the time, and Jerry Yang, CEO of Yahoo!, launched their partnership together in 1995 in the first cyber café in New York City.

OpenText also provided search services like Google, Netscape®, MSN®, and MCI. In the early 90s, OTI was one of the most heavily trafficked Web sites. But OpenText evolved into performing search and other functions for organizations using their own internal Web sites or intranets (discussed further in Chapter 2). These original search repositories evolved into managed content repositories behind the firewall.

Before Facebook launched in 2005, organizations used early forms of social network tools to connect their employees. OpenText built collaborative products known as Communities of Practice or Social Media for Corporations that are used today as secure "Facebooks" behind the firewall. These applications were to become very important to apps management (discussed in Chapter 5).

JERRY YANG OF YAHOO! AND TOM JENKINS OF OPENTEXT

WORKING BEHIND THE WEB SITES

Since the early days of the Web, there has been a need to build the "Corporate Wall" so that organizations could promote and market themselves. OpenText produces sophisticated Web Experience Management (also known as Web Content Management or WCM), which powers many of the largest Web sites in the world.

"FACEBOOK" FOR CORPORATIONS

Managing Web sites can involve e-stores, which people are familiar with as the "electronic shopping cart". The management of Web sites with e-commerce functionality requires the careful administration of transactions using Web technology. This is very important to applications management, because the administration of application downloads from an app store also requires a secure transaction.

While consumers were busily shopping online, the rate of content creation behind the firewall outpaced the content produced by consumers by almost 100 times. In time, a large "hidden" archive known as the Deep Web was built behind the firewall. Although content solutions were developed for the entire global economy, the investment priority was given to solve problems in the financial, energy, and government sectors first. These sectors tend to have the highest priority placed upon them for regulatory compliance and an archive for litigation; and

compliance purposes is a key facet in an effective ECM system. These archives in the Deep Web have significance for new forms of applications or “apps” that will make use of this content.

MOBILIZING THE ENTERPRISE

In recent years, mobilized applications within the enterprise were developed to increase the productivity of employees so that they were “always on”. As a key forerunner to the app store, the ability to mobilize applications onto various mobile devices such as smartphones and tablets was essential. This was revolutionized by the first mobile device and app: the BlackBerry® and mobilized email and Personalized Information Management (PIM).

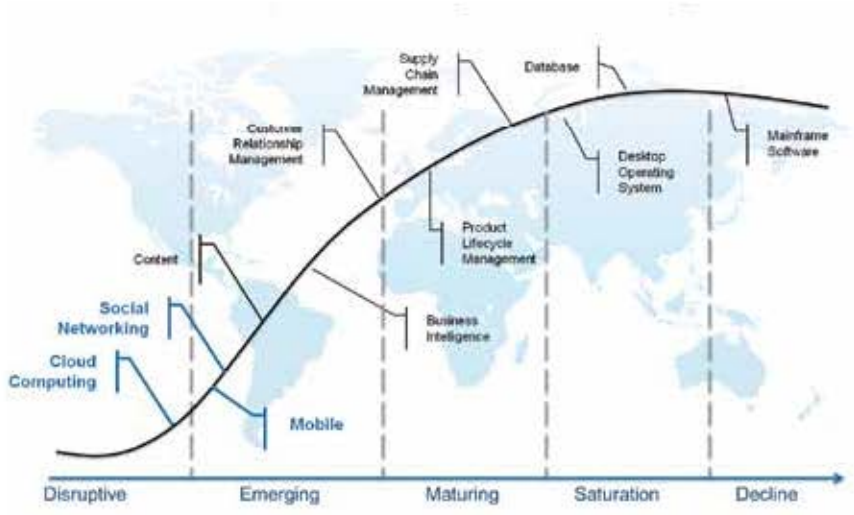
Consumers expect rich, mobile, social, and personal experiences. Behind the firewall, they expect to access the same tools and technologies they use at home to create these experiences at work. These expectations will continue to drive new devices, new applications, and new interactions. All of this will create new types of content to manage in new and more complex ways.

MOBILIZED APPLICATIONS WITHIN THE ENTERPRISE

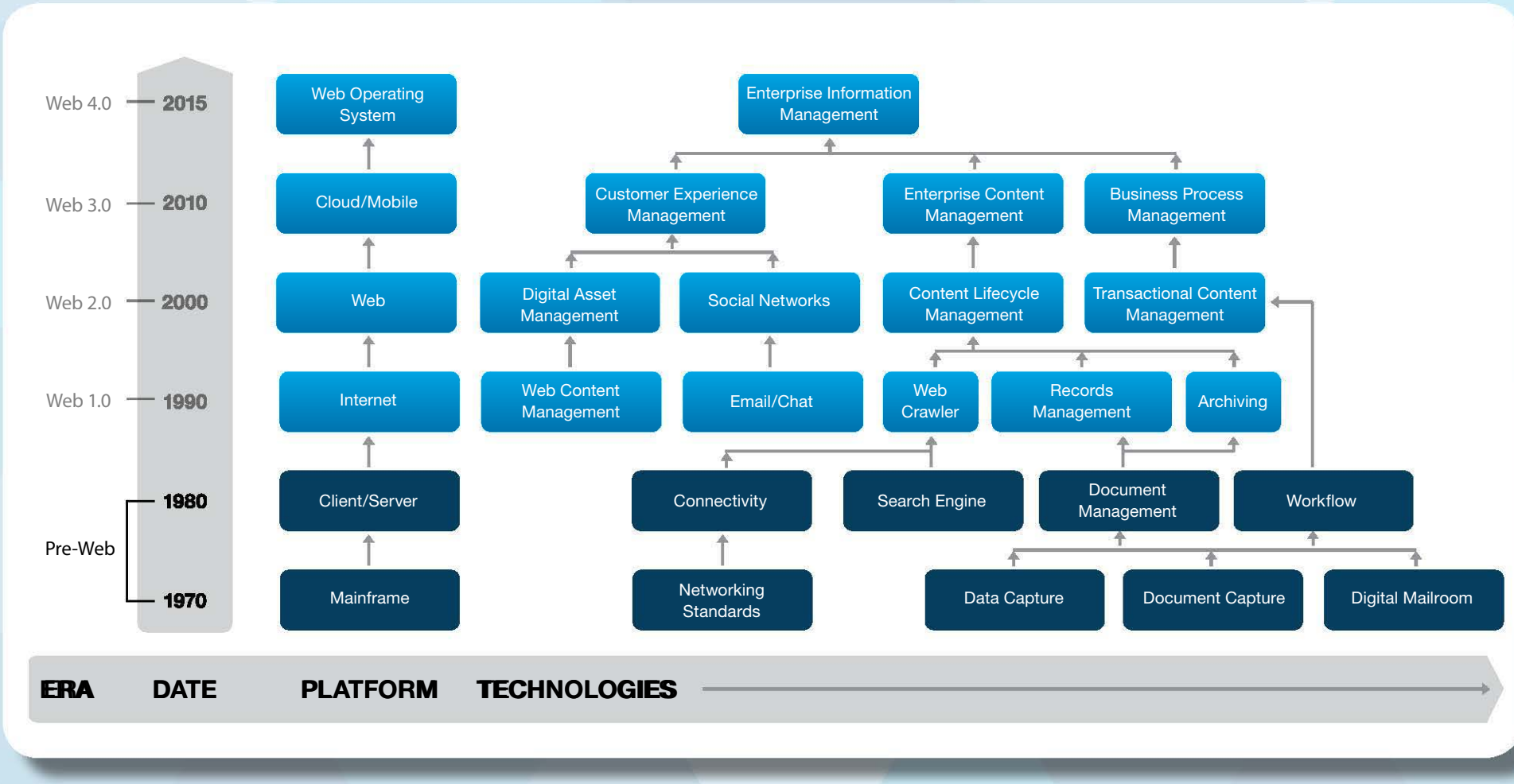
As consumers bring new technologies and personal devices to work, enterprise content will mix with personal content to create potential security breaches. For example, a personal iPhone® holds personal items such as pictures, email, and music, along with corporate information. Corporate information has certain security, governance, and privacy requirements—how can the enterprise enforce these rules for personal devices that are not owned by the organization? What happens when that employee leaves the organization—with sensitive information—and the organization is unable to wipe the device clean? How to ensure secure content and access to mobile apps inside the enterprise is discussed in detail in this book.

PREPARING FOR THE ROAD AHEAD

A tremendous wave of IT innovations is coming. In the diagram below, the wave of IT innovations started with the mainframe and database, through enterprise software that has reached various levels of maturity. The last three innovative technologies—social networking, cloud computing, and mobility—have not been dominated by any single vendor. As you read the following five chapters, you will gain an understanding of the development of past core EIM technologies and how their development was required to prepare for the road ahead.



A WAVE OF MAJOR IT INNOVATIONS


Web 4.0
2015
Web 3.0
2010
Web 2.0
2000
Web 1.0
1990
Pre-Web
1980
1970
Web Operating System
Cloud/Mobile
Web
Internet
Client/Server
Mainframe
Enterprise Information Management
Customer Experience Management
Enterprise Content Management
Business Process Management
Digital Asset Management
Social Networks
Content Lifecycle Management
Transactional Content Management
Web Content Management
Email/Chat
Web Crawler
Records Management
Archiving
Connectivity
Search Engine
Document Management
Workflow
Networking Standards
Data Capture
Document Capture
Digital Mailroom
ERA
DATE
PLATFORM
TECHNOLOGIES

Chapter 1

Pre-Web / 1970-1990

Laying the Foundation

The introduction of the Personal Computer (PC) significantly changed the way people work in an office environment, acting as a catalyst for the development of tools like Microsoft Offi e® and resulting in tremendous improvements in productivity and efficiency. Before the PC, documents were managed on a case-by-case basis, leaving behind a paper trail that was often untraceable. And while the PC was effective, it was somewhat limited; no greater system existed to connect personal computers together in an easy and effective way, so people and information remained disconnected.

Pre-Web

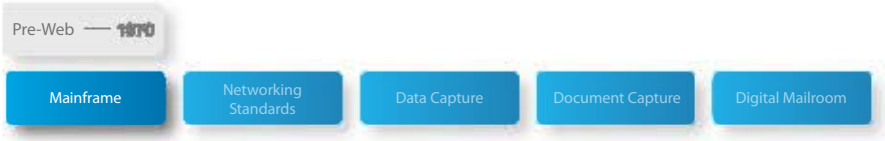
In the 1950s and 1960s, the computing world was dominated by huge computers called mainframes. Mainframes were large, powerful data processing systems that connected people in organizations more effectively than PCs because everyone worked through a central processing unit (CPU) and memory storage. Then, in 1970, small computers known as "minicomputers" ushered in the age of the client/server architecture. This architecture allowed organizations to connect different types of computers to the Local Area Network (LAN). New opportunities emerged for software development for databases, for example, and business planning software such as Enterprise Resource Planning (ERP) systems used to manage Human Resources (HR), Legal, and Accounting content. This type of software helped organizations improve efficiencies across many applications, from airline scheduling to the production of automobiles.

In the 1980s, as computers became even smaller and more affordable, organizations began to place one at every employee's desk. Computers could now "talk" to each other through phone lines. This resulted in decentralized computing, meaning that while hardware and software "lived" on PCs at individual workstations or office locations, the computers still shared files and devices like printers. Software systems expanded to help organizations digitize, store, and print their paper documents.

As computers evolved, so did networking technologies. CPU power grew and connection bandwidth increased. Without these two developments, the early Internet would not have developed as quickly as it did.

AUTOMATING BASIC COMPUTATIONS

In the 1970s, the **MAINFRAME** emerged as a forerunner of what would become cloud computing. At the time, mainframes were the only practical way of providing people with access to computing power, though they required cooling systems and entire buildings to house them. These early systems were large and expensive—in contrast to current trends with mobile technology being both affordable and portable. Only government labs, universities, and major corporations could afford mainframes.



Large organizations used mainframes to automate basic computations that had previously required many staff members to process. The bulk data processing applications usually included industry statistics, financial transaction processing, and ERP. Due to the critical nature of these applications, mainframes were appreciated for their defining characteristic: RAS. The term in computing refers to Reliability, Availability, and Serviceability. To take advantage of these three characteristics, IT departments had to plan and implement carefully. Despite the costs associated with extra planning and expensive hardware, organizations found that clerical productivity increased.

MAINFRAME COMPUTER

While they improved efficiency, these mainframes did not provide an interactive interface for users. The first mainframes accepted punched cards, paper tape, and/or magnetic tape in batch mode. This changed in the 1970s when special terminals gave users access to the mainframe in a timesharing mode. These terminals were called "dumb terminals" or "green screens".

ACTING AS A HOST

Popular into the 1980s, green screen terminals showed only the color green on a black background. Some cash registers still display a green screen. The monochrome or one-color monitor displayed text and numbers more clearly and were used with almost all dumb terminals.

A dumb terminal refers to any type of computer terminal that does not process its own data or run software; this is all done on the mainframe computer. This included network computers and X terminals. Basically, the terminal acted as a host, displaying the information while the X-server ran the application and transmitted data in the background. The multi-user server, for example, ran multiple instances of the one copy of the word processing program on the X-server.

A DUMB TERMINAL OR GREEN SCREEN

The mainframe represents, in essence, the first example of cloud architecture. The mainframes housed central processing units and memory and were connected to dumb terminals or green screens. Because applications ran off the mainframe, not the terminal, the slow speed of the connection between the two limited the applications. The Cloud is truly a "back to the future" moment in computing as much of the architecture and applications software is borrowed from early innovations in mainframe architecture, including the use of green screens or dumb terminals.

A key difference between today's Cloud and yesterday's mainframe computing is memory. Because all the computing happened inside the mainframe and not at the dumb terminal, memory at the terminal level was not a concern. As computer hardware companies endeavored to personalize computing, more advances were required to build memory systems that were compact and inexpensive.

BUILDING THE FOUNDATION BIT BY BIT

The early memory systems were vulnerable and awkward to use. In the mid-1940s, cathode ray tubes using electron beams could store up to thousands of bits, but were extremely sensitive to environmental disturbances. Later in the decade, inventors, including An Wang who later founded Wang Laboratories Inc., which will be discussed in greater detail later in this chapter, started to explore innovations for a non-volatile memory. Read Only Memory, or ROM, is an example of non-volatile memory, or one in which the computer retains memory even when it is without power.

Another key player in the development of non-volatile memory was IBM® employee Robert Dennard. He figured out how to store a bit of memory as a charge on a capacitor in a single transistor cell in the late 1960s. Intel® used this technology as the foundation for their memory chip that could hold 1 kB RAM by 1969.[1] By the mid-1970s, DRAM or dynamic random access memory, was the standard for most computers. DRAM is an example of volatile memory because it requires a power source, but it was far less expensive than previous technologies.[2]

By the mid-1980s, personal computers were shipped with 128 kB of memory and a 1 MB memory chip was developed.[3] Two years after Nippon Telegraph and Telephone was incorporated as a private company in 1985 in Tokyo, it announced the successful development of a new 16 MB DRAM chip. The company had begun as a public corporation in 1952. The 16 MB chips could store the amount of information printed on 600 pages, but were not commercially available for a few years.

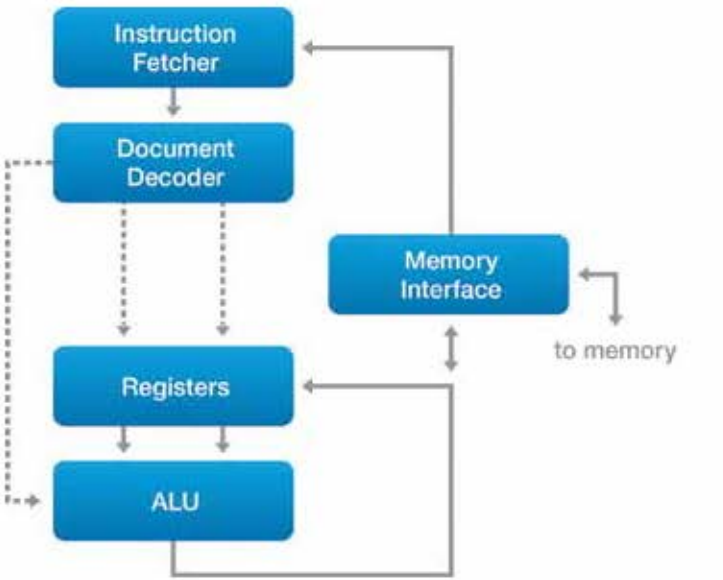
1 Bellis, Mary. History of Computer Memory. about.com: inventors.about.com/od/rstartinventions/a/Ram.htm
2 Miller, Stephen W. Memory and Storage Technology. AFIPS Press, 1977.
3 Bellis, Mary. History of Computer Memory. About.com Guide. inventors.about.com/od/rstartinventions/a/Ram.htm

INCREASING POWER

Another type of chip became very important for computers in the 1970s: the chip that houses the microprocessor. The microprocessor is the engine of the computer. The first chip could only add and subtract four bits at a time, but before the development of the single chip, engineers built computers from collections of chips or from transistors.[4]

Intel developed the first chip in 1971 to power a portable electronic calculator. Known for its innovations since its inception in 1968 in California, the first products from Intel were metal oxide semiconductor static RAM and bipolar RAM. It was the announcement of the 1103 DRAM that changed the industry as it became the standard for computer memory.

The microprocessor, also known as a CPU, is a complete computation engine housed on a single chip.[5] The CPU takes digital data as input, processes it by following the rules stored in its memory and then provides the results as output. A calculator provides a good example of how a microprocessor works.



CPU PROCESS[6]

When two numbers and the plus sign are inputted, the microprocessor follows rules to add the two numbers together and display the total as the output. Microprocessors in PCs are used for calculations, text editing, multimedia display, and communication over the Internet.

Each command a CPU performs takes a series of steps. A powerful CPU can process multiple commands in seconds. Originally, the calculations, or computations, that the computer could handle were very simple. Eventually, computers were designed to handle complex data such as American Standard Code for Information Interchange (ASCII) coded words. ASCII is a standard for the digital description of alphabets in a language using a single byte of memory in which a byte is composed of 8 bits and a bit is a simple one or zero. ASCII contains 128 numbers that are assigned to corresponding characters.

ASCII codes correspond to text in computers and they allow computers to store and exchange data with other computers and programs. In early databases, content such as a person's name was simplified to an employee number so that the computer could handle the computation. By the end of the era, 16-bit and 32-bit became the standard CPU size for computers. As the standard bit size grew, so did the need for faster and stronger memory.

As computers became more powerful and access to storage for content improved, organizations began to understand their value as productivity tools. But in order for computers to be optimized as office tools, an important development was required: all computers within an organization would need to be connected.

CONNECTING COMPUTERS, CONNECTING PEOPLE

In the 1970s, developments in computing paved the way for the coming Internet. Electronic engineers worked to invent connecting hardware and cables, increase speed and capacity, decrease hardware size, and increase overall hardware performance.

IBM, or International Business Machines Corporation, became the new name of the Computing-Tabulating-Recording Company in 1924. It not only produced electronic computer technologies, but enabled the US Government's Social Security Act of 1935 as the "biggest accounting operation of all time." Through the 1960s, it developed a revolutionary family of mainframe computers, the System/360™ family.

4 Pollack, Andrew. Japanese chip breakthrough. New York Times, Feb 5, 1987.
5 "Microprocessor". How Stuff Works: www.howstuffworks.com/microprocessor.htm
6 Martin, Chris. CPU block diagram.svg, 1 June 2006. Wikipedia: en.wikipedia.org/wiki/File:cPU_block_diagram.svg

The 1970s brought new products including technology used for the magnetic-strip on credit cards, floppy disks, and an early form of today's ATM machine.[7] Before it started to build the personal computer, IBM researchers invented the relational database—the technology that would build the foundation for future applications.

Despite technological advances in the 1970s, voice, data, and entertainment technologies were yet to be integrated. Analog telephone carried voice; broadcast radio and television carried entertainment; and RS-232 or Binary Synchronous Communications (BSC) serial connections between dumb terminals and mainframes carried data.

Before the Internet era, early cell phones operated on voice only. The size of small briefcases, these devices had limited battery life and limited mobility. Despite the awkwardness of the early cell phones, they are the early forerunners of the mobility trend—suddenly people did not need to be tied to a desk or a land line to communicate.

As leading companies in the telecommunications industry, Motorola and Bell Laboratories, Inc. were staunch competitors in the field of cellular research. Motorola had hired Martin Cooper in 1954 and he developed the first portable handheld police radio. Regarded by many as the father of the cellular phone, Cooper went on to design the first working cell phone prototype, the Motorola DynaTAC (DYNamic Adaptive Total Area Coverage). On April 3, 1973, Motorola held a public demonstration with a 30-ounce phone and that inspired Cooper's vision of personal wireless communication.[8] Five years later, in 1978, Bell Labs conducted its first trial of a commercial cellular network in Chicago.[9]

THE MOTOROLA DYNATAC

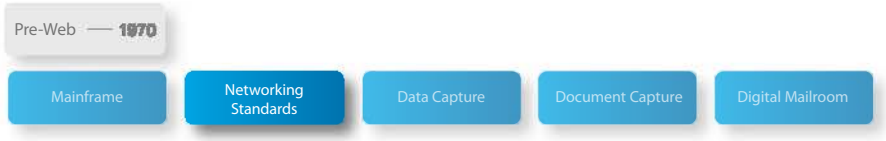
GETTING NETWORK-READY

It was Bell telephone systems that first began converting to the Digital Data Service (DDS) circuits in the mid-1970s. Later, Bell deployed Integrated Services Digital Network (ISDN) and DS1 lines to customer premises, and AT&T followed suit with its first digital switch.

As data services stabilized, computer networking technologies were being developed and tested. Since Chester Carlson's invention of xerography in 1938, Xerox® became known for its innovative products from printing, desktop computer workstations that combined computing, text editing, and graphics creation, and digital publishing systems. Yet it was the invention of Ethernet in 1973 in the Xerox research lab in Palo Alto that helped to later build the Internet.[10] Bob Metcalfe was the inventor of the technology, Altos, that was designed to connect the Xerox personal computers together. In 1979, he left Xerox to start his own company 3Com.[11]

The Ethernet technology takes a stream of data and divides it into smaller sections called frames. Every frame not only knows its destination with source and destination data, but also includes error-checking data to decrease damaged data. Though Ethernet did not become a standard until 1980, it did become the most common networking technology.

In the 1970s, the need to connect digital machines, such as mainframes and later minicomputers, required the development of **NETWORKING STANDARDS**, which led to the Ethernet, TCP/IP, and a variety of other standards. The standards provided a method for streams of digital information to be conveyed from one machine to another without human interface. These were the forerunner of all of today's Internet Protocol for streaming data between machines, as well as systems as large as cloud server farms.



Transmission Control Protocol (TCP) was published, but the architecture for Transmission Control Protocol/Internet Protocol (TCP/IP) architecture was not formalized until 1978. It was to become the most common communication language, or protocol for the Internet. Transmission Control Protocol assembles a message or file into smaller packets transmitted over the Internet. Then a TCP layer reassembles the packets into the original message. The Internet Protocol makes sure that the each packet gets to the right destination. To protect these packets as they travelled over the network, engineers Whitfield Diffie and Martin

7 Our history of progress. IBM Archives: Valuable resources on IBM's history. www-03.ibm.com/ibm/history/
8 Timeline. Motorola Solutions, 2012: www.motorolasolutions.com/US-EN/About/Company+Overview/History/Timeline#1970
9 Testing the First Public Cell Phone Network AT&T Tech Channel, 1979: techchannel.att.com/play-video.cfm/2011/6/13/AT&T-Archives-AMPS:-coming-of-age
10 Our History. Inside Innovation at Xerox: www.xerox.com/innovation/xerox-innovation-history/enus.html
11 Griffin, Scott. "Bob Metcalfe". Internet Pioneers. 2000:www.ibiblio.org/pioneers/lee.html

Hellman developed a public-key cryptography scheme in 1976. Without this development, the Secure Sockets Layer protocol from Netscape® Communications that protects privacy and transactions over the Internet would not exist today.

GROWING COMPUTER USAGE

While engineers were working on connecting computers, IBM was about to introduce something that would become one of the greatest moments in computing. In 1981, IBM introduced the PC; forever changing the way people would interact with information. Previously, an IBM computer cost approximately $9 million and required an air-conditioned space about a quarter acre in size and 60 people to constantly input instructions.

EARLY PC

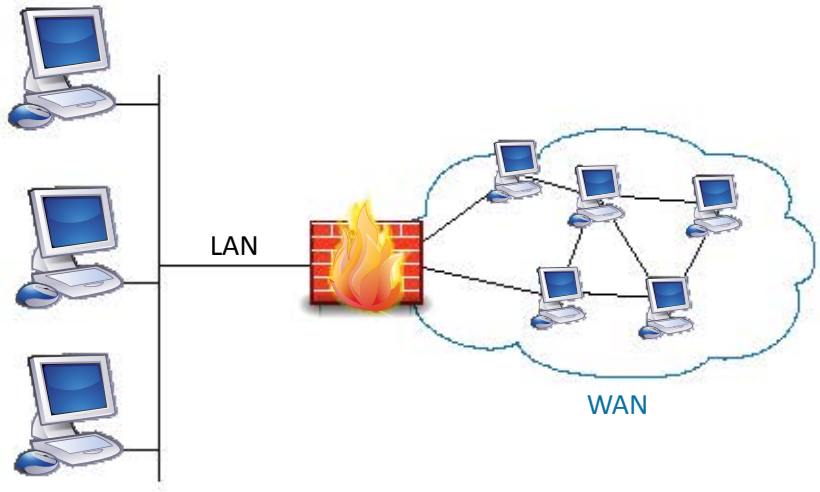
Suddenly, a much smaller machine with a microprocessor could process information faster and store more words than a large cookbook for less than $1,600. With the advent of the PC, businesses and individuals could now afford to buy computers. As computers became more widely accessible, productivity levels improved and the amount of digital content grew.

In1981, there were fewer than two million personal computers in use in the USA. By the end of the decade, there were 54 million personal computers. This growth was due to improvements in performance and organizations recognizing the PC as a valuable productivity tool. As organizations came to this realization, they started networking their computers to make more effective use of their content.

SETTING UP AND PROTECTING NETWORKS

Computer networking did not become a common business technology practice until the mid-1980s.[12] LANs preceded the much larger WANs (Wide Area Network), which eventually became the computing basis of the commercialization of the early Internet. In the early 1980s, office buildings, labs, and even homes were setting up LANs. LANs were created to meet the increased need for data transfer between PCs.

Within an enterprise, security of content became increasingly important as information was accessed on a computer. Organizations used firewalls to protect their networks. A firewall consists of a device, or a set of them, that allows network transmissions between a LAN and a WAN. A firewall uses a set of rules to protect networks from unauthorized users having access to information within an organization.

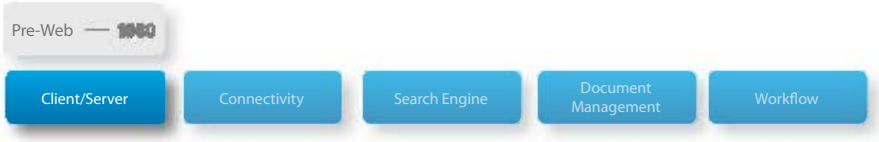


CONNECTING A LAN TO THE WAN BEHIND THE FIREWALL

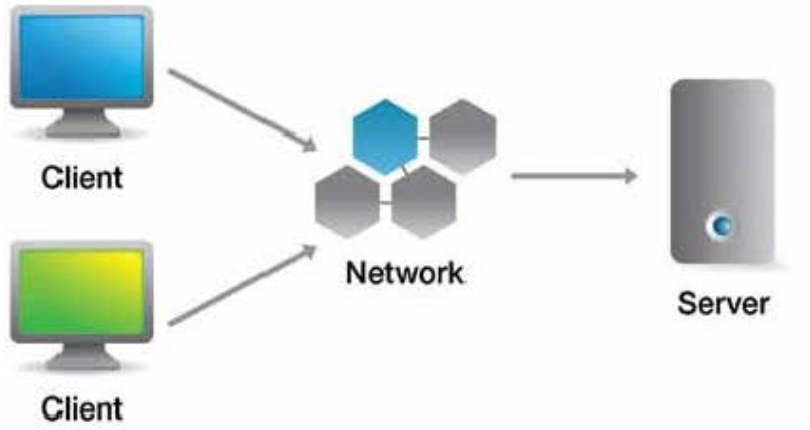
12 Chen, Catherine. Computer Network Management: Best Practices. ISOM Dept., Miller College of Business, Ball State University Muncie, IN, 2006: www.osra.org/2006/chen.pdf

Ethernet soon became the standard networking technology for LANs. Token Ring and Token Bus networking technologies competed with Ethernet initially, but Ethernet adapted more quickly and was able to use twisted pair cable, the same as telephone systems.

LANs used the computing architecture known as **CLIENT/SERVER**. In the 1980s, client/server architecture resulted from two improvements in computing: power and size. This led to the creation of mid-sized computers (or servers) that would be hubs of processing and storage to be "shared" by many people who had smaller personal computers or within a LAN. Client/server architecture soon replaced mainframe architecture in many applications.



Client/server architecture was popular for organizations. The client/server model defined the way that computers operated in network computing within an organization. The server provided functions or services to the clients, but the clients had to "ask" the server for these services.



HOW CLIENTS CONNECTED TO THE SERVER

Other types of servers include application servers, database servers, mail servers, and print servers. A Web browser like Internet Explorer® is a specific type of client, as are email clients and online chat clients. This type of architecture allow people to share services and even software. Before client/server architecture existed, in order to share software, disks had to be physically taken from one PC to another.

CREATING THE HUB OF THE NETWORK

At the server level, the Digital Equipment Corporation (DEC™) was an early leader in the hardware race. DEC got its start in 1957 when it started building small circuit modules for laboratory use. Its founders, engineers Ken Olson and Harlan Anderson, had worked on early machines at the Massachusetts Institute of Technology (MIT). They shifted their attention to the VAX series in 1976. However, no one dominant vendor established an industry standard; it was a competitive hybrid of many types of computers and different software providers.

In 1982, the Novell® Inc. system was a practical choice for operating systems for servers in business, because it could handle up to 250 users on one server. The software to enable different computers to share information was developed by three Brigham Young University graduates that Jack Messman (who went on to become CEO) discovered playing a computer game in the Novell warehouse. The three graduates had developed a game called Snipes—the first PC-networked game—which they created to keep occupied when they were not busy in the warehouse.[13]

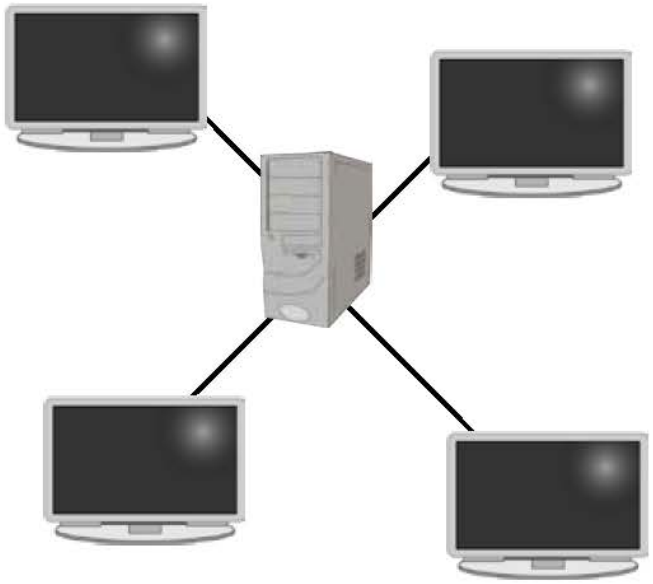
All early Web servers used UNIX® technology. The company long known for connecting America through phone lines, AT&T Bell Labs, created the UNIX operating system in 1971. UNIX is the language used to run a minicomputer or server, and is one of the oldest and most popular operating systems. Universities first used UNIX servers because they could license the source code at no cost and it was designed to be hardware independent. UNIX eventually became the underlying language of the Internet.[14]

UNIX SERVER

13 Messman, Jack. The History of Novell. The Novell Museum. www.novellmuseum.net/history_of_novell_g.htm
14 Milestones in AT&T History. AT&T. www.corp.att.com/history/milestones.html

UNIX servers made porting applications easier. To "port an application" involves moving an application from the operating system it was developed to another operating system where it will run. (Open standard programming like Sun Microsystems' Java®, now owned by Oracle®, minimizes or eliminates the work needed to port applications.)[15]

Once used extensively on corporate servers and in small businesses, UNIX is still used in scientific and professional circles. It became the backbone for the Internet because it could be used in star typology networks. This meant that UNIX could handle multiple stations connected to a central hub which could then be connected to other hubs.



STAR TYPOLOGY NETWORK

Designed for a star typology, UNIX was also known for its strong security and simple design that made it easy to implement. UNIX could handle a variety of tasks simultaneously—users could check their email and spell-check a document at the same time. And it could do this for multiple users, even while the computers ran different operating systems. UNIX could also serve as an operating system for all types of computers including PCs, engineering workstations, multiuser microcomputers, minicomputers, mainframes, and supercomputers.

The open source code allowed developers to introduce a wide range of new features and versions customized to meet any special need. The straightforward code allowed developers to build it in blocks, known as modules, making it easy for developers to learn and use. Hardware manufacturers quickly modeled operating systems on UNIX including Solaris, HP-UX, Linux®, IBM AIX®, and even Mac OS X®.[16] Microsoft® had started developing operating systems upon its inception in 1975 by Paul Allen and Bill Gates. In 1993, it introduced Windows® NT, a more server-friendly, heavy duty operating system at a much lower cost.

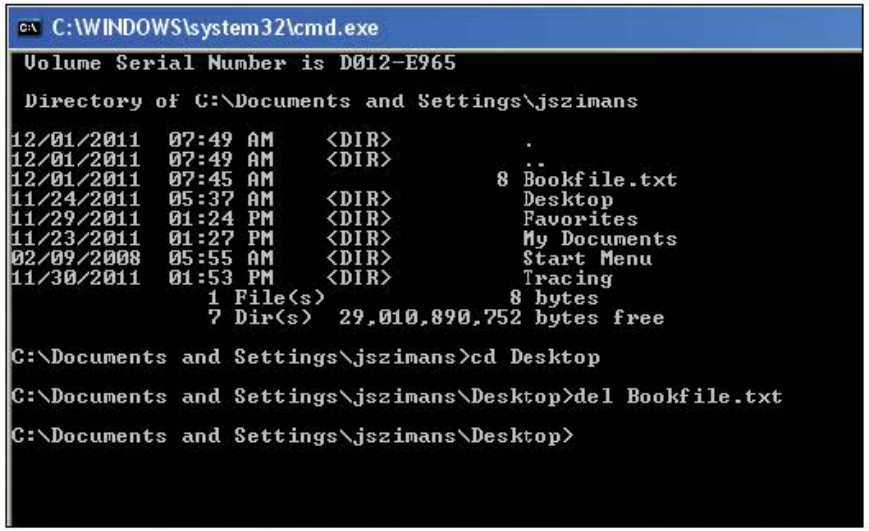
In 1994, a company that grew out of McMaster University in Hamilton, Beame & Whiteside, was busy developing network management software with the TCP/IP protocol. The TCP/IP architecture had been formalized in 1978; by 1984, TCP/IP was being used as the primary networking protocol for the early Internet—ARPANET.

Using the TCP/IP protocol, Beame & Whiteside provided PC-to-UNIX networking products. Hummingbird, a company discussed in detail later in this chapter, took the technology developed by Beame & Whiteside and adapted it to become a network file system (NFS), which they combined with the technologies from Common Ground Software. The software became Maestro and Columbus—electronic document distribution software—and together the two integrated internal and external computer networks. For more information about how this technology evolved, visit: opentext.com/btf-connectivity-nfs.

MOVING TO GRAPHICAL USER INTERFACES (GUIS)

On the client side, several operating systems vied for leadership of the market—Motif®, Microsoft Windows® for PCs, Apple® Macintosh®, IBM OS/2, and OS/2 Warp—and the competition forced rapid development. Microsoft started with MS-DOS, which shipped in 1981. The Disk Operating System, or DOS, interface used by PCs required users to type in instructions at the DOS prompt.

15 "Port". SearchNetworking: searchnetworking.techtarget.com/definition/port
16 Rosen, Ken, Douglas Host, Rachel Klee, James Farber, Dick Rosinski, Unix: The Complete Reference. McGraw-Hill Osborne, 2007, page 3.



DOS PROMPT

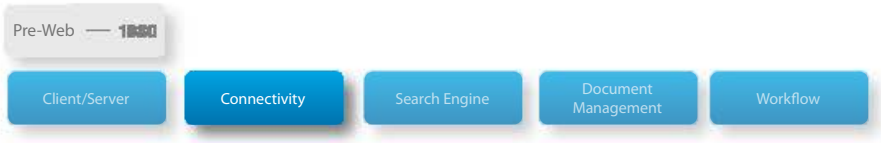
It was the Apple Macintosh, however, that brought forth a new user interface and inspired software developers to make their interfaces easier to use. The graphical user interface (GUI) allowed people to use a mouse to point and click. So rather than typing a number of commands to delete a file, for example, users could simply drag the file to the recycle bin icon.

Xerox actually introduced the idea of a GUI in the early 1970s, but it was Apple co-founder Steve Jobs who commercialized it. Jobs and Steve Wozniak started building Apple Computers in Jobs' family garage in 1976 and the company was incorporated in 1977. In the early 1980s, Apple developed the GUI that revolutionized personal computer operating systems. Almost 10 years later, in 1990, Microsoft adopted a GUI—Windows—and it became one of the most widely used operating systems in the enterprise.

Windows won the market, not because of its superior technology, but because of the number of applications written using its system and an established partnership with a number of hardware manufacturers.

EMULATING DUMB TERMINALS WITH PCS

As PCs started showing up on desks in the workplace, LANs took off, and GUIs like Microsoft Windows became popular, mainframe use changed dramatically in terms of terminal access. As people became used to GUIs, organizations required fewer employees with specialized skills and training. PCs were more affordable than dumb terminals and during this transition period, software was being developed to emulate the specialized terminals. The explosion of tens of millions of independent computing devices lead by PCs in the 1980s required the creation of more sophisticated **CONNECTIVITY** solutions that permitted systems, such as a PC, to talk to a mainframe despite the fact that neither was designed to do that.



In Toronto in the late 1980s, Fred Sorkin and his partner Barry Litwin of Hummingbird Communications founded an innovative networking system for graphics. Sorkin knew that X terminals would not be around for a long time, but he could see that the desktop PC could handle the same work if he refashioned the original X-Windows system. At the time, because of interconnectivity issues, different makes and sizes of computers could not communicate.

Hummingbird released Exceed in 1989 to link PCs to workstations and larger computers. Using Exceed, users could run a word processor beside a high-powered X-Window/UNIX application running on mainframe networks. It integrated all of the systems that had been separate on desktop PCs. Users could move data or images from one window to another to share content and applications from different types of computing platforms. People could even use Exceed to turn a laptop into a remote X-Window terminal. This improved user productivity by streamlining business workflow and allowing for better data exchange between applications, regardless of platform.

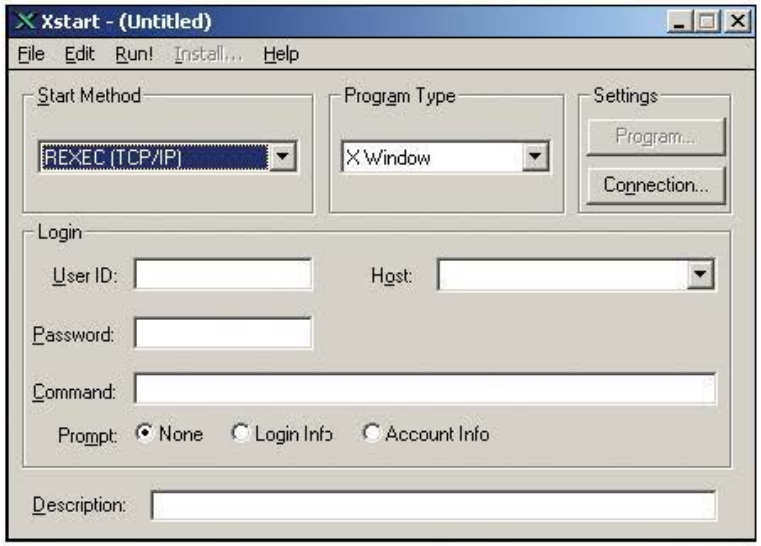
CAMEO

EUGENE CHERNY

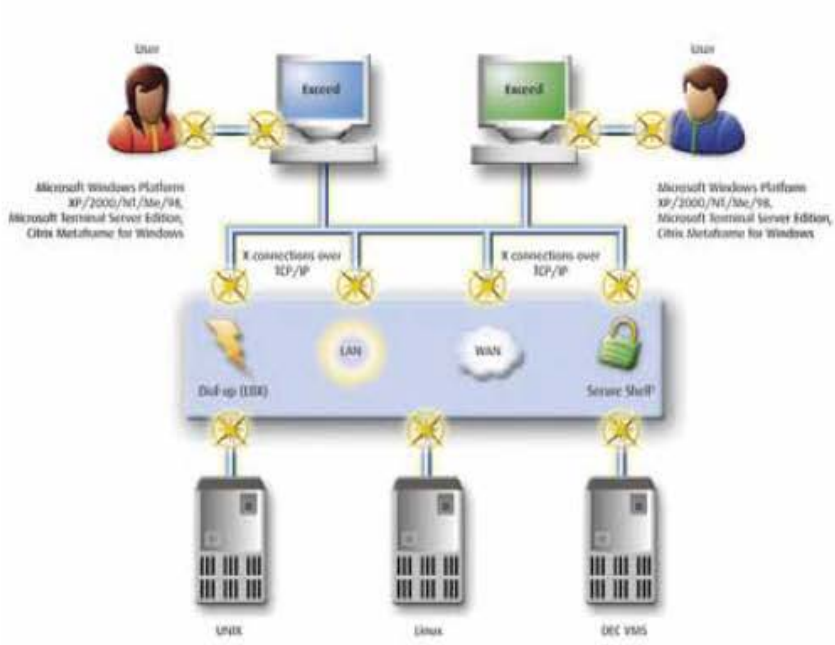
EXPERTS IN NETWORK CONNECTIVITY

"When Hummingbird was founded in 1984, the computing landscape was very different from what we have today. UNIX was at that time the predominant server operating system, the Internet was in its infancy, and interacting with a computer consisted mostly in being able to enter arcane command lines on a monochrome screen, a feat which was reserved for a small elite. During that year, a team of researchers from MIT unveiled a revolutionary system that would allow UNIX applications to offer a full-color GUI to their users. X-Window was born.

We immediately saw the opportunity at Hummingbird in reconciling the two worlds of microcomputing (the IBM PCs) and the professional UNIX servers and became a pioneer in the field of network connectivity. In 1989, we took the network world by storm by introducing the fruit of this effort: Exceed, a high-performance solution that allowed IBM PC users to remotely access their UNIX applications and interact with them as though they were sitting in front of a UNIX workstation. Exceed soon became the gold standard for network remote access and outpaced its competitors in both performance and market share."



AN EXCEED INTERFACE



HOW EXCEED WORKS

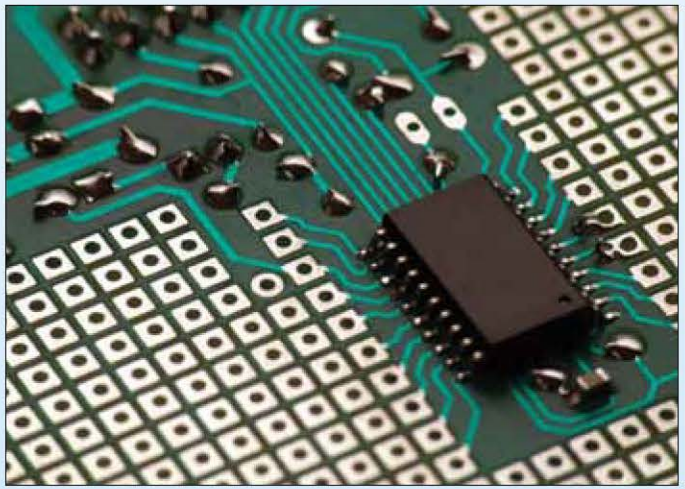
RENESAS ELECTRONICS

ELECTRONICS SUPPLIER IMPROVES EFFICIENCY AND REDUCES TOTAL COST OF OWNERSHIP BY CONSOLIDATING WITH EXCEED

The world's number one supplier of microcontrollers, and a premier supplier of advanced semiconductor solutions, needed a solution that would centralize its geographically dispersed engineers and servers. With engineers working in virtual teams, it was imperative that they be able to access the information and expertise they needed, when they needed it.

As well as overcoming the technical barriers imposed on a scattered workforce by geographical distances, the Company also wanted to strengthen its server infrastructure to support high network traffic volume and enable a higher number of users to collaborate using the network. They found a solution in Hummingbird's connectivity solution, Exceed, which allowed them to consolidate servers in Tokyo, Hyogo, and Kanagawa in Japan.

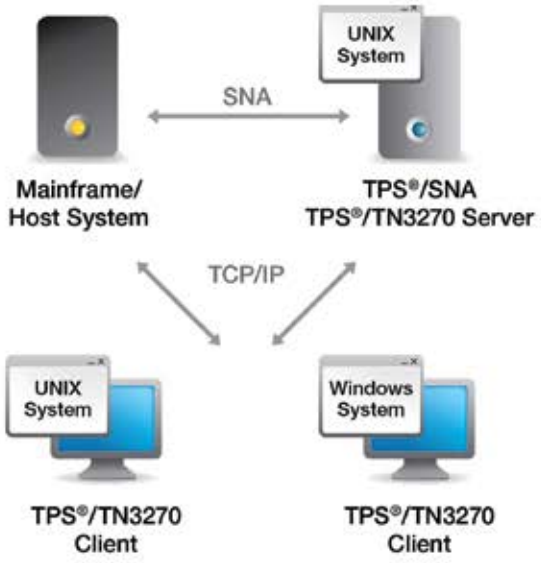
By consolidating all of its servers using Exceed, the organization has reduced traffic volume and increased efficiency, resulting in a lower overall total cost of ownership of the solution. Working methods and practices were greatly improved with a centralized server, along with the speed and quality of design work from its engineers.



MICRO-CONTROLLER

By the time PCs based on 386, 486, and Pentium were released, the X terminal was no longer used and Hummingbird moved into the PC X-server trade. By the mid-1990s, their customer base included government, manufacturing, healthcare, retail, and financial customers. For more information about how this technology evolved, visit: opentext.com/btf-connectivity-exceed.

In the early 1990s in Canada, another emulation software was being developed. The IBM 3270 series was often used to connect to mainframe computers, often at a remote distance. The series' purpose was to minimize the frequency of interrupts to the mainframe by reducing the amount of data transmitted. Telnet 3270 software, developed by McGill University in Montreal, and PolarSoft Inc. emulated a 3270 class terminal. It communicated by sending and receiving 3270 data streams using the Telnet protocol. Typically, standard telnet clients couldn't act as substitutes for TN3270 clients because of the different ways they exchanged data, but the emulators allowed for communication over a TCP/IP network. In 1997, this technology became part of Hummingbird offerings, and it allowed Hummingbird to offer its customers TN3270 communications for Windows 3.x, Windows NT, Windows 95®, and Macs.[17]



CONNECTING THE MAINFRAME TO OTHER SYSTEMS

The migration to client/server architecture continued, and mainframes were used less often as client/server architecture became the norm for many enterprises. Mainframes would return in later forms as e-business grew in the 1990s and during the Web 3.0 era for cloud architecture.

DRIVING ENTERPRISE CONTENT MANAGEMENT

Connecting PCs in the organization through a LAN led the way to improved personal productivity. Microsoft not only developed operating systems, it also developed software that focused on personal productivity including email and desktop publishing for the new personal computers. Software developers realized that they could develop tools to help manage the many documents knowledge workers produced, as well as develop workflows to increase efficiencies.

The client/server architecture influenced much of the early developments of what would become components of Enterprise Content Management (ECM), such as document management and workflow, discussed later in this chapter. In fact, virtually every feature used in private cloud networks originated in this area. ECM can be defined as systems that capture, store, retrieve, print and disseminate digital content for use by the enterprise. Digital content includes pictures/images, text, reports, video, audio, transactional data, catalog, and code.

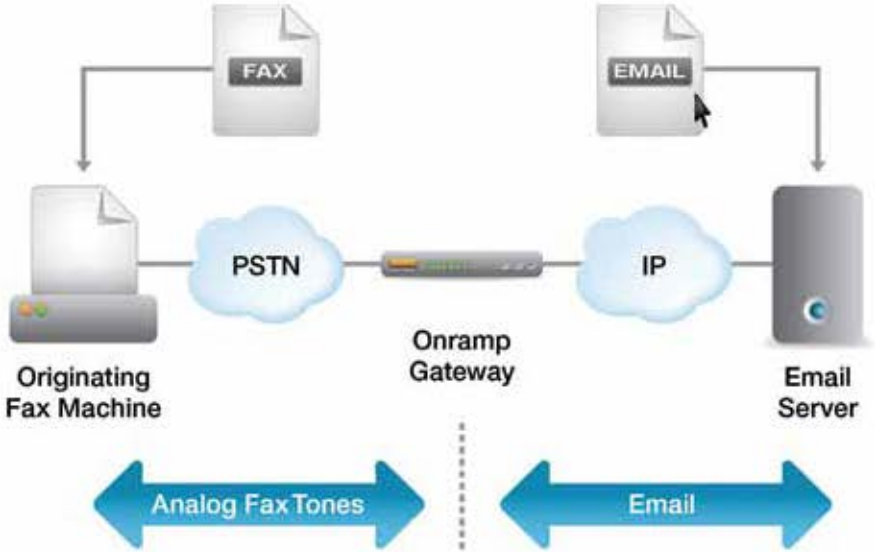
The development of secure, high-fidelity connections and more powerful systems at the desk of every employee made it possible to distribute tasks within an enterprise. With the quantity of documents that knowledge workers created with PCs on their desks, organizations recognized the imperative need for the content to be shared and stored so it could be found again.

During this period, some of the most fundamental assumptions about how the Web was built and would function were made. Organizations were facing challenges with content as they were increasingly required to convert paper documents to digital format, and make these objects or files accessible for later use. In the early years, automotive terms like "highway", "on-ramp", and "off-ramp" were used to refer to the concept of digitizing information and making it available through print or other formats. Large organizations recognized that more efficient processes would reduce costs. This was a driving force of new technology developments and purchases by the enterprise.

17 Hummingbird pays $6.3M for TN3270, TN5250. Computer Business Review, Jan 16, 1997.

GETTING ON THE HIGHWAY

One of the first challenges faced with early networks was the "on-ramp" into the digital world from the analog world. At the time, machine-readable content did not exist and no one really understood how to take written pages and convert them to a language a computer could understand. Before the Internet could really succeed, words had to be digitized and categorized into a machine-readable form. This is referred to as Input Management or Image Management.

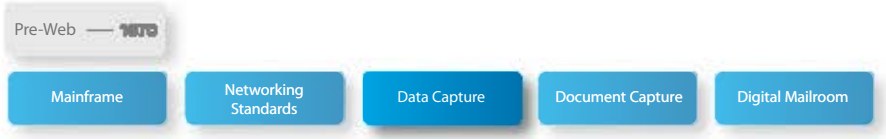


FAX ON-RAMP PROCESS

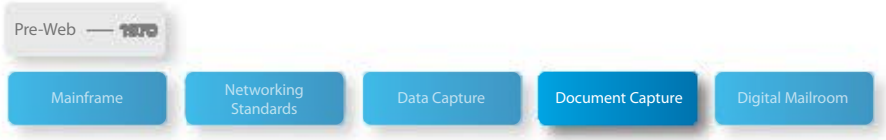
For the most part everything was captured as an image, and not individual words or even characters. To capture data, developers needed to figure out a way to read the content and convert it to ASCII code. Not every language was as easy to capture as English, French, and Spanish; symbolic languages like Kanji and Mandarin were more difficult. Eventually double-byte character sets were developed.

At first, the high cost and sheer size of the equipment prevented some organizations from starting to digitize their documents and processes. The equipment also required greater network bandwidth and higher-resolution displays for the graphical content making it cost-prohibitive to many organizations.[18] Once the technology was ready, input management was basically broken down into three categories: data capture, document capture, and digital mailroom.

In the 1970s, the advent of digital computing required the creation of a **DATA CAPTURE** ability that would allow the analog world to enter the digital one. Data capture automated data entry by capturing the information in forms and semi-structured documents like invoices. A modern evolution of this method became known as bar code scanning in which data is encapsulated into a bar code, which refers to the digital signature of a product or some item to be catalogued or re-used in the digital world.

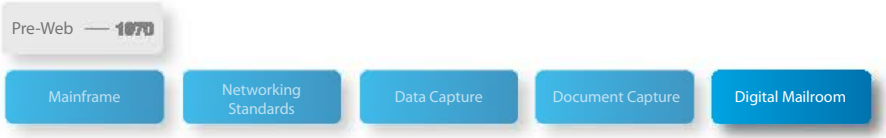


For less structured documents, **DOCUMENT CAPTURE** was required to assemble digital images into a complete set of related data. A key requirement was the digital scanning of a piece of paper and the corresponding interpretation of the "digital bits" through a technique known as optical character recognition, or OCR, which then translated the digital images into ASCII, the protocol standard for languages and numbers which assigned a specific "byte" (8 bits) address to each letter and number. The technology, though similar to data capture, was an essential requirement that permitted monitors and user interfaces to recreate the digital image or language for a human to interface with the computer data.



18 Coffee, Peter. Hurdles loom for image processing. PC Week July 17, 1989 v6 n28 p35.

DIGITAL MAILROOM was the natural evolution of the creation of files of documents and other digitally generated pieces of information that would travel electronically in a similar fashion to the “mail cart” travelling within an office building in the analog world and through the postal service between locations. The digital mailroom handled all types of documents to classify and transfer to the appropriate person, business application, or archive.



CAPTURING DATA

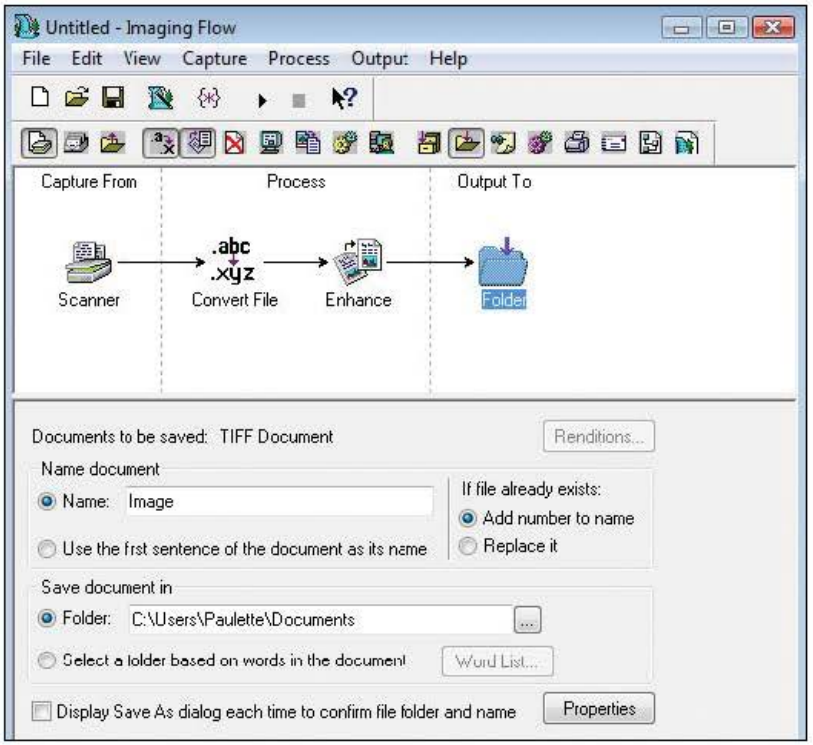
When a document could not be reduced to machine-readable code (digital words), it was preserved as an image object, such as a check or an engineering drawing, so that it could be treated as a legal proof of existence. The combination of images along with digital words became essential to workflow in the early years of the ECM industry. A very important and pioneering company in this regard was Wang Laboratories, Inc.

Wang Laboratories had long been known for its innovations. Founded in 1951 in Massachusetts, it first developed electronic phototypesetters and calculators. In 1976, Wang introduced the first dedicated electronic word processor, the Wang WPS. These multiuser systems contained their own microprocessors and disk storage was centralized in a master unit that was shared by other workstations. These systems were a huge breakthrough because office personnel could easily operate, administer, and share files without special training.

Wang worked to produce hardware systems to compete with IBM. Most notable was the Wang VS minicomputer in 1979. Innovation continued to push the company forward as patents were filed for redaction technology, electronic image manipulation, and image decompression.

In 1987, Wang introduced the Wang Integrated Image System (WIIS). WIIS enabled organizations to transform paper documents into digital-image databases. The system linked Wang VS minicomputers, scanners, WORM (Write Once, Read Many) and WIIS software. The software could capture, store, retrieve, and share data in an image without requiring that the content be in text or alphanumeric form.

As Wang recognized that it needed to expand support beyond its own computer systems, its Microsystems Division introduced a new system called Freestyle. Targeted at mid-level executives in workgroup environments, the integrated image-processing system included a digitizing pad and pen, a digital telephone, a high-resolution monitor, a scanner, and a fax board. The system allowed users to combine text, scanned images, digitized voice messages, and handwritten notes into a single document that could be sent to Wang computers or PCs over LANs.



THE IMAGING FLOW PROCESS

In 1989, Wang released a software development tool kit for programmers to develop document image-processing systems for other operating systems, including Microsoft Windows. Open/Image Windows supported image file management, file storage, scanned-image input and output, printer output, and all other functions needed to create an image-processing system under Windows.

In the early 1990s, IBM invested $25 million into Wang Laboratories Inc. due to its interest in the imaging technology. The collaboration was seen as a way to include imaging as part of office technologies. As individual PCs became more powerful for manipulation of the image files, Wang designed two new software packages to better integrate PC LANs and IBM mainframes using the Wang VS minicomputers as the image server.

By 1995, New York's Eastman Kodak Company, Kodak subsidiary Imagery Software Inc., and Wang announced that they would market and develop common imaging architectures. Eastman Software absorbed Wang Imaging for Windows software. Find out more at: opentext.com/btf-imaging-for-windows.

CAPTURING VIA SCANS

There were other image capture developments at this time. Companies developed technologies such as scanners, cameras, and fax machines to scan documents and convert them into digital format. Fax machines became commonly used in organizations because they converted paper into a digital form that could be transmitted over a phone line. For organizations that sent out hundreds of invoices every month, fax servers automated this process. A fax server emulated multiple fax machines—one for each user on the network. It consisted of a computer with a fax program and a modem capable of sending and receiving fax signals and Internet data, a connection to the Internet, and LAN users.

In the late 1980s, Joe Cracchiolo and Brad Feder co-founded a consulting business, Cracchiolo & Feder, Inc. Together they created RightFax in 1992, a network-based fax server software. By 1996, their company was listed as one of "Inc. 500's Fastest Growing Private Companies in America". For organizations that had multiple incoming faxes to multiple employees, RightFax automated the process with electronic inboxes. These automated fax capabilities improved productivity and efficiency while reducing costs, mainly because they replaced stand-alone fax machines.

CAMEO


2009

LUCY NORRIS

EARLY DAYS OF IMAGING

"In the early 80s, Document and Image Processing (DIP) systems were used primarily for storage and retrieval. Systems were marketed on the premise that it's easier to retrieve electronic images from desktops than it is to store and physically retrieve paper-based files. At this time, the technology was expensive and not very user-friendly.

Imaging became more accessible to commercial users in 1985, when FileNet Corp. introduced its minicomputer-based system. Although the system carried a price tag of $500,000 and up, it was far less than an integrated system.

In the mid to late 80s, Wang Laboratories, Plexus Corp., and IBM entered the market. DIP systems, in general, were still expensive, departmentally focused, and minicomputer-based.

By 1988, DIP systems that could run on LANs, such as ViewStar and MARS from Microdynamics, became available. These were still expensive... But we quickly introduced Wang's Open/Image Windows to market. It provided some degree of office automation. But keep in mind that the computers needed to run the software were fairly expensive—the average image-enabled workstation could cost between $10,000 and $15,000. By the mid-1990s, an image-enabled PC cost approximately $3,000. And today, well, all of our computers come that way."

CAMEO

TREBER REBERT

FAXES AVOIDING THE PHONE

"RightFax was conceived to solve a specific problem: A law firm had to monitor its fax machine, gather paper faxes as they came in, and route them to the intended recipients... at all hours of the day and night. At a time when email was only beginning to be ubiquitous, at RightFax we had the idea to give each user his or her own fax mailbox on a centralized system that would automatically handle the sending, receiving and, most importantly, routing of faxes. This solution not only eliminated much of the manual processing (and the paper involved), but provided a more detailed audit trail for each fax. This convenience was rapidly adopted by all sorts of businesses in addition to law firms.

By utilizing state-of-the-art fax board technology, RightFax could communicate with basic fax machines, so it was easy to integrate into any fax-intensive business process. Unlike popular ERP systems of the day, our customers didn't need to invest in additional technology. Because of its reliability and expanding feature set, RightFax quickly became the leading fax server solution."

RightFax continues to grow as the trusted leader in enterprise fax with enhancements under the OpenText name: opentext.com/btf-faxdocumentdistribution. Many of these enhancements include OCR engine enhancements via RecoStar technology from CGK, which is discussed in detail on the following page, and cloud computing capabilities with the new OpenText hosted fax services offering.

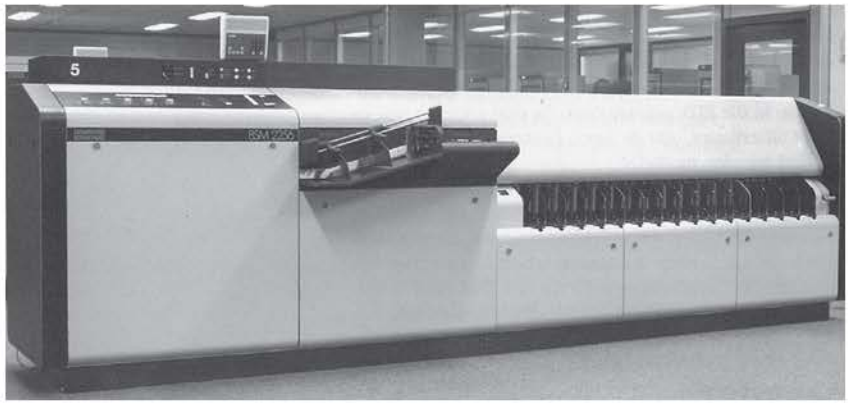
RIGHTFAX SERVER INTERFACE

CAPTURING DOCUMENTS

As the Pre-Web era drew to a close, technologies such as Optical Character Recognition (OCR) began to achieve accuracy rates greater than 90 percent and people started trusting their use. OCR research began as early as the late 1920s. OCR electronically translates the scanned images of text into machine-encoded text. The technology made it possible to edit the text, search for it, and store it more accurately. Eventually this led to technologies like machine translation and text-to-speech. One company in Konstanz, Germany, CGK, saw OCR as a path to a check-free society.

The flagship products of CGK became digital character recognition and reading and capture systems for hand- and machine-printed content

(OCR/SLS). Development started in 1959, but the first successful model of the OCR Reader and Sorter was the BSM 2256 built in 1973. Banks first used this technology to read the OCR lines of checks and transfer documents for booking and sorting purposes.



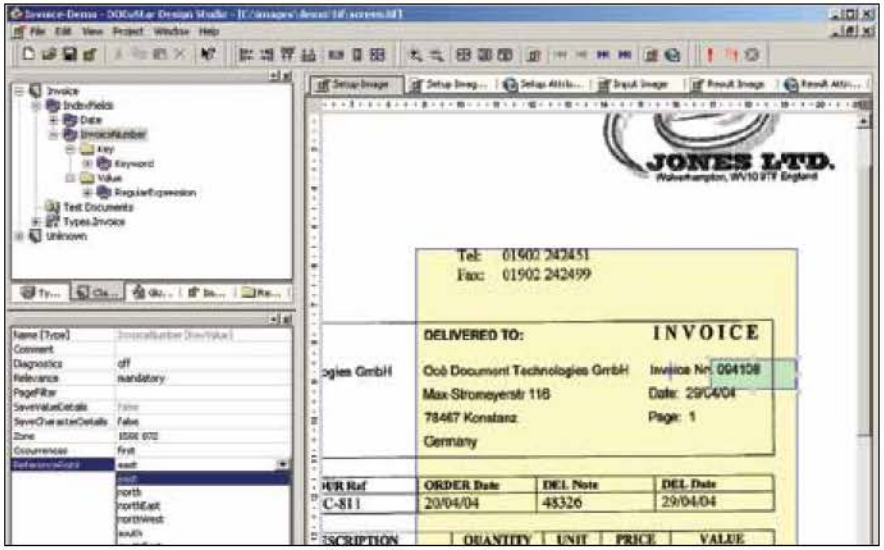
LOTTO BSM®

When the vision of check-free societies emerged, additional business was sought and found. At the state lottery, Staatliche Sport-Toto-GmbH in Stuttgart, and shortly after also in Basel, Munich, The Hague, Leipzig, and Brussels, lottery tickets were read, and by 1980 each BSM 2257 could read and sort up to 110,000 tickets per hour.

A check-free society did not emerge as quickly as envisioned, so managing data from money transfer orders and checks continued as a business application. Further development of character recognition developed into hand-writing character recognition in 1983 with the introduction of Computer Character Reader CSL, mainly targeted at extracting data from money orders. Additional challenges had to be overcome before the next generation of readers for general forms, and even American checks, could be introduced into the market beginning in 1991.

The AllFont Form Reader was used at German Customs for custom declarations scanning, and the Courtesy Amount Reader Box aided UNISYS to read up to 35 currency amounts per second. Various US banks have used the technology since 1991. Of course, due to the necessary processing power, all of these products were based on custom-developed, special hardware components. Software development, however, was done on DEC VAX machines.

This technology eventually evolved into two flagship software products in the mid-1990s: RecoStar and DOKuStar. RecoStar, and its successor product RecoStar Professional, were high-performance OCR/ICR engines for forms and documents. It not only provided the fastest conversion of bitmap documents like scans or faxes into text, but also very high quality data extraction from hand- or machine-printed forms.



DOKUSTAR INTERFACE

CAPTURING AND INTERPRETING DATA

Reading quality was additionally improved and DOKuStar, and its successor DOKuStar Professional, became high-performance Intelligent Document Recognition (IDR) software. It classified documents and located and extracted data even in semi-structured and unstructured documents. While structured data can be easily searched for in a database, unstructured data is more difficult to input and find. This technology now runs inside OpenText Capture Center, making incoming mail processing and indexing for archiving automatic.

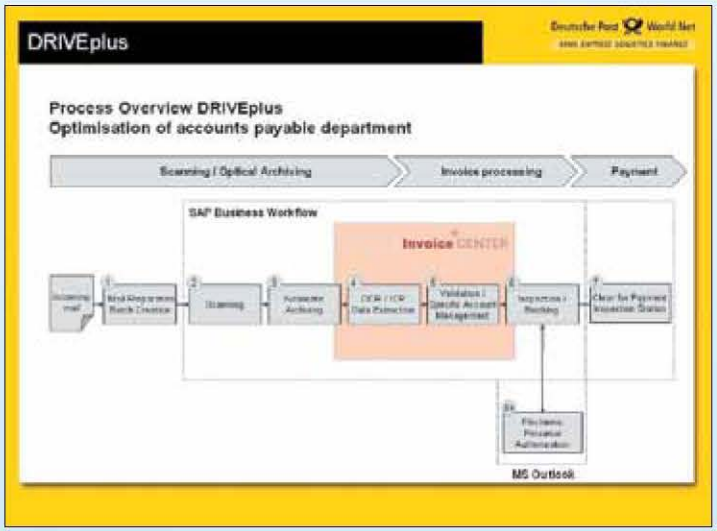
DEUTSCHE POST AG

POSTAL SERVICE AP IMPROVES WORKFLOW EFFICIENCIES WITH INVOICE CENTER

One of the largest German enterprises, Deutsche Post moves more than 70 million letters each day, and as an internal service provider, the Shared Service Center Accounting in Cologne performs all accounting tasks for Deutsche Post and its 20 subsidiaries. It needed a solution that would optimize processes and cut down on costs, as well as be fully embeddable in the already existing SAP Business Workflow™.

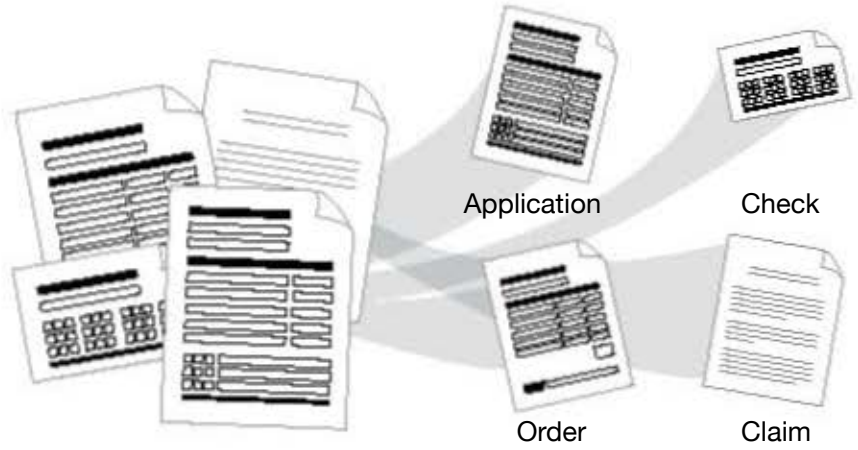
Incoming mail is scanned, the invoices are digitized, archived, and transferred before the DOKuStar recognition software—a part of Invoice CENTER—reads in the required accounting data. Once the data is captured, the accounting entry is made and automatically compared and balanced to an existing order in SAP®. Through email, all invoices can be viewed, verified, and authorized in a Web browser.

The new workflow system for incoming invoices makes it possible to settle them on the same day, increasing productivity by 25 percent. “We were able to increase our customers’ satisfaction by settling accounts on time and without complications,” explains Dietrich Franz, project manager for Process Organization Accounting at Deutsche Post AG.



THE AP PROCESS FOR DEUTSCH POST USING INVOICE CENTER

OpenText Capture Center continues to capture data from scanned images and faxes and interprets the content using the OCR/ICR and IDR technologies developed by CGK. This not only reduces manual keying and paper handling, but accelerates the business processing, improves data quality, and saves customers money by automating the process from the point of entry—the mailroom.



DOCUMENT REVIEW PROCESS

MOVING DATA THROUGH THE DIGITAL MAILROOM

With the data and document capture technologies, enterprise employees in the early 1980s accessed complete customer files containing scanned images of all letters, reports, documents, graphics, and photographs. Organizations with paper-intensive businesses like finance, law, and insurance, realized that an imaging system could reduce their storage costs. Several companies bought technologies that could index and search millions of documents, primarily for online services and litigation support of large legal cases.

However, there was another challenge that existed once a document was converted into digital form: how to move it around in a flow pattern that resembled the mailroom trolley passing between floors of an office building. For high throughput activities like check processing, it became

CAMEO

WOLFGANG LELLMAN

BUILDING A CHECK-FREE SOCIETY

"As early as the 70s, we had a vision of a 'check-free' society at CGK. We worked closely with a few German banks to optimize their check and money order processing in order to get rid of paper transport between banks.

The end of the 80s brought about important technology leaps in the development of new hardware and software for character recognition. Around that time, there were also increases in processor speeds and associated components, which allowed us to create increasingly complex reading software. Applications of our solution could become more and more complex.

We began working on a solution for the USA on behalf of the US company Unisys, and developed hardware and software to read the monetary value of US checks. This product, which was commercialized in 1991, made it possible to read up to 35 checks per second, regardless of whether they were typed or handwritten amounts. We had highest accuracy on the market. The same technology also allowed us to read money orders in Germany and other European countries."

CAMEO

KAMRAN KHEIROLOMOOM

ONE OF THE MOST POWERFUL TOOLS

"Back when we started VewStar in the late 80s, our primary focus was on document image processing, which included routing of documents through simple scanning and indexing workflows. ViewStar was the first company to provide an imaging and workflow system that was 100 percent Local Area Network and software-based. This became the standard and other companies, most notably FileNet, were forced to move from manufacturing and selling expensive and proprietary hardware to pure software companies.

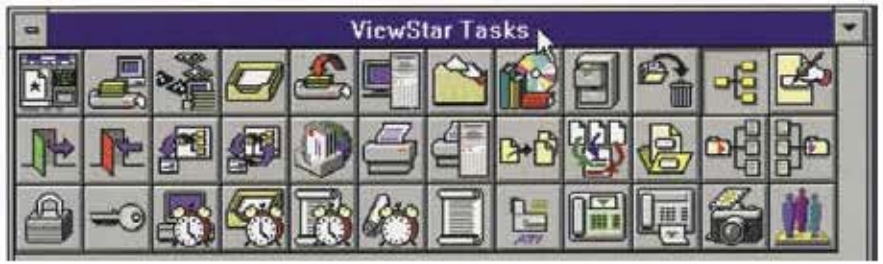
A few years later, we developed significant extensions in our proprietary scripting language to automate more robust document workflow tasks. Finally, by early 1995, we introduced a powerful new graphical workflow modeler called Process Architect, which allowed someone other than programmers to define workflow processes. Though it's been nearly 20 years since we conceived and developed Process Architect, at the time it was the most powerful tool of its kind and a definite precursor to the visual process modelers you see to this day."

necessary to implement a flow through a set of rules and this came to be known first as workflow and then as Business Process Management (BPM), discussed in Chapter 4. One of the pioneering companies in this market was ViewStar.

First developed as an imaging processing software, the founders of ViewStar wanted to provide document management software for PC LANs. Most products on the market in 1986 required special, proprietary, and expensive hardware. To forego the hardware, ViewStar used PC networks to process the images. It would compress and decompress the images, render them, and then allow the user to manipulate them. ViewStar even created its own graphical user interface before GUIs were available.

MAKING TECHNOLOGY EASIER TO USE

ViewStar developed its GUI to improve usability. Ease of use for their customers was important, and the release of ViewStar 3.1 in 1993 reduced the number of steps required to scan documents and linked the scanning process to an online help system. It sped up the workflow by allowing documents to be scanned directly into folders and helped the user through the scanning process.



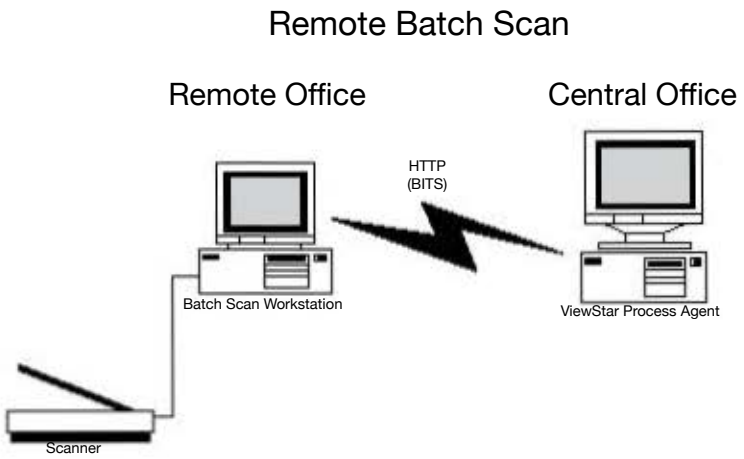
VIEWSTAR TASKBAR

Transferring image files was expensive and time-consuming. Innovation continued at ViewStar and its software included distributed networks to hold images for overnight transfers to lessen disruption in the workplace. Users still required hardware to scan and store the images. ViewStar worked with vendors like Fujitsu Systems of America Inc. for scanning

hardware. Sony Corp. of America and Hewlett-Packard Co. offered ViewStar-compatible optical jukeboxes.

As computer technology continued to evolve with different platforms, ViewStar evolved with it. By the mid-1990s it became an open, object-oriented, networked-based business process automation software. ViewStar was one of the first in the industry to deliver a document management package for Windows NT. It supported other industry-standard hardware and software platforms, including: UNIX operating environments, Oracle, Microsoft SQL Server®, Sybase® databases, Novell Netware®, and Microsoft Exchange.

Its client/server document workflow software let customers automate document intensive business processes. ViewStar products were used in various applications, including consumer and mortgage lending, claims processing, underwriting, trust management, contract management, accounts payable, and customer service. A merger in 1995 with Caere gave ViewStar the capability to incorporate its OCR technology with natural language processing and logical form recognition technology.



A VIEWSTAR PROCESSING AGENT PROCESSES BATCH SCANS REMOTELY

CAMEO

STEVE RUSSELL

WORKFLOWS IN THE PRE-WEB ERA

"The Business Process Management market really started in the late 1980s. At the time, BPM focused largely on workflows—as it still does today in many ways. It was an interesting time from a competitive point of view. There was one big gorilla on the block—FileNet—and lots of smaller companies. IBM was on the scene around imaging of documents, but it wasn't into workflows, at least not until the late 1990s. Staffware was an early arrival on the scene in early 1990s. But most competitors focused on image capture. Xerox was working on manipulation as well as capture.

So really in the 1980s there were two types of competitors that would later make up the BPM market as we knew it in the 1990s—image capture and manipulation and routing of work amongst staff."

In the late 1990s, ViewStar started integrating telephony, email, and more into its BPM software. BPM was computing technology that automated, streamlined, and optimized processes by managing the flow of work and information across an organization, discussed in greater detail in Chapter 4. The ViewStar technology continues to drive process management and change management as part of the OpenText Business Process Management solutions: opentext.com/btf-bpm.

The technology advanced through this era from capturing data as an image to individual characters. For organizations requiring batch processing, like invoicing, the automation of these processes saved them time and money. But offices did not become paperless; in fact, new developments were needed for output as input technologies developed.

EXITING THE HIGHWAY

Once organizations had digitized their content, new storage and distribution methods were required. Technologies that allowed the content to be printed or saved continued to improve during this time. Printers became more sophisticated and higher resolution from the basic dot matrix printer to the ink jet printer, and finally to the laser printer. The technologies developed at this time were known as Output Management technologies.

Output Management technologies included:

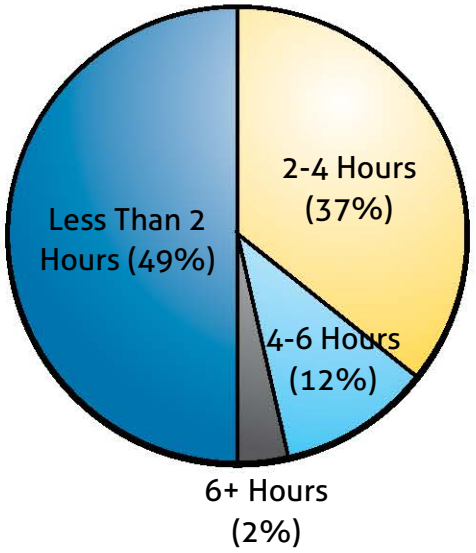
- Print
- Fax
- Web and portals
- Electronic distribution such as email archiving

Content was exploding with the development of the on-ramp technologies, networks were growing, and more people and computers were interacting with content. Multiple people edited the same documents and images—everything from legal and human resources documents, invoices, building layouts, and circuit board designs. Various authors created editing and authorship chaos when teams worked together to accomplish tasks like co-writing a technical manual or making changes to a building floor plan. And the vast quantity of documents made it hard to find anything.

Before content could be outputted, it needed to be found and retrieved. To create order, development began on the early forms of the EDMS or Electronic Document Management System. This allowed teams of individuals on a network to view, markup, and edit documents.

SEARCHING IN UNSTRUCTURED TERRITORY

Perhaps the most fundamental piece of any content management system is the search engine. Imagine how many hours people waste looking for the information they need to do their job. With the explosion of data that occurred as more content traveled onto the on-ramp, finding and reusing information became important. But data can take on different forms in digital systems, and that makes retrieval much more difficult.



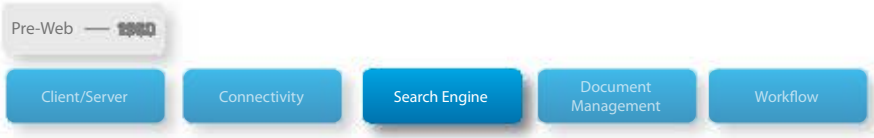
TIME SPENT SEARCHING FOR INFORMATION

There is structured data—like form fields that feed into a database—and there is unstructured data, such as content in an email or on a Web page. Both types of data need to be captured, processed, stored, and retrieved.[19] Because structured data is based on numbers organized into

19 Jilovec, Nahid. Electronic document Management Growing in Importance. System iNetwork, Mar 1, 2011: www.systeminetwork.com/article/systems-management/electronic-document-management-growing-in-importance-65692

tables, the tables can be quickly manipulated to find data that refers to those numbers. Words, on the other hand, especially without context, are difficult to organize and search. Of all the enterprise content created, stored, searched for, and shared every day, the majority remains unstructured.

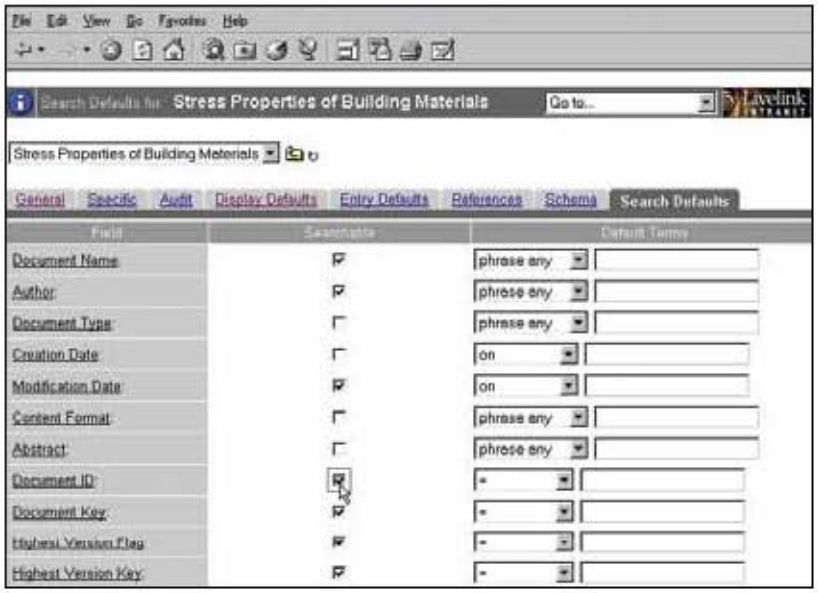
With more people sharing common files within LANS and the introduction of word processing systems, spreadsheets, presentation tools, and email, the amount of unstructured data exploded. Not only did organizations need to store this information, but they needed to manage, secure, and access it again for further distribution. Early on, organizations realized that to find the documents they needed to conduct business, they needed search tools. The need to find or "search" for these files and their contents lead to the invention of "search engines" that would scan across all of the files in a system and create an index of the contents so that the pointers would allow the user to quickly find files across a large file system. These client/server **SEARCH ENGINES** would become the prototype for Web search engines.



Without search engines, finding information on the Internet would be comparable to searching for a needle in a haystack. A Google search in 2011 for the term "firewall" produced over 139,000,000 results. Fine-tuning this search for a "book about firewalls" displays many results depending on context: security, networking, and intranets in computing; information about a part of the vehicle that separates the engine from the driver and passengers in automotive manufacturing; within construction, a firewall is the barrier inside a building designed to limit the spread of fire, heat, and structural damage. The term would also produce results including a film, a couple of novels, a musician, a G.I. Joe character, and an episode of a computer animated show called Reboot. With the amount of digital content steadily increasing, organizations and individuals needed a way to sort through content to find relevant information.

SORTING THROUGH TEXT

With no efficient way to search through all their research findings, Battelle Memorial Institute needed help in the early 1970s to support its internal research efforts. Battelle is a private nonprofit applied science and technology development company headquartered in Columbus, Ohio. As one of the largest independent research foundations in the world, its researchers needed a full-text retrieval system. They invented BASIS so that they could sort through enormous quantities of text at a phenomenal speed.



BASIS INTERFACE

After applying BASIS to support their research in toxicology and materials science, Battelle decided to commercialize the technology. BASIS quickly gained a reputation within the world's most research-intensive organizations after sales in 1973 to the Technical Research Institute for the Japan Society for the Promotion of Machine Industry and the US Naval Ship Research and Development Center.

As demand increased, Battelle formed Information Dimensions, Inc. (IDI), in 1986, as a wholly owned subsidiary. This helped the company expand

globally and develop commercial relationships, along with governments and universities, allowing IDI to test BASIS against more demanding applications. It also allowed for innovation as IDI introduced Techlib to manage corporate and government library collections. In 1998, OpenText acquired IDI to expand its search technology.

TECHLIB INTERFACE

BUILDING THE FIRST SEARCH ENGINE

It was one thing to build a search tool that would search a proprietary database and retrieve the content, but for all the content that was on a computer, or even in a network, a search engine was needed. The company that developed the very first search engine was Fulcrum Technologies Inc. Ken Leese, Peter Eddison, Eric Goodwin, Peter C. Reid, and David Potter founded Fulcrum in Ottawa, in 1983. Most of the founders met while working with a consulting company called Mobius Software, which developed and maintained a mainframe-based full-text search engine for West Publishing.

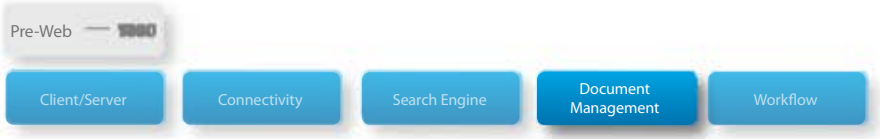
The founders formed Fulcrum to bring full-text search technology for unstructured data to minicomputers for small- and mid-size companies. Eventually, Fulcrum developed the technology for Windows. In 1991, Ful/Text version 5.0W allowed Windows 3.0 users to archive and retrieve most types of documents. By 1994, Fulcrum worked out a deal with Microsoft to be the search engine in Windows NT. The success of this relationship led to the release of Fulcrum Find in 1996, which extended the Microsoft Exchange text search capabilities so that users could search several folders simultaneously and search messages and attachments. The original Fulcrum technology continued to evolve as it became OpenText Search Server, eDOCS Edition.

In the late 1980s, another company based in St. Gallen, Switzerland, was also developing technology, called PC Search, to search files for words. IntUnix developed the electronic information management and retrieval system based on a powerful full-text indexing and search engine. In 1993, IntUnix started to cooperate with OpenText and use its search technology. Its early customers included banks, manufacturers, and government departments, and eventually OpenText acquired IntUnix.

Searching unstructured data was essential to document management in the enterprise. As the number of user directories grew, there was more to search and retrieve over a WAN. Many organizations were overwhelmed with increasing amounts of content produced by PCs, scanners, and fax machines. The enterprise was struggling to manage documents for redundancy, while enabling employees to collaborate effectively to exchange information and ideas.

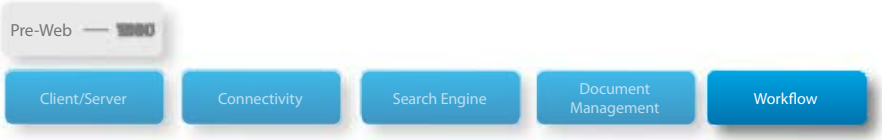
EMPOWERING ORGANIZATIONS TO INCREASE EFFICIENCIES

Organizations learned that if they could not efficiently manage their documents, they could risk losing new business, fail to adequately support existing business, and even fail to comply with stringent government regulations. **DOCUMENT MANAGEMENT** systems became available at this time to empower organizations to succeed by increasing efficiencies, improving productivity, and reducing expenses. The next big challenge became controlling access to shared drives as client/server applications integrated electronic documents and processes.



The sharing of files across large file systems also led to the creation of document management software that would permit many users to simultaneously use the same file and maintain an organized control of the "versions" and how the rules by which these versions would be merged into one updated document. This became an essential tool for large groups that were authoring complex documents such as aircraft technical manuals.

The interaction of people across distributed networks such as LANs required the co-ordination of work and this became known as **WORKFLOW**. A workflow engine would permit the creation of complex workflows that would emulate and exceed the actual analog route by which work was formerly accomplished in organizations.



Documents of all types and origins played an essential role in business processes and workflows, from routine approval processes to complex accounting operations, accessed by multiple people and integrated into multiple processes. Often this integration occurred manually as employees entered data from the accessed document into an enterprise application, such as ERP or Customer Relationship Management (CRM) systems. Software at this time enabled organizations to automate these business processes. Workflows started replacing paper-based processes by electronically routing documents from one person to the next.

Originally, workflows were viewed as add-ons to document management capabilities to map approval processes. By standardizing the interactions between people and content, workflows not only defined the processes, but automated and tracked the flow of tasks between individual systems and departments.

CAMEO

ED DURST

VENTURING INTO A BRAVE NEW WORLD

"As organizations moved from proprietary word processors like IBM DisplayWriters and Wang Word Processors to PCs and LANs running Novell and WordPerfect®, there was a significant gap in functionality, namely no ability to categorize, search, and find documents stored on the network. This gap was filled by a few early vendors in the market like Saros, SoftSolutions, and PC DOCS. PC DOCS was the first vendor to venture into the brave new world of Microsoft Windows and that is when I joined the company (November 1992)—it was a situation where I had the opportunity to install the software when running a small consulting company to law firms. I liked the product so well I decided to join the company.

Those early days were chaotic as we were all part of a step change in the computing landscape as organizations began to see the benefit of information sharing, which they were just never able to do via the mainframe, minicomputers, or even isolated PC environments."

REGIONAL MUNICIPALITY OF YORK

IMPROVED BUSINESS PROCESSES USING OPENTEXT DOCUMENT MANAGEMENT EDOCS EDITION

The Regional Municipality of York is located just north of the City of Toronto. Comprised of nine municipalities, it has a population of close to one million with approximately 25,000 businesses located within its borders. The Region has an annual budget of $1.7 billion and employs 2,600 full-time staff.

York Region wanted to transition to the latest version of the OpenText Document Management, eDOCS Edition, and required an implementation that would not disrupt service to their staff. They had a large number of documents and emails on shared network drives. The multitiered architecture of OpenText Document Management, eDOCS Edition offers the Region a comprehensive set of standard functionality.

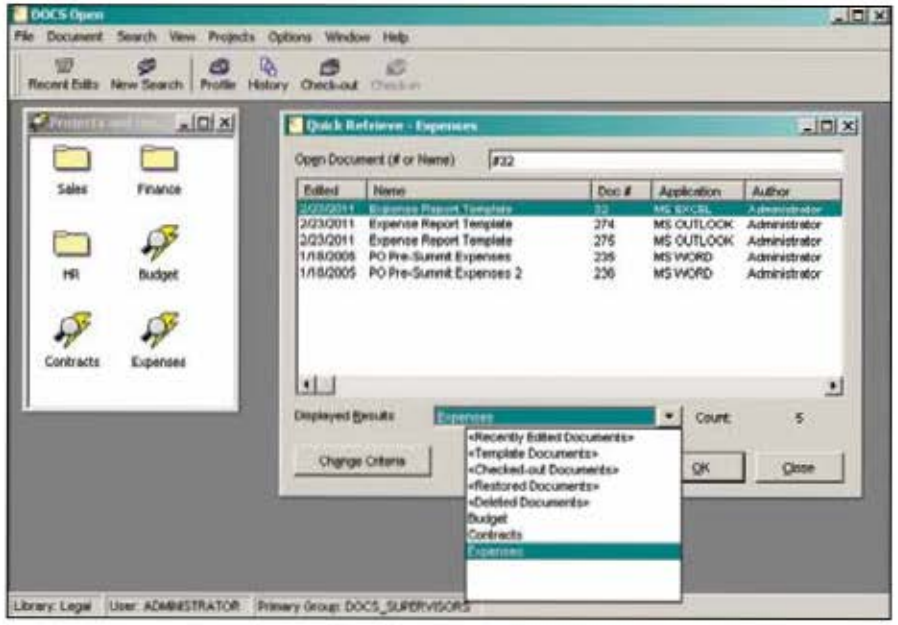
York Region has improved business processes across the organization and has significantly reduced the amount of time spent on document-related activities, including search and retrieval, check-in/check-out, versioning, and applying appropriate security controls.

THE REGIONAL MUNICIPALITY OF YORK ON GOOGLE® MAPS

MANAGING MULTIPLE USERS AND VERSIONS

As digital documents passed through an organization, multiple authors would work on the same document simultaneously. Systems became more complex, controlling versions and adding rules to overwrite edits and maintain an audit history of any changes made to a document. This was the birth of the document management industry, which would mature to become a fundamental building block of an enterprise content management system.

PC DOCS, the first document management software for PCs, was developed by CMS/Data Corp. In 1991, CMS/Data Corp. decided that it needed to broaden beyond support for WordPerfect into other applications used in the enterprise. Version 4.0 of PC DOCS allowed users to call up files in Lotus 1-2-3, as well as Microsoft Word, without actually exiting PC DOCS. PC DOCS has since evolved into OpenText Document Management, eDOCS Edition.



PC DOCS INTERFACE

CAMEO

ULF KASSHAG

STREAMSERVE AS IT EVOLVED

"We marketed the StreamServe Suite as an infrastructure solution—a business communication platform—that could be used for eBusiness or any other communication channel.

The product suite was designed to manage and automate the flow of critical business information. StreamServe enabled our customers to communicate with their customers, suppliers and partners in a wide range of formats, across many types of channels, and in a customized manner.

In the mid-2000s, StreamServe had another evolution. StreamServe Enterprise Document Presentment (EDP) software enabled the world's leading companies to communicate effectively with their customers, partners, and suppliers. The automated creation and presentment of documents in any format through any channel helped enterprises convert internal information systems into dynamic, interactive, and customized communication channels, and extended the reach of their current systems."

CAMEO

RON VANGELL

THE START OF MAGELLAN

"In the late 80s early 90s, optical disk storage became a cheap alternative to expensive disks. Among the different technologies, the Write Once, Read Many known as WORM, became popular with IT data centers as it was a 'permanent' record that was accepted by auditors and the courts. The new storage medium allowed for all sorts of data from mainframes to personal computers to be stored inexpensively. Unfortunately, the drivers and access to these optical mediums only allowed for file write and read type access. In other words to read it, once written, you had to copy the file from the optical drive back to an expensive disk. The concept of 'Direct' read at the record level access point did not exist.

So, we started developing software that would not only store files and databases on the optical drive, it would index them there and allow you to read them directly which made the optical drive behave just like disk storage. As a result, the storage and CPU savings were enormous."

In 1992, the company took its name from its product and became PC DOCS Inc. It then upgraded its software to include improved security and the ability to search while editing and monitor employees' keystrokes and print commands. Two years later, Open 2.0, a Microsoft Windows-based document management software enabled users to track and edit documents from remote sites as workforces expanded globally and became more mobile.

BUILDING AN INTELLIGENT OUTPUT MANAGEMENT SYSTEM

During the Pre-Web era, many off-ramp technologies needed to convert digital files back into the analog world. This required more than just "printing" the document or image, but a much more complicated method of merging the digital world with the analog world so that machine-generated text could be placed with other forms of analog information. A leader in this field was StreamServe.

As part of the document lifecycle, organizations looked for ways to automate tasks and deliver business-critical information more productively. Take, for example, a manufacturing company that shipped its products. After orders were received and placed into the system, orders fulfilled and packed, the final step in the workflow is the automatic printout of packing lists for the shipping company, as well as its own records. An intelligent output management system like StreamServe not only managed this kind of system, but monitored its progress at every stage.

Per Einarsson, Birger Lundgren, Curt Lestrup, Hans Otterling, Lars-Ove Axelsson, and Magnus Einarsson founded the company in Sweden in 1994 as DocuServe, and the company released its first version of its software in 1995 with the same name. Both names changed to StreamServe in 1997. Its Enterprise Document Presentment (EDP) software automated how documents were created and then formatted and output.

The solution enabled data-driven routing that could be handled through numerous communication channels including printers, e-commerce solutions, fax, email, and eventually the Internet. StreamServe was awarded Software of the Year in Sweden in 1997. StreamServe formed alliances with IBM, SAP, and Oracle—similar to those existing at OpenText when it acquired StreamServe in 2010. This helped solidify its partnerships while adding compatible document output and customer communication management software.

BMW FRANCE

AUTO DEALER REDUCES PRINTING COSTS BY 60 PERCENT WITH STREAMSERVE

BMW France required a software solution that was capable of managing large streams of data from a number of computers and databases—to the tune of 775,000 documents—across its dealership network. The company also had to be able to quickly generate emails, PDF files, and printouts of information. After a general review of software on the market, BMW France selected document processing solutions from StreamServe.

With more than 800 invoices being generated daily (each edited in five copies), the first phase was to optimize invoice processing. For the next phase, the company applied the StreamServe solution to improve its documents for page setup, personalization, color, and legibility—giving dealers and customers pieces of more value and ensuring brand consistency in marketing brochures.

Operational within a few weeks, the solution allowed the company to quickly set up new printing processes for invoices. The customizable invoices required only one-sheet printing and could be distributed by mail. Filing was done automatically and duplicates were accessible on the intranet and extranet. Using StreamServe solutions, the distributor was able to improve productivity and reliability by eliminating multiple captures and tasks, resulting in more effective traceability of their documents and an overall reduction in prints costs by as much as 60 percent.

BMW M3

CAMEO

JASON LIKINS

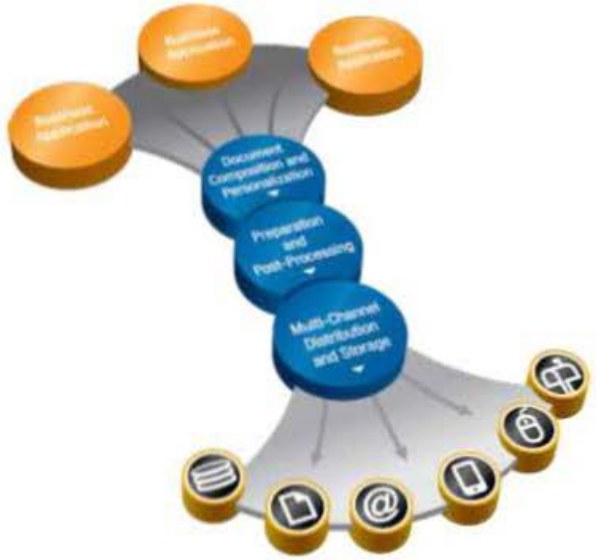
SAVING TREES

"The idea started for Vista Plus in 1989. We offered a print spool management application for Hewlett Packard's MPE operating system. As a feature of this spooling application, we added a 'print preview' function to the product. Soon this feature became so important and useful to customers that we realized it was valuable enough to become its own product line.

When companies started to worry about their Y2K system issues, there was a big influx of ERP deployments as a strategy to address these concerns. The ERP systems at that time did not have any features or functionality to manage reports and output—Vista Plus filled this gap nicely.

One of our customers was so excited to move from legacy hardware that they had a party to de-commission their mainframe as they moved to a UNIX environment.

There was a photograph taken the moment they turned the mainframe off and of the 'Vista Plus' tree they planted in honor of the paper they had saved."



STREAMSERVE OUTPUT FLOW

USING MACHINE INTERVENTION

In the early years of computing, Magellan Software and a product called Vista Plus from Quest Software pioneered machine intervention as a way to locate, decompress, and display content that had been digitized.

Magellan wrote the first program in the market that allowed viewing on optical media. The first digitally recorded optical disk was created by Philips and Sony in 1975. It was a five-inch audio compact disk (CD) in a read-only format. This meant that once content was written to a disk, nothing else could be added to the disk and it could only be played. It took both companies another five years to create a digital storage solution for computers using this same sized CD called a CD-ROM.

Not until 1987 did Sony demonstrate the erasable and rewritable 5.25-inch optical drive.[20] This optical disk drive used laser light or electromagnetic waves as part of the process to read or write the data to or from optical disks. These are often called burners or writers. CDs, DVDs, and Blu-Ray disks are all types of optical disks.

Ron Vangell and Edward Malley founded Magellan in 1993 in Irvine, California. The company provided content management and e-Business

20 Computer Peripherals - Chapter 12. Optical Disks. Nanyang Technological University, Singapore. October 16, 2001. www.lintech.org/comp-per/12OPDISK.pdf

solutions. The IBM lab in Tucson, Arizona approached Magellan to write an interface to manage IBM servers. IBM needed a way to capture, index, paginate, and move content to optical storage.

Magellan developed software that took one second to locate, decompress, and display content. IBM sold this technology to its mainframe customers. Magellan then used their own technology with their document management software to scan, index, and retrieve digitized materials. It put them light years ahead of their competition.

OUTPUTTING CONTENT

Three men in a garage in Newport, California started Quest Software with a line of high availability and middleware products for HP Multi-Programming Executive (MPE). As Quest developed features for MPE, one of the features became so important that Quest developed it further into its own product—Vista Plus. The suite consisted of two components: Vista Plus Professional and Vista Plus Output Manager. Vista Plus Professional focused on the longer-term storage, retrieval, and online viewing of output—like a data warehouse for end-user created reports and electronic documents. Vista Plus Output Manager focused on the physical print and distribution of output.

As Quest began entering the markets of database management, application change management, and Microsoft management, it was clear that the Vista Plus Suite, though powerful, did not directly fit their product portfolio. OpenText acquired the product to add as a key element to their enterprise content management suite.

Although Output Management is considered to be an older technology, organizations continue to use it, often in mission-critical environments.

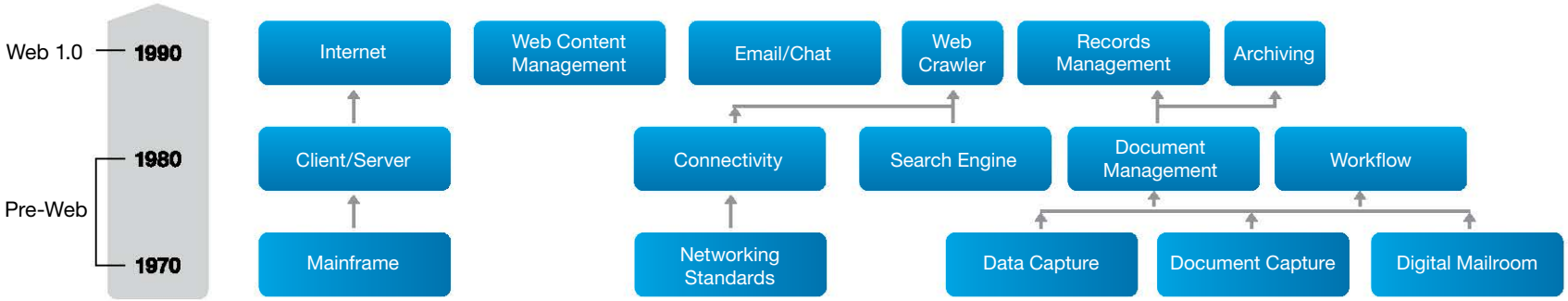
Paperless offices have not become a widespread reality, though products like Vista Plus did start to reduce the need for paper. Paper becomes less and less essential as more technologies function to support mobility.

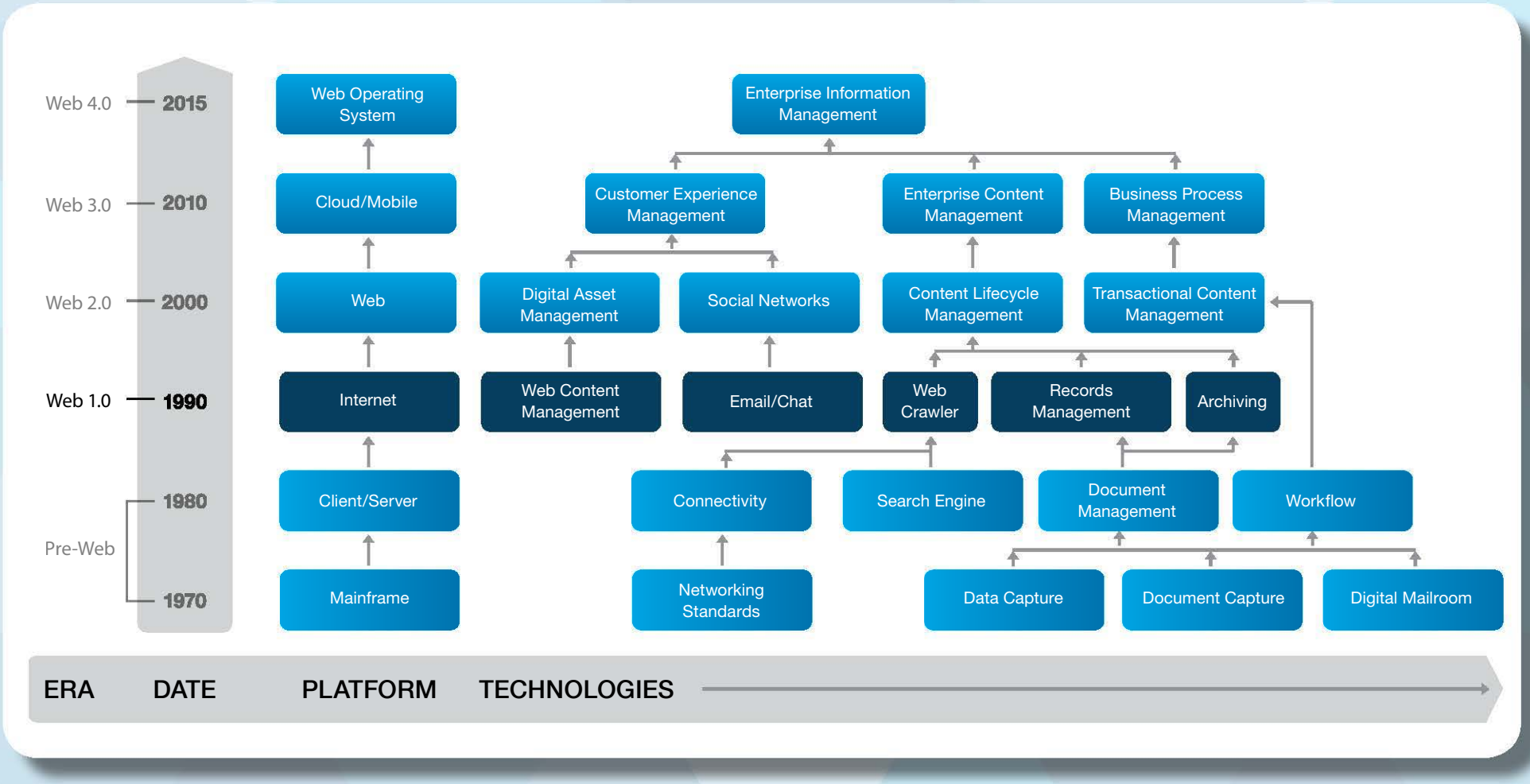
GETTING READY FOR THE WEB

The infrastructures for the Information Highway were developed during the Pre-Web era. As technology developments of hardware increased in power and memory size, and they decreased in size from mainframe, to minicomputer, to PC, they became less cost-prohibitive. And as the number of computers grew, connectivity technologies developed to support sharing. The development of protocols readied systems for online connections in office buildings and beyond, to the Internet.

Web 1.0 would see the connection of the pre-network world of the desktop. As the world became more connected, organizations realized that they needed to protect the volumes of content that were being produced when organizations converted the analog world to the digital world. The need to manage, search and retrieve all this content—securely—baffled many organizations at first. Once data and image capture technologies were developed, along with digital mailroom technology, search, document management, and workflow technologies were required. This enabled organizations to reuse and improve their content.

Eventually, document management technologies would expand to handle compliance and governance issues and workflow would become part of business process management technology. But the development of Web Content Management technologies that emerged as the use of the Internet expanded into the enterprise took us to a new world where content began to appear in new forms.




Web 4.0
2015
Web 3.0
2010
Web 2.0
2000
Web 1.0
1990
Pre-Web
1980
1970
Web Operating System
Cloud/Mobile
Web
Internet
Client/Server
Mainframe
Enterprise Information Management
Customer Experience Management
Enterprise Content Management
Business Process Management
Digital Asset Management
Social Networks
Content Lifecycle Management
Transactional Content Management
Web Content Management
Email/Chat
Web Crawler
Records Management
Archiving
Connectivity
Search Engine
Document Management
Workflow
Networking Standards
Data Capture
Document Capture
Digital Mailroom
ERA
DATE
PLATFORM
TECHNOLOGIES

Chapter 2

Web 1.0 / 1990-2000

Connecting to the Internet

Slow and awkward describes the early days of the Internet. Just as Microsoft® and Apple® had transformed PC computing by replacing DOS line prompts with a user-friendly GUI, Mosaic revolutionized the Internet by creating the first popular GUI for the Web. Netscape® commercialized this GUI with its Web browser, replacing the text-based Internet with a graphics-based World Wide Web. Suddenly the Internet had a whole new, user-friendly look and feel. The Information Highway was here and ready to connect millions of people with information in new and visually compelling ways.

THE EARLY WEB

As the Internet evolved and became a familiar tool for many, mainframe and client/server computing moved online to connect content management technologies with enterprise content. Document management, records management, archiving, and other technologies followed suit. As a result, content was no longer confined to reside in LAN systems.

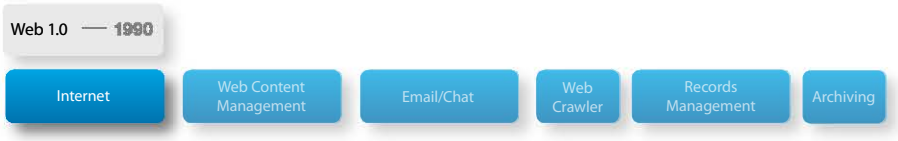
Netscape, and then Microsoft, created easy-to-use software that could connect any computer to the Internet, allowing people to exchange information with each other, or even millions of other people. This capability was unprecedented and caused a surge in use that was followed by a tsunami of content. Often described as “info-glut”, the volumes of information created gave rise to search technologies to help people achieve a more direct and faster way to find what they were looking for on the Web.

In the early years of the Web, the OpenText Index (OTI) was one of the most used Web sites on the Internet. It was like a Google® before Google existed, using Web crawlers to scour the Web for information. OpenText developed partnerships with the pioneers of the Web: Netscape, Yahoo!®, and Microsoft. These partnerships enabled these companies to develop sophisticated technologies that would provide new ways for people to interact with each other and the content they created.

The early Web borrowed from the client/server architecture. Systems moved online and became “Web-based”. As the Web grew to support online applications, more users, and new file formats, technologies for Web Content Management (WCM) and portals were introduced. As its infrastructure strengthened to accommodate a growing Web and more people connected across the globe, the Web transitioned to the next era in its maturity—Web 2.0.

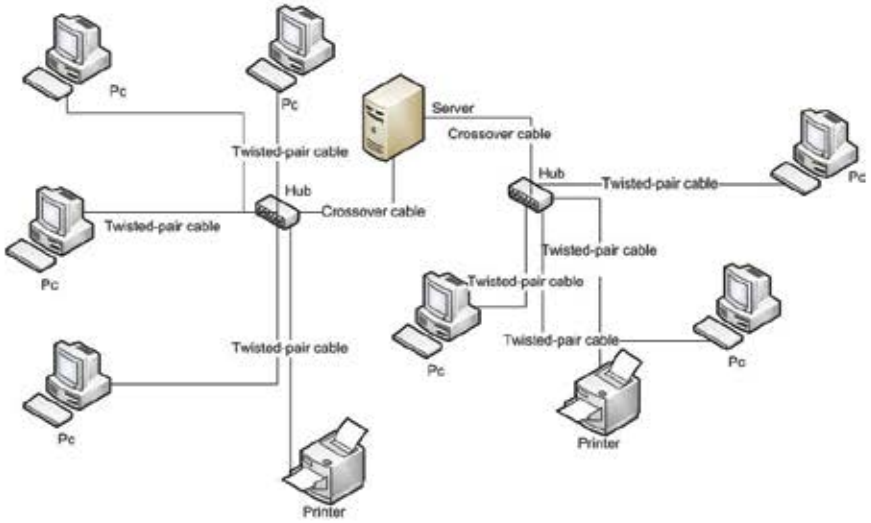
NETWORKING AMONGST RESEARCHERS

From its inception, no country or company controlled the **INTERNET**. Universities and telecommunications were the early adopters of the Internet. Development of the Internet began at Massachusetts Institute of Technology (MIT) with Joseph Carl Robnett Licklider. In the 1960s, he oversaw the development of a worldwide network of computers with the US Department of Defense Advanced Research Projects Agency (DARPA). Another MIT professor, Lawrence Roberts, joined DARPA to help develop the first packet switching network.



With the project renamed, Advanced Research Projects Agency Network (ARPANET), the group connected four computers in 1969. That same year, on October 29th, the first Internet message was sent from computer science Professor Leonard Kleinrock’s laboratory at University of California, Los Angeles and a new public standard for networks emerged. HTML (HyperText Markup Language) and HTTP (HyperText Transfer Protocol) would be used throughout the world to communicate between computers and people.

As discussed in the Pre-Web chapter, TCP/IP (Transmission Control Protocol and Internet Protocol) was developed in the 1970s, and this led to large organizations getting their various offices connected via Local Area Networks (LANs) and Wide Area Networks (WANs). Rick Adams founded the first commercial Internet service provider, UUNET—now an internal brand of Verizon Business—in 1987 in northern Virginia.



A COMPUTER NETWORK

Along with universities, research facilities were some of the first users of the Internet. In 1989, CERN (European Organization for Nuclear Research) was the largest Internet node in Europe. At CERN, another MIT professor, Tim Berners-Lee, along with a young student there, Robert Caillau, implemented the first successful communication between a HTTP client and server over the Internet in 1990. Once Berners-Lee built his prototype system to make it easier to share and update information among researchers, he used those ideas to create the World Wide Web. He then built the first Web browser, and continues today as the Director of the World Wide Web Consortium (W3C) that oversees the Web's continued development.

OVERCOMING COMPUTING CHALLENGES

Through funding and grants, universities and research centers could afford the powerful computers of the time. The hardware of the Early Web, however, limited its users and restricted the sophistication of applications. Slow connection and processing speeds, along with a limited memory size, impacted overall performance. Video files like those watched on YouTube® would have been impossible to download and watch in the days of the Early Web.

About five years before Berners-Lee created the World Wide Web, two University of Waterloo Computer Science professors took on a project that was also challenged by the limits of the computing technology available at the time. For example, a standard desktop computer housed a 10 MB hard drive with 128 kB of RAM and cost approximately $400 for a Commodore® or almost $1,000 for an IBM® PC.

THE COLLECTION OF OXFORD ENGLISH DICTIONARIES

In 1984, the Oxford University Press wanted to create a second edition of the Oxford English Dictionary (OED). Along with this endeavor, they also wanted to produce a complementary electronic version that could be revised and extended quickly and easily. It had taken 71 years to produce the first 13 volumes and supplement, and 14 additional years to update the original supplement with a new four-volume supplement.

TRANSFORMING DICTIONARY TO DATABASE

Fundamental to any dictionary, and one of the goals of the new Oxford English Dictionary project (OED2), was the ability for researchers, editors, publishers, and students to find any word or string of words in the OED. The two University of Waterloo Computer Science professors, Frank Tompa and Gaston Gonnet, answered the request for proposal from Oxford University Press to develop special software for editors and the public to use. They won the contract and work began.

The first challenge was to get all the current text content, 60 million words and 600 MB, into a system. To handle the computing, the University of Waterloo purchased a DEC™ VAX/11780 with 1 GB of memory costing between $500,000 and $600,000 at the time.

VAX/11780

In the newly founded University of Waterloo Centre for the New Oxford English Dictionary and at Oxford, computer systems were built to pre-process text and edit it in electronic form. The University of Waterloo team developed a tagging and coding software which would later become the OpenText Transduction Toolkit, or TTK, and used the new Standard Generalized Markup Language (SGML) encoding scheme to mark up the text. The Waterloo team also developed PAT, a high speed search tool for the large list of words and definitions, and LECTOR to display the content.

In time, the dictionary was converted to a large database that could be indexed with the search technology PAT. Being a dictionary, the text was already structured, making it easy to index. The system extracted the document characters in an index to make searching faster. It also used string search technology so users could complete a search no matter what size the query—one word or more.

With these new technologies, the Oxford University Press could produce and update the dictionary more quickly and frequently. After seven years, the group completed the project successfully and the innovation would change the publishing industry and computer software, helping make them ready for the coming Information Age.

The Waterloo team designed TTK, PAT, and LECTOR to support open systems architecture. This way, users could incorporate solutions into other programs developed in-house or from other vendors. This would become important as the technology expanded into other and more commercial uses.

TAKING SEARCH TECHNOLOGY TO MARKET

The University of Waterloo professors made a strategic decision to market their innovative software beyond the OED2 project. Other academic institutions that found these technologies incredibly useful included Stanford, Columbia, Princeton, Dartmouth College, Kyoto, Australian National University, University of Pennsylvania, and the Swiss Federal Technical Institute. Based on the success of these applications, Open Text Systems was incorporated on July 12, 1989.

The University of Waterloo has a unique intellectual property policy that allows researchers to retain ownership of Intellectual Property (IP) rights over any of the intellectual property they create while at the university. Open Text Systems had the non-exclusive license to use, modify, and sell the original software they developed.

FRANK TOMPA, FOUNDER OF OPENTEXT, 1992

Knowing that the search technology could be brought to market, the two professors, Frank Tompa and Gaston Gonnet, along with the man who would become the co-inventor of XML, Tim Bray, went to work. Supported by eight investors, four full-time employees, and a 33 MHz mainframe, the team released the software trio of TTK, PAT, and LECTOR in March 1990.

Business customers were looking for effective ways to control the increasing amounts of data that they needed to store, maintain, and later, retrieve. As the amount of content in organizations increased, they realized that it was too costly to simply store the information for later retrieval.

OpenText released OpenText 4 in 1994. It used many of the first SGML tags made available in a standard search engine product. At the time, the market held more established competitors in search—Information Dimensions, BRS/Dataware, Fulcrum, and Verity. Despite this fact, OpenText prevailed, growing and attracting customers from around the world that included Union Bank of Switzerland, Mutual Life Assurance Company of Canada, Grolier Publishing, Peugeot Incorporated, and the Government of Japan.

People and companies started to invest in the Internet, and customers were recognizing the potential of search technology. Less than a full year after releasing OpenText 4, the company released the next product—OpenText 5. With the three elements of TextSearch, TextQuery, and TextView, OpenText improved the speed and customers could index, search, and view a number of different document formats. And because more users were familiar with the easy-to-use Microsoft Windows® format, OpenText improved the GUI.

It was the University of Virginia's Alderman Library that took PAT to an Internet application. The Library used the software to access a number of texts including the King James Version of the Bible through online access by WAIS (Wide Area Information Server), and later, the Web. This first Internet application not only gave OpenText leadership in the academic market; its search and retrieval software would lead to a search engine that could index the Web in seconds.

CAMEO

TIM BRAY

LOOKING BACK

"It was pretty tough sledding in the early days—we had to reorganize and reshuffle more than once, which is why the current company, Open Text Corporation, officially dates from 1991. We paid the rent, but certainly weren't getting rich. The main problem was that our stuff was built for the Internet, but the Internet wasn't really there yet.

In 1993, I started hearing about this 'Web' stuff, and I liked it a lot. In November 1994, I was at a conference and one of the early Web guys made a speech talking about how he thought there was going to be a lot of call for search technology on the Web. I thought: 'I wonder if our search engine would work for that?' Then the pieces started falling into place in my mind: crawler, parser, hacked Web server. It could all be done and it wouldn't be that complicated. I got so excited that I was physically shaking on and off for the next three days. At the time, I saw it strictly as a good marketing ploy."

CREATING THE INTERNET GUI

When Tim Berners-Lee created the first GUI for the Internet—the Web browser—four million people were using the Internet.[1,2] The Web browser was essentially a software application that could retrieve and present resources on the Web. Browser technology required many new innovations, including new software to access information (HTTP) and the new graphical knowledge (HTML) that gave each Web page a distinct style. Because Web technology development standards were "open" and access was free, innovation and global usage flourished and the Internet became wildly popular.

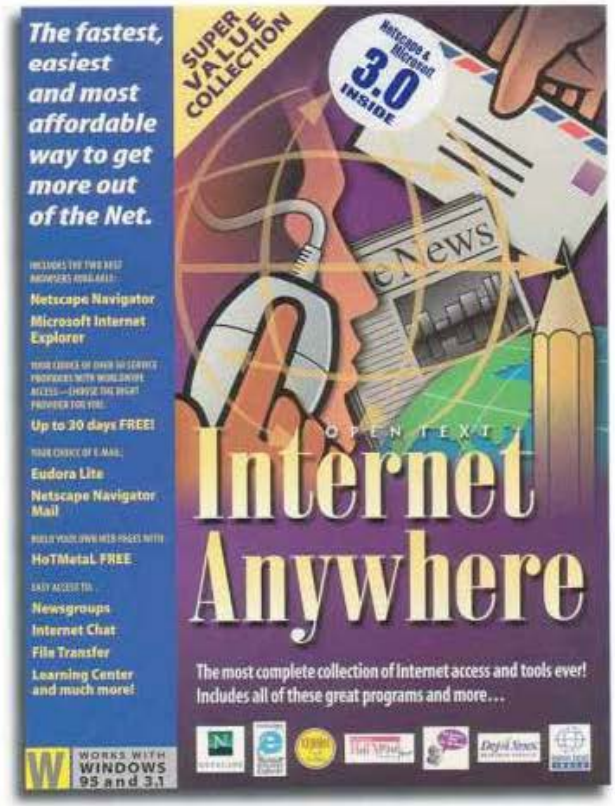
In 1993, with 10 million Internet users, Mark Andreessen led the team at NCSA to develop Mosaic, and then Cello (the first Windows Web browser discontinued in 1994[3]), Lynx 2.0 (a text-based browser), Arena (which started as W3C's test platform[4]), and Mosaic 1.0. These were the new Web browsers on the market. A year later the number of Internet users doubled. Andreessen started his own company Netscape and introduced Netscape Navigator™. Other new browsers included IBM WebExplorer, MacWeb, IBrowser, Agora, and Minuet.

Finally in 1995, Microsoft developed its first browser and bundled it with Microsoft Windows operating system. By 2002, Microsoft Internet Explorer® would dominate the market with a 95 percent market share.[5] As the number of Internet users increased and Web browsers made the content easier to view, content exploded.

NAVIGATING WEBSITES

Web sites multiplied rapidly. The first Web sites were static digitized versions of newspapers and corporate brochures. A Web site was comprised of a group of Web pages that were stored on a server in HTML format that was sent to the client Web browser. This type of Web site could support text, some images, and simple forms which typically enabled users to sign up for something. The content was pre-defined and not tailored to specific users. Content creation and maintenance was a manual process for managers of Web sites, or Webmasters.

Many people did not know how to navigate through the vast, constantly changing amount of content available on the Web. Across the street from OpenText in Waterloo, Mortice Kern Systems (MKS) had a product division working on a product called Internet Anywhere that used some of the first email tools (which will be discussed later in this chapter) and Web browsers.



INTERNET ANYWHERE PRODUCT BOX

In 1994, Windows-based Internet Anywhere was introduced at COMDEX, a computer expo held in Las Vegas. The software helped Internet users navigate around the Web, access and compose email, and receive news from UseNet Groups by pointing and clicking. People were getting used to the desktop GUI that allowed them to point and click on their PCs, so to have a tool that could do the same for the Internet was well accepted. Internet Anywhere was also easier to set up than other Internet front ends at the time. All it required was the software and a modem. Users could also set up their own email addresses and create their own

1 History and Growth of the Internet. Internet World Stats. June 21, 2011: www.internetworldstats.com/emarketing.htm
2 Internet Users. The World Bank Group. 15 December, 2010: data.worldbank.org/indicator/IT.NET.USER/countries/1W?display=graph
3 Lipskas, Vygantas. Cello – First Windows Web Browser. FavBrowser.com, 2010: www.favbrowser.com/cello-first-windows-web-browser/
4 Huges, Phil. Linux and Web Browsers. Linux Journal, May 1, 1997: www.linuxjournal.com/article/2219
5 Baker, Loren. Mozilla Firefox Internet Browser Market Share Gains to 7.4%. Search Engine Journal, Nov. 24 2004: www.searchenginejournal.com/mozilla-firefox-internet-browser-market-share-gains-to-74/1082

domains. From both the implementation and the user perspective, Internet Anywhere was fast to install and easy to use.

CONNECTING THE ENTERPRISE

Later that year, MKS took Internet Anywhere a step further to enable enterprise-wide connections. The Novell Netware® version gave enterprises a way to allow employees to send news and mail to other users on their LAN, or even globally. As well as being easy to use and install, the software also secured enterprise information on an internal server, which managed all permissions and ensured content security.

The technology earned the company the Emerging Technologies Award by the Canadian Advanced Technology Association.[6] But it was the 1995 version of Internet Anywhere that really expanded its functionality. This new version supported UNIX-to-UNIX protocol, as well as the ever more popular TCP/IP. By using the protocol of the Web, users could access information services like the World Wide Web. Its increased telnet functions meant that remote users and offices could access database files and increase their productivity.

At the end of 1995, Internet Anywhere no longer fit into the long-term strategic plans at MKS. The team that joined OpenText through the acquisition of the technology brought vast Internet knowledge and experience to help OpenText expand its focus beyond a search engine for documents.

SEARCHING THE INTERNET

Information was being added to the Internet at a pace that no one could keep up with. Seemingly overnight, it had become the world's largest repository of information. Like a library, it was bulging with information that people were eager to find and consume. To make information easier to find, a few companies like Verity and DEC (now part of HP) developed what became known as a search engine and created Web sites that enabled people to search the Internet. Search became the first widely used application on the Internet.

Tim Bray realized that the search engine technology that OpenText had developed could work for the Internet. He single-handedly wrote the Internet version of the search engine. In 1995, OpenText announced that

CAMEO

JOEL GRAY

FIRST CONNECTING TO THE INTERNET

"In early 1995, at the height of Internet hype, I was part of a team of 11 desktop software designers that found itself in a race to build a suite of easy-to-use software applications that would help connect the novice computer user to the 'information superhighway'.

We worked for a software company in Waterloo called Mortice Kern Systems, or MKS. I can remember nervously sitting in a circle of chairs at one end of the office when Tom Jenkins walked in to speak with us about OpenText, the company of about 40 people that had just acquired both our product, Internet Anywhere, and our team, located just across the street.

Tom spoke about the OpenText Index, a massive search resource on the Internet, and a vision for combining the ability to connect to the Internet with the ability to find information easily. We had no idea it would lead to one million queries a day in a partnership with Yahoo!"

6 Delrina, Unitel, MKS top list of CATA winners. Computing Canada, June 8, 1994.

OpenText Index (OTI), a technology that indexed and searched the Web was free to anyone on the Internet with a Web viewer. The technology included an Internet agent that could repeatedly visit, read, and index every word in every document on the Web.

OTI AS SEEN USING NETSCAPE NAVIGATOR

By the fall of 1994, Yahoo! was attracting almost one hundred thousand unique visitors. Like much of the early Internet technology, Yahoo! originated as an idea shared between two university students—David Filo and Jerry Yang, Ph.D. candidates in Electrical Engineering at Stanford University. With all the available information on the Internet, the two were trying to keep track of their personal interests. Their lists of favorite links grew too fast and needed some organization so they began to categorize them, and then subcategorize them.

MAXIMIZING SEARCHES TO MAXIMIZE EFFICIENCY

Despite the fact that Yahoo! was getting so many unique visitors, it was still basically a directory that listed Web sites on the Internet. OpenText and Yahoo! developed a partnership such that OTI allowed Yahoo! to search every word on every Web page.

In 1995, the Internet was a popular, engaging topic in the media in North America and Australia, spreading to Europe in 1996. 1995 brought commercial agreements to OpenText that would initiate the trend of working with some of the most influential companies of the time, like Oracle®.

Oracle started in 1977 as a consulting company called Software Development Laboratories (SDL). Its co-founders were Larry Ellison, Bob Miner, and Ed Oates. They commercialized the relational database model—this innovation would change the face of business computing. Other developments by Oracle include: storage equipment, servers, operating systems, virtualization software, middleware, and a host of applications.

Licensing of the OpenText indexing and retrieval technology was the first non-Oracle information search technology offered by Oracle and it gave Oracle customers a variety of information, indexing, and retrieval technology options. Three months after the Oracle agreement, IBM also licensed OpenText Index. But the relationship that really boosted the OpenText brand was its partnership with Yahoo! It reached its peak at one million queries a day, and OpenText generated revenue by splitting the advertising sales revenue with Yahoo!

INTERACTING WITH WEB CONTENT

The creation of the Web browser enabled more than the simple browsing of attractive Web pages. As the limitations of connection times, processing speed, and memory size lessened, users began to add video and audio files to the Web. Browser technology allowed for the addition of this interactive and dynamic content.

Dynamic Web sites could generate content on the fly by piecing together blocks of code, procedures, or routines. By using templates, reading cookies, recognizing previous history, or following repeated or favored clicks, customized content was created. Because dynamic sites operated more effectively, they were easier to maintain, update, and

expand. Dynamic Web sites became popular as they required building a template and a supporting database, as opposed to static Web site creation that was based on building hundreds, or even thousands, of individual static HTML Web pages.

Eventually these new ways of finding and consuming information on the Web found their way into the enterprise, causing the development of technologies that would allow individuals to interact with their enterprise content in ways similar to browsing the Web—with one key difference. Content was private and because businesses had to secure their information, the technology had to work behind the firewall, a boundary that prevents users without permission from crossing from one area to another in the network.

MIKE FARRELL

GOING BEHIND THE FIREWALL

Mike Farrell, Executive Vice President, OpenText from 1992-2006, realized that the technology and standards that OpenText used for the Internet could also apply to business applications. He realized that people would want to do something more with the files they found in their searches. Farrell wanted to build a complete system to find and re-use electronic documents.

With document collections doubling monthly in both academic and commercial institutions by the mid-1990s, managing content became critical. Business management programs like Enterprise Resource Planning (ERP) programs led to more automated transactions within organizations. Oracle led the industry in database development to help companies efficiently manage numeral-based data. Another company, SAP®, was also pursuing database development.

SAP was started in southwest Germany in 1972 by five former IBM employees with the vision of building standard application software for real-time data processing. By 1973, SAP completed its first accounting system, which eventually became known as SAP R/1. The product line expanded to include a range of products including production management modules, human resources, e-commerce, and portals.

CAMEO

MARK KRAATZ

400 QUERIES PER GALLON

"Everything ran smoothly for a couple of months, with the load from the Yahoo! service increasing steadily. At the peak of our service for Yahoo!, we were doing over one million queries per day, which at the time was an unheard of number.

Then it happened. On December 12th, 1995, a huge storm blew in from the Pacific packing 100+ mph winds and torrential rain. The storm swept over the entire San Francisco Bay area, knocking down telephone poles in its path leaving over one million Bay area residents without power. Worse still, due to the widespread damage, it looked like some places would be without power for days, possibly weeks.

What were we to do? Just as OpenText was getting ready to go public, having the OpenText Index off the air for a few days, let alone a few hours, was unthinkable.

We moved into action quickly. Our local staff and one of our new IT managers (it was his first week on the job!) went to a rental agency and got a 4,000 watt gas-powered generator. They got the machine set up and by 10:00 p.m. that evening we had a single server back on the air."

The system behind the firewall known as intranets, and the ability to do something with files found with the search engine was called integrated document management. Because intranets were private networks inside organizations, they provided secure access to corporate information. They enabled organizations to become more integrated, efficient, and productive in the most basic business process—people working together.

OpenText was one of the first companies to understand the potential that intranets offered to large corporate and government environments—to help make jobs easier to do and employees more productive.

ORGANIZING THE MESS

OpenText released Latitude in 1995. OpenText understood that the amount of information available in the enterprise, from electronic documents to CD-ROMs, LANs, WANs, and the Internet, was enormous. This inspired the marketing team to create the campaign slogan "Life is messy…deal with it." Latitude enabled enterprise users to find and retrieve documents they needed amidst a jumble of enterprise content using the OpenText 5 search engine. It even ran on multiple platforms and supported SGML and HTML.

The pioneering technology developed by OpenText was acknowledged when Latitude received the Award of Excellence at Seybold Seminars in Boston in March 1995. This encouraged a partnership with Netscape who held 70 percent of the browser market at the time. Early in 1996, Netscape bundled the Navigator Web browser and Commerce Server™ with the Latitude Intranet System product suite.

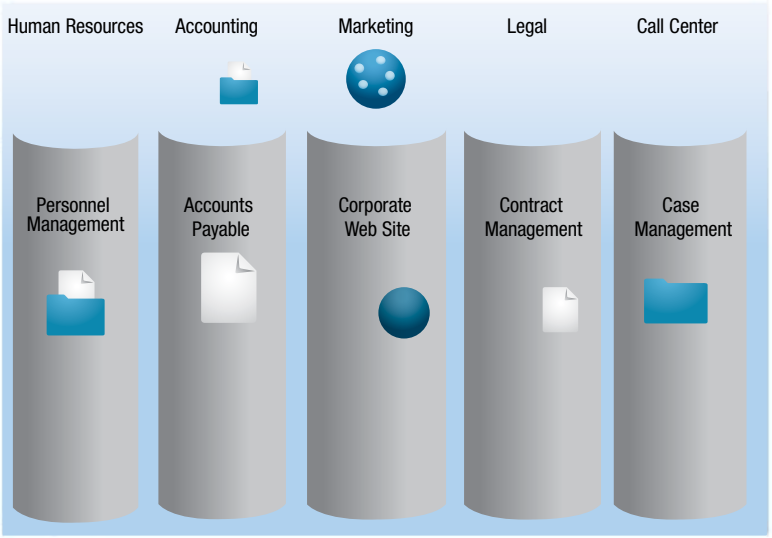
LATITUDE USER MANUAL

In the corporate world, few companies were in this line of work because the software for corporate intranets required more sophisticated and secure technologies. OpenText took advantage of this to increase its technical expertise and expand its products to fit user needs.

It was clear to OpenText by the end of 1995 that intranets were the emerging computer platform. Large organizations had invested in placing a PC on every desk and connecting all employees, even those in different locations through networks. The management team saw the intranet as more than a publishing platform for large enterprises to post their internal policies and procedures, human resources forms, and sales collateral. They knew that intranets could actually improve the way people communicate, manage processes, and collaborate.

VIEWING INTRANETS AS A BUSINESS TOOL

Technology changes of the Information Age and the globalization of the economy affected the business environment. Within organizations, intranets gave users more access to information and to other people, even outside their office, but this also created challenges. So much information made it difficult to find what was needed, and the worldwide distribution of resources made managing people more difficult. Finally, access controls were complicated by the amount of data that existed and the tools or technologies that were being used to access this content.



CORPORATE CONTENT TRAPPED IN DEPARTMENTAL SILOS

At the time, many companies regarded intranets as experimental applications. OpenText wanted to apply intranets as business tools that would address content challenges and help employees collaborate using only a browser, a phone jack, and a password, regardless of their location. OpenText realized that all electronic content needed to be managed as long as it was required by the organization.

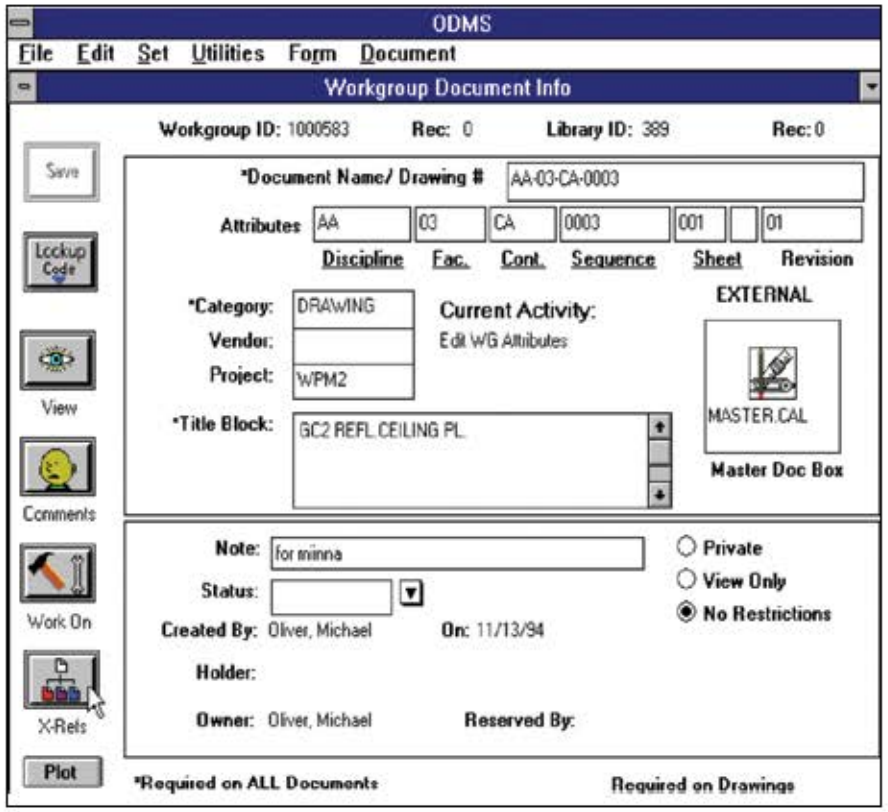
The early technologies of content management were driven by the imperative to improve efficiency and save money. There were departmental requirements such as purchase order processing, invoicing, claims processing, project management, sales readiness, and product lifecycle management. Each department's specialized content management system worked effectively, but in isolation. Information silos between departments caused duplication, wasted resources, and difficulties sharing and collaborating.

INTEGRATING TO COLLABORATE

OpenText wanted to round out its core functionality so that users could manage documents, establish collaborative workgroups, and manage and track the progress of their work—called workflow—using intranets. OpenText found the technology that would perfectly match its search engine and messaging capabilities in the Livelink product from Odesta with its document management, project collaboration, and workflow technologies.

In the early 1980s at Northwestern University in Illinois, a group started to create a document management system. The group became Odesta and the document management system was Mac- or VAX-based. While approaching its 10th anniversary in November of 1992—with 120 employees, growing debt, and venture capitalists ready to pull out—Daniel Cheifetz, along with other executives and one quarter of the staff, created Odesta Systems Corporation. They purchased the VMS-based Odesta Document Management System (ODMS).

Immediately, the team began to upgrade the document management and workflow automation program, including options for a UNIX server and Windows. The company was competing against the Lotus Notes® packages of the Lotus Development Corporation. Phil Beckman, Director of Software Development at Odesta Systems continued to work on the next generation of software: Livelink. Based on client/server architecture, the client presented the user interface, while the application and business logic ran on the server. Odesta now had a fully customized, platform-independent document management and workflow system.



CLIENT/SERVER SOFTWARE THAT PREDATED LIVELINK

TAKING DOCUMENT MANAGEMENT TO A NEW LEVEL

In March 1995, Odesta took Livelink to the Documation Conference in Long Beach, California, for its first live demo. The team was sure they had most of the bugs worked out. Livelink was a big hit—the crowd surrounded the booth, five people deep, all waiting for a one-on-one demo. The success of the launch gained the attention of many, including customers like Canon. Together, the developers from Odesta and OpenText realized that this technology could move to the Web.

CAMEO

BILL MORTON

SUCCESSFUL LAUNCH

"In early 1995, Daniel [Cheifetz] called all of us into his office to announce that the new release would be called 'Livelink'. Daniel also gave us draft copies of the new product brochure. The brochure included rather ethereal narratives illustrated by artsy photographs that Daniel had commissioned from a local creative company. I vividly remember looking up 'sea change' and discovering that this would indeed describe the events that followed over the rest of the year.

We had a wildly successful launch. Almost immediately after the launch the Internet became important for corporate use. The question quickly became how could you realize this [Livelink] in a Web browser? The architecture made it easy. There was a short turnaround for Odesta to launch a Web-based architecture for Netscape browsers. By moving to a Web client, Livelink was the first Web-based document management system.

It became our objective to deliver application software that would provide the benefits of the Internet to corporate environments."

Once OpenText combined its technologies with those of Odesta, they released Livelink Latitude at the end of 1995. It was the first Web-enabled system for searching, developing, and distributing documents. According to Tom Jenkins, then President and Chief Executive Officer, "Livelink is the first collaboration workgroup system that reflects the way people really work. It enables everyone—no matter where they are—to communicate, access information, build documents, and distribute the results. It is what OpenText calls client/surfer software."

Not only did the release include powerful search and document distribution capabilities, it also featured a "universal viewer" called Latitude Portal. Users could access word processing, CAD, and multimedia documents and objects, no matter what their native format. To see how this product has evolved, visit: opentext.com/btf-documentmanagement.

OPEN TEXT
Intranet

THE NEW LOGO TO HELP PEOPLE UNDERSTAND THE NEW PRODUCT

DEVELOPING THE INTRANET

At this time, the Internet was still a new concept for many. The commercial marketplace did not understand what an "intranet" was; they thought it was a typo. This made explaining the new product, Livelink 7, to prospective customers difficult. The marketing team developed a new logo and advertisement to explain the concept of the new Web-based product.

The new advertisement was aimed to compete directly with Lotus Notes. In 1995, IBM had acquired Lotus Notes. The software was an integrated desktop client option for accessing business email, calendars, and applications from the IBM Lotus Domino® Server. It could be used as a document management system with discussion forums and provided each intranet project with its own home page, a library, a discussion area, the ability to route workflows, and search tools.

BUILDING NETWORK KNOWLEDGE

As the amount of content grew, early applications of the Internet and intranet needed to become more sophisticated—internally to support compliance with regulatory laws and externally to support corporate Web sites. In order to scale their technologies and expand, organizations that were working with Web technologies required solid networking knowledge and experience.

Kirk Roberts and his team at NIRV Center founded one of the first Internet Service Providers (ISP) in the world in Toronto in 1987. At NIRV, they knew how to scale a network and maintain a hosted service. The network considerations and features of its work would impact future designs of OpenText search engines and document management systems.

When he became part of the OpenText team, Kirk Roberts led innovations in hosted services efforts that included Livelink OnLine (LOLI) and b2bScene offerings. This work made Livelink accessible to small- and mid-sized companies. The team developed a way to access software via the OpenText Web site on a pay-as-you-go basis.

REDEFINING BUSINESS

Open Text Corporation was the third Internet company to list on the NASDAQ. In January 1996, OpenText completed an Initial Public Offering (IPO). A second public offering was made in 1998 on the Toronto Stock Exchange (TSE). In 1999, there was a wave of IPOs with companies being created around various Internet concepts—the dot.coms. The bubble burst one year later and slowed the economy for many companies in the industry. It was at this time that OpenText decided to concentrate their focus on the intranet behind the firewall.

b2bSCENE INTERFACE

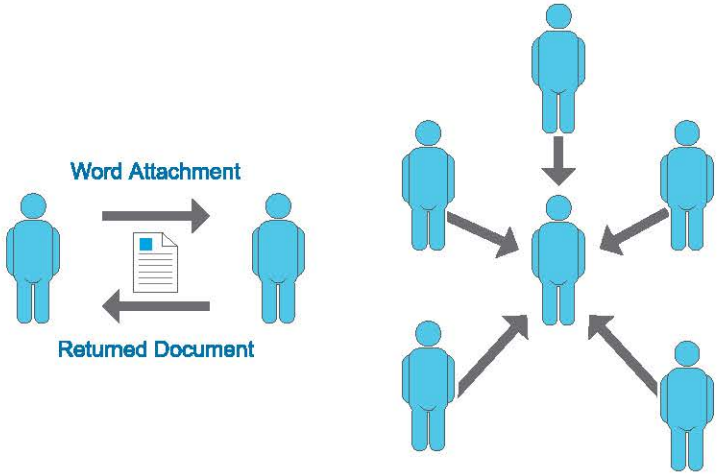
In 1997, Dan Latendre, Vice President of Product Marketing, said, "I see the Internet as a showcase, a marketing vehicle. It's a good place to introduce yourself, but the intranet is where the good business is done, using real technology close to the firewall. Businesses are tired of getting wedded to client/server applications. But when you get into intranets, or even extranets, as many companies are doing, everyone knows how to use a browser and it just makes things easier."

DEVELOPING THE GAME CHANGER

In 1997, Zona Research predicted that spending on intranets would reach US $2.1 billion. The International Data Corporation (IDC) reported $3.0 billion by 2000. It was a growing business, and as more sophisticated applications like Business Process Management (discussed in Chapter 4) became applied to intranets, the cost of implementation was expected

to rise. Organizations spent the money because they saw value in extending their reach to remote users, partners, suppliers, and even customers as companies became global.

During this time period, intranets were connecting business computers, but organizations needed collaboration tools. The OpenText product strategy focused on providing scalable, standards-based collaborative solutions, and this differentiated OpenText from its competitors. Microsoft and Lotus collaboration was message-based. Between two users this worked fine because emails could be sent with attachments, but this did not work effectively for a group. Take for example, sending a document to a group of users simultaneously—problems arise when modifications are made to the document and emailed back to the author. The author then has to consolidate all of the modifications in one document.



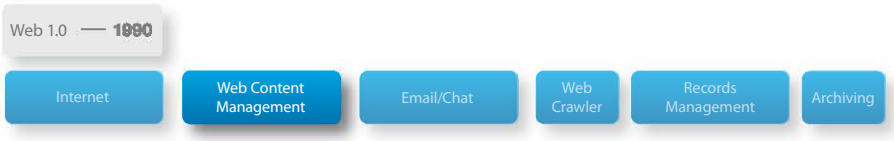
EMAIL COLLABORATION BETWEEN INDIVIDUALS VS. DOCUMENT COLLABORATION AMONG GROUPS

Livelink was built on a repository-based collaboration model, or groupware. This meant that everyone shared equally in updating a document. It also included a library or vault for storage, and the search tools made it easier to locate and access knowledge. Working together became easier.

As the enterprise grew and started organizing its internal content with intranets capable of managing risk, cutting costs, and increasing efficiencies, the popularity of the Internet was still growing as a common public platform. The enterprise realized that the Internet was not only needed for front office functions, but it too had to work more efficiently. As more people began to create and maintain Web sites, it created a need for Web Content Management so that there was a simple way to manage all the information that was being "posted" by servers to the Web.

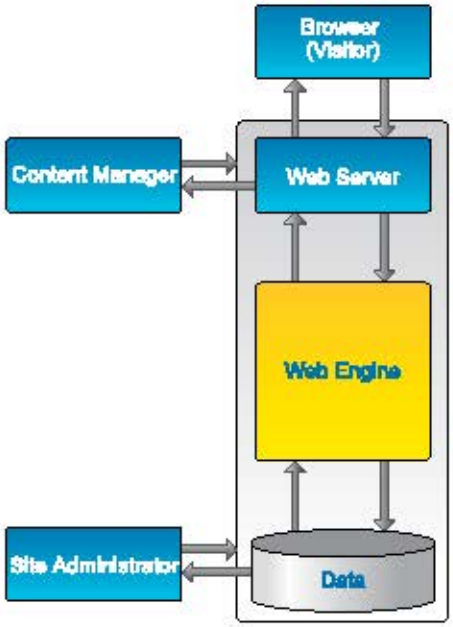
INCREASING WEBMASTER PRODUCTIVITY

Ease of use became an important part of employee productivity in many areas of the enterprise. Early Webmasters needed easy-to-use tools to manage all the content they had to deal with on their Web sites. These tools became known as **WEB CONTENT MANAGEMENT** (WCM).



Early WCM systems allowed editors to develop content in an easy-to-use browser-based interface. The WCM content repository stored that content to publish to the Internet, intranet, or extranet. Using templates, organizations could make sure that even though content was easily changed, the design and layout remained consistent and professional.

Vignette, out of Austin, Texas, was one of the early innovators in the Web Content Management space. Founders Neil Webber and Ross Garber wanted to make Web publishing easier and more personalized. Their first product development effort focused on large-scale content management workflow processes. Vignette announced StoryBuilder, but it never shipped. They struggled to make the technology work, so Garber cold-called C|NET executive Jonathan Rosenberg. The San Francisco-based new media company had a similar technology: Prism. Prism allowed even technophobes to publish Web pages. C|NET had not commercialized their product, so they handed it over to Vignette to merge with the Vignette technology.



WCM ARCHITECTURE

Vignette shipped the new product, StoryServer, in January 1997. StoryServer is widely considered to be the first Web Content Management tool. Later that year, Vignette merged the StoryBuilder technology into the StoryServer product, and shipped in September 1997.

A document publishing model inspired StoryServer technology. It allowed users to move templates through various workflow stages. But the caching system was the defining attribute of StoryServer. This allowed access to pre-generated pages, and that meant viewers would see Web pages as fast as the underlying hardware and Web server software could send them to the network. StoryServer developed a degree of scalability that most products could not match.

MAKING WEB SITES EASIER TO MANAGE

The C|NET connection helped Vignette attract business and capital. C|NET invested $500,000 in the solution, and in return, it took a 33 percent stake in Vignette, providing an introduction to venture capital (VC) investors. Vignette raised another $27.8 million through VC firms like Charles River and Adobe Ventures from 1996-1998. C|NET then connected Vignette with online publishers the Chicago Tribune and CBS Sportsline.

Garber continued to look forward and wanted to expand beyond the online publishing market. He repositioned Vignette as a customization and production tool for dynamic Web sites of all kinds, refocusing its marketing efforts on the lucrative corporate market. It aimed to be the answer for content developers publishing Web sites without needing to know HTML.

VIGNETTE USING ITS OWN TECHNOLOGY TO BUILD ITS SITE

The Application Programming Interface (IDE) that Vignette used along with the Application Programming Interface (API) also made Web development easier. The Vignette IDE and API offered an alternative to the conventional CGI/vi/Perl Web development. Big media customers like Fox News, Disney, and National Geographic, with a need for decentralized content development and publishing, became early

BEHR

WEB CONTENT MANAGEMENT FOR THE LARGEST PROVIDER OF PREMIUM PAINTS AND STAINS FOR THE NORTH AMERICAN DO-IT-YOURSELF HOME IMPROVEMENT MARKET

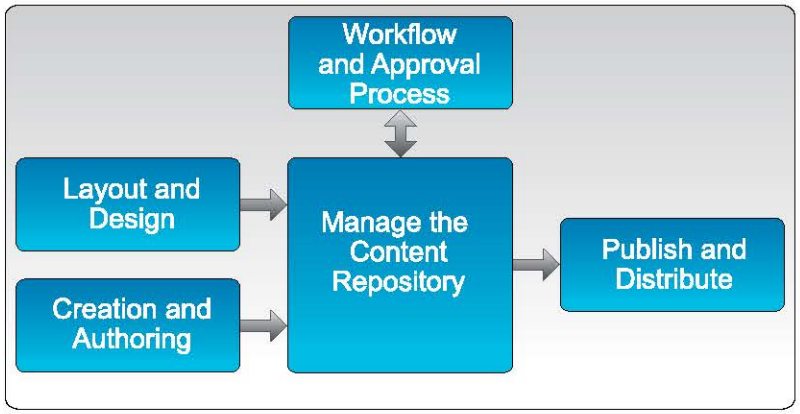
Using Web Content Management, BEHR has evolved its online presence from a static HTML site to a cinematic experience designed for homeowners and do-it-yourselfers alike. Visitors to the site have a vast array of tools to help them pick, compare, and test-drive colors. Features include a virtual Color Center that replicates BEHR color centers found in The Home Depot stores, an Inspiration Gallery with wide-format, magazine-quality images to spark ideas and an online Workbook where users can save and track their home projects and color choices.

Web Content Management provides advanced rich media management capabilities and a high-performance foundation for BEHR.com, enabling deep interactivity and an easier, immersive Web site experience. Behind the scenes, WCM enables BEHR to minimize IT involvement in Web site updates, putting the ownership of BEHR.com directly into the hands of the eBusiness and marketing professionals who drive its online initiatives.

BEHR INTERACTIVE WEB SITE

customers. Organizations liked that the software let people change their Web site without IT support. Vignette went public in February 1999, and was listed as one of the 10 most successful "dot.com" IPOs of the year.

By the end of the decade, Vignette started moving into the mobile delivery of content and internationalizing its business. It provided multilingual sites based on user preferences, which led to Vignette becoming the engine behind China.com. Throughout the next decade, Vignette made several acquisitions to round out its technologies and introduced more multimedia support. The technology powers Web sites around the world as the Web Content Management component of the OpenText ECM Suite.



A SIMPLIFIED WEB CONTENT MANAGEMENT LIFECYCLE

While Vignette was getting its start in North America, InfoOffice was pioneering Web Content Management systems in Germany. In the mid-1990s, the InfoOffice team wanted non-technical users to change Web sites quickly and easily, and even create Internet and intranet sites. As the software developed into a solid management system, they changed its name to RedDot. Customers identified with the red dot used in the software to help users navigate and the name stuck. Other players in the WCM space included Interwoven (now HP), Microsoft, Obtree (which IXOS acquired), and Broadvision. For more information about WCM technologies, visit opentext.com/btf-wcm.

Enterprises wanted to sell products and services to customers, as well as automate business workflows. This pushed growth in the WCM industry. And often, organizations were managing more than one public Web site or intranet. New technologies created during the Web 1.0 era helped organizations bring them together into a single point of access, or a portal.

PERSONALIZING PORTALS

When Yahoo! debuted, it was a page of Jerry Yang's and David Filo's favorite Web links on the World Wide Web. This was one of the original Web portals. A portal presents information from many different sources in an organized way. Web portals can also present news, stock prices, entertainment, and other personalized information, including email. Like MSN® or iGoogle, portals have become even more sophisticated with the capabilities to show multimedia applications including social networking tools discussed in more detail in Chapter 3, like Twitter®, video postings, and blogs.

Once again, intranets borrowed from Internet technology. Portals allowed a secure, single sign-on into several systems of the organization including workflow management, collaboration technologies, and content publication. Portals helped organizations simplify their intranets and gave them a common look and feel, while still allowing for personalization and user customization.

Even with WCM in place, people still wanted ways to simplify Web publishing. In San Francisco, Ed Anuff of Wired.com and Oliver Muoto, an executive at Touchwave, wanted to make it easy to administer and build Web sites. What was more compelling, however, was their desire to introduce dynamic content like news feeds into Web pages.

Anuff and Muoto founded Epicentric, Inc. in 1998. The first product to market, Epicentric Foundation Server, launched in 1999. As one of the company's flagship products, it supported multiple portals for different groups of employees and/or partners within the enterprise. A sophisticated permissions feature allowed administrators to specify roles, groups, and access rights for every type of content.

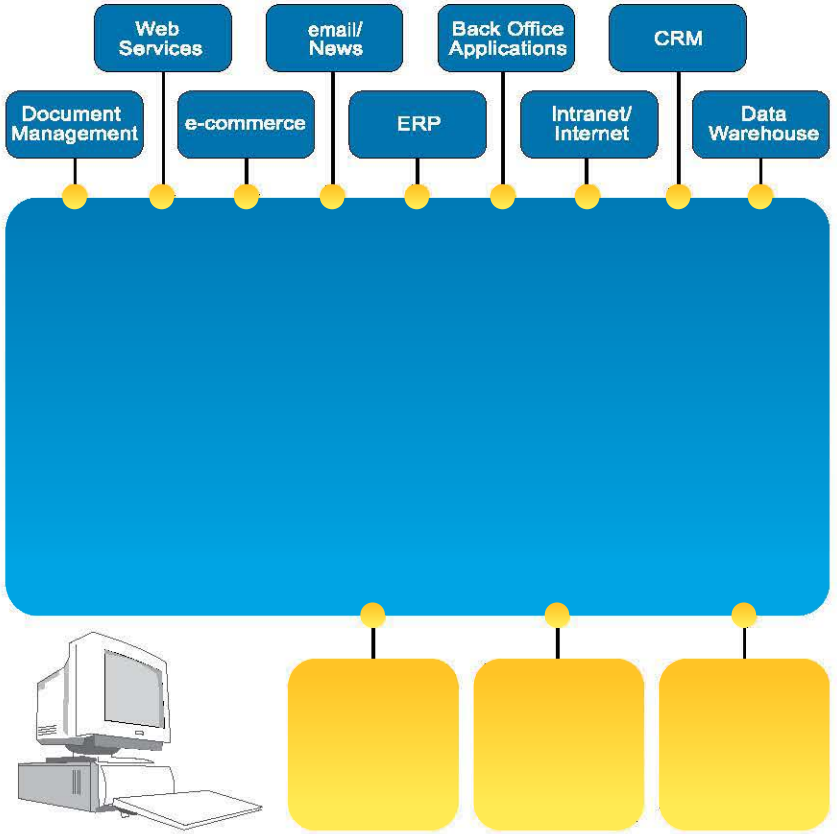
CAMEO

PAUL LOOMIS

PUBLISHING IN A PORTAL

"Epicentric was a portal company. We were the engine behind Motorola Web sites. It was a very dynamic group—the pace of innovation was fast! We were founded in late 1998, went to market in mid-1999 with version v2.0 of our portal product... We had skipped right over v1.0. Shortly after releasing v2.0, we released v3.0. We were the first to move away from using API to configure portals—creating an admin interface was groundbreaking at the time! In early 2001, we integrated Web Content Management inside the portal, using an abstraction layer. This was another amazing innovation. We even provided workflow for Web publishing within the portal.

Another strategic business we had at the time, which turned out to be way too early to market, was the use of syndicated services to feed data to applets sitting in the portals. We would take data from their parties, break it up, and feed it directly to the customer base. We were doing news, weather, and other feeds. No one else in the market was doing that at the time."



SYSTEMS UNDER THE PORTAL UMBRELLA

USING THE PORTAL TO ACCESS MULTIPLE SITES

Epicentric grew as a company developing software and services for corporations and media businesses to create personalized portal Web sites. It let users provide integrated Web services such as applications, content, and commerce to customers and employees across intranets, extranets, and the Internet. Using Epicentric technology, Global 2000 companies implemented multiple sites for several different audiences in a cost-effective and efficient way. Their new dynamic sites were attracting a greater number of visits than their static Web pages ever had.

The Epicentric portal stayed competitive by including its own content management system (CMS), which included a workflow component. Epicentric integrated the system in a way that allowed customers to use their existing CMS, such as Documentum or Interwoven®.

PORTAL OF ENTERPRISE CONTENT FOR EMPLOYEES AND PARTNERS

Epicentric provided Internet business solutions for customers such as General Electric, J.P. Morgan Chase & Co., Lockheed Martin, US Postal Service, Hartford Life, Autodesk, Altra Energy Technologies, Inc., Verizon, Vodafone, Motorola, and ChemConnect. Some of these clients, including J.P. Morgan Chase & Co., Outlook Ventures, New Vista Capital, and Motorola, believed so strongly in the product that they invested funds in its development.

In 2002, Epicentric won several awards, including:

- 2002 Best Portal Solution in eAI Journal's Annual Awards[7]
- 2002 PC Magazine Editor's Choice[8]
- 2002 eWeek Excellence Awards[9]

The technology is now part of the OpenText Portal, and you can learn more at: opentext.com/btf-portal.

EPICENTRIC FOUNDATION SERVER

While Anuff and Muoto were releasing the Epicentric Foundation Server, OpenText was looking to add new value to its offerings by aggregating

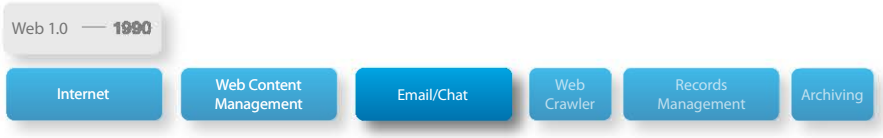
7 eAI Journal Awards Epicentric Best Portal Solution for Bank One Extranet Deployment; Epicentric Recognized for Excellence and Innovation in Enterprise Portal Technology. allBusiness, May 20, 2002.
8 Epicentric Foundation Server is PC Magazine Editors' Choice for Portal Software. Judges Award Epicentric Top Honors for Technical Excellence and Completeness of Vision. allBusiness, July 23, 2002.
9 Epicentric Foundation Server Wins Year's Best 'Portals & Knowledge Management' Product in eWEEK eXcellence Awards. allBusiness, Feb. 25, 2002.

content from one or more Livelink instances. myLivelink was one of the early portals. It was developed to combine content from Livelink with information from other Web resources like stock quotes, weather reports, and business news, into a single, personalized Web interface. The OpenText automated agent technology presorted the information into industry categories. Released in late 1999/early 2000, it worked first with Livelink 8.1.1, and was later renamed Livelink UNITE.

When companies were looking to keep productivity high, more technology companies made more sophisticated portals, content, and document management applications, advanced search technology, and other tools to pull all the information together for the enterprise. With the advancement in Internet technologies, one Web page could be transformed into a portal, combining content from several other sources on the Internet and securely, from behind the firewall.

COLLABORATING THROUGH EMAILS AND CHATS

During the Web 1.0 era, collaboration had become very important. Although intranets took collaboration to new levels, it started with email. The primary method of communicating between two people was through the use of **EMAIL AND CHAT.** Email began almost with the start of the Internet, although its popularity became significant once a critical mass of people had email addresses. Email then evolved from the UNIX-based systems of the early Internet into the first PC-based systems such as Chameleon and FirstClass, as well as Lotus Notes.

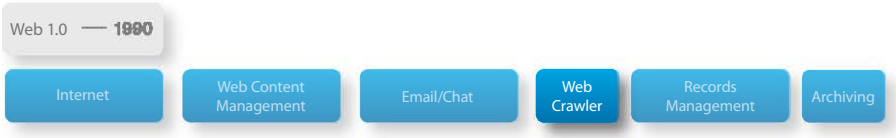


Microsoft Exchange became popular in the mid-1990s. Eventually Lotus Notes and Exchange became the Internet standard for PC-based email. However, in the early 2000s, email became one of the first popular cloud services with the offering of Yahoo! mail, Google mail, and Hotmail®. Soon more than one billion people had an email address.

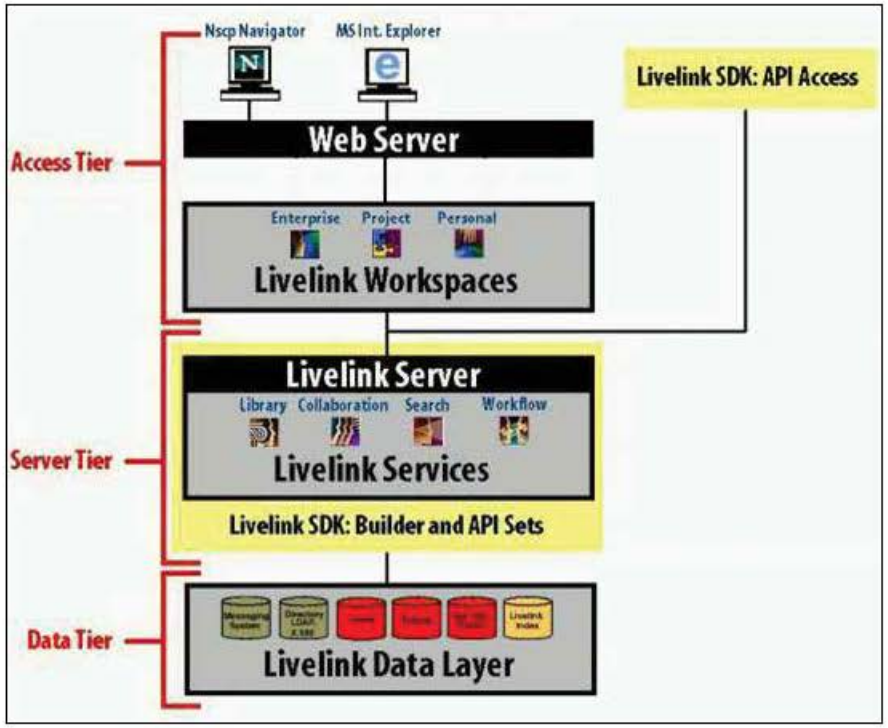
Chat also became a popular means by which people had “immediate” conversations with each other, as did texting on cell phones. In 1992, the first text message was sent to a phone, not from another phone, but a keyboard. It was not until 1993 when Brennan Hayden sent the first commercial text message in Los Angeles, that SMS (Short Message Service) was used. Within the enterprise the ability to collaborate in real time through chat- and text-type tools meant the conversation happened more quickly than email, and it was easier to involve more than one person at a time.

ADDING TECHNOLOGIES

As the Web became more complex and dense, search engines became more popular. An essential requirement for a search engine to function properly was the ability to find the Web sites in the first place so that it could build an index of the entire Web at that time. This led to the creation of **WEB CRAWLERS**. These were robot programs that scoured the Web by following links and separating private and public Web addresses. The Web crawler technology of Network Solutions Group became the Livelink Spider.



Another company, Campbell Services, brought enterprise-level calendaring into Livelink Intranet. The ability of Livelink Intranet to help users work better together improved the OpenText market position. The enterprise needed intranets and OpenText was delivering what users wanted. OpenText started moving its efforts away from the Internet, which included spinning off the OpenText Index into About.com in 1997, with OpenText as one of the largest shareholders when it went public in 1999. A year later, in 2000, OpenText completely exited this market. There was more than enough to keep OpenText busy with the growing needs of managing content in the enterprise.



LIVELINK ARCHITECTURE IN 1998

GAINING CONTROL AND MANAGING RISK

As intranet repositories continued to grow and enterprises added more content to the Web, they became worried about more than just managing all this content; they became concerned about managing risk. Large organizations realized that they needed control over corporate records and information holdings to comply with audits as well as regulatory and litigation issues. It became a struggle for companies to balance the need for candy—the interaction, collaboration, and fun that helps people to build relationships between people, and aspirin—what is needed to ease the pain if something happens and keep things under control.

Major, well-publicized events at the end of the decade brought the need for systematic controls over the information required to do business close to home for the enterprise. Clearly, organizations needed to manage their critical business documents in a highly secure infrastructure. It started with the accounting scandal at Enron, and climaxed in 2001 with 9/11. Suddenly safety, testing, and protection from laundering became increasingly important for organizations.

CANDY VS. ASPIRIN MODEL

In response to scandals like Enron, the USA passed the Sarbanes-Oxley Act (SOX) in 2002. This legislation, also known as 'Public Company Accounting Reform and Investor Protection Act' or 'Corporate and Auditing Accountability and Responsibility Act', set new, mandatory standards for all US public company boards, management, and public accounting firms. These standards pertained to critical financial information such as corporate responsibility for financial reports, enhanced financial disclosures, and corporate and criminal fraud accountability. While these standards only applied to the USA—the number of regulatory requirements across the globe continued to grow. In the case of governments, citizens expected accountability. In legal proceedings, disclosure requirements highlighted the risks both of retaining too few and too many records.

With the increase in the volume of digital objects, there was a need to keep track of versions, as well as just the sheer volume of digital objects being created, used, and stored for future use. Often these objects were valuable enough to keep, but many times once these objects had

CAMEO

BRIAN MACLEOD

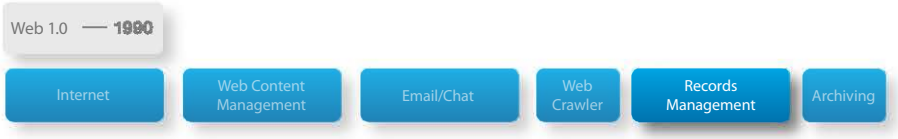
THE HISTORY OF RM AT OPENTEXT

"Our first products were based on physical file management, sold largely to the Canadian Federal Government. Just prior to the acquisition, our products were enhanced to support the simultaneous management of electronic, physical, and image-based records.

These packages ran in a Microsoft Windows environment. Our software components integrated with popular Windows-based products such as word processing, spreadsheets, fax, full-text retrieval, and email. The design philosophy was to provide an open architecture within iRIMS and its adjoining modules, so as to fit into almost any LAN and DBMS configuration setting.

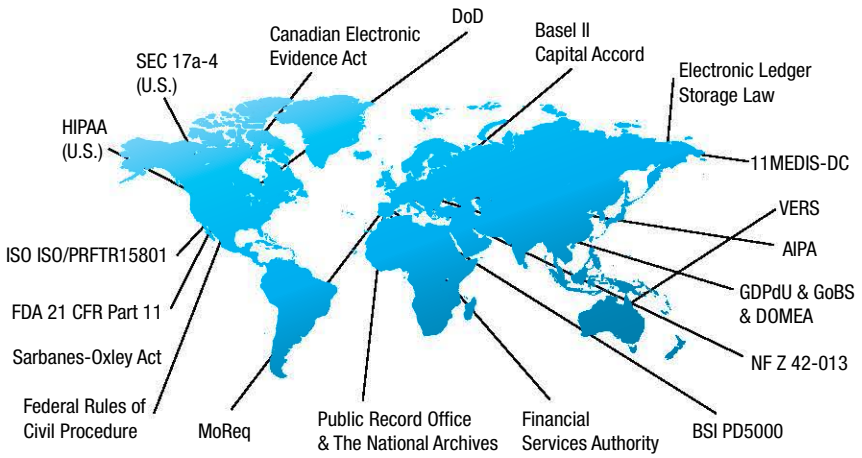
As a result of the research we did, iRIMS received US Department of Defense (DoD) 5015.2 certification and Federal Government of Canada RDIMS certification for Electronic Records Management. The DoD certification is an internationally recognized standard mandatory for all Electronic Document Management solution providers to the Department of Defense and other US Government Departments. Prior to becoming part of OpenText, this standard was becoming mandatory for other opportunities in the global market place since it was the only certification of its kind available in our field of research and development. Since then, other certifications and standards have emerged; the Public Records Office for the UK Government has a similar certification to 5015.2, ISO has published its own standard for electronic records management, and the US FDA's 21 CFR part 11 applies to the pharmaceutical industry."

served their purpose they could be thrown away. The need for long-term organizing led to the creation of **RECORDS MANAGEMENT** and archiving technologies.



Unmanaged content puts an organization at risk. Critical documents can be lost or deleted. Records management software helps by attaching rules to electronic documents that meet the operational needs, accountability requirements, and community expectations. These rules tell the system when it is safe to delete the documents, or move them to a data archive.

More than 100,000 rules and regulations worldwide… and growing



GLOBAL REGULATORY PRESSURES

PSSoftware started as a consulting service for records management in 1986 in Ottawa, but began to focus on the development and integration of records management for both electronic and paper records. One of their primary customers was the Government of Canada.

MANAGING RECORDS FOR COMPLIANCE

Development partnerships between companies started to become common in the mid-1990s. OpenText had formed partnerships with companies like WorldWide Technology Inc. and PSSoftware to assist and promote individual software vendors to create products that enhanced or expanded core products for specific customer requirements. PSSoftware had other partnerships as well with PC DOCS, FileNet, Documentum, Centura, Oracle, Microsoft, IBM®, and Novell.

As more software companies supported different types of electronic documents files, PSSoftware enhanced their products to manage not only electronic and paper records, but image-based records as well. It also integrated with word processing documents, spreadsheets, and email.

The development of the Recorded Information Management System (RIMS) provided an open architecture. This made it easier to fit into almost any LAN or database management system (DBMS) setting. It also ran in Microsoft Windows since users were most familiar with this environment.

PSSoftware successfully applied for certifications from the US Department of Defense, Government of Canada, the UK Government, ISO, and the pharmaceutical industry. This records management technology complemented Livelink. The work that PSSoftware had done to become standards-compliant moved OpenText Records Management ahead of the competition, like FileNet and TrueArc (acquired by Documentum in 2002), when the Sarbanes-Oxley Act (SOX) was enacted in the USA in 2002. To learn more about this product, visit opentext.com/btf-ecmsuite.

PRODUCT LITERATURE FOR RECORDS MANAGEMENT SOFTWARE

AARGAUISCHE GEBÄUDEVERSICHERUNGSANSTALT (AGVA)

OPTIMIZED BUSINESS PROCESSES AND PRODUCTIVITY WITH ARCHIVING

For the major insurance company AGVA in Switzerland, the assessment of buildings and claims settlement lies at the core of the company's activities. To streamline the complex processes involved, and to link content to process, the insurance company implemented an integrated system made up of ECM and ERP.

Process and document management are entirely managed by a Business Process Management solution, which, together with an archiving solution, forms the ECM infrastructure at the company. All insurance products are managed using an ERP system and an inventory management system. Customer files are managed using the archiving solution, which is integrated with the ERP system for easy access to relevant information.

This integrated solution gives field staff direct access to up-to-date information about insurance coverage, claim benefits and premiums. Business processes have been optimized, becoming more efficient and easier to manage. As a result, productivity has increased, resulting in cost savings, and customer service has improved, resulting in improved customer satisfaction.

CLAIMS MANAGEMENT AT AGVA

COMBINING DOCUMENT AND RECORDS MANAGEMENT

As the demand for records management grew, OpenText management realized that this was an extension that would complement the Livelink product. Livelink Records Management was released in 2000 as the first comprehensive, completely Web-based document and records management solution for the enterprise.

With the new Records Management extension to Livelink, OpenText helped customers more effectively manage their audit, regulatory, and litigation risk by controlling all their corporate records and information holdings, including paper, email, audio/video clips, images, word processing documents, and more. In the process, the enterprise could increase the value of its corporate information with highly descriptive metadata, or structured information attached to data to make it easier to retrieve, use, or manage. Livelink Records Management helped organizations better manage their critical business documents in a highly secure infrastructure.

Another company working on records management software at the time was Tower Technology in Australia. Their product Tower Seraph was a comprehensive records management system, which was US DoD 5015.2 certified. Besides government and university customers, health systems recognized that they could use records management software to manage patient records carefully and securely. Records management software also helped pharmaceutical companies comply with rules and regulations surrounding healthcare research. With constant changes to legislation, pharmaceutical companies needed to ensure compliance throughout the lifecycle of the documentation. In 2003, Vignette acquired Tower Technology.

With daily pressure to comply with regulation and constant changes to legislation, managing records and any document throughout its lifecycle became crucial. OpenText knew that if it offered customers document management with the addition of records management, customers would find value in the combined offering.

Regulatory compliance became increasingly important to organizations as they expanded globally and produced more electronic documents. However, this required one more piece of technology— archiving.

CAMEO

MANFRED HEISS

CHALLENGING DEVELOPMENTS

"IXOS had software for managing jukeboxes for WORMs (Write Once, Read Many), the only optical media available for archiving then. These optical disks were the size of a baking tray (12 by 14 inches) and had a capacity of 1.3 GB. Also, scanning documents was quite a challenge then, as scanners came as heavy beasts that needed to be attached to a workstation with dedicated interface cards from Kofax, which came for the price of a medium-sized server today.

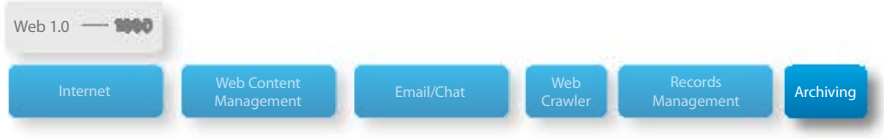
Development life was quite challenging at that time: we needed to come up with our own drivers for controlling optical jukeboxes via SCSI. Moving media from slot to drive, spinning up drives, positioning drive heads, reading data, optimizing drive handling—all of that had to be done by IXOS software. During this time, we became experts on dealing with optical devices. This clearly distinguished IXOS from many competitors who did not have any in-house expertise on this topic.

There were no software libraries available that dealt with compression/decompression of scanned images at that time. Our first algorithms took more than 30 seconds to decompress a single TIFF page. After some twisting and turning, we were down to a few seconds. And you have to keep in mind that CPUs in 1988 were running on 10 MHz (MHz not GHz as we have today)."

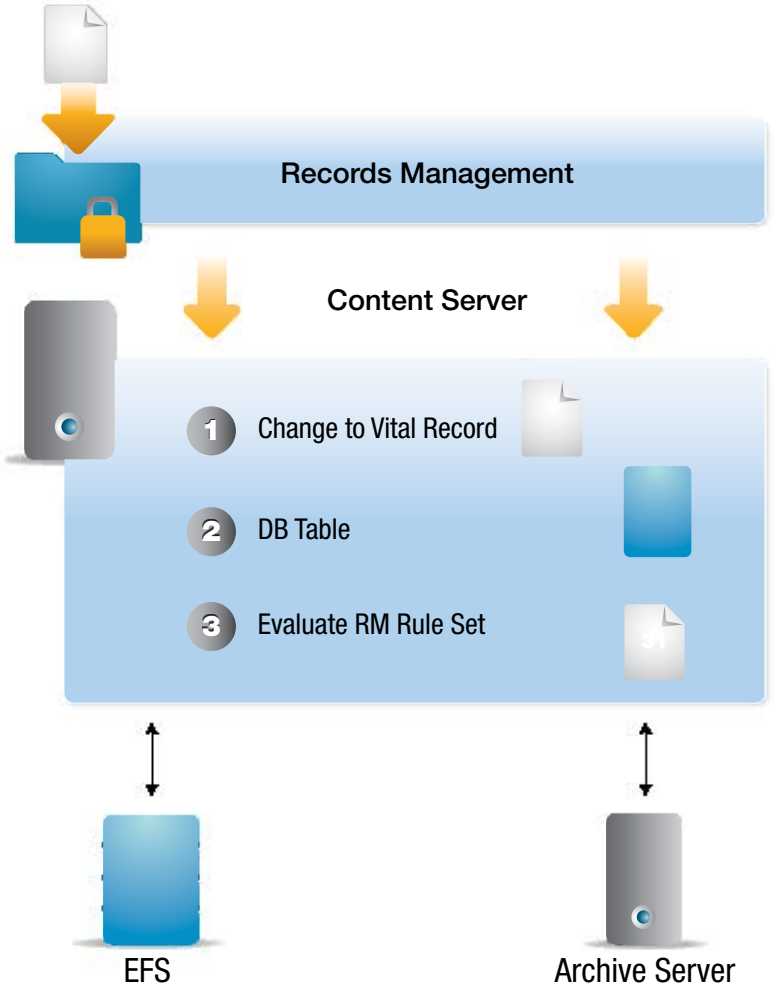
CLINICAL TRIALS APPLICATION OF RECORDS MANAGEMENT

BUILDING AND ACCESSING ARCHIVES

What happened to documents once organizations decided they were no longer required for current administrative purposes? The great bulk of modern records can and should be deleted as soon as they have fulfilled their immediate purpose. Some others need to be kept for a few years for audit. But many organizations realized that they had documents of continuing value for legal and other reasons required for long-term continuity and reference. A records management system could help automate this process, however, if an organization needed to maintain a document, it had to **ARCHIVE** it.



For all of the information that organizations shared on the Internet or on their intranets, archiving was about more than simply preserving the content and storing it securely in a central repository. It was also important to provide access to those files when they were needed again. For example, a company involved in a lawsuit might need to find 10-year old documents to support the case. Legal issues for governments may involve records that are decades or even centuries old.



RECORDS MANAGEMENT AND ARCHIVING

A major innovator in electronic archiving was IXOS. Just months after it was founded in 1988, IXOS signed a master agreement with Siemens, a company founded in Berlin in 1847 that revolutionized telecommunications by improving the pointer telegraph by electrically synchronizing the transmitter and receiver. From telecommunications, Siemens expanded its business through innovations in electric transportation, incandescent lamps, radios, and supermicroscopes before they started focusing on data processing in 1954. It was this line of business that partnered Siemens and IXOS.

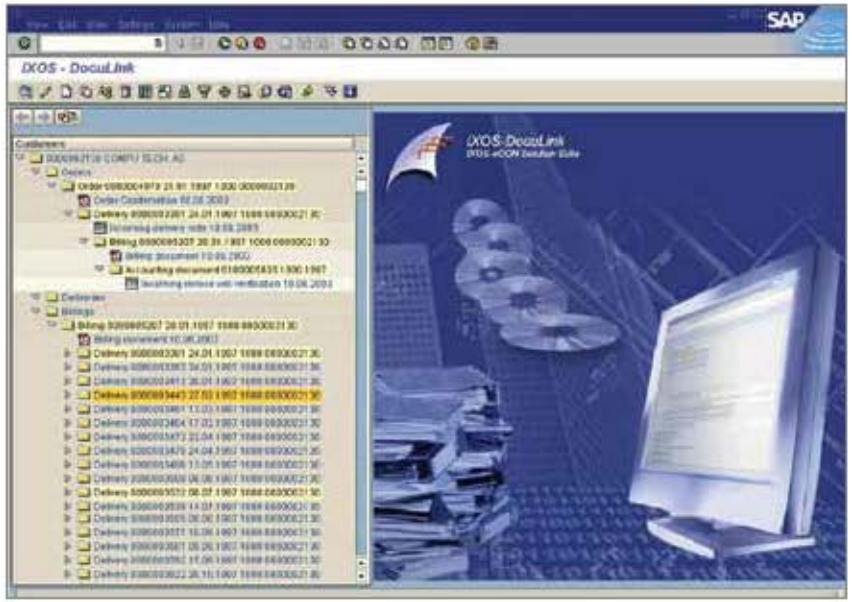
The first order for IXOS was to develop an imaging and archiving system for the German Federal Employment Office. This order led to the development of a solution that involved scanning paper records and creating ASCII documents used to process payments for Germany's unemployed. The system organized documents in simple folders and retrieved them by request based on a reference number for each document.

The first version of the product, OFR-X, went live in 1989 on a UNIX platform. IXOS installed OFR-X in 12 locations and on more than 1,000 desktops across Germany—all connected through a document pipeline. At that time, IXOS had the first commercially available GUI for an archiving product. The successors of this project are still running and managing more than 4 TB of data to this day.

Following the trend of development partnerships, in 1990, IXOS cemented another partnership with Siemens. Siemens wanted to develop a new archiving system called ARCIS. IXOS completed much of the development work with the exception of the archive WORM (Write Once, Read Many) server, which came from Siemens. One of the major differences between ARCIS and OFR-X was the ability to configure everything in the interface, using the database to permanently store configuration data.

DEVELOPING SOFTWARE FOR THE FUTURE

Most systems supported only UNIX, but IXOS recognized the value in developing software to support Microsoft Windows systems in 1992, a move many competitors thought foolish. The strong leadership of this German company continued as it participated in the rapid expansion of SAP information. As mentioned earlier in this chapter, SAP was a leading innovator of ERP programs in the 1990s, and the SAP ecosystem quickly grew. Its technology automated transactions that occurred within organizations to improve productivity.



A SCREENSHOT OF IXOS TECHNOLOGY

As SAP expanded around the world, the strength of its relationship with SAP kept IXOS in the race. Part of its success was based on IXOS updating their technology for use with Microsoft operating systems. In 1994, IXOS opened its first office in the USA, in California. When Microsoft released Windows® NT 3.5 in 1996, IXOS released the first server version of its product for Windows. The product name changed to IXOS-ARCHIVE. The company also implemented a new scanning methodology. Over time, IXOS standardized an open scanning system to the Microsoft platform.

In 1998, IXOS and Microsoft opened IXOS NTC, the Microsoft NT Competence Center, which offered a service for hardware vendors to certify their hardware for SAP R/3 and put a SAP-endorsed certification label on server hardware for Microsoft Windows. These strategic steps brought Microsoft and IXOS closer together and IXOS gained recognition in the Microsoft community.

Today, archiving technology from IXOS has been combined with Livelink from Odesta, records management from PSSoftware, and OpenText original search technology to form the OpenText Enterprise Library. By combining all of these technologies into a single foundation, Enterprise Library helps organizations find content more easily while managing their content more cost effectively within compliance guidelines. For more information about this technology, visit: opentext.com/btf-enterpriselibrary.

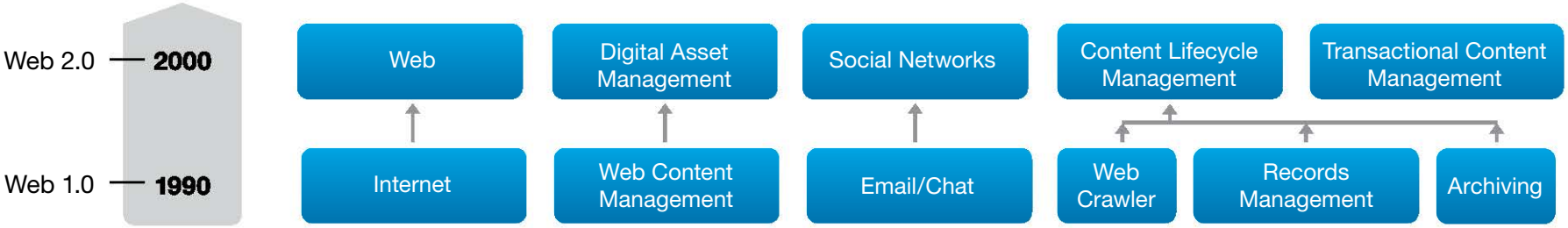
The archives for a company became the Deep Web inside organizations. Archiving was especially critical in the financial, energy, and government sectors where high priority is placed on regulatory compliance. Archiving became more important as use of the Internet in the enterprise increased and content kept expanding. Organizations needed to consider new forms of applications to make use of all this content.

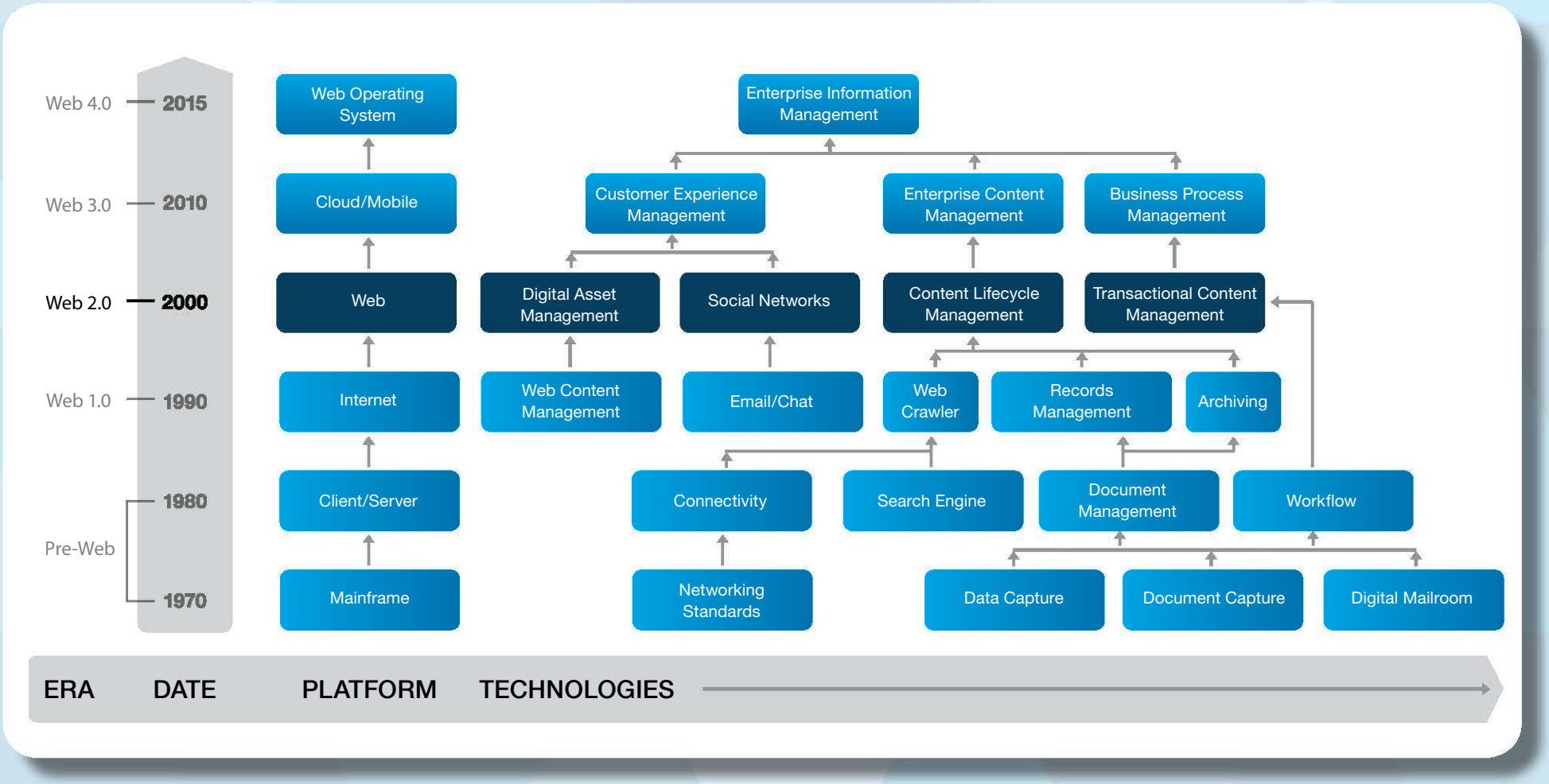
MOVING TO MULTICHANNEL CONTENT

As the Internet became widely and publicly used in the early 1990s, Web 1.0 was born. Generally, the GUI browsers displayed HTML versions of company brochures. As the era progressed, connection speeds and bandwidth increased, and the cost of Web site development and hosting dropped. People were able to interact with online applications and each other to create new content through the use of Web Content Management and email technologies. Fewer browser restrictions meant that applications could grow and raise productivity even further for the knowledge worker.

For Enterprise Content Management, Web 1.0 provided a Web-based interface for content management technologies behind the firewall. Applications became available enterprise-wide rather than requiring installation on individual desktop PCs. The era introduced early ECM technologies that required stronger search engines and led to the development of Web crawlers. Software was also introduced to manage the complete lifecycle of electronic documents from creation to archive or eventual deletion, decreasing risk and increasing compliance.

The technologies of Web 1.0 allowed for the development of more sophisticated technologies that could handle the growing amount of content in new forms that emerged in the 2000s and the new social networks, while running the enterprise.




Web 4.0
2015
Web 3.0
2010
Web 2.0
2000
Web 1.0
1990
Pre-Web
1980
1970
Web Operating System
Cloud/Mobile
Web
Internet
Client/Server
Mainframe
Enterprise Information Management
Customer Experience Management
Enterprise Content Management
Business Process Management
Digital Asset Management
Social Networks
Content Lifecycle Management
Transactional Content Management
Web Content Management
Email/Chat
Web Crawler
Records Management
Archiving
Connectivity
Search Engine
Document Management
Workflow
Networking Standards
Data Capture
Document Capture
Digital Mailroom
ERA
DATE
PLATFORM
TECHNOLOGIES

Chapter 3

Web 2.0 / 2000-2010

Everyone Gets Connected

In 1995, only 16 million people accessed the Internet. By 2005, that number increased to more than one billion people. More powerful technology, faster connection times, and lower costs brought even more users to the Internet from all across the globe. Another half billion people signed on as regular users in the next three years.[1] As the popularity of the Internet skyrocketed, social networking brought new forms of content and risk to the enterprise. And new forms of content required new technologies to manage them.

THE CURRENT WEB

The term “Web 2.0” was introduced at a conference in 2004 hosted by O’Reilly® and CMP Media. Tim O’Reilly described Web 2.0 as a trend that moves away from the traditional client/server-based applications to technologies that use the Web as a platform for collaboration. In O’Reilly’s vision, the Web became a network to facilitate emergent applications based on an infrastructure of participation. What followed was the development of applications like Facebook® and Twitter® and an ensuing explosion of user-generated content. The focus had changed from technology to the people using the technology.[2]

On the public Internet, applications such as Facebook brought people together into social networks, and YouTube® allowed users to easily post and share videos. Blogging, based on the term “Web-logging,” became a popular tool that anyone could use because it was easy to use and blogging applications were highly accessible. Blogs became a new form of online journalism. People shared their opinions and observations in blog posts and some gained a huge number of followers, becoming thought leaders almost overnight. Blog comments could be posted, with passionate discussions that followed in real time as people increasingly interacted online. The Web grew to accommodate a growing community of diversified users.

But the public Internet was not the first place that these applications first appeared. They had already appeared on the private Web. By 2000, organizations had created virtual private networks (VPNs) giving them a quality infrastructure at a speed that made them efficient. Suddenly, collaborative interfaces were added on as another level to Enterprise Content Management (ECM).

OPENTEXT BLOG

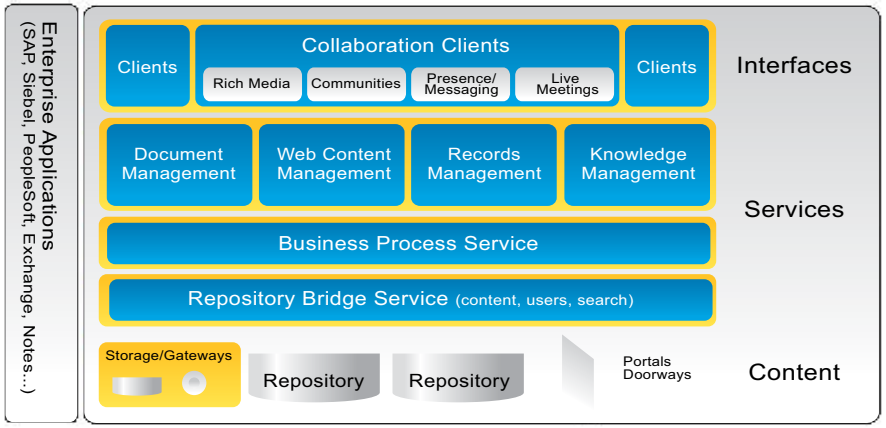
TRANSFORMING THE WEB INTO DYNAMIC SITES

The **WEB** continued to grow and it affected the enterprise in the marketplace and behind the firewall. New interactive technologies and communication models transformed the Web from static pages to links to dynamic sites that could automatically assemble information based on user habit, preferences, or interests. Web 2.0 applications facilitated interaction, instant information sharing, and collaboration over the Internet.

1 Internet World Stats: www.internetworldstats.com
2 O’Reilly, Tim. Various Things I’ve Written. O’Reilly About: tim.oreilly.com

The enterprise struggled to balance risk mitigation with individual creativity and productivity gains from Web 2.0 technologies (remember the candy/aspirin analogy). Organizations had to think about clearly defining and communicating social media policies so that their compliance process itself did not become a source of risk. Behind the firewall, these risks were mitigated by a fully integrated and secure ECM platform that supported full content storage, archiving, lifecycle, and records management functionality.

The Web 2.0 technologies focused on collaboration and rich media assets added new forms of content behind the firewall. Organizations used Communities of Practice (social networks for organizations), Digital Asset Management (to support videos and images for Web sites), and wikis (just like the public Wikipedia®). These technologies when used in the private Web were referred to as “Enterprise 2.0.”



ECM ARCHITECTURE

ECM TECHNOLOGIES

CONNECTING ECM 2.0 TECHNOLOGIES

ECM 2.0 was the secure management of all content types, from social networks, blogs, wikis, and other types of Web 2.0 technologies across multiple repositories, applications, devices, and platforms. ECM 2.0 helped manage and optimize the flow of content throughout an organization. Technologies like social media became important for the enterprise during the Web 2.0 era. The growth of social media drove user participation. Web 2.0 technologies focused on productivity, communication, and collaboration. Lifecycle technologies had to follow suit and evolve to support the full lifecycle of content, in all its new formats. Security, storage, management, archiving, and dissemination were required for these new content types.

The enterprise focus on improving efficiencies sharpened, and transaction technologies also evolved to manage data in the context of systems and processes. Software was developed to connect people and information to business rules and processes. Software companies adapted the applications originally developed for client/server infrastructure to work with Web technology.

CAMEO

VINIT DOSHI

DISRUPTIVE TECHNOLOGY

"Web 2.0 challenged and transformed the traditional Web publishing principles into a true multichannel digital experience strategy where social and rich media became inseparable elements of an organization's online evolution. Vignette led the shift toward a video-centric Web and brought community and social media capabilities to the enterprise.

The Vignette architecture and modern platform helped customers scale to meet the needs of their future, and make the online customer experience more personal, engaging, immersive, and dynamic.

As 2010 approached, the WCM industry was at the cusp of another major transition, evolving into a much broader Customer Experience Management market where Mobile and Social Commerce, Semantic Web, and Cross-Channel Experience gave organizations a competitive edge."

BUILDING EXPERIENCES ON THE WEB

As the Web further evolved from static pages of Web content into interactive discussions based on social networks using blogs, wikis, and other tools that encouraged two-way communication, WCM evolved into Web Experience Management or WEM.

Large organizations required their Web sites to easily scale for hundreds of sites, hundreds of content contributors, millions of site visitors, and billions of page views, and this pushed the demand for WEM. The management system allowed for a global experience to manage the whole content lifecycle from creation and publishing through to delivery. With the ability to integrate the dynamic enterprise Web content into large-scale applications, it also made content reuse easier.

WEM has the ability to leverage ECM content within a WEM publishing process and combine it with social features on Web sites to optimize the user experience and maximize content reuse. It also supports content personalization by integrating the best of portal and WCM capabilities into one environment.

PIECING CONTENT TOGETHER

A defining feature of Web 2.0 technology is its ability to pull information and personalize it within shifting contexts. Mashups are one example of this, combining several different data sources into new and unique applications, services, or dashboards to present content in new ways. Mashups enable the creative and increasingly complex presentation of many forms of content.

A mashup is a Web page or application that brings together or "mashes up" different information or functions from different sources, similar to the remix of a song. Data from different places is assembled into one easy-to-use interface. Mashups aggregate data and combine it with other information in a visual way to make it more useful for personal or professional use.

COHN & WOLFE

THE SOCIAL WORKPLACE PROMOTES THE FREE FLOW OF IDEAS AND BUILDS A TEAM ENVIRONMENT

When global media communications services company WPP public relations agencies GCI Group and Cohn & Wolfe merged, they were faced with the task of creating a unified global agency and working environment that would enable it and its people to succeed. Cohn & Wolfe understood it was crucial to build a system to share expertise and interact with ideas.

Cohn & Wolfe developed a new kind of portal that was not so much an intranet as an internal social network—a site with the familiar look and feel of social media sites, such as Facebook. The site embraced the overarching idea of social media: let anyone create content and let anyone engage and respond to that content to generate a snowball effect of conversation and idea development. The goal: let self-directed talent thrive.

The agency's Web 2.0 tools (including blogs, wikis, forums, profiles, communities, social bookmarks, tagging, and subscriptions) not only delivered on their original purpose of unity and collaboration, but also fueled business productivity. Cohn & Wolfe was able to develop a platform that connected everyone and at the same time provided a valuable source of ideas and expertise to sustain the agency's focus on thought leadership. The platform generated its own momentum; growing and improving as more people used it.

THE COHN & WOLFE "DEN"—THEIR "INTERNAL FACEBOOK"

CUSTOMER EXPERIENCE MANAGEMENT

Just as social media found its way into the enterprise, mashups infiltrated the business environment. Besides giving users visually rich content, organizations realized that mashups gave them the agility to combine content and services in new ways without requiring help from the IT department. Take, for example, the ability for Accounts Payable clerks to access relevant information to resolve payment process exceptions through a familiar Microsoft Outlook®-style interface. The interface could pull the content from a number of different sources through a mashup.

With businesses using Web 2.0 tools to make collaboration easier, a 2008 Forrester Report predicted that the corporate mashup market would reach $700 million by 2013.[3] What made Web 2.0 portals different? They were fast and easy to implement because mashups used open Application Program Interfaces (APIs). This encouraged non-technical users to produce customized Internet applications and add other Web 2.0 tools like blogs, wikis, and forums to the mix.

Mashups could also connect people to important data sources within an enterprise. Because all information and data was safe behind the firewall, organizations did not need to be concerned about security. Inside the enterprise, Digital Experience Management, integrated content, control, and experience into a social portal, leveraging content from shared repositories in highly differentiated ways. OpenText provides Digital Experience Management through OpenText Widget Services (discussed in Chapter 4).

USING MASHUPS TO STREAMLINE THE ACCOUNTS PAYABLE PROCESS

Even if external applications provided additional content for a mashup, search results were centralized and permission-based. More importantly, this content could be extended to mobile users, so they could access the information they needed from any place at any time.

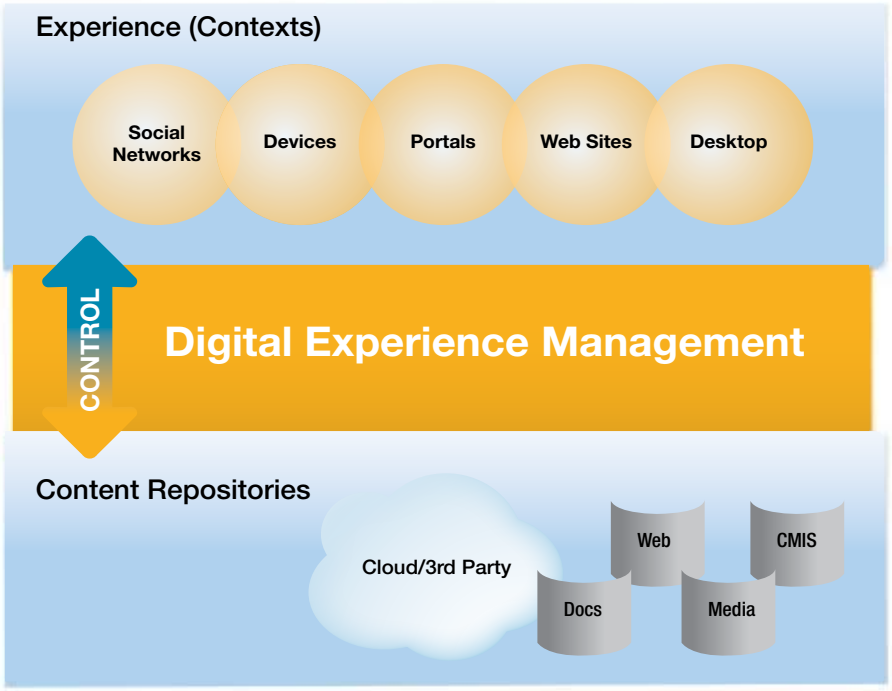
GOING MOBILE WITH MASHUPS

In early 2001, Epicentric began offering mobile users wireless access to Web Services, allowing customers, partners, and employees to access personalized commercial services, business applications, and content from any location with a handheld device. In 2001, Epicentric also added the ability for business users to assemble, customize, deliver, and manage dynamic Web Services and business applications by integrating a Web Services tools company, Application Park—one of the pioneers of mashup builders.

This technology became Vignette Portal and it allowed the enterprise to deliver a consistent look and feel using highly personalized Web and mobile sites that combined content like video, blogs, real-time feeds, and applications. Later rebranded as OpenText Portal, it gave organizations the opportunity to engage with employees, partners, customers, and

3 IBM to release enterprise mashup tool; IBM has delivered mashup prototypes before but this will be the company's first generally available, supported product. InfoWorld.com. June 6, 2008.

prospects at every touch point to support complex relationships over time. Easy access to information and services improved productivity, fueled innovation, and improved customer satisfaction.



MULTI-CONTENT SYNDICATION

Many mashups, including the OpenText Portal, allowed for portlets. Software developers created these software components to plug into an existing portal. A portal could contain several portlets, and some examples of portlet applications included email, weather reports, discussion forums, or news. The ability to mash together the different types of content was useful, but there were other tools required to add more collaborative working models. To find out more about the OpenText Portal, visit: opentext.com/btf-portal.

Digital objects used in Web sites and portals required an additional layer of media management behind the firewall to protect the enterprise from risk. As technology advanced and smartphones became smarter,

CAMEO

BERTRAND DE COATPONT

DYNAMIC CONTENT

"In September 2003, Vignette acquired Intraspect, at that time a leader in Collaboration and Knowledge Management software, with a number of marquee customers around the world and some very unique concepts such as contextual collaboration—that is the possibility to share information in various contexts and collaborate on this information locally independently from the other contexts.

Also in 2003, Microsoft Sharepoint® was starting to get some significant traction for basic collaborative document management and sharing: the need for us to differentiate further with 'Vignette Collaboration', formerly 'Intraspect Knowledge Server', was becoming pressing. At the same time, Wikipedia, Wordpress®, and a few other players started to popularize other forms of collaboration at a larger scale—with a strong emphasis on the ease of use and deployment.

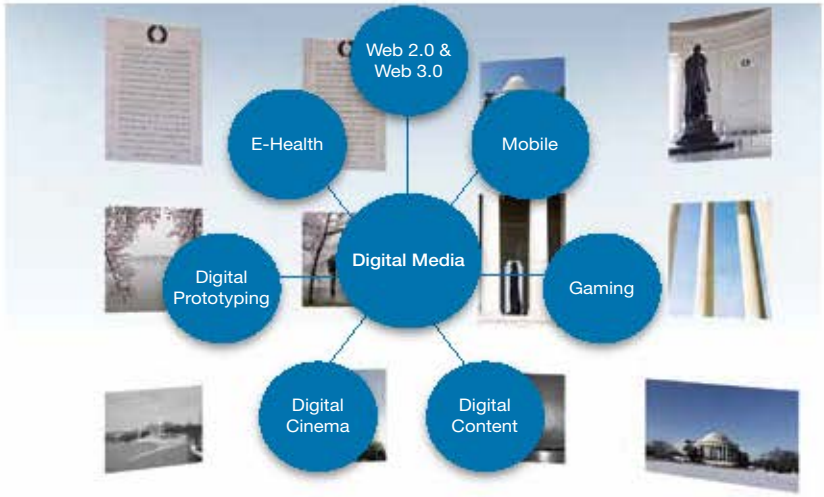
That's when we started to morph Vignette Collaboration into Vignette Social Communities, now OpenText Social Communities, a platform adopting these popular Internet models combined with unique capabilities to contextually apply social tools, applications and mashups to all sorts of content, from Web sites to Enterprise Applications."

video, audio, telephone communications, and images were on the Web and found their way into the enterprise. All these files were made up of unstructured data.

PROTECTING AND MANAGING DIGITAL MEDIA

As the decade progressed, digital cameras became smaller, less expensive, and widely available in cell phones (discussed in Chapter 4). All of this new media, large in file size, required more bandwidth on a global level. The popularity of applications like Flickr® for photographs and YouTube for video grew and the term rich media was replaced by "digital media".

Digital media is most simply defined as any information that is created and shared virtually, rather than physically. As new technologies joined with traditional methods of distribution, the term digital media has grown to encompass Web sites, video games, email, desktop publishing, MP3 players, podcasts, personal video recorded files, recordable CDs and DVDs, high-definition TV, GPS systems, and 3D modeling. Even the high-resolution digital displays on gas pumps, elevators, and billboards have made global distribution of media files part of people's everyday lives.



MEDIA MANAGEMENT AS A HUB

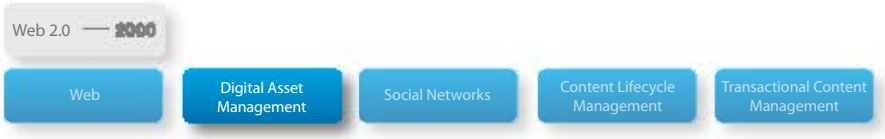
As more digital media was produced, shared, and consumed, organizations saw new opportunities to share their messages in more innovative ways—and faster than ever before. The rapid expansion of digital media use meant that organizations needed to be able to protect the intellectual and creative rights for all these new assets, as well as have the tools to create, store, and manage images, graphics, video, and more.

PROTECTING VALUABLE MEDIA

Each of the following illustrates the importance of digital media files as business assets that must be managed and protected:

- An advertising agency has created a vast library of content, including photography, graphic files, animations, PDFs, and videos that must be stored, moved, and protected.
- A design center in a manufacturing company needs to store, protect, and securely collaborate using vector graphic files, Microsoft PowerPoint® files, and PDFs.
- A large consumer packaged goods company wants to re-use and collaborate on content for advertising campaigns like photographs, graphic files, audio for radio ads, and video for television commercials.

To meet their media management needs, organizations started looking for technology that would help them efficiently produce, manage, and distribute their digital media assets. A new industry grew out of this content-centric computing called **DIGITAL ASSET MANAGEMENT** (DAM). As the use of digital media expanded across the enterprise, DAM soon became applicable in many departments, including production, marketing, training, human resources, creative services, and editorial content.



Digital media became essential as organizations began to rely on higher quality collaboration and content shared through video. Manufacturers of products ranging from kitchen appliances to toys discovered that they could build communities of users based solely on the use of quality digital media content. This increased the need to manage the valuable intellectual property invested in this content.

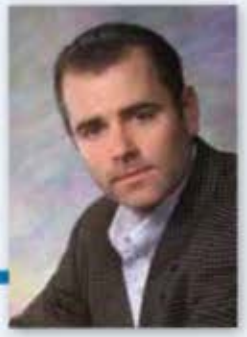
A DAM organizes all digital media content and then combines it with the ability to re-express the content into new forms or products. To protect their investment in the creation of vast amounts of digital media, companies needed to be able to store, access, and manage this content throughout its content lifecycle with speed and agility, making organizations more efficient and protecting intellectual capital in the process.

How did organizations transform their digital content into competitive advantage? Many organizations found that a DAM system helped them manage all aspects of the lifecycle of their creative assets—from creation and ingestion through to packaging, transforming, and distributing the content.

DIGITAL CONTENT LIFECYCLE

As time went on, organizations referred to DAMs as Media Management solutions. An effective Media Management solution required more than mass storage; it needed a database that could scale to support the growing volume and complexity of assets and be able to manage them intelligently. Since digital media comes in a wide range of file formats, the system had to

CAMEO



SCOTT BOWEN

AN APPLICATION TO DO IT ALL

"At the $1B Educational Publishing Division of The Thomson Corporation, we were searching for a next-generation editorial content management system that could manage diverse editorial content to enable publishing through to the then-early Internet. We looked at the first-generation multimedia management systems, but they were typically specific to either images or video, and didn't handle text. We investigated SGML publishing systems but they didn't handle media well. So in 1996, we decided to build a software application that would do it all well. We wrote a business plan to create a new software division—Thomson Editorial Asset Management Solutions, or TEAMS.

We built the first generations of the software over the next few years, running an expansive beta program with a diverse set of Thomson operating companies. Our vision was original and pure—a system that managed all content types natively and equally, designed such that the atomic central element was neither a document nor a page, but instead an asset. In 1999, a small group of us executed a management buyout of the division with support from a large New York private equity firm. And so in June of that year, Artesia Technologies was born and along with it a pioneer in the emerging Digital Asset Management software category."

be flexible enough to support current and future file formats. There were systems available that could handle over 150 formats, including popular image file types, document formats, and standard streaming audio/video formats.

A media management solution required a secure central repository. In many industries, intellectual property rights added additional security requirements to DAM systems. To properly protect and leverage corporate assets, organizations used additional information stored as metadata to ensure Digital Rights Management. Increases in bandwidth resulted in the growth of video services and file sharing, causing organizations to develop and deploy digital rights management solutions to control the distribution of digital media.

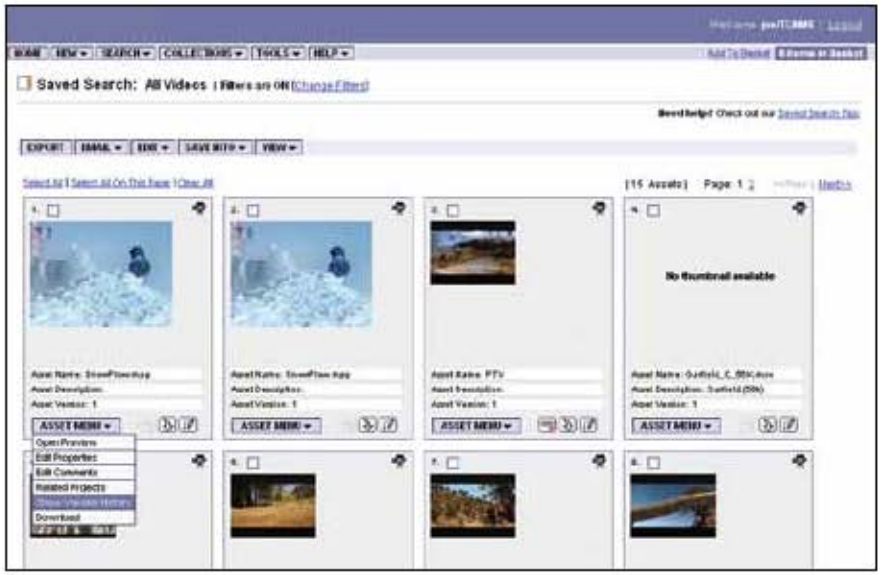
ORGANIZING CONTENT WITH METADATA

Metadata is structured information attached to a digital asset that makes it easier to retrieve, use, or manage an information resource. Metadata has helped organizations manage their brand, intellectual property, and digital rights. By applying metadata to digital assets, organizations were able to make quick decisions and simplify their processes based on information being immediately available and coupled with the asset. Image elements, for example, could be located for later reuse. Legal rights for use could also be bundled with images, advertisements, videos, and more. For a marketing organization, or a marketing department for example, DAM systems with metadata ensured branding consistency and reduced the risk of legal action.

Metadata is also used to assign taxonomies to the digital files during upload to the system. Taxonomies are categories that are used to organize the digital assets. The importance of metadata and taxonomies becomes more important as semantic technology develops in the Web 4.0 era.

As part of a DAM system, taxonomies and metadata gave producers, editors, designers, and Web developers the ability to quickly find pre-approved digital assets, including logos, photos, storyboards, film, video, and animation in a central repository. The time savings meant that more time could be spent on the creative production of assets, rather than managing or looking for them. Media management promoted content reuse increasing the savings of dollars and human effort to prepare new content for distribution across the many different channels.

Media management helped organizations distribute digital media across Web, print, wireless, broadcast, and cable outlets. For a commercial provider of entertainment programming, automated scheduling and distribution via media management saved time and ensured that business rules were followed. Within an organization, a media management system also offered a self-service model for authorized field personnel to direct, field, and channel finished brand and promotional assets.



METADATA AND DIGITAL ASSET MANAGEMENT

STORING DIGITAL ASSETS AND SAVING BRANDS

Companies like Electronic Arts™ and Timberland® have spent millions of dollars developing, promoting, and ensuring the integrity of their brand. With so many media types and distribution channels, and more being developed, the challenges and opportunities increased. Media management was one way that departments like marketing, advertising, public relations, and creative services could access and collaborate around a central database of approved digital brand assets.

HBO

PREMIUM TELEVISION NETWORK PROTECTS INTELLECTUAL CAPITAL AND INCREASES EFFICIENCY BY DIGITALLY MANAGING ASSETS

HBO is America's most successful premium television network, offering rich digital media content, blockbuster movies, innovative original programming, provocative documentaries, concert events, and championship boxing. HBO sought a solution that would allow them to easily access and share digital content both within HBO and the larger Time Warner family. The requirements for the overall system functionality and user experience entailed the system handling large volumes of content, as well as addressing disparate databases, workflows, and use cases for each of the organizations.

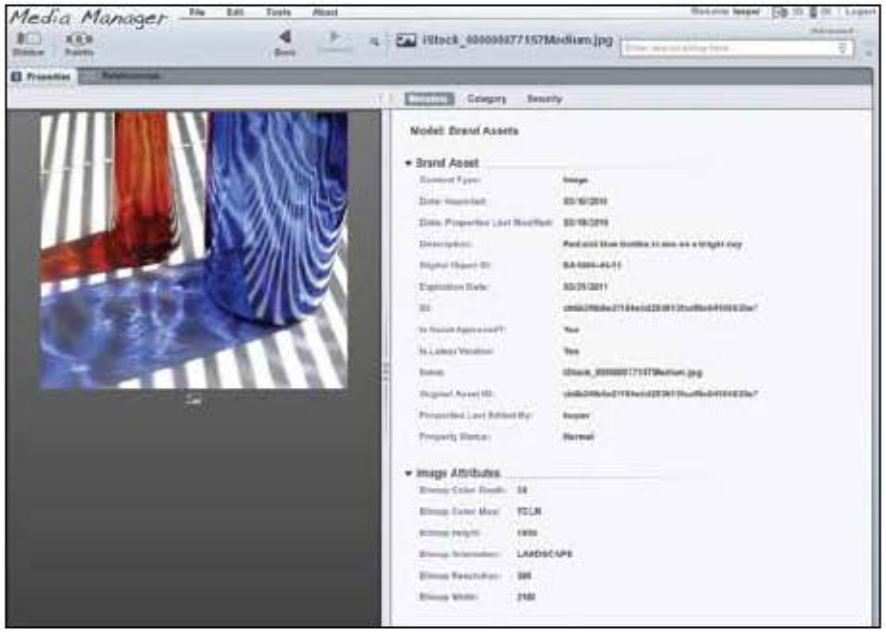
HBO's Media Management implementation encompassed all of HBO's digital photographs supporting such areas as marketing, promotions advertising and sales. These assets can range from location shots from HBO Films to a gallery of quality professional photos of HBO celebrities.

Part of their overall strategy is to ensure careful management of metadata. Assets are tagged with corresponding metadata, such as contractual information, as early as possible to ensure that metadata travels with the asset throughout its lifecycle. This metatagging process is enforced with an embedded workflow component. The HBO digital asset management system is accessed by all of the Regional Offices and currently holds more than 325,000 assets.

MEDIA ASSET MANAGEMENT SOLUTION FOR HBO

In 1999, Artesia Technologies Inc. was founded in Rockville, Maryland, out of a product division of The Thomson Corporation. The company's technology was a scalable enterprise-class digital asset management solution. It stored rich media content and managed the creative workflows around the editing, collaboration, and distribution of media files.

A number of organizations were interested in Artesia DAM for advertising and marketing activities, but the demand also grew for production environments in entertainment media, publishing, and the US government. One of the principles of DAM was that an asset was only an asset if an organization could find it and use it. As a Web-based system, Artesia customers could access, update, and manage approved files from anywhere in the world. Artesia DAM made it easy to find assets because the metadata included the rights associated with images, along with details about place of origin, photo caption text, thumbnail images, and size and resolution.



METADATA INPUT WHILE UPLOADING ASSETS

Chris Veator, CEO of Artesia Technologies, said that they often used the expression "COPE: Create Once, Publish Everywhere". The technology resonated with many and in 2000, Artesia was named one of ComputerWorld's "Top 100 Emerging Companies to Watch". In 2001, Artesia received an award from New Media called "The Awesome Product Award".[4]

In 2004, OpenText acquired Artesia and formed the Artesia Digital Media Group, which became the foundation of the OpenText Digital Media Group. In a press announcement, President and Chief Executive Officer of OpenText, John Shackleton made the following statement: "ECM is about bringing order to the management of unstructured content to improve efficiency and manage compliance. These demands are now driving digital media content into the ECM fold, so that video, audio, photos and graphics can be managed alongside more traditional content—documents, records, and email."[5] To find out how this technology has evolved, see: opentext.com/btf-digitalassetmanagement.

Other than images, video is one of the biggest media types to come onto the scene in the Web 2.0 era. Where equipment costs were once prohibitive to buying high-end video equipment, handheld and affordable solutions appeared, creating a proliferation of video content on the Web.

DOING MORE WITH VIDEO

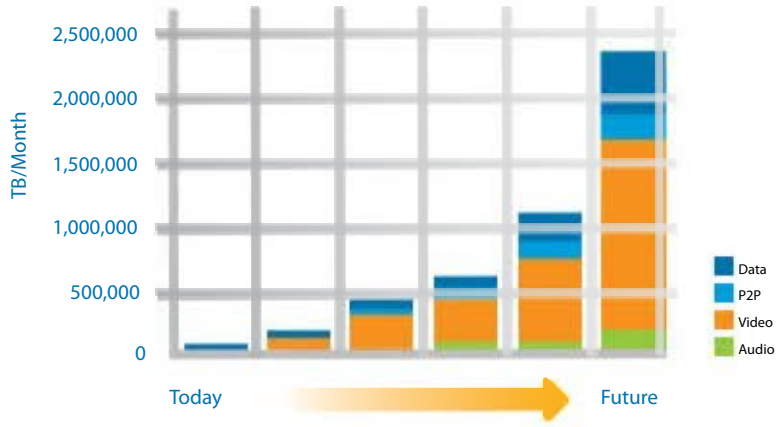
The popularity of online video has soared as exemplified by YouTube consumption rates. The amount of bandwidth used by one billion video streams each day is said to consume as much bandwidth as the entire Internet did in the year 2000. Video is so popular that it is one of the key drivers for the demand for high bandwidth services.

As the enterprise adopted video services, bandwidth management became critical to support the distribution of video content. Many organizations started developing and using videos in corporate communications, education and training, HR administration, sales enablement, and other departments. As organizations expanded across the globe, video became an ideal medium for educating and communicating across the entire enterprise, both internally and externally, across different locations. The growing number of videos within the enterprise resulted in the need to store and manage these assets in a scalable and secure fashion.

4 Martin, Nicole. DAM right! Artesia Technologies Focuses on Digital Asset Management. EContent, September 2001, p 61.
5 "Open Text Launches Digital Media Group Artesia Subsidiary is Core of New Specialty Business Serving Media, Entertainment Industry, Growing Digital Content Needs of Large Non-Media Companies." Press release, October 19, 2005.

But how did the average Internet consumer's use of video differ from a corporate user? When a consumer downloaded a video online, it was accessed and viewed on demand with little concern for control and security. Organizations needed video content to integrate into the existing business and IT environments. Distributed over private networks, it had to securely connect to an organization's technology infrastructure and scale to support a wide internal audience.

Videos, like other digital media in the enterprise, were required to follow the organization's rules for Content Lifecycle Management, discussed later in this chapter. Organizations would have to save, store, archive, and delete videos with security and publishing control in mind to lessen risk and adhere to compliance requirements. Organizations embracing a YouTube-like environment inside the enterprise needed a robust infrastructure to support the demand for company-wide video creation, distribution, and viewing.



VIDEO WILL DOMINATE INTERNET TRAFFIC

INTEGRATING AND SHARING VIDEOS

Not only was it more popular for organizations to push video externally to their audiences, they also started to use tools like podcasts to "talk" to their customers and employees. Enterprises required software tools that could help them manage this new content in all its formats—video and podcast—along with traditional documents and records.

CAMEO

SCOTT BURKHOLDER

VIDEO AS AN EXTENSION OF THE ECM SUITE

"Vidavee started up in the consumer market sphere. Shortly after, Google® acquired YouTube for $1.6B—this flooded the market with competition. To differentiate, we abandoned the consumer and editing portal approach and instead focused on building a 'Web audio/video engine' based on Web Services APIs that customers and partners could use to layer custom UIs on top of the technology. Today, our focus is extending the OpenText ECM Suite with our video technologies.

Surviving those early years meant that we were able to move from venture capital funding to a steady revenue stream—all while earning some firsts in the market! We developed many innovations focused on the management and editing of compressed video content. We were the first to support clip sharing, as well as progressive download seeking. We even developed some technology around media mining that allow conversion for face recognition and speech-to-text.

Now, we are seeing a transition from document-based communications to video, including: sales pitches, building brands, corporate communications, training, and more."

In 2005 MicroNets, Inc. was founded in New York City, but operated under the name Vidavee. Vidavee produced Web media operating systems to integrate media services into existing products. A video sharing platform, it also provided user-generated Web, mobile, and podcast content.

In 2007, Vidavee created some buzz when it launched Vidavee Grafitti. It allowed users to take any YouTube video and add speech bubbles, effects, animations, and other add-ons. An interface that even amateur video editors were familiar with made editing easy, including a timeline to show when the add-ons would appear. Users could then post their finished clip to share on Facebook.

It was the tagging capabilities and heat maps technology that really separated Vidavee from its competitors. Vidavee enabled users to identify sections of interest from a video that they could share, increasing the views and attracting new users. The heat maps helped organizations analyze how viewers interacted with the videos. Organizations could take that information and strategize about how to improve impressions and drive revenue by focusing on the most popular sections of a video stream, and dynamically inserting advertising or other digital media.

In 2008, Vignette Corporation acquired Vidavee and formed Vignette Video. Using the Vidavee technology for video tags and heat maps, Vignette Video was a hosted video management solution that featured a customizable Flash®-based media player, which allowed users to tag and share any segment of a video. Vignette became one of the first vendors to provide enhanced capabilities to ingest, manage, transcode, and deliver video and other Web content through a single workflow and user interface.

Vignette was able to offer their customers additional features and support to create and manage their user-generated content. With the acquisition, Vignette could deliver the unprecedented ability to use the same publishing platform for text, images, advanced video, and other rich media.[6] For more information, visit: opentext.com/btf-videoservices.

Technology trends driving the creation of digital content across an increasing number of channels impacted media management. Television broadcasters looked to produce content on demand, and book publishers needed to do more than publish a printed book—audiobooks and eBooks were introduced and these, in turn, were supplemented with rich media content online. These trends drove media management systems to integrate with social networks.

VIDEO LIBRARY MANAGEMENT—STREAMING CORPORATE CONTENT

HAVING MANY-TO-MANY CONVERSATIONS

In the 2000s, **SOCIAL NETWORKS** became popular as the Web evolved to the point where almost everyone belonged to a social network. With its reliance on shared content, social media created the demand for Web sites to connect people to each other and content in a more dynamic way than simply finding documents with a search engines.

6 "Vignette to Acquire Video Publishing Capability." Press Release, April 20, 2008.

Discussions that flowed from one-to-many, via email, for example, were replaced by many-to-many communications through social networks and "tweets". Users were not only consuming content; they were producing it as well. This content was called User-Generated Content (UGC), and it ranged from rating an article, to leaving comments on a product Web site, and posting personal information on Facebook. Based on UGC, peer-to-peer online influence grew in importance as people began to rely more on "home-grown" content from their friends and family to instruct, guide, and inform rather than the traditional corporate Web pages, advertisements, or communications. Marketing was being impacted by this content that was authentic, honest, and sincere.

The Web 2.0 technology phenomenon was mirrored behind the firewall. Social networks, like blogs and wikis, were brought into the enterprise to be used as productivity tools. Users within an organization set up profiles, combining personal and professional information through photographs, relevant links, blog sites, and more. As a result of the network effect produced by social media, employees began to connect with others based on skills, expertise, or interests, and companies benefited from improved productivity, reduced project cycles, and increases in innovation and idea generation.

USING A DASHBOARD TO COLLABORATE

OpenText Social Workplace, or OTSW, is a social dashboard that brings together groups of users across geographies and hierarchies to work together as a team. Because information security in the enterprise is vital, OpenText ensured the security of OTSW to conform to information governance rules. As a proof of concept, OpenText announced in May 2011 that they were working with the Commonwealth Secretariat to develop a portal designed to connect the people, organizations, and governments across the Commonwealth. Spanning six continents, members of the Commonwealth community could connect via the Internet to share information, network, and collaborate online.

OTSW ICON

CAMEO

ADAM HOWATSON

OTSW BREAKTHROUGH

"Before OTSW provided the platform for the world's first cloud-based government collaboration program for 20 countries, social media had never influenced global policy in such a way. OTSW enabled government leaders and senior government officials to develop policy in a collaborative and iterative method. By not relying on email and documents, it not only provided a significant increase in the level of security in organizational collaboration and sharing, it served as the backbone for the world's first multilateral cloud offering.

OTSW provided organizations with the capacity to instill digital collaboration and purpose within an organization. By freeing them of the email shackles and unlocking mobile and social collaboration, they could actually deliver services and programs. Lastly, it permitted organizations to take part in the global social media landscape by providing the fine balance between security and innovation. Enabling organizations to innovate using social media, while increasing enterprise security, is a must."

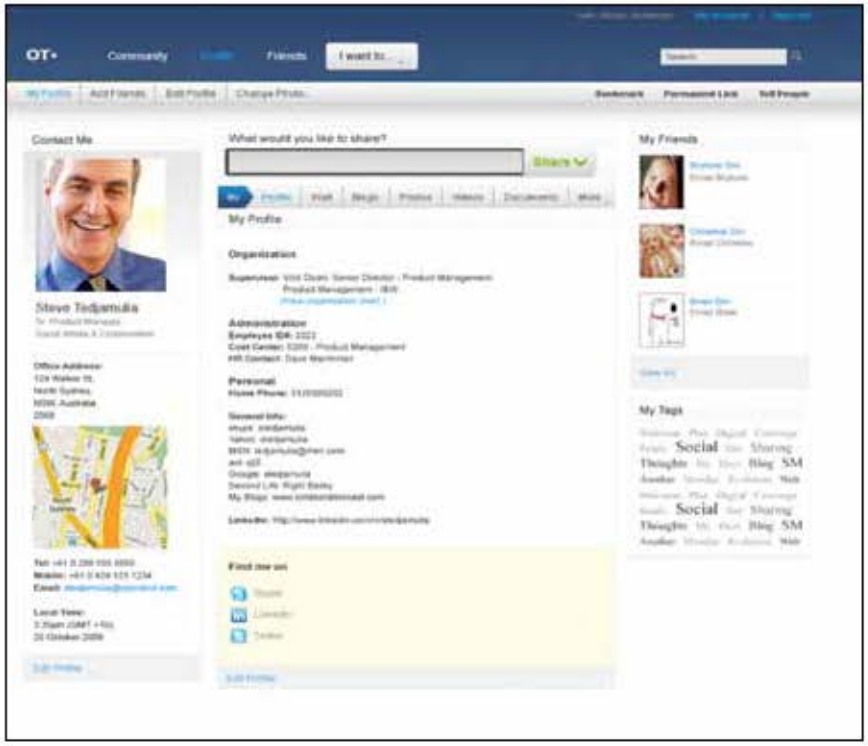
Web 2.0 technologies, like social media, present a myriad of security risks for the enterprise, which is why many organizations do not permit the use of social media behind the firewall. Most social software like Facebook, Google, and LinkedIn® maintain data ownership, but OTSW allows clients to retain their IP and data ownership rights. When OTSW was deployed for the G20 Summit in Canada in 2010, it was the only social networking site that met the stringent Government of Canada security standards. G20 delegates were guaranteed secure ownership, or digital rights, over the data they created, stored, and shared on the mobile social network. To discover more about this technology, visit: opentext.com/btf-otsw.

GETTING SOCIAL IN THE WORKPLACE

A Social Workplace functions as a Facebook for the enterprise. Inside an organization, when users share information quickly and easily, in ad hoc ways, the resulting quality content achieved greater productivity, sparked new ideas, and even increased innovation. Within a social workplace, employees who share their knowledge are quickly regarded as experts and the collective information from these experts becomes a powerful asset for any organization.

Just like Facebook, within a social workplace, employees could develop a personal profile, build a contacts list, update their status, and write on a colleague's "wall". By adopting consumer features in an enterprise technology, organizations were able to overcome hierarchical and administrative barriers to increase an employee's willingness to share their ideas and information. Sharing and team work were fundamental to a company's ability to innovate. Organizations that have encouraged the social workplace have experienced the organic growth of communities around projects and topics of interest. This is the new knowledge workplace.

The social workplace used tools that many employees were familiar with, including forums, wikis, and blogs. Social collaboration, when combined with other enterprise content management technologies bridged geographical, organizational, and generational gaps, thereby releasing content for exchange in many formats across many channels.



CONSUMERIZATION OF THE ENTERPRISE—FACEBOOK FOR ORGANIZATIONS

In 2009, the McKinsey & Company consultancy firm conducted surveys to find the benefits of a social workplace. According to the surveys, participants had better access to knowledge and expertise, experienced higher levels of satisfaction, and innovated at higher rates using social media tools. In fact, based on the McKinsey surveys, innovation rates rose by as much as 20 percent and knowledge workers experienced a 35 percent increase in access to expertise from using social media tools.

The key to Web 2.0 was collaboration. Promoting a social workplace promotes collaboration. But how did organizations manage all that corporate knowledge?

CANADA 3.0

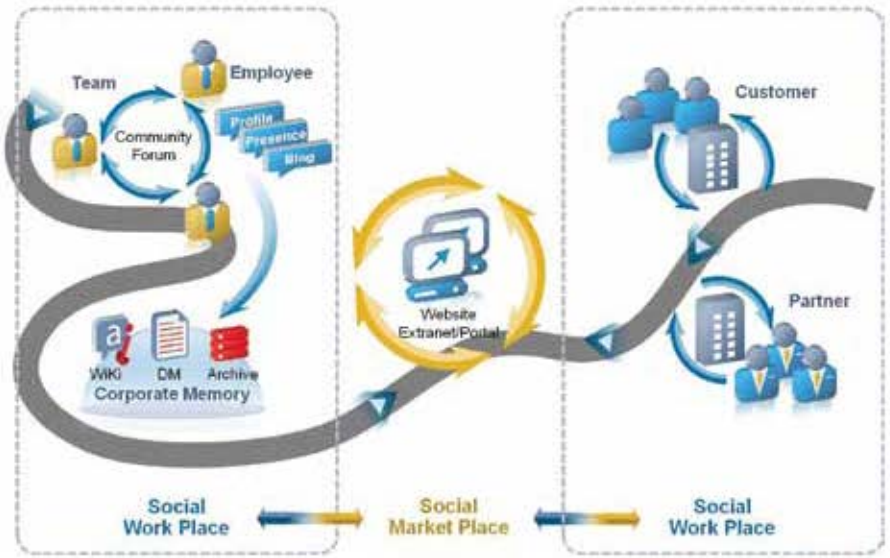
CANADA'S PREMIER DIGITAL MEDIA EVENT USED SOCIAL MEDIA TO ENGAGE AND STIMULATE ONGOING DIALOGUE

Canada 3.0 is organized by the Canadian Digital Media Network (CDMN), the University of Waterloo Stratford Campus, and the Stratford Institute. Launched in 2009, the event provides a once-a-year opportunity for Canadians in digital media to come together to discuss the key issues and make the plans required to propel Canada to a leadership position in global digital media.

The event is largely focused around building critical connections and networks. The Canada 3.0 Community and mobile app provide platforms for continuing dialogue, based on a central repository for collecting and sharing the information, discussion, and outcomes of all event-based collaborations. The online community, complete with embedded media, blogs, forums, member profiles, and a Twitter feed on the home page, promotes dialogue around the event all year long. This all contributes toward the continuing development of CDMN.

The marketplace community is a good example of cross-media integration. The site is driven largely by user-generated content and uses social media to integrate online and offline presentations at the event. During its inaugural event, Canada 3.0 gathered feedback and input from attendees in order to accurately determine the goals, mission, and objectives of CDMN. Using social media content, the CDMN generated interest in the show, highlighted key events and collected invaluable feedback around key stakeholders, target audience, areas of focus, and more.

CANADA 3.0 COMMUNITY FACILITATED CRITICAL DIALOGUE AND NETWORKING



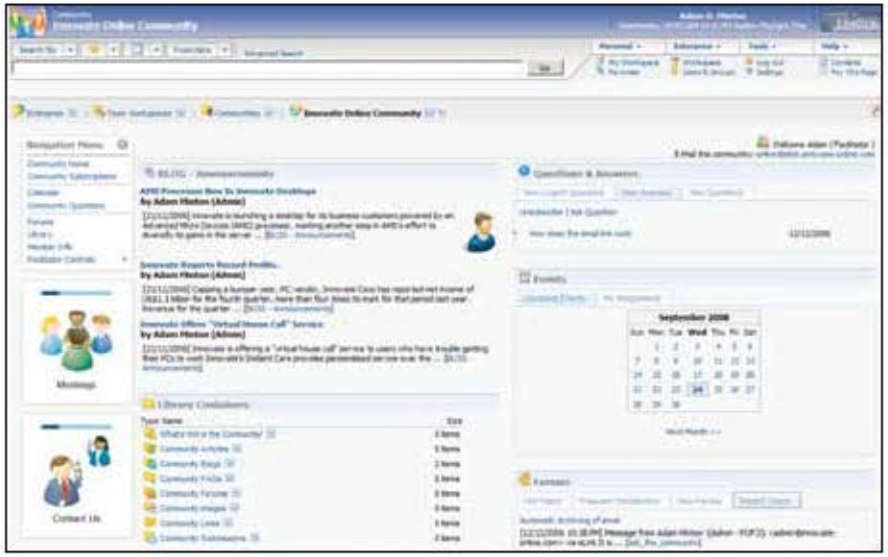
THE SOCIAL WORKPLACE

ENGAGING EXPERTISE

Many organizations brought together expertise and resources across global operations, and even partnerships, to keep on top of a fluctuating marketplace. Web 2.0 introduced technologies that facilitated the evolution of knowledge management into Communities of Practice.

Basically, knowledge management was about people, relationships, communities, and defining new and better ways to work. Communities of Practice combined this premise with new Web 2.0 technologies to present a single interface specifically targeted towards a group of users with similar goals and interests. This idea did not just involve employees; customers and partners were brought into the fold as well.

Communities of Practice built relationships internally and externally, improving productivity, and fostering innovation. In these online communities, experts became passionate about their area of expertise, topic or study, discovering the synergies that flowed from exchanging knowledge with colleagues who were equally committed. Communities of Practice captured all content so that the users could develop new policies and build on each other's insights with teams located in the same office or on another continent. In the process, organizations had to establish new best practices and address old habits around knowledge sharing.



COMMUNITIES OF PRACTICE CAPTURE COLLECTIVE KNOWLEDGE

OpenText Online Communities (built on Communities of Practice) fostered sharing between staff and OpenText customers. As early as 2004, OpenText provided Communities of Practice to customers, including those in the government sector. The community gave government departments and agencies an open forum to share ideas and best practices for how to effectively apply ECM solutions. This type of use allowed OpenText to develop closer relationships with its government customers.[7] To find out how this technology has evolved, visit: opentext.com/btf-socialcommunities.

With Web 2.0 technologies, the connections between users were most important; the technology that acted as an enabler is secondary. Communities were based on trusted relationships, so users needed to establish a sense of identity through their profiles, messaging, rating, and sharing tools. This sharing of expertise and the capture of that content gave organizations a competitive edge in a global economy.

7 "Open Text Launches Online Community for Government Customers Forum Provides Discussions, Information on ECM Applications in Government. Livelink-based E-Community Reinforces Bonds with Customers." Press Release, April 15, 2004.

INCREASING CONNECTIVITY AND ACCESSIBILITY

The digital economy created a shift in the way people worked together. Increased connectivity and accessibility meant mobile workers could still contribute collaboratively. ECM technologies enabled this by linking physical devices with virtual and mobile environments so that everyone could access and exchange information. A virtual meeting room, for example, allowed virtual members to enter the meeting, invite others to join, watch a streaming video, or collaboratively edit a document in real time.

Social media demonstrated the expertise of an organization to the entire workforce. It allowed mobile professionals to be as effective and information-aware as they were in the office, while bringing immediate benefits from connecting in context—on location, at a job site, or with a customer. In Chapter 4, we will see how mobility impacted social media further by helping organizations to drive bottom-line profit by making their employees more productive, efficient, and knowledgeable.

Mobile access to online communities and social media functionality allowed people to collaborate with colleagues. They could still share critical information, solve pressing issues, and continue to innovate and feel a sense of community even from remote locations, away from the office. Organizations began to see the connections that drove people to share information, make decisions, collaborate, and innovate.

CONNECTING MOBILE PROFESSIONALS

CAMEO

JANET DIXON

TALKING TO A GOOD NEIGHBOR

"In four years as Program Manager of OpenText Online Communities, which uses Communities of Practice, I've seen staff and customers engage from all over the world, sharing knowledge and improving communications through collaboration. I've built relationships with customers that I otherwise wouldn't have met. Collaborating in a forum is easy, informal, and conducive to building relationships; in time, you feel more like you're dealing with friends than business associates. In a survey that I gave to some of our Communities' members, a customer remarked that when they dealt with me in the community, it was like 'talking to a good neighbor.'"

SNCF

A RAIL COMPANY RAPIDLY SHARING BEST PRACTICES THROUGH A COMMUNITY OF PRACTICE

The French rail group found a way to manage documents and help staff collaborate to better serve one billion customers every year. SNCF has successfully restructured its electronic content management system and is now energizing its professional communities via a single portal.

Internal challenges faced by SNCF included: amalgamating and using all available information, capitalizing on and sharing best practices, setting up spaces dedicated to professional communities and consistent presentation of information on the intranet. Since the 2005 launch, communities structured around the professions within the infrastructure division have evolved, enabling genuine cooperation through sharing best practices and using IT tools developed on a local level. In fact, the community was so successful that deployment has expanded to include three out of four divisions at SNCF.

The online professional communities are simple to use and highly innovative; they constitute a rapid and pragmatic exchange system that guarantees confidentiality based on profiles. Anyone can post useful information about SNCF activities here, and it can then be accessed and used by everyone. Today, sharing best practices is a reality, and the response to information has improved significantly.

SNCF'S COMMUNITY OF PRACTICE

COLLABORATING ON THE GO

With collaboration tools accessible via the Web, organizations ensured that their workforce kept in touch, no matter where they were located. Collaboration tools that could be used anywhere started cropping up in the 1990s. Three researchers from Bell Northern Research, the research and development arm of Nortel Networks, decided to start their own consulting business as hardware/software architects and developers called SoftArc Inc. They did not want to consult; they wanted to build robust architectural frameworks. They got their chance late in 1989, when the Scarborough Board of Education in Ontario needed an email and collaboration system for teachers.

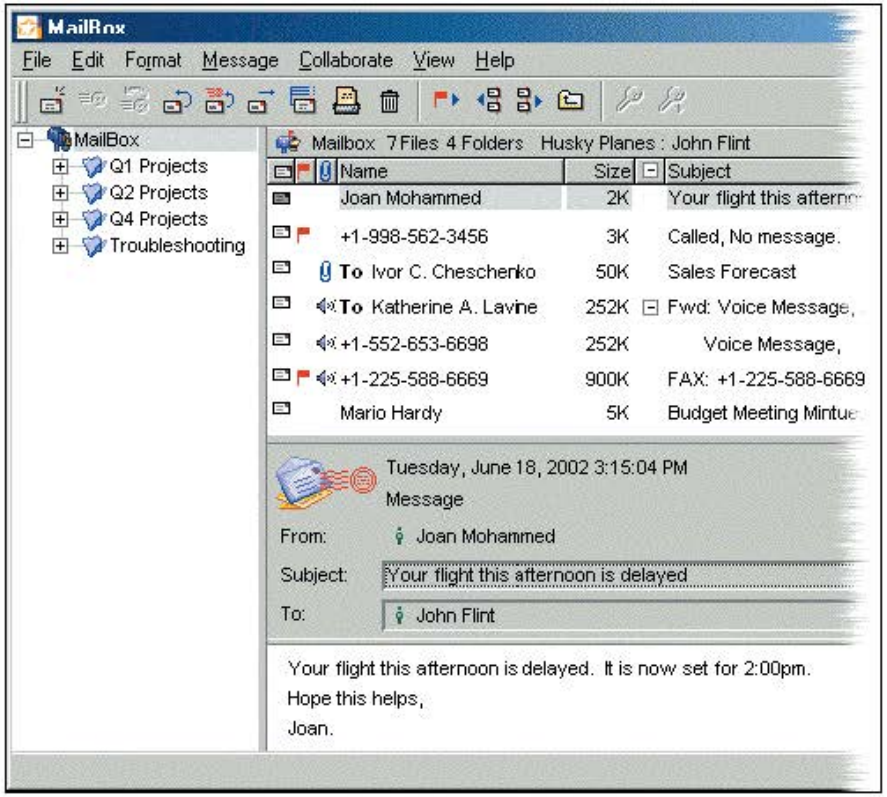
In 1990, they delivered EduNet, the Educational Networking System. It shipped to a single site with a single platform across a single type of network, but the architectural framework was the base for a product that evolved into a multiplatform, multiprotocol, multiserver powerhouse. By end of 1991, EduNet, renamed FirstClass, sold 100 systems. A year later, FirstClass 2.0 shipped with Internet mail connectivity, multiserver gateways, directory syncing, and even a Japanese version. And, they received and rejected their first buyout offer—from Apple®.

Users loved their products. At the first user conference in San Jose, all their raving fans wore t-shirts that said "I use FirstClass and I love it."

UNIFYING COMMUNICATIONS

By early 1996, the founders realized that they needed to "Internetify" FirstClass if they wanted to stay in business, and by 1997, they released the FirstClass Intranet Server. Now they had built a multiprotocol system. The same year, they developed FirstClass Unified Communication. It allowed users to go to any computer with a Web browser and access email, voicemail, and fax messages— one place for all messages.

As a small company, the founders were not sure if they could compete and talked about selling— including to OpenText. Instead, in 1999, the company merged with a small Vancouver company, MC Squared Learning Systems, and changed their name to Centrinity. The product matured, and Unified Communications became available through the phone, or personal digital assistant like a Palm or BlackBerry®. Users could access their FirstClass files and folders on any computer with a standard Web browser.



FIRSTCLASS MAILBOX

Eventually, collaborative workspaces and private instant messaging chats were added. The "conferences" or collaborative workspaces allowed teams to work together, no matter where users were as long as they had access to a computer with a Web browser. Users stored information in these conference spaces and had discussions—they could even call in and have FirstClass read their messages to them. And in September 2002, the Centrinity Board of Directors accepted an acquisition offer from OpenText. Their collaboration through messaging technology complemented the repository-based collaboration capabilities of Livelink (which evolved into the OpenText ECM Suite). The technology created innovative new collaborative knowledge management solutions for OpenText.

When organizations provided secure, managed access to enterprise systems, they helped employees access the resources they needed to do their jobs effectively. It allowed professionals on-the-go to create, manage, find and publish content in a compliant and secure fashion. No one had to wait to make an informed decision.

SEARCHING THROUGH CONTENT GATHERED BY COLLABORATION

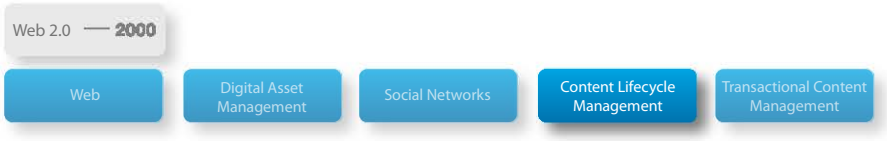
With so many collaborative tools added to the Web 2.0 mix, the enterprise was burdened with more content in a wide variety of formats to manage securely. In 1999, Grad Conn, science fiction writer Cory Doctorow, and John Henson founded OpenCola to create a "collaboration object lookup architecture" software in Toronto. Based on client/server architecture, the "clerver" application, as OpenCola called it, allowed users to collaboratively search, acquire, manage, and share information from several data sources. This included the Internet, peers on their network, and existing proprietary databases. And users could do this from a single interface.

This search functionality expanded beyond the search engine capabilities of the time because it performed contextual searching. The process required that the engine search the entire contextual subject matter of a document to find relevance, and expanded previous searches with more relevant results. Searches would continuously increase results as needed throughout the network to find the content the user was seeking.

OpenCola released all of its software and specifications as open source. OpenCola concentrated on peer-to-peer swarming techniques that accelerated the distribution of high-volume content. This was generally a way to reduce the load on source servers to continuously access the information and then stream the content within an organization. In 2002, OpenCola shifted from peer-to-peer switching to Web search, but they still used peer-to-peer ideas. In 2003, OpenText acquired OpenCola.

MANAGING THE FLOW OF CONTENT

As the Web continued to evolve during this time, the concept of a living document or digital object emerged. This led to the creation of **CONTENT LIFECYCLE MANAGEMENT**, which managed the full lifecycle of content objects (documents, images, video, etc.) through the creation phase to the active use phase, and finally the archival/deletion phase.



Based on the OpenText Enterprise Library, Content Lifecycle Management combined document management, records management, workflow, archiving, and imaging into one fully integrated solution. From creation of content, through to its eventual archival or deletion, this solution effectively managed the flow of content to create new business opportunities, reduce cost and risk, and achieve regulatory compliance. It was important to protect the content and the organization, but there was other content in the organization that needed to be managed through a different flow—the flow of transactions.

AUTOMATING BUSINESS

TRANSACTIONAL CONTENT MANAGEMENT permitted the unification of the accounting applications of the original era of computing from mainframe and client/server (known as ERP) with the new era of content by integrating the presentation and interaction of both numbers and words. Business processes are usually initiated by a trigger, which can include a received correspondence, fax, email, online submission, or message from another application. This involved technologies that were covered in Chapter 1, including scanning and imaging, automatic document recognition, optical character recognition, and fax management.

In every organization, numerous business processes were occurring each day—from filling out a purchase request to assigning documents for review and approval. The effectiveness of each, and the overall efficiency of an organization depended on automating business processes. Before a process could be orchestrated, it needed to be designed, modeled, and deployed. As a process was completed, a required activity

was triggered, which could include passing off information to another application, printing a document stream, sending a message via fax, email, or posting information on a self-service portal.

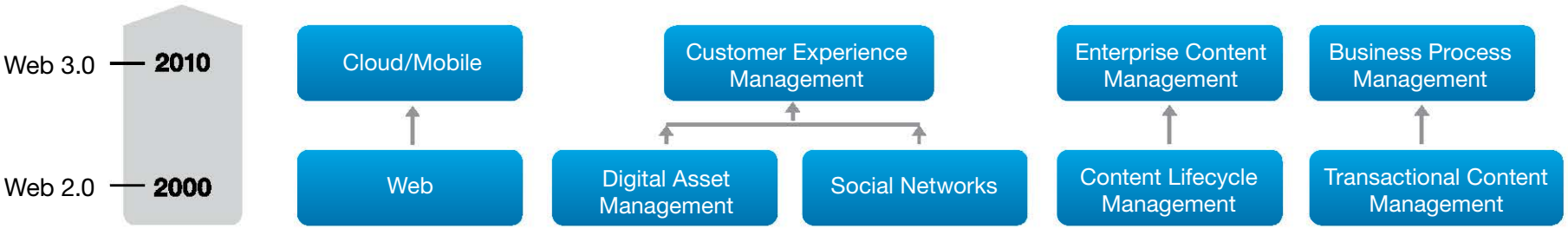
The software industry developed numerous applications that dealt with transactional data in an attempt to efficiently handle the electronic commerce content. From basic spreadsheets to powerful enterprise applications, such as ERP, CRM, and supply chain management, these applications primarily dealt with numerical data and incorporated them into core business operations. In Web 3.0, organizations began to maximize content value by making unstructured documents accessible within the context of business processes through Transactional Content Management.

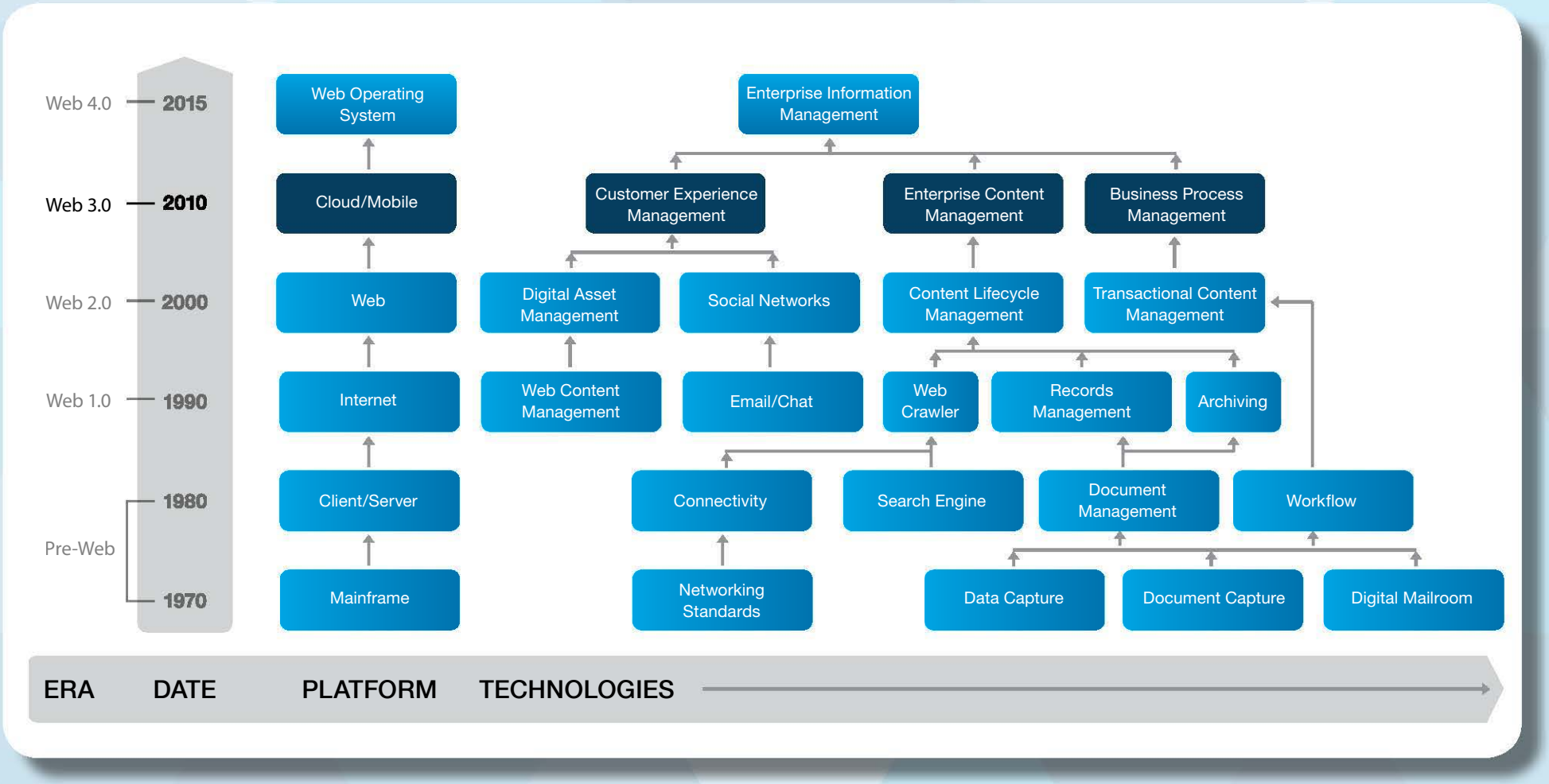
MOVING AWAY FROM WIRES

In the Web 2.0 era, organizations were required to deliver a matrix of applications across multiple platforms and devices as consumer usage and enterprise usage converged. Web Experience Management and social networks combined personal and work information on both sides of the firewall, presenting serious security threats. Largely due to social networks, the number of digital media assets exploded and required media management technologies. As the lines blurred between consumer and business content, organizations became increasingly focused on how to minimize the risk of sensitive data falling into the wrong hands when devices go astray or security breaches occur.

As we moved into the Web 3.0 era, mobile device use grew exponentially. Mobile devices started to move to touch screens as people moved away from the mouse and keyboard—giving the user a richer and more intuitive experience. The iPhone® has already moved far in this direction. As touch screens became more common, user interface development started to create more compelling, immersive end-user experiences as users could do everything with touch, including immersive three-dimensional interfaces. Users started to navigate through screens in a new, very intuitive way by viewing and manipulating objects, media assets, videos, Web content, processes, and more.

Mobile usage also increased the need for cloud computing so that content could truly be available anywhere, at any time, and on any device. The demands within the enterprise included a need for the Cloud to be secure and the ECM technologies to be accessible by knowledge workers not only through a laptop, but also mobile devices.




Web 4.0
2015
Web 3.0
2010
Web 2.0
2000
Web 1.0
1990
Pre-Web
1980
1970
Web Operating System
Cloud/Mobile
Web
Internet
Client/Server
Mainframe
Enterprise Information Management
Customer Experience Management
Enterprise Content Management
Business Process Management
Digital Asset Management
Social Networks
Content Lifecycle Management
Transactional Content Management
Web Content Management
Email/Chat
Web Crawler
Records Management
Archiving
Connectivity
Search Engine
Document Management
Workflow
Networking Standards
Data Capture
Document Capture
Digital Mailroom
ERA
DATE
PLATFORM
TECHNOLOGIES

Chapter 4

The Semantic Web / 2010-2015

Some Call It an Evolution

Some call it an evolution, but it is closer to a revolution. Its power is certainly transformative. In this era, content types, mobile devices, and Internet technologies converge to fundamentally change the way people find, store, and manage content. As a result, the workplace and households around the globe are significantly different. The new world is more social and collaborative than ever before, with interactions happening across multiple channels, devices, geographies, and in the Cloud.

THE SEMANTIC WEB

As technology progresses beyond the first generation of social networks, personalization has become everything. With the customization, analytics, and intelligence available on the Web, communications have shifted from many-to-many to many-to-one. Content is more dynamic, searches are smarter, and as a result, information is much more relevant.

With new applications and content formats, Enterprise Content Management (ECM) has expanded beyond the traditional content types of the Web 1.0 era. Business forms and document management, while still critical to the enterprise, are encompassed by the deluge of digital media that followed in the Web 2.0 era. The focus of Web 3.0 is on content applications, and the ECM industry has followed suit with developments in mobile apps and semantic search to help the enterprise gain control of its content.

The Web 3.0 era, also called the Semantic Web, is characterized by highly intelligent, interconnected, and very personal interactions with multiple devices connected to the Web. The Semantic Web delivers an intelligent online environment that understands the meaning and context of content as it is being consumed. The Semantic Web describes technologies that understand the meaning of terms over and above just searching for terms. This understanding enables the anticipation of user needs and the dynamic delivery of highly relevant and personalized information and services, taking content customization and delivery to a whole new level. A Web that understands meaning and context benefits users, systems, and organizations. Considering the network effect of tagging and linking content across the enterprise, the Semantic Web and related technologies hold great potential to provide referential value to content and enrich it.

With 10 years of experience building interactions with the Web, the industry is changing. These changes require organizations to change their profit models. In the entertainment industry, for example, television, videos, and movies are rapidly and cheaply distributed through sites like NetFlix®, Hulu™, and the Google TV™ platform. Along with new distribution channels for media, consumption is changing. With an array of mobile devices available, content is accessed from anywhere. Mobile technology is having a great effect on ECM because it brings greater context to content transactions. And the mobile market continues to grow; it is estimated that by 2014, 50 percent of all mobile phones will be smartphones or tablets.[1]

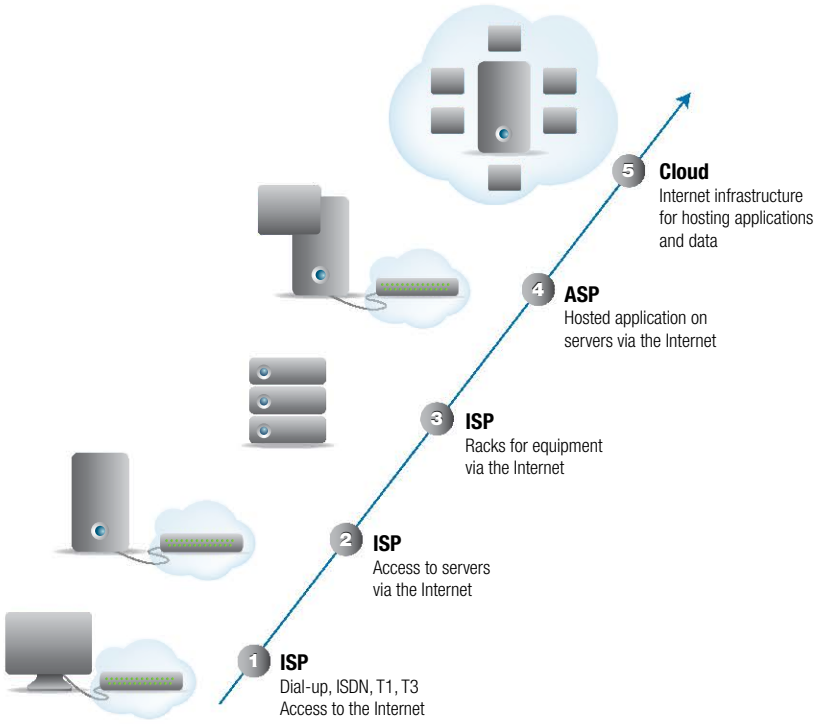
CONNECTING THROUGH MOBILITY AND CLOUD COMPUTING

In this era, the **CLOUD** emerges from the Web. The Cloud provides the concept that not all servers and programs need to be physically located at the point of origin of the user. Instead, the Cloud introduces the concept of distributing computing throughout the entire Web giving the user great flexibility to meet “peak demand” and make it easier for a request to be delivered over the Web. At the same time, the availability of bandwidth in most areas is leading to the creation of wireless equivalents to all wired network standards, and the Cloud is also becoming **MOBILE**.

The advent of cloud computing aligns directly with the expansion of ECM and the economies of scale required to manage the tremendous volume of information available in digital format. Demonstrating a profound shift in the way organizations acquire and use technology, cloud computing is based on old methods used to store and share information, manage

1 “OpenText Everywhere”. Mobile Applications and Solutions PowerPoint: www.opentext.com/2/global/products/products-mobility.htm

databases, and deploy Web services. Cloud services combine thousands of computers and storage networks, or public mainframes, into "server farms". The power of the Cloud lies in its immense server infrastructure. Without the connectivity and powerful processing of mainframes developed during the Pre-Web and Web 1.0 eras, cloud computing would not have been possible.



THE EVOLUTION OF THE CLOUD

SECURING THE DISTRIBUTED ENTERPRISE

The Cloud is a hot topic in the IT world, but not a simple answer to an organization's needs. As more technologies move to the Cloud, organizations need to develop strategic approaches to manage all the "stuff" that lives in the Cloud—the videos, blogs, images, documents, spreadsheets, Web sites, emails—securely. Cloud-based computing gives organizations the opportunity to manage the exponential growth of content in safe and effective ways.

Many people spend time in the Cloud on a daily basis—on Web-based email services like Gmail®, social networking sites like Facebook®, photo-sharing sites like Flickr®, and video-sharing sites like YouTube®. Organizations and individuals allow third parties to manage their content and apps for them remotely, rather than maintaining their own hardware and managing their content or applications locally. Instead, they connect to the content and applications located on servers belonging to third-party providers over the Web. Many cloud services are open, which means that the content is owned by the public cloud site.

People use cloud computing for storing and sharing information, managing databases, and deploying Web services. While their services may differ, cloud computing services deliver on demand over the Internet from massive data centers. A key benefit—and the premise for how the Cloud will revolutionize IT—is the ability to "rent" computing services from a third-party provider rather than owning and maintaining physical infrastructure. Cloud computing demonstrates a transformation in the way organizations acquire and use technology. As organizations see the benefits of "renting" over the capital expenditures of purchasing and running software, they increasingly use content management and collaboration services in the Cloud.

The Cloud also makes it easier for mobile workers to share information across their various devices. It allows them to access the same content whether on their desktop, laptop, or the evermore popular mobile devices—smartphones and tablets.

MOVING FROM CELLULAR TO MOBILE

Mobile technologies are exploding in Web 3.0. As early as the 1980s, development of cellular networks started taking off, but the mobile trend did not take root until 1990. As described in Chapter 1, the early cell phones were the size of small briefcases with limited battery life and mobility. In 1983, the USA had its first cellular phone subscriber[2] and the inventor of the cell phone, Martin Cooper, managed to invent a phone that was smaller than his original design at 16 ounces. The new DynaTAC came to market with the hefty price tag of $3,500.

2 The 1980s (Divestiture and a "Whole New Ballgame"). Telecommunications history Timeline: www.webbconsult.com/1980

CAMEO

EUGENE ROMAN

AN IDEA VIRUS

"Working with the telecommunications giants that took the cell phones to the mass market was like being part of a revolution. It wasn't really until the early 1980s that cell phones became portable for the first time, not requiring a car station or other heavy terminal station. Since those early days, the number of cellular phone subscribers has approached almost six billion across the world. Because of what the cellular network represented to communication, it became an idea virus and a must-have technology.

As a result there's a cell phone for six out of every seven people on earth today, we're truly a connected world. The convergence of cellular telephony and personal computing in smartphones and tablet devices is going to again revolutionize communication in the same way—taking those six billion subscribers and making them all nodes in a connected global network with unlimited applications..."

Cooper's vision that the cellular phone needed to work for the person not the location, inspired the major development of the First Generation (1G) phones. 1G allowed for calls to be transferred from one cell site to the next if the user travelled during a conversation. NTT in Japan launched the first commercially automated cellular network. By the mid-1980s, Japan became the first nation-wide 1G network.

By the 1990s, one million Americans subscribed to cellular phones and mobile phones weighed as little as three ounces.[3] As the year 2000 approached and the Internet was highly accessible, mobile devices could handle more than phone calls. In the late 1990s, RIM®, in Waterloo, released their first BlackBerry® pager with wireless Internet. It ran on AA batteries. In 2002, the BlackBerry progressed from a pager device to a phone with integrated email, and by 2007 Apple® launched the first iPhone®. A year later, the first Android®-powered phone entered the market and Apple® kicked off the tablet market with the first iPad® in 2010, giving users a whole new mobile experience.

GOING WIRELESS MORE QUICKLY

The Web 2.0 era moved us far from the 1996 Palm Pilot with wireless capabilities. Salespeople on the road were thrilled to have their corporate data available to them almost anywhere. With the surge of high speed 2.5G, 3G, and Wi-Fi network support, and the wide-scale deployment of smart mobile devices, mobility became faster and more effective. With improved connectivity, higher bandwidth, unrestricted accessibility, and powerful devices, the enterprise had gone mobile.

Enterprise knowledge workers had multiple ways of accessing their content from televisions to PCs to cell phones, and in the Web 2.0 era, the next to evolve was the mobile device. By the beginning of the Web 3.0 era, the enterprise began adopting tablets as well as smartphones.

Smartphones offer advanced PC-like capabilities. But the limited screen size of mobile devices sometimes makes it difficult to display the information. The ability to view, filter, and sort information easily and intelligently on a mobile device is a key requirement, and it is critical to create a positive user experience. Newer mobile devices have become more popular in consumer sectors with innovative interface design, a QWERTY keyboard, email access, and calendar capabilities.

3 Marples, Gareth. The History of Cell Phones – A Vision Realized. The HistoryOf.net, 2008.

Knowledge workers have the choice of advanced devices including BlackBerry and iPhone/iPad and mobile platforms like Google Android, Nokia Symbian™ OS, Apple iOS, and Windows® Mobile.

PERSONALIZING EXPERIENCES

Consumers can meet any of their digital needs with their mobile device. Information and devices are customized to suit individual needs. Content is no longer push; it is pull as users sign up for services like RSS feeds to receive targeted information, Web pages are highly personalized and social network "walls" display updates from select friends and groups. Technology is empowering people; they decide what they want to receive, and when, through apps, discussed in the next chapter, they select and download to a mobile device—often for free.

Apps continue to become smaller, faster, customizable, and distributed via the an App Store® as well as virally through social networks. With data stored in the Cloud, apps can run on any device and with the powerful new wireless networks available, they can run anywhere. Mobile apps are created to serve a specific purpose with little or no back-office-type server or content integration. Used on an as-needed basis, apps continue to save consumers time and effort because they are so accessible and do not require a PC with an Internet connection to work.

APPS AVAILABILITY BY PLATFORM

The mobile workforce requires more powerful, secure mobile applications to access the same functionality and secure access to vital enterprise content expertise and resources. As ECM moves further into the mobile platform market, this market continues to grow exponentially and outside the usual distribution methods. More than 65 percent of enterprises in the US and UK deployed five or more mobile apps in 2011. Organizations with ubiquitous access to information in a secure, managed, and easy-to-use way experience greater efficiencies. Mobile Web users expect to experience the Web in the same way as they move from one device or location to another. Mobile devices liberate mobile professionals to take their work with them, from the office, to the airport, to a customer meeting, providing a secure and seamless experience across devices, interfaces, and applications. By making applications available for all operating systems including Apple iOS, BlackBerry, Android, and Java, organizations can give employees a choice in the device they use, encouraging easy adoption and increased productivity.

BUILDING MOBILE APPLICATIONS

People continue to access a huge variety of services on their mobile devices—from video-on-demand, mobile TV, news and sports portals, mobile banking, and social networks. People are rarely without their mobile devices. For many organizations, creating apps that make their customers' lives easier becomes very important. While Web sites used to drive sales, enhance employee productivity, and increase brand awareness, in the Web 3.0 era, the focus shifts to mobile applications.

WAVE SUPPORTS ALL MAJOR MOBILE OPERATING SYSTEMS

In 1999, Oliver and Nick Sturrock founded weComm in London, UK. It was a pioneer of the mobile application industry building robust and scalable applications. Its infrastructure allowed developers and customers to focus on the creative process to build better user experiences.

CAMEO

OLIVER STURROCK

TECHNOLOGY AGNOSTIC

"The Wave Platform is technology agnostic! It helps solve the biggest problem corporate customers, government organizations and app creators have today: namely the dilemma of whether to select a single platform for app delivery or to incur the high cost of porting, deploying, updating, and maintaining apps across the entire landscape of devices. Wave powers the development and delivery of compelling mobile application experiences that possess a familiar native handset experience.

While developing Wave, we overcame a major cause of poor mobile end-user experiences by developing our own Mobile Transport Protocol (MTP), which monitors the quality of network connection and estimates the latency and bandwidth availability. Knowing that the connection is not available means that we do not pump data into a broken data pipe; equally, when there is a good connection we can enable business-critical services such as real-time or high-volume content publication and high-integrity transactions, such as eCommerce or trading. We rebuilt the reliability and sequencing provided by TCP but with a more sophisticated algorithm that understands the likely causes of errors and responds more appropriately. We have filed 11 patents on various aspects of MTP alone."

weComm provided interactive mobile data solutions and its flagship product, the Wave Platform, enabled everything from interactive mobile TV to financial services to mobile advertising. The Wave Platform allowed customers to create high quality, media-rich apps for all leading mobile handsets. It supported all the major mobile operating systems including iPhone, iPad, Android, BlackBerry, Windows Mobile, Symbian, and Java.

With the Wave Platform, organizations did not need to invest in specific mobile skills, or pay for development for each operating system. They used Wave Studio design tools. With these tools, they could quickly build prototypes and easily change the content and structural elements without losing its look and feel. That meant they could host dynamic content that was always up-to-date and consistent with their brand. The platform reused components so that customers could move their app to market quickly, without paying for multiple operating system developments.

After acquiring weComm technology, OpenText accelerated its mobility strategy. The device-independent platform gives its customers the ability to deliver functional apps for all types of devices. For more information on this core technology, visit: opentext.com/btf-mobileecm.

weComm strengthened the OpenText position in mobile ECM by providing enterprises with a way to create, deliver, and maintain mobile applications for all mobile operating systems. With weComm technology, mobile applications and solutions operate within a compliance-based environment that requires security and policy controls.

Like weComm technology, mobile solutions, such as OpenText Everywhere, help organizations find a balance between productivity and governance by offering secure, reliable, mobile access to a repository and other ECM technologies. This can be done within a single native application designed specifically for an organization's ECM deployment so users do not have to move in and out of applications to keep workflow processes moving and stay up-to-date with colleagues. By having the same access to tools as they would in the office—workflow steps, project workspaces, personal workspaces, favorites, and social collaboration—the experience of mobile workers is seamless and the flow of work is unimpeded. For more information on this technology innovation, visit: opentext.com/btf-opentexteverywhere.

EMERGENCY MEDICINE PHYSICIANS

OPENTEXT MOBILE WAVE PROVIDES GAME-CHANGING MOBILITY PLATFORM FOR EMP

Emergency Medicine Physicians (EMP) is one of the largest privately held providers of emergency care in the US, with 1,200 physicians at 80 sites practicing medicine from coast-to-coast. With remote sites across the country and groups of physicians frequently on the road, EMP uses market leading technology solutions to keep employees informed and connected.

EMP wanted to push content to physicians' mobile devices for on-the-go access to the apps and content on their preferred mobile device. "A lot of times when their shift is over, physicians don't want to stay at the hospital and continue to fill out their paperwork. Our goal was to enable them to more easily perform many of these administrative tasks outside the hospital, whether it's from the subway, their car, their couch, or wherever they happen to be," says David Peppard, CIO and CTO, at EMP.

With OpenText Mobile Wave, EMP found a platform that integrates with their OpenText enterprise portal and enables them to publish native apps to the leading mobile devices on the market, including Apple, Android, and BlackBerry. In addition to saving the company money and improving physician's productivity, the mobile solution is also helping EMP's recruitment efforts.

SCREENSHOT OF WAVE TECHNOLOGY ON ANDROID

TRACKING LATITUDE AND LONGITUDE

The original smartphones had such small screens that it was undesirable to accomplish some tasks on the go. With the introduction of the Apple iPhone, and then the iPad, screens are far more suitable for tasks like approving artwork for an ad or a vendor invoice. This drives the need for high quality content both inside and outside the enterprise.

Organizations are launching new ways to exchange and process content to increase productivity. More and more content types are becoming available for employees inside and outside the office. The integration of different media, including video, requires new solutions for the creation, distribution, and consumption of digital media. The consumption of digital media using mobile devices gives organizations, specifically their marketing teams, new ways of personalizing messages for their consumers.

As early as 2007, organizations were practicing proximity marketing and using geolocation to target ads based on a mobile device user's physical location. Geolocation uses latitude and longitude data to pinpoint the location of the person making the query. In 2009, several geolocation APIs were being widely used, including the following examples:

- Twitter® added upgrades that allowed users to automatically share their location and even organize "tweets" based on location origin to give users more meaningful and localized experiences.
- RIM announced location-based services so that developers could use methods to get location information into their apps and geocoding (by taking GPS coordinates and converting them into an address).[4]
- Google® announced it was adding geolocation information to search results to help .org, .com, and .net domains.[5]

More apps are integrating geolocation, like RentCompass which launched the first Canadian apartment rental search application for the Android. Search and geolocation seem to go hand-in-hand as a way to increase the relevance of search results.

When used with search, geolocation helps users easily find a café or good pizza in a new city. To make this happen for search, latitude and longitude is stored in the index as document variables. A scoring function is built into the search so that it can measure the distance between the user's location and the latitude/longitude data of the document, which is compared as the search happens. It remains important to have a way to acquire a user's location—a Web site or app may have a profile stored for their users using an IP location software or a GPS-enabled device.

When location extensions were added to RSS feeds, this technology brought in a new age of coupling information with physical spaces. Local news can be accessed through GeoRSS. People can access important local information like transit schedules and environmental data on their mobile phones. Technology developments in the field of sensors can detect temperature and Web cam traffic cameras, and can feed this information to mobile devices as well.[6]

This technology can be used to feed information through the mobile Web. Context-aware systems know where individuals are, sense what they are doing, and then adjust their behavior or make recommendations based on the context.[7] Based on mobile phone usage, the system is aware of a person's agenda, itinerary, intentions, and preferences, and can filter and present information accordingly.[8] So within a block of a favorite restaurant, an individual might suddenly receive a coupon for a free appetizer as the system anticipates behavior based on context.

One of the challenges for this kind of technology as the demand for it grows is its ability to be accurate. Location intelligence is a specific type of business intelligence with data types, structures, analysis, and presentation methods tailored for geospatial data.

Backed by this kind of computing power and an immediate connection to people and content, it has become easier and faster to find, share, and collaborate and build processes around content.

IMPROVING CUSTOMER EXPERIENCES

Web sites are evolving again during Web 3.0 with the combination of Web Content Management (WCM), Digital Asset Management (DAM), and social networking to create **CUSTOMER EXPERIENCE MANAGEMENT** or CEM. With CEM, a Web site is now as much a gathering place as it is a source of information and content.

4 Hesseldahl, Arik. RIM Teams With Adobe, Shows New Blackberry Features - BusinessWeek Nov 09, 2009: www.businessweek.com/the_thread/techbeat/archives/2009/11/rim_teams_with.html
5 Parfeni, Lucian. Google to Add Geolocation Information to Search Results, Softpedia, Dec 2, 2009.
6 Rowell, Laurie. In search of Web 3.0, N W September 2008, pg 22.
7 SiliconIndia. The 'Invisible' Context-Aware Technology is Here to Stay, Startup, Tuesday, 15 Nov 2011: www.siliconindia.com/shownews/The-Invisible-Contextaware-Technology-is-Here-to-Stay-nid-97619-cid-100.html
8 Rowell, Laurie. In search of Web 3.0, N W September 2008, pg 22.

CEM technologies help organizations to provide their customers, and their employees through an intranet, with the best user experience. Often this includes personalized information, interactivity, and new forms of media to consume. Unique customer experiences can lead to loyalty, increased sales, and customized customer services.

GATHERING BUSINESS INTELLIGENCE

CEM combines semantic search capabilities with Business Intelligence to deliver highly relevant information and a richer customer experience. Business Intelligence applies dimensional models to data and supports reporting and interactive data analysis. Marketing departments are keenly focused on gathering intelligence from users so they can become more familiar with their audiences to target them with relevant information, offers, and services. As with any body of knowledge, metadata is required to gather accurate business intelligence.

Metadata is increasingly important in the Web 3.0 era. In preceding eras, metadata played a key role in the effectiveness of early search engines and media management. Tagging information is important because it is required for data to be machine-readable. A framework is needed to describe the data and all its annotations.

Sophisticated modern metadata extends a body of knowledge beyond Communities of Practice and other collaborative models introduced in the previous chapter to enrich meaning. This aligns with Tim Berners-Lee's vision as the inventor of the Internet: "The Semantic Web is not a separate Web but an extension of the current one, in which information is given well-defined meaning, 'better enabling computers and people to work in cooperation.'"[9]

USING CONTENT ANALYTICS

Semantic computing exploits machine-represented meaning to enhance search, data integration, knowledge management, and information-centered business processes. The processes that facilitate semantic computing include the application of content analytics, context production, and annotation coupled with efforts to map databases into linked data repositories.

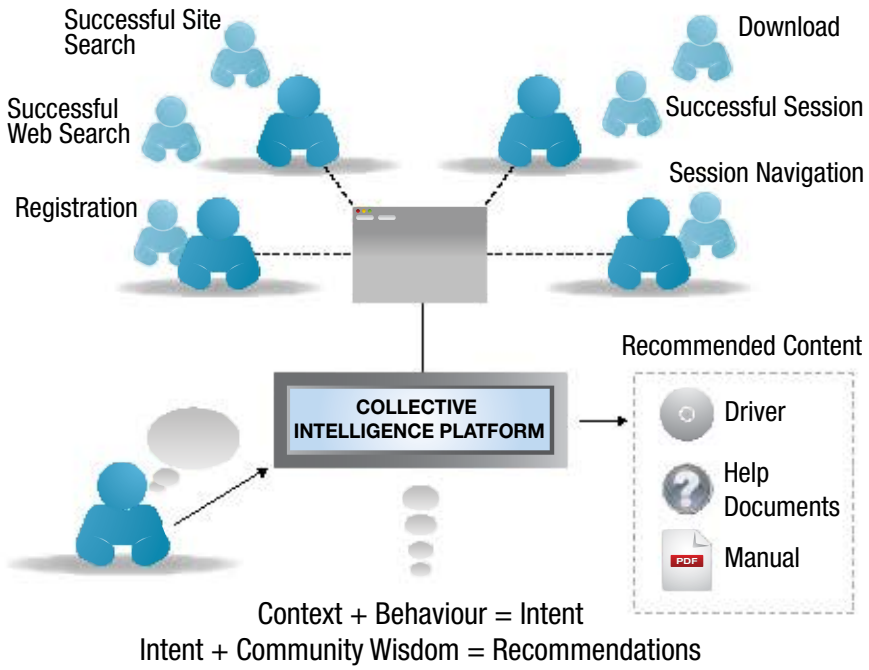
Content analytics is used today to complement Business Intelligence and plays a huge role in semantic computing by facilitating semantic data integration, search, and information management. Adding this layer of intelligence to online, social, and enterprise content enables organizations to generate structured information from unstructured sources. Content analytics parses and interprets the Web, as well as social and enterprise content. Then by indexing it all, it makes sense of opinions and attitudes and provides recommendations. Content analytics have become valuable to the enterprise because with it, organizations can target and enrich content based on the combined intelligence of measured attitudes and opinions, in-depth Web analysis, seeded search results, and focused results.

TRACKING PATTERNS FOR BETTER RESULTS

Emerging technologies make it easier to integrate Web development with metadata and taxonomies to relate terms to each other, even when they are used on different sites.[10] Web applications have appeared that can build up a digital identity for an individual and target content. LinkedIn® provides a good example of this. Based on content mined from an individual's profile, the application displays advertisements for open positions that align with a person's skill set and experience. Much of this is done using content analytics. Content analytics completes a similarity search to look for things that are statistically or semantically similar.

Content analytics help to make sense of the mess of content that exists on the Web, searching through a variety of content types, including articles, blogs and comments, emails, images, status updates, profiles, contact center notes, forums, forum postings, SMS/IM texts, and audio/video streams. Content analytics handle subjectivity by measuring sentiment, opinions, and emotion. This becomes extremely important for business applications in customer service and support, marketing, product and service quality, contextual ad placement, and policy and politics. New tools like Tip Top were developed to help marketers determine if social influence was positive or negative, and make refinements to social media based on the results.

9 T. Berners-Lee, J. Hendler,O. Lassila, The Semantic Web, Scientific American, 2001.
10 J. Hendler, Web 3.0 Emerging, Computer, Jan. 2009, pp. 111-113.

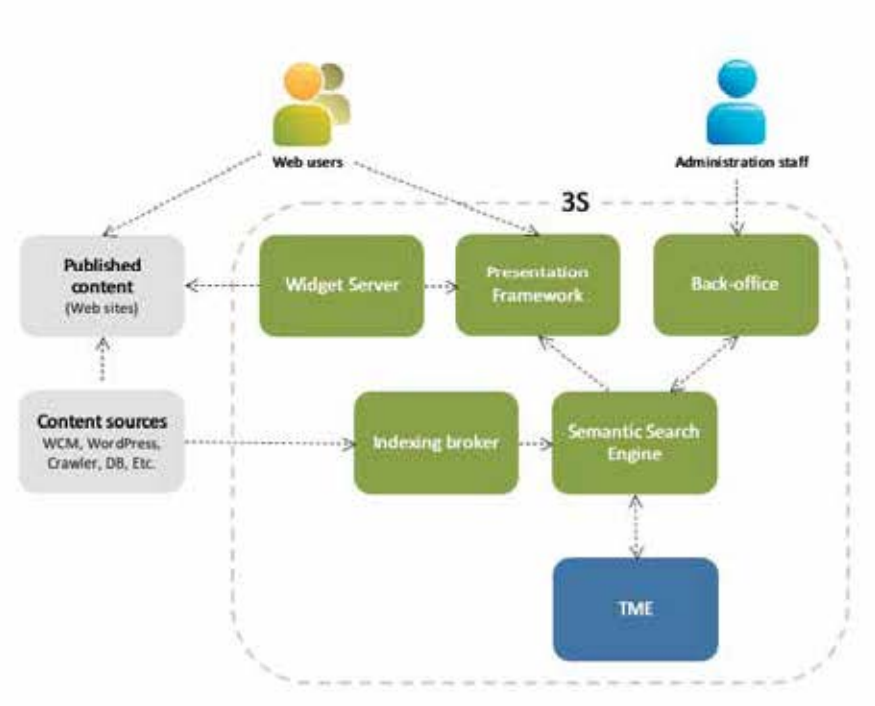


SOCIAL SEARCH COMBINES RESULTS AND COMMUNITY WISDOM

CONNECTING AND PERSONALIZING RESULTS

Nstein, a company out of Montreal, developed a semantic technology called TME (Text Mining Engine) 5. It applied new linguistic tools to help manage metadata and analyze sentiment, or feeling, in an article to determine if reaction was positive or negative. TME 5 could extract meaning, nuance, and context from unstructured content. The ability for a company to analyze what was said about them, their products, or even their competitors provided a deeper understanding of their audience.[11]

Mario Girard and Laurent Proulx founded Nstein in 2000 via a merger between the IT research and development firm GESPRO and Net Création, a technology marketing company. In addition to the Text Mining Engine, Nstein worked with clients to design complete digital strategies to implement Web Content Management, Digital Asset Management, and picture management desk products. These products powered digital publishing for some of the most prestigious newspapers, magazines, and content-driven organizations, including Reader's Digest, CondéNast publications, BBC, TIME, The Economist, The Canadian Press, and Radio France. Nstein also worked with life science industries, governments, and organizations in North America, France, and the UK.



INTERACTION BETWEEN NSTEIN COMPONENTS

TME identified concepts, categories, proper names, places, organizations, sentiment, and topics in particular content pieces and annotated the content to show underlying nuances and meaning in content.

The company's Web Content Management solutions allowed content producers to develop and edit documents and slideshows, manage contributions, and follow editorial and behavioral statistics in real time.

11 "Nstein Technologies Targets New Markets", Nstein Press Release. 2009.

This helped organizations analyze the behavior of Web site visitors and track patterns of behavior. Content-rich enterprises benefited from the ability to centralize vast amounts of content and understand how users interacted with it.

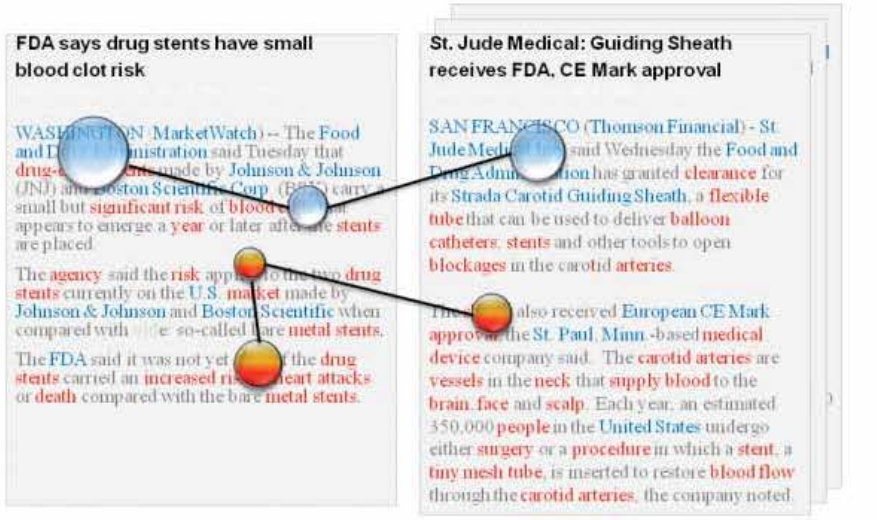
Each of the technology offerings from Nstein used its patented text mining technology. This technology helped the enterprise optimize content, connecting users to relevant information on a personal level. The Nstein 3S (Semantic Site Search) multi-index finding engine served up highly specific content search results. The innovative technology developments resulted in KMWorld awarding Nstein its "Trend Setting Products" award for four years in a row.

TRACKING BEHAVIORS

One Nstein customer is a humanitarian, non-governmental organization that worked on projects in war-torn regions and developing countries facing endemic disease. To report the conditions of a humanitarian emergency accurately to the rest of the world and to governing bodies, the organization uses Nstein technologies to track behavior in terms of the frequency of diseases in hospitals. By finding data on the occurrence, timing, and location of epidemic emergence (or "seasons"), the organizations could then stockpile vaccines and other drugs.

By understanding the patterns of behavior, organizations can increase their Web conversion rates with promotions and ad placement strategies based on positioning content most relevant to Web site visitors, catching their interest and new business. The Nstein semantic search technology helps its customers to do just that. That technology is now known as OpenText Content Analytics.

With OpenText Content Analytics, customers can use enhanced information retrieval capabilities provided by the native search inherent to the OpenText ECM Suite. Users are also able to make use of this technology within social media environments to analyze the interactions between users and expose them to more relevant information. For more information about this innovative technology, visit: opentext.com/btfcontentanalytics.



ASSOCIATING CONTENT IN CONTEXT IN SEMANTIC SEARCH

MAKING PREDICTIONS

Not only can semantic technologies analyze the interactions between users, but they can interpret patterns of behavior and use them to predict behavior. One discipline that examines this question in depth is Web navigation, which is based on usability studies (for example, videotaping a Web site visitor's navigation behavior). It is believed that navigation behavior can be accurately predicted by users' navigation paths.

Based on understanding how users navigate a Web site, organizations can build adaptive Web applications. Predictive tools help interface designers by indicating where users click on a Web site. When an organization adds a semantic search component to their Web pages, they can predict search behavior as well. In the Web 2.0 era, Web users received more information than they needed, and much of this information was not relevant to their interests or needs. Semantic search is able to take search to new and more sophisticated heights, helping users get more accurate and useful information.

The principle of the Semantic Web is that if data is available, it can be analyzed. Based on the amount of information on the Web, the ability to suggest behavior based on searching the Web is becoming

CAMEO

MARTEN DEN HARING

SEMANTIC INNOVATION

"When Nstein was founded in the year 2000, it wasn't common to use the word 'Semantics', but semantics was the founding principle at Nstein: semantics for classification, summarization, search, and even semantics for translation.

Nstein's insight was that semantically enriched data could be browsed and searched more effectively. The distinction between ordinary search and semantic search can best be explained with the idea that search should be more like what a knowledgeable person can do compared to a basic search engine. When we ask a person to find information about OpenText, we don't expect them to produce every document, article, blog, and tweet ever written that contains the word 'OpenText', only the ones with relevant information. In addition, we might reasonably expect to see related information about companies that OpenText has acquired, such as 'Global 360' or 'StreamServe'. The difference here is that the knowledgeable person has more context to understand the information and make logical connections and decisions.

Today, search by context rather than search by word is becoming ever more important as the volume of information continues to grow at exponential rates."

increasingly important for media organizations, governments, and financial institutions. Take for example, the huge number of tweets that have historically been posted before political uprisings and riots. This information, in combination with semantic search, could help public sector organizations predict when and where a potential uprising might take place, and prepare for this to ensure public safety.

Rather than using a mathematical model to measure how many times a word is used and how often it appears within a block of text, the Nstein technology uses a linguistic model. It scans content, emulating the way a person would scan a Web page, picking out important keywords or phrases to find relevant information. Just as history is used to identify emerging trends, semantic technologies work in a similar way by sorting through old data to look for repeated patterns. This process is called back-mining.

AIMING FOR ACCURACY

The Web is made up of a huge amount of referential content. Content is displayed as resources that link to other resources. The Semantic Web looks for meaningful data using software that requires a library or repository, documents, and images that lead to topics, people, and places based on context. It makes connections with all the content that it could reach because the software understands the meaning of the data. This data can then be used to create a customized experience tailored to suit an individual's interests and preferences.

The majority of information that people deal with on a daily basis is unstructured. Examples include emails, voicemails, video, and other forms of information. As discussed in previous eras of the Web, this kind of information is difficult to index. Companies have been evolving complex indexing and search technology for almost a decade. Nstein was one of the first companies to take this technology to market.

Organizations have benefited from Nstein solutions through improved efficiencies and time-savings. Using semantic search technology from Nstein, people can find the information they need to do their jobs and make better decisions faster, based on more accurate search results.

The Web improves the ability to search for and share documents. The Semantic Web expands on this ability, allowing data from a variety of sources, including Web pages and online databases to be used

and shared by different software applications, with an added level of understanding. Semantic software examines meaning units instead of words. This is called computer-aided indexing and it has the ability to index 6,000 documents in an hour.

TOPIC MAPS + QUERY-DRIVEN PAGES

INCREASING PRECISION

From searches through Pre-Web documents to the Search Engines of Web 1.0, search technologies continue to evolve to increase the precision of the results. With the amount of content available within the enterprise, precision ensures that organizations make the best use of every corporate asset. A proven benefit of search technology, the ability to find content easily, accurately, and quickly, saves the enterprise time and money.

Semantic Web technologies offer a huge advantage to the end user and the enterprise. The precision of a search for information using different criteria helps organizations collect data that may have been more difficult to find, and enables enterprise users to share that information. The Nstein 3S multi-index semantic site search used content analytics to power a faceted search.

A faceted search takes different approaches to complete a search by applying multiple filters. A navigational search tool like the original Yahoo!® used a hierarchical structure, or taxonomy, to browse and narrow the search. Then Web search engines generated a list based on a query as one or more words in a text box. The difference between the previous search technologies and Nstein 3S is that 3S embedded its technology with text analytics capabilities to increase accuracy.

SEMANTICALLY DRIVEN FACETED SEARCH

Content analytics and metadata enable rich, faceted searches across many different platforms. Nstein technology gives users easy-to-read results organized by topics and entities, along with links to other valuable and related content. For the end user, it is incredibly user-friendly because it generates a microsite based on search results.

EXPANDING ENTERPRISE SEARCH

3S, or Semantic Site Search, now known as OpenText Semantic Navigation, expands the search capabilities of the OpenText ECM Suite. The use of content analytics supports enterprise customers in their compliance and litigation readiness needs by helping them identify relevant content for archiving. The system automatically suggests which content assets end users should file as official records and greatly improves the efficiency of content collection and review for e-discovery and audit purposes.

Despite improved access to information, it remains important to know which sources should be trusted on the Web. User-generated content, information posted to Wikipedia®, Twitter, and even comments on a blog, for example, should be checked for authenticity and accuracy. Another challenge posed by social content is the informal use of language and the shorthand used in microblogging and texts. The advanced text mining capabilities of Nstein technology are uniquely suited to a social media world where deciphering emergent short-hand grammar and abbreviations is critical.

OpenText Semantic Navigation technology extracts meaning, nuance, and context from vast amounts of unstructured content. This helps organizations transform content into knowledge that is easy to find, repurpose, and reuse. The ability to write once, publish many times helps organizations, especially in the media and entertainment industry, to deliver content more quickly and efficiently across digital channels. The predictive technologies of the Semantic Web help improve user experience in Web applications by integrating the content analytics with Web Content Management systems. Content analytics play a role in delivering the best and most compelling experience for mobile users across multiple platforms. To find out how this technology has evolved, visit: opentext.com/btf-semanticnavigation.

DISCOVERING NEW REALITIES

There are other new technologies emerging in the Web 3.0 era to build more compelling user experiences. For example, multiple platforms were introduced for gaming. Games moved from the arcade into the home with game consoles, small mobile systems, and a number of applications developed solely for gaming on smartphones and tablets. In February 2012, for example, games were the most popular Apple App[12] Store downloads. Gaming is now taking another turn—it is immersing the players into the game.

Immersive technology has been used in educational situations like military or medical training. The approach is based on technology blurring the line between the physical world and the digital or simulated world to immerse users in the experience. It can include:

- Virtual worlds which are simulated environments like Second Life®
- Augmented reality where a view of the real world has elements that are augmented by computer-generated sensory input such as video, graphics, or sound
- Contextual gaming like Xbox® Kinect™
- 3-D environments built for training, which is moving into gaming

With the development of gaming systems like Xbox Kinect, new uses of immersive technology are rapidly developing for home use. Contextual gaming liberates people from simply sitting in front of the console. Further technology developments integrate this concept into 3-D alternate reality environments to give games a fully immersive experience.

IMMERSIVE TECHNOLOGY ON THE WEB

Moving beyond entertainment, immersive technologies have a much larger role to play in the future Web—and the enterprise. Applied inside the enterprise, these technologies present immersive experiences for corporate users, such as collaboration, learning and training, and improving customer experience. As the technology develops further, it can be applied to more virtual meetings. The 3-D space offers a way to organize simultaneous conversations across several locations for a brainstorming meeting, for example.[13]

Adding social collaboration tools to content management technologies significantly changes how people distribute content, especially digital media assets. Organizations can take advantage of mashups and extend them with widgets. Widgets give control of content to the content owner to share on the Web with other users. Widgets are mini applications that

12 "App Store Metrics." 148Apps.biz, Feb 13 2012: 148apps.biz/app-store-metrics/
13 Levin, Mervyn. 3-D internet and enterprise: emergence of virtual worlds and serious games in the Workplace, DEVELOPMENT AND LEARNING IN ORGANIZATIONS, VOL. 24 NO. 2 2010, page 17.

GLOBAL PUBLIC HEALTH INTELLIGENCE NETWORK (GPHIN)

FINDING THREATS WITH TEXT MINING TECHNOLOGY

The Global Public Health Intelligence Network (GPHIN) Centre for Emergency Preparedness and Response Public Health Agency of Canada uses the latest technology to spot threats to human life. The GPHIN system uses translingual text mining to assign relevancy scores to numerous articles coming from worldwide sources, helping analysts count and track instances of possible threats.

A recent National Post article cited GPHIN's importance to detecting global threats. Unlike its American counterpart ProMed, GPHIN does not just track diseases. The group monitors any threat to human life—natural or man-made, for example bush fires in California, pestilence outbreaks in Africa, even theft of nuclear material. As such, the Canadian team and its technology are continuously monitoring over 1,000 potential threats around the globe. The team publishes eight different reports, three times a day. It is precisely this monitoring by organizations like GPHIN that triggers responses—such as the WHO declaring H1N1 a pandemic, which in turn accelerates the development of vaccines.

Processing up to 20,000 articles a day, it would be impossible to track this volume without the search technology.

TRANSLINGUAL TEXT MINING RESULTS

CAMEO

ADAM HOWATSON

INTERACTING WITH CONTENT

"In the near future, I think we'll see a major shift to on-demand apps for the enterprise and a lot of activity in the Cloud, but longer term I think we're going to see a much more immersive experience, where we interact with the technology in much more pragmatic and perhaps kinesthetic ways. In the same way that range camera technologies like those seen in the Xbox Kinect have allowed us to manipulate virtual environments, the same will be true for the way we leverage, share, and interact with the content and information we use every day at work and in the home. By making interfaces more immersive and intuitive, we can provide people with a pretty revolutionary experience. The possibilities are limitless..."

extend content from any source and embed it into an experience, like embedding a media player into Facebook to share YouTube videos.

Online virtual environments have great potential to enhance collaboration in the enterprise. Some companies use Second Life-type of environments as a way to experiment with virtual events. OpenText held its first online annual conference (Content World) in 2010. Each user had a professional identity using an avatar, attended various presentations, chatted with other attendees, and called virtual meetings on the spot. Customers, partners, and OpenText itself saved on travel costs, but still had the chance to collaborate and share best practices. By allowing users to immerse themselves in a 3-D interactive environment, organizations still access networking opportunities, resources, and speakers on topics of interest.

PRESENTING INFORMATION IN NEW WAYS

In 1999, Anthony Gallo started a Toronto-based company, Vizible, to humanize the Internet by making it more accessible and intuitive through creative ways of presenting and navigating information. Vizible saw the benefits of giving users new ways to engage and interact with content that was less flat and hierarchical. In The Museum of Modern Art (MoMA), in New York City, had an exhibition called MoMA Workspheres. It showcased the technology, and it gained worldwide attention as part of the great tradition of MoMA for industrial innovation and design.

One Vizible customer, Deutsche Bank, used the technology to create a next-generation global equities research terminal. The application earned Vizible the Deutsche Bank Technology Award for the most differentiated and innovative technology of the year in 2004. The following year, Intel used the technology in keynotes to demonstrate their view of the future at two separate conferences. An increasing number of customers and analysts began to regard Vizible as a leader in enabling organizations to increase their business process productivity in innovative ways.

One of the early applications of Vizible technology for OpenText was the combination of a 3-D user interface with media management. The technology provided broadcasters and content creators with new, compelling ways to deliver digital media content.

CONTENT WIDGETS EXTEND CONTENT INTO EMBEDDABLE DIGITAL EXPERIENCES

TAKING LEARNING TO ANOTHER LEVEL

Immersive technologies combined with the Semantic Web offer a huge opportunity to extend learning systems. Immersive technologies add a new level of customer experience, while Semantic Web helps users locate and find content and deliver it in ways and channels that suit their needs. Web 3.0 technologies give learning systems new ways of managing learning and engaging more users to learn at their convenience. Collaboration tools make it easier to interact with the subject matter experts and information.

As trends in the marketplace change, it is difficult for people to keep track of information required to complete day-to-day tasks. In order to stay competitive, organizations require that their employees have fast and easy access to critical corporate information. When learning management systems first came on the scene, they were typically scheduling systems for classrooms. In the early 2000s, they evolved into e-learning programs with enrollment and tracking tools.

CAMEO

ANTHONY GALLO

INTERNET OF REAL LIFE

"The redesign of how we interact with our world is what the next Web will be about. It will be about a new kind of Integration, one that is more profound and impactful. The next iteration of the Web will integrate the physical world seamlessly into our virtual and connected world.

Web connectivity is everywhere, always-on, and for everyone, yet our world, the physical world, where we live, breath, walk and talk, is not yet taking part in the Web in a meaningful way. Yes—we depict the world through images and maps and locate ourselves within it through GPS and tags, but that is not where we are going, that is where we have been. We are headed to a place where digital content and information connects seamlessly with the physical world and allows the inter-mediation of browsers and operating systems to disappear. It will all be in the Cloud.

Many are calling this the 'Internet of Things', I call it the 'Internet of Real Life'. The next generation of Web innovation will design our everyday objects and the spaces and places around them to include networked information and control. It will bring our networked information systems into the design of our buildings, cities, and natural environment. We will be interacting with information and each other though our physical interactions in the world and with its objects."

G20 SUMMIT

CREATING A DIGITAL AND IMMERSIVE EXPERIENCE OF CANADA

As Canada hosted world leaders for the G8 and G20 summits, media from around the world updated a global audience with Summit developments. This presented Canada with a unique opportunity to draw international attention to the country's strengths as a destination for business, investment, and tourism. The Experience Canada pavilion was designed to showcase Canada through compelling images, interactive displays, and access to experts who could elaborate on Canada's valued qualities as a host nation.

Although the International Media Centre was accessible to accredited media only, an online version of the Experience Canada corridor extended the event to the public, enabling a global audience to experience Canada as an innovative and contemporary destination. The site, located at www.vg20net.org, combined digital experience management with an immersive experience, presenting 3-D displays from the Experience Canada Marketing pavilion. As a virtual counterpart to the physical site, the video mashup helped the Canadian Government to further promote Canada's key attributes using leading edge technology.[14]

A DIGITAL AND IMMERSIVE EXPERIENCE AT THE CANADA PAVILION

14 Jenkins, Tom. Managing Content in the Cloud. OpenText Corporation: © 2010.

LEARNFLEX PLATFORM

With organizations building certification programs, making more courses available, and experiencing a large number of users enrolling in e-learning, learning systems need to follow suit to support more complex, corporate-wide systems. Because they focus on employee development, many systems need to integrate with HR systems to track completion results, as well as for compliance purposes. Social media technologies introduce sophistication and complexity to learning systems in the form of peer-to-peer, peer-to-manager, and peer-to-expert interactions that the Internet facilitates.

In 2001, Michael Skinner, Jason Stimers, and Carlos Oliveira formed Operitel in Peterborough, Ontario, to produce and distribute learning management systems for high tech, financial, educational, and transportation sectors. Its flagship product LearnFlex helped the enterprise acquire, create, and transfer information and knowledge.

PROVIDING FIRST-CLASS EDUCATION

The company also offered Web 2.0 and Web 3.0 technologies in its enterprise portals for a number of business functions, as well as enterprise channel information and Customer Relationship Management (CRM) portals for Communities of Practice and other forms of collaboration. Behind every innovation was a philosophy of providing a first-class user experience and the interface, as usual, was key to adoption and ease of use.

To capitalize on informal learning that was growing in organizations, Operitel developed LearnFlex Connect to open communication channels and allow for greater sharing, collaboration, and interaction safely behind the firewall. Users could use tools they were familiar with from other social media platforms, such as the “Like” button from Facebook and commenting functionality from blogs.

Knowing that learning would follow the trend to mobile, Operitel developed LearnFlex Mobile. On-the-go learning helped the enterprise achieve their strategic business objectives while making it easier for employees to learn. LearnFlex Mobile users could launch, complete, and track e-learning courses on the move. They could even register for the course, view their learning plan, and get approval from their manager—all from a mobile device.

In 2011, the internationally renowned Brandon Hall Group honored Operitel with the Best in Class Smartchoice certification after it assessed the LearnFlex Learning Management System.[15] Later that year, OpenText acquired Operitel to add powerful e-learning capabilities to its solutions.

At the enterprise-level, e-learning solutions can help ensure content security, enrich information, preserve knowledge, and more effectively engage their employees, partners, and customers. E-learning solutions continue to expand in time with the immersive and Semantic Web. As trends in business and technology change, and the world becomes more mobile, organizations need more tools to help keep their employees up-to-date.

15 “Operitel Roadmap” Operitel PowerPoint, 2011.

CAMEO

MIKE SKINNER

PROVIDING THE WORKFORCE WITH KNOWLEDGE

"Our first two clients were very diverse; the first was the third largest school board in North America and the second was a worldwide manufacturing company that trained employees and dealers. By working with these two unique organizations and combining the expertise of the Operitel team, we were able to build a Learning Management System that was flexible to support the different business needs of our educational and corporate clients.

Our main differentiator has not changed for the past 10 years; it is the simple fact that technology needs to be flexible enough to enable an organization. We strongly believe that as organizations evolve the technology that supports them needs to evolve as well.

For many years a workforce could be defined by two qualities, the knowledge it possesses and the skills to use this knowledge. As the Web evolves, our workforce will be able to have greater access to knowledge, which means our workforce can focus on evolving their skills knowing that the knowledge is easy accessible."

PROVIDING END-TO-END SOLUTIONS

ENTERPRISE CONTENT MANAGEMENT, or ECM, is a combination of content technologies including document management, records management, and archiving. ECM helps organizations manage people, processes, and content.

ECM technologies help manage and optimize the flow of content throughout the enterprise. An effective ECM solution delivers all the tools necessary to produce and manage content in any format, by multiple users, across unlimited domains. Another key requirement is a logical centralized repository. Enterprise content is stored, shared, and managed inside a shared repository to give end users access to content, no matter where it resides within the ECM system. Content is protected in this repository where it is stored in secure, compliant, and reusable ways.

Social technologies should integrate seamlessly within an enterprise's information ecosystem. That means that social media must be compatible with the existing content lifecycle and transaction management technologies. ECM provides an ideal platform for creating content quickly and easily, while also delivering it in a personalized context.

The knowledge worker has evolved into a mobile professional, whether working remotely or in the traditional office environment. And being mobile, they expect the ECM solutions they use every day to be accessible on their mobile device, including technologies like social networks.

Staying connected to professional and social networks makes mobile collaboration possible. In the Web 1.0 era, collaboration drove productivity, and in the Web 3.0 era, mobile devices have pushed productivity levels even further. The ability to access business information while participating in workflow processes, as well as collaborating with customers and colleagues, has become crucial for the mobile professional.

GLOBAL IT COMMUNITY ASSOCIATION (GITCA)

HELPING THREE MILLION IT PRO MEMBERS ACROSS THE GLOBE FURTHER THEIR CAREERS

With over 1,200 Member Organizations representing over three million IT professionals, GITCA is the world's largest international not-for-profit independent organization powered by dedicated volunteers. They are devoted to the development and growth of the IT community and provide no-charge services to support and connect the leaders of user groups, associations, and student IT organizations. With the current uncertainty of the global market, GITCA wanted to ensure that its IT professionals maintained their skills in a constantly evolving technology market. The company selected Operitel to provide official Microsoft® e-learning for three million IT pro members.

Operitel Corporation, producer and distributor of the award winning LearnFlex Learning Management System, is an educational technology company that specializes in building adaptive Web-based enterprise-level applications. Using the Operitel e-learning solution, GITCA has been able to provide highly relevant and quality e-learning content in a cost effective way. The service is offered to IT professionals around the world, who can access coursework at their convenience and work at their own pace. The e-learning solution has helped GITCA achieve their mission of empowering IT professionals with the ability to improve their skill sets to stay relevant, contributing to individual career growth and the organization's future direction.[16]

GITCA WEB SITE

16 "Culminis selects Operitel to provide Official Microsoft E-Learning for 3 million IT Pro members" Operitel Press Release: 2009: www.operitel.com/culminis.aspx

ECM SOLUTIONS FRAMEWORK

TAKING BUSINESS ON THE GO

Having the wireless Web means people can access the latest movie review, email, weather, or stock reports, but many organizations do not have the business applications required to help their mobile professionals get the information they need and collaborate in real time. The enterprise understands the advantages of wireless accessibility, realizing that users can continually collect information from multiple channels and then distribute that information across the enterprise.

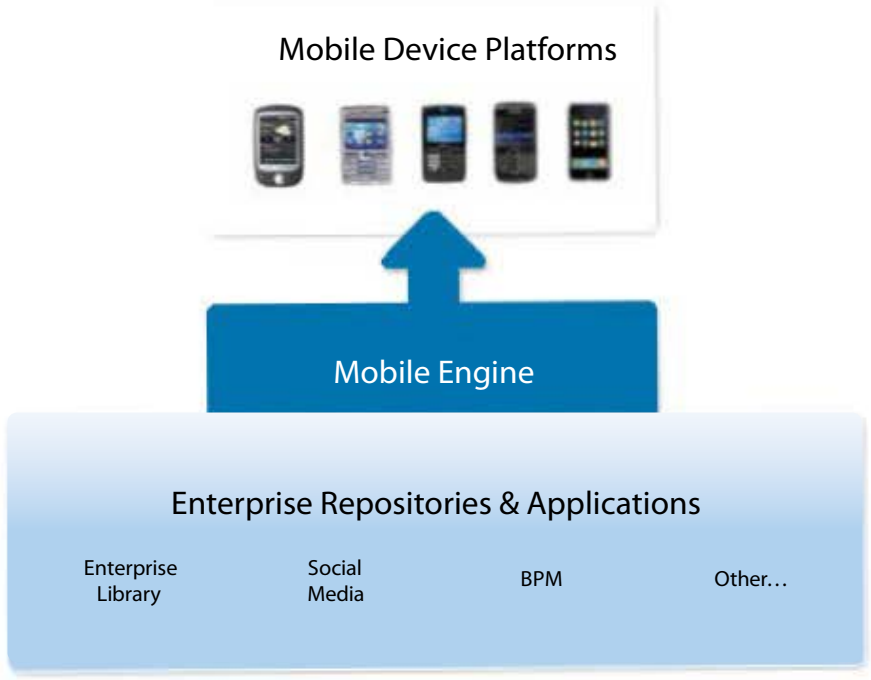
By giving mobile professionals access to their entire professional toolbox on their mobile device, organizations can expedite their business operations. Imagine a salesperson in the field needing a manager's approval to give a customer a discount—with the right mobile ECM tools, that decision can be made almost instantly. The ability to have critical information immediately available revolutionizes content management and mobile computing. And by combining traditional content management functionality with compliance, records management, social media, process management, and other applications, organizations can deliver critical information in context.

SOCIAL NETWORKING ON THE GO

Extending ECM to mobile devices involves more than just mobilizing existing applications. Organizations need to consider a number of important factors when moving powerful enterprise systems outside of office and IT environments, including offline storage and secure access to content; the use of mobile capabilities like GPS, alerts, and calendars; performance based on the device, the network, and availability of bandwidth; and the security of content.

The availability of content by mobile professionals improves their ability to make decisions. A lawyer can apply records management and compliance policies to dispositions received on a mobile device. Marketing professionals can search, retrieve, view digital assets, and approve the final artwork on a mobile device, and Web managers can review and approve Web site content. Even the executive who spends most of the time travelling and receiving numerous workflows or processes in a week can receive the content needed to make sound business decisions.

Mobile ECM delivers flexible solutions and applications for mobile workers who require constant up-to-date information to do their jobs. They can quickly and easily communicate and collaborate with team members. Increased access to resources significantly improves productivity, as organizations seize new opportunities, improve customer services and retention, and mobilize applications to keep business agile, responsive, and moving forward.



THE MOBILE ENTERPRISE FRAMEWORK

PROVIDING MOBILE INFRASTRUCTURE AND SECURITY

ECM provides an extensible content infrastructure for mobile professionals, giving them access to applications that leverage the entire enterprise ecosystem—from ERP systems to the enterprise library to process and content management solutions. With a connection to these back-end repositories, mobile ECM delivers fast and seamless access to an organization's IT environment, trusted corporate repository, and enterprise processes directly on a mobile device.

To be effective and safe, mobile platforms must be integrated with secure services like directory services to authenticate users and deliver all of the capabilities of an organization's back-end infrastructure directly to users on their mobile device. This model ensures that content is managed securely and delivered expediently. This ability is not limited to documents, text, and traditional content types; it also includes the ability to sort, manage, and classify non-traditional content types such as social

CAMEO

JOHN SHACKLETON

BUILDING THE ECM INDUSTRY AND AN ECM THOUGHT LEADER

"The ECM industry has continued to grow through economic uncertainty, recession, and the "dot.com" bubble burst of 2000. Companies powering this business have been adaptable, acquired and developed new technologies, and continued to innovate.

And they have all played a part in building the Hidden Web and Big Data. Companies that have seen success in the ECM industry have remained flexible in times of change and nimble in response to customers' business needs. The ECM industry evolved from search engines to systems that facilitated document management on the Web. Collaboration tools were added to help organizations effectively manage their business processes and critical documents. Another key to successful companies in this space was the ability to consolidate numerous solutions—and it's made the ECM industry what it is today."

media and other rich media experiences, including high definition video. For more information on mobile ECM, visit: opentext.com/btf-mobileecm.

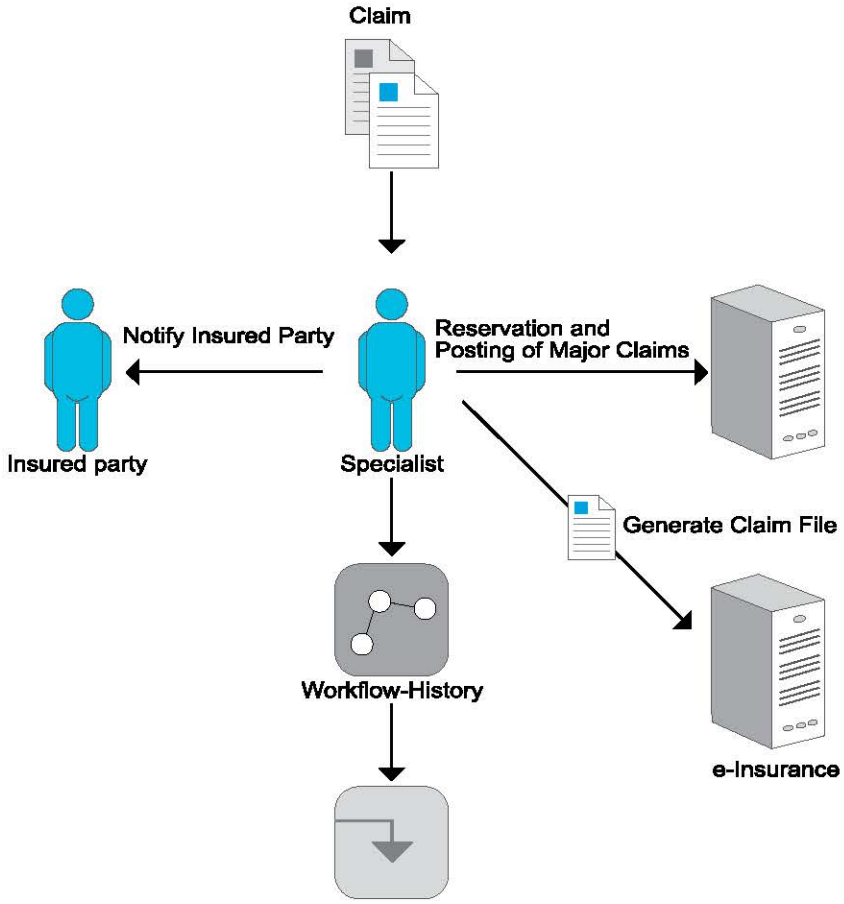
EVOLVING BUSINESS PROCESS MANAGEMENT

As people access growing amounts of content using their mobile devices, much of this content is produced in the context of business processes. Whether ad hoc or structured, processes need to take place within an organization to complete specific jobs or actions. As digital content and the power of computers continues to grow, technologies are being developed to automate the processes.

BUSINESS PROCESS MANAGEMENT, or BPM, has evolved as workflow has become more complex, involving work steps for larger numbers of inter-related people and actions. Most often, these actions that are produced involve other computer programs such as purchase orders in accounting and contracts contained in digital documents.

BPM allows organizations to leverage and extend their existing technologies to support the processes that drive the success of the business. Take, for example, an insurance company. A typical insurance company receives approximately 10,000 claims a day. Once scanned, the customer number and claim total is added to each machine. The workflow applies certain rules to determine whether the claim falls within assigned limits. If the data is complete and business rules satisfied, the claim is automatically processed and the customer receives payment.

Metastorm, founded in 1996 in Baltimore, delivered a complete BPM suite for roundtrip process improvement including design, automation, analysis, and monitoring of both human- and system-based processes. Metastorm solutions addressed the process value chain with complete end-to-end process software. Organizations could not only complete business modeling and architecture, but develop analytics to better understand their operations, and then design, automate, and monitor the processes. This gave organizations the ability to enhance business insight across their processes and the execution of those processes.



CLAIMS PROCESSING AT AN INSURANCE COMPANY

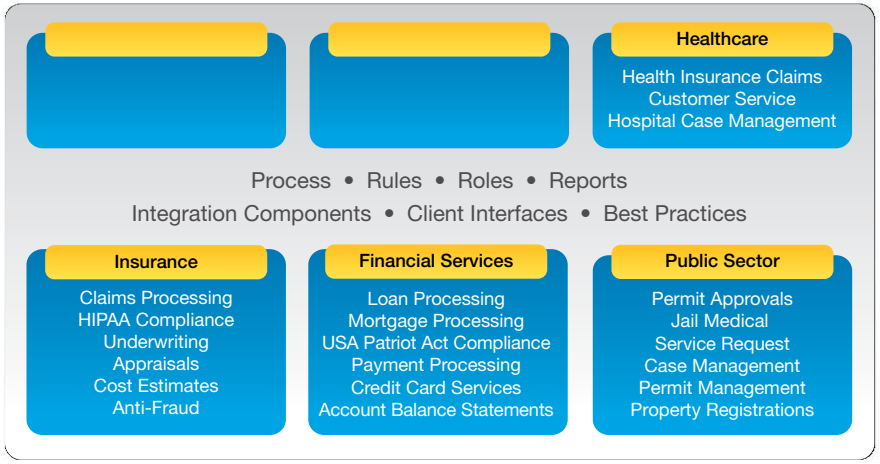
BPM offers organizations several benefits, not the least of which are cost savings, better management of processes, increased quality, faster time to market, and regulatory compliance. BPM governs the trans-action technologies used in ECM suites to help organizations improve efficiencies, shorten project lifecycles, lower costs, and increase product

and service quality. Industries such as financial services and insurance, energy, government, life sciences, and healthcare use BPM to help with customer on-boarding or claims processing. For more information on the core technology from Metastorm, visit: opentext.com/btf-bpm.

GROWING IMPACT OF BUSINESS PROCESS MANAGEMENT

ViewStar, one of the early workflow software vendors discussed in Chapter 1, was acquired by eiStream in 2001. eiStream originated with former Kodak software businesses Eastman Software (purchased from Wang in 1997) and the purchase of Kofile in 2000 by a group of investors led by a Dallas businessman. Before it became known as Global 360, it acquired Keyfile and Identitech.

The combined acquisitions gave Global 360 more than 20 years of experience in helping more than 2,000 customers in 70 countries to reduce paper, automate processes, and empower individuals to deliver increased productivity, service levels, and business performance. Global 360 software created, monitored, analyzed, and managed automated business processes. Not only did it help clients address accounting functions, claims management, reporting, and regulatory compliance, but it offered document management technology as well.



EXAMPLES OF BPM APPLICATIONS BY INDUSTRY

Global 360 approached its software development differently. It conducted extensive customer implementation experience and two years of focused research with the builders who designed and developed the systems, the participants who worked within the system every day, and the managers who monitored and managed the business. It was persona-based BPM—the first BPM approach to focus on the way work gets done and how to do it better.

The impact of BPM grew during the Web 2.0 era. With more content available to a greater number of people on a global level, ECM was bound to become more BPM-focused. Some of the BPM interfaces included: ERP for Human Resources, Legal and accounting departments; Customer Relationship Management for customer support; and Supply Chain Management for component tracking and content management.

The persona-based approach resulted in a better user experience, interaction, and collaboration for everyone involved in a process. Clients included AEGON, the City of Vancouver, Crédit de Lyonnais, Carlson Marketing, and Revlon. In 2010, Microsoft honored Global 360 at its Microsoft Partner Awards with Information Worker Solutions, Visio Partner of the Year. When OpenText acquired Global 360 in 2011, it was the leading independent provider of process and case management solutions. For more information on this core technology, visit opentext.com/btf-bpm.

TAKING BPM MOBILE

The ability to access and view files from a trusted enterprise repository using a mobile device in real time is a fundamental benefit of mobile content. Mobile access to corporate content and systems gives people the ability to manage critical documents like travel expenses, vendor invoices, human resources documents, and customer information from a mobile device. The ability to make informed decisions keeps processes and productivity on track.

Decision-makers also benefit from mobile BPM because they can access, review, digitally sign, and approve steps in business processes in a secure and compliant manner no matter where they are. With Mobile BPM, management accesses, engages with, and acts on the critical information and processes that drives their business. It brings the mobile workforce a step closer to seamless access to BPM.

But BPM functions beyond workflow. It aims to integrate all affected applications within an enterprise by monitoring processes and assembling all required information. BPM includes process and data monitoring at the server level, enterprise application integration to link together different applications, integration of Business Intelligence with rule structures, integration of information warehouses, and utilities that assist users to complete their work more efficiently.

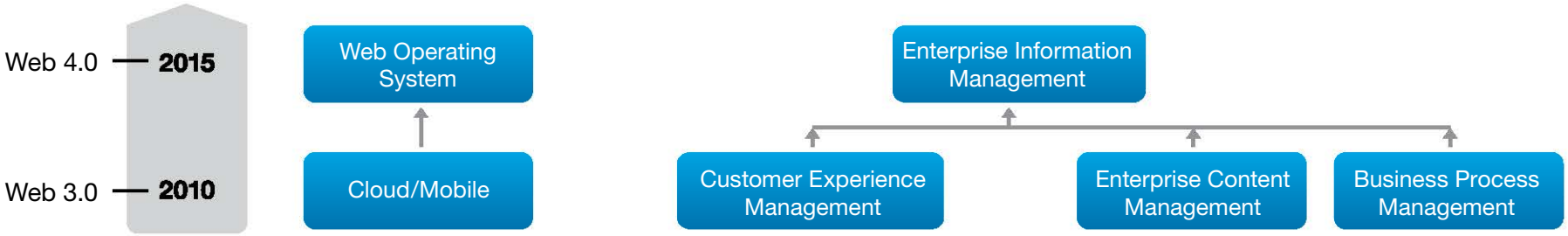
MOVING FURTHER FASTER

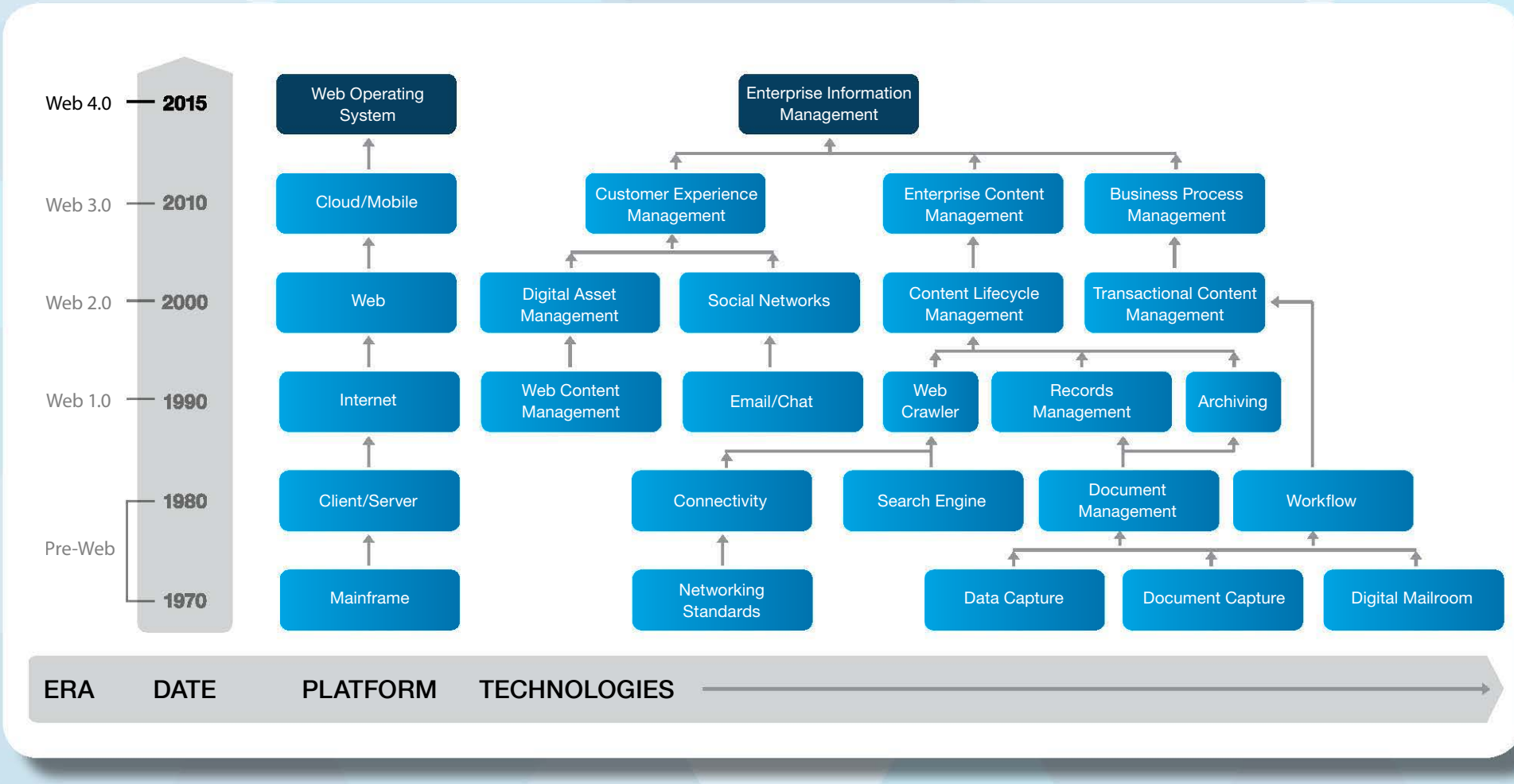
Technology is advancing into the future faster than expected. As emerging technologies integrate with search and retrieval technologies, content becomes even more tailored and personalized. With increasing quantities of digital content in the enterprise and the Cloud, the enterprise is experiencing higher levels of efficiency.

Behind the firewall, more targeted and secure applications help the enterprise manage its growing content more effectively. Based on patterns of behavior, the enterprise becomes smarter—making use of semantic tools to target information. Its content is augmented by mobile features like geolocation and other push technologies. Mobility empowers employees to work on the move and immersive technologies heighten the experiences of Web users.

The expectations of consumers have changed as well. As users consume more applications that pull and aggregate requested information, users' expectations grow. They expect to receive the information when, where, and how they prefer it. This expectation will grow as the technologies of the Future Web develop.

Along with personalization, consumers expect to move seamlessly between platforms, applications, devices, and content types. IT departments will be required to make this happen while ensuring security and governance requirements are met. The social and mobile technologies of the Web 3.0 era challenge the enterprise in new ways, while presenting new opportunities for growth and success.




Web 4.0
2015
Web 3.0
2010
Web 2.0
2000
Web 1.0
1990
Pre-Web
1980
1970
Web Operating System
Cloud/Mobile
Web
Internet
Client/Server
Mainframe
Enterprise Information Management
Customer Experience Management
Enterprise Content Management
Business Process Management
Digital Asset Management
Social Networks
Content Lifecycle Management
Transactional Content Management
Web Content Management
Email/Chat
Web Crawler
Records Management
Archiving
Connectivity
Search Engine
Document Management
Workflow
Networking Standards
Data Capture
Document Capture
Digital Mailroom
ERA
DATE
PLATFORM
TECHNOLOGIES

Chapter 5

Future Web / 2015-

The Path of the Future

This is the era of the digital enterprise and the Web as an operating system. Using the Web to access programs has enabled the development of fast, easy, and lightweight applications. In the very near future, straightforward and affordable access to them will be ubiquitous. The Web as an operating system, combined with mobility, social technologies, and the Cloud will have a lasting impact on enterprise technologies as they morph into Enterprise Information Management, and it will affect how we access, share, use, and protect content.

FUTURE WEB

Since personal computers first appeared in offices and homes, users have interacted with them using three components: a monitor, a keyboard, and a mouse. While there have been improvements in these technologies, including flat screen monitors, Bluetooth® mice, and ergonomic keyboards, 30 years later most users still use a monitor, a keyboard, and a mouse.

Mobile phones with trackballs and trackpads in the early to mid-2000s initiated a new way of interacting with computing devices. Then the widespread consumer adoption of the Apple® iPhone® in 2007 and the iPad® in 2010, with their multi-touch screens, introduced a fundamental shift in usability. Other vendors of mobile phones and tablets quickly followed suit and laptops and peripheral monitors have started to incorporate touch screens.

Smartphones and tablet computers have introduced another critical change in computing. Suddenly consumer demand is driving the adoption of new technology, even behind the firewall. Computer usage started in the workplace with mainframes and dumb terminals. Even when desktop computers appeared, users considered them to be a business tool for the workplace.

Today, consumers adopt new technologies, introduce them into the workplace, and pressure the organizations' IT departments to support them. IT replaces technology based on budgets, generally at a much slower rate of purchase than consumers buy new devices. Based on experience in the past of consumer adoption leading the way with technology, it can be expected that touch screen laptops and monitors, and, in many places, tablets, will become common in the workplace as IT replaces its current inventory.

ENTERING A NEW PHASE OF COMPUTING

In the future Web, the **WEB OPERATING SYSTEM** emerges from the Cloud and mobile devices. In this type of architecture, the users, the application, the content, the program, and the computing power (storage and processing) can be located anywhere within the Web and the application itself can be started and modified from any device.

A new business model has evolved as devices like the iPad and smartphone are driving the adoption of applications from digital distribution platforms like iTunes® and the App Store®. The success of this model and the rapid rates of consumer adoption are evident in the billions of apps downloaded. But how will apps and their distribution alter the course of business? Fundamentally, considering Apple has already shipped millions of iPads and many Fortune 100 companies are using them, with CIOs surveyed by Morgan Stanley expecting to incorporate tablets into their networks in 2012.

With the arrival of the iPad, touch screen computing, and the simplification of installing applications on mobile clients using a digital distribution platform, the world has entered a new phase of computing. It is now possible to forecast that every person on the planet can interact with the Web and that every use of the Web will be written as an "app" using a Web operating system.

The success of Facebook®, smartphones, and tablets has driven the evolution of the Web as an operating system at least 10 years earlier than originally forecast. This is the single most significant technology development to affect business since the PC, and it will dominate

computing well into the future. Client computing has been transformed by smart mobile devices. The timeline chart on this page shows how quickly mobile apps have evolved when compared to the rise of the PC, a market that was 30 years in the making.

The rapid shifts experienced in consumer and enterprise computing are forcing software vendors to adapt to meet the new demands of the marketplace.

PC Market: 30 years in the making	Web Operating System: 5 years in the making
1980: Started with personal computers: Microsoft® and Apple	2008: Started with smartphones: RIM® and Apple
1985: Leveraged proprietary operating systems	2009: iTunes and App Store create simple app delivery. Google® introduces Android® as horizontal alternative
1990: Vertical: Mac vs. Horizontal: Windows® with Vertical having initial success. But in the end hardware vendors choose Horizontal (Intel®)	2009: Web as operating system wars begin in earnest
1995: Horizontal wins as industry matures	2010: Vertical: Apple iOS vs. Horizontal: Google Android
2000: Windows platform has PC monopoly. Office integrated into suite from applications	2010: Vertical has initial success in early stages. But in the end Hardware chooses Horizontal (Moto, Samsung)
2005: Suites became a platform for more applications	2011: Horizontal wins as industry matures
2010: Applications dominated the PC industry	2012: Android platform has mobile Web as operating system monopoly

THE DEVELOPMENT OF THE PC MARKET VS. WEB OPERATING SYSTEM

The demands of the marketplace also require a new standard in the enterprise. This standard is known as **ENTERPRISE INFORMATION MANAGEMENT** (EIM). As the enterprise becomes more complex both in size and the amount of content, one thing is constant—the need for productivity.

EIM can deliver a comprehensive software suite that encompasses: the capture of information; the management of structured, unstructured and application data; the exchange and presentation of information on both sides of the firewall; intelligent business processes and solutions; information applications that parallel ERP data and process; enterprise information architecture that enables enterprise applications as well as mobile, social, and Cloud; and Business Intelligence and analytics. These concepts are supported by the four pillars of EIM.

Information Governance	Information Exchange	Information Processes	Information Security
Meet growing compliance and regulatory requirements to reduce exposure and legal risk in the process of value creation.	Support productive, secure and engaging information exchange and collaboration in the new work culture.	Rapidly extract value from growing volumes of business information and evolving business processes.	Protect your valuable business information from both the outside intruder, and leaks from inside.

THE PILLARS OF EIM

The pillars represent functions of the three core technologies discussed in the previous chapter: Customer Experience Management (CEM), Enterprise Content Management (ECM), and Business Process Management (BPM).

- Information Governance provides the evidence of digital content in the form of a record or document as found in both CEM and ECM.
- Information Exchange consists of technologies including CEM and ECM, as well as connectivity that provide for the on-ramp, off-ramp, and collaboration of digital content.
- Information Process provides the flow of communications, approvals, and content in a business activity; it is BPM.
- Information Security consists of technologies we associate with ECM and BPM, to manage permissions to view and use digital content.

EIM ARCHITECTURE

Combined, these core technologies form EIM, the future of enterprise software technology. The core technologies of CEM, ECM, and BPM still require the use of enterprise business information technology, as earlier detailed as libraries or repositories for the content to reside in.

MANAGING THE SOCIAL ENTERPRISE

EIM encompasses Web 2.0 technologies like blogs, wikis, and social networks. These are forcing change in many organizations. As users bring new and disruptive content-driven tools into the enterprise, the lines are blurring between consumer-based Internet tools and enterprise collaboration tools.

As discussed in the previous chapter, people are opting for new ways to work together and share information—and introducing new forms of content into the IT domain faster than organizations can develop and implement strategies to manage them. Organizations have a critical need to develop a new set of rules to manage this content as content continues to evolve.

The key for EIM will be to discover how businesses can effectively manage the customer experience, enterprise content, and transactional content delivered in any format, across any channel (including the Cloud), and any device. From an enterprise perspective, the focus is productivity and how organizations must adopt new technologies to remain competitive. For government, such fundamental change enabled by the potential of this technology is the only means of maintaining services while achieving essential cost savings.

Unproductive or disengaged employees cost the US economy up to $350 billion per year in lost productivity. In the future, the desktop office (or the old way of desktop computing) will be replaced by social networks as the new productivity standard. This has already taken place, as illustrated in chart below when Facebook caught up to Google in total number of hits. This happened because people prefer human interaction over machine-based algorithms, or peer-to-peer content over a list of search results. Taking this a step further, group productivity is the greatest source of organizational productivity.

WEEKLY MARKET SHARE OF VISITS TO FACEBOOK AND GOOGLE

BALANCING SECURITY AND PRODUCTIVITY

When used in combination with search, the information found on social networks—in profiles, blogs, blog comments—is considered referential and therefore, trusted information. In the Future Web, the use of social networks will surpass the use of email. Many organizations continue to bar access to Facebook, Twitter®, and YouTube®. Echoing the 1980s when organizations limited their employees' access to email—unwittingly decreasing their ability to network and generate business activity—organizations are barring Web 2.0 technologies like social networking and blogging.

Organizations view social media tools as security risks. The enterprise has not yet understood the benefits of these tools, and perceives social media as a threat to productivity. This is why many technology organizations today focus on how to share digital information so that it is secure, private, and protected behind the firewall.

KEY IT CHALLENGES

Social media tools complicate the management of enterprise content. They operate outside of conventional constraints, so organizations need to develop, monitor, and manage new content control policies. Using tools outside the firewall puts corporate information at risk. However, security goes beyond the function of a firewall and should prevent security breaches occurring from the inside out, like the WikiLeaks example.

Organizations cannot determine if their social content is at risk without understanding how it is stored, managed, and whether these methods comply with external regulations and internal governance policies. Through the effective use of technology, organizations can create governance, risk management, and compliance processes for social content and social collaboration. Making social media secure inside the firewall will be a key area of technology focus for many years to come as organizations try to balance the need for security and access with the need for openness through social media and other productivity tools.

SHIFTING TO A SEMANTIC ENTERPRISE

The move from analog content to digital content creates whole new ways of learning, being entertained, working, and in fact, living. The change from "digital content everywhere and anywhere" to "smart digital content on demand" has brought a whole new set of risks and opportunities not only to the consumer, but to the enterprise.

Search engine sites now capture more than one trillion Web pages. Many organizations make hundreds of thousands of content items available on their Web sites. Large commercial sites handle several thousand products. Intranets store incredible amounts of unstructured data. The challenge has become helping users find the exact information they require. People expect a Web experience that gives them the content they desire, based on their needs, their persona, and their intent. As discussed in the previous chapter, the Semantic Web delivers an intelligent online environment that understands the meaning and context of content as its being consumed.

Text mining functionality like entity extraction or sentiment analysis radically alters searches on the Semantic Web by adding a layer of analytics to deepen the understanding of content and meaning. Semantic Web technologies enable users to look beyond content for facts and relationships between objects and their properties.

More intelligent search methods are coupled with the increase in mobility and widespread availability of high-speed bandwidth. As everyone has some sort of GPS on their person at all times, location-based data combined with other intelligence gives users access to highly targeted content. Brands run proximity-based campaigns and marketing tailored Web sites to specific users using Web 3.0 technologies. Mobile GPS, social networks, and cloud repositories provide additional, intelligent context to drive the development of semantic technologies.

INCREASING MOBILE USAGE

Cloud services combined with mobile devices force vendors to change their strategies, and significantly impact the behavior of IT departments around the world. Analysts predict that building cloud applications will outpace virtualization and storage. The enterprise will need to overcome four key concerns to adopt the Cloud: security; compatibility with existing IT infrastructure and applications; privacy; and overall performance.

INCREASED PRODUCTIVITY THROUGH INCREASED USEAGE

As mobile usage increases, so will enterprise use of the Cloud. There is a strong link between mobile accessibility and the Cloud. While mobility promises to increase access to content in all formats, the Cloud is able to handle this demand for volumes of information easily and cost-effectively. Combined with mobile access, the Cloud is rapidly introducing the "Consumerization of IT" to the enterprise, where the IT department develops and distributes applications for users within an organization's own "private cloud".

As discussed in the Web 3.0 era, the world has gone mobile. Millions of cell phone handsets have been replaced by smartphones and tablets. Governments and corporations have made huge investments to make network connections faster and more affordable.

MOBILE ACCESS TO ENTERPRISE CONTENT FROM MULTIPLE SYSTEMS

FEEDING CONTENT INTO THE MOBILE ENTERPRISE

As mobile devices become more commonplace, organizations are expected to support this trend and provide access to content in every format across every kind of device. This portability—or the ability to access content on the go—is a defining characteristic of digital content. It is fragmented, mashed up, delivered across many channels, and accessible across every device, at any time, in any place. And it needs to be managed, especially behind the firewall.

Mobility feeds the pace and complexity of content that is created and shared, and businesses are struggling to stay on top of managing information. Users want to connect via their mobile device or tablet to the Web, where they can access resources, applications, each other, and content. And the enterprise needs to make sure that this is available.

Behind the firewall, immediate access to content means that knowledge workers can make decisions more quickly, and the enterprise can capture these decisions to increase productivity and protect information at the same time. Productivity increases because the information can be pulled together from a number of internal and external sources—news, maps, weather, traffic updates, and more—through a mashup. As discussed, mobile mashups deliver highly personalized and relevant content by combining a user's location, profile, and social network with mobile phone functionality like GPS, ringtones, and alerts.

"APP-ITIZING" THE ENTERPRISE

Tablets and smartphones are rapidly becoming more commonplace in the workplace. To remain competitive, software vendors will be required to provide applications for these devices to allow users to access their content in a useful way. To become a mobile application or "app", software must be adapted to support touch gestures for the first time. At the same time, the GPS location information that mobile devices like tablets now include software to enhance value.

In designing the enterprise applications of the future, wireless Internet access will give users the feeling that they can be everywhere at once and remain in touch with far-flung offices. And services, even on aircraft in flight, will only increase to enable continuous interaction.

Some municipalities have offered or are experimenting with free public access Wi-Fi networks to reduce the cost of Internet access for lower income families. One Indo-Canadian entrepreneur (Raja Singh Tuli of Datawind) designed a $35 tablet to sell in India. This makes the on-ramp to the Internet more accessible than ever, and adoption continues to grow in previously under-served parts of the world, such as Africa, parts of Asia, and parts of Latin America. Upcoming 4G wireless networks in developed countries will also provide new opportunities for connecting, collaborating, and sharing information.

For enterprise software developers, the increase in the ubiquity of wireless software access allows them to focus development efforts on "app-ized", mobile software. Previously, design had been focused on the user sitting in an office using a monitor, mouse, and a keyboard over a wired network. Support for mobile devices such as smartphones and tablets started out as a nice-to-have capability that supported a small subset of users. Now, mobile access via tablets and smartphones is becoming standard for the enterprise.

DRIVING THE EVOLUTION OF ENTERPRISE APPLICATIONS

The Web as an operating system is the new architecture of applications, replacing the old method of installing a single client application onto a computer with the remote download of an app from a distribution platform. Software companies no longer distribute consumer software via a floppy disk, a CD, or a download from an FTP site—this will be supplanted by a lightweight app downloaded from the Internet. The

rapid adoption of cloud applications like Facebook, Gmail®, YouTube, and other Web sites, as well as improved public access has led to the success of this new application paradigm.

Like these cloud applications, the lightweight apps are empty containers and require access and the exchange of content to be applicable and effective. These apps differ from client/server-based software, and even Web-based software, because they are highly targeted, fragmented, and small. Delivered on the fly when needed, they run on a mobile device, but are not "stored" on the mobile device. Based on the Web as an operating system, mobile apps are light on memory, fast to deploy, and cheap to develop—and highly accessible to anyone for download and use.

Mobile apps will drive the evolution of enterprise application software. Behind the firewall, organizations will replace software applications with a collection of specific and targeted apps which employees can download and personalize on their own mobile device. An enterprise app store would function in a way similar to the Apple App Store, but will give IT the ability to monitor, certify, and administer the data of the organization and how it is used. If an organization chooses not to implement its own Web operating system, it surrenders its security to some other organization outside the governance policies of the organization.

MOBILIZING APPLICATIONS

The mobile market is currently being dominated by the rapid-fire development of mobile applications or "apps". These tools make life easier for millions of people for social networking, taking photographs, getting recipes and news, watching entertainment, and more.

Mobile apps are discreet programs designed to solve a specific purpose with a tether to back-office servers or new types of ultra availability via "app content servers". Designed to perform at the touch of a smart screen, the possibilities exceed what users can do with a conventional PC connected to the Internet. This kind of immediate access to content on the go makes mobile apps invaluable to users.

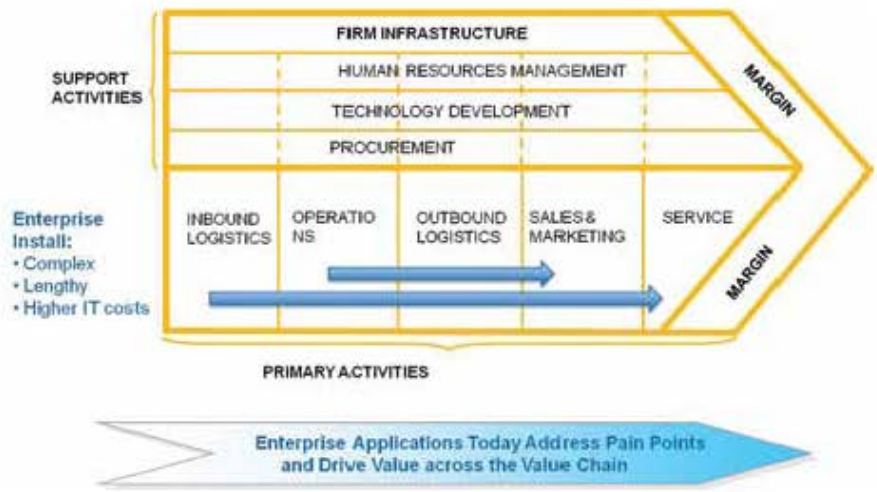
Many smartphones and tablets have apps already installed during manufacture, but others customers download from various mobile software distribution platforms. It is this second option for downloading apps from the Cloud that holds great promise for the enterprise. For organizations, all apps must be in the private cloud—behind the firewall. As the technology evolves and the Cloud becomes more prevalent, the limits in app development are being pushed by the use of the Web as an operating system and distribution platform.

MOBILIZED APPLICATIONS

FOCUSING ON ONE TASK

Recent developments in the industry will impact how software is packaged. The success of the Apple iTunes and App Store, as well as the Google Android market, have shown the way. Just as consumers want to buy songs or TV episodes rather than entire albums or seasons, knowledge workers of the future will follow the trend, downloading apps that focus on performing one specific task. Rather than accessing a bloated software application full of features, users will want to access and use the single feature they need.

Enterprise applications generally follow a form of "value chain" that assists the organization to create value. IT is constrained by governance, security, and performance, and that makes many enterprise applications difficult to install and upgrades complex and lengthy. Generally, that means that upgrades and installations only happen every few years.



ENTERPRISE BUSINESS APPLICATION

Most modern forms of business applications can trace their origins to the database and ERP eras—both characterized by a client/server architecture approach as discussed in Chapter 1. As organizations adopted the Internet behind the firewall, this complexity continued and organizations were faced with the same set of constraints, except the delivery method became an internal Web download to a browser client. This still led to high costs in IT since training and implementation was required.

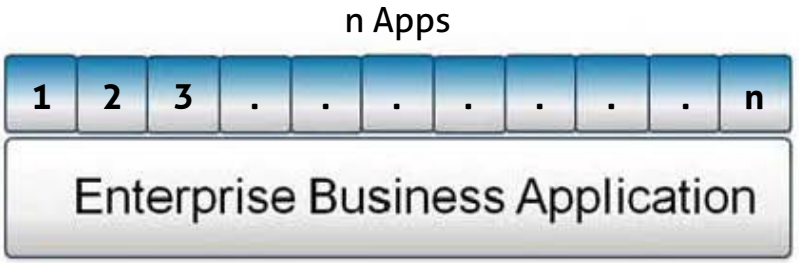
The architecture on the server side was generally the same with one big exception: the servers could all be connected just as the clients were. This, in turn, led to a revolution of virtual usage of server machines with the newly found Internet connectivity driving productivity improvements for IT, server utilizations went from 10 percent to over 50 percent or more.

In the 1990s and early 2000s, IT departments generally installed enterprise software on-premise and had IT staff run it. IT investments were large and high risk with long buying processes and complex, detailed RFPs. These long, complex software purchasing processes meant that IT purchasers wanted to deal with as few vendors as possible. This favored vendors with complete suites of products with a large number of features. To meet this IT demand, even to be short-listed, vendors developed suites with more and more features.

PACKAGING ENTERPRISE SOFTWARE

Applications software written and shipped as a maintenance upgrade or sold as a download will be replaced by a collection of apps with small amounts of custom code for broadly-based solutions. This solution granularity was not possible in the PC era. The cost of deployment did not allow for so many small apps. Enterprise app stores, whether private or public, offer relatively inexpensive apps that focus on a specific task.

In the diagram on this page, one sees an enterprise business application can be broken down into tasks that can each be handled by apps. Individual departments within an organizations can easily purchase the apps they need from the internal app store. This lessens the financial risk when business requirements evolve. Since departments purchase feature-based apps to solve the tasks at hand rather than a feature-based software suite, total cost of ownership and financial investment is reduced.



TASKS BROKEN DOWN INTO APPS

In the Web 4.0 world, enterprise apps will number in the hundreds, if not thousands, and these apps will need to be managed and administered. A typical fully-fledged and dedicated application may be broken down into its molecular functions, each of which will be made available with one or two percent of the total functionality of the original application. In other words, the multitude of functions available in a mature enterprise application will be broken down into sub-functions. Each sub-function will represent an easily installed, downloadable app from an enterprise app store. It could require hundreds of specific function apps to duplicate the functionality of a single software application.

INTRODUCING CONTENT ON THE GO

The promise of an app store-type type architecture for the enterprise would allow users to have easy-to-use specific downloads—an easy, one-click experience. This would then create a simple "shopping cart" charge to IT, immediate delivery of the software and content to the user on-demand without IT intervention (or support). All that is required is a device with access and a budget.

For this to work, the app must be very simple, since it will be downloaded without a manual or training. Complex functions cannot be delivered with the same consumer user experience. They must be deconstructed in order to take advantage of "one-click" computing.

THE COMBINED MODEL

It is likely that organizations will engage in a hybrid or combined model—something in between the current model and the more consumer-based app store model. This will be more complicated to manage, but IT may not have much of a choice. Consider the migration from the horse to the automobile in transportation a century ago. Cities were saddled with the complexity of administering two systems at the same time. This transition occurred over more than a decade.

The same will be true for apps and applications. IT will begin with the highest value apps and connect them into a traditional application process. This is another critical reason why IT departments cannot connect to public store—there is currently no ready connectivity to the content and software that already exists behind an organization's firewall.

DEVELOPING PRIVATE CLOUDS

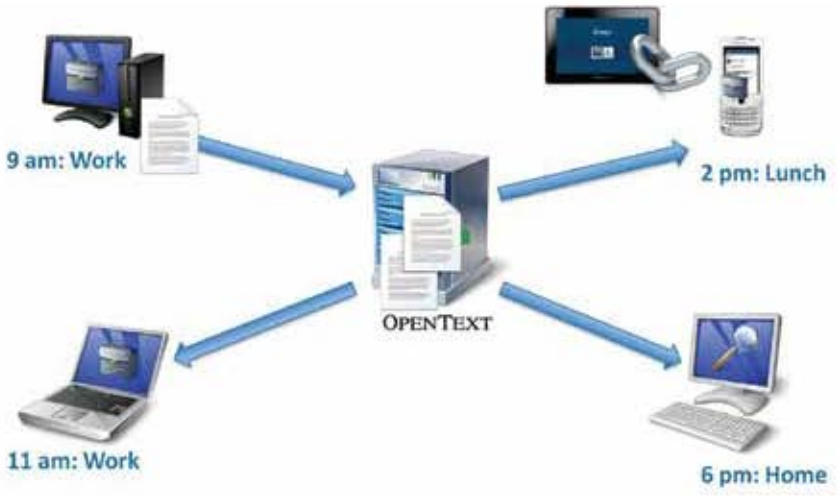
Apple's iCloud® is a cloud storage and computing service from Apple that was made public in June 2011. This is a public cloud that delivers computing resources on demand over the Internet using Web services or applications. An internal cloud is required to duplicate this behind the enterprise firewall. An internal or private enterprise cloud emulates cloud computing services on a private network. Security, compliance, governance, and reliability can be more closely managed in a private cloud.

Paving the way for the enterprise private cloud, innovations in the consumer Internet continue to shape the way that people share and interact with information. From file- and photo-sharing Web sites to cloud-based storage services, it is becoming easier and faster to publish, share, and access content on the go. To date, the consumer-style experience has improved customer satisfaction and set new standards for business user adoption with expectations for convenience, speed, and ease of use.

For the enterprise, a cloud-based operating and distribution system lays the groundwork for the development of the personal "mobile social cloud". Based on the convergence of social, mobile, and cloud computing, technology vendors will provide their customers with an "appstructure"—an architecture that allows for the development of mobile social cloud apps for distribution in the private cloud of the enterprise.

Consider a day in the life of user within an organization. A user arrives at work and opens a file from the desktop. Later on in the day, at an internal meeting, the user works from a laptop, but still wants to access the same document opened earlier so the team can collaborate on this document. At lunch, the user receives an urgent request for a comment on the document from a team member back at work. The user can access the document via a smartphone or tablet, modify the document, reply to the request, and upload the modified document. And finally, at home later that evening, the user can review the same document using a home computer connected securely to the organization through a firewall tunnel.

At no point is the security of the document or the other team members' work ever compromised by being located or accessed outside the firewall. The entire process works around a secure version of the enterprise private cloud.



A DAY IN THE LIFE OF THE ENTERPRISE

As noted earlier, the Cloud is a collection of devices connected through the Internet. Much of the Web as an operating system that will make an app store possible depends on low cost and high speed connections. In the enterprise, content in the Cloud is varied. Core enterprise application content—such as SAP® archives or Microsoft Office® documents or emails—is vital to support the functions of the Web 4.0 enterprise.

Globally, IT departments will race to create more effective productivity tools based on the innovations of the Cloud, an app store, and mobile devices to create new "apps" for their customers behind the firewall. In effect, every major organization in the world that maintains a firewall and a proprietary repository of content will want to create a private cloud apps environment.

This will include on-premise cloud services with an app store available to all internal consumers. These self-service kiosks will be developed to provide a set of very personalized apps unique to each organization, department, or business unit, to manage the enterprise apps and the content behind the firewall within the apps development environment. This set of tools will enable enterprise IT departments to manage an enterprise app store. This appstructure is what supports the "Consumerization of IT".

CONTENT IN THE CLOUD

This will bring new challenges for the enterprise. Enterprise apps will need to make use of repositories behind the firewall to guarantee security and privacy of information.

SECURING ENTERPRISE APPS

As with the consumer world, any single user will download a set of apps that IT or management push to them as a regulatory requirement, or the business customer will select the apps that they require on an as-needed basis. These apps will continue to be segmented in the same way that major applications have been segmented previously in organizations, by vertical and horizontal applications. To explain: a vertical mobile app is

file management for a given company and a horizontal mobile app is an employee expense form submission.

AN ENTERPRISE APP STORE

There will be early distinctions between private and consumer app stores. Security requirements will define most of these distinctions, especially in this new world of BYOD (Bring Your Own Device) to work. Many people increasingly use their own personal devices in the workplace, combining personal information with enterprise content and mobile apps.

This implies that IT departments no longer own the "client device" and will have limited authority over information on mobile devices. As personal and professional content mixes, organizations will need to manage corporate information with precision. A private device cannot be wiped clean if an employee leaves the organization—but the enterprise app and the associated content must not leave with it. For this reason, features like archiving and the control of content will take place through the app itself rather than the device.

DIFFERENTIATING CONSUMER AND ENTERPRISE APPS

Behind the firewall, organizations will replace the software applications of today with a collection of specific and targeted apps which users can download and personalize on their mobile devices. Employees within the enterprise will expect the user-friendly features of consumer apps. Enterprise apps will handle secure content, support a permissioned access structure, and have rules of access for use. Audit and regulatory requirements must be respected. IT must certify and administer the apps to protect the organization, but likewise protect the ease of use. In this way, they will differ from the consumer apps currently flooding the market.

Besides offering security, another key difference between consumer and business apps will be that most business apps will require a content repository to make them useful. Access to content behind the firewall typically involves moving through numerous levels of security or "permissions". A mature Enterprise Content Management (ECM) engine provides a solid foundation for enterprise grade apps by delivering a secure repository and can be coupled with a rapid app authoring and deployment framework.

To demonstrate how this works, we can examine a potential Accounts Payable (AP) app based on a module used within accounting departments to determine exceptions to rules in an Enterprise Resource Planning (ERP) system. To be effective, the app requires access to secure content such as contracts, emails, and attachments, plus any other content, as well as access to ERP data such as AP ledger entries and purchase orders and shipping. Combined access to both the ERP and ECM system allows for the quicker resolution of an issue by a Line Manager who doesn't have to wait for accounting staff to resolve the issue. For the app to be effective, it requires secure access to a repository of databases.

ECM, with its proven content management functionality and security, anchors the mobile social cloud. It takes advantage of existing IT infrastructures and security to create an environment where business-critical information can be exchanged, used on the go, and retained in ways never before possible. A good illustration of this is a document sharing app.

SHARING CONTENT SECURELY WITH AN APP

A document sharing app brings together a secure repository, a mobile app, and the private cloud. It allows enterprise users to share, edit, and manage content in secure folders across devices changing the speed and simplicity of information sharing within an enterprise. Enterprise apps like this use existing secure IT infrastructures to create an environment. This technology revolutionizes the way people share information within the enterprise. A good example of a document sharing app is OpenText Tempo. To find out more about this innovative technology, visit: opentext.com/btf-tempo.

CONTENT FUELS ENTERPRISE APPS

With an app like this, organizations maintain absolute control of their data, while allowing users to easily and effectively share content which is typically emailed or stored on cumbersome network shared drives. The important point here is that the enterprise still "owns" the content and it is protected. The ability to maintain safe data in existing systems while providing the cloud-based app experience that users demand benefits everyone. In a very essential way, the mobile social cloud will change the speed and simplicity of information sharing in the enterprise.

OPENTEXT TEMPO APP FOR THE IPAD

The effect of mobile apps on the industry can be compared to the evolution of writing computer code from line prompts to using a Microsoft Windows® GUI, in which the user never sees the underlying code. It took 40 years to move from a machine-based language to a sophisticated graphical interface that many people could use almost intuitively. This forever altered the way people accessed, used, developed, and communicated using computers and the Web. Using the Web as an operating system has taken the Internet to a whole new level of abstraction, much in the same way that Facebook and YouTube abstracted the Web beyond the browser and Web sites, heralding a shift in computing and the delivery of content and services to users.

REINVENTING THE ENTERPRISE

Improved access, bandwidth, and computing power have helped commercial users learn to use the power of the Internet. As youth create video mashups on YouTube, use an iPod touch® to video-chat with friends in another hemisphere, and share media across any number of devices, the enterprise must and will follow suit—using innovative technologies to shift old paradigms and create new business models. Here are some of the more visible shifts that are taking place:

- E-learning is we-learning.
- Social work now means working socially.
- Information searches are being replaced by semantic searches.
- Massive amounts of free-flowing digital information create new risks and windows of opportunity for organizations worldwide.
- New digital workflow tools combine business knowledge with effective operational methods.
- The "Consumerization of IT" now determines enterprise technologies, operating and growing the enterprises of the future.

Behind the firewall, digital technologies drive changes in the old hierarchies, attitudes, and approaches. The demand for new technologies has prompted the development of devices and applications, which in turn produce new kinds of interactions and types of content to manage. The traditional hierarchies and silos of major organizations defined how information is created and shared, and how it flows. When information begins to be managed as an enterprise asset, the organization shifts dramatically. The enterprise of the Future Web needs to adapt to derive value from all this information in dynamic, innovative ways.

More and more, organizations expect to manage content storage and exchange in many forms across different repositories—and devices—into the Cloud. Security is a major area of concern, with a focus on putting control mechanisms into place to protect intellectual property and personal data. At the same time, employees expect and demand immediate access to intelligent and valued information.

Smart apps will overtake monolithic, siloed legacy systems. Millions of apps will be invented, out of which a few new mission critical apps will emerge to dramatically transform how people work in all industries. Experiencing content will impact how people buy, employees learn and grow, and partners and suppliers interact in the ecosystems of the future. More effective tools will be required to unlock the power of content, and organizations that do not deliver these tools will simply fall behind their competitors and eventually disappear.

There is much risk and opportunity for every enterprise, not-for-profit, and government institution across the globe in the Future Web era. Hyper-mobile connectivity is not only possible, but affordable and widespread. Without a doubt, the digital future is here to stay. The key question now is how this new social, mobile, and cloud-based culture will shape commerce, education, and lifestyle. In turn, how quickly can established institutions and structures change to adapt to the imperatives of this technology, while holding true to the underlying principles and values which characterize our society?

FOLLOWING TECHNOLOGY TRENDS

Enterprise software companies should follow and understand consumer-driven technology trends. They provide opportunities like the formation of complete industries or new business models. When overlooked, organizations fail to keep pace with new developments and fall behind their competitors.

Besides mobile apps, consumers are adopting a number of other technologies, including 3-D television, voice control (Siri® on the iPhone 4S), motion control Xbox® Kinect™, and more. Will these technologies become more common in PCs, tablets, and smartphones? Will they be adopted by the enterprise? Only time will tell, but chances are good that at least some of them will.

There are also other technologies that may currently be too expensive for wide consumer adoption. Technologies such as: transparent monitors, holographic 3-D projections, detection of eye movement, facial recognition, and 3-D printing. Most of these will be used in niche markets and applications, but certain enterprise applications will need to support them.

In addition to changes in hardware technology and how users interact with computing devices, consumers have also driven changes in software design. Features made popular by instant messaging (Yahoo!® Messenger, Windows Live® Messenger), social networking sites (Facebook), and blog sites (Blogspot®, WordPress®, Tumblr®) have already made their way into enterprise software. Many enterprise software applications provide the ability to chat, comment, rate, and share with other users. No longer simply trends, users expect these features as part of their enterprise software.

Another software design trend that has garnered a lot of attention in the last few years is "gamification". Gamification seeks to apply the design techniques of video games (which are some of the most highly sophisticated programs today) to consumer and enterprise software applications. Game controllers will not likely be used to interact with enterprise software, but gamification may make a software application more engaging or "fun" based on features like points, scoreboards, competitions, and so on. Gamification increases user adoption and provides incentives for users to complete what would otherwise be boring and mundane tasks. At this point, many software vendors are experimenting with game design techniques and some of them will likely make their way into enterprise software in the coming years.

TRANSFORMING: READY FOR APPTITUDE

The CEM, ECM, and BPM industries have a rich heritage of adapting consumer trends on the Internet and inventing new and compelling applications for the enterprise market. The core technologies for effectively managing content behind the firewall parallels the evolution of the Internet itself. The innovations of those core technologies led the evolution of the market from Web 1.0 to Web 2.0 technologies for Enterprise 2.0 applications, to Web 3.0, and finally into Web 4.0. These solutions have shaped what is becoming the EIM market and today, its technology is well-positioned to guide the evolution into EIM.

The EIM market began with the early databases in the 1980s. Repositories replaced databases in the 1990s, enabling proprietary access to content. In 2000, repositories were expanded to support applications to manage content and processes in an organization. These applications were then integrated into suites such as the OpenText ECM Suite. In 2005, suites became a platform for more applications, like digital asset management and social networking. In 2010, apps broke onto the scene, destined to dominate the industry.

Largely hidden behind the firewall, EIM technologies will transform the way people interact with technology and information, with tremendous impact on lives around the world. Moving forward, technology is advancing more quickly than ever, while content continues to grow at an enormous pace. As consumers drive the use of technology in the enterprise, there is pressure on technology companies to continue innovating to provide secure, mobile, and social content management solutions across all verticals.

The future holds great opportunity for technology companies with vast repositories and core technologies that allow them to provide the enterprise with secure, mobile, and social capabilities in the Cloud. With experience building online retail Web stores, building an enterprise app store securely behind the firewall is the next step to providing enterprise customers with technology that allows their employees to be more productive, engaged, and efficient.

Organizations cannot keep up with the technological evolution, much less anticipate it. The shift from PC to mobile devices may already be over. In this state of technology flux, there is one constant: the enterprise reliance on content. Content is the knowledge base of the enterprise, whether in the private sector, government, or academia. Content, properly maintained and structured, is the enterprise's most valuable asset. Vital for effective service or product delivery, for creative innovation and for accountability, content is the cornerstone of business. It must be managed effectively. As illustrated in this book, the Web 4.0 enterprise will make use of disruptive developments like social media, the Semantic Web, cloud computing, and mobile apps to create, share, manage, and enrich content—improving productivity and inspiring innovation to new heights along the way.

LOOKING TO THE FUTURE

Mark Barrenechea

President and CEO of Open Text Corporation

For 20 years now, OpenText has been helping organizations manage and maximize the value of content to gain significant business success. From its origins as creator of one of first Internet search engines and early Web-based document management, workflow, and portal software, OpenText realized the potential of the Internet early on as a platform for collaboration, along with the value of digital content as a strategic asset that must be managed throughout its “life”.

From its inception to its current position today as a market leader in Enterprise Content Management (ECM) software, OpenText has been the cornerstone in the formation of an industry. Tremendous opportunities lie ahead for ECM, Business Process Management (BPM), and Customer Experience Management (CEM) as fundamental technologies in the Enterprise Information Management (EIM) industry, to solve some of the major challenges faced by users of the Hidden Web and Big Data all over the world.

Analysts calculate the ECM and BPM markets to be over $8 billion each. Cloud and smartphones/tablets should take this market space well over $20 billion. This is one of the fastest growing industries in the world.

The strength of the past success in solving problems for users has created a billion dollar industry, and transformed OpenText from a start-up with roots at the University of Waterloo into a billion-dollar company. The huge popularity of mobile computing and apps, the Web’s evolution into an operating system and cloud computing are creating compelling experiences for end users within the Hidden Web—and in combination will transform the technology industry forever.

The industry continues to evolve and OpenText will continue to innovate in a space that has already led the way for users throughout the world.

THANK YOU

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GLOSSARY

3-D Virtual Environments—See Virtual Reality.

1G (1st Generation)—The first generation of telecommunications standards introduced in the 1980s were analog standards. Nippon Telegraph and Telephone (NTT) launched the first commercially automated cellular network of the 1G generation in Japan in 1979.

2G (2nd Generation)—The second generation of wireless telephone technology was commercially launched in Finland on the GSM standard. Phone conversations were digitally encrypted, the systems were significantly more efficient on the spectrum than 1G which allowed for far greater mobile phone penetration levels, and 2G introduced data services for mobile with SMS text messages.

3G (also 3rd Generation or International Mobile Telecommunications-2000 (IMT-2000))—A family of standards for mobile telecommunications defined by the International Telecommunication Union. Services include wide-area wireless voice telephone, video calls, and wireless data, all in a mobile environment. Compared to 2G and 2.5G services, 3G networks deliver simultaneous use of speech and data services and higher data rates, allowing network operators to offer users a wider range of more advanced services while achieving greater network capacity.

Advanced Search—A variety of software tools that allow users to get more relevant search results. These tools include Boolean Operators, Stemming, Adjacency and Proximity Searches, Thesauri, and Synonyms.

4G—The fourth generation of cellular mobile communication standards which is being gradually implemented. It provides expanded broadband coverage for mobile Internet access, including HD TV and 3-D TV.

AJAX—See Asynchronous JavaScript and XML.

API—See Application Programming Interface.

Application—Software or programs used to execute tasks on computers.

Application Programming Interface (API)—An interface implemented by a software program to enable interaction with other software, much in the same way that a user interface facilitates interaction between humans and computers.

App Store—A digital distribution platform for iPhone® mobile apps developed and maintained by Apple Inc. Users can visit the App Store® for example, to browse and download apps developed by Apple.

Appstructure—An architecture that allows for the development of mobile social cloud apps for the private cloud of the enterprise.

Archive (verb)—Systematic transfer to alternate storage media of digital data of continuing value that is no longer required to be immediately accessible. Often stored on Computer Output to Laser Disk (COLD) systems.

Archives (noun)—Records and digital assets that have been identified as being needed for future legal, evidentiary, or historical value. These are permanently preserved in the context of their creation as evidence of action, decision, and transaction. 'Archives' also refers to the department or institution entrusted with this task.

ARPANET (Advanced Research Projects Agency Network)—A group out of the US Department of Defense developed this early form of the Internet in 1969. It used TCP/IP as its primary networking protocol.

ASCII—A standard for the digital description of alphabets in a language using a single byte of memory in which a byte is composed of eight bits and a bit is a simple one or zero.

Asynchronous JavaScript and XML (AJAX)—The development of dynamic, interactive Web sites through communication between browsers and Web servers via XML.

Augmented Reality—Computer-generated sensory input such as sound, video, graphics, or GPS data augments elements of a live view of a physical, real-world environment. By adding elements like computer vision and object recognition to provide information about the surrounding real world of the user, the technology makes the world interactive and digitally manipulates it.

Avatars—Users create avatars or personalities of themselves for the purpose of a role in a call center, to play a game on the Wii, or as an attendee at a virtual conference. It's a digital personification of the user to increase personalization and allow users to play different roles within different contexts.

Back-mining—Part of the Semantic Web process that goes through old data looking for patterns.

Bandwidth—The volume of information per unit time that a computer, person, or transmission medium can handle.

Batch Processing—The process consists of the execution of a series of programs or jobs on a computer that require no manual intervention. The input data is all preselected and the computer runs the scripts or command-line parameters to process it and produce a set of output data files. The program collects the input data in batches of files and then processes the data in batches.

Big Data—Applies to the large data sets that exists in the public Internet, private Internet (behind the firewall), and repositories of data (also behind the firewall). The enterprise software data strives to capture, manage, process, and store these growing data sets.

Binary Synchronous Communications—These are the connections that carry data between dumb terminals and mainframes. This IBM link protocol was developed in 1967.

Blog (also Web Log)—A chronological and topic-oriented collection of entries posted on a Web page. Typically, blogs communicate an author's point of view and solicit feedback in the form of comments which can be posted with the blog.

Boolean Operators—Logical connectors used within advanced search software to obtain more relevant results.

Broadband—Relating to or being a communications network in which the bandwidth can be divided and shared by multiple simultaneous signals (as for voice or data or video).

Browser—See Internet browser.

Business Applications—Software programs used to solve business needs such as word processing, accounting, or customer relationship management.

Business Intelligence (BI)—A technology for analysis of information contained in structured data. It is the structured counter-part to content analytics.

Business Process Management (BPM)—Refers to aligning processes with an organization's strategic objectives, designing and implementing process-centric tools or architectures, and determining measurement systems for effective process management.

Calendaring—Collaboration software used to schedule time on an individual, team, or enterprise basis.

Canadian Digital Media Network (CDMN)—Established in April 2009, CDMN was created to stimulate job creation, commercialization, and global competitiveness across Canada. One of the founders of the national digital media conference, Canada 3.0, CDMN has established nodes in the form of development centers, acceleration centers, and commercialization hubs to connect businesses, entrepreneurs, research institutions, and governments.

Central Processing Unit (CPU)—The part of a computer that does most of the data processing. The CPU and the memory form the central part of a computer to which peripherals are attached.

Channel—A communication medium to output content. It could be via the Web, printed materials, video, CD-ROM, etc.

Chat (also Instant Messaging or IM)—Real-time instant messaging and other forms of chat within the context of an overall topic, Web site, or meeting space.

Client/Server—A system of sharing files and executing applications within a LAN or WAN.

Cloud Computing ("The Cloud")—A metaphor inspired by the cloud symbol used to represent the Internet in flow charts and diagrams, Cloud computing describes the disruptive transformation of IT toward a service-based economy, driven by economic, technological, and cultural conditions.

Collaboration Object Lookup Architecture—This software architecture allows users to collaboratively search, acquire, manage, and share information from several data sources using a single interface.

Collaboration Software—Programs that link processes and individuals across different locations and time zones to create an environment where team members work together to share ideas, experiences, and knowledge.

Collaborative Workspace (or "Conference")—A shared workspace in a connected environment where users can collaborate and work together even when separated by geography. Users can both store content in the workspace, as well as hold discussions.

Commenting—Adding online comments to social media to add value, including commenting on online documents, blogs, wikis, and more.

Community of Practice (CoP)—A self-organizing collection of people who collaborate and share resources to support work in a specific field. Organizations develop Communities of Practice to encourage and aid knowledge transfer and collaboration between employees, promoting productivity and fostering innovation through the act of sharing, refining. and distributing best practices.

Compliance—Adherence to a body of regulations, government legislation, or standards (for example, ISO 9000).

Composite Applications—Model-driven development environments that rely on graphical process modeling tools to support direct interpretation of the models into executable code. The technical concept can be compared to mashups, however, composite applications use business sources of information, while mashups typically rely on Web-based sources.

Conferencing—Real-time meetings between groups over the Web. In organizations, these meetings facilitate the exchange of information as if all the users were in one room together, such as collaboration around presentations or spreadsheets, on white boards, and shared screens.

Connectors—In database management, a link or pointer between two data structures.

Content Analytics—A technology for analysis of information contained in content. It allows customers to optimize user experience by dynamically serving up content based on automatically created content relevance.

Content Lifecycle Management (CLM)—The combination of document management, records management, workflow, archiving, and imaging into a fully integrated solution to effectively manage the lifecycle of content, from creation through to archiving and eventual deletion.

Content Management—Storage, maintenance, and retrieval of HTML and XML documents and all related elements. Content management systems may be built on top of a native XML database and typically provide publishing capabilities to export content not only to the Web site, but to CD-ROM and print.

Content Syndication (also Web Syndication)—A form of syndication which makes Web site content available to multiple sites, often in the form of Web feeds delivering summaries of recently added or updated content.

Contextaware Systems—These systems know where you are, sense what you are doing, and then adjust their behavior or recommendations based on the information. It refers to the idea that computers can both sense, and react based on their environment.

Contextual Information (Collaboration)—Smaller services/objects that can be embedded in business applications.

Contextual Searching—Contextual search goes beyond searching on file name or key fields. It looks at the data within documents and records and supplies results based on the context of content.

Control—A program module or routine that enhances program functionality. A control can be as small as a button on a user interface or as large as a complicated forecasting algorithm. The term is often used with regard to user interface functions such as buttons, menus, and dialog boxes.

Converters—An application that converts data from one code to another.

Cross-Platform—Refers to developing for and/or running on more than one type of hardware platform. It implies two different processes. The first is programming source code that is compiled into different machine environments, each of which has to be supported separately. The second method is with the use of an interpreter such as the Java Virtual Machine.

Customer Relationship Management (CRM)—Enterprise-wide software applications that allow companies to manage every aspect of their relationship with customers. The goal of these systems is to assist in building lasting customer relationships and to turn customer satisfaction into customer loyalty.

DAM—See Media Management.

Data Archiving—Data archiving offloads historic data from the online database and archives it for future access on a secure media.

Database—A collection of data arranged for ease and speed of search and retrieval.

Database Management Systems—Software packages that control the creation, maintenance, and use of a database.

Data Capture—A method of data input that requires no data entry. Specific devices are designed to capture data such as barcode readers or magnetic stripe readers (like on a credit card).

Data Center (also called Server Farm)—A collection of computer servers usually maintained by an enterprise to accomplish server needs far beyond the capability of one machine. Server farms often have backup servers, which can take over the function of primary servers in the event of a primary server failure.

Data Warehouse—A database designed to support decision making in an organization. Data from the production databases are copied to the data warehouse so that queries and analysis can be performed without disturbing the performance or the stability of the production systems.

Desktop—The area of the monitor screen in a graphical user interface (GUI) against which icons and windows used to run applications appear.

Digital Asset—Describes any subdivision or collection of content and metadata that holds value to the owner. Digital assets may include photos, video, audio, Web pages, text documents, Microsoft® PowerPoints, or graphics.

Digital Asset Management (DAM)—See Media Management.

Digital Economy—An economy based on goods and services produced through Web technologies, digital media technologies, and other electronic business processes.

Digital Experience Management (DEM)—Using tools such as widgets to embed digital media, DEM presents significant content distribution opportunities for organizations outside the enterprise, as well as enabling emerging social collaboration tools within the enterprise.

Digital Media—The term encompasses a wide variety of content types—photos, graphics, audio files, video clips, Flash® animations, PDFs, PowerPoint files, and design layouts.

Disposition—Final deletion of content when it reaches the end of its lifecycle.

Disruptive Innovation or Technology— Used in business and technology, a disruptive technology or disruptive innovation is an innovation that creates a new market and value network, and eventually disrupts an existing market to displace an earlier technology there.

Document—A piece of work created with an application, such as by word processor. A computer file that is not an executable file and contains data for use by applications.

Document Management (DM)—Involves the capture and management of documents within an organization. The term traditionally implied the management of documents after they were scanned into the computer. Today, the term has become an umbrella under which document imaging, workflow and information retrieval fall.

Document Repository—A database that includes author, data elements, inputs, processes, outputs, and interrelationships.

DS1 (Digital Signal 1)—Devised by Bell Labs, this T-carrier signaling scheme is a widely used telecommunications standard in North America and Japan. It is capable of transmitting both voice and data between devices.

Dumb terminal—Displays information, but does not run any applications or process data—that is all done on the mainframe connected to the dumb terminal. Also called a green screen.

ECM—See Enterprise Content Management.

ECM 2.0—Managing content from Web 2.0 social networks.

ECM Applications—Applications usually tailored to address line-of-business problems or customized for specific vertical markets.

Electronic Digital Management System—In order to manage digital documents, systems created to allow users on a network to view, markup, and edit documents.

Email—One of the first and most popular uses for the Internet, email (electronic mail) is the exchange of computer-stored messages by telecommunication.

Email Management—The application of content lifecycle management to emails to manage the creation, archiving, storage, and disposition of email messages.

Enterprise 2.0 (E2.0)—The use of emergent social software platforms, such as social networking, blogs, wikis, and other Web 2.0 technologies within organizations, or between organizations and their partners or customers. Also called enterprise social software.

Enterprise 4.0—The evolution of technologies within the enterprise based on a Web operating system in which the large client/server-based legacy software applications written over a year and shipped to the customer are replaced by collective mobile apps based on custom code for broadly based solutions. These apps will be developed and maintained inside the private cloud and will require EAM, or Enterprise Application Management.

Enterprise Application—A computer program designed to perform specific functions, such as inventory control, accounting, payroll, material management, etc.

Enterprise Application Management (EAM)—As IT departments increasingly develop and maintain a variety of very personalized apps unique to each organization, EAM describes the management of a new set of tools that will be required to manage content inside the firewall within the Web operating system environment.

Enterprise App Store—The enterprise equivalent to the Apple App Store® as a distribution platform, only maintained behind the firewall (or in a private Cloud).

Enterprise Content Management (ECM)—Systems that capture, store, retrieve, print, and disseminate digital content for use by the enterprise. Digital content includes pictures/images, text, reports, video, audio, transactional data, catalog, and code.

Enterprise Information Management (EIM)—Enterprise Information Management can deliver a comprehensive software suite that encompasses the capture of information; the management of structure, unstructured, and application data; the exchange and presentation of information on both sides of the firewall; intelligent business processes and solutions; information applications that parallel ERP data and process; enterprise information architecture that enables enterprise applications as well as mobile, social, and Cloud; and Business Intelligence and analytics.

Enterprise Repository—Think of this as the enterprise library—it is a location for storage, often for safety or preservation within the enterprise. It is a trusted source of content which can be searched and retrieved.

Enterprise Resource Planning (ERP)—Any software system designed to support and automate the business processes of medium and large businesses. This may include manufacturing, distribution, personnel, project management, payroll, and financials. ERP systems are accounting-oriented information systems for identifying and planning the enterprise-wide resources needed to take, make, distribute, and account for customer orders.

Entity Extraction—An entity extractor locates and extracts places, people, organizations, and more. Controlled vocabularies and linguistic rules are used to identify and extract all occurrences of an entity type. Entity types can include product names, company names, proper names, geographic locations, dates, times, and more.

Ethernet—Commercially introduced in 1980, Ethernet is a family of computer networking technologies for local area networks (LANs).

Extensible Markup Language (XML)—An initiative from the World Wide Web Consortium defining an "extremely simple" dialect of SGML suitable for use on the World Wide Web. See also HTML and SGML.

Extranet—An IP network providing secure connections between remote users and a main site, or among multiple sites within the same company, including connectivity to business partners, customers, and suppliers.

Faceted Search—By applying multiple filters, a faceted search does not follow a hierarchal structure only.

Firewall—A firewall is a part of a computer system or network that is designed to block unauthorized access while permitting authorized communications.

Federated Search—The simultaneous search of multiple online databases or Web resources, federated search is an emerging feature of Web-based library and information retrieval systems.

Forums—Online discussion forums in which users post "articles" to forums organized around a topic, typically in question and answer format resembling an offline discussion.

Full-Text Retrieval—Software that allows users to search the entire text portion of digital information and retrieves files that match the user's search criteria. Document-retrieval systems store entire documents, which are usually retrieved by title or by keywords associated with the document. In some systems, the text of documents is stored as data. This permits full text searching, enabling retrieval on the basis of any words in the document.

G8—An annual summit meeting of the heads of government for the Group of Eight for the world's major economies—Canada, France, Germany, Italy, Japan, Russia, UK, USA, and European Union. Created by France in 1975, the G8 nations comprise of 53 percent of global nominal GDP. Each year, the conference is hosted by a different member state; in 2010 it was held in Huntsville, Ontario.

G20—A semi-annual summit meeting of finance ministers and central bank governors from 20 major economies. Former Canadian Finance Minister proposed the G20 in 2008. These countries account for more than 80 percent of gross national product, 80 percent of world trade, and two-thirds of the world population.

Geolocation—Associates a geographic location with an IP address, GPS coordinates, Wi-Fi connection location or other computer or chip identification like a MAC address or RFID tag. Data can include country, region, city, postal/zip code, latitude, longitude, and time zone.

Gigabyte (GB)—The gigabyte is a multiple of the unit byte for digital information storage. One gigabyte is 1,000 MB or one thousand million bytes. The unit symbol for the gigabyte is GB or Gbyte.

GPS or Global Positioning System—A satellite-based navigation system maintained by the US government that provides location and time information anywhere on the Earth, which is freely accessible by anyone with a GPS receiver.

Graphical User Interface (GUI)—A type of user interface that allows people to interact with programs in more ways than typing such as computers; hand-held devices such as MP3 Players, Portable Media Players or Gaming devices; household appliances, and office equipment with images rather than text commands.

Heat Maps—Graphical representations of how elements in an area of space are viewed or read. For a Web page, a heat map shows where a user is mostly likely to look on the page.

Hidden Web (also called Deepnet, Deep Web, or the Invisible Web)—Refers to World Wide Web content that is not part of the surface Web, which is indexed by standard search engines.

Hosting—Maintaining a computer system and its applications at a third-party site.

Hypertext Markup Language (HTML)—A structured document format in which elements (commonly referred to as "tags") are embedded in the text. Tags are used for presentation formatting to delimit text which is to appear in a special place or style. HTML is an extension of SGML.

Hypertext Transfer Protocol—The networking protocol that serves as the foundation of data communication for the World Wide Web.

Immersive Technology—Immerses a user into a digital or simulated world by blurring the lines between the digital world and the real world. Most often seen in gaming, military training, and flight simulation, but can also extend to virtual worlds like Second Life.

Index—In data management, the most common method for keeping track of data on a disk. Indexes are directory listings maintained by the operating system, RDBMS, or the application. An index of files contains an entry for each file name and the location of the file. An index of records has an entry for each key field (for example, account number, or name) and the location of the record.

Information Governance—The set of multi-disciplinary structures, policies, procedures, processes, and controls implemented to manage information on all media in such a way that it supports the enterprise's immediate and long-term regulatory, legal, risk, environmental, and operational requirements.

Instant Messaging (IM)—See Chat.

Integrated Development Environment (IDE)—A software application consisting of a source code editor, compiler and/or an interpreter, build automation tools, and a debugger for computer programmers.

Internet—An interconnected system of networks that connects computers around the world via the TCP/IP protocol.

Internet Browser—The program that serves as the client front end to the World Wide Web.

Internet Service Providers (ISP)—A company that provides access to the Internet.

Intranet—An "internal Internet" configured behind a firewall to connect individuals and departments. A privately maintained computer network that can be accessed only by authorized persons, especially members or employees of the organization that owns it.

IP address—An Internet Protocol (IP) address is a numerical label that is assigned to devices participating in a computer network utilizing the Internet Protocol for communication between its nodes.

ISDN—A set of communications standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the telephone network.

Java—A programming language that originated at Sun Microsystems (has merged into Oracle®) with the purpose of allowing application developers "write once, run anywhere". It is currently one of the most popular programming languages in use for client/server web applications.

Keyword—A term used as a keyword to retrieve documents in an information system such as a catalog or a search engine.

Knowledge Management (KM)—An umbrella term for making more efficient use of the human knowledge that exists within an organization. The major focus is to identify and gather content from documents, reports, and other sources and to be able to search that content for meaningful relationships. Knowledge Management also concerns the ability to identify high-value individuals within an organization.

Knowledge Worker—One who works primarily with information or one who develops and uses knowledge in the workplace.

LAN—Local Area Networks connect computers within a limited area like an office building, computer lab, school, or home.

Learning Management Systems—A software application to administer, document, track, and report training programs, classroom, and online events, e-learning programs, and the associated content.

Mainframes—Computers used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, enterprise resource planning (ERP), and financial transaction processing.

Mashups—A Web page or application that combines data or functionality from two or more external sources to create a new service.

Media Management (also known as Digital Asset Management, Brand Asset Management or Media Asset Management)—Media Management consists of the ingestion, storage, management, retrieval, production, and distribution of digital assets.

Metadata—Sometimes known as data about the data, metadata describes and provides context for content.

Meta-search—Allows users to enter search criteria once but access several search engines at the same time and create a single list of results or display the results according to their sources.

Micro-blogging—Blog posts with a limited character set to keep messages short. An example of micro-blogs are "tweets".

Microprocessor—See Central Processing Unit.

Mobile App—Mobile apps, also called mobile applications, are software applications that run on smartphones and tablet computers. Mobile apps are discreet programs designed to solve a specific purpose with a tether to back-office servers or new types of ultra availability via "app content servers". They are designed to perform at the touch of a smart screen, enabling users to do things that begin to exceed what is possible with a conventional PC connected to the Internet.

Mobile Device—Includes personal digital assistants, smartphones, and tablet computers. A mobile device is a small hand-held computing device typically operated with a touch screen or miniature keyboard.

Mobile ECM—Secure access to ECM technologies and functionality via a mobile device.

Mobile Professional—One who works primarily out of the office or travels often away from the workplace.

Multimedia—Integration of text, voice, video, images, or some combination of these types of information. Also called Rich Media.

Multiplatform—Refers to a software application that's developed to run on different operating systems.

Multiprotocol—Refers to applications developed to run across different networking protocols.

Online—Connected to or accessible via a computer or computer network. Typically refers to being connected to the Internet or other remote service.

Online Community—A virtual community that exists online whose members form relationships, establish trust, and exchange knowledge. Online communities combine social software functionality, including text-based chat rooms and forums that use voice, video text, or avatars.

Online Discussion Forums—See Forums.

Open Source Software (OSS)—Computer software for which the source code and certain other rights normally reserved for copyright holders are provided under a software license that meets the Open Source Definition or that is in the public domain.

Operating System—A computer's master control program that manages its internal functions controls its operation. An operating system provides commonly used functions and a uniform, consistent means for all software applications to access the computer's resources. Windows® and UNIX® are operating systems.

Optical Character Recognition (OCR)—Recognition of printed or written characters by computer. Each page of text is converted to a digital image using a scanner and OCR is then applied to the image to produce a text file.

OSS—See Open Source Software.

Permissions—Management of who can access a computer or network. The Access Control List (ACL) is the set of data associated with a file, directory, or other resource that defines the permissions that users, groups, processes, or devices have for accessing it.

Personal Computer (PC)—A computer built around a microprocessor for use by an individual, as in an office, home, or school.

Platform—The term originally concerned only CPU or computer hardware, but it also refers to software-only environments. A messaging or groupware platform implies one or more programming interfaces that email, calendaring, and other client programs are written to in order to communicate with the services provided by the server.

Podcast—A series of digital media audio or video files that are released episodically and downloaded through Web syndication.

Portal—Within the enterprise, software that provides access via a Web browser into all of an organization's information assets and applications. Portals provide a variety of services including Web searching, news, white and yellow pages directories, free email, discussion groups, online shopping, and links to other sites.

Portlets—Pluggable software components that are managed and displayed in a Web portal. Portlets produce fragments of markup code that are aggregated into a portal page.

Plug-in—A computer program that interfaces with a host application.

Process Management—The automation of business processes using a rule-based expert system that invokes the appropriate tools and supplies necessary information, checklists, examples, and status reports to the user.

QWERTY—The most used modern-day keyboard layout on English-language computer and typewriter keyboards.

RAM—Random Access Memory is a form of computer data storage. When there is no power provided, any data saved in RAM is lost.

RAS—Refers to reliability, availability, and serviceability. This is a defining characteristic of a mainframe computer to describe its robustness. Reliability refers to the computer's ability to detect and report faults. Availability refers to the amount of time the computer is operating without downtime. Serviceability describes how easily it is to diagnose the system when a problem arises.

Real-Time Collaboration—Tools that let people to collaborate simultaneously. The primary data collaboration tools are electronic whiteboards, which are shared chalkboards and application sharing, which lets remote users work in the same application together. Some form of human communication is also necessary, so text chat, audio, or videoconferencing is often part of the total system.

Really Simple Syndication (RSS)—RSS feeds deliver aggregated and syndicated Web content to Web-based or desktop clients called "readers." RSS readers inform users when Web sites, blogs, wikis, or news sources get updated.

Records Management (RM)—Refers to the creation, retention, and scheduled destruction of an organization's paper and film documents. Email and computer-generated content also fall into the RM domain.

Redundancy—The duplication of critical components of a system with the intention of increasing reliability of the system, usually in the case of a backup or fail-safe.

Relational Database—A database in which all the data and relations between them are organized in tables. A relational database allows the definition of data structures, storage and retrieval operations, and integrity constraints.

Reporting—Metrics-focused analysis of user behavior (unlike Web analytics which is experience-driven).

Rich Content or Media—See Digital Media.

Rights and Permissions—Identifies the circumstances under which a particular asset may be used. For instance, indicates who legally owns the asset, in what mediums it may be used (Web, print, TV) and the financial liabilities incurred to include the asset.

ROM—Read Only Memory is a type of media storage for computers and other electronic devices that can't be modified, or can be modified slowly and with difficulty. It is a non-volatile memory type which means that the data remains stored even without a power source.

RSS Feeds—A format of XML that is intended to share information in a condensed format (such as a title, description, and link to a new article). RSS feeds are good for syndication.

Scalability—Ability to reach high-performance levels.

Search—A technology focused on user-driven information retrieval based on statistical occurrence of search keywords in text-based content.

Secure Socket Layer (SSL)—A protocol that encrypts information over the Internet. Many payment Web sites use SSL to protect users' personal information.

Semantic Web—See Web 3.0.

Semantics—A term used often in the context of the Semantic Web which typically refers to RDF-based modeling of online user experience. In the context of content analytics, the term semantics is sometimes used to refer to the connotation of information contained in content or what is the information about.

Semantic Search—Searches data beyond just word recognition but seeks to understand the intent of the user and the contextual meaning of words as it searches.

Sentiment Analysis—Sentiment analysis detects the tones in content, identifying and displaying opinions that are expressed in clusters of sentences, phrases, or entities.

Server—A server computer, sometimes called an enterprise server, is a computer system that provides essential services across a network, to private users inside a large organization or to public users in the Internet. Enterprise servers are known to be very fault tolerant, for even a short-term failure can cost more than purchasing and installing the system.

SGML—See Standard Generalized Markup Language.

Short Message Service (SMS)—Text messaging sent using this service, which allows a short alphanumeric message (160 alphanumeric characters) to be sent for display on a mobile or cell phone.

Single Sign-on—Allows a user to log in to a system once yet access all the related systems without being prompted to log in to each one.

Smartphone—A mobile phone that offers advanced, PC-like functionality such as email, Internet access, calendaring, and viewing capabilities, along with a built-in full keyboard or external USB keyboard and VGA connector.

Social Bookmarking (also Social Tagging)—A way for Internet users to share, organize, search, and manage bookmarks of Web pages of interest. Tags and descriptions can be added to these pages to make them easier to find. Popular examples include Delicious.com and StumbleUpon.com.

Social Media—Media designed to be disseminated through social interaction, created using highly accessible and scalable publishing techniques. Social media uses Internet and Web-based technologies to transform broadcast media monologues (one-to-many) into social media dialogues (many-to-many).

Social Networks—Web sites that facilitate connections of people based on self-generated user profiles. Facebook.com and LinkedIn.com are examples of social networking sites.

Social Workplace—The social workplace uses Web 2.0 technologies to connect people with their peers and with critical content and information. Also referred to as Enterprise 2.0.

Social Software—Describes software programs that lets users leverage the Internet to interact, collaborate, and communicate. Examples include social sites like Facebook®, Flickr®, and YouTube®, along with ecommerce sites Amazon.com and eBay®. The terms Enterprise 2.0 (E2.0) and Web 2.0 are also used to describe this style of software inside the enterprise (for organizations) and outside of the enterprise (for individual consumers), respectively.

Social Tagging—See "Social Bookmarking".

Software—The programs, routines, and symbolic languages that control the functioning of a computer and direct its operation.

Software as a Service (SaaS)—This type of computing delivers a single application through the browser to a large number of customers using a multi-tenant architecture.

Structured Data—Data that resides in fixed fields within a record or file. Relational databases and spreadsheets are examples of structured data.

Tablet—A tablet computer, or tablet, is a mobile computer that is larger than a mobile phone or personal digital assistant (PDA) but smaller than a laptop, with a flat screen that is operated through touch and an onscreen virtual keyboard.

Tag Clouds—A tag cloud is a visual depiction of user-generated tags.

Tagged Image File Format (TIFF)—A file format for storing images, including photographs and line art.

Tagging—Enables users to assign keywords to content such as blogs, documents, forums, and video files without following predefined terms.

Taxonomies—The classification of data into groups or categories.

TCP/IP or Transmission Control Protocol/Internet Protocol—The basic communication language or protocol of the Internet.

Telnet Protocol—A network protocol used on the Internet or LANs that provides an interactive text-oriented communication in both directions using a virtual terminal connection.

Terabyte (TB)—A unit of computer memory or data storage capacity equal to one trillion bytes or 1,000 gigabytes (GB).

Text Analytics—Sometimes referred to as text data mining or text mining, text analytics as a subset of Content Analytics refers to a set of technologies for analysis of information contained in text-based content assets.

Thumbnail—A low-resolution small size rendition of an image asset; or, small size textual rendition of a text asset.

Touch Screen—A visual display that can detect the presence and location of a touch within the display area.

Transaction—Synonymous with a specific business application, such as order entry, invoice information capture, etc. To create, change, or display business information in an enterprise application, users have to call certain transactions in the system. **See also**—Transactional Data.

Transactional Data—Orders, purchases, changes, additions, and deletions are typical business transactions stored in the computer. Transactions update one or more master files and serve as both an audit trail and history for future analyses. Ad hoc queries are also a type of transaction but are usually not saved.

Tweet—See Micro-blogging.

Twisted pair cable—A type of wiring that twists together two conductors to cancel out electromagnetic interference that was invented by Alexander Graham Bell. This is used for telephone line networks.

Unstructured Data—Data that does not reside in fixed locations. Free-form text in a word processing document is a typical example.

User-Generated Content (UGC)—Refers to different types of content or digital media produced by end-users and made publicly available. Also known as consumer-generated media (CGM) or user-created content (UCC).

User Interface (UI)—A user interface is the system people use to interact with a computer or other device. Typically, a system may expose several user interfaces to serve different kinds of users.

User Profiles—A collection of personal data associated to a specific user typically within an online community or corporate intranet. Profiles often contain a picture, relevant personal and professional information including knowledge, skills, abilities, department, projects, roles, other contacts and links.

Video—The technology of electronically capturing, recording, processing, storing, transmitting, and reconstructing a sequence of still images representing scenes in motion.

Virtualization—An umbrella term that describes software technologies that improve portability, manageability, and compatibility of applications by encapsulating them from the underlying operating system on which they are executed.

Virtual Private Networks (VPNs)—Allows remote users of a network to access a central organizational network and its data through an authentication process like a login.

Virtual Project (Workgroup)—A group of individuals who work on a common project via technologies such as email, shared databases, threaded discussions, and calendaring. Virtual workgroups are mandated by company policy and employment requirements.

Virtual Meeting—A meeting between users that does not require them to be in one geographic location. This can include the ability to share computer screens, audio, and video.

Virtual Reality or Virtual Worlds—Computer-based simulated environments or communities (such as Second Life®), where users can interact with one another and objects in the environment. Also called "immersion" or interactive 3-D virtual environments, where the users take the form of avatars for graphical display to others.

WAN—A wide area network (WAN) is a computer network that covers a broad area (i.e., any network whose communications links cross metropolitan, regional, or national boundaries).

Web—A shorthand way to refer to the World Wide Web and possibly its complementing technologies. For example, a Web authoring tool might be used to create documents that contain HyperText Markup Language (HTML).

Web 1.0—Began with the release of the WWW to the public in 1991, and is the general term that has been created to describe the Web before the Web 2.0 phenomenon.

Web 2.0—Refers to Web-based applications that enable new and emergent ways of searching, presenting and consuming information using the Internet. Web 2.0 is characterized by predominantly by technologies that use the Web as a platform for collaboration and communications. The term also covers applications that are participatory in nature, lightweight, and easy to deploy (APIs and mashups, for example) and are available online as a service.

Web 3.0 (also the Semantic Web)—The phase of Web application development directly following Web 2.0, which includes the ability for programs and systems to "understand" the meaning of content and services, to deliver highly personalized and relevant content and services to end users and computers. These highly personalized services will be accessible using ubiquitous connections and powerful mobile devices, including the Blackberry®, iPhone®, and Android®.

Web 4.0—Web 4.0 achieves a critical mass of participation in online networks that deliver global transparency, governance, distribution, participation, and collaboration. Fundamental to this era is a reliance on the Web as an operating system, which, when combined with mobility and cloud computing, it moves the Internet a step closer to becoming the foundation of McLuhan's "Digiverse" as a massive web of digital information and collective intelligence.

Web Analytics—A technology for user behavior analysis (click-stream analysis). It allows customers to generate reports on user behavior on the site and to optimize user experience by dynamically serving up relevant content based on metadata (=recommendations).

Web Browser—See Internet browser.

Weblog—See Blog.

Web Content—The content featured as part of the user experience on Web sites, including text, video, images, sounds, and animations.

Web Content Management (WCM)—Systems designed to drive Web sites by separating content from presentation and providing the following capabilities—capacity planning, site design/layout, look/feel navigation, content development, production, delivery, session tracking, and site evolution.

Web Editor—An HTML editor is a software application for creating Web pages. Although the HTML markup of a Web page can be written with any text editor, specialized HTML editors can offer convenience and added functionality.

Web Engagement Management (WEM)—The evolution of WCM from static pages of Web content into interactive discussions based on social networks using blogs, wikis, and other tools that encourage a two-way communication**.**

Web Operating System—The Web as an operating system is the new architecture of applications, replacing the old way of installing a single client application onto a computer with the remote download of a mobile app from a Web-based distribution platform.

Web Services—Web Services refer to the Web-based provision of services via open interfaces. This enables the integration of "third-party" applications with a Web site, giving rise to new sites or mashups.

Web Site—A collection of related Web pages with supporting images, videos, or other digital assets that share a common domain name or IP address in an Internet Protocol-based network.

Widget—Highly portable Web applications which allow non-technical users to add dynamic content or functionality to Web pages. User-friendly Web sites are increasing their use of widgets to simplify and enhance the Internet user's experience.

Wi-Fi—A very high bandwidth connection. A Wi-Fi-enabled device such as a personal computer, video game console, mobile phone, MP3 player, or PDA can connect to the Internet within range of a wireless network connected to the Internet.

Wiki—A collection of articles that can be entered, edited, linked, and expanded by any authorized user. Wikis facilitate the open sharing of knowledge on a designated Web page.

Workflow—Using applications and technology to automate the execution of each phase in a business process.

World Wide Web (WWW)—An HTML-based Internet system developed at the European Center for Nuclear Research (CERN) in Geneva. Also relates to the complete set of documents residing on all Internet servers that use the HTTP protocol. The Web is accessible to users via a simple point-and-click system.

WORM (Write Once, Read Many)—Data storage technology that allows data to be written to a disk a single time without it being erasable. Because it is not rewritable it has been an archiving technology used by the enterprise. Optic media is a form of WORM.

WYSIWYG (What You See Is What You Get)—Describes the presentation of content that appears very similar during edits and output.

XML—See Extensible Markup Language.

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