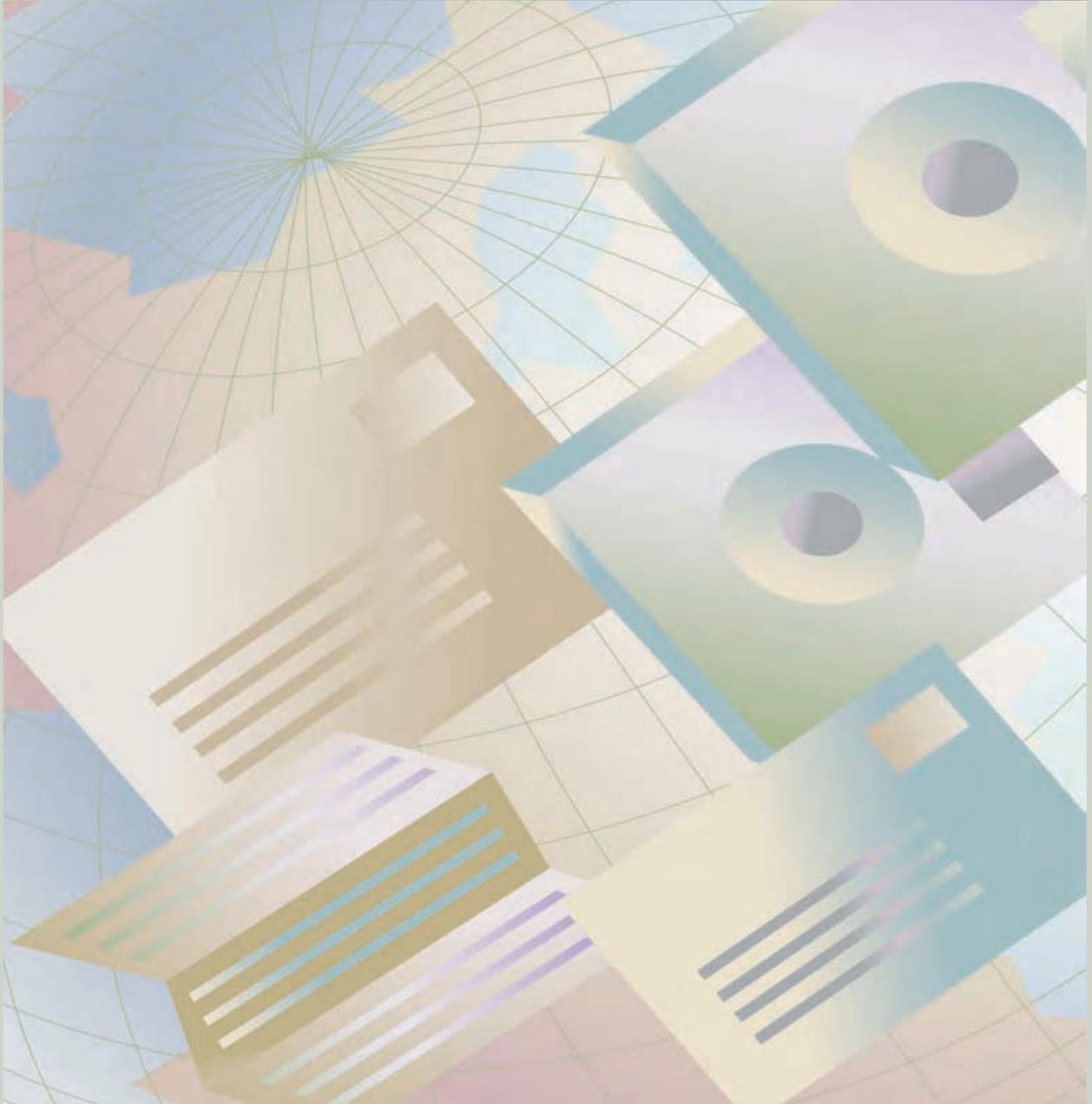


Managing information and documents

Produced by Cimtech



The definitive guide – 18th Edition



Document management • Records management • Content management
Document and data capture • Workflow management • Services

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Managing information and documents

The definitive guide

18th Edition

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Welcome to the 18th edition of Cimtech's guide and directory: *Managing information and documents: The definitive guide*

Cimtech has been publishing a guide and directory to the document, content and records management industry for the last eighteen years.

Printed copies of *Managing information and documents: The definitive guide* are distributed free of charge to readers of Infoconomy and Cimtech publications, and to members of AIIM Europe. At the same time there will be free online access to the electronic version of the guide and directory via the Cimtech and Infoconomy websites and the www.doconsite.co.uk website of the guide itself.

The contents cover the range of products and services available to help organisations manage their corporate information and business processes more effectively. Corporate information management covers the whole spectrum of corporate information, including structured, semi-structured and unstructured information. Relational databases are still the engine of choice for managing structured data, but there is an ever-growing range of options available for managing semi-structured and unstructured data.

This guide is designed to help you plan your unstructured and semi-structured information management requirements. It will help you find your way through the hype and the acronyms, and will present you with points to consider before specifying and procuring one or more systems. You can then use the relevant sections of the directory to draw up a shortlist of suitable suppliers. For those who have already implemented a system, the guide also provides a valuable update of developments in this fast-moving field.

Over the years Cimtech has responded to industry developments by changing the scope and coverage of this publication. Cimtech is now using the term enterprise content management (ECM) to describe an overall integrated solution designed to manage all the core unstructured and semi-structured information within an organisation and to provide the vital collaboration software needed to help individuals, teams and organisations to work together effectively to achieve their goals.

Such a solution needs to be capable of integrating and supporting a wide range of content management and collaborative functions. These include traditional document and data capture, and document management, records management, content management, web content management (WCM), knowledge management and digital asset management. The collaborative functions include messaging, instant messaging, scheduling and meeting support, content sharing, web conferencing, online meetings, business process management and electronic forms.

Many suppliers claim to provide full ECM solutions. Some come from the traditional document management field, others from the WCM field. The only way organisations can be sure of obtaining all the functions they need is to specify them in a detailed requirements document and agree with the preferred supplier whether they are to be delivered single source or via a consortium.

We recently expanded Section A of the directory to cover systems that provide document, content, web content, records and knowledge management facilities and all the collaborative facilities. Systems that support a subset of these functions are also identified in the section. We then provide separate sections for specialist suppliers of document capture subsystems, workflow management or business process management software, micrographic systems, paper and film scanners, bureau services, off-site storage facilities and consultancy services.

1.1 The introductory guide

■ *Chapter 1* outlines the contents of the guide and includes introductions to Cimtech, AIIM Europe and *Information Age*.

■ *Chapter 2* provides a historical guide to how we came from a totally paper world to the era of enterprise content management in just thirty years. It looks at how IT has developed to the point where ECM can be supported and highlights the vital role of developments in operating software, architectures, database engines, networking, storage subsystems and key peripherals including scanners, printers, multifunction devices and a whole range of digital capture devices.

■ *Chapter 3* is a guide to all the components that make up an enterprise content management solution. This provides an ideal starting point from which you can draw up an ECM shopping list.

■ *Chapter 4* provides guidance on how to prepare for an ECM implementation by developing a corporate approach to information and records management. It provides a brief introduction to the wide range of legislation, regulations, international and national standards and guidance notes that today represent best practice in information and records management. Compliance is a major driver today in both the public and private sector. Whether you are governed by legislation or simply seeking good advice this chapter will shine a light on the guidance that is available and point you to where you can get further information and copies of the relevant documentation.

■ *Chapter 5* outlines a recommended methodology for managing the preparation for and the specification, procurement and implementation of your own ECM solution, or whatever subset of ECM makes best sense for you at the present time. It includes a step-by-step guide to improving your records management policies and procedures as well as the implementation of your system.

■ *Chapter 6* expands one element of the methodology presented in chapter five and describes how you can make the all-important business case for investing in your preferred solution.

■ *Chapter 7* reviews the approaches that organisations are taking to adopting ECM solutions. It includes a series of case studies.

■ *Chapter 8* contains a review of developments in 2006 which was a busy year for enterprise content management.

■ *Chapter 9* provides a preview of forthcoming events for 2007.

1.2 Classified Directory

The directory provides a comprehensive, classified listing of all systems, software, services and specialist hardware.

There are nine consolidated directory sections. Each one covers a specific category of products or services and is designed to help organisations draw up a shortlist of suppliers capable of meeting their requirements. After reading the guide, you should be able to start making choices about the type of software and services you need.

A. Electronic document, content, web content, records and knowledge management systems

Developers, publishers and main distributors of electronic document, records, content, web content and knowledge management software, including ECM solutions designed to manage the full range of electronic content. Each listing includes the product name, the system architecture, the range of services provided, a description of the product and the applications targeted.

B. Document and data capture subsystems

Developers, publishers and main distributors in the UK of systems and subsystems for scanning and digitising content held on paper, microfilm or electronic forms. Such software is designed to be integrated with the systems described in Section A so the captured content and attribute data can be loaded into the systems. Each listing includes the product name, the output options, a description of the product and the recognition, indexing and forms processing facilities provided.

C. Workflow management software

Developers, publishers and main distributors of workflow or business process management software who sell direct to end users or to developers and integrators. Such software can be interfaced with the systems listed in Section A. Each listing includes the product name, the range of services provided, the system architecture, the published software pricing policy, the targeted markets and a product description.

D. Resellers/distributors and system integrators

Resellers and system integrators who act for one or a small subset of the products listed in Sections A, B and C. They may specialise in supporting specific market sectors, e. g. local government or manufacturing. Having chosen the product, the next decision is selecting the most suitable reseller or integrator. This section should help you make that decision.

E. Micrographic equipment and systems

Manufacturers and suppliers of microfilm cameras for filming documents and computer output microfilm (COM) recorders for recording data output from computer systems directly to film. Also includes additional production and retrieval equipment including processors, duplicators, readers, reader-printers and digital workstations plus software for indexing and retrieving documents stored on microfilm.

F. Input and output devices

Manufacturers, suppliers and resellers of a range of devices for scanning all sizes and formats of paper and microform and for printing or plotting digital content back onto paper in a range of sizes. Includes multifunction devices.

G. Bureau services

Service bureaux that scan and digitise paper or microfilm documents or microfilm paper documents for customers. Also includes the full range of data entry bureaux. Listing includes details of the types of documents and data they can capture and additional facilities including indexing, recognition and format conversion. This section includes the results of a survey of charges covering scanning and microfilming services.

H. Off-site document storage services

Commercial companies that store paper files and computer media off-site at warehouses and stores and provide a management, retrieval and delivery service. Listing includes details of the services provided including indexing, storage and retrieval services.

I. Profiles of service bureaux

Descriptions and more details of the service bureaux listed in Sections G and H.

J. Independent consultants

Independent consultancy companies that provide a range of services including strategy studies, feasibility studies, compliance checks, security reviews, procurement services, records management services, project management and business process re-engineering services.

K. Product name index

A listing of product names and their suppliers. If you know the name of a product but not the supplier, then look here first.

L. Publications and associations

A list of magazines, reports, books, societies and associations serving the content management industry.

M. Glossary of document, records and content management terms

The most common acronyms and terms used in the document, records and content management business are listed and defined.

N. Supplier contact details

Once you have identified relevant suppliers in the directory, turn to this section for a comprehensive alphabetical listing of suppliers' names and contact information.

1.3 Who is Cimtech and How Can We Help You?

Cimtech Ltd is the UK's Centre for Information Management and Technology based at the University of Hertfordshire. We offer impartial, expert consultancy, information and advice on all aspects of corporate document, records and content management including full ECM implementations. We have been providing such a service for forty years and number among our members UK and European organisations in both the public and private sectors. Specialisms include assisting clients with all aspects of information and records management including information and records audits, production of corporate classification schemes, assistance with options reviews and feasibility studies for the range of ECM solutions, system specifications, procurement, client-side project management and full implementation support plus assistance with process modelling and business process management.

We have provided consultancy support to users on over 400 projects in the past three years, taking them through the information gathering and analysis stage, feasibility study and options review, on to the development of a records management strategy and a detailed statement of requirements, to the procurement and implementation of a system that meets their requirements. (See our website www.cimtech.co.uk for a list of clients).

As part of its work Cimtech needs access to up-to-date, comprehensive product information and hence we have built up a database and defined the product classifications and categories used in this publication. One of our services is to make such information available in this publication. It is supported and updated by surveys and news items in our online journal *Information Management & Technology (IM@T.Online)*.

Cimtech members can use our enquiry and consultancy services to receive more up-to-date information throughout the year.

Cimtech also provides a range of courses supporting our areas of expertise and runs an annual conference on ECM and ERM in the public sector with the support of The National Archives. The Cimtech website contains the latest information on the courses, publications and services that we offer.

Thank you for taking the time to read *Managing information and documents: The definitive guide*. We hope you find it valuable and the ideal reference book for the challenging world of enterprise content management. Your comments and suggestions for future editions would be gratefully received.

Tony Hendley
Managing Director, Cimtech Ltd

Roger Broadhurst
Directory Editor, Cimtech Ltd

1.4 ECM – The Last Enterprise Frontier

From its first adoption in the late 80s, document management has re-invented itself many times. As the core part of the enterprise content management umbrella, it is a growth area as organisations seek to take control of e-mails, web pages and electronic documents in a single system that is managed and compliant.

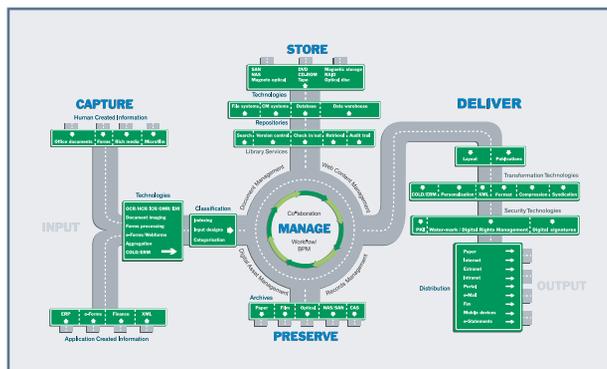
The term enterprise content management (ECM) was introduced by AIIM in 2001 in discussion with its members, who are the principle suppliers of document and information management software. It is defined as the "technologies, tools, and methods used to capture, manage, store, preserve, and deliver content across an enterprise". ECM technologies focus on the unstructured information that exists outside the confines of databases – such as e-mail, word processing documents, spreadsheets, digital images, and paper documents and forms. This type of information represents a majority of the information in most organisations, with some industry estimates placing it at 80 percent of all information created. At the most basic level, ECM tools facilitate the management of an organisation's unstructured information, wherever that information exists. At its highest level, ECM is a corporate strategy to improve content collaboration, compliance and continuity.

Strategic drivers

For many large organisations, ERP and CRM implementations are now largely complete. ECM holds the promise of achieving the same levels of control, central access, collaboration and reporting across the remaining disparate data within the enterprise. Efficiency savings from single-point storage and rapid access to all aspects of corporate content can be huge. It also enables business process flexibility for re-organisation and outsourcing, and it will underwrite continuity and disaster recovery plans. There is the added driver of legislative and regulatory compliance which has been brought into sharp focus with recent regulations. Traceable and accessible storage of all exchanges of e-mails, correspondence, staff records and contract agreements, along with a records management mechanism and lifecycle management policy, provide a tangible route to good corporate governance.

There is no single definition of what constitutes an ECM system but, to illustrate the connection between the different elements of ECM, AIIM has developed the ECM Roadmap to demonstrate the different concepts or components that need to be covered.

This roadmap indicates the technologies under the ECM umbrella rather than the structure of an idealised ECM system, but it does form a basis for understanding the contents presented throughout this guide, as well as providing a useful checklist for discussions with potential suppliers. It is also used as the basis of AIIM's ECM Certificate training programs.



ECM growth

Despite the attractions of wall-to-wall content management, green-field implementations of ECM in larger organisations are rare. Many companies invested in the first adoption phase of document management in the early 90s. For many paper-heavy

applications such as claims processing or delivery logistics, document management quickly became part of the system infrastructure defining those business processes. Other groups such as lawyers and engineers adopted the technology for its universal access and collaboration benefits. Meanwhile, improved recognition techniques drove many forms-processing applications.

Towards the late 90s, an ever-increasing volume of documents and related content was being generated electronically. The "content" term was picked up from the Internet, and particularly the intranet community, to describe any information of worth to the business – eg, spreadsheets, images, maps, design files, reports and, of course, e-mails. Much of this content was simply en-route for paper output prior to distribution and use, but a growing proportion would remain in electronic form for its whole lifecycle. We characterise this content as "unstructured data".

For obvious reasons many organisations sought to manage and store these electronic documents in a controlled and indexed manner. Those that already used document management systems for scanned documents could see the obvious benefits of storing both types within the same database. And equally obviously, the established vendors in the document management market could see a whole new growth area opening up for them.

Product developments

Over the last few years these suppliers have steadily built upon their core document management databases, adding capture modules, records management modules, invoice processing modules and lifecycle storage systems. Many of these product enhancements have been achieved through consolidation and acquisition amongst the leading industry vendors. As the compliance and collaboration implications of documents and e-mails have grown, the infrastructure giants, such as Microsoft, Oracle and SAP, have also entered the ECM frame.

So today we have the situation where ECM can be used as an umbrella term to cover a host of document processing, collaboration, search and content management technologies, with varying degrees of integration between them, but which have the potential to become a single store of enterprise-wide information. Equally, many large organisations already have multiple document repositories, frequently from different suppliers, and are seeking to provide integration and single-search capability.

ECM adoption

So we can see that the adoption curve of information and document management systems has experienced an unusually steady growth as the focus has moved from document capture in the early stages, through process improvement and customer service response in the mid-years to the company-wide information and records management focus of today.

The implication is that ECM has once more put document and information management onto the rising edge of the demand curve. If so, how are the early adopters getting on? According to analysts Ovum, most ECM implementations have actually been at departmental level. There are indeed very few truly enterprise systems at the fully operational stage. Many are still working through the roll-out programme. Within the AIIM community, 26% are

What is the most significant business driver behind your current interests?	Organization size		
	Large	Mid	Small
Improve efficiency	27%	27%	22%
Reduce costs	8%	9%	5%
Increased profits, better performance	10%	9%	16%
Better customer service	13%	15%	14%
Faster turnaround, improved response	9%	11%	21%
Leadership, competitive advantage	4%	5%	5%
Compliance	20%	15%	13%
Risk management/Business continuity	9%	9%	5%

working to link departmental systems across the enterprise, 27% have implemented departmental systems, whilst 46% are still in the planning or thinking stage. As we know from experience, implementation of any wall-to-wall system is fraught with issues relating to scalability, change-management, integration with other systems and the sheer scale of the implementation.

Having said that, the reasons for doing it are compelling. We are likely to reach a point where some form of ECM control will be deemed mandatory if companies are to be competitive and resilient, no matter what their size. Some content management functionality will be provided as part of the operating system infrastructure, and collaboration and search technologies will blur the boundaries of classic document indexing and control. However, as the price-per-seat falls, IT buyers from the larger companies – and then from the smaller ones – will take a considered view of the potential benefits, wrap ECM into their annual spending plans, and begin to make major investments across the enterprise.

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1.5 AIIM Europe

AIIM Europe AIIM is the international association for users and suppliers of enterprise content management (ECM) solutions – the strategies, services and technologies that capture, manage, store, preserve and deliver information in support of business processes.

AIIM is a not-for-profit organisation whose objective is to ensure that users and suppliers become better connected and have access to the knowledge, skills, advice and support necessary to successfully manage the challenges of information management. AIIM's main objectives are to provide:

- executive networking
- market education
- industry advocacy
- professional development.

Education, education, education

AIIM believes education is the key to helping organisations take control of their information. The AIIM Certificate Programme in ECM and ERM (Electronic Records Management) provides an internationally recognised qualification, improving both competence and confidence for project managers, process owners, records managers and IT staff. Courses can be taken at Practitioner, Specialist and Master levels. Launched in 2005, the AIIM Certificate Programme has already attracted over 2,000 participants.

AIIM also organises a series of webinars throughout the year, providing in-depth discussion of key ECM topics. These presentations can be accessed live over a web connection, or downloaded at any time after the event. See www.aiim.org.uk/webinars.

Professional membership

AIIM Professional Membership is for individuals in both the public and private sector. Benefits include a subscription to *EDOC* magazine, training discounts and access to AIIM educational resources. These enhance the knowledge of industry professionals, ensuring that they stay informed about technologies, building business relationships and laying the foundation of career advancement. For more information visit www.aiim.org.uk/membership.

Trade membership

Trade membership of AIIM helps suppliers to maximise their marketing budget, keep their employees up-to-date and publicise

their commitment to the ECM industry. Benefits include networking meetings, workshops, market research, event discounts and training opportunities. Only trade members are linked directly with AIIM's unique community in the UK, Ireland and overseas. Advisory Trade Members have a further level of opportunity to influence and discuss industry issues with their peers.

Market research

AIIM measures the uptake of ECM technologies, along with the drivers and barriers for adoption. AIIM surveys have raised concern about e-mail record-keeping, and indicated disparity in good practice between electronic records management and paper records management. The research results are available to all AIIM members and also form part of our market education programme through the press.

AIIM events

The annual AIIM Roadshow visits five UK cities in the Spring, with over 35 leading industry suppliers and an educational programme of keynotes, seminars and roundtable workshops. In the Autumn there is the Info Ireland event in Dublin, and AIIM supports the Documation show in London.

AIIM international

On an international level AIIM provides news, information and resources through its various publications, industry reports, white papers, user guides, website and blogs. Access the AIIM repository at www.aiim.org. AIIM on Demand in Boston is the major Spring ECM event in the US, with an extensive exhibition and conference.

For further information about any aspect of AIIM membership, events or educational programmes, please call 01905 727600 or e-mail angela@aiim.org.

1.6 Information Age

Information Age is the UK's leading IT-in-business magazine. It is for all executives involved in the application of technology for strategic, competitive advantage and improved efficiency. We help our audience become more confident and successful in their use of technology, in their choice of suppliers, products and services, and in their management of people and partners.

Information Age segments its coverage into three broad areas:

- **Technology** – examining both existing and emerging technologies, discussing origins and functions, the leading suppliers and the technical issues that may speed up or inhibit take-up.
- **Strategy** – describing how companies are, or should be, using technology products and services. Best practice, mistakes, implementation issues and the strengths, weaknesses and suitability of certain technologies for specific problems are all covered
- **Finance** – addressing two complementary aspects of finance. The financial prospects of suppliers, especially how M&As and other significant changes can affect a supplier's position. Secondly user-critical questions such as return on investment, billing methods and other related issues are examined.

Beyond its monthly print format, *Information Age* has spun out its successful formula into a range of different events and market research – both online and offline – including large-scale conferences, one-day seminars, private lunches, surveys, webinars, podcasts and email services.

Visit our website – www.information-age.com. You will be able to register for our renowned events, enter awards, participate in our surveys, and receive all the latest news, views and analysis from the *Information Age* team.

Step by step to enterprise content management

When talking to consultancy clients or lecturing on courses we are often asked four important sets of questions.

The first relate to definitions: what is meant by the many acronyms used in this industry? It is important, at the start of the guide, to establish a few working definitions that will be used throughout this guide. Other frequently used terms are defined in the glossary section. In Chapter 4 we point readers to where more formal sets of definitions can be found.

The second set are about the history of this industry – how have we arrived at the era of enterprise content management?

The third set relate to what sort of IT infrastructure is needed to support an ECM solution.

The fourth set relate to how an organisation should prepare for and successfully implement an ECM solution, who should own the project and what skills are needed.

These are important questions and we try to provide a concise answer to each of them in Sections 2.1 to 2.4, which comprise the bulk of this chapter, before going on in Chapter 3 to look in detail at the key components that make up an enterprise content management (ECM) solution.

2.1 Definitions

Data We like to work to a hierarchy so we start at the bottom with 'data'. Raw data includes the characters that make up text, the digits that make numbers, the pixels that together form a digital image, etc. On its own, and without context and structure, raw data is of limited value but it forms the base on which everything else is built. Computers process data.

Information The next big step in the hierarchy takes us to information and this can generally take one of three forms – structured information, semi-structured information and unstructured information (Fig. 2.1).

Structured information

Alphanumeric data in a relational database is structured in rows and tables. This structured information is at the heart of most of our core computer administration systems, or line-of-business (LOB) systems – our finance systems, human resource systems, enterprise resource planning (ERP) systems, etc.

Semi-structured information Documents created to a standard template such as committee minutes, standards and technical manuals are often referred to as semi-structured information.

Unstructured information Less-structured documents, such as correspondence and e-mails, and content objects such as images, recorded telephone conversations and video clips, are often referred to as unstructured information. All the information contained within the document is related and there is usually a start and an end but within those parameters there is very little additional structure.

Document A document is a container that holds a collection of data which, therefore, represents information. The information contained within the document may be structured, semi-structured or unstructured. The world of business and government is based around documents. Transaction documents record transactions of one sort or another and often, therefore, have a commercial and legal value. Reference documents have a knowledge management value and are published and referred to by professionals as a source of knowledge.

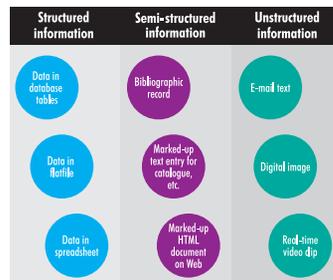
Content Documents can be simple or complex containers. They may simply contain a few lines of text or they may comprise thousands of pieces of text, tables, graphics, images, motion video sequences, audio sequences and other multimedia material. In computing, a complex document may comprise multiple files including graphics, text and image files. To differentiate between data at the lowest level and documents at the higher level the computer industry has coined the term 'content'. Content is used in at least two different ways in the computer industry. At the low level we have 'content objects' which comprise any form of computer file including graphic, audio and video files. Data can be processed and held as content or content objects in a content file and this content can be collected together to form a document. At a higher level content is also used as a generic term to mean the whole range of files held on modern computer systems including both content objects and documents. The use of 'content' in the term 'enterprise content management' is at the higher level to mean generically all content, i.e. documents and content objects.

Files The computer industry use files to hold collections of data typically created using one application – so text created on a word processing package is stored in a text file while image data created on an image processing application is held in an image file. The file suffix indicates the application used to create it. That is how we define 'files' in this guide. There is a potential confusion here with the paper filing world as here we tend to use the term file to mean a paper folder that holds multiple paper documents. To avoid this confusion in this guide we use the term folder to mean a digital or physical container that holds multiple documents and/or content objects. In the computer industry a folder will tend to contain multiple files. In the paper world a folder will tend to contain multiple documents.

Folder As described above, to enable us to work across the two worlds of data processing and paper filing we propose in this guide to follow the lead set by The National Archives⁽¹⁾ and use the term 'folder' to mean both a physical container such as a wallet or folder that is used to hold paper documents and as a digital container which is used to hold computer files which may comprise content objects or documents or both.

Record The next important term to define, and one of the most difficult to get full consensus on, is 'record'. Large organisations have had records managers for many years and there are growing professional records management societies in all developed countries across the world. Traditionally, a subset of the paper folders and documents held by organisations would be designated as records and a smaller subset as vital records. The criteria used to determine what was a record included legislation, regulations,

Fig 2.1
Information types

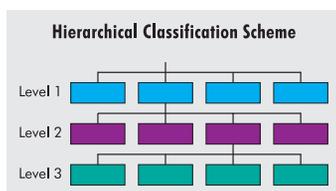


operational, historical and others. Put simply, some documents were regarded as ephemeral and hence did not need to be kept while others were deemed to be valuable and had to be kept as records for a fixed period of time. As data processing was widely used and databases were set up then the data contained in these databases were also reviewed and in most cases designated as records. An excellent definition of a record produced by The National Archives⁽²⁾ is as follows: 'A record is a specific piece of information produced or received in the initiation, conduct or completion of an institutional or individual activity. It comprises sufficient content, context and structure to provide evidence of the activity. It is not ephemeral – that is, it contains information that is worthy of preservation in the short, medium or long term'.

Metadata Metadata is the term used in the computer industry to describe data which is held and associated with files and folders to uniquely identify each content object, document or record and to provide information on its content, context, structure and use. The metadata is what is used to identify and retrieve the content, to organise it, control access to it and assure its integrity. If you are coming to this from the paper filing world then think of metadata as indexing data or finding aid data plus additional data used to control and manage the content.

Class Traditionally, when managing large collections of books or paper folders, librarians and records managers have used a classification scheme where they divide the world of knowledge, or the holdings of an organisation, into classes on a hierarchical basis with top level classes and second level classes and so on down to as many levels as are needed. In libraries, books were

catalogued or classified by being assigned to the right class. Classification is used today in enterprise content management and there are many different ways in which content and records can be classified (Fig. 2.2).



Publication A subset of documents will be published as publications. The distinction between a document and a publication is important when looking at ECM. Prior to electronic publishing you sent manuscripts to a printer who would typeset the content and create metal plates from which the required number of copies would be printed. This was time consuming but justified if large numbers of high quality copies were needed. With electronic publishing if you submit electronic text it will be marked up using a markup language and will then be rendered using a defined style sheet. Using the same marked up text and different style sheets the electronic publisher can publish the content on paper and via a range of digital channels. With the Internet we are publishing an increasing percentage of our documents so more of us are making use of markup languages and style sheets to ensure we can reuse our content and publish it across a wide range of channels.

2.2 A Brief History of Enterprise Content Management

2.2.1 The all-paper environment

One hundred years ago all the information which an organisation held – the corporate memory – would have been held on paper or in the brains of the employees. Data was recorded in tables in ledger books and documents comprised handwritten text on a range of sizes of paper.

When mainframe computers were first introduced after the second world war, some of the ledgers were replaced by temporary digital storage, but for safekeeping most computer data was also output to paper in the form of bulky computer printouts (Fig. 2.3).

2.2.2 Paper and microfilm

A photographic medium called microfilm had been in existence for many years in niche markets such as banks where cheques were regularly microfilmed. In the 1970s, alongside the rise of the computer, the use of microfilm



Fig 2.3
The all-paper environment

increased as a way of reducing the space occupied by inactive and archival paper records. Paper folders were used while documents were active but, when they became less active, the paper was microfilmed and held in a range of microfilm formats to save space and preserve them (Fig. 2.4). Large volumes of valuable reference documents were also microfilmed and duplicates made and sold as a low-cost form of publishing. There were roll microfilm formats including 16mm and 35mm and there were what were described as flat or unitised formats including microfiche, microfilm jackets and aperture cards.

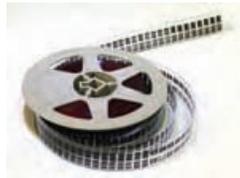


Fig 2.4
16mm roll microfilm was used extensively for business documents

Government departments, financial institutions and manufacturing companies all made use of microfilm with active folders held in paper format and closed files held on microfilm jackets or roll microfilm. Several suppliers also developed computer output microfilm (COM)

recorders which allowed computer data to be recorded directly onto microfilm at very high speed. The use of microfilm peaked in the 1980s and billions of documents were recorded onto this medium. Microfilm made a secure archive format and huge collections remain on microfilm today. However, it was never a very easy format to use and was not practical for the management of active documents. It survives today as an archive medium but on a relatively small scale.

2.2.3 Computers in the office

In the 1980s the entry level cost for computing came down considerably, and alongside shared mainframe and minicomputers we saw the introduction of personal computers in the office. Word processing became widespread with staff creating their own documents in electronic format. This was followed by spreadsheets and many other personal productivity applications.

To start with, these office computers were seen as a way of making us more productive at producing paper documents so paper remained the format of choice for holding master documents and records.

As Microsoft achieved dominance in the personal computer world with its Windows operating software and Office applications a level of de facto standardisation was achieved and demand grew from users who wanted to manage their electronic documents online. Users started to develop ad hoc hybrid records management solutions where internally generated electronic documents were held in electronic folders on shared or personal drives while incoming documents were held in paper folders in shared locations. The forward looking used the same set of metadata to index the paper and electronic folders so all the information held on a particular client or topic could readily be retrieved. So, as well as hybrid paper and microfilm records systems, we now had hybrid paper and electronic records.

Tools for managing structured data were developing throughout this period and by the 1990s they included relational database management systems, simple flat-file databases and spreadsheets. The choices related to the volume of data to be managed, the value of the data, the potential number of users of the data and the type of processes that need to be carried out.

Individuals and teams were starting to use spreadsheets and PC databases. Teams and departments were managing databases and specialised applications built on top of relational databases.

Fig 2.2
Hierarchical classification scheme

Government departments and large commercial organisations started to use computer systems to manage paper records. A computer database was used to hold the metadata needed to uniquely identify each folder and folder part, to track the location of folders as being in the registry or out on loan to users, and the status of folders as open or closed. Some of the suppliers of such records management or registry software have gone on to develop electronic records management and ECM solutions.

2.2.4 Document image processing (DIP)

In the 1980s we saw the next significant development on the route to ECM. Suppliers started to launch a range of scanners that could scan sheets of paper from A4 to A0 size and create digital images from them which could be stored, retrieved and viewed on a new range of high resolution PC screens supplied with digital image viewing software. When DIP systems were first introduced the typical IT infrastructure in offices was not powerful enough to support high volume solutions. Digital images created very large computer files and most organisations lacked the local area networks and, certainly, the wide area networks needed to transmit high volumes of such images to all the staff in an insurance company or a government office. In addition, the computer displays were expensive and needed to be supported by accelerator cards in standard PCs to provide the necessary processing power, e.g. to rotate an A4 image through 90 degrees. Fig. 2.5 shows an early DIP system including a document scanner and a high-resolution display.

Nevertheless, DIP fired the imagination of heavy users of paper files and as the ICT infrastructure improved in the 1990s (see Section 2.3 below) so the use of DIP expanded. The range of scanners developed to include machines that could scan from 1 to 200 sheets per minute single- or double-sided. There were large format scanners for maps and plans, and scanners for microfilm and 35mm slides producing images in black and white, greyscale or colour.

There were two main categories of DIP system on the market. Small-scale systems were, in effect, electronic filing cabinets. The storage medium of choice was recordable optical disk. The active scalable systems were supplied with workflow management (WFM) software so organisations could scan the incoming post, route the images to designated staff to process, and keep track of the status of each work item on the system. Such systems were often provided with a forms processing capability so they could also capture data from forms, validate it and load it into business administration databases⁽³⁾.

2.2.5 Electronic document management

In the 1990s a new generation of systems were introduced to manage digital documents created on Microsoft Office and other application packages. These systems were designed to manage active, changing documents and were referred to as electronic document management (EDM) systems. They managed all the documents in a repository or library and assigned index data or metadata to each document to manage the relationships between them and provide access control. They were provided with check-out and check-in facilities and version control so they could keep track of the latest versions of documents that were going through revision cycles. They were widely used in head office applications and by legal firms and pharmaceutical companies.

Over time DIP and EDM systems merged to form integrated document management systems capable of capturing and managing incoming paper documents as digital images and of managing digital documents in the same electronic folders. For the first time they offered users the promise of an alterna-

tive to paper folders for the management of both incoming and outgoing documents.

The document and data capture subsystems were increasingly provided by specialist software providers including Kofax and Captiva (now part of EMC) who designed their capture subsystems to interface with all the leading EDM systems on the market.

2.2.6 Full-text retrieval and knowledge management

Ever since books were first printed publishers have employed specialist indexers to extract key words from the text of the book and arrange them in alphabetical order in indexes. Shortly after organisations started to process text on computer systems a number of suppliers developed full-text software engines that could scan a large library of electronic documents and create a full-text index listing in alphabetical order all of the words contained within the documents and every instance where they were held. The user could define a set of 'stop words,' which were typically contained in all documents (the, and, etc.), and these were not indexed. Such software was of particular value to librarians and information professionals trying to find articles on specific subjects. A whole industry was born with publishers creating huge online databases of documents on specific subjects that information professionals could search online to create a shortlist of relevant material.

Initially, such databases contained only abstracts of the articles. The searcher was provided with a set of bibliographic references and then had to obtain physical copies of the articles from libraries that held them. The EDM suppliers were quick to see the potential of full-text retrieval and quickly integrated the leading engines in their solutions. Users could therefore search for the folder or document they wanted or, alternatively, they could carry out a full text search and find all the documents in the library that contained specific words or phrases.

2.2.7 Collaboration software

In addition to needing tools to manage structured data in databases and documentary information in EDM systems, organisations began to identify a need in the early 1990s for electronic tools to support cooperative working. They discovered that users did not simply need to access information in electronic filing cabinets. All organisations performed functions and those functions could be broken down into a series of activities. Each activity comprised a series of transactions or processes. In order to carry out those processes or transactions efficiently and effectively people needed to work together. Fig. 2.6 shows a screenshot from Microsoft Office SharePoint Server, one of the leading suites of collaboration software.

A range of tools started to emerge to support cooperative working and again these took advantage of improvements to ICT infrastructures (see Section 2.3 below).

Different tools were developed to support unstructured, ad hoc processes on the one hand, and high-volume, rules-based structured processes on the other.

The simplest and most flexible tool to aid co-operation was e-mail. As offices invested in PCs and networks so e-mail grew in importance until it is now ubiquitous. With e-mail it became possible to send anyone a message with an attached document and ask them to answer a query or carry out a process. The problem was that the sender did not receive any confirmation that the message had been received, that the document had been read or when the recipient had completed the process unless the recipient replied by e-mail. Hence e-mail came to be regarded as ideally suited to trigger ad hoc processes that happen only very infrequently.

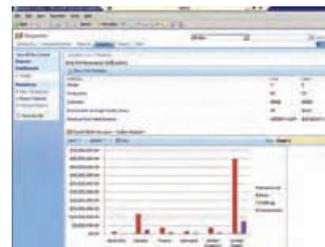
Fig 2.5
An early DIP system



shows an early DIP system including a document scanner and a high-resolution display.

Nevertheless, DIP fired the imagination of heavy users of paper files and as the ICT infrastructure improved in the 1990s (see Section 2.3 below) so the use of DIP expanded. The range of

Fig 2.6
Collaboration software – sample screenshot from Microsoft Office SharePoint 2007 (courtesy Microsoft)



On top of e-mail we saw the development of groupware software which was epitomised by Lotus Notes in the 1990s and which spawned many followers. With groupware, users could develop simple applications to handle processes such as scheduling meetings, booking travel facilities and sharing documents in a series of team document libraries. Over time groupware has given way to collaboration suites which take full advantage of developments in the ICT infrastructure (Fig. 2.7).

Fig 2.7
Functions provided by collaboration software



The late 1980s and early 1990s saw the launch of a range of workflow management (WFM) software aimed at complex and structured business processes involving the co-operation of different

users and systems, and where there are multiple steps or tasks to be carried out in a particular sequence and in a consistent way in order to achieve the required business objectives.

WFM software allowed large organisations to redesign and automate their business processes, to manage change and to ensure that processes better met business objectives. The software required included process modelling software, build software, enactment software, administration software and user interface software that determined how users interacted with the WFM suite.

When linked with DIP and EDM software, WFM software allowed organisations to scan their incoming post, route it to the staff who needed to process it and provide them with access to all the tools and all the data they needed to perform their tasks. It led to the complete redesign of functions such as claims processing and loan processing.

Fig 2.8
Content management system facilities

2.2.8 Electronic publishing and content management

Almost as soon as word processors were installed in offices, both commercial and corporate publishers started to use electronic publishing software. The initial benefit of electronic publishing to print publishers was that publishers would be able to take electronic content, mark it up or format it, and then render it to create masters for conventional print publishing on the one hand, and render it for electronic publishing on the other.

The key to the widespread use of electronic publishing was standards and the availability of new digital publishing channels. Initially, all the major suppliers had their own markup languages. As long ago as 1969 IBM developed their Generalised Markup Language (GML) and, after a lot of testing and development, the robust International Standard (ISO 8879) called Standard Generalised Markup Language (SGML) was developed. This was followed by associated standards including the Document Style, Semantics and Specification Language (DSSSL) which standardised the creation of style sheets. Although the GML standard was always extensible and generalised the SGML standard added many features and options⁽³⁾. SGML was a powerful and intricate standard and became the de facto standard for the interchange of large, complex documents such as airline maintenance manuals.

As we shall note in Section 2.2.9 below, the advent of the Internet and the World Wide Web saw the arrival of new standards including HyperText Markup Language (HTML) that was based on a simple example document type in the SGML standard. The simplicity of HTML allowed programmers worldwide to quickly build systems and tools to work with the Web. Most of HTML's element types are generalised and descriptive but it only uses a fixed set of element types. HTML is not extensible and hence cannot be tailored for particular document types.

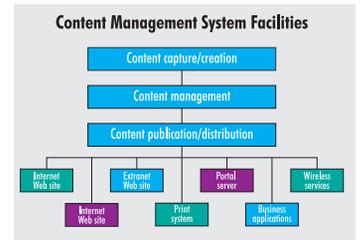
As Charles Goldfarb explains in his excellent book⁽⁴⁾ on the subject, as the Web grew in popularity developers found HTML's fixed document type a limitation. Browser vendors started to make

incompatible extensions to HTML and the great strength of the Web – interoperability and standardisation – was under threat. The World Wide Web Consortium (W3C) acted. They invented a simple HTML oriented stylesheet language called Cascading Style Sheets (CSS). Much more significantly they also decided to develop a subset of SGML that would retain the power and flexibility of SGML but also remain simple in line with the general philosophy of the Web. The new standard was named Extensible Markup Language (XML) and they also opted to develop standards for advanced hyperlinking and stylesheets – Extensible Linking Language (Xlink) and the Extensible Style Language which combined elements of the CSS and the ISO DSSSL standard. XML was specifically designed to facilitate reliable interchange on the Web. This included the interchange of data and documents but also paved the way for electronic business with computers communicating with each other across the Web via XML.

The arrival of electronic publishing and SGML created a specialised demand for content management systems rather than electronic document management systems. Content Management (CM) was the term used to differentiate systems that managed at the content level from systems that managed at the document level. CM systems were designed to help organisations exploit, reuse and publish their content. A CM solution was designed to keep the content separate from the delivery mechanism or the presentation format.

With a DIP or simple EDM system you have no choice about how you view the document: you see either an image of a page in an image viewer or you see the native file presented by the application used to create it. With a CM system the content can be marked up using SGML or XML and then the user defines, using a style sheet, how they want that content to be rendered on one or many delivery media or channels. The delivery device can be a PC display, a mobile phone screen, a PDA screen, a piece of paper, etc. (Fig. 2.8).

Hence a CM system treats content more like data in a database. The content can be held in a neutral format and marked up so it can be reused as an asset in a number of different ways. A CM system manages



semi-structured information to create a re-usable resource that enables an organisation to fully exploit that content, just like a database enables them to fully exploit their structured data.

CM systems should be capable of managing all content from creation or capture through to eventual destruction. They should provide facilities for capturing, managing and providing access to the content. They should provide facilities for processing the content and for publishing it on internal or external websites or in printed form, on CD-ROM or via PDAs and mobile phones as required. CM systems also need to be capable of managing dynamic, constantly changing content.

One of the key features supported by CM systems is assembly: the ability to assemble a document from all its component content objects and render it on screen or on paper or however it is required to be rendered in future.

For many years CM was a relatively specialised marketplace supporting large commercial or corporate publishers. The advent of the Internet and the World Wide Web has widened the market for CM, or at least for an important subset of CM called Web Content Management.

2.2.9 The Internet, the World Wide Web and Web Content Management

In the 1990s interest in the Internet and the World Wide Web grew rapidly and took us all another huge step further towards

enterprise content management. The Internet is really nothing more than a network of networks that developed from a need in the US government defence community to connect disparate computer systems and share resources on them. Most organisations connected their local area networks to the Internet via a service provider. Many applications were developed to harness the potential of the Internet, including e-mail and file transfer, but the application with the greatest impact for ECM was the World Wide Web, a document-based hypertext system which operates as an overlay to the Internet. It protects users from the need to know where information is physically stored and allows authors and users to set up, manage and navigate information bases or websites that span different locations, resources and suppliers.

The World Wide Web involves a range of software tools⁽⁵⁾ including (i) web server software that delivers web pages to users, (ii) the HTML (Hypertext Markup Language) used to describe the structure of documents (pages) to be delivered via the Web and also used to define URLs which are used to point to other resources on the Web, (iii) the browser which is the client program used to view information on the Web and was made available for almost any environment and (iv) HTML editors to make the process of creating HTML pages as easy as desktop publishing.

Internet websites grew at a rapid rate and we saw the introduction of corporate intranets and extranets so people could create internal corporate websites or websites that could be accessed by their contractors or partners, but not by unauthorised users.

The power of the Web was obvious but it took a while for some of the pitfalls to emerge. While it was easy to set up websites and load documents onto them, it was less easy to keep the material up to date and to maintain all the links as documents were changed or deleted. It was also difficult to monitor the quality or consistency of the material published on a website and, after a while, users got bored with disorganised websites.

This created a demand for a specialised type of content management system designed to manage the content to be published on websites and, not surprisingly, this software came to be known as web content management (WCM) software.

To support WCM you need to deal at the content and at the document level, and you need to capture existing content, transform existing content and support the creation of new content specifically for the Web. A WCM system will support the use of templates. A designer can create and edit templates, which are applied to the content submitted by authors to ensure the content on a website follows a house style. A WCM system should also support content syndication: the facility to pull content from third-party sources including news feeds.

A WCM system has to support the development of websites. Organisations need facilities for the development of content-based web applications, supporting both code and content elements. They also need to create web pages that are reusable, and index and manage them in the repository alongside the content. One of the key functions of a WCM system is that it can be used to set up and design the layout of pages and then check all the links between pages and content and hence guarantee the integrity of all the links within a specific website.

WCM systems support workflow and processes designed to pass content from authors to editors where it is reformatted or transformed ready for publishing and where it is reviewed and approved for publishing on the Web. A core function supported by all WCM systems is web publishing or delivering approved content to the correct live web server and ensuring that the correct content appears on the right site in the correct format. WCM software will also monitor the usage made of content and incorporate archiving software for pulling inactive content off a website.

The World Wide Web on the Internet was based around a standard browser that effectively provided a gateway into the world of knowledge stored on all the websites on the Internet. Over time, the raw search engines have developed into public

portals – literally software designed to act as a gateway to the world of knowledge held on the Web. Companies such as Google, Yahoo, AOL and Microsoft provide personalisation features that enable users to configure a personal page to contain selected links to sites, information and applications.

2.2.10 Electronic records management

As indicated in Section 2.2.3 above, in the 1980s many large organisations managed their paper records using records management software and they had a print-to-paper policy whereby all documents deemed to be records had to be printed out and stored in paper folders.

From the early 1990s a growing percentage of documents were created electronically and the paper-based RM regimes began to fail. Users were reluctant to print out a copy of all their electronic documents and, increasingly, incoming paper documents were held in paper folders and outgoing digital documents were held in directories on magnetic disk drives. As e-mail became widespread and websites sprang up, and as business administration systems allowed users to attach electronic documents to data records, some radical action was needed for organisations to avoid losing control of their records and hence their accountability.

Records managers looked at the new DIP and EDM systems, but the suppliers were focused on meeting the need to manage active documents that had to be routed around an organisation, annotated and edited. There were very few facilities provided for corporate classification, declaration and disposition. In addition, most systems were designed to manage only electronic documents when what the records managers needed were hybrid systems that could manage paper records and electronic records.

A number of the suppliers of RM software for controlling paper records enhanced their systems to manage electronic records as well. In addition, some new suppliers focused on the electronic records management (ERM) market. But there were no standards for best practice in ERM and the EDM software was relatively immature and fast moving.

In the UK the Public Record Office (PRO) – now The National Archives (TNA) – initiated a collaborative project between central government departments and agencies to identify functional requirements for ERM in the UK government context and to evaluate available systems against those requirements. The first version of the requirements⁽¹⁾ was published in 1999 and identified three core functional areas for ERM systems:

■ **Declaration** – the ability to capture the document(s) that make up the record and freeze its content so that it cannot be changed thereafter

■ **Classification and organisation** – support for the structuring and categorisation of records so that all relevant records are brought together at the same point in a corporate file plan or taxonomy for consistent access and lifecycle management. A file plan defines a hierarchy of classes, folders, folder parts, documents/records and components (content)

■ **Disposition** – facilities to support the maintenance of sustainable records over time, to retain only those that should be kept and to manage the controlled disposal of those no longer needed.

A number of suppliers committed themselves to meeting the requirements in full. The PRO set up a testing process and, in 2000, drew up a list of approved ERM software products.

Those organisations that did not want active document management facilities could purchase and implement a standalone ERM system. Where companies had already implemented an active EDM system, a growing number of suppliers of EDM systems integrated their products with ERM software to provide integrated document and records management solutions which were referred to as electronic document and records management (EDRM) solutions.

Following the work by the PRO, the European Union commissioned and published a more detailed set of guidelines and requirements called MoReq⁽⁶⁾ to assist users specifying their requirements for an ERM system. The arrival of these documents, together with a drive by UK government to persuade public sector bodies to manage their new records in electronic format, has led to a rapid growth in the market for ERM systems and for integrated EDRM systems. In 2002 The National Archives issued a new version of its requirements document⁽⁷⁾ with more detailed metadata standards. Most recently the European Union has agreed to support the development of an updated version of the MoReq standard which is referred to simply as MoReq2⁽⁸⁾.

2.2.11 Towards enterprise content management

After nearly thirty years of evolution we arrived at a situation in 2003 when it became clear that what users needed was not just a whole series of tools that met part of their requirements but rather a suite or framework of software that would enable them

to meet all their content, document and records management requirements and all their collaboration requirements. The suppliers responded with a series of acquisitions and mergers and new software development that has allowed many of them to develop inte-

grated solutions. Today, in 2007, there are broadly three types of suppliers on the market: suppliers of point solutions, suppliers of EDRM suites and suppliers of ECM frameworks (Fig. 2.9).

■ **Point solutions** The first category of suppliers offer one tool and are targeting small to medium-sized customers and those who need a solution to a specific problem in one department or process. They will typically offer an electronic document management solution, a web content management (WCM) solution or a collaboration suite.

■ **EDRM suites** The second category comprises those suppliers who have combined document capture, document management, RM and business process management (BPM) functions to create what they refer to as an electronic document and records management (EDRM) suite. Such a suite meets all the document and records management requirements of a large organisation that needs to set up a tightly-controlled records management regime for regulatory compliance. They can usually also be integrated with one or more collaboration suites. What they do not generally cover are an organisation's WCM or general content management requirements. Currently a large number of public sector organisations are in the market for a corporate EDRM solution that will interface with their existing WCM solution and their existing collaboration software. In most cases the objective of the users is to manage all core and vital records on one system.

■ **ECM framework** The third category comprises those suppliers who have combined an even wider range of software to create what they refer to as an enterprise content management (ECM) framework. This term has been promoted by AIIIM, and Cimtech uses this term in the guide to describe the suite of software that many suppliers are assembling to help organisations manage all their unstructured and semi-structured information and support all their collaborative working requirements. A full ECM framework includes document management, content management, web content management, knowledge management and the full range of collaboration tools including BPM tools.

To meet the full range of CM requirements across an enterprise, ECM frameworks will need to manage information at a

number of levels, from data to content object to document to folder to class. Now that most new documents are created electronically and because it is desirable to reuse and republish the content in many different ways, it is logical that the content should be stored in its smallest constituent parts. This allows it to be processed, reused and exploited as efficiently as possible. Hence ECM frameworks need to manage content in a neutral, reusable format.

However, once the content has been created, assembled and published or distributed in electronic or paper form, there is also a need to manage the document as a whole to ensure that the integrity of the document is maintained. This ensures that it can be used as a true record of what was actually published/distributed to a specific audience on a specific date and time. Hence ECM frameworks also need to manage the document itself as a record. Similarly, if an organisation receives orders in the form of paper or electronic documents, then they may well need to be captured and transmitted as a whole and/or stored as records.

The major software suppliers – including Microsoft, Oracle, IBM and EMC – are all aiming to provide enterprise-wide platforms on top of which users or their system integrators can build custom or packaged applications. The first three are offering content management facilities now as an extension to their relational database management solutions. They are also acquiring established content management suppliers. IBM has acquired FileNet and Oracle has acquired Stellent. Another large ECM supplier – Open Text – is expanding its customer base by acquisitions. More details on the current state of the marketplace can be found in Chapter 8.

Most medium-to-large organisations are embarking on a journey that will take them towards an ECM framework. Where they start from and how many phases they need to go through will depend on what investment they have already made in information management and collaborative software and what their key drivers and business objectives are.

Some may have already implemented a number of point solutions and so will need to build on that investment and integrate the different tools via a portal and common data structures.

Many in the public sector will be looking for compliance and good governance and will be trying to increase the percentage of records managed in electronic rather than paper format. Their first move may be to implement an EDRM suite and use a systems integrator to create a simple interface between the EDRM and an existing WCM solution.

Others will be focused on supporting the move to electronic commerce and will be investing heavily in web content management.

Alternatively, organisations may decide to bite the bullet and opt for a single large supplier who looks likely to expand its current offerings and meet all their future requirements in a single ECM framework. They will still have to select early applications and adopt a phased implementation approach but will be working with a single, integrated set of tools.

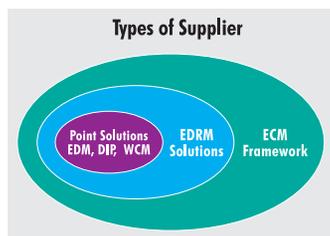
2.3 Reviewing your ICT Infrastructure for ECM

In Section 2.2 above we traced the development of applications designed to manage unstructured and semi-structured information – a whole range of information management and collaboration tools that are coming together to form ECM frameworks.

While this has been happening over the last thirty years there has been a steady stream of related developments at the ICT infrastructure level. Organisations have been investing significantly in computer hardware and software, networks and communication systems, computer storage, memory and key peripherals. ICT infrastructure and platforms have therefore been developing to the point where they are ideally suited to support not just traditional forms of data processing but also enterprise content management.

Going back in time we had mainframe computers or minicomputers hard wired to dumb terminals. We keyed data into our

Fig 2.9
Types of suppliers



systems, the data was processed centrally and we saw the results on screen or on massive computer printouts. Documents and data were created centrally.

In the 1980s the arrival of personal computers led to the era of personal productivity. We started creating our own documents and moved to an era of client and server computing where user PCs were connected to servers for shared storage and shared access to printers, but where users could also manage their own electronic documents locally. Minicomputers and mainframes went on creating content and data centrally but users started producing vast amounts of content locally as well.

As DIP and EDM systems came on stream they exposed weaknesses in the ICT infrastructure in most organisations which had to be addressed. Many users lacked PCs with sufficient power or with high resolution screens and many more found that their networks lacked sufficient bandwidth to enable them to retrieve high volumes of large files.

With the Internet, the Web and corporate intranets most organisations have browsers on the desktop and, in many cases, portals and are moving to an n-tier environment.

However, if experience has taught us anything it is that most organisations are not able to move to new platforms as rapidly as their suppliers would like. Hence, anyone considering a move to ECM should look carefully at their ICT infrastructure and consider whether some of the following areas are in need of improvement.

2.3.1 Networks

For users in large organisations with head offices and branches the bandwidth of their local and wide area networks was a crucial factor. If you were scanning large volumes of paper documents at a branch and those digital images had to be accessible in the head office then you needed a high bandwidth network to move them. Equally, if you had a central library of electronic documents at the head office which users in branch offices needed to access on a regular basis then you needed sufficient bandwidth on your wide area network or you had to look at setting up distributed or replicated libraries in different locations. This problem became even more critical if organisations encouraged a policy of remote or home working where staff needed to be able to access documents from home or a hotel room. Today, with organisations moving into headquarters buildings with high bandwidth networks already installed along with broadband connections and powerful wireless networks, then network bandwidth is less of an issue although we still regularly consult with clients for whom planning for ECM will involve a significant investment in their networking and communication systems. If you use high volumes of digital colour images or multimedia files, including digital audio and video, then you need to look carefully at compression technology to reduce the file sizes and also at your network bandwidth.

2.3.2 Desktops and office applications

In the mid 1990s with client/server architectures most EDM and DIP systems suppliers offered thick client software that required powerful PCs with sufficient memory and processing power to support the EDM client software as well as an office suite, line of business applications, e-mail software, etc. Imaging users also needed a high-resolution, large-format screen that often came with its own driver or accelerator card. Hence implementing EDM often implied a significant desktop upgrade cost.

Today, organisations increasingly have powerful PCs with large displays and most ECM suites require little or no software to be installed on the PC. ECM software leverages Internet technology to deliver services so you only need a web browser to access it. Many suppliers continue to offer thick client options for users running client/server line of business systems and users who want to access the document management application from within their office suite or e-mail client.

If, like a number of clients we are working with, you have little

control over the desktops some units will be operating, then you are well advised to conduct a survey prior to planning any ECM implementation. A useful exercise, which we recommend you undertake before specifying your requirements for an ECM solution, is to survey the software used in your organisation to create content and documents. If you use the Microsoft Office suite you should not have a problem. If you use a wide range of specialist packages to create specialist content including, but not limited to, specialist CAD packages, GIS packages, multimedia packages, etc., then you should list them and check whether interfaces exist or will have to be developed specifically for you at cost. As a general rule, organisations that have preferred packages and do not support variants without a strong case find it easier to migrate to ECM solutions than users who have a laissez faire approach to the use of application packages.

The more you have standardised on one office suite and one e-mail client the easier your move into ECM will be. Microsoft is adding a number of features into their new Office 2007 application suite that support and enable ECM. Support for XML will make it easier to publish Office documents on the Web and will facilitate integration with structured databases and applications.

2.3.3 Servers, databases and storage

Many organisations that have not invested in any EDM or ECM solution are set up with departmental servers to hold office documents, personal databases, e-mails, etc. When staff from several departments need to work together on projects, or where departments need to share information on a client or a property, then they start to hit physical and other access problems. There may be a number of access control, rights and privileges issues so simply putting the documents up on the intranet may not be the answer.

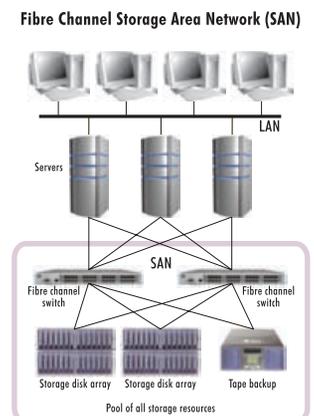
The vast amount of digital information being generated daily via e-mails, office applications, the Internet, business systems and scanning subsystems and the move to ECM systems means that having the right digital storage strategy is now becoming of vital importance. The old solution of high-density disk drives directly attached to local servers (DAS) does not meet our information sharing requirements. It is inefficient because it is not possible to automatically transfer capacity from an under-utilised system to an overloaded system and so leads to storage devices being over-specified. What is needed is information that is accessible on demand and, where that data has had to be migrated off the primary online storage medium for backup and archive purposes, it must be retrievable according to agreed policies, until the retention period expires. Planning for this is a complex but vital activity and explains the interest and attendance at storage conferences and exhibitions.

There is a growing use made today in the newer technologies such as network attached storage (NAS) and storage area networks (SANs) that enable capacity to be shared between systems and applications (Fig. 2.10).

Such solutions can avoid many of the management problems associated with local server storage and can be fully leveraged when you come to implement an ECM solution which will then remove some of the logical and access barriers as well. So if you are looking at a move to corporate ECM you would be well advised to consider a move to networked storage within the scope of the project.

Network-attached storage involves a special purpose

Fig 2.10
Storage area networks allow multiple users to share high performance storage devices



device comprising both hard disks, e.g. RAID, and an operating system such as Windows Storage Server 2003, that is wholly dedicated to serving files over the network. Sometimes known as storage servers, these devices essentially take over the storage and file-serving roles from other servers on the network and provide a lot more flexibility in data access by virtue of being independent. Some NAS products are sold as plug-and-play solutions making them very easy to install, deploy and manage.

NAS has found wide application in small and medium-sized organisations and, in recent years, has developed more sophisticated functionality that makes it increasingly attractive to larger enterprises as well. It is particularly attractive in environments where different servers are running different operating systems as it enables the storage of data to be centralised. NAS can therefore integrate into any environment and serve files across all operating platforms, e.g. Windows, Unix, NetWare, Apple Macintosh, etc. Significant benefits can also be achieved due to the improved resilience and the simplified security, management and backup of data that is afforded by NAS.

Storage area networks represent the current stage in the evolution of networked storage. In essence, a SAN affords similar functionality to NAS in that it provides network clients with access to dedicated data storage devices. However, a SAN differs by locating the storage devices on their own separate network and providing direct communication between them over very fast links, e.g. 4 gigabits per second. A SAN can therefore be thought of as a separate network of storage devices physically removed from, but still connected to, the network.

Typically, each server on the network is connected to the SAN using a host bus adapter (HBA) located in a free slot in the server. Fibre optic cable is then used to link each server to the various storage devices on the SAN via one or more fibre channel switches similar in appearance to an Ethernet switch. These switches add intelligence to the routing of information within the SAN ensuring that data gets to and from the correct device as efficiently as possible. SAN management software is used to automatically monitor and manage the entire storage infrastructure, e.g. the configuration and optimisation of the SAN components and the provision of usage statistics.

The ability for the different devices to communicate with each other on a separate network affords several advantages, one of which is the ability to backup all the data on the SAN, e.g. from disk to tape, without adding any traffic to the LAN. This LAN-free backup ensures improved performance for all services and users using the LAN. In addition to providing higher levels of performance and fault tolerance, SANs provide a resilient infrastructure that can easily be modified as storage needs change.

Recent developments have seen something of a convergence of SAN and NAS by combining the best elements of each to improve the efficiency and lower the cost of storing data. The primary distinction between SAN and NAS comes down to the choice of network protocol. SAN systems transfer data over the network in the form of disk blocks using protocols such as SCSI whereas NAS systems operate at a higher level with the file itself.

Planning is vital and involves both business and technical staff. You need a complete picture of what an organisation's data needs are. For ECM this involves the sort of audit we have described in Chapter 5. The best advice is to decide what you need to store and what effect the loss of that data would have on your organisation. Once you have assigned values and rules to the data you can then examine products and architectures.

Three areas need to be considered when implementing a storage strategy: (i) tiered storage, (ii) virtualisation and (iii) automation of the management environment. Tiered or hierarchical storage involves moving information from one tier to another as its importance and value changes. Critical business data that is needed quickly at all times will be on tier one which will be expensive online storage. Data which is critical but not needed so

urgently is held on tier two and data that is relevant but not essential is held on tier three. The storage policy then covers what is needed to protect the data, whether replication is required, whether the data should be stored on different sites and so on. For ECM all records would be on tier one or two.

The storage media hierarchy still covers a wide range of magnetic disks, optical disks and magnetic tapes. Magnetic disks would be the medium of choice for tier one and in many cases for tier two material. Optical disks are increasingly being used for tier two and three and magnetic tape is the back-up medium of choice and also the tier three medium (Fig. 2.11).

Storage virtualisation is coming in slowly and is designed to separate the logical organisation and management of data from the underlying physical layer so a whole network of devices may be looked at as one big disk. It simplifies the management of the storage architecture and reduces the management of multiple device interfaces and commands across the SAN. Interoperability is still a problem today between different vendors' equipment.

Setting the policies and configuring the storage environment into an ideal state is a major task, to keep it running smoothly you need skilled staff and tools to monitor the storage sub-systems.

The Directory section of this publication does not include a category for storage products, although the contact details for many of the leading hardware suppliers are included at the end of the Directory. The leading suppliers in the UK include Adic, Dell, EMC, Fujitsu, Hewlett-Packard, Hitachi Data Systems, IBM, LeftHand Networks, Nstor/Xyratex, Plasmon, Quantum, Sony, Sun StorageTek and Tandberg Data.

Traditionally, suppliers of EDM solutions managed the index or metadata in a relational database and the files in a file management system. This is still a popular option today. However, increasingly the leading database providers, including Oracle, Microsoft and IBM, are providing content management facilities as an extension to their RDBMS offerings. Oracle has offered Oracle Content DB and Oracle Records DB as components of its Collaboration Suite since 2005 but now they have repositioned them as Oracle Database options. The Oracle database looks like a virtual drive and users just drag and drop or 'Save As' to create, edit or delete content files in a folder hierarchy. Oracle provides file versioning and the facility to save files into multiple folder hierarchies. Oracle Records DB further allows users to set up records management policies, create file plans, declare records and manage retention schedules.

So you will be able to manage most types of content from within a database and will begin to see the major database providers providing basic content management services. The database providers will then be offering these platforms to developers as a base on which to build advanced ECM solutions. Open Text has already announced that it will build on these Oracle extensions in future versions of their ECM solutions. Others can be expected to follow suit. See Chapter 8 for further details.

It may well be important in future to ensure that your ECM supplier is building on your preferred corporate database platform.

2.3.4 E-mail and messaging

One of the biggest problems many clients face is finding all the e-mails, attachments, other office documents and paper documents that they hold on a specific topic, person or project. Because their e-mails and attachments are currently stored separately from their office documents and their paper documents, they do not have one folder they can go to for all the relevant material.



Fig 2.11
Storage media – optical disk,
magnetic disk, tape cartridges

One of the key objectives of EDM and ERM solutions is to provide a hierarchical folder structure where you can save all your important e-mails, documents, scanned images, etc. To do this your ECM solution has to integrate closely with your e-mail solution so you can cut and paste e-mails into the folders and transfer metadata, etc.

Two areas to look at with your current ICT infrastructure are (i) do you have one or more e-mail systems, and (ii) have you invested in any sort of e-mail archiving solution already?

If you have one e-mail solution and it is Outlook and Exchange then most of the suppliers should be able to interface with it. If you have multiple e-mail systems or you use other solutions, then the issues involved in interfacing e-mails with your ECM solution get slightly more complex and the solutions need to be proven.

If you have an e-mail archive then you need to decide whether you want to maintain a separate e-mail archive alongside your ECM solution or whether you want the ECM solution to replace the e-mail archive over time. A number of clients opt to automatically archive every e-mail in or out of the e-mail archive as a back-up and then users save what they consider to be important e-mails into the relevant folders on the ECM solution. If you are setting up a full ERM facility on the ECM then the saved e-mails and attachments can be declared as records and assigned to folders with agreed retention schedules.

2.3.5 Collaboration software

In the historical section we charted the development of collaborative software and in Chapter 3 we make the point that any ECM solution should combine information management and collaborative tools. If your organisation has already made a major commitment to a set of collaborative tools then you need to be fully aware of this as it will be a major factor when it comes to selecting your ECM solution. We come across many clients who are using collaborative software from Microsoft (SharePoint) or IBM (Lotus) and even more who are not currently committed but are interested in collaborative software. When looking at ECM solution providers you will find some who have their own collaborative software as part of their ECM suite. Examples here would include Microsoft, Open Text and Documentum. You will also find ECM suppliers who prefer to work with existing generic collaborative software such as that from Microsoft and IBM (Lotus). A review of your current commitment to collaborative software will enable you to review the relevant supplier offerings to see which best meets your situation.

2.3.6 Existing document and content management solutions

Finally, it will also be important for you to survey your organisation and identify what investments you have already made in the range of information management tools that go to make up an ECM solution. You may have some DIP or EDM solutions in a particular department. You may already have a knowledge management solution with portal. You may have a web content management solution. You need to look at these and determine the level of commitment to each and review the other software available from the same supplier. We are often asked to help clients with a number of existing systems to develop a strategy that enables them to extract value from existing investments while at the same time clearly establishing a corporate standard for the future to avoid any further proliferation of platforms.

2.3.7 Input and output peripherals – scanners and printers

One thing that is certain is that no matter how fast you move towards ECM you will not see the paperless office any time soon. Although e-mail and the Internet have reduced considerably the amount of paper-based, inter-company communications, organisations that deal with the public still receive significant volume of

paper post and staff bring back paper documents from exhibitions and conferences that need to be loaded onto the system. Organisations that hold electronic masters may still support staff who need duplicate paper files to support frequent trips to client sites, building sites, etc.

Hence, capture systems that comprise scanning and digitising paper documents and indexing them into the system still represent an important element of an ECM solution. We look at this area in more detail in Chapter 3.

There are still many occasions when staff need to print copies of electronic documents to check work or to take them to meetings, for example. What users of ECM solutions are reporting is a general reduction in the use of photocopiers and an increase in the use of printers. Paper documents are scanned in once and then multiple copies printed out in many instances.

Scanners, printers and combined multifunction devices will therefore represent an increasingly important part of your ICT infrastructure. Casual decisions made about such devices can cause considerable ongoing problems and costs.

In general, with scanners and printers and multifunction devices, as with office software, organisations should seek to impose corporate standards and reduce proliferation to reduce costs and ease training and operational support issues.

Broadly speaking, most organisations have two or three different requirements for scanning. First, organisations that receive a high volume of post need some form of scanning centre where bulk scanning is done to service levels and under close supervision. Second, most organisations need on-demand or walk-up scanners which can be used to capture small volumes of content on a local basis. Third, there may be a requirement for specialised scanners in one or more areas including large format scanning (Fig. 2.12) or scanning of microfilm and slides.

For ease of support and integration users should avoid making major investments in scanners until they have decided on their preferred ECM solution and capture software.

One important issue is to have clear corporate policies on what material should be scanned in colour or greyscale or black and white, and what scanning resolution is appropriate for each type of material. There are many apocryphal stories of novice users scanning

documents in colour and at very high resolution, not compressing the file and then e-mailing it to lots of users and effectively slowing the network down for a period.

For printing, many organisations will need a mix of central production and specialised printers and plotters, departmental printers and personal or team printers. Again, policies are needed on colour printing as costs can escalate where there are no controls.

For departments and units with low volume scanning and printing requirements an area of increasing interest is multifunction devices. These vary considerably but a fully functioned device can operate as a printer, a scanner, a fax machine and a copier. The advantages in low volume areas are that you can buy one for considerably less than the cost of a separate scanner and printer let alone a scanner, a printer and a photocopier.

Low-cost multifunction devices (MFDs) selling from around £50 have proved extremely popular in home and small office applications where their small footprint is a major benefit. They typically feature inkjet printing technology and allow colour scanning, copying and printing. However, they are only suitable for very low volume convenience applications and so do not appeal to corporate users. Leading suppliers include Epson (www.epson.co.uk), Canon (www.canon.co.uk), Hewlett Packard (www.hp.co.uk) and Lexmark (www.lexmark.co.uk).



Fig 2.12

Specialised scanner for large formats

The next category of MFDs are again quite compact but are based on laser printing technology capable of producing higher quality output at higher speeds (prices £200 to £500). Some have networking capability and, although printing might be black and white only, they usually allow scanning in colour. Leading suppliers include most of the digital photocopier suppliers, e.g. Canon (www.canon.co.uk), Hewlett Packard (www.hp.co.uk), Ricoh (www.ricoh.co.uk) and Toshiba (www.toshiba.co.uk/imaging).

In moving higher up the MFD line the term MFD almost becomes synonymous with photocopier in the sense that virtually all digital photocopiers are MFDs that provide scanning and network printing and fax facilities in addition to copying. Models are available to suit all volumes and, while black and white models dominate this sector, there is an increasing trend towards colour as prices fall. Again, the leading suppliers are the established photocopier/printer manufacturers including Canon (www.canon.co.uk), Hewlett Packard (www.hp.co.uk), Konica Minolta (www.konicaminolta.co.uk), Kyocera Mita (www.kyoceramita.co.uk), Océ (www.oce.com/uk), Panasonic (www.panasonic.co.uk), Ricoh (www.ricoh.co.uk), Sharp (www.sharp.co.uk), Toshiba (www.toshiba.co.uk/imaging) and Xerox (www.xerox.com).

One of the issues you need to consider is who should be responsible for scanning and printing in future – IT or facilities/reprographics? It is a classic area where cooperation will be needed in future so IT can ensure the devices will interface with their capture software and ECM solutions and facilities and reprographics can ensure they have the right mix of devices to meet the business requirements.

2.3.8 Summary

In summary we can say that almost nobody will have the perfect infrastructure for ECM. But the good news is that each year, in most cases at least, our infrastructure gets nearer to the ideal. A detailed review of your existing infrastructure will ensure you are aware of the areas where improvements are needed and where decisions are needed to reverse current trends and avoid proliferation.

2.4 Preparing your Organisation for ECM

If you surveyed most large organisations and asked them who was responsible for information management (defined as covering all the areas covered in our historical review and in Chapter 3) then the following are some of the more popular answers you would receive. In many large organisations you would receive all the following answers and perhaps more.

- ICT or IT or ISD
- Records Management
- Information Manager
- Office services
- Administration
- Facilities Management
- Reprographics/printroom
- The library
- The Archive
- Corporate Services
- The Compliance Manager/ The Freedom of Information officer
- External Relations (Internet website)
- Corporate Publishing
- Web Services (intranet and Internet websites)
- Individual departments (responsible for own paper and electronic files).

If your organisation is looking to implement a corporate ECM solution then it should go without saying that this is far more than just an IT project, although the IT challenges may be significant.

A large part of any such move will be a review of all the information and records held by an organisation and a move to define corporate roles and responsibilities for information and records management in future.

A corporate solution like ECM will involve many units that have previously seen themselves as being largely autonomous and free to make their own decisions. In the past, reprographics or the facilities team would have decided which copiers or printers to purchase. In future this will need to be a team decision with a number of interests represented including IT, the post room, Reprographics and end user departments, etc. Again, instead of going off and procuring standalone systems the staff responsible for corporate publishing and for the Internet and intranet websites will have to consult with IT and records management before defining their requirements for web content management solutions.

Organisations need to carefully consider two issues. (i) how they organise and assign roles and responsibilities for ECM in future and (ii) how they organise the ECM project to ensure that all parties are represented, involved in and own the solution.

In the first case, decisions need to be made from the top. Public sector organisations have been driven by pressure from government, The National Archives, the Information Commissioner, etc. They have been driven by targets to manage all new records in electronic format, to meet e-Government targets and to comply with Freedom of Information and Data Protection legislation. They have drawn up information and records management policies, appointed compliance officers and, in most cases, set up a network of information and records contact points in each department or business unit.

The picture in the private sector is mixed. Heavily regulated industries have had information and records management and quality management procedures in place for many years. Other organisations are just waking up to the implications of recent financial and corporate governance rulings and regulations.

In summary, organisations need to reorganise their information management functions and responsibilities and draw up policies, strategies and procedures as well as simply specifying and implementing a system. Chapter 4 reviews best practice guidance, standards and legislation in this area. Chapter 5 provides a ten-stage methodology for preparing for ECM and implementing a solution.

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Enterprise content management from A–Z

3.1 Defining Enterprise Content Management

A full ECM framework (Fig. 3.1) should support information and records management, and collaborative working. Drilling down, an ECM framework should provide all the tools needed to facilitate and manage the input of content, the management of the content, the

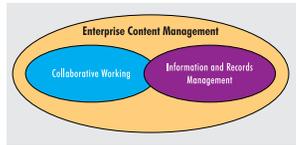


Fig 3.1
Enterprise content management framework

output of content and the management of all the related processes (Fig. 3.2).

These four key functions can then be further subdivided into a whole range of facilities, some of which are generic and will be required by most users, and some of which are relatively specialised and will only be required by a subset of the market.

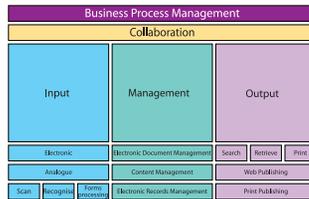


Fig 3.2
The ECM framework should provide a full range of facilities and tools

For input we need facilities to capture existing analogue documents, to create new content, to capture data via electronic forms and to index the content to uniquely identify it and allow us to search for it in future.

For management we need to classify and manage the content and documents, to declare a subset of them to be records and manage them as records throughout their life, including the provision of electronic preservation and archiving functions as required. We need to define the authorised users of the content and provide access control and security facilities and we also need to link the content to related applications and databases.

For output we need to provide authorised users with facilities to search for, retrieve, view, annotate and edit the content and documents held, and provide facilities to identify, assemble and distribute any of the content to any publishing/delivery system that may be appropriate, including web servers and printing systems.

For process management a full ECM framework should also provide the collaborative tools needed to facilitate collaborative working and the automation of key business processes (Fig 3.3).

In any organisation there will be scope for improving the way content is managed in all departments and across all business processes. Where organisations start and where they place their initial investment depends on where the main problems are, where their priorities are and where the best returns will be achieved.

A key principle of ECM is that the content should be created or captured only once

and stored in one location. How the content is retrieved will vary depending on whether the user is an author or editor retrieving content from the main repository for editing, or an end



Fig 3.3
Functions provided by collaborative software

user retrieving published content by navigating a website or a printed publication.

The opposite table lists the four core functions and the key facilities that should be supported under each function. Each of the facilities is reviewed separately below.

Core Function	Key Facility	Section where facility reviewed
INPUT	Existing document and data capture	3.2
	New content creation	3.3
	Content syndication	3.4
	Electronic forms for data capture	3.5
	Indexing	3.6
MANAGEMENT	Classification	3.7
	File and metadata management	3.8
	Application integration	3.9
	Digital asset management	3.10
	Application development and administration	3.11
OUTPUT	Searching and retrieval	3.12
	Content distribution	3.13
	Website design and development	3.14
	Web publishing	3.15
	Personalisation	3.16
PROCESS MANAGEMENT	Collaboration and business process management (BPM)	3.17

3.2 Existing Document and Data Capture

Most ECM solutions will need to support the capture of existing documents. There is an endless range of content and document types that can be captured and managed on an ECM system but all should fall into one of the following categories:

Analogue (i.e. non-digital) content, such as the content held on paper and photographic media, that has to be scanned, digitised (captured) and converted into one or more digital images before it can be managed on the ECM solution. This includes any image of the physical world which can be captured via a digital camera, including cameras in mobile phones. If it is necessary to edit, search or load into a database the text content of a digital image (the text on a letter or the text and numeric content on a paper form, etc.) then recognition software is necessary. Recognition software processes each digital image captured and converts any alphanumeric characters contained on the image into coded data. Other analogue content that can be digitised and held on ECM systems includes video, audio and multimedia content.

Digital content created on an application package (e.g. office suites, HTML and XML editors, CAD packages, graphics packages, digital video and audio, and general multimedia packages) still supported by the organisation but created prior to the implementation of the ECM solution. This will need to be reviewed to see whether it can be destroyed or whether it needs to be migrated. If a proportion needs to be migrated then a cost effective strategy needs to be agreed. This will involve using any bulk loading facilities provided with the ECM solution and the interfaces developed with the applications used to create the content.

Digital content created outside the system and made available in a digital format online or via a physical digital medium, and legacy digital content created on old application packages that may no longer be supported. This digital content may need to be converted into a common format before being loaded into the ECM solution. One option is to convert it into a static format such as a digital image. A second option is to convert it into an editable or processable format such as RTF or HTML.

3.2.1 Analogue document capture

A combination of a scanner and image processing software allows users to scan analogue content, digitise it and edit the digital image. A subset is optimised to capture digital images of the content of a single or double-sided page of a document. In document imaging the focus is on the speed of capture and on capturing a true facsimile of the original content that can be used as a legally admissible surrogate if required.

It should first be established whether the content already exists in digital format. If it does, then that is what should be loaded into the ECM system. Only if it does not exist should the organisation go through a document capture process.

The next decision is whether an organisation needs to capture new documents on an ongoing basis (e.g. incoming post) or whether it also needs to capture an existing collection of documents (e.g. a collection of manuscripts) in which case a backfile conversion exercise is required. For large backfile conversion projects many users opt for a bureau service.

Document preparation The first step prior to scanning is to prepare the analogue documents. This is usually relatively straightforward. Documents may need to be removed from envelopes, and any staples or paper clips will need to be removed. Pages will be unfolded and laid flat, and there may be a need to insert header sheets at the start of each document. These header sheets will usually contain a barcode which simply indicates the start of a new document.

For backfile conversion the same preparation tasks will normally be required plus some additional tasks depending on how old the documents are, whether they are grouped in folders, and how they need to be indexed. Two or more header sheets may be needed – one at the folder level and one at the document. Documents may need to be sorted by size or by quality. Bound documents may need to be guillotined to remove the spine and documents will need to be placed in batches.

Scanning There are three types of scanners for scanning paper documents – rotary, flatbed and planetary scanners. Rotary scanners use a mechanical transport to feed single sheets through the machine. This allows them to operate at high speeds although they are less well suited to scanning damaged documents.

Flatbed scanners are like photocopiers – users can open the platen cover and feed each sheet manually for or stack single sheets in an automatic document feeder. Planetary scanners are used for scanning bound books or large format material. Fig. 3.4 shows a flatbed scanner with an automatic document feeder capable of handling documents up to A3 size.

Most users will need an A4 scanner, or an A3 scanner if they have outside originals to scan. Some scanners capture only one side of the page at a time (simplex) but most can scan both at once (duplex). Large format scanners can capture A2, A1 or A0 originals but the cost increases with size. There are specialist scanners for scanning all formats of microfilm, 35mm colour slides and other transparencies. There are also high volume scanners for scanning remittances including cheques and credit card vouchers.

Document throughput rates range from a few pages per minute to 100–200 pages per minute. The cost of the scanner usually increases with the rate of throughput. They can be divided into personal, workgroup, section or departmental, and production scanners. Multifunction devices will often be used at the personal and workgroup level. Average prices for workgroup scanners are £100–£200, departmental scanners £1,000–£2,000 and production devices £5,000–£50,000.

The higher the resolution of the scanner the better the quality of the image but the larger the file size, which can cause problems later when it comes to moving it around a network. 200dpi (dots per inch) is the preferred standard for most document capture applications with 300 or 400dpi for the scanning of poor quality originals or where recognition will be used for data capture. Some document scanners output black-and-white images only. Some output black-and-white or greyscale and some will

output colour, greyscale or black-and-white. Greyscale is used for scanning poor quality, low contrast originals. Colour scanners are used to capture colour graphics and photographs and where colour is important in the design of the document (e.g. colour forms). Many scanners are supplied with built-in image enhancement software to improve image quality from poor quality originals. Fig. 3.5 shows a planetary scanner specially designed for scanning bound books.



Fig 3.5
A planetary scanner designed to operate with bound books

It is impossible to guarantee high quality images at all times. Hence, some form of quality control is recommended when scanning vital documents. Some automatic quality assurance software can be purchased on high-end systems and selective manual checking can be combined with the indexing process.

There are a number of image file formats in use. You need to convert your images into a format that meets your requirements. Factors to consider include whether the images can be viewed on a browser or in your preferred image viewing/editing package, how much you want to reduce the size of the images by using compression (the smaller the image file the faster it will be transmitted), and whether you want to be certain that the image is a true facsimile of the original (important for legal documents).

Traditionally, black-and-white document images were compressed using the CCITT compression algorithms used in facsimile machines and stored as TIFF (Tagged Image File Format) images.

Colour images start as typically 8–32 times larger than black-and-white images so compression is even more important here. The Joint Photographic Experts Group (JPEG) have developed a number of compression algorithms for colour images and many users store their colour images as JPEG files. It is important to distinguish here between colour images of physical scenes such as the sea, the sky or a sunset, where lossy compression can be used (some data is lost), and images of colour documents (e.g. colour forms) where most users still require lossless compression (no data is lost) to ensure the legal admissibility of the image is not compromised. If you are scanning a large backfile of valuable documents in colour many users will scan them and create an archive image set which will either not be compressed at all or compressed using a lossless compression. They will then create a working copy of each image which will be held as compressed images. The smaller compressed files are perfectly adequate for daily use and can be retrieved and printed quickly. The archive set would only be retrieved in the event of a legal dispute or the need to demonstrate the integrity of the images.

LZW is a format often used for greyscale images. Two other important formats are GIF, which is supported natively by browsers, and PDF (portable document format) which is the format used by Adobe in Acrobat. There are several versions of PDF which equate to the various options available when scanning a document. PDF image stores an image only of the page. The next level of PDF is used if you have applied recognition to the page image. If the software was confident then it inserts the relevant character. If the software was not confident then it keeps a bit map image of the character it was trying to read. Finally, if you scan a complex document with a page comprising text, image and graphic zones then you split the image into zones and hold one zone as an image and another as text. There have recently been some further extensions to PDF including PDF/E for large format images including maps, plans and multi-layer drawings, and PDF/A for archival uses.

If you are scanning documents to load into an ECM system then you need to check carefully what formats the system will support natively. Some systems will allow you to store the images in any of the above formats and provide you with a viewer to view them direct. Others will only support a subset. Some ECM suppliers only see PDF as an output format. They will render an



platen cover and feed each sheet manually for or stack single sheets in an automatic document feeder. Planetary scanners are used for scanning bound books or large format material. Fig. 3.4 shows a flatbed scanner with

Fig 3.4
A modern flatbed scanner with automatic document feeder

Fig 3.6
Data and document
capture workflows

image stored as TIFF or GIF into PDF image for output but they do not store the image as a PDF file. If you asked a bureau to store all your images as PDF images this might mean a large conversion requirement when you load the images into the system. Always look at the complete picture when planning a scanning exercise – what do I need to scan, how do I want to process it, where do I want to load the images, how do I want to manage, search and view them? Only then will you be able to select the most appropriate formats.

Indexing and loading Prior to scanning you need to review the documents and decide how you want them to be organised and indexed in order to support your management and retrieval requirements. The range of indexing and classification techniques is reviewed in Sections 3.6 and 3.7 below. It is important at this point to recognise that you can save a lot of time and effort at the indexing stage if you capture that data when you prepare and scan the documents. Once you have guillotined them and taken them out of folders you will have lost a lot of contextual information which it may be difficult, if not impossible, to recover. So look at your documents first and work out how you can capture some of the vital data as you prepare and scan them.

As an example, you may be doing a backfile scanning project involving scanning all the documents held in 5,000 folders. Each folder may represent an insurance policy, a mortgage loan or a social services care file or any other type of case. On average there may be 100 documents in each folder but the total may vary considerably from 10 to 500.

At a minimum when scanning you may want to associate each image of each document scanned with the folder or the case identity it belonged to and you will want to keep track of the order in which you are scanning the documents in the folder, e.g. oldest first or newest first. You will want to be sure that every folder is scanned and that the case file value is captured one hundred per cent accurately. It is likely that you will have an application managing the cases and on a database each case or folder will have a unique identity. This may already be written on the folder or, if you are lucky, there may be a barcode on each folder that contains the identity.

To save indexing effort and improve quality then one approach would be to use the database application to print an eye readable and barcoded version of each case file value on a set of folder header sheets and to then use the title of the folder and the eye legible label to place the right header sheet in the front of each folder. You could also export this data and use it to bulk load the ECM system – in effect creating 5,000 empty folders in the ECM system one for each case file and titled with the unique identifier for the case file.

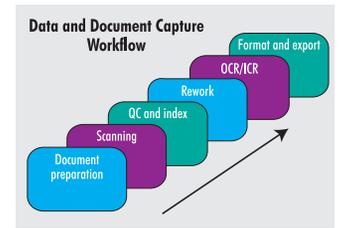
When you scan the documents you make each folder a batch, scan the header sheet first and then scan the oldest or the newest document. All the document images scanned are assigned to the required folder. In this example you are using the contextual data to avoid having to key in the case file reference value for each image. The case file value will always be accurate and you will be notified if you try and scan the same case folder twice or if, at the end of the process, you have not scanned any documents into one or more case files.

Clintech and other consultants help users to define their requirements for large backfile conversion projects in detail and this saves the client money and improves the quality of the results.

If you want to go further and index each document, then as each batch of documents is scanned it will be necessary to indicate the start of each new document and add metadata to each document. If all the documents are single-sided the system can automatically split documents, but if they are of variable length they need to be prepared by placing a barcode on the first page of each document or by inserting a header sheet in front of each document. That can represent a considerable overhead.

The next step (if recognition is not required to capture data from

the images) is to load the images and index data into the ECM solution. For ongoing capture this is a simple process. For backfile capture a bulk import needs to be planned to ensure the images and index data are provided in the format and sequence required for loading (Fig. 3.6).



One issue to consider is whether backfile conversion should be done in-house or via a bureau service. Large conversion projects need considerable management skills, extra equipment and take up a lot of space, thus a bureau may be preferable. Suppliers of document capture software, scanners and scanning bureau services can be found in the relevant directory sections.

Data capture

In addition to capturing images of the content of a document, it is often important to capture the full text or data from a document so it can be processed and reused. While the cost of computer hardware and software continues to fall, the cost of manual data entry increases at an alarming rate and there are significant accuracy issues with manual data capture. There are two key applications linked with scanning – full-text capture and forms processing – where developments in the technology can significantly reduce, if not eliminate, the volume of manual data entry.

Full-text capture Full-text capture takes the scanning and capture process a stage further. For content management there are three main options:

- (i) Take the document image, apply recognition software and load the images into the file server and the text into the full-text engine for searching. The user can search the content of the document and retrieve the images for viewing. The user cannot edit the document content but the image is a legally admissible facsimile of the original. This approach tends to be used in records management applications.
- (ii) Use more intelligent capture software such as Acrobat Capture from Adobe. In full PDF mode this divides an image into text and graphic zones and recognises the text and the type fonts to create an intelligent PDF document that can be searched and viewed but not easily edited. This approach can be used in knowledge management applications.
- (iii) Process the image, divide it into zones, recognise the text, capture the graphic and image zones, mark up the text using a mark-up language and tag the graphic and image files to the marked-up text. The text can be loaded into a full-text engine for searching and the user can edit the retrieved content. This approach is used in publishing and, hence, full content management applications to fully exploit the content. As the content is semi-structured and fully reusable it can be rendered in different formats for different delivery channels.

The cost of these three options is in reverse order of functionality as options (ii) and (iii) can involve significant manual processing depending on the quality and complexity of the documents.

Forms processing If organisations need to capture data from customers or contractors in remote locations then the traditional answer is to send them a paper form. Keying data from these forms into computer systems is a costly and error-prone business that most organisations would like to avoid. For internal applications it is possible to make the forms available on the intranet and move to electronic forms for applications such as requesting travel warrants, submitting expense claims, and completing timesheets.

As indicated in Section 3.5, many organisations are also now making full use of electronic forms to capture data online. The take up of electronic forms is high in many inhouse applications. One issue is that many members of the public still do not have regular access to the Internet and the public sector is obliged to provide them with the choice of online or paper forms. Hence for the next few years most organisations will have to plan for a hybrid forms processing requirement and operate a paper forms processing system alongside their electronic forms.

Fig 3.7
Paper forms processing steps

Paper forms processing starts with the design of the paper form (Fig. 3.7) which needs to be optimised for automated data capture. When the forms come into an organisation they need to be scanned and converted into digital images. The images are then processed, the form templates recognised and the boxes located. The data is recognised and extracted from each box, validated and either accepted or rejected based on confidence levels and business rules. Where the data is rejected, the software presents an image of the box and prompts the operator to enter the correct data via key from image (KFI) software. When all the data is captured the images of the forms are archived and the data exported to the business application for loading and additional validation.

The accuracy of forms processing applications depends on how complex the data entry requirements are, how well designed the forms are, and how much scope there is for validating the data. Generally speaking, such applications aim to automate 70–90 per cent of the data capture process. In large-scale applications the payback can be very significant indeed.

The 2001 UK Census used paper forms processing technology with approximately 500 million pages scanned and hundreds of gigabytes of data extracted automatically. Multiple-choice examination papers, most of the lifestyle surveys that are dropped through letterboxes and some government forms (Fig. 3.8) are processed using forms processing software.

Data capture applications lend themselves to outsourcing through data capture bureaux. An interesting new development in this area is intelligent document capture, where data can be captured automatically from documents that are less structured and uniform than traditional turnaround forms.

3.2.2 Digital content capture

When a new ECM solution is implemented, there will be legacy digital content held throughout the organisation that may need to be loaded into the new system. This includes e-mails and attachments, content created on office applications and content created on old applications that may no longer be supported.

If the content is sufficiently valuable then organisations will need facilities to load that content into the new system. Content created on office applications supported on the new system can be opened and then indexed into the new system as if it had just been created. Increasingly, solutions have facilities for capturing e-mails so existing e-mails can also be opened and saved into the new system and the contextual data captured as metadata.

Content created in old applications may have to be saved in interchange formats and then loaded into the new system. Examples include PostScript, PDF, RTF, ASCII and TIFF. When planning the implementation of a new ECM solution, it is important to formulate a data migration plan.

Migration of content can become a time consuming and costly exercise so it is important to manage expectations. Many users currently hold paper folders containing prints of documents created inhouse and will also keep the digital version of those documents on their personal or shared drive space. If the current records management policy stated that the master was the paper record then the value of the digital version is questionable unless it serves a function as a template.

One successful strategy is to make the shared and personal drives read-only for 6–12 months once the new system is installed so users have their new folder structure set up on the new system and, if required, they can access the shared drive, open a document and then save it into the relevant new folder. At the end of that period the old material that has not been accessed and transferred will be archived and eventually deleted.

If you are converting formats then, depending on the importance of the material, it is advisable to run tests and check that no content or formatting data is lost.

3.3 Content Creation

The bulk of the documents and content to be managed on ECM solutions are created electronically and, on average, 50–60 per cent are created internally. Hence it is vital that CM solutions are fully integrated with the applications used to create content.

The majority of corporate documents are still created on office suites, e-mail software, graphics packages, CAD, digital video and audio packages, etc. Office applications have been interfaced to document management systems for many years so all the content created on those packages can be saved directly into the system and managed from creation to disposal. Indeed, such systems can be set up to make it impossible to save the content anywhere other than in the new system. Increasingly, systems are also designed to integrate closely with popular e-mail software so e-mails can be indexed and handled as documents or records. This is an important facility in any ECM solution.

Where a small subset of these documents are to be published on a corporate intranet or Internet site, many organisations set up a separate process to enable the intranet or Internet team to identify and retrieve documents, edit them, transform them to HTML format and approve them for publication.

Increasingly, in an integrated ECM solution, authors will be required to indicate when creating the content, whether the content object is to be published on a website or not. If it is, then there is a choice available. With the first option the author can continue to use the office application, if preferred, and then the process of editing, reformatting and approving it can be handled automatically under process management control.

Alternatively, and increasingly, where several authors are writing content for the Web then there are a number of options available to control that process. For relatively simple content the authors can be provided with templates. The template will define the structure of the content including the mark-up, the title, the body text, etc. The text will be rendered into HTML format ready for publishing to the website and that content file will be logged on the CM system.

The use of templates will grow with the increase in web publishing but template input is not always ideal for the input of complex text documents. Hence WCM systems can support content creation in office applications directly from a web browser or from HTML, and increasingly XML editors or applications for streaming video or audio data. Most WCM suppliers support HTML and XML editors and offer content transformation facilities so existing content can be converted into HTML.

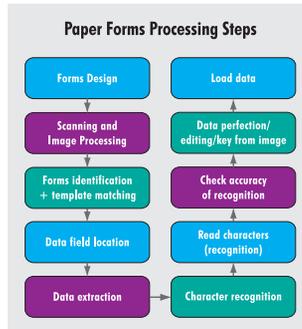


Fig 3.8
Form designed for automatic processing of hand printed data

For the foreseeable future there will be at least two routes. You can create the content in your preferred office application and then it will be transformed or you can opt to use web content creation tools and templates as appropriate and hence produce content that can be loaded directly. The latter approach is now widely used in organisations that publish considerable volumes of material via the Internet.

Design of web page layout is a separate activity requiring special skills so that is usually confined to the web team and is covered in Section 3.14 below. Web pages can be defined and held as templates on an ECM system.

3.4 Content Syndication

Syndication is a content capture process offered by ECM and WCM suppliers to enable users to gather selected content from third-party sources over the Internet. Content syndication enables users to set up systems to go out and gather dynamic content that is updated on a regular basis on selected websites. This may include news feeds from agencies such as Reuters and stock exchange data plus streaming video content from broadcasters and images from the providers of image library services, etc. In order for such a sophisticated process to work successfully content interchange standards have to be widely agreed and supported. Many of the suppliers of these content feeds will be commercial publishers looking to charge for the provision of the service. Hence they will require digital asset and rights management software, see Section 3.10 below.

With the Internet being used increasingly for electronic commerce, vital new standards such as XML allow computers to interoperate and exchange information. Therefore, data can be exchanged and rendered onto pages on websites to give up-to-date pricing information, stock availability, timetables, job vacancies, etc. So we have moved rapidly from being able to access static content on websites to being able to do business with organisations from their websites 24 hours a day. XML will increasingly be used to replace paper orders, invoices, policies, premiums, receipts, etc.

Data will be rendered onto electronic documents that can be e-mailed to clients or printed out and despatched. As Tom Jenkins points out in his excellent book on content management⁽⁶⁾, as a website continues to develop, dynamic content plays an increasingly important part and the integration capabilities of the WCM software acquire central importance. The more dynamic a website becomes the more flexible the WCM system must be to support external applications, products or interfaces. WCM solutions can and increasingly will need to integrate with ERP systems to push information to the Web.

3.5 Electronic Forms for Data Capture

In Section 3.2, above, we described paper forms processing software that allows users to scan and digitise a paper form, recognise the form template, identify capture zones and automate the lifting of data from the capture zones, validate the data and load it into a database. Such systems provide users with an image of the original form for legal purposes and the data for loading into a database, for example.

Increasingly, users are looking to replace paper forms with electronic forms that allow them to enter data online, validate the data and then load it into a database. Such electronic forms software is provided bundled with business administration systems. It is also provided as part of workflow and collaboration packages. Finally, there are dedicated suppliers of electronic forms software.

Electronic forms have been widely used inhouse in organisations for years. With the Internet it is possible to place electronic forms on the website and ask customers and contractors to complete them via a browser. Such an approach now forms the base for most business-to-consumer (B2C) electronic commerce applications today. Such electronic forms solutions have to provide:

- a design module to design the most appropriate form for each application
- a data entry module with built-in validation and security
- a print module for applications where users still need to print the form before completion
- a database connectivity module for online validation via databases
- a workflow module for routing and back-end/exception processing.

It is important to design forms that engage the user and are pleasant to complete but that also validate the data and screen out as many errors as possible. Where required for legal or audit purposes, the data entered by an individual can be captured and placed on the form template and an electronic image of that form stored so, just as with paper forms processing, users can be provided with an electronic image of the completed form and with the data for loading into a databases. Leading suppliers include Adobe, IBM and Microsoft.

3.6 Indexing

One key function that any ECM solution must support is the indexing of the content and documents being loaded into the system, or the association of key metadata with each content file held. What distinguishes an ECM solution from a traditional file management system is the amount of metadata that can be attached to the content. This data will be used to organise, control and uniquely identify each content object on the system. This provides one of the real value-added features of ECM. The process of entering or deriving that metadata and attaching it to the content files is called indexing.

There are two main reasons why organisations need to attach metadata to their content. The first is to control and manage it. The second is to help users to search for, access and retrieve the content – in other words, subject indexing (Fig. 3.9). In ECM solutions both types of indexing will be required.

3.6.1 Structured indexing

Most traditional DIP and EDM systems have been used in back-office functions to control and manage documents while they are being created and edited or while they are being used in one of a number of core business processes. Hence, structured indexing has been vital and the index data has been managed in a relational database. Most CM and all WCM systems are geared to the front office and to delivering content to end users. A key here is to allow users to search for and access documents that contain information about the subjects they are interested in. For subject indexing there are several content indexing options available, including structured indexing, unstructured or free text indexing and hypertext linking (Fig. 3.10).

Control data is required to:

- uniquely identify or register each content file on the system
- control access to each content file
- define the links and relationships between content objects
- organise the content files in a storage structure
- archive and restore content
- track every transaction on the content file throughout its life

Why index?

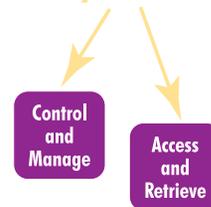


Fig 3.9
Index data is used to control and access content

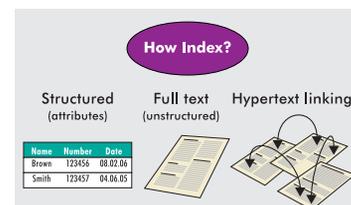


Fig 3.10
Options for subject indexing

Fig 3.12
Hierarchical classification scheme

- track the status of the content file
- control the content change process through check out/check in and versioning.

In most systems the control metadata will be entered into a series of fields and managed in a relational database.

The second category of indexing data is that which is entered to help users search for and identify specific content files or content files that contain information on a specific subject. There are several approaches to subject indexing. First, the same structured indexing approach described above can be applied. Second, free-text or full-text indexing is employed. Third, is a technique called hypertext linking that is widely used on the Web to help users to browse through libraries of digital documents.

Any ECM solution should be able to make use of a corporate thesaurus as an aid to consistency in subject indexing. A corporate thesaurus or a controlled vocabulary of terms is designed to ensure that authors, indexers and users employ the same terms to represent the same concepts. In its simplest form a thesaurus comprises a list of controlled or preferred terms and a series of cross-references or pointers indicating non-preferred terms and the preferred terms that should be used instead of them, or the relationships that exist between the preferred terms.

3.6.2 Full-text indexing

Where subject searching is required, the user is often less interested in locating a specific document and more interested in finding content concerning a particular subject irrespective of the documents in which it is held (Fig. 3.11). A full-text indexing system uses all the text available to it to index each content file in the database. If the content files do not contain searchable text then the data has to be keyed in or downloaded from an existing database.

Depending on the importance of the content, the next step would be to add an abstract of the content to the basic data, and then to enter the full text itself. Clearly, if the content is held in digital format then all the text can be used to index it.

Depending on the importance of the content, the next step would be to add an abstract of the content to the basic data, and then to enter the full text itself. Clearly, if the content is held in digital format then all the text can be used to index it.

3.6.3 Hypertext linking

The third option, hypertext linking, is far from a new idea. Hypertext basically involves non-sequential reading and writing within electronic documents. Authors are able to link concepts directly, creating trails of associations between ideas, either within a single document or across documents, which may be followed by readers. The links are essentially the same as those used in printed documents, cross-references, citations, footnotes, annotations, index terms, definitions, etc. but now invoked within an interactive computer system. The links may be hierarchical, leading the user to material at ever-increasing degrees of detail, or lateral, using some form of cross-reference.

Hypertext links are vital to allow front-office users to navigate structured websites by following the links.

3.7 Classification

One key element of the indexing process is classification. This is so important that it is dealt with under a separate section heading. Indeed, when considering how to manage and index information, organisations should always start by considering the classification scheme.

Classification is nothing new. Libraries have been classifying their books for hundreds of years, and supermarkets classify their goods, as do mail order companies. However, classification is a

major undertaking and organisations need to carefully consider what they are trying to achieve and look at best practice, before embarking on what will be a costly exercise.

Best practice for information management is covered in Chapter 4. There is general agreement that organisations need to divide their information into a number of classes and that these classes are best organised in a multi-level hierarchy or taxonomy (Fig. 3.12). Increasingly, most organisations are looking to classify their information and records on the basis of functions, activities and transactions or processes, with functions being the top level class.

Writing on the subject, Christopher Olsen⁽¹⁾, who oversees the CIA's RM program, stated that everything in the Agency can be aligned under five major categories: administration, policy, intelligence, operations and projects, and programmes. If they can do it then so can everyone else!

First, there must be agreement on what is being classified. Most large organisations today have multiple information collections or silos and each may well be classified already. If you plan to move towards one ECM solution, do you want to implement just one classification scheme across your entire organisation? In the public sector and in heavily regulated areas of the private sector there is a general consensus that all the records of the organisation should be managed within one corporate, functions-based classification scheme if at all possible.

The National Archives (TNA) and the European Union (MoReq) have published requirements and guidelines designed to assist large organisations in developing such classification schemes and populating them with folders, folder parts, records and documents. However, these allow for multiple schemes where required.

TNA and MoReq specifications for ERM, while mandating a classification scheme, also allow for subject indexing at the folder and document/record level. In order to support consistent subject indexing, organisations have developed controlled sets of terms, thesauri or category lists. In the public sector there is now the Integrated Public Sector Vocabulary⁽²⁾ (IPSV). The Local Authority special interest group of the Records Management Society (RMS) has developed a Local Government Classification Scheme (LGCS) which provides a function-based approach to developing a classification scheme for local authorities. JISC has sponsored similar work for higher education institutions.

Any ECM solution in future should provide the metadata needed to support the classification and indexing of folders and documents. Ideally, the full-text engines supplied as part of the ECM and EDRM solution should also provide auto-categorisation facilities so that these can be applied where they make sense and provide a more reliable alternative to manual indexing and classification. Exciting developments in the document and data capture field may mean that future systems will be capable of reliably scanning and auto-categorising all incoming post.

3.8 File and Metadata Management

The most basic function, which any comprehensive ECM solution should support, is to organise, store and control access to the content objects or files in one or more repositories (Fig. 3.13). As outlined in Chapter 2, Section 2.3, the ECM solution can take advantage of existing storage management subsystems in your organisation or you may wish to combine the procurement of an ECM solution with the procurement of a

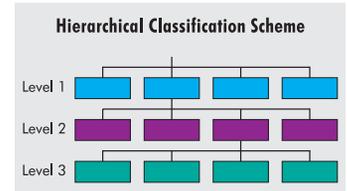
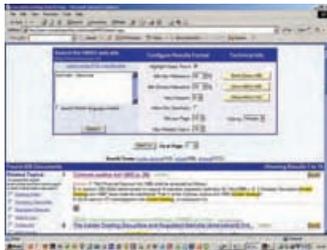


Fig 3.11
Full-text searching used to search the content of a web site



Where subject searching is required, the user is often less interested in locating a specific document and more interested in finding content concerning a particular subject irrespective of the documents in which it is held (Fig. 3.11). A full-text indexing system uses all the text available to it to index each content file in the database. If the content files do not contain searchable text then the data has to be keyed in or downloaded from an existing database.

Depending on the importance of the content, the next step would be to add an abstract of the content to the basic data, and then to enter the full text itself. Clearly, if the content is held in digital format then all the text can be used to index it.

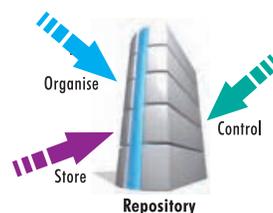


Fig 3.13
ECM repository management

Fig 3.14

Metadata should be attached to image files as soon as possible

new storage management system.

An ECM solution's first function is to assist in organising and managing content. Any ECM solution will manage content plus associated metadata about each content object or file managed on the system. The metadata helps the users and system administrators to: uniquely identify or register each file, track the relationships between files, control the files, track the status of files, retrieve files using a range of search criteria, restrict access to the files based on roles and responsibilities and maintain the integrity of the files.

In addition to organising content, organisations need to impose a number of controls on that content to ensure that it is not deleted or corrupted inadvertently, and to automate some of the labour-intensive tasks that are typically associated with managing content through its life. A good ECM solution should manage vital content throughout its life from creation or capture through to eventual destruction or long-term preservation. In order to automate many of these functions, key metadata has to be gathered about all the content managed by the system.

ECM solutions need to provide sophisticated levels of access control and privileges. As with all computer systems there need to be facilities to register users, assign them a password and unique user ID and assign them to one or more groups or roles. There also need to be facilities to define access rights and privileges. This includes control over who can access which files, who has read-only access, who can annotate files, who can edit files and enter new files into the system and, most significantly, who can delete files. It also covers who can enter attribute data and amend or delete attribute data and who can define new users.

Sections 3.2–3.5, above, indicate the range of input options that most ECM solutions should support. They should also support mass export facilities so that, if required, all or a defined subset of content files can be exported together with all or a subset of the attribute data held for each file. This is particularly vital should the organisation wish to change suppliers.

To look further into some of the management facilities it is helpful to split our overall ECM solution up and look at some of the document management, content management and records management facilities that may be required.

For the increasing number of applications where content is to be published on a website there is an additional set of website design and web content publishing requirements. These are reviewed separately in Sections 3.13–3.16, below.

3.8.1 Document management

In Section 2.2 we traced the separate development of document image processing systems and electronic document management systems and how they merged to form integrated document management solutions. DIP and EDM themselves have slightly different management requirements so it is worth considering them separately.

3.8.1.1 Image management

DIP systems were designed to take the paper out of offices. Incoming paper would be scanned and indexed, then digital images were routed to staff to view and process.

Today, instead of using separate DIP systems each with their own capture subsystem, most suppliers offer an integrated document management system as part of their ECM solution and use one of a few generic document capture subsystems to provide the capture facilities as detailed in Section 3.2.

Digital images, on their own, cannot be read by computers so it is vital to attach metadata to the images as soon as they are scanned to determine how many images belong to one document and to capture data such as the date when the document was received, the author, recipient, document type, etc. (Fig. 3.14). In most cases DIP was linked to workflow management software so that whole business processes such as processing

new business or handling claims could be automated. The process was modelled, the steps identified and then the images were captured and routed to the right users to carry out each pre-arranged step of the process. To do this



it was necessary to capture additional metadata covering the status of the document and, in specific applications, the client number or the loan or policy number. All the images relating to a document were usually stored in a single computer file and then grouped into folders by predetermined metadata.

To be fully effective a lot of DIP systems also needed to be tightly interfaced with line-of-business systems such as policy or mortgage administration systems and ERP systems. The techniques for achieving this are reviewed in Section 3.9 below.

By their nature, most digital images of paper are largely static or archive files so, once captured, the main requirement was to store the image files and metadata and ensure that the images could be viewed when required. Most DIP systems will support a number of image viewers that allow users to view the images, browse between the images that comprise a document, rotate the images, enlarge or reduce the images and, of course, print them out if required. Digital images are typically compressed for storage and transmission so the image viewers will decompress the image and most will allow users to view the image as black-and-white, greyscale or colour.

Authorised users may need access to image annotation facilities. Annotation allows users to attach notes, comments and graphical mark-ups to existing image files without amending the original – as distinct from editing, which does result in the file being changed. Annotations are treated like separate layers linked to the source content file so authorised users can then see the original image or the annotated image as required.

It is less common in an office environment for users to be provided with image editing facilities but these can be provided and where they are needed the management requirements are the same as for the EDM solutions described below. Examples where image editing is commonly used include planning and CAD where images of old paper designs may be annotated using raster or vector techniques and then the user may wish to 'burn' the annotation into the original image to produce an updated image.

3.8.1.2 Electronic document management

EDM systems were developed in the early 1990s to help manage the vast numbers of electronic documents being created on personal computers and held on personal or shared drives. The main requirement was to improve access to these documents, preserve them from accidental overwriting, control who could access them and control the process of creating, updating, approving and issuing new versions of documents so people could be sure they were working with the most up-to-date version.

EDM systems supported collaborative working on complex documents with teams sharing, accessing and updating content that would be brought together to form documents.

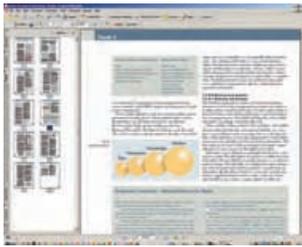
Most electronic documents contained searchable text and so, unlike images, they could be searched using text retrieval software. Consequently, EDM suppliers incorporated text searching in their solutions. However, most EDM applications also required metadata to be attached to documents to uniquely identify them and allow them to be searched by author, title, date, etc.

Hence, all EDM solutions provide a range of controls over how documents can be edited and loaded back into the system. There is a need to avoid editing conflicts and to alert users that content is being edited and hence may no longer be up-to-date. Many systems impose a library model where content must be checked out to be edited then checked back in again.

Compared with file systems they also prevent overwriting and insist that if content is checked back in, it is assigned a new version number. With most systems, when content is checked out a lock is placed on that content which prevents anyone else from editing it until the first edit is complete. Users may view the content but will usually be alerted to the fact that it is in edit.

As with DIP systems, EDM solutions were often provided with workflow management facilities so the process of checking out a document, editing it, having the change reviewed and approved and issuing it as a new version could be automated. The requirements here were not as demanding as with DIP and so the suppliers often developed and incorporated their own workflow management software into the solution.

Everyone is used to viewing content files in their native application software. To meet back-office document management requirements, EDM systems support this option of launching the



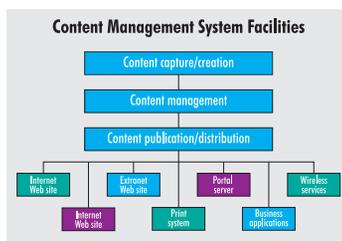
native application. Another option supported is to store the files in their native formats but employ universal file-viewer software that users can launch when they wish to view or print a file, and that will display it as if it were the original application. A third option is to set up the system so that all content

saved to the repository is held in two formats: its native format for back-office processing and a formatted format such as Adobe's Acrobat PDF if it is simply to be viewed and printed (Fig. 3.15).

Editing in an EDM environment is carried out via the application software that was used to create the file and makes use of the controls described above.

3.8.2 Content management

As already outlined in Section 2.2, the advent of electronic publishing created the need for advanced content management systems that could manage content in a neutral format and then render it into a number of styles as required by different delivery channels through the use of document type definitions (DTD), markup languages and style sheets. In the 1980s and 1990s these were very specialised requirements. With the advent of the Internet and the Web such requirements are now mainstream.



Content management (CM) systems were designed to help organisations exploit, reuse and publish their content. A CM solution is designed to keep the content separate from the delivery mechanism or the presentation format (Fig. 3.16).

With a DIP or simple EDM system you have no choice about how you view the document: you see an image of a page in an image viewer or you see the native text in a word processor, etc. It is assumed that you have a PC running MS-Windows, a 15in or 17in display and that the image or text is displayed for you using the native application or an image viewer.

With a CM system the content can be marked up using SGML or HTML or, increasingly, XML and then a document type definition and one or more style sheets determine how that content will be rendered on one or many delivery devices. The delivery device can be a PC display, mobile telephone screen, PDA screen, different paper formats, etc.

Hence a CM system treats content more like data in a database. The content can be held in a neutral format and marked up so it can be reused as an asset in a number of different ways. A CM system manages semi-structured information to create a

re-usable resource that enables an organisation to fully exploit that content just like a database enables them to fully exploit their structured data.

CM systems should be capable of managing all content from creation or capture through to eventual destruction. They should provide facilities for capturing, managing and providing access to the content. They should provide facilities for processing the content and for publishing it on internal or external websites, in printed form, on CD-ROM or via PDAs and mobile phones as required. CM systems also need to be capable of managing constantly changing (dynamic) content.

One of the key features supported by CM systems is assembly: the ability to assemble a document from all its component content objects and render it on screen, on paper or however it is required to be rendered in future.

For many years CM was a relatively specialised marketplace supporting large commercial or corporate publishers. The advent of the web has widened the market for CM or at least for a subset of CM called web content management. The additional facilities required by WCM systems are reviewed in Sections 3.13–3.14, below.

3.8.3 Electronic records management

As already described in Section 2.2, requirements for ERM software were specified by The National Archives in the UK⁽³⁾, by the European Union⁽⁴⁾ and by the Department of Defense⁽⁵⁾ in the US. Software was initially developed to operate independently but, very quickly, the EDM system suppliers and then the ECM solution providers either acquired the software or developed their own ERM modules in order to provide integrated solutions.

The detailed ERM requirements are reviewed in Chapter 4. The main additional management requirements include the following.

First, it is a requirement that a subset of documents can be captured and declared to be records and from that point on their content and metadata is controlled and cannot be changed. In the case of a dedicated ERM solution all documents entered onto the system would be declared as records. In the case of an integrated EDRM or ECM solution then a subset of the documents managed on the system would be declared as records.

Second, an ERM system must provide full support for the structuring and categorisation of records so that all relevant records are brought together at the same point in a corporate classification scheme or file plan for consistent access and lifecycle management. The National Archives file plan defines a hierarchy of classes, folders, folder parts, documents/records and components (Fig. 3.17). Specific metadata is mandated or recommended at the class, folder, part and record level.

Third, an ERM system must support the maintenance of sustainable records over time, to retain only those that should be kept and to manage the controlled disposal of those no longer needed. This means that retention and review schedules have to be defined at the folder or record level and a series of processes supported on the system to support the controlled review, destruction or export of records.

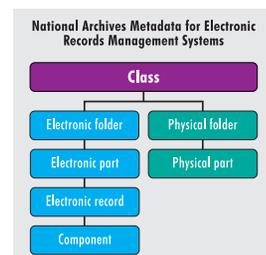
Fourth, most ERM systems will be required to manage electronic records, paper records and hybrid records. The metadata held at the class and folder and part level is similar but in most cases paper documents will not be individually indexed on the system unless they are of considerable value. The system will track the physical location of the paper records in boxes on shelves in specific stores. The system will also track the status or location of paper folders – in store, checked out to a user, missing, etc.

Fifth, the requirements call for electronic preservation and

Fig 3.15
A multi-page document viewed in PDF format

Fig 3.16
Content management system facilities

Fig 3.17
The National Archives metadata for ERM systems



archiving facilities. These include support for the migration of content to avoid obsolescence where the originating application software supplier no longer supports the software or the rendition of the content into a format such as PDF. They would also support moving sets of records into a dedicated electronic archive. A lot of work is being done to define best practice in this area and in Chapter 4 we look at emerging standards for electronic archives.

Ten years ago most EDM systems would manage the structured metadata in a relational database and the content files in a file management system. Today, and increasingly in future, all the major relational database providers including Oracle, Microsoft and IBM have extended their relational database engines to manage content objects as well as structured data. So users have a choice of managing their content files in a file system or in an extended database. Oracle in particular is developing a range of records management as well as content management facilities as extensions to their new enterprise database management engine. We look at these developments in Chapter 8.

Fig 3.18
Screenshot of digital asset
management system

3.9 Application Integration

Today most users will not be looking to install an ECM solution in isolation but to integrate it with their entire information infrastructure including their Microsoft Office, back-office and CRM applications. The business systems hold the key data and the ECM system holds the back up and supporting content so that, clearly, the two have to be designed to work together.

There are a wide range of business administration systems in organisations today. They include bespoke systems developed in-house, best-of-breed package solutions implemented in one area of the business, or enterprise-wide systems – most notably the ERP systems provided by companies such as SAP and Oracle.

Many bespoke systems have been replaced due to the cost of supporting them but many more have been maintained due to the high cost of a complete replacement. In such cases there is little scope for a tight integration with the ECM solution due to the costs and risks associated with making any changes to the bespoke system. Many organisations opt for integration at the screen level in these cases. If the bespoke system is a customer administration system, integration allows the user to access a customer record via the administration window then switches to viewing the customer folder in the content window that corresponds with the customer number in the customer database.

Where the policy is best-of-breed, the organisation will have many different administration systems and, if an enterprise-wide rollout of ECM is embarked upon, each administration system will have to be integrated. The ECM solution should be provided with open documented application programming interfaces (APIs) to all the ECM functions so that the two systems can be fully integrated if required. Users of the existing business administration systems will then be able to call up and process all the content as required from within the business administration systems. Provided the systems both use standard SQL and ODBC-compliant databases then the two databases can be kept synchronised.

One traditional option in these first two cases has been to implement the ECM solution then use business process or workflow management (BPM/WFM) software to control the business process and create the links between the business administration system and the ECM solution. In this case the user interacts with the workflow software, which brings up the relevant data entry screens for amending a customer data record and displays the relevant content from the customer content folder so that the user can view and check the new data to be entered. The BPM/WFM software acts as a bridge between the user and the different systems needed to carry out their role in the process.

Where an organisation is rolling out an enterprise resource planning (ERP) system and an ECM solution the two can, with careful planning, be closely integrated. The same integration approach can be replicated in applications such as finance and

human resources. Not surprisingly, a number of the major ECM suppliers have strategic alliances with the ERP suppliers and the ERP suppliers are themselves developing ECM solutions.

Tom Jenkins sums up the requirement very effectively:⁽⁶⁾ “To maximise its effectiveness, organisations need to connect content to the appropriate business processes – and make it automatically accessible to anyone involved in the process”.

3.10 Digital Asset Management

Another module offered in many integrated ECM solutions is digital asset management (DAM) and digital rights management (DRM) software. These are aimed at organisations that own or manage what are sometimes referred to as rich digital assets including images, audio tracks, video clips or collections of graphics, broadcast news, or similar content – all of which is marketed to other organisations on a commercial basis.

The owners of the assets need software to manage the assets, to help potential customers to identify the assets and then to make the assets available in the required format (Fig. 3.18). The more flexible the output options, the greater the chance of a sale.



Another term for digital asset management is media asset management. A digital asset is any digital content that has value. A digital asset represents the asset's content and metadata that typically includes information about the format, the rights/permissions and the usage history. In its early life DAM was used primarily by video production, printing and publishing departments. The Internet revolution has made DAM much more widely applicable. DAM now allows organisations to manage large collections of diverse content centrally, and prepare and stage that content for delivery via digital distribution channels. The Digital Media Resources Group at Penn State University defines DAM as follows: 'DAM ingests, indexes, categorises, secures, searches, transforms, assembles and exports content that has monetary or cultural value. The fact that an asset is represented digitally presents many opportunities for revenue generation and operating efficiency. This is what defines DAM and distinguishes it from ECM in general'.

The DMR Group define seven core steps in the DAM process:

- At creation an artist, writer or filmmaker creates new content
- The content is indexed and the metadata does not just describe when it was created it can be used to interpret and catalogue the content, e.g. a storyboard of key frames from a streaming MPEG-2 video
- The content is stored
- When required the content is delivered in the required format
- The content is resold
- The content is reused as required
- The content is reviewed.

So DAM is used to manage rich multimedia formats and, in most cases, the owners want to be able to charge the user for access and to prevent them from gaining unlawful access. That is where digital rights management comes in. The objective of DRM is to give customers what they want (image, article, etc.) when they want it (one time use, subscription, redistribution rights, etc.), how they want it (HTML, PDF, GIF, etc.), where they want it (PC, PDA, cell phone, paper, etc.) and at a price they want to pay (pay per view, multi-subscription rates, try before buy, etc) in an easy way.

From a publisher or asset owner's perspective DRM needs to cover content reuse, security of rights protection against piracy, etc. There are lots of different views about the benefits and viability of DRM. You are referred to three websites for more information⁽⁷⁾. Someone in your organisation will probably need to make use of such software. If so, it will be worth checking if your shortlist of

ECM suppliers provide a DAM module.

3.11 Application Development and Administration

3.11.1 Application development

Although most organisations will undoubtedly use a systems integrator or the main supplier to implement their preferred solution and integrate all the component parts, at some point they may need to develop new applications and will almost certainly need to administer the solution once it is fully implemented.

Time and space do not allow a consideration of all the functions required here or all the issues that may be faced, but organisations certainly need to consider their requirements carefully in this area and ensure that the solution is provided with a full application development environment and a comprehensive set of administration tools.

A major ECM solution should be provided with a comprehensive application development environment for developing and configuring applications. It should include visual editors that are user friendly and intuitive and that support integration with commonly used application development tools. API templates and workflow templates should be provided. The suppliers should also, of course, provide a full range of training courses along with supporting documentation for developers and large end users wishing to do their own development.

3.11.2 Administration functions

Administrative functions to be supported will include:

- defining users and their roles, access rights and privileges
- defining the classification scheme to the system and ongoing configuration control/maintenance
- administering workflows and changing process definitions and business rules in a controlled way
- defining, running, maintaining and modifying key system reports
- supporting multi-server architectures
- roll-back and recovery in the event of faults when content is being distributed to servers, etc.
- monitoring the usage of content on the websites and archiving old or infrequently-used content
- backing up the content objects and metadata in the repository
- archiving the content objects and metadata
- controlling the mass import and export of content and metadata as required
- maintaining a complete log and audit trail of user transactions on the managed content
- keeping the repository and the web servers in synchronisation
- preserving electronic records via migration and other agreed preservation strategies.

Administering EDM systems has proved challenging for many users. It is clear that administering ECM solutions will be a very complex and demanding task. Administration should, therefore, be covered in detail in the statement of requirements (SOR).

3.12 Searching and Retrieval

A core attribute of any ECM solution is to improve access to the content held. Core technologies include searching and the use of portals (Fig. 3.19).

The ECM solution should provide query facilities that allow users (novice, experienced and administrators) to search for content files based on as much as possible of the information held about them on the system. This will include the structured metadata, the full text where it is

available in a searchable form and the hypertext links.

When searching on structured attributes, novice users will require a form-based interface or a simple query-by-example interface where they are prompted to enter the attributes to be matched in specific fields. Structured searching is ideal when back office staff are looking for a specific document that they know exists in the library or for all the documents by a specific author.

Content or full-text searching is ideal when users are looking for documents on a particular subject. They can enter any word or combination of words and retrieve all documents that contain that word or combination of words. Increasingly, modern search engines support natural language searching so users do not have to learn Boolean operators. Many search engines also contain fuzzy logic facilities to overcome poor spellings and they employ algorithms that can expand the search terms used to locate all related concepts. New advances in search engines include the ability to parse and search against non-textual assets, such as images and video, and the ability to profile users based on which hits users opt to retrieve.

ECM solutions need to support full-text searching alongside structured searching. Most of the major suppliers use the leading third party search engines. Indeed, many have acquired the suppliers of those engines. Users should be able to construct hybrid searches that combine structured attributes and full-text searching. This is a powerful combination where the structured attributes are used to limit the scope of the search and then the flexibility of full-text retrieval is employed to find all the relevant content within the limits prescribed.

Systems that meet TNA requirements for electronic records management will provide a corporate classification scheme and a file plan that will comprise classes, folders, folder parts, documents/records and components or content objects. Users can use the classification scheme to navigate around the content library and identify the relevant folders and records within them.

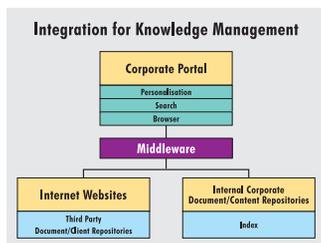
Any ECM solution will need to provide all levels of users with browser-based access to the content they are authorised to access and most suppliers offer their own portal. The Web is based around a standard browser that effectively provides a gateway into the world of knowledge stored on all the websites on the Internet. Today, all ECM solutions have embraced this technology so users can use one interface to access the information held on their ECM solution and all the relevant information held outside on third-party websites. Raw search engines have also developed into public portals – literally software designed to act as a gateway to the world of knowledge held on the Web. Companies such as Google, Yahoo with myYahoo and Microsoft provide personalisation features that enable users to configure a personal page to contain selected links to sites, information and applications.

Most of the ECM solution providers offer their own portals to provide users with a secure and single point of access to information, people and business processes in a way that can be personalised to their roles, responsibilities and individual requirements. Key components include the portlet, gadget and widget programmes that present information from another application or database and the portal servers that provide core services including application connectivity, integration and presentation.

Portals enable organisations to control the access to and distribution of information via a unified point. In a large ECM solution the portal provides a single way into the document and content repositories and a range of applications. Used alongside the search technology described above, portals provide users with their own personalised view of the information held in the ECM solution and outside it.

For knowledge management purposes, portals enable users to not only search content libraries and third-party websites simultaneously but also to create selective dissemination of information (SDI) services. Users can define the subjects, the libraries and the websites they are interested in. The portal will then track these

Fig 3.19
Integration for knowledge
management



libraries and sites, and will alert users when new content is added which meets their subject interest profile.

3.13 Content Distribution

The next area to consider is how to distribute and publish key subsets of the content sitting in the ECM repository(ies) in a form that will make it easily available for use by customers, partners and employees (Fig. 3.20). An ECM solution needs a powerful



mechanism to allow it to publish and distribute approved content to the right physical location and the right logical application including web servers, portals, business applications, print servers and other output options. An ECM solution should provide

users with a single user interface from which they select content and publish it to selected delivery platforms. The user should be able to select a logical publication, which might comprise a website or a print publication, and the software should then be capable of handling all the complex actions needed to distribute that content to the right physical locations and applications.

The content will often be targeted at different audiences and each audience will have its own preferred delivery mechanism, e.g. Internet website for customers, extranet website for partners, intranet website for employees and printed publications for another set of customers. Content for commercial publication would be marked up and held in a neutral format so that it can be processed and presented across multiple presentation platforms including web browsers, wireless devices and pre-press/print environments using different style sheets.

One of the key requirements for an integrated ECM solution is that all content is held in the required format in the repository(ies) and then retrieved, rendered and distributed in the required delivery format to the delivery platforms that serve a specific audience. Any changes made to the content source needs to be automatically reflected in the different locations where the content is used.

To guarantee delivery of content via an ECM solution, the transport of the content across the network should be transactional, where the transaction is successful only when confirmation is received that the content has been successfully delivered to all the different locations. The actual delivery of the published content to the end users will be performed online by a range of standard web, application, portal and e-commerce servers and offline by print systems as required.

Most WCM suppliers use standard web, application and portal server infrastructures to deliver content to large numbers of concurrent users. This enables them to reuse the core functions of those servers for performance management, security and scalability. Some of the specific functions required to support the publishing and delivery of the content to a website are reviewed separately in Section 3.15.

The integrated ECM solution should provide integration with enterprise information portals that allow the content managed on the integrated ECM solution to be delivered through the portal interface. The portal server can then be used as a framework to present content to visitors and to manage visitor interactions.

Similarly, the ECM solution should allow content to be published to paper-based publications. This will allow organisations to use the same content source for both their online and their offline publications. An editorial team would typically select and assemble the right content items for a paper-based publication with the ability to maintain relations between the content items. The content publication created by the editorial team would then be published to either a desktop client such as Adobe InDesign or QuarkXPress, or to a typesetting system. The detailed format-

ting for the print publication would then be completed within those environments.

3.14 Website Design and Development

For most users, the publication process will result in the content being published on one or more websites and made available to internal users via an intranet, to contractors and partners, etc. via an extranet and to the public via the Internet.

For these users, ECM solutions have to support a specific set of web publishing functions, some of which are specific to web publishing, and some of which, as demonstrated above, are common to all publishing applications. The key functions include website design and development, content capture and preparation, content delivery/publishing and personalisation (Fig. 3.21). Website design and content preparation are covered here.

Web content publishing and personalisation are covered in Sections 3.15 and 3.16.

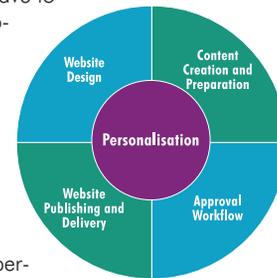


Fig 3.20
Content distribution

Fig 3.21
Web publishing functions

3.14.1 Website design

The first task, as in all publishing applications, is to define the structure of the website or the overall publication. Website designers traditionally start with a site map that illustrates the site's structure, and storyboards that detail the pages and their relationship to other pages. Generally, the overall structure should be agreed before the detailed design of the pages commences. It is essential in web publishing, as in all publishing applications, to separate the content from the overall structure or logic of the publication. Web content, like all content to be published, needs to be held in a form which allows it to be reused and displayed in different formats. This can only be achieved if the structure of the web pages and the content are managed separately.

Web pages are defined and held as templates and need to be tightly managed and rigidly controlled. They define the layout of the page, where specific content objects will be displayed, and where the menu items will appear. They define the containers into which the content is placed and the display formats. Good website design usually involves the use of a limited number of page templates. The WCM system should manage the page templates as content objects and control them using all the controls defined above. The number of page templates and the range of links that can be created between them determine the structure of the website and how effectively it operates.

The leading ECM solution suppliers support multiple presentation templates so content can be created once and then displayed in different devices. For marketing purposes this technique can be used to take content and re-brand it for different applications.

Standard generalised markup language (SGML) was developed as a mark-up language to support complex electronic publishing applications. HTML was developed out of SGML to support simple web publishing requirements, and now XML has been developed to extend the facilities available with HTML without, hopefully, becoming as complex as SGML. HTML supports the creation of links between pages and content items but cannot guarantee the integrity of all the links. Changes to the website can break links. One of the great benefits of a good WCM tool is that it can be used to check the links and guarantee the integrity of the links within a website.

Publishing on the Web is still a developing area so there is no consensus on all the web publishing features, and hence all the WCM features, required. The links that need to be supported are ultimately all the links needed to cater for all the ways in which users may need to access, cross-reference and browse through

content on a website. Experience from traditional publishing and other electronic publishing applications is being brought to bear on web publishing.

All websites provide facilities to link one web page to another so that users can navigate from page to page (inter-document linking). Given that pages may contain text content that occupies several screens, an intra-document linking facility that allows the definition of a table of contents, and which creates links from the table to the start of each text section and back again, is vital. Again, most websites make use of such links.

Most websites also provide links from specific content items to other related content items on different pages, and hypermedia links to content items on other websites. There are other, more specialised links that can be created.

To define requirements, organisations should look at all the links they need to employ within their websites. They should then check what types of links the various WCM systems will support and what tools they provide to help maintain these links when the website is changed, new pages added or old pages deleted. In particular, if there are many links to external sites, the WCM software should provide tools that make regular checks that these links still exist and report back failures.

In the early days most websites held static HTML pages that did not change. Today, more and more pages are dynamic which means that they are created on the fly at the time of access. The power of XML opens up more and more scenarios where dynamic pages will be used. Information from a live database can be inserted in the HTML page when required so the user can see the latest information at the time. The more dynamic the site the more flexible the web content management solution has to be to support all the necessary interfaces.

A valuable feature highlighted by one of the leading suppliers is whole site versioning and back up. During development, the contents of a staging area can be regularly published as new editions or as sequential snapshots of the complete website. These back-ups include all the file assets, application code, database content and configuration files that comprise current and previous versions of the entire site.

3.14.2 Content preparation

The content that organisations want to publish on a website may need to be created or captured using a range of techniques as already outlined in Sections 3.2 – 3.4. However, once it is obtained the content may need to be reviewed and approved for publication and third-party content may need to be prepared for publication by converting it into a supported format.

The leading WCM systems provide content collection or content aggregation server software that can collect diverse types of information from other websites, databases, flat files and e-mails and transform the data for presentation on the website. All WCM software should support collaborative authoring and editing, allowing organisations to devise automated processes for reviewing and approving content prior to publication. This is covered in Section 3.17.

3.15 Web Publishing

The third function that any WCM system should support is the publishing or distribution process (Fig. 3.22). This involves taking the content files and the relevant web page templates for a website from the CM repository and distributing them all to the selected website server or a staging server. This is a key task for the WCM module of an integrated ECM solution. The preferred web server and application server software will then normally be responsible for running the live website and delivering the content to the visitors. The WCM software should be able to identify the web page templates and content files that need to be delivered from the content library to the website by reviewing the attribute data held for the content files. The WCM software will also be required to remove selected content from the live website if that content has expired or has been replaced. Finally, the software is required to maintain all the links between pages and content items on the website.

Sophisticated WCM software should provide tools that address the needs of multiple website deployments. These simplify issues such as synchronisation, localisation, branding and content delivery. As an example, an author may be creating content that is to be delivered on the corporate website, the corporate intranet and on an extranet. The content may be customised and reformatted for each site. All this should be automated as far as possible as soon as the content is approved for publication.

The web publishing process, unlike conventional publishing, is not always a one-time process. The content delivered to visitors often needs to be assembled from different content sources (see Section 3.4 on content syndication). The WCM solution should be able to support a range of options from fully static assembly with pre-prepared HTML pages to a fully dynamic assembly model where the web or application server does the assembly of web pages. In a static delivery case, all the content assembly should be conducted by the WCM software prior to content distribution. Where this is feasible it will optimise performance.

In a dynamic situation, the assembly should be conducted by the web or application server. Dynamic assembly is well suited to applications where real-time data needs to be inserted from a news-feed or back-office application, or where the content needs to be personalised based on the profiles of a specific visitor.

Increasingly, on active websites, the web content needs to be delivered on demand in response to specific queries. For example, many organisations' website home pages contain lists of news items, and when a user clicks to retrieve those news items, the list of news items is created by issuing a query on the CM library. This 'publish-on-demand' facility opens up new opportunities and makes new demands on the CM software. One of the vital facilities that must be provided is content personalisation, which is covered in Section 3.16, below.

For more information and white papers on WCM requirements, facilities and case studies see the websites of some of the leading WCM suppliers as listed in the directory section.

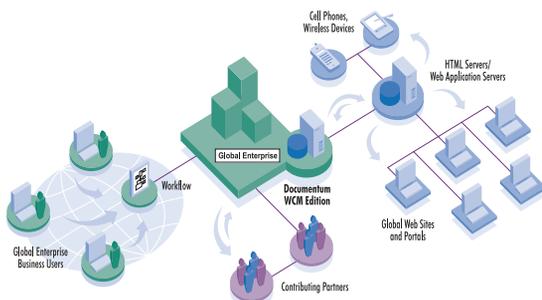
3.16 Personalisation

The interactive delivery of web content means that the content can be personalised to meet the needs of the individual who is searching the website. There is a developing range of personalisation options, which range from translating content into different languages, selecting content that suits the age and level of expertise of a user, or reacting to user expressed preferences.

In the example used in Section 3.15, when a user clicks on the 'news items list' the software can check the profile of the user and then present only those news items that meet the user's subject interest profile. Hence, in many cases, WCM systems must be capable of generating on the fly content directly relevant to the user. In order to meet this challenge a number of WCM suppliers currently license personalisation engines from third-party suppliers. Examples of the facilities available include automated

Fig 3.22

Enterprise web content creation and publishing to multiple devices and sites (courtesy EMC Documentum)



system adaptation for various browsers, language and locale detection, behaviour adaptation, implicit optimisation of site structure and content to suit the needs of the visitor and the use of a recommendation engine.

An integrated ECM solution needs to include a powerful suite of personalisation software to ensure organisations can meet all the current and future requirements of their various website users.

3.17 Collaboration and Business Process Management

Alongside information management the other main function which an ECM solution must support is collaboration. People and systems need to work together and access and create information in order to conduct essential business processes. Tools that facilitate the sharing of that information and help people work together and interact with computer systems more effectively can save organisations considerable amounts of money and improve customer service significantly.

Many users will be moving to enterprise content management as part of an overall move to team or collaborative working. The software required to support team working is referred to generically as collaborative software and the subset designed to control and automate structured business processes is referred to as business process management (BPM) or workflow management (WFM) software.

3.17.1 Email

The simplest software to aid collaboration is e-mail (Fig. 3.23). If you wish to alert a user of your ECM solution to the fact that a new content file is available you should be able to mail a

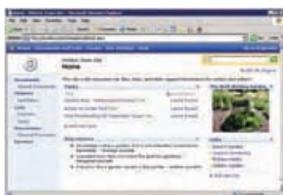


pointer or a cross-reference to a content file to the user. When the e-mail is opened and the user clicks on the pointer the ECM solution is triggered to retrieve and display the content file. This model is widely supported by ECM suppliers. To send content

to users without access to the system, users should be able to create mail messages, call up and attach a content file to the message and send the e-mail with the attachment to the third party. The content file could be sent in its native application format if the recipient is likely to have access to that application, or the content could be rendered into a formatted format such as PDF so the recipient could access it via a PDF viewer. The problem with e-mail is that there is not much feedback to let you know whether the user has received the message and acted on it so if you are forwarding the same kind of information to the same people on a regular basis there has to be a better way.

3.17.2 Collaborative software

With collaborative software users can develop simple applications to handle processes and improve the productivity of the group. They can share information, set up meetings, communicate online even though they are in remote locations and even different time zones. Key functions supported by leading col-



laborative software packages include messaging, scheduling or meeting support, group discussions, online meetings, web conferencing, online notice boards, group content creation and management, BPM and group management (Fig. 3.24).

3.17.3 Business process management

Workflow management means literally managing the flow of

work through a business process – a process that will increasingly have been modelled and re-engineered to meet business objectives (Fig. 3.25). The word to emphasise is ‘managing’. As

indicated above, BPM software is usually implemented by organisations that must have tight control over the flow of work through a particular structured business process. The reasons why they need tight control usually include some of the following:

- high volumes of cases being processed at any one time
- many people and computer systems involved at various stages in the process
- to impose control on the process
- to truncate the process-elapsed time
- to ensure each case is processed to quality standards
- to ensure each case is processed according to a set of rules
- to capture management information and audit trail data
- to improve customer service.

When looking at ECM solutions it is useful to distinguish between the types of BPM software that will be provided bundled with the ECM solution and the need also, in many cases, to link to third-party production BPM software or collaborative software. Most ECM solution suppliers will provide some bundled BPM facilities. They will typically support core EDM and WCM processes including content capture and approval, content editing and approval, content routing and distribution and content publishing on a website. If more complex BPM capabilities are required to carry out sophisticated process modelling and workflow design, and to support complex processes and interactions with line-of-business systems then the integrated ECM solution should include an optional powerful BPM software package, which can be interfaced with ERP systems and used to model and automate processes. A list of WFM/BPM suppliers is provided in Section C of the directory.

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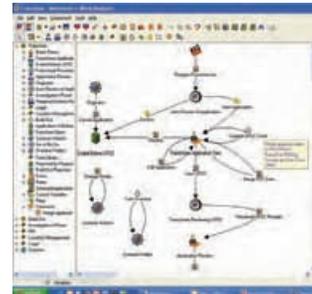


Fig 3.25
Example of graphical workflow with business process management software

Fig 3.23
E-mail software facilitates simple collaboration

Fig 3.24
Sample screenshot of collaboration software in use

Preparing for corporate information and records management: a guide to best practice

4.1 Coverage

In this chapter we review some of the key steps that should be completed to ensure that an organisation is ready to make the move to electronic information and records management and collaborative working (Fig. 4.1). The recommendations are based on good practice, guidelines and standards, and on Cimtech's more than twenty years' experience of assisting clients with the implementation of enterprise content management and electronic records management solutions.

Section 4.2 makes the case for improving corporate information and records management, and for managing information as a corporate asset. Section 4.3 looks at what is involved in agreeing a corporate information management and records management policy, and the benefits that they can bring. Section 4.4 reviews best practice guidelines and standards.

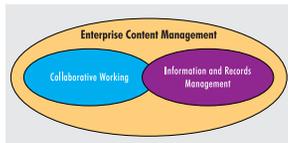


Fig 4.1
Enterprise content
management framework

4.2 The Case for Information and Records Management

For organisations, the information they possess is a strategic asset (Fig. 4.2). Without that they would find it difficult or impossible to operate. This information has a very high value equal to or, in many cases, exceeding the value of staff or capital assets.

However, many organisations do not really understand those information assets and are not harnessing or exploiting them to their full potential. Even worse, in many cases they are not even

Fig 4.2
Information is a strategic asset

The corporate governance of information assets

The board should determine the organisation's policy for information assets and identify how compliance with that policy will be measured and reviewed, including:

- The identification of information assets and the classification into those of value and importance that merit special attention and those that do not.
- The quality and quantity of information for effective operation ensuring that, at every level, the information provided is necessary and sufficient, timely, reliable and consistent.
- The proper use of information in accordance with applicable legal, regulatory, operational and ethical standards and the roles and responsibilities for the creation, safekeeping, access, change and destruction of information.
- The capability, suitability and training of people to safeguard and enhance information assets.
- The protection of information from theft, loss, unauthorised access, abuse and misuse, including information which is the property of others.
- The harnessing of information assets and their proper use for the maximum benefit of the organisation including legally protecting, licensing, re-using, combining, re-presenting, publishing and destroying.
- The strategy for information systems, including those using computers and electronic communications and the implementation of that strategy with particular reference to the costs, benefits and risks arising.

protecting them, so they are vulnerable to loss or theft.

This is despite the fact that over a decade ago the influential Hawley committee published a report called *Information as an asset: the board agenda*⁽¹⁾. The report proposed that all significant information in an organisation, regardless of its purpose, should be properly identified, even if not in an accounting sense, for consideration as a business asset. The board of directors, it argued, should address its responsibilities for information assets in the same way as for other assets, e.g. property and plant. This implies that a new approach to information management is required.

The board should satisfy itself that: the information it uses is necessary and sufficient for its purpose, it is aware of and properly advised on all the subjects on its agenda, its use of information, collectively and individually, complies with applicable laws, regulations and recognised ethical standards.

To determine the quality and quantity of information needed for effective operation many organisations are taking a functional view of their activities. They are reviewing the information required at each stage of each process in the business to ensure that necessary and sufficient information is available for effective operation – and no more. Too much information can be as bad, or even worse, than not enough information. They are defining



roles and responsibilities with regard to information. Best practice calls for a clear distinction to be drawn between its owner (responsible for creation and accuracy), the custodian (responsible for physical safekeeping), those with right of access (who can view but not change information), those with the right to copy (who can reproduce information for other purposes) and those with the right to destroy (who can eliminate all traces of information).

Records management is a vital subset of information management and today there are international standards and guidelines designed to assist organisations in formulating and implementing standard records management policies and procedures.

International Standard 15489:2001 *Information and documentation – Records Management*⁽²⁾ is a two-part standard. It emphasises that standardisation of records management policies and procedures ensures that appropriate attention and protection is given to all records and that the evidence and information they contain can be retrieved efficiently and effectively using standard practices and procedures.

The standard was developed in response to consensus among participating ISO member countries to standardise international best practice in records management using the Australian Standard AS 4390 *Records Management* as its starting point. It defines the objective of any corporate records management policy as being "the creation and management of authentic, reliable and useable records, capable of supporting business functions and activities for as long as they are required".

4.3 Developing Information and Records Management Policies

4.3.1 Information management policy

Since the work of the Hawley Committee was published a number of organisations have developed their own corporate information

Example information management policy

- Internal information is owned by the company. All information will have a defined custodian who, as the authorised agent of the company, will be responsible for its management and for making it available to those who need it.
- Information will be managed to support business processes rather than organisational hierarchies.
- Information will be managed, accurate and up-to-date and will be readily accessible to those who need it.
- Information will not be retained or distributed unnecessarily.
- A consistent approach to managing information will be adopted across the whole company and will cover the lifecycle of information (creation, indexing, storage, retrieval, revision, archiving/disposal).
- Methods of information management will give due attention to security, protection, legal, environmental and cost issues.

management policies (Fig. 4.3). A good policy should be short and concise so it can be read and memorised by all employees. One policy developed at the time comprised six key points.



The first point is very important as it establishes that information and records management is everyone's responsibility. If a user

creates information/records while being paid by an organisation they have a responsibility to ensure it is adequately managed.

The second point is echoed in many best practice guidelines.

The third point is easy to agree but hard to deliver. It should be a core business objective. If it is, then it becomes relatively easy to justify electronic systems as without them the task of keeping information accurate, up-to date and readily accessible is extremely labour intensive.

The fourth point addresses legal and efficiency issues.

Organisations need to take account of data protection issues and should avoid copying and duplicating activities, which do not add value but consume considerable resources.

The fifth point is vital and electronic records management (ERM) and process automation offer the tools to achieve such consistency, but the stages in the lifecycle need to be defined.

The sixth point echoes the need for compliance with good practice and legislation. The BSI *Code of practice for legal admissibility and evidential weight of information stored electronically*⁽³⁾ recommends organisations adopt an information management policy.

In order to ensure that this information is well managed, and to meet its business needs, the organisation needs to define and implement good management practices. Information, like any other asset, needs to be classified, structured, validated, valued, secured, monitored, measured and managed efficiently and effectively. To provide guidance to those who have the responsibilities of these practices, the senior executives need to approve an information management policy statement.

Chapter 1 of the BSI code outlines the content and approval recommendations for the policy statement and is recommended reading. Annex E of the code includes an example policy document that may be used during the drafting of an organisation's policy document. The code recommends that the policy document should contain, as a minimum, the following sections:

4.3.2 Records management policy

Many organisations, especially in the public sector, have produced their own records management policy. Guidance on how to develop an overall policy is provided in the ISO 15489⁽²⁾ and by bodies such as The National Archives (TNA). Based on this guidance most policies are relatively concise documents structured

Section	Content
Information covered	Specifies which information 'types' are covered by the policy.
Security classification	States the policy regarding security classification (where used).
Storage media	States the policy regarding the type of media to be used for storage.
Data file format	States the policy regarding data file formats and version control.
Standards	States the policy regarding relevant information management standards.
Retention schedule	Defines retention periods and disposal policies.
Responsibilities	Defines responsibilities for information management functions and for compliance with the Code.
Consultations	Includes or references the results of consultations with appropriate legal and/or regulatory bodies and with others where necessary.
Auditing	Defines requirements for auditing relative to particular document 'types'.

Fig 4.3
Developing effective corporate information and records management policies is vital

around ten to twelve headings. The following headings have been used by Cimtech when developing RM policies for clients:

Section	Heading
1	Purpose
2	Policy statement
3	Scope
4	Policy context
5	Legislation and standards
6	Records management systems
7	Responsibilities
8	Promotion
9	Training
10	Review
11	Authorisation
12	Glossary

Purpose This section should define its key aims. In the public sector typical aims would be to ensure that the authority:

- Has appropriate records to meet its business needs and the needs of its stakeholders
- Operates records management procedures and practices that conform to applicable legislative requirements
- Clearly defines responsibilities and accountability for records
- Provides staff with the resources, knowledge, competences and procedures to manage records according to the policy
- Addresses its obligations under Freedom of Information legislation to have a policy in operation for records management.

Policy statements These need to be supported by detailed standards and procedures explained in a records management guide, and by a programme of staff training and communication. The policy statement should be short and sharp and commit the organisation to maintaining all the records it needs and is obliged to keep. One example follows:

The authority will document its business activities with records that are complete, authentic, reliable, secure and accessible and manage those records in accordance with all applicable legislative requirements throughout their lifecycle.

Fig 4.4

The scope of the RM policy may include paper records as well as electronic records



Scope The scope of the policy will define the range of records covered and generally will indicate that the new policy covers both paper or analogue records (Fig. 4.4) and electronic records in all formats. It will refer to a list of records if such a list has been produced as a result of an audit and it will cover any exclusions.

Policy context This should refer to other relevant documents. This may include the information management policy and strategy of the organisation.

Legislation and standards This should list all legislation that has an impact on the records that must be kept and all standards the authority is committed to following. These would include relevant Acts of Parliament, codes of practice and standards.

Records management systems This section should specify a minimum set of requirements for systems and processes that manage records. It may list all the core processes covered and should refer to separate detailed procedures for the management of paper and electronic records and indicate where they are held.

Responsibilities This section should indicate generic and specific records management responsibilities within the organisation including senior management, records management and information management staff, managers and supervisors and all staff.

Promotion The section should explain how the policy will be implemented in practice and how the policy will be communicated to all employees. Detailed implementation procedures will be included in the guide. Any project to implement an ECM solution should include a communications plan designed to ensure all employees are informed about the project and kept up-to-date on the status of the project and their responsibilities.

Training This section should explain how all levels of staff will be trained to ensure records management responsibilities are met.

Review This section will commit the organisation to reviewing the policy on a regular basis and will task a committee with that responsibility and define the criteria it will be reviewed against.

Authorisation This section will state that the policy has been authorised by senior management.

Glossary This will contain key definitions including what is meant by a record. There are many such definitions. A useful one provided by The National Archives is as follows:

"A record is a specific piece of information produced or received in the initiation, conduct or completion of an institutional

or individual activity. It comprises sufficient content, context and structure to provide evidence of the activity. It is not ephemeral – that is, it contains information that is worthy of preservation in the short, medium or long term."

Many existing records management policies cover only paper records but increasingly any overall policy should include electronic records. Extracts from The National Archives draft corporate policy on electronic records⁽⁴⁾ are provided below. The overall policy should make it clear that electronic records are covered by the policy and state that all systems and processes that deal with electronic records must ensure that the records are managed in line with the overall records management policy.

The National Archives Corporate Policy on electronic records is aimed at departmental record officers and other personnel charged with records management in public sector organisations. The aims set out for the policy in Section 1, Summary, are to:

- Provide clear guidance on what electronic records are and why they need to be kept
- Explain how good ERM serves major needs of the department
- Set out generic principles and policies on specific aspects which form the basis of implementation
- Define responsibilities for records throughout the organisation.

Section 2, *Introduction*, places the document in the context of the wide range of guidance documents produced by The National Archives. It explains why a policy for ERM is needed. The policy should ensure that:

- The record is present
- The record can be accessed
- The record can be interpreted
- The record can be trusted
- The record can be maintained through time.

These are key objectives for all records – analogue or electronic – and should be included as aims in any general records management policy as well. The National Archives point out that the first three items are commonly found in a general organisational information policy, aiming to ensure that:

- The right information is captured, stored and preserved according to needs
- It is fully exploited to meet current and future needs and to support change and development
- It is accessible and meaningful in the right format to those who need to use it
- The appropriate technical, organisational and human resource elements exist to make this possible.

The National Archives further points out that the remaining items (trustworthiness and permanence) carry special implications for records and influence the way in which the first three can be implemented. In order to achieve these qualities for electronic records, formal policy statements can offer the corporate authority and institutional guidance, which records managers require.

Section 3 reviews how organisations should plan the development and adoption of the policy.

Section 4 defines the overall coverage of the policy.

Section 5 covers the policy framework. The National Archives makes the point that the policy may be merged within a general corporate policy for records or kept separate. Maintaining the effectiveness of the policy means the interaction between the electronic records policy and other policies should be stated. The following examples are cited by The National Archives and could be added to: following best practice (ISO 15489, PD 0010, etc.), the department's e-business strategy, freedom of information, data protection and existing records policy.

The National Archives Corporate Policy (document breakdown)

Section 1	Summary
Section 2	Introduction – providing a context
Section 3	Planning the policy
Section 4	What a policy should cover
Section 5	Policy framework
Section 6	Implementing the policy
Section 7	Technical policy
Section 8	Preservation policy
Section 9	Registration policy
Section 10	Access policy
Section 11	Security policy
Section 12	Policy review

Section 6 covers implementation. The policy should be communicated from the top of the organisation in a summary form that everyone can understand. The full policy should be provided to people who have a part to play in its implementation and further development. Procedures will need to be developed later in line with the policy and embedded in the ways people work. Effective records management is one element within corporate information management and should be co-ordinated with and contribute to the development of the information management strategy.

Section 7 covers the technical policy and should establish the criteria to be applied to the technologies that process electronic records. Government and individual organisations' IT strategies will set requirements for the IT systems in more general terms.

Section 8 covers the preservation policy needed to ensure that electronic records are visibly present and maintained in an authentic state. The technology that serves to process the electronic record will change over time, but the preservation policy should seek to minimise the risks associated with any technological changes and ensure that the records remain intact.

Section 9 – the registration policy – should help the organisation to set minimum conditions for the registration of electronic records. The registration policy should be broad enough to standardise registration systems so electronic records are well organised and can be discovered by a third party. It should not be so restrictive that the records are arranged or labeled in a cumbersome way and thus slow down operations.

Section 10 is the access policy, which should control the movement of information in and out of the records management systems, allowing the records to be created or viewed by different categories of users.

Section 11 – the security policy – should build confidence in the management of records. It should protect the records management infrastructure as well as safeguard individual records from interference and misrepresentation.

Section 12 covers the review of the policy. A policy review should happen on a regular basis and can increase the effectiveness of the policy by establishing how it is interpreted within the organisation and suggesting changes where there is uncertainty (Fig. 4.5).

This is a very useful document, which can be found in the records management area of The National Archives website⁽⁴⁾ alongside other relevant guidance documents.

4.3.3 Implementing the policies

It is not sufficient simply to agree an information and records management policy. The next challenge is to implement that policy. Some of the key components needed to successfully implement information and records management are listed below.

One of the key tasks to be carried out by an organisation is to benchmark its current corporate information and records management policies, procedures and systems against best practice guidelines. Chapter 5 summarises Cimtech's preferred methodology for improving policies and procedures and specifying and implementing a corporate ECM solution. It is based on the EDRM System Implementation Toolkit⁽⁵⁾ which Cimtech developed for the Joint Information Systems Council (JISC) and which can be broadened out to cover a full ECM implementation.

The key components for a successful information and records management policy

- An information management policy, which must be supported by senior management and be widely publicised.
- An individual or a team in a large organisation tasked with the implementation of the policy and reporting back to the board. In a large organisation the team should comprise senior staff from information systems, the library, the records management section and external independent consultants such as Cimtech and others listed in the Directory section.
- A strategy for implementing the policy – for defining the overall information management requirements, the objectives and the framework for integrating the organisation's information resources, services and systems.
- As a result of the strategy, standards, procedures and controls for the acquisition, storage, processing, distribution and disposal of information in all its forms.
- As a result of a successful strategy the information systems needed to support the real business needs.
- As a result of a publicised policy and senior management support a general awareness among staff of the real costs and value of corporate information, i.e. the value of the information asset.

4.4 Best Practice for Information and Records Management

There are a number of published guides and standards for best practice in information and records management (Fig. 4.6). Below we review briefly what we consider to be some of the key documents and list standards and other guidance documents.



4.4.1 Principles of good practice

BSI DISC PD0010⁽⁶⁾ *Principles of Good Practice for Information Management* was authored in 1997 by Bill Mayon White and Bernard Dyer of the Image and Document Management Association (IDMA). It is designed to present a set of proposals or principles. The introduction defines the audience for the principles: "They are intended to help those who have the responsibility for assisting their employees to develop and operate new methods and techniques for managing information, and in particular that information which is stored and managed as documents."

There are five main principles. These are intended to act as guidelines for a set of procedures that any organisation should be capable of devising and operating as an extension of their current operating procedures, or of their quality management processes.

4.4.1.1 Recognise and understand all information types

The key objectives here are "the identification of information assets and the classification into those of value and importance that merit special attention and those that do not. You need to identify all your information, classify it and then index your information and record how it is represented".

They also state that organisations should choose "appropriate methods to capture, store and transmit information", which is similar to the fourth point in the policy above. Organisations need to establish the concept of lifecycle management and agree a consistent approach to managing information.

4.4.1.2 Understand the legal issues and execute duty of care responsibilities

This ensures that all staff are aware of relevant regulations governing information management and record keeping and then ensuring that everyone understands their responsibilities.

Fig 4.6

A number of published guides are available covering best practice

Fig 4.5

Policies need to be reviewed regularly



The five principles of good practice for information management

- Recognise and understand all types of information
- Understand the legal issues and execute duty of care responsibilities
- Identify and specify business processes and procedures
- Identify enabling technologies to support business processes and procedures
- Monitor and audit business processes and procedures

4.4.1.3 Identify and specify business processes and procedures

This section represents an extension of the requirements of the ISO quality standard BS EN ISO 9000 *Quality management and quality assurance standards*⁽⁷⁾. In order to understand information management requirements, and requirements for new electronic systems, the business processes need to be understood. Whereas they would have been documented in procedure manuals for ISO 9000 compliance we can now use process modeling software.

Equally, of course, the business processes can be improved and remodeled to take account of the fact that the introduction of electronic document, records and content management systems will mean that processes can be changed and streamlined.

4.4.1.4 Identify enabling technologies to support business processes and procedures

The objectives are to identify appropriate technologies to support and enable business processes. The authors wisely caution the user to establish procedures to monitor and control exposure to risks arising from the misuse or failure of its computer systems. As the technology becomes ever more sophisticated the need for contingency should always be considered.

4.4.1.5 Monitor and audit business processes

The final principle is that organisations should monitor and document their operations and any deviations from standards. In particular, any system implemented should be capable of providing audit trails for all information and documents.

4.4.2 ISO 15489-1:2001 Information and documentation – Records Management

A more recent British and International Standard is also extremely relevant here. ISO 15489:2001 *Information and documentation – Records Management*⁽²⁾ was issued in two parts in 2001 in order to standardise international practice in records management using the Australian Standard AS 4390 as its starting point.

It is recommended for organisations that are setting up a records management programme or for those that need to audit existing policies, procedures and systems prior to developing a records management strategy and/or specifying requirements for an ECM solution. However, it should be clearly understood that ISO 15489 does not comprise a set of requirements for a records management system (paper based, hybrid or electronic). The National Archives and MoReq requirements address that.

Part 1 of ISO 15489 provides general guidance to managers on establishing records management policies, procedures and systems. It defines a comprehensive programme, which includes determining what records should be created and what information should be included in the records, what metadata should be created with the records and how they should be organised.

It recommends that a records management strategy should be documented in a strategic plan, such as an information management strategic plan, which should be incorporated into organisation-wide planning documentation. It defines the high-level requirements for a records system and outlines recommended records management processes and controls.

Part 2 is an implementation guide for use by records manage-

ment professionals. It provides one methodology that will facilitate the implementation of ISO 15489-1 in all organisations. It includes an eight-point plan for designing and implementing a records system based on the Australian DIRKS (Designing and Implementing Recordkeeping Systems) methodology. This is a clear and concise document and is now forming the basis for a range of courses aimed at users who need to set up a corporate records management plan.

ISO 15489:2001 eight-point plan

- Conduct preliminary investigation
- Analyse business activity
- Identify requirements for records
- Assess existing systems
- Identify strategies to satisfy requirement
- Design records system
- Implement records system
- Conduct post-implementation review

4.4.3 ISO 23081-1:2006 Information and documentation – Records management processes – Metadata for records – Part 1: Principles

The first part of this standard⁽⁸⁾ was revised by workgroup TC 46/SC11 and published in 2006. It is a further extension of the ISO 15489 records management standard to help people understand, implement and use metadata within the framework of ISO 15489. It addresses the relevance of records management metadata in business processes and the different roles and types of metadata. It does not define a mandatory set of records management metadata to be implemented, since these metadata will differ in detail according to organisational or specific requirements for jurisdiction. However, it assesses the main existing metadata sets in line with the requirements of ISO 15489.

This first part of ISO 23081 sets a framework for creating, managing and using records management metadata and explains the governing principles. The proposed future Parts 2 and 3 will be more explanatory and provide practical guidance on implementation issues and how to assess records management metadata sets against the principles in this part of ISO 23081. These future parts will be Technical Reports that should be considered as more time-bound documents that will need regular updates.

We will review these later parts as soon as they are published in the 2008 edition of this publication or earlier in *IM@T.Online*.

In a records management context, metadata is data 'describing the content, context and structure of records and their management through time'. As such, metadata is structured or semi-structured information that enables the creation, registration, classification, preservation and disposition of records through time and within/across domains. Part 3 will provide an assessment of existing metadata sets against ISO 15489 and 23081-1` including record keeping and archival metadata sets and schemas such as Dublin Core⁽⁹⁾, ISAD/G EAD⁽¹⁰⁾, ISAAR⁽¹¹⁾ and RKMS⁽¹²⁾.

4.4.4 Additional standards and best practice guides for records management

In addition to the core documents above there is a wide range of guidance documents from The National Archives including the evaluation workbook to assist public authorities in assessing conformance of their records management systems to the Records Management Code issued by the Lord Chancellor (see Section 4.4.5 below). Other TNA guidance includes the following:

- File creation
- Tracking records
- Storage of semi-current records
- Business recovery plans

- Discontinued and transferred functions
- Documentation of records work
- Preparation of records for transfer to The National Archives
- Closure on transfer guidelines
- HR aspects of records management
- How to complete an information survey of records
- Management of records of temporary bodies
- Management of private office papers
- Management of audiovisual records
- Model retention and disposal schedules
- Cataloguing guidelines
- Access to public records guidance manual.

Other relevant standards and best practice guides for records management and archiving include the following:

Standards	
Records storage	BS 5454:2000 Recommendations for the Storage and Exhibition of Archival Documents
Cataloguing	International Council on Archives, General International Standard of Archival Description [ISAD (G)], 2nd edition, 1999
Conservation and preservation	BS 4971:2002, Repair and allied processes for the conservation of documents – Recommendations BS 1153, Recommendations for processing and storage of silver-gelatine-type microfilm
Records management	BS ISO 15489-1:2001, Information and documentation – records management

4.4.5 Records management legislation and compliance issues in the public sector

The core piece of legislation for central government departments is the Public Records Act 1958 which places the responsibility on government departments and other organisations within the scope of the Act for making arrangements for selecting those of their records which ought to be permanently preserved and for keeping them in proper conditions. It further requires these arrangements to be carried out under the guidance of the Keeper of Public Records who is responsible for co-ordinating and supervising the work of selection.

The Act lays down that documents selected for preservation shall be sent to the The National Archives (Fig. 4.7) not later than thirty years after their creation but that their transfer may, for administrative or other special reasons, be postponed with the Lord Chancellor's approval.

In the *Modernising Government White paper*⁽¹³⁾ of 1999 all central government organisations were set a target to create and manage all new records electronically by 2004. Following on from the target, The National Archives continues to work with government departments, the wider public sector and other stakeholders to develop, implement and improve the standard of electronic records management across the public sector. The TNA Records Management Department was for some years the main point of contact between TNA and central government departments and agencies. To help accomplish this demanding task, TNA has recently set up a records management advisory service, now part of the National Advisory Services (NAS),

the remit of which has been broadened to provide advice to the public sector.

In 2000, however, the Freedom of Information Act⁽¹⁴⁾ introduced significant changes to the Public Records Act of January 2005. The Act replaced the access provisions for UK public records set out in the Public Records Acts 1958 and 1967 and governs access to information held by most public sector bodies.

The Lord Chancellor has issued two codes of practice under the Act. The section 45 code sets out good practice in handling requests for information. The section 46 code⁽¹⁵⁾ is in two parts. Part I sets out good practice in records management and applies to all FOI authorities and also to bodies that are subject to the Public Records Act 1958 or the Public Records Act (Northern Ireland) Act 1923. Part II is aimed at records offices holding public records, and departments from which those records are transferred. It sets out how records should be transferred.

The National Archives has developed an evaluation workbook in the form of a consultation draft to assist public authorities in assessing conformance of their record management systems to the Records Management Code⁽¹⁶⁾. The National Archives has also produced or collaborated in the production of model action plans to help different parts of the public sector achieve compliance with the Records Management Code⁽¹⁷⁾. Most recently, TNA has developed a self-assessment programme and guide⁽¹⁸⁾ designed to assist public bodies in carrying out internal audits to determine whether their records management systems comply with the Code.

The Data Protection Act⁽¹⁹⁾ was passed in July 1998. The National Archives has produced a guide⁽²⁰⁾ setting out how the Act affects records managers and archivists.

The Freedom of Information Act gives rights of access to a wide range of information. However, rights of access to environmental information are provided by a separate statutory regime, the Environmental Information Regulations. New regulations were laid in December 2004⁽²¹⁾ which bring into UK law a new EU directive 2003/4EC on public access to environmental information. The new regulations came into effect in January 2005 and replace the 1992 Environmental Information Regulations. Further information about access to environmental information, including guidance on the Regulations can be found on the website of Defra.

4.4.6 Requirements and best practice for electronic records management

Organisations should also review two key documents that are designed to help define requirements for ERM systems. They are the *Model Requirements for the Management of Electronic Records (MoReq)*⁽²²⁾ which was prepared for the IDA programme of the European Commission by Cornwell Affiliates plc and is now being revised, and the latest version of *The National Archives Requirements for Electronic Records Management Systems*⁽²³⁾.

The National Archives document clarifies the fact that 'these generic requirements are not a full specification. They form a baseline that sets out, in the mandatory part of the requirements, the minimum necessary to undertake credible electronic records management.' The TNA document was always designed to form part of a compliance scheme. Hence it contained a set of functional requirements that supplier products could be tested against and the TNA set up a testing programme in the UK.

The original MoReq document is similar to The National Archives document but there are three main differences. MoReq was designed to be equally applicable to the private and public sectors whereas The National Archives document was for UK government use specifically. Secondly, MoReq was designed to be international in scope and was translated into the languages of the European member states. Thirdly, the original MoReq document was not designed to form part of a compliance scheme.

Like The National Archives document, the MoReq document contains a generic set of functional requirements. It was intended to be used by potential ERMS users as a basis for preparing a

Fig 4.7
The National Archives at Kew is responsible for the preservation of selected government documents



statement of requirements, by ERMS users as a basis for auditing or checking an existing ERMS, by training organisations as a reference document for preparing course material, and by ERMS suppliers and developers to guide product development.

National Archives 2002 Entities MoReq 2001 Entities

Class	Class/Level
Electronic/Paper/Hybrid folder	Electronic/Physical file
Electronic/Paper/Hybrid folder part	Electronic/Physical volume
Electronic/Paper record	Electronic/Physical record
Electronic component	Electronic/Physical document copy
	Electronic/Physical document version

The key entities defined in each document are similar and are presented in the table above. Unfortunately, the terms used to describe them differ. The National Archives uses the term Electronic/Hybrid/Paper Folder whereas MoReq uses the term Electronic/Hybrid/Physical File. The National Archives avoids the word 'File' as this is used in computer systems to describe a lower level object such as a content file or a document file. Both mean the same – the old physical file folder or a new virtual electronic folder. The National Archives divides a folder into Parts, while MoReq prefers to use the term 'Volume'. The National Archives does not use the term 'Document' now – preferring 'Component' to cater for content objects as opposed to documents.

In 2005 TNA announced that the current phase of the evaluation scheme would complete at the end of 2005. The key dates were a cut-off for expressions of interest at the end of March 2005 and a deadline of end of June 2005 for fully worked submissions prior to testing. TNA will keep a list of approved products accessible and the requirements will be kept accessible for any public sector organisation to tailor and augment to meet their needs. Hence the TNA 2002 ERMS requirements are still a useful document to refer when developing ITTs.

From 2006, attention shifted to Europe where efforts were made by the EU Document Lifecycle Management (DLM) Forum to set up a new EU de facto standard (MoReq2) and an associated compliance testing regime with an appropriate organisation. At the DLM Forum in 2005 Ian Macfarlane of TNA reported on the plans for MoReq2. The scoping report for MoReq2 was endorsed and funding was agreed. As we went to press the contract was awarded to a consortium headed by Cornwell Management Consultants who authored the original document.

The overall aims for the MoReq2 development are to develop extended functional requirements within a European context and

to support a compliance scheme by:

- Strengthening from MoReq what have become key areas and covering important new areas of requirements with clarity
- Ensuring that the functional requirements are testable and

Requirement Comparisons – National Archives versus MoReq

The 2002 National Archives document defines a series of ten core requirements followed by three optional requirements.

- **Record organisation**, which covers the classification scheme, classes, folders and folder parts. The equivalent MoReq section is the 'Classification scheme'.
- **Record capture, declaration and management**, which covers how records should be captured, declared as records and managed and covers record metadata, move, copy, extract and relate functions, and bulk import facilities. The equivalent MoReq section is 'Capturing records'.
- **Search, display and presentation**, which covers those functions. The equivalent MoReq section is 'Searching, retrieval and rendering'.
- **Retention and disposal**, is a major section covering disposal schedule definition, allocation and execution, resolving conflicts, review and destruction. The MoReq section has the same title.
- **Access control**, covers access to ERMS, access control markings, roles, groups, allocation to classes folders and records, custodian, execution of access control markings and privacy and opening of records. The equivalent MoReq section is part of 'Controls and security'.
- **Audit**, defines the audit trail requirements. The MoReq equivalent is in 'Controls and security'.
- **Reporting**, defines all the reporting requirements. MoReq covers this under 'Administrative functions'.
- **Usability**, defines the user interface requirements. MoReq covers this under 'Non-functional requirements'.
- **Design and performance**, covers integrity, interfaces, disaster recovery, storage, performance and scalability. MoReq covers this under 'Non-functional requirements'.
- **Compliance with other standards**. MoReq covers this in its Annexes.

The National Archives document includes three optional modules.

These are not a mandatory part of the core ERM requirements.

However, if an ERMS supplier wishes to demonstrate a capability of providing one or more of the functions covered by the optional modules, within the context of ERM, then the system must fulfill all of the mandatory requirements in that module.

- **Authentication and encryption**, covers electronic signatures, electronic watermarks and encryption.
- **Document management**, covers high-level requirements for an integrated EDRM system but does not include a detailed EDM specification.
- **Hybrid and physical folder management**, covers additional requirements for systems that will be required to manage both paper and electronic folders. It covers physical folders, markers, retrieval and access control and tracking and circulation and disposal.

For many users the document management and hybrid requirements will be mandatory so they should be studied carefully. The equivalent requirements are covered by MoReq in 'Other functionality'. The latest National Archives document promises other optional modules in future, which will cover content management, casework and workflow, image management and document scanning and preparing records for transfer.

MoReq base module

1. Introduction
2. Overview of ERMS requirements
3. Classification scheme
4. Controls and security
5. Retention and disposal
6. Capturing records
7. Referencing
8. Searching, retrieval and rendering
9. Administrative functions
10. Optional modules (see below)
11. Non functional requirements
12. Metadata requirements

developing test materials to enable products to be tested for compliance with the requirements

- Making the requirements modular to assist application in the various environments in which they will be used.

To provide compatibility, MoReq2 is to be an evolutionary update to the original MoReq, not a radically different product.

The MoReq requirements are to be arranged in a base module which constitutes the minimum necessary to provide credible electronic records management and as optional modules. The base includes sections 1–9, 11 and 12 the metadata requirements.

The proposed arrangement of optional modules (a modified section 10) is as follows:

MoReq optional modules

- Management of physical records and hybrid file retention and disposal (existing)
- Document management and collaborative working (existing)
- Integration with workflow (existing)
- Casework (new)
- Integration with content management systems (new)
- Electronic signatures, encryption, electronic watermarking (existing)
- Distributed systems (new, including existing requirements drawn from base and other sections)
- Offline and remote working (new)
- Definition and description of record keeping processes (new)
- Fax integration (new)
- Security categories (from 4.6).

So, at present, the TNA requirements are the standard to follow. In future this role will pass to MoReq2 which is due to be published at the end of 2007. In 2008 we should see the start of a new testing programme that will run across Europe.

TNA has also produced the *e-Government Policy/Framework for Electronic Records Management*⁽²⁴⁾ with the eGovernment Unit in 2001 and a set of background guidelines on the management, appraisal and preservation of electronic records.

The National Archives has also produced a set of toolkits to help organisations develop electronic document and records management, including:

- How to produce a corporate policy on electronic records
- Toolkit for compiling an inventory of electronic records
- Toolkit for appraising the inventory of electronic records
- Good practice in managing electronic documents using Office 97 on a local area network
- Framework for strategic planning and implementation
- Sustainable electronic records, strategies for the maintenance and preservation management of electronic records on websites and intranets, and an ERM toolkit
- Business classification scheme design
- Guidelines on developing a policy for managing e-mail
- Guidance publication on realising benefits.

4.4.7 Requirements and best practice for electronic records preservation and archiving

When the TNA ERMS requirements were first produced in 1999 they were aimed at government departments, and the traditional model was that they would manage their own records while they were active and semi-active. They would then review them and the TNA would be invited to select a small percentage deemed worthy of long-term preservation. This placed the onus for the long-term preservation of government records on The National Archives and they have gone on to develop their own electronic archive as described below. Hence the initial requirements did not cover the

issue of long-term preservation of electronic records in detail.

However, it was soon recognised that government departments also would need to manage electronic records that were not required by The National Archives but which nevertheless had to be kept accessible for long periods. Outside of central government many public sector bodies will have to manage records in electronic format for long periods of time.

Fortunately there are a growing number of sources of expertise and guidance on the archiving and preservation of electronic data and records.

The National Archives has produced two relevant documents

- The Management, Appraisal and Preservation of Electronic Records, Vol.1 Principles, Vol.2 Procedures (see box below).

- The National Archives, The Generic Requirements for Sustaining Electronic Information over Time (2003)

Jones and Beagrie also produced an excellent work *Preservation management of digital materials: a handbook*⁽²⁵⁾.

The Management, Appraisal and Preservation of Electronic Records

Volume 1 Records management in information age government
Electronic records in the organisation
Record organisation and structure
Management of electronic records
Design of electronic records management systems
Strategies for developing electronic records management

Volume 2 Creating and capturing records
Managing and maintaining records
Inventory, appraisal and disposal
Preservation of electronic records
Safeguarding records from Year 2000
Outline functional requirements
Relevant standards

The scoping report for MoReq2 confirmed that metadata elements of preservation will be included. It will be ensured that the metadata is compatible with ISO 23081 (Principles for metadata) and with the OAIS (Open Archival Information System standard ISO 14721). ISO 23081 is reviewed above. The OAIS standard is reviewed below.

ISO 14721:2003⁽²⁶⁾ specifies a reference model for an open archival information system (OAIS). The purpose is to establish a system for archiving information both digitised and physical with an organisational scheme composed of people who accept the responsibility to preserve information and make it available to a designated community. This reference model addresses a full range of archival information preservation functions including ingest, archival storage, data management, access and dissemination. It also addresses the migration of digital information to new media and forms, the data models used to represent the information, the role of software in information preservation and the exchange of digital information among archives. It identifies both internal and external interfaces to the archive functions and it identifies a number of high level services at these interfaces. It provides various illustrative examples and some best practice recommendations. It defines a minimal set of responsibilities for an archive to be called an OAIS and it also defines a maximal archive to provide a broad set of useful terms and concepts.

The National Archives have set up their electronic archive to comply with this model. Such a solution needs a hierarchical digital storage solution. The National Archives used FileTek's StorHouse which is built around products such as EMC's Centera and MAID. You also need application software, and The National Archives used Tessella Support Services to develop the application.

The US's National Archives and Records Agency (NARA) has also recently let a \$300 million contract to Lockheed Martin to develop an Electronic Records Archive which employs similar software.

The Digital Preservation Coalition (www.dpconline.org) is a useful source of information on all aspects of digital preservation. It is supported by JISC, the British Library and others. They have published *Directory of Digital Preservation Repositories and Services in the UK*. This includes a listing of archive data services.

Other information sources are the Digital Curation Centre funded by JISC (www.dcc.ac.uk) and ERANET the Electronic Resources Preservation and Access Network (www.erpanet.org).

Another relevant standard is METS⁽²⁷⁾ (Metadata Encoding and Transmission Standard) which is maintained by the US Library of Congress. For a major archive project – Making of America II (MOA) – the Library provided an encoding format for descriptive, administrative and structural metadata for textual and image-based works. METS, a Digital Library Federation initiative, attempts to build upon the work of MOA and provide an XML document format for encoding metadata necessary for both management of the digital library objects within a repository and exchange of such objects between repositories (or between repositories and their users). Depending on its use a METS document could be used in the role of Submission Information Package (SIP), Archival Information Package (AIP) or Dissemination Information Package (DIP) within the Open Archive Information System (OAIS) reference model so it is tightly linked to the OAIS standard referenced above. A METS document consists of seven major sections – METS header, descriptive metadata, administrative metadata, file section, structural map, structural links and behaviour.

One of the issues when archiving electronic records is whether you hold them in an editable, viewable and printable or read-only form. Where archives need to hold records in an editable form one of the key standards is the Open Document Format being developed by OASIS. For the read-only static format the new PDF Archive format (ISO 19005-1:2005) would be appropriate.

OASIS⁽²⁸⁾ is the Organisation for the Advancement of Structured Information Standards. It is a not-for-profit international consortium that drives the development, convergence and adoption of e-business standards. The consortium produces more web services standards than any other organisation along with standards for security, e-business and standardisation efforts in the public sector. Founded in 1993 OASIS has more than 5,000 participants representing over 600 organisations. The consortium hosts two of the most widely respected portals on XML and web services standards. OASIS was originally founded under the name SGML Open as a consortium of vendors and users devoted to developing guidelines for interoperability among products that supported the standard generalised markup language (SGML). OASIS changed its name in 1998 to reflect an expanded scope of technical work including the extensible markup language (XML) and other related standards.

ISO 19005-1:2005 *Document management – Electronic document file format for long-term preservation – Part 1: Use of PDF 1.4 (PDF/A-1)*⁽²⁹⁾. PDF/A is a constrained form of Adobe PDF version 1.4 intended to be suitable for long-term preservation of page-oriented documents for which PDF is already being used in practice. The standard was developed by an ISO working group with representatives from government, industry and academia and active support from Adobe. PDF/A attempts to maximise device independence, self containment and self documentation.

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Designing and implementing a records management system

5.1 Background

This chapter outlines a proven methodology for designing and implementing a records management system. If you wish to review your current records management policies, procedures and systems, benchmark them against best practice, improve them to meet best practice and your specific objectives, and implement some form of electronic system, then this chapter provides you with a guide to managing the project.

It is based on an EDRM system implementation toolkit⁽¹⁾ developed for JISC by Cimtech and available on the JISC Infonet website. The toolkit itself was based on Cimtech's own methodology plus the DIRKS⁽²⁾ methodology developed by The National Archives of Australia and summarised in ISO 15489⁽³⁾. It also takes note of the JISC Records Management InfoKit⁽⁴⁾, which is also available on the JISC Infonet website.

The methodology comprises ten stages or main tasks. These are listed in the table below and reviewed in Sections 5.2–5.11.

Cimtech's methodology: the 10 stages

Stage	Covered in section
1. Positioning ECM and EDRM systems	5.2
2. Defining and managing your project	5.3
3. Information gathering and analysis	5.4
4. Feasibility study and options review	5.5
5. Making the business case for the preferred approach	5.6
6. Defining the statement of requirements (SOR)	5.7
7. Procuring the solution	5.8
8. Managing the implementation	5.9
9. Measuring the results	5.10
10. Project closure and solution support	5.11

Cimtech's lecturers run a regular one-day course at the Fielder Centre (Fig. 5.1), Hatfield, Hertfordshire⁽⁵⁾, to explain the methodology in more detail. The same course can be delivered in-house



Fig 5.1
The Fielder Centre, Hatfield –
the venue for Cimtech courses
and conferences

for an organisation's project team.

Each stage is defined as one or more steps. A complex stage will be broken down into more steps for clarity.

At one level it is designed as a best practice guide to be read by a project team prior to setting up a project in order to audit their project

plan. The methodology can provide a framework to help in planning a project.

At another level the methodology can function as a step-by-step guide to setting up, planning and managing a system implementation project.

Stage 1 duplicates Chapter 3 of this guide. It reviews the ECM platforms and how they vary in character, scope and function. It also helps to position ECM systems alongside other IT applications and systems. Finally, it reviews best practice guidelines for information and records management so current policies, procedures and systems can be assessed prior to planning the project.

Stage 2 outlines an approved project management methodology⁽⁶⁾ and gives advice on defining the scope of a project and developing a project management plan using that methodology. In particular it makes the case for either running a separate records management project in advance of a system procurement project or of combining the two.

Stage 3 reviews the information gathering and analysis stage of the project. The information gathering and analysis requirements overlap considerably. Following the steps in Stage 3 should gather all the information needed to:

- agree and implement the right record keeping strategies for an organisation
- agree and implement the right EDRM solution.

Stage 4 then takes organisations through the feasibility or options review stage. First, the different record keeping strategy options available need to be reviewed before deciding the preferred strategy for the institution. Second, the different options for developing an EDRM solution need to be reviewed before deciding on the preferred solution.

The main focus of this methodology is then on selecting the preferred system solution for an organisation. However, it is difficult to achieve that if the preferred overall records management strategy for an organisation has not been agreed. That is why Stage 4 also guides organisations through the record keeping strategy options at a high level.

Stage 5 assumes that organisations have agreed the preferred approach and provides a step-by-step guide to making a business case for the preferred solution. It shows how to assess the costs of the solution, the strategic benefits that it will bring and the hard or tactical benefits that can have a financial value placed on them and be used to offset the costs.

Stage 6 takes organisations through the process of defining detailed requirements for the solution. Following a standard template this stage shows how to define high-level requirements for a new system, business objectives and the detailed functional and technical requirements for a system and the services that need to be covered by the contract.

Stage 7 details a sample public sector procurement process. A specific procurement procedure is assumed but the impact of selecting other procurement routes is also reviewed.

Stage 8 then provides a step-by-step guide to managing the implementation process. This should be a collaborative process with the buyer and the supplier acting as a team. The exact breakdown of roles and responsibilities will vary between each supplier and organisation but this stage provides guidance on what to expect and how to manage each step.

Stage 9 covers how to measure the results and ensure the project has met the business objectives.

Stage 10 addresses how to close the project down and ensure that the system is supported post implementation so that benefits can be derived from the system over the medium term.

5.2 Stage 1 – Positioning ECM and EDRM Systems

This stage is designed to help the project team agree exactly what they mean by an ECM or EDRM system, how the new system will integrate with existing IT systems and applications, and to show how a system procurement should be seen as part of an overall records management programme.

Stage 1 comprises three steps:

Step 1 defines what an ECM or EDRM system is, what it is designed to do, what variations of systems exist with different acronyms and how they vary in scope and function.

Step 2 positions EDRM systems alongside other IT systems and applications within the institution.

Step 3 reviews best practice guides for operating an information and records management programme.

N.B. Steps 1 and 2 duplicate Chapter 3 of this guide so they are not reproduced here. Step 3 duplicates Section 4.4 of Chapter 4 of this guide so, again, is not duplicated here. The full contents of Stage 1 can be found on the JISC Infonet website⁽¹⁾.

Section of Chapter 3 where function is reviewed	Description of function
3.2	Existing document and data capture
3.3	Content creation
3.4	Content syndication
3.5	Electronic forms for data capture
3.6	Indexing
3.7	Classification
3.8	File and metadata management
3.9	Application integration
3.10	Digital asset management
3.11	Application development and administration
3.12	Searching and retrieval
3.13	Content distribution
3.14	Website design and development
3.15	Web publishing
3.16	Personalisation
3.17	Collaboration and business process management

5.3 Stage 2 – Defining and Managing a Project

This stage is designed to help define and manage the project.

Stage 2 comprises three steps:

Step 1 looks at a recommended project management methodology and then provides guidance on how to define and manage a project using that methodology (Section 5.3.1).

Step 2 provides specific guidance on the procurement options available and how to choose the right one (Section 5.3.2).

Step 3 looks at developing a change management and communications plan as part of an overall project plan (Section 5.3.3).

5.3.1 Stage 2, step 1 – Project management methodology

The key to a successful project is to follow an agreed and proven project management methodology. Cimtech follows the project management methodology outlined in the JISC Project Management Infokit⁽⁶⁾.

This Infokit takes an approach based on PRINCE2 (PProjects IN Controlled Environments). PRINCE2 is a methodology approved by government for public sector projects. The JISC Infonet method pares down PRINCE2 to a framework suitable for managing any project.

Project start-up and closure occur once. Planning, managing and controlling form an iterative cycle that may repeat many times before the project is complete.

The five main components of the JISC methodology

- Project start-up
- Planning
- Managing project phases
- Controlling risk, issues, changes, quality, etc.
- Project closure

5.3.1.1 Project start-up

The Infokit section on project start-up contains six sections:

Project start up

- Sponsorship
- Defining the project
- Stakeholders
- Building the project team
- Setting up the project infrastructure
- Costing the project

It is vital to define the scope of the project (Fig. 5.2) and JISC recommends up to four documents to define the project: (i) the project brief, (ii) business case, (iii) project initiation document (PID) and (iv) project charter.

The business case can only be an outline at this stage. The methodology assumes that a detailed business case can only be produced at Stage 5 once the information gathering, analysis and feasibility stages have been completed and a preferred approach agreed.

JISC provides a link to a PID template on the project management Infokit. There are ten recommended core components for a PID as listed below.

All of these areas are explored in the full JISC EDRM toolkit. One vital area that needs to be explored here is the scope of the project. Organisations planning to implement some form of ECM solution that includes ERM will be in one of three categories.

Category 1 The organisation has a designated records manager and is undertaking a programme of records management (RM) projects to set up RM policies, procedures and systems.

The ECM system project is planned as part of this overall programme. The overall programme plan and timetable should show the RM projects starting ahead of the system project and should show the key dependencies between them including the following:

- An RM policy will be published prior to procuring a system

Core recommended contents for a PID

- Project goals and objectives and critical success factors
- Project scope
- Identified risks and constraints affecting the project
- Assumptions made about the project
- Project's organisation structure and roles and responsibilities
- Project control mechanisms
- The reporting framework
- Stakeholders and their involvement
- Project planning and a milestone project plan
- Project budget



Fig 5.2
Define the scope of the project

- A corporate records audit will be completed prior to procuring a system
- A corporate classification scheme/file plan will be designed prior to implementing a system or scheduled to complete in step with the planned roll out of the system
- Retention schedules for all records listed in the audit will be documented prior to implementing the corporate system
- Procedures and systems for the management of semi-current and archive paper records will be documented prior to implementing the corporate system.

In this case the project plan can take account of all the RM tasks that have been completed and some of the steps outlined in Stages 3, 4 and 6, below, can be truncated or avoided.

Category 2 The organisation has a designated records manager and is undertaking a programme of RM projects designed to set up and agree professional RM policies, procedures and systems. No system implementation project was planned as part of this overall RM programme.

In this case the decision to set up an ECM system implementation project has just been made and hence a separate project plan is needed. The new system project plan will need to include reference to the existing RM programme and the key dependencies between the system project and the RM programme. The key dependencies would be the same as those listed in category one.

The system project plan can take full account of all the RM tasks that have been completed and hence some of the steps outlined in Stages 3, 4 and 6 can be truncated or avoided.

Category 3 The organisation is not currently undertaking any programme of RM projects. The decision to set up an ECM system implementation project has just been made and the organisation is just starting to define the project and draw up a project plan. In this worst case either two projects should be set up – an RM project and a system project – and the key dependencies between them should be defined or, if it is more expedient, a system implementation project should be set up including all the required RM tasks within the plan.

What such organisations should not do is plan to procure an ECM system without having undergone any form of RM programme and with no professional RM input to the project.

5.3.1.2 Project planning, project closure

In a long and complex project, such as an RM and ECM system implementation project, it is not desirable or feasible to develop a complex and detailed plan and then stick rigidly to every element. You need to adjust to circumstances and findings at each stage.

Hence this methodology advises organisations to draw up a high level or milestone plan at the outset and to revisit it at each stage of the project. More detailed plans for each project stage can be developed and then project managed at two levels – the overall project plan and the detailed project stage plan.

Cimtech's methodology covers ten stages and defines the key steps and type of resource that will be required. However, it is only once the first stage is completed that we can go into detail in the second stage and only once we have made key decisions in Stage 2 can we define the detailed requirements for Stage 3 and the resources that will be required to complete it.

Hence planning is an iterative task that carries on throughout the project. It involves feeding back the findings of each stage and readjusting the overall plan to reflect the latest position.

Managing the project is done stage by stage and involves developing a detailed plan for each stage at the start and using it to manage that stage at a more detailed level.

Project control is also an iterative task that carries on throughout the project. It is best to start with an agreed approach to controlling the project, apply that approach through each stage of the project and adapt the approach as required.

Project closure is the final component implemented at the end of the project when all the stages have been completed. It therefore mirrors the project start-up component.

The key document for any project is the plan. This will be a document that will not be finished until the project is completed. It will be constantly amended to reflect feedback from each stage.

The general principle that should be followed is that the completion of each stage of the plan should be associated with the achievement of one or more milestones at each stage and, ideally, each step in each stage should have a clearly defined deliverable.

Organisations need software tools to assist with project planning and management. These are covered in the JISC project management InfoKit. They must also be able to estimate the time and resources needed to complete all the tasks. The JISC EDRM toolkit provides a 'Resources required to complete the stage' sub-section for each stage.

The project team should regularly review which steps have been completed and which have been delayed, and what the impact is of any delays on the rest of the plan.

The team should also review which steps will lead to changes in the overall project plan and, hence, changes to the detailed steps required in each stage.

At the end of each stage key aspects of the project should be reviewed. These should include:

- The business case as outlined in the PID and in Stage 5
- The project scope as defined in the PID
- The project stages as defined in the project plan
- Is the project meeting the objectives defined in the PID?
- Has the risk situation altered?
- Should the project progress to the next stage?

Only when these questions have been answered should teams proceed to plan the next stage in detail.

There must be a reporting standard for the project. A standard highlight or status report template can be useful. Again the JISC Project Management InfoKit provides samples. Dates should be scheduled for formal steering and project board meetings. These should be scheduled to coincide with the completion of major stages. In addition, it is good practice to set up a user group and plan regular monthly meetings as part of the communications plan, which is reviewed in Step 3 below.

Once the project plan and the monitoring, review and reporting mechanisms have been created, the last major area to consider is the control mechanisms needed to keep the project on track and to deal with all the issues that occur during a long and complex project.

These include:

- Risk management
- Issue management
- Change control
- Quality control.

Finally, any project should be formally closed to ensure that:

- The organisation has formally accepted all outcomes
- Operational procedures are in place
- The handover to operational staff has been completed
- Documentation and reference material is in place
- Any further actions and recommendations are documented and disseminated
- The results are disseminated to the relevant people
- There are no loose ends.

5.3.2 Stage 2, step 2 – Procurement

The project plan should include details of the preferred procurement approach. The choice of procurement approach can influence the timetable as it will introduce defined milestones. In an RM programme and ECM system implementation project organisations may need to make several procurements.

5.3.2.1 Consultancy and project management support

First, third-party consultancy support or project management support may need to be procured. Depending on the size and duration of the project, organisations can run a competitive procurement – writing a brief for the work, inviting three quotations and selecting the best value proposal.

Those in the public sector can use Catalyst, select the required category of service and send their brief to qualified consultancies.

One point to note is that many of the specialist independent consultancies are not large enough to figure on the approved list of Catalyst providers. Hence, if public sector organisations have a list of consultants that they want to invite to tender they may need to contact them direct to find out the name of their Catalyst partner and then invite their partner to respond.

When procuring consultancy support clarify whether RM support or system procurement support is required, or both, and seek references. When procuring project support expertise it is worth specifying that this is an ECM procurement and that staff with experience of managing similar projects are required.

5.3.2.2 Procuring system and supplier services

The second and major procurement is the ECM system and associated supplier services. Detailed advice on compiling a statement of requirements (SOR) for a system and services can be found in Stage 6. Detailed advice on the procurement options can be found in this stage and Stage 7 of the JISC EDRM toolkit.

In the public sector, projects can follow a formal EU OJEU procurement or use the Catalyst routes. The JISC toolkit provides a detailed guide to OJEU procurement including a process model and timetable.

In the private sector the common approach is to draw up a supplier shortlist, issue a requirement and select the preferred supplier to negotiate a contract with. This process is reviewed in Stages 6 and 7, below.

5.3.3 Stage 2, Step 3 – Communications and change management

The project plan should definitely include a series of change management and communications tasks. Implementing an ECM system inevitably means significant changes to working practices. To make sure that staff are aware of, and take a positive view of, the project they need to be kept fully informed and resources need to be devoted to managing the change process and communicating the aims and objectives of the project.

5.3.3.1 Awareness building

At the start of the project the awareness of the project needs to be raised and the benefits of all the preparative work should be stressed (Fig. 5.3).

An electronic project newsletter and project web pages on the intranet should be produced and updated on a monthly basis. Other communication routes include notice boards, staff publications and staff induction material.

Senior management need to be involved when setting up the project and structures. They can help draw up a list of contact points; people who can help compile the records audit and who can increase awareness of the project in their areas. They should all be local champions for ECM.

The project team and/or consultants should set up early workshops to explain the objectives of the project to staff, to outline the project plan and when staff will be impacted by the planned changes. In all projects it is vital to pre-empt the rumour mill and be first to get out a positive message about the new project.



Fig 5.3
Build awareness of the project
from the outset

5.3.3.2 Change management

Throughout a project it is important to ensure that people are ready for change. They may feel insecure and antagonistic if they are simply told that their paper files are going to be taken away without being told what is being provided as a replacement, what the benefits are, what training and support will be available and when the change will happen.

An implementation plan and timetable should be published and the project office, the local contact points and the supplier contacts should also be publicised, indicating who staff should contact for information or support. The user group and the project board will agree where the pilots will be run and the preferred roll out order. This should be based on an assessment of how ready a department is for ECM, how keen they are to be early adopters and how suitable their records are for conversion. Once agreed, this should be publicised and explained.

The next step is to provide staff with a view of the planned solution. The chosen supplier should be tasked with setting up a model office or a sample configuration of the solution. Staff in key departments should be invited to use the model office and provide feedback on the user interface, the file plan and all aspects of the solution.

Facilities should be provided for them to load sample documents and e-mails onto the system including the scanning of paper documents.

Next, the project team and the supplier must provide a comprehensive change management or user implementation package for each department, starting with a pre-implementation workshop. It should include an assessment of the records to be loaded onto the system, a plan for agreeing the folders to be set up, any backfile scanning and data migration requirements and a training plan. Responsibility for the provision of these services should be clearly defined.

The implementation package should provide a checklist for heads of departments to complete to indicate their department is ready to go live. Amongst the supplier, the project team, consultants and local contacts should be a mix of RM, IT, business analysis and training expertise to provide a full change management package.

When implementing a corporate solution at least four levels of training should be provided: training for end users, operators, RM staff and system administrators.

5.3.3.3 Communications plan

This is linked to the awareness-building tasks described above and should cover the duration of the project.

So, in addition to announcing the project, the communication channels set up for the project should be used to keep staff aware when all the major milestones are achieved, if there are any changes to planned timetables, training dates, acceptance testing dates, etc. When setting up the project plan it is useful to create a list of communication milestones or events and tick them off through the project.

The communication plan should also cover the promotion of good RM practice. As policies and procedures are agreed they should be publicised, as should the overall file plan when it is agreed. It should be published as part of the roll out when a department has all its folders on the system.

Useful features for the project web pages can be a frequently asked questions (FAQ) page in which some of the worst rumours about ECM projects can be corrected.

5.4 Stage 3 – Information Gathering and Analysis

This stage is designed to help the project team to plan, timetable and resource their information gathering for the project and the analysis that follows. This stage recommends good practice and provides a number of tools to use in the information gathering.

This stage assumes that information gathering and analysis is

being conducted for a combined RM and ECM system procurement project. It is divided up into four steps, which equate to the first four information gathering and analysis steps advocated in the DIRKS⁽²⁾ Manual:

- Step 1 looks at how to conduct a preliminary investigation (Section 5.4.1)
- Step 2 looks at how to analyse business activity (Section 5.4.2)
- Step 3 looks at how to identify the organisation's record keeping requirements (Section 5.4.3)
- Step 4 looks at how to survey existing RM and other information systems (Section 5.4.4).

5.4.1 Stage 3, Step 1 – Preliminary investigation

The DIRKS Manual includes a detailed account of how to conduct a preliminary investigation (Step A). The four key steps are:

- Determine the scope of the preliminary investigation
- Collect information from documentary sources and interviews
- Document the research
- Prepare a report for senior management.

The work done in Step 1 needs to be balanced against the work planned in Step 4 – the detailed survey of the organisation's existing record keeping systems. The outputs of the preliminary investigation should be:

- A clear understanding of the organisation and the administrative, legal, business and social context in which it operates. This should include a structured review of the organisational structure, which can help to scope the resources required to conduct Steps 2 to 4. For a system procurement it is helpful to also record the physical location of each department, section, etc. This will help in Stages 4 and 6 when the current IT infrastructure, including the network, needs to be documented.
- A general appreciation of the organisation's current record-keeping strengths and weaknesses including the need for ECM/EDRM and the benefits it could bring in each area.
- The information needed to feed into the project definition and planning documents as defined in Stage 2. This will become much clearer after the completion of Step 1 of the resources required to conduct Steps 2 to 4.

Hence, one dependency is that Step 1 must be carried out before the PID for the project is completed.

5.4.2 Stage 3, step 2 – Analysis of business activity

The DIRKS Manual includes a detailed account (Step B) of how to conduct an analysis of business activity (Fig. 5.4). The key steps are:

- Collect information from documentary sources and interviews
- Analyse the work performed by the institution
- Identify and document each business function, activity and transaction
- Develop a business classification scheme based on a hierarchy of business functions, activities and transactions
- Validate the analysis of the business activity with senior management.

This is a resource-intensive activity so it emphasises the importance of agreeing the scope of the project and the approach being taken to information gathering. If the goal is to develop a comprehensive business classification scheme then as much of the organisation needs to be reviewed as possible.

However, if a phased system implementation is being planned, information gathering can be phased as well.

For a radical implementation of an ECM solution that includes business process re-engineering, the core business processes also need to be modeled in detail. Also, the impact that ECM, includ-



ing BPM, could have on how they are conducted needs to be reviewed so that they can be redesigned to take advantage of the new technology and better meet business objectives.

At the end of the analysis of business activity there should be:

- An understanding of the relationship between the organisation's business and the records that are a by-product and evidence of its activities
- A foundation for developing tools to establish corporate control over record keeping including thesaurus development, preparation of disposal schedules, identification and specification of record keeping requirements and the formal assignment of record keeping responsibilities
- An understanding of the scope for business process improvement and automation resulting from the implementation of an ECM solution incorporating BPM software if that is within the scope of the project.

This information should be clearly documented in:

- A function source document detailing the organisation's functions, activities and transactions with associated process maps/models
- A business classification scheme that shows the organisation's functions, activities and transactions in a hierarchical relationship.

The classification scheme is used together with the record keeping requirements that are defined in Step 3, below, to develop two additional important records management tools that are defined in the DIRKS Manual as being:

- A thesaurus of terms or records classification scheme to control the language for titling and indexing records in a specific business context
- A disposal authority/schedule that defines the retention periods and consequent disposal actions for classes of records. The DIRKS Manual stresses that to conduct this vital step requires personnel with analytical skills, modeling techniques, oral and written communication skills and a broad knowledge of the institution. Internal resources can be used, if they exist, or consultants. Ideally a mix of both as consultants will lack the knowledge of the organisation.

5.4.3 Stage 3, Step 3 – Identification of record keeping requirements

The DIRKS Manual includes a detailed account of how to identify record keeping requirements (Step C). The key steps are:

- Locate relevant sources
- Identify regulatory, business and community requirements for record keeping
- Document these identified requirements in a suitable manner for reference purposes
- Determine and document which of the identified requirements will be met.

At the end of the step the following should have been gained:

- An understanding of the organisation's need to keep records as evidence of its activities
- An appreciation of the organisation's level of exposure to evidence related risks
- A framework to support records appraisal decisions and disposal actions
- An appreciation of the factors that influence how these requirements can be met
- A benchmark for judging whether the organisation's current records systems meet these requirements
- A basis for determining the strategy which will best enable the organisation to meet these record-keeping requirements.

5.4.4 Stage 3, step 4 – Assessment of existing systems

The DIRKS Manual includes a detailed account of how to assess existing systems (Step D). Beyond the DIRKS requirements there

Fig 5.4
Analyse the business activity

are some significant additional information gathering requirements that should be conducted at this stage to provide all the data needed to specify requirements for an ECM solution.

5.4.4.1 DIRKS survey and assessment of RM systems

The four key tasks that comprise the DIRKS assessment are:

- Identify existing paper-based, electronic and hybrid business information systems within the organisation (Fig. 5.5)
- Analyse whether the organisation's prioritised record keeping requirements are being met
- Determine whether current systems have the capacity to meet them by measuring the gap between what exists and what is desired
- Prepare a report describing the strengths and weaknesses of existing information and records management practices. This can form the basis for Stage 4 – the feasibility or options review.



Fig 5.5
Identify existing paper-based and electronic information systems

This is a resource-intensive activity so it emphasises the importance of agreeing in the project plan in Stage 2 the scope of the project and the approach being taken to information gathering.

Those looking to implement a corporate ECM solution, who want a full audit of the current records for FOI purposes, or who want to cost any solutions to current paper records management problems (off-site or central storage, microfilming, scanning, etc.) need to conduct a comprehensive audit. However, those planning a phased system implementation can phase the information gathering stage as well.

In addition to paper and electronic filing systems, existing databases should also be audited. Both involve the use of questionnaires. It is essential in both cases to identify local RM contacts in each department or section and for them to identify the custodians of each main record set (paper and/or electronic).

Cimtech has two basic questionnaires: one for databases and one for paper or electronic filing series. It is difficult to get staff to complete questionnaires accurately.

The records manager audit is the labour intensive audit. It involves the records manager visiting every RM contact and record-set custodian, interviewing them and completing the questionnaire on a one-to-one basis.

The delegated audit is the less labour intensive approach used by Cimtech when called in to conduct an audit for a client. It involves a three-pronged attack comprising questionnaires followed by workshops and face-to-face interviews. The questionnaires are posted on the intranet with a database link or are e-mailed out as spreadsheets to RM contacts together with an invitation to a workshop. The invitation would be signed by the project sponsor – the more senior the better. It is crucial to have top-level sponsorship for the project and to have a close network of records management contacts in each department and section.

The workshop should describe the status of the project, stress the vital role of the information gathering stage and then take staff through the process of completing the questionnaires and answer any queries they have. After the workshops the staff complete the questionnaires and the records manager or the consultant reviews the results and compiles a master spreadsheet, or simply reviews the data in the database depending on the method employed. Where poor data has been provided then follow up interviews are conducted and these may result in new questionnaires being completed. Typically a 20 per cent follow-up is needed.

More details of the audit methodology are provided in the JISC EDRM toolkit. Guidance on conducting records audits is also provided by The National Archives on its website⁽⁷⁾. Cimtech provides courses on how to conduct an audit with example spreadsheets.

5.4.4.2 Survey of current document and content management systems

As part of the records survey described above – to provide all the information needed to specify the required ECM solution – detailed data must be gathered in the following areas:

- For all existing paper-based, electronic and hybrid document and records management systems gather data on current practices including:
 - (i) how they are captured/created
 - (ii) how they are indexed/organised/managed
 - (iii) what security and access controls are provided
 - (iv) what finding aids are provided
 - (v) how are they routed/distributed across the institution
 - (vi) how are they retrieved and viewed and copied/printed
 - (vii) where are they stored, backed-up and archived
 - (viii) how are they reviewed and disposed of?
- For all existing paper-based, electronic and hybrid document and records management systems gather volumetric data
- Review the existing IT infrastructure including the applications used to create documents and content.

The document/records/content review, together with the analysis of business activity and the questionnaires, needs to provide a detailed review of the current creation or capture, management, access and disposal practices.

This is an area that can best be conducted by a specialist consultancy following a standard methodology. Those wishing to conduct such a review themselves need to study Chapters 3 and 4, and Stages 4 and 6 in detail.

This information-gathering stage is vital. It is essential that all the data relating to the current systems is gathered and that all the key stakeholders are interviewed to identify their views; this will highlight the shortcomings of the current systems and the new functions and features they need from the new system.

The review of the organisation's IT infrastructure should include interviews with ICT staff to obtain network diagrams, minimum specifications of hardware and software for desktops and servers, preferred standards and preferred products and suppliers.

It should list all the applications used to create, edit, annotate and view electronic documents and content, etc., including e-mails and multimedia files. It should include details of all the main business administration systems and an indication of how the new solution will integrate with them. It should include details of any existing EDM or WCM systems and an indication of how the new solution will interface with or replace them over time.

5.4.4.3 Outputs from the survey

At the end of the assessment of the organisation's existing business information systems and the detailed review of the document and content management systems there should be:

- An understanding of the strengths and weaknesses of existing records and information management practices
- An appreciation of the potential exposure to records-related business and accountability risks caused by not meeting the record keeping requirements documented in Step 3
- A detailed understanding of the IT infrastructure and core business administration systems and existing EDM and content management systems
- A detailed set of data on current document flows and document and record volumes
- A detailed set of data on current document and records and content management practices, sufficient to specify a set of requirements for a new solution.

5.5 Stage 4 – Feasibility Study and Options Review

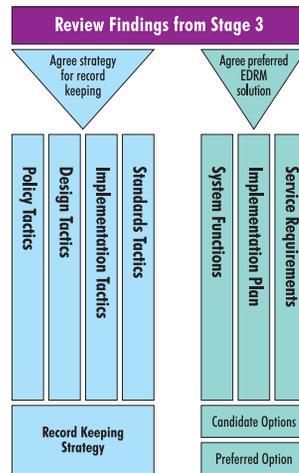
This stage is designed to help the project team identify the most appropriate policies, procedures, standards, system functions and services to implement in order to improve upon and remedy the

weaknesses identified in Stage 3 Step 4. It is also designed to ensure that organisations meet the record keeping requirements identified in Stage 3, Step 3, and their key business objectives for the project (Fig. 5.6).

Fig 5.6
The feasibility study options review (JISC)

Stage 4 is a guide to the feasibility stage and is divided into two steps:

- Step 1 looks at the different record keeping strategy options available to ensure the institution meets its record keeping requirements.
- Step 2 looks in more detail at the system solution. It builds on the data provided in Stage 1 and gathered in Stage 3, and reviews the options for implementing a system and deciding on the preferred solution. At the end of the step the preferred solution needs to have been agreed on.



5.5.1 Stage 4, step 1 – Agreeing a strategy for record keeping

The DIRKS Manual includes a detailed account of how to develop a strategy (Fig. 5.7) for record keeping (Step E). A record keeping strategy should include developing or adopting policies and procedures (see Chapter 4), developing or adopting standards and implementing new system components or complete new systems and practices. The key is that the strategy ensures that the institution meets its record-keeping requirements and meets the business objectives set for the project. The DIRKS Manual states that to complete Step E the following four tasks must be completed:

Fig 5.7
Develop a strategy for record keeping

■ Investigate a range of tactics to satisfy record keeping requirements
 ■ Identify appropriate tactics to satisfy the organisation’s record keeping requirements
 ■ Assess factors that may support or hinder the adoption of these tactics in the institution
 ■ Adopt an overall design strategy to bring the tactics to fruition.



- Investigate a range of tactics to satisfy record keeping requirements
- Identify appropriate tactics to satisfy the organisation’s record keeping requirements
- Assess factors that may support or hinder the adoption of these tactics in the institution
- Adopt an overall design strategy to bring the tactics to fruition.

The overall result of this step should be an agreed, planned and systematic approach to the creation, capture, maintenance, use and preservation of records in the institution that will achieve the objectives laid down in the DIRKS Manual in Step E:

- Form the basis for good record keeping practices throughout the institution
- Assist with the design or redesign of the organisation’s record keeping and information systems
- Contribute to related organisational objectives (business process re-engineering, e-business, streamlined administration, compliance, space savings, etc.)

The DIRKS Manual defines two key deliverables from this step:

- A documented range of tactics that satisfies the organisation’s record keeping requirements and meet organisational constraints
- A report for senior management recommending an overall strategy to improve record keeping in the institution.

The DIRKS Manual identifies four broad approaches that can help an organisation satisfy its record keeping requirements:

- Policy tactics – principles, statements, instructions and other corporate instruments

- Design-based tactics – the definition and specification of system functionality and the development or selection of technological solutions
- Implementation-specific tactics – practical and user-oriented solutions
- Standards development and compliance tactics.

Such tactics can be applied separately but are usually needed in combination to meet an institution’s requirements. As indicated above, this toolkit is primarily focused on successfully implementing an ECM solution so the second approach is singled out and covered in much more detail in Step 2 below.

5.5.2 Stage 4, step 2 – Agreeing a preferred ECM solution

There are five main questions that need to be answered in Step 2:

- What system functions must the solution provide to meet record keeping requirements and business objectives?
- What is the preferred implementation plan?
- What services are required to support system implementation?
- What are the candidate options?
- What is the preferred option?

5.5.2.1 System functions

In Chapter 3 of this guide, and in Stage 1 of the JISC EDMR toolkit, the core functions that comprise a full ECM solution or an EDMR system were reviewed. At Stage 1 it is difficult to know exactly what functions are needed as all the necessary fact-finding work has not been carried out. At Stage 4 it should be possible to decide on the functions and facilities needed and hence whether an EDMR system or an ECM solution is required.

5.5.2.2 Implementation plan

There is general consensus that those implementing a corporate system need to develop a phased implementation plan. Even assuming that there is an agreed classification scheme and a core set of system functions to roll out, there are still a number of labour-intensive tasks to perform for each department/section prior to them implementing the system.

The preferred approach is to break down the implementation into phases and sub-phases. The coverage of each phase is detailed in the JISC EDMR toolkit and is reviewed in Stage 8.

Phases	Description
Phase 1	Specification
Phase 2	Model office/prototype
Phase 3	Pilot(s)
Phase 4	Initial roll out
Phase 5	Secondary roll out
Phase 6	Corporate application development
Phase 7	Support

5.5.2.3 Service requirements

The third area where there are options to consider is services. Any purchased ECM solution is made up of a combination of software, hardware and services.

As long as the organisation has a modern IT infrastructure the only hardware probably needed for the solution will be scanning equipment and dedicated server(s) plus additional networked storage. Licences will also need to be purchased for the software modules required to support the functions identified in Section 5.5.2.1, above.

Requirements depend on how the solution is procured, tasks the organisation is happy to take ownership of and tasks delegated to the supplier or a third party. The following table represent some core services that the supplier should be required to provide.

Service	Description
1	Project planning and management services. Includes working with project team and providing supply-side project management and support.
2	The supplier should configure, install and test the software at all phases on the hardware purchased by the organisation and attached to the network to ensure that the system provides all the required core functions and facilities. This includes loading the classification scheme/file plan onto the system.
3	The supplier should provide integration services as specified in the ITT to integrate the solution with the desktop and with key business administration systems.
4	Change management, training and documentation services.
5	The supplier should provide software support and optionally specialist hardware support services for an agreed period of three to five years.

The issues and options including some potential additional services that might be needed are reviewed in the full Stage 4 in the JISC EDRM toolkit.

5.5.2.4 Candidate options

Based on the decisions made in Sections 5.5.2.1–3, realistic options should be agreed and detailed. The work on Stages 1–3 and this step should enable the options to be narrowed down, leaving a subset that appear capable of meeting business objectives and RM requirements within the budget. A maximum of four to six options should be considered and reviewed.

5.5.2.5 Preferred option

The options that resulted from the review in Section 5.5.2.4 now need to be assessed so that the preferred option can be selected. How detailed this process needs to be will depend on two factors. The first one will be the degree of consensus within the team. If all agree after due consideration that one option is preferable then the reasons why the other options were not preferred simply need to be agreed. If there is a disagreement then the rival options need to be explored in more detail until a consensus is reached on the preferred option.

The second factor will depend on what the stakeholders and project board require. If they decide that they need a business case for each of the options considered in Section 5.5.2.4 then there will need to be a high-level business case for each option.

If they are happy to accept the recommendation of the team on the preferred option then there can be just one detailed business case for the preferred option. This is preferable if there is consensus as it reduces the amount of work involved in costing every option.

5.6 Stage 5 – Making the Business Case for the Preferred Approach

This stage is designed to help the project team to make the strongest business case possible for the preferred option (Fig. 5.8). As this is a vital topic it is treated separately in Chapter 6 of this Guide. A full business case can be found as Stage 5 of the JISC EDRM toolkit on the JISC Infonet website⁽¹⁾.

5.7 Stage 6 – Defining the Statement of Requirements (SOR)

This stage is designed to help the project team to plan and produce the SOR for the preferred ECM solution. This will form part

of the invitation to tender (ITT) document that will need to be sent out to shortlisted suppliers. The procedures will vary depending on the approach adopted. For this stage and Stage 7 it is assumed that this is a public sector procurement being conducted under the EU open-procurement, fixed-price procedure.

Stage 6 lays out the process of compiling a statement of requirements (SOR) for an ECM solution (Fig. 5.9). It is based on a model six-part document and Steps 1 to 6 indicate what should be covered in each section of the document.

- Step 1 covers the ITT (Section 5.7.1)
- Step 2 covers the background to the requirements (Section 5.7.2)
- Step 3 covers the functional requirements (Section 5.7.3)
- Step 4 covers the technical requirements (Section 5.7.4)
- Step 5 covers the service requirements (Section 5.7.5)
- Step 6 covers the price schedule (Section 5.7.6)

A model template for an ITT for an EDRM solution is available for download from the JISC Infonet website as part of the JISC EDRM system implementation toolkit.

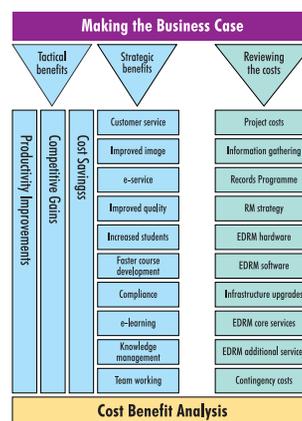


Fig 5.8
Making the business case (JISC)

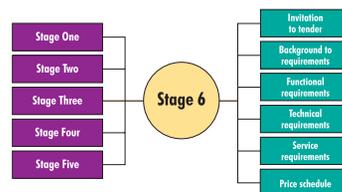


Fig 5.9
The process for compiling a statement of requirements (JISC)

5.7.1 Stage 6, step 1 – Invitation to tender

The first section to be completed is the ITT. It should invite tenders for a single contract covering the provision of an ECM solution and associated supplier services for the whole or a defined subset of the organisation.

It should make it clear that the solution will be implemented in phases and that there will be some review points and potential termination points defined. It should lay out the following:

- Required format of responses
- Responsibility for costs associated with bidding process
- Scope of procurement/contract
- Procurement process and evaluation criteria
- Terms and conditions.

5.7.2 Stage 6, step 2 – Background to the requirements

Step 2 presents to suppliers the background and business context. It needs to describe the business and statutory role of the organisation, along with a brief history, a review of the key functions it performs, its mission statement or vision for the future.

The current organisation should be described. For each department the full-time staff establishment should be specified and the locations where they operate from. All the information needed should have been gathered in Stage 3.

The current policies, procedures and systems used to manage content, documents and records, including e-mail, then need to be described, as do volumes, a list of the software applications used to create content and documents across the organisation and any planned new systems. The business objectives identified for the ECM solution including all your record keeping objectives should then be reviewed.

Finally, the current IS strategy and ICT infrastructure should be presented in detail. This should include a review of any corporate standards for hardware and software, current supported environ-

ments and planned future direction. All the corporate IT and main departmental IT applications should also be detailed.

This data is important to enable the suppliers to understand the organisation's scope and culture and its preferred IT platforms.

5.7.3 Stage 6, step 3 – The functional requirements

In Stages 1 and 4 the platform options and functional requirements should have been reviewed, resulting in the selection of a preferred approach. The functional requirements now need to be detailed to ensure that the supplier finally selected is capable of meeting all the key requirements within the budget.

5.7.3.1 Summary of requirements

It is best to start with a high-level summary of the requirements. As you get into the detail the document becomes bulky and complex. It is useful if you can go back to the start and see the overview. The high-level functions should be defined under the same four headings used in Chapter 3:

- Input
- Management
- Output
- Process management

The phases of the preferred implementation plan should also be defined, and departments and user numbers should be assigned to each phase. It is then preferable to point to where additional requirements are defined for each function and phase. Cimtech generally defines the overall functional requirements first and then the specific requirements for each phase.

TNA requirements

Stage 1, step 3 of the full JISC EDRM toolkit, and Chapter 4, Section 4.4 of this guide, references best-practice guides and requirements standards.

The National Archives 2002 Requirements for Electronic Records Management Systems⁽⁸⁾ provides ten sets of core requirements and three additional sets of optional requirements. They cover almost all the ERM requirements an organisation could have but only some of the ECM requirements.

The ten core requirements and three optional sets of requirements are as detailed in the table below. Organisations in the public sector requiring a corporate solution with ERM functions should include the mandatory TNA requirements and any

optional ones required in the SOR.

Organisations in the private sector requiring a similar solution should review the TNA requirements and MoReq and include the core requirements in their SOR.

5.7.3.2 Input requirements

N.B. the facilities or requirements listed under the four core functions in the JISC toolkit vary from the facilities reviewed in Chapter 3 of this guide. This reflects the fact that the JISC toolkit was developed four years ago and has not been updated subsequently by Cimtech.

The core input requirements identified in Stage 1 of the JISC EDRM toolkit for an EDRM system (excluding web content management) are detailed in the 'Core input requirements' table.

5.7.3.3 Management requirements

Once the content and documents have been captured and a subset declared to be records, the next step is to manage them. Here the management functions are divided into generic EDM, CM and ERM facilities, which also include facilities to manage physical records. The TNA requirements in this section should be included under ERM requirements.

For an ERM solution the TNA 2002 Requirements for Electronic Records Management Systems is published in four parts. Part 1 contains the ten core and three optional sets of functions requirements. Part 2 is the metadata standard and contains an introduction to the metadata requirements and a review of each of the metadata elements. Part 3 is the reference document and contains a glossary of terms and a flat listing of all the metadata elements to be held at the class, folder, folder part, record and component level. Part 4 is an implementation guide.

The core metadata requirements need to be reviewed. For active ECM solutions additional metadata will need to be held at the folder, document and component level. Initial indexing requirements need to be gathered at the information gathering stages. The final details of the index requirements are usually agreed with the preferred supplier at the specification stage.

5.7.3.4 Output requirements

The reason why organisations invest in capturing and indexing content and documents, and in managing them, is so that they can search for, retrieve, reuse and publish the content. The requirements identified in Stage 1 of the JISC EDRM toolkit for an

Core requirements

A.1	Record organisation	Classification scheme and fileplan
A.2	Record capture, declaration	Capture, declaration, record types, record metadata, move, copy, extract and relate, bulk import and management
A.3	Search, display and presentation	Searching, display, presentation
A.4	Retention and disposal	Disposal schedules definition, allocation, execution, resolving conflicts, review, export and transfer and destruction
A.5	Access control	Control to classes, folders and records; custodian; execution of access control markings; privacy and opening of records
A.6	Audit	Audit
A.7	Reporting	Reporting
A.8	Usability	Usability
A.9	Design and performance	Integrity, interfaces, disaster recovery, storage, performance, scalability
A.10	Compliance with other standards	

Optional requirements

B.1	Authentication and encryption	Electronic signatures; electronic watermarks; encryption
B.2	Document management	Document management
B.3	Hybrid and physical folder management	Physical folders; markers; retrieval and access control; tracking and circulation; disposal

Core input requirements

	Function	Description
1	Input	
1.1	Electronic capture	
1.1.1	Electronic content/document capture	Capture of electronic content/documents created via standard office software applications
1.1.2	Electronic document/data capture	Capture of electronic document/data created via line of business and other business administration systems
1.1.3	Electronic forms	Design electronic form, publish form, capture of data via form, validate data according to business rules and load data into application and/or capture image of form
1.1.4	E-mail capture	Capture of e-mails and attachments and management of them as documents/records
1.1.5	Content transformation	Capture of content and editing/conversion of content into format suitable for Web publishing
1.1.6	Import of electronic content/documents	Text documents, XML documents, spreadsheets, e-mail messages, PDF documents, held as single files document images, vector graphics, etc.
1.1.7	Import of compound documents	Multimedia documents, CAD files, directly interlinked documents, etc.
1.2	Analogue capture	
1.2.1	Scanning and digitising analogue content	Scan and capture digital image and key in index data
1.2.2	Scan, digitise and text capture	Scan and capture digital image and recognise and capture textual content
1.2.3	Scan, digitise and forms processing	Scan, digitise and analyse image data – recognise that image contains image of a specific form side template and then process structured form image to extract data from fixed positions on template
1.2.4	Scan, digitise and semi structured	Scan, digitise and process semi-structured form image for data capture data capture
1.2.5	Scan, digitise and raster to vector	Scan, digitise map or design and convert to vector data for processing
1.3	Index data capture	Permit entry of index data associated with a document/content file to facilitate control and retrieval
1.4	Categorisation	Automatic classification of content/documents into categories based on content/rules
1.5	Declaration as a record	Define status of document to be a record so it is managed as a record

Core management requirements

	Function	Description
2.1	Management	Electronic content, document and records management functions
2.1.1	Management	Manage documents as single electronic files in a repository
2.1.2	Management	Manage compound documents comprising container documents and component content files in a repository
2.1.3	Management	Manage the links between content components and container documents in a repository
2.1.4	Management	Assign metadata (index data) to documents/ content objects and register each document/content object in the repository.
2.1.5	Management	Managed structured index data/metadata in relational databases
2.1.6	Management	Index full text of content in a full text engine to facilitate full text retrieval
2.1.7	Management	Management of controlled thesaurus of terms
2.1.8	Storage	Provision of mass storage facilities including hierarchical storage management if required and content addressable storage if required
2.1.9	Management	Mandatory provision of check out and check in facilities so document/content object cannot be overwritten – it can only be copied and then amended and checked back in
2.1.10	Management	Mandatory provision of version control facilities to ensure that edited document can only be checked back in as next version of same document or as new document
2.1.11	Management	Control access to metadata, content, document and records via access control markings, roles, groups, etc.
2.1.12	Management	Solution must meet mandatory audit trail requirements
2.1.13	Management	Solution must meet specified reporting requirements – all transactions on documents/records
2.1.14	Management	System must support minimum usability requirements
2.1.15	Management	System must be resilient, must maintain integrity of documents/records, must meet minimum performance requirements and must be scalable.
2.2	Records management	Support TNA requirements as detailed below
2.2.1	Record organisation	Classification scheme, classes, folders, parts and components
2.2.2	Record capture, declaration	Declaration and management of records including metadata and management
2.2.3	Retention and disposal	Disposal schedule definition; allocation and execution; resolving conflicts, review and destruction
2.2.4	Hybrid and physical	Physical folders; markers; retrieval and access control; tracking and circulation; disposal folder management
2.2.5	Authentication and encryption	Electronic signatures and electronic watermarks and encryption

Core output requirements

	Function	Description
3	Output	
3.1	Search	Facilities to search all metadata; search full text content; save searches; present search results.
3.2	Display	Facilities to display all content/documents/records captured and managed on the system irrespective of whether the application used to create them is present or not.
3.3	Presentation	Facilities to present metadata and records to applications outside the solution in a form suitable for electronic publication.
3.4	Print	Facilities to print all types of content, documents and records, which are printable in same way as they are displayed on screen.
3.5	Facsimile	Facilities to output content/documents to facsimile format and transmit it to defined facsimile numbers.
3.6	E-mail	Facilities to attach content objects/ documents held in the solution to email messages and send them to specified email accounts
3.7	Portal	Facilities to search and display content/documents held on the solution from within a named portal.
3.8	Multi-channel content	Facilities to publish specified content to specified delivery channels using defined style delivery/publishing sheets, etc.
3.8.1	Print publishing	Facilities to publish specified content to print media using defined style sheets, etc.
3.8.2	CD/DVD publishing	Facilities to publish specified content on CD/DVD media using defined style sheets and software.
3.8.3	Delivery to mobile phones	Facilities to render content in format suitable for display on mobile phone screens using defined style sheets and software.
3.8.4	Delivery to PDAs	Facilities to render content in format suitable for display on PDA screens using defined style sheets and software.
3.8.5	Internet/intranet/extranet	Facilities to render and publish specified content to specified websites using defined website publishing style sheets and web publishing software.
3.8.5.1	Website development	Facilities to define and develop websites using web content management software
3.8.5.2	Develop web applications	Facilities to develop web applications using web content management software.
3.8.5.3	Develop web pages	Facilities to develop specific web pages for use on a website using web content management software.
3.8.5.4	Check links	Facilities to check and maintain the integrity of all links made on a website.
3.8.5.5	Content approval	Facilities to route content through an agreed approval process using web content management and business process management software.
3.8.5.6	Support multiple website deployments	Facilities to publish content to multiple websites and synchronise process.
3.8.5.7	Content personalisation	Facilities to customise content delivered to a searcher based on profile gathered of searcher.

Core collaboration requirements

	Function	Description
4	Collaboration/business process management	
4.1	Collaboration	
4.1.1	Calendaring/scheduling	Shared diary services for scheduling events, meetings, etc.
4.1.2	Whiteboarding	For freehand drawing and pen-based writing on handheld computers, tablets, etc.
4.1.3	Instant messaging	Real-time, text-based, peer-to-peer communications over the internet
4.1.4	Presence detection	The ability to see if others on a pre-selected list – are online concurrently
4.1.5	E-learning	An online education or training programme that can be on demand or set to a pre-determined date and time
4.1.6	Knowledge management	Makes the institution's information and knowledge available to all wherever it is based – includes portals and other search tools
4.1.7	Digital asset management	Supports, storage, retrieval and reuse of digital objects and provides rights management facilities
4.2	Workflow/business process management	
4.2.1	Business process modeling and building	Business process design and build tools to graphically model and redesign business processes and define them to the workflow engine
4.2.2	Business process management	A workflow/business process management engine that holds the business rules and controls the flow of each case or transaction through each step of the workflow/business process
4.2.3	Business process administration	Tools for administering the workflow/business process including reporting and monitoring tools, audit tools, etc.

EDRM system (excluding web content management) were as follows. Requirements 3.1–3.7 cover basic search, retrieve, display and output requirements. Requirement 3.8 covers content delivery/publishing requirements that will require the content to be held separately from the delivery process and involves defining (by the use of style sheets) how the content should be rendered and presented to suit specific delivery/publishing mechanisms.

5.7.3.5 Process management requirements

The final area relates to staff collaboration (Fig. 5.10) and process management. The requirements identified in Stage 1 of the JISC EDRM toolkit for an EDRM system (excluding web content management) were as shown in the following table.



Organisations should decide whether they want to procure a collaboration suite as part of their procurement, whether they already have a preferred collaboration suite with which the solution will need to interface, or whether, at this stage, a separate collaboration suite is not needed at all. The detailed requirements for BPM will come out of the analysis of business activity and the detailed review of current processes.

5.7.3.6 Scope of each phase

The requirements listed above will indicate the type of solution needed and should ensure that the solution procured is capable of meeting overall requirements.

However, it must be ensured that the reseller or integrator is capable of building on the platform to deliver the solution required at each phase of the implementation plan. The first step is to clearly define in the SOR the scope of each phase and the specific requirements for each phase.

5.7.4 Stage 6, step 4 – The technical requirements

Step 4 should contain the key technical requirements to ensure the solution fits on the current and planned IT infrastructure and can be supported by the current ICT department with their skill set.

Cimtech also recommends summarising all the volume data gathered, albeit with some caveats. Volumes can provide a set of assumptions and a baseline against which the suppliers can quote. Once the preferred supplier is selected and the project moves on then the assumptions can be used to agree the actual costs for a specific number of users in a specific phase. It also enables an accurate comparison of the costs of different suppliers. Headings for this section of the SOR should include:

- User numbers
- Storage volumes
- Existing hardware and software
- New hardware and software to be specified
- Performance requirements
- Resilience requirements
- Standards
- Escrow.

Areas covered under each heading are detailed in the full JISC EDRM system implementation toolkit.

5.7.5 Stage 6, step 5 – The service requirements

In Step 5 the agreed mix of core and additional services that the supplier is required to provide needs to be specified. The core services are listed in the table in Section 5.5.2.3, above. The issues and options including some potential additional services that might be needed are reviewed in full in Stage 4 of the JISC EDRM toolkit.

5.7.6 Stage 6, step 6 – The price schedule

Step 6 should contain the overall price schedule. Cimtech recommends using three tables:

- The first should cover all capital costs divided by phase
- The second should cover all recurring revenue costs by year
- The third should cover any optional capital costs by phase.

It is important that the capital costs table is divided up by implementation phases with all costs allocated to phases. This simplifies matters should the contract need to be terminated at the end of a phase.

See the table in Section 5.9.3 (Phase 3 – Pilot costs), below, for typical costs to be included in the table for Phase 3. For Phase 4 and onwards organisations should ask for indicative rather than firm costs. These would include fee day rates for all levels of staff.

Fig 5.10
Determine your requirements for collaboration and BPM suites

5.8 Stage 7 – Procuring the solution

This stage is designed to help the project team manage the procurement process efficiently (Fig. 5.11). Stage 7 comprises four steps. It follows on from Stage 2 of the toolkit where advice is given on project management and the choice of procurement approach. This stage assumes that a restricted fixed price EU OJEC procurement is undertaken as discussed in Stage 2 Step 2.

- Step 1 covers a review of the suppliers on the market
- Step 2 covers the notice and prequalification step
- Step 3 covers the issue of the ITT, clarifications and shortlisting
- Step 4 covers selecting the preferred supplier

Advice on how to conduct each of these steps is provided in the JISC EDRM toolkit⁽¹⁾.

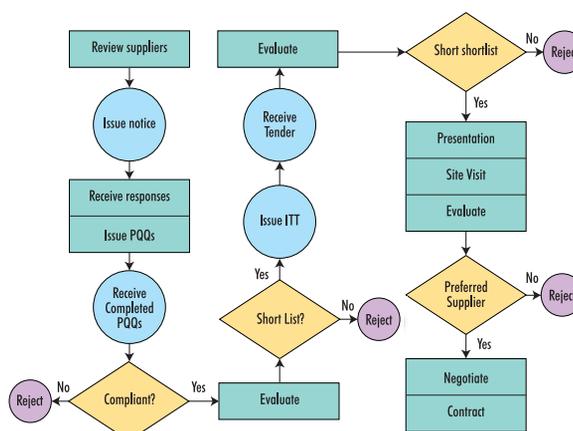


Fig 5.11
Procuring the solution (JISC)

5.9 Stage 8 – Managing the implementation

This stage is designed to help the project team plan and manage the implementation phases once the preferred supplier has been selected. It has been split into six steps and builds on Stage 2 of the toolkit. At Stage 8 each agreed implementation phase needs to be planned and managed with the preferred supplier to ensure that both sides carry out their roles and responsibilities to the full, so that the requirements are met. Stage 8 also builds on Stage 4, Step 2, where a proposed implementation plan was reviewed. Stage 8 assumes that the project team has agreed to that seven-phase implementation plan.

- Step 1 covers project initiation following award of contract to the preferred supplier
- Step 2 covers Phases 1 and 2 of the implementation plan
- Step 3 covers Phase 3 of the implementation plan
- Step 4 covers Phases 4 and 5 of the implementation plan
- Step 5 covers Phase 6 of the implementation plan
- Step 6 covers Phase 7 of the implementation plan.

5.9.1 Stage 8, step 1 – Project initiation

Do not aim to achieve too much at the first project initiation meeting after the award of contract. This will be the first meeting after the formal procurement and contract stage so it provides an ideal opportunity for both sides to really meet each other and also provide additional background information to each other.

The aim is to go through the project plans and project structure, the roles and responsibilities and agree the high-level timetable for Phases 1–3 and the meetings needed to complete the key tasks.

By the end of the meeting, roles and responsibilities should be clarified and a schedule of meetings should be mapped out. A contact list should be drawn up and logistical issues resolved including where the supplier team will be based when on site, etc.

5.9.2 Stage 8, step 2 – Phases 1 and 2 Phase 1

Phase 1 will involve a series of meetings and workshops between the project team and the preferred supplier. These will provide an opportunity to go through all the requirements for the core system in the ITT, and the 'model office' requirements in particular, and through all the relevant responses in the supplier's tender to agree how best to meet the requirements with the chosen platform.

The preferred supplier will have his own methodology to follow and, provided this includes all the tests and checks required, the organisation can follow this approach. Key milestones that both parties should document in the project plan should include:

- Dates for workshops and meetings
- Date for draft specification
- Date for agreed specification
- Date solution ready for supplier testing in their environment
- Date for model office solution to be brought on site
- Date for user training sessions
- Date for user groups to trial model office and give feedback
- Date for formal acceptance test.

Phase 2 – Model office

Once agreed it is the responsibility of the organisation to make available the space required to set up the model office. If the organisation is purchasing the hardware specified by the supplier then the two sides need to agree the logistics of this.

It is vital that the team and the designated users are trained before being asked to participate in formal testing. The specification should detail the procedures and scripts that will be used for the test. It will specify the responsibilities of the organisation and criteria that will determine whether or not the test is acceptable.

At the end of the model office the plan should allow for feedback sessions and both parties should agree what changes are needed to the core system specification and document them.

5.9.3 Stage 8, step 3 – Phase 3

Well in advance of the start date for the pilot, the change management and communications plan needs to be initiated and the project team need to start holding workshops with the users in the pilot department and their RM support.

The staff in the pilot department must be fully informed and trained in the scope, objectives and operation of the pilot. The following should be clearly stated: the number of users to be given access to the system during the pilot; the business processes to be covered in the pilot; whether the solution is being implemented on a 'day-one-forward' basis or whether it will include digitising paper relating to 'active cases'.

There should be a clear indication of how the new solution will integrate with desktop office application software and the line of business application/s used by that department. It should also be explained what will happen at the end of the pilot – how the solution will be rolled out in the department and the support that will be available at all stages.

Dates should be set for user training and agreement should be reached with the RM support staff on how the folders in that department will be set up on the system to fit into the file plan, and the processes they will go through to capture new documents, retrieve existing documents, etc.

Finally, staff in the pilot department should be given a go-live date and a plan for floorwalking support for the agreed period, followed by a switch over to helpdesk support. The plan should include provision for detailed reviews and reporting processes and should include the dates for the user acceptance test.

- Dates for workshops and meetings
- Dates for RM planning meetings – reviewing and defining folders on system
- Date to agree business process management requirements
- Date for draft changes to specification
- Date for agreed specification
- Date solution ready for supplier testing in their environment
- Date for pilot solution to be brought on site
- Date for testing integration with line of business system
- Date for any backfile conversion to be completed and data loaded on system
- Date for user training sessions
- Go live data for pilot implementation
- Date for formal acceptance test
- Date for end of floor walking support.

Core milestones for a pilot will include the following:

- Both parties need to agree how far ahead of the start of the pilot the team should go into the department to start the planning and support process, and how long after acceptance the team will need to stay to provide floorwalking support.
- Provided all the core requirements were tested at the model office stage there is no need to repeat them all here. The areas that should be tested include any changes to the requirements agreed as a result of the model office tests and any requirements that are specific to the pilot – including any integration with a line of business system, any new business processes and any areas that could not be tested at the model office stage.

5.9.4 Stage 8, step 4 – Phases 4 and 5

At the end of the pilot the plan should allow for a series of feedback sessions and both parties should agree what, if any, changes are needed to the core system specification and document these. More importantly, both parties should review the actual timetable required for the pilot, as opposed to the planned timetable, and the actual resources required to support the pilot as opposed to the planned resources.

Any significant variances should be noted and the planned timetable for the first rollout should be reviewed. The plan should also break the rollout down by department/section or process so that there is a defined number of steps. After that review has been conducted, the rollout needs to be managed as a series of steps, where each step is handled like the pilot. On a regular basis the scope of the steps planned should be reviewed.

5.9.5 Stage 8, step 5 – Phase 6

The implementation plan assumes that by the end of Phase 5 the core solution will have been rolled out to all the departments within the scope of the project, so all office-based staff should have access to the system.

At this stage the organisation will already have partially taken ownership of the system. There will be staff trained in administering the system, records staff trained in conducting all the required RM functions on the system, and the bulk of staff should be trained in using the system.

Phase 6 calls for the development of a number of business process management applications on the system that can streamline administration and provide a number of core benefits.

One of the first decisions will be: does the supplier need to be called back in to provide support in specifying and developing these applications or a third-party consultancy, or are there now sufficient skills and resources to do the work in-house?

The second decision will be validating or drawing up a revised list of candidate processes in scope of Phase 6. The tasks themselves will then include those outlined below.

Task	Description	Comments
The first three tasks should be conducted once at the start of Phase 6		
1	Additional information gathering and analysis	Interviews, process modeling, areas for improvement
2	Feasibility study and options review	Review business case for improving each process and priority
3	Detailed plan for preferred option	Timetable and resources for implementation
The next three tasks should be repeated for each process		
4	Specification	Specify new process, discuss and sign off
5	Pilot	Pilot new process in one department
6	Roll out	Roll out new process across institution

As part of the information gathering task the relevant stakeholders will need to be interviewed, the current processes documented, and the objectives and scope for improvement agreed. The team will then need to review the case for implementing each business process and agree a recommended priority for each process. A high-level business case should be made for each option.

The result should be a report for the project board outlining the options reviewed, the requirements identified, the case for improving/automating each process and a recommended course of action. If the case is agreed then the team would need to draw up a plan for implementing the processes in the agreed sequence.

The team would then need to draw up a more detailed plan for each process covering the standard steps of specification, piloting and rollout. The tasks included under those headings would be as described above for earlier phases.

At the end of Phase 6 staff will be using the system to meet their specific team and departmental requirements and also using the system to play their role in core corporate business processes.

5.9.6 Stage 8, step 6 – Phase 7

The final phase that needs to be managed is when there is no further significant development needed on the project. The project closure process is reviewed in Stage 2 under project management. The support options are reviewed in Stage 4, step 2.

5.10 Stage 9 – Measuring the Results

This stage is designed to help the project team plan and manage the process of reviewing the project at key stages and measuring the results (Fig. 5.12). Has the solution delivered the expected benefits? Has the solution delivered other valuable unexpected benefits?



Stage 9 has been split into three steps. It builds on Stage 5 where advice is given on making the business case for an ECM or EDM solution – including all the benefits.

■ Step 1 makes the case for conducting a review of the project at key stages and measuring the results

- Step 2 covers the measurement of tactical or tangible benefits
- Step 3 covers the measurement of strategic benefits
- Step 4 covers feeding back the results obtained into the remainder of the project

5.11 Stage 10 – Project Closure and Solution Support

This stage is designed to help the project team plan and manage the project closure process and ensure that the solution is fully supported. The JISC project management InfoKit recommends that any project should be formally closed to ensure:

- The organisation has formally accepted all outcomes
- Operational procedures are in place
- The handover to operational staff has been completed
- Documentation and reference material is in place
- Any further actions and recommendations are documented
- The results are disseminated to the relevant people
- There are no loose ends.

This stage comprises two steps:

- Step 1 provides a checklist for project closure using the JISC headings
- Step 2 covers the support arrangements in more detail.

5.11.1 Stage 10, step 1 – Project closure checklist

It is good practice to conduct a formal project closure and complete a checklist to ensure that key tasks have been completed. The recommended checklist covers the seven bullets listed above.

5.11.2 Stage 10, step 2 – Solution support

At project closure, by definition, services such as development, further integration with systems, etc. will no longer be required. However, the organisation will continue to need a software support contract with the supplier and may need a continued hardware support contract for specialist hardware.

It is important to take the opportunity that project closure brings to clarify ongoing support requirements. Project closure is a good time to review support arrangements and make sure that the organisation is covered for the medium term.

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Fig 5.12
Measuring the results

Making the business case

In the ten-stage JISC methodology described in Chapter 5, Stage 5 involves making the business case for the preferred solution that you will have agreed at the end of Stage 4. It is a vital stage as without a strong business case projects may not be approved and that is why we have devoted a whole chapter to it.

In this chapter we will look at how to make the business case for the corporate implementation of an EDRM system where the primary driver is compliance. However, the key steps involved in making a business case are

essentially the same whether you have decided to opt for a point solution, an EDRM system or a full ECM framework. You need to establish the benefits, the costs and the risks and conduct a cost benefit analysis. So when we talk about EDRM in this section substitute point solution or ECM framework to suit your situation.

The key to making a successful business case is detailed preparation and planning (Fig. 6.1). Prior to writing the business case for an EDRM solution as part of the JISC methodology you need to have completed some or all of the following tasks:

- define your business objectives
- carry out information gathering
- benchmark your procedures/systems against best practice and business objectives
- identify areas for improvement
- review options and agree preferred solution.

These are all covered in earlier stages of the ten-stage methodology. If Stages 1–4 have been conducted, it is possible to quantify and value information assets and to identify the areas where improvements are needed to comply with best practice and to meet business objectives. Organisations will then be well equipped to prioritise them for investment.

Stage 4 involves carrying out a detailed feasibility study to determine what the options are for moving forward and achieving objectives, where the best potential business case exists and the preferred solution. Stages 3 and 4 give an insight into the problems with existing procedures and systems, and the impact they are having on the organisation. A cost can then be put on these. If improved information/RM procedures and a move to an EDRM solution will solve those problems and eliminate most of those costs, then this will help make the business case.

The feasibility study will also identify the key business benefits that can be obtained by improving those processes. Some of the main benefits that can be achieved by a move to EDRM include:

- improving staff productivity
- reducing costs
- expanding market reach
- generating visibility
- offering new services
- e-commerce and doing business 24 x 7
- improving customer service and responsiveness
- improving customer retention
- truncating processes and hence gaining the competitive advantage.



Fig 6.1
Detailed preparation and planning, the key to a successful business case

If the feasibility study indicates that these benefits can be achieved only if the organisation invests in an EDRM solution then there is the basis of a strong business case for an investment in such a system.

Additional benefits that can be achieved from the implementation of an EDRM solution include:

- improved knowledge management
- regulatory compliance
- disaster recovery
- space savings
- improved staff morale
- improved team working and collaboration
- more efficient exploitation of corporate information assets.

The key data needed to make a business case include:

- (i) the tactical or tangible benefits that will be achieved
- (ii) the strategic or intangible benefits that will be achieved
- (iii) the real costs of investing in the preferred solution
- (iv) an assessment of the risks.

Stage 5 involves reviewing the business case and comprises the following steps:

- reviewing the tactical benefits the solution will bring
- reviewing the strategic benefits the solution will bring
- establishing the real costs involved in implementing the preferred solution
- conducting a cost benefit analysis.

6.1 Stage 5, step 1 – Reviewing the Tangible Benefits

The tactical or tangible benefits can be presented under the following headings:

Productivity improvements If, by investing in the preferred solution, staff productivity can be improved then you can achieve tangible benefits. The benefits could be the savings involved in reducing the staff numbers required to process existing business levels or in processing more business in future with the same number of staff. In the latter case the savings would have to be against an agreed plan to spend more money on extra staff to meet a projected growth in business. These would be virtual savings.

Competitive gains If the introduction of the preferred solution leads to improved customer service, and hence enables the retention of more customers and the acquisition of new ones, then this benefit will increase income and can be set against the cost of the system.

Another example involves reducing the time from initial concept to delivery of a new product and hence speeding up the return on the investment through the use of an EDRM solution to manage product designs and documentation, and to control the change control and approval processes.

Cost savings If all key content is placed on a website and web content management is used to ensure the content is up to date and secure, enabling customers to access and download the content in digital format, 24 hours per day, then considerable amounts of money can be saved in printing, postage,

copying and filing costs plus the costs of employing an extra shift of staff to handle enquiries over the telephone over the same 24-hour period. There are also savings in furniture and consumable costs if many cabinets and folders are replaced. Many organisations are using ECM solutions to automate the way in which committee agendas, papers and minutes are distributed to committee members.

Improved cash flow Another major area can be cash flow (Fig. 6.2). Many organisations that have lost control of their supplier payment process can improve cash flow and save interest payments by drawing down only the money they know they will need to settle payments over a set period. At present, with so many payments in the paper-based approval cycle and no BPM software to report statistics, they have to draw down considerably more money in case they have to pay all outstanding commitments and hence they lose the interest on that money. If new orders can be processed in 24 hours with e-procurement, rather than the previous five or ten days, then cash flow can be significantly improved as well.



Fig 6.2

Improved business efficiency can result in improved cash flow

Space savings Organisations with paper-intensive processes will save space by installing a digital system. If staff are laid off as a result, or you avoid taking on more staff, then additional space will be saved. Whether an accountant will allow space savings to be claimed depends on whether the space can be re-used or if it can be proved that, had the space not been saved, the organisation would have needed to move to larger premises. In the latter cases space savings can be very significant. In the former case they are less so.

Tangible benefits Tangible benefits include:

- productivity improvements
- competitive gains
- cost savings
- improved cash flow
- space savings.

6.2 Stage 5, step 2 – Reviewing the Intangible Benefits

In addition to the hard financial benefits reviewed above, the implementation of the preferred solution will also deliver strategic or intangible benefits.

These are more difficult to quantify but can, in many cases, prove even more significant. Indeed, the strategic benefits are often vital and hence outweigh any tactical considerations. Some of the key benefits include the following:

Strategic benefits

Strategic benefits include:

- improved customer service to agreed targets
- improved visibility and image
- meet e-business and electronic service delivery targets
- ability to deliver improved quality levels to agreed financial targets
- reduced production cycles
- regulatory record keeping compliance
- value of corporate information assets enhanced
- improved knowledge management
- improved management information
- support process-oriented/team working

Fig 6.3

Review the costs of investing in policies and solutions

- full disaster recovery
- ensure the organisation is more responsive to change.

Traditionally, such vital strategic benefits are regarded as soft, or intangible, and many accountants will not attach a cost figure to them. However, if a business activity analysis establishes that these strategic benefits are vital and there is senior management backing to achieve them, the project will be in a much stronger position. At the very least, project managers can look at the cost of achieving these benefits via conventional means, which will include additional staff costs and system costs.

The cost of the preferred solution can then be compared against the higher costs involved in meeting those objectives via conventional means.

In most cases it will be possible to demonstrate that an EDRM solution is the most cost-effective solution and, in some cases, to show that it is not possible today to achieve the desired business objectives without using these technologies. If business process analysis indicates that the organisation is at risk of failing to comply with legislative requirements, that it cannot provide up-to-date, accurate sets of the records required by industry inspectorates or a major customer, then one of the key strategic benefits could be survival itself.

A key corporate objective may be to improve customer service and the answer may be to implement a contact centre that can provide a single point of contact between you and your customers. The process analysis exercise may confirm that there are problems managing customer data and documents, and controlling customer transactions. Unless organisations also invest in a new internet-based customer administration system, a content management system and WFM software, the investment in a call centre will not necessarily improve customer service levels.

In Chapter 7 there are some real-life examples of the benefits that EDRM and ECM solutions can deliver.

6.3 Stage 5, step 3 – Reviewing the Costs

The real costs (Fig. 6.3) of investing in RM policies, tools and procedures and in an EDRM solution will include some or all of the following costs:

- project management
- information gathering and analysis
- information architecture improvements
- records management tool development
- records management strategy implementation
- specialised hardware
- standard software
- development
- integration with applications and line of business systems
- business process redesign
- IT infrastructure upgrade
- implementation core services
- additional services
- contingency
- change management
- communication and training.

The costs should be quantified and divided into one-time system implementation costs and ongoing costs. The one-time costs go into the model as the initial system costs. The ongoing costs are balanced against the ongoing system savings to arrive at an overall figure for ongoing system savings.

The project management



costs would include third-party consultancy support plus internal project team costs. There are very few specialised hardware costs. If there is a large document capture requirement there will be significant scanner costs and, if high volumes of document images or other multimedia content are being captured, there will be significant additional storage costs.

The software costs are sometimes difficult to pin down as different suppliers have different pricing policies. Look at server costs, per-user costs and concurrent user costs. There may also be separate costs for different modules including WCM, ERM, collaborative software and BPM. For organisations with many users it is worth negotiating as the published price is rarely, if ever, the final cost.

It should be possible to obtain fixed costs for all of the above items as a result of the tendering process. The development costs are more difficult to pin down. If the implementation plan advocated in Stage 4 is followed, you should expect to obtain a fixed price to provide Phases 1–3 (specification, model office and pilot). Once a project moves into Phases 4–6 (roll-out and corporate applications) it is less realistic to expect a fixed price as the amount of integration, BPM and change management services are hard to define so far in advance. What should be sought are fixed daily rate costs for all staff levels and an indicative number of days to support the roll-out based on a given set of assumptions. Support costs can be clearly defined and agreed at contract stage.

One set of additional service costs will cover the scanning and indexing of any legacy or backfile paper documents. Suppliers should be required to provide a framework of costs that can be used to agree the cost of any specific requirements that emerge during the project.

Training costs can be significant if there are large numbers of users. Options here include paying the supplier to train the administrators, operators and a small number of users who are given the task of then training the other users. This approach is referred to as 'train the trainers'.

Training, change management and communication costs should not be reduced as these are vital areas to win users over to the solution. Most large EDRM projects that do not succeed cite user resistance as one of the main reasons. If the users are not involved early through user groups, awareness briefings, etc., and if they are not fully supported through training – through the use of tranche managers responsible for migration and folder design, etc., and the use of floor walkers during implementation – then there will be a significant risk of user resistance.

6.4 Stage 5, step 4 – Cost Benefit Analysis

To make a tight financial case the project figures must be accepted. Ideally, the organisation will follow a standard methodology for measuring the finance case for an investment in new technology. If it does, they should be followed. If not, make a strong case and follow good practice, and your methodology could become the corporate model in future.

Use terms and measurements that are widely accepted in the financial world and use the organisation's internal standards for project lifetime and internal rate of return. The business case should ideally include all or most of the points listed below:

- an explanation of why the organisation should invest in the preferred solution
- a statement of what the system will cost to implement (broken down into components)
- a statement of when the organisation will start to see a payback on the investment
- a statement of the savings that will result over the project life
- a statement of additional strategic benefits that will result from the investment
- optimistic and pessimistic sensitivity analyses

- a review of the risks and how they will be mitigated.

In addition, obtain firm initial system implementation costs and running costs from suppliers or consultants with experience of implementing such systems.

To put a firm value on staff savings, space savings and improved cash flow, it will be necessary to obtain agreed figures from the finance department. These will include salary costs, space costs, overhead costs, inflation rates, projected business and head-count growth, the corporate tax rate and other key financial figures.

Deciding on the project life can be complex. Too long a period and the ongoing costs associated with replacing hardware and software will have to be factored in. Too short a period and there will not be long enough to amortise the costs of investing in backfile conversion if that is a major cost component or the development of complex workflows.

You can then present:

- the cost of doing nothing
- the cost of investing in the solution
- the period before you reach the discounted project payback
- the payback you will receive from the system over the agreed project life.

The expected return on investment can then be presented and compared with the return the organisation would get from investing the money. If the project life is five years, the objective should be a discounted project payback of under 36 months. If the project life is 7 years the payback may stretch out to 4–5 years.

The value of the savings that will be achieved over the life of the project should be presented as a net present value, i.e. the value today of the money that will be received over the five-year period using an agreed interest rate figure.

Finally, because very few IT projects come in under budget, as many risks should be factored in as possible using optimistic and pessimistic sensitivity analysis techniques. A good business case will stand a pessimistic view – 20 per cent reduction in staff savings, 20 per cent budgetary increase, etc. – before it begins to look marginal.

If there is a strong business case after the cost benefits analysis, the tactical benefits will provide a good return on investment and the strategic benefits can be regarded as a very valuable bonus that should make a compelling case for investment.

If the case is more marginal, the project will need strong senior management backing to help prove that the strategic benefits have a value greater than the costs of achieving them.

ECM applications and case studies

7.1 Applications for ECM

How many applications for ECM are there in a large organisation? Analysts, market researchers and the suppliers themselves have looked for a standard way of categorising the applications for ECM solutions. Various approaches have been taken but none of them are totally satisfactory and there is no single accepted classification.

The problem is that different industries operate in different ways and it is difficult to define applications that are common across all industries. Applications overlap and mean different things to different industries.

In their excellent book, *Enterprise content management solutions: What you need to know*⁽¹⁾, Bill Forquer, Peter Jelinski and Tom Jenkins defined the following ECM applications:

ECM applications

- Accounts payable/administration
- ISO 9000 quality assurance
- Bid management
- Managing marketing extranets
- Content management
- Manufacturing processes
- Court case management
- New hire induction/education
- Customer care centres
- New product development
- Customer due diligence
- Policies and procedures
- Derivatives management
- Project collaboration
- Digital asset management
- Records management
- Engineering change management
- Vacation time management
- Government publications management
- Vendor communications
- Human Resources

We have taken a more generic approach and list below the core applications most frequently cited by suppliers and Cimtech user members in a survey. Ten generic applications were identified:

- case processing
- transaction processing
- customer relationship management (CRM)
- document-enabling ERP
- team support/collaboration
- filing and archiving
- electronic records management (ERM)
- project and technical document management
- publishing
- library and knowledge services.

Fig 7.1

Customer relationship management, an important application for ECM

The first applications are primarily transaction oriented. These transaction applications can then be divided up into case management or extended transactions and transaction processing or single item transactions.

In the middle group are applications such as CRM, document-enabling ERP, project and technical document management, etc.

The third group comprises content and knowledge management applications including publishing, library and knowledge services. Examples include research databases, technical information, specifications, manuals, catalogues, competitive supplier databases and collections of standards, procedures and regulations.

7.1.1 Case processing

Case processing covers applications where documents relating to a case need to be gathered together and held during the lifetime of the case, which will comprise one or more extended transactions. Examples include insurance policy administration, loan administration, mortgage processing, and care service administration.

Traditionally, a paper file folder was set up and maintained for each case with sub folders often set up for stages or activities in the case. A DIP/EDM solution would replace the paper folder with an electronic folder – paper documents would be scanned and indexed and electronic documents saved directly into the relevant electronic folder. Business process management software would be used to route the documents to staff for processing and to interface with key business administration systems. The EDM solution would be interfaced closely with the business administration system so staff could access the data held on a case on the system and then pull up a list of all the documents held for the case on the same screen and view them as required. This is an area where e-commerce is starting to make major inroads with more customers requesting loans and policies online and updating information via electronic forms rather than simply via paper forms or the telephone. Hence the volume of paper that needs to be scanned is reducing over time and the volume of content that needs to be accessible by authorised users across the Internet is increasing.

7.1.2 E-commerce / transaction processing

Transaction processing covers applications where high volumes of transactions are processed as a series of single items. Examples include cheque and remittance processing, direct debit processing, and credit card payments. Such records have a short active life and are then archival. Increasingly, again, customers can settle such payments across the internet so the volume of paper to be scanned and the amount of data to be captured from the paper is gradually reducing and the use of electronic forms is increasing.

7.1.3 Customer relationship management (CRM)

CRM covers applications where organisations want to manage all their customers' points of access and create a single, integrated view of the customer and all their interactions with the organisation (Fig. 7.1). They want to be able to answer any question a customer may ask on the first contact, whether via fax, e-mail or website visit, etc., completely and consistently without any further research or the need to call the customer back. In most cases they also want to move towards the situation where they can provide their customers with



the same facility to access, via the Internet, all the key information that the organisation holds about them.

To achieve this, the CRM application needs to interface with all the databases/administration systems held within the organisation that hold data about their customers. The CRM application also needs to interface with all the systems that hold documents from or about their customers. The latter can be achieved if the organisation implements an ECM solution with common metadata standards. The CRM can then be linked to every folder and document held that relates to a specific customer.

CRM is an interesting example of the trend to use data and documents gathered as a by-product of transaction processing for knowledge management applications. By capturing, managing and analysing information about customers, knowledge is generated that can be re-used in more effective marketing campaigns and in long-term planning of business and services.

7.1.4 Document-enabling ERP

This covers applications where content management is integrated with corporate ERP applications from SAP, Oracle and many other suppliers. All finance documents can be accessed by authorised users of the finance module and all human resource documents by authorised users of the human resource module, etc. Finance and HR are good examples of applications that usually span the whole organisation. Once digital versions of supplier invoices are created, staff in almost every department will need to access them in order to approve invoices and check up on past dealings with suppliers. Similarly, once personnel documents are digitised, central HR staff may need access to them, line managers will need access to some documents and staff will need access to their own documents. Again, e-commerce is vital here with organisations advertising jobs on their web sites, allowing users to register an interest, download job descriptions, submit CVs and job applications online, etc.

7.1.5 Team support / collaboration

This covers general-purpose office productivity and collaborative applications where, typically, users have invested in a networked office system that provides them with a suite of office applications and messaging. They now want to supplement the basic file management facilities on their network server with more advanced document and content management and collaboration facilities and add document capture facilities so that they can manage the bulk of their office content in digital format. This is the low-cost, scalable application area that is targeted by the major software companies with their collaboration suites and by a number of the ECM suppliers with their own collaborative platforms. Increasingly, basic records management facilities are also being provided as part of the baseline solution.

7.1.6 Filing and archiving

Filing and archiving covers simple applications where users opt not to implement an active EDM system but simply to install an electronic filing system in the back office. Incoming paper documents are routed around manually and worked on in paper format and then passed to a central point where they are scanned, indexed and managed on the system for ease of retrieval in an electronic filing cabinet. Similarly, when staff generate outgoing documents a digital version will be placed in a shared directory and then indexed and archived on the system by a dedicated person. Such systems aid retrieval and save space but do not aid collaboration and team working. As the market matures these sort of applications will be replaced by full ECM implementations but at present they still offer a low cost entry point for many organisations.

7.1.7 Electronic records management (ERM)

ERM covers applications where the core records of an organisation have to be managed and controlled for long periods of time for legal reasons or because they are crucial to the accountability of the organisation. The organisation may already have a central registry and a records management software package to manage paper records and one or more EDM systems in point solutions. Now it decides to replace the existing system(s) with one EDRM suite that can manage both paper and digital records and provide users with a single point of access to its corporate records. Systems geared to this market need to provide both electronic document management and records management facilities. In the public sector they have needed to comply with the TNA requirements for ERM systems and will be expected to comply with the core MoReq2 requirements in future.

7.1.8 Project and technical content management

Project management covers applications where a large number of individual content items have to be gathered together and synchronised. There is a need to control the relationship between these items. Version control and change management are important functions here – particularly in technical product information management applications. Manufacturing companies need powerful ECM facilities to manage all the product information they hold including CAD data, technical documentation, policies, procedures and standards, legal documentation and financial documents.

Similarly, construction companies (Fig. 7.2) need powerful ECM facilities to manage all the documentation relating to a major construction project including CAD data, plans, maps, technical documentation, procedures and standards, bid documents, contracts and other legal documents and finance documents.



Similarly, construction companies (Fig. 7.2) need powerful ECM facilities to manage all the documentation relating to a major construction project including CAD data, plans, maps, technical documentation, procedures and standards, bid documents, contracts and other legal documents and finance documents.

7.1.9 Publishing

Publishing covers applications where a group of users need to collaborate to create, maintain and deliver as formal publications a range of complex document, e.g. parts manuals, procedures, standards, promotional material. Again, versioning and check-in/check-out services are vital. Full content management facilities are required where the publisher wants to manage the content in an open accessible format so it can be rendered and re-used on multiple occasions to create a range of publications in a range of formats and on a range of media. WCM facilities are needed in most cases to allow the publisher to design and set up the required websites on the Internet, intranet or extranet and to support the authors and editors and control the approval and publishing process and the archiving process. All organisations now publish a subset of their content via the web and for some organisations publishing is their main business.

7.1.10 Library and knowledge services

Library and knowledge services cover applications where content files need to be held and tightly organised in libraries. Subject searching in this application, which includes research and technical documentation, is often critical. The emphasis is on providing staff with tools and training to enable them to search and retrieve content held in third party libraries as well as on providing them with tools to set up and search their own internal libraries. Scanning, automatic categorisation, full text searching, portals, profiling and SDI are all key requirements in these applications.

Fig 7.2
Project and technical content
management is vital to
construction companies

7.2 Case Studies

7.2.1 Case Study A

Invoice management and data capture provide solid foundations for Alfred McAlpine's invoice processing.

Introduction

Alfred McAlpine is a leading support services business with over 9,000 employees. Through the range of services they offer, they aim to be their clients' partner of choice in the built environment. They can design, finance, build, manage and maintain buildings and infrastructure, or apply their expertise in these areas to deliver solutions that meet their clients' specific requirements.

The challenge

In 2004, Alfred McAlpine were finding that processing approximately 120,000 supplier invoices per year was causing several problems for their Accounts Payable (AP) department including:

- Time consuming manual data entry
- High cost of data entry
- Delays caused by finding paper invoices
- Problems matching invoices to purchase orders
- Invoices being lost or misplaced
- High invoice processing costs
- Employing more staff to handle growing invoice volumes

They initiated a project to implement a document management and workflow solution that could solve these problems. A primary driver was to increase efficiency and also to provide the ability to absorb more work without the AP headcount increasing. An extensive search for a supplier resulted in Documation's Invoice Management Solution (IMS) with EMC Captiva's solution for data capture being chosen.

The solution scans all incoming supplier invoices and, using the EMC Captiva data capture technology, Alfred McAlpine now retrieves key header and line item data. This speeds up the delivery of data into IMS seamlessly, reduces manual data entry errors and frees up data entry staff for knowledge roles.

The solution integrates seamlessly with both financial systems and ensures that the correct details are passed to each system.

Workflow is used to assist with problem invoices, for example by checking to see if there are duplicate invoices, to minimise the manual effort required from the AP team. The invoice details are then automatically updated to the finance system so the invoices can be matched and paid.

All invoices and documents can be retrieved directly from the IMS solution with full status information and a full audit trail.

Strategic project – change of finance system

Alfred McAlpine is experiencing a period of considerable expansion currently, with considerable further growth projected over the next few years. A strategic review has been undertaken across the organisation to ensure that the infrastructure and IT systems are in place now to support this future growth. The decision was made to change the finance solution, moving from two separate systems to centralised use of Oracle eBusiness. Alfred McAlpine wanted to ensure that they could still receive all the benefits from their Documation IMS system, whilst extending its use to tightly integrate with Oracle eBusiness suite.

- Oracle eBusiness and Documation IMS – Documation are an established Oracle partner and the IMS solution integrate with the eBusiness suite. Alfred McAlpine took advantage of this relationship, expanding the IMS solution alongside the Oracle eBusiness suite to offer additional business performance improvements.

- Integration with Oracle Electronic Invoice Processing (eIP) – Certain invoices lack purchase orders. After capturing the data with EMC Captiva, IMS posts these invoices directly to the Oracle eIP module. IMS integrates closely with eIP to allow an image of the invoice to be viewed by the authoriser.
- Auto pre match with Oracle – Invoices with a Purchase Order number must be matched by AP staff against the order and receipts in Oracle, the system then automatically performs a match overnight to ensure that there are no invoice lines without an order and therefore that the invoice can be paid.

Alfred McAlpine wanted to use IMS to automate as much of this process as possible, whilst still retaining the standard matching functionality within Oracle. On investigation, it was discovered that up to 40% of their purchase order invoices would match directly to a single order. It is possible to fast track these invoices by IMS carrying out the pre-match rather than the user. This entirely removes the manual user intervention. Simpson describes the outcome of the automation: “Using this solution means that up to 40% of purchase order related invoices are posted and paid automatically without any intervention by AP staff, this has provided considerable savings in time and effort”.

Solution implementation

A major advantage during the implementation was that the two project teams from Documation and Alfred McAlpine had worked together in the past. Oracle Consulting were also involved, providing implementation skills and the eIP module. The three companies worked seamlessly together creating a strong, skilled team. Simpson says: “The project had a real buzz about it, mainly as it involved innovative new functionality, but also because it was such a tightly defined and planned project, with a very disciplined team. The result was a project completed on time and within budget – quite an accomplishment in today’s IT world”.

7.2.2 Case Study B

Invoice management and data capture provide solid foundations for Alfred McAlpine’s invoice processing.

Introduction

In early 2006, Kingston University opened talks with Microsoft Education UK and Microsoft® Gold Certified Partner Silversands to achieve these goals, with portal solutions for both blogging and the “self-service” creation and management of secure collaboration sites. Kingston University was interested in participating in the 2007 Microsoft Office system Rapid Deployment Programme (RDP) to explore new services well in advance of the release. Of the many applications and new functions available in the 2007 Office release, McNeice and his team focused on the following software and its potential use across the campus:

- Microsoft Office SharePoint® Server 2007: workflow and portal server software, closely integrated with common Microsoft Office system client applications.
- Microsoft Office OneNote® 2007: for note-taking in lectures, running on a new generation of extremely light and portable tablet computers.
- Microsoft Office InfoPath® Forms Services: a Web-based forms application integrated as part of Office SharePoint Server 2007.

Benefits

Kingston University has achieved success with two important projects – the rollout of blog sites for its academics and the creation of collaboration sites to share research with teachers and third parties at other universities. By joining the RDP, Kingston has achieved fast results and is reinforcing its international reputation

for educational excellence.

Researcher blogs build reputation for excellence

The university has built pilot blogs for more than 50 academic and research groups, and plans to provide academic blogs eventually to all PhD students and academics linked to their My Sites for ease of access and updating.

“Initial feedback from users suggests that posting information on a personal website is straightforward and, above all, fun,” McNeice says. “Little training has been required because most people are familiar with the interface from other Microsoft products.”

Now, instead of wasting time struggling with technology, users can focus on thinking about what to say. “The fact our academics can now manage an interface to an international audience – anonymously or otherwise – provides a new level of freedom of debate and discussion never seen before,” says McNeice. This is just the first step toward using blogs to reach international audiences, create new research networks, and advance enterprise activities with private-sector businesses.

Research sites extend to wider community

Research sites presented a different challenge that involved working with a specific collaborative group that extended to people “outside the walls” of the traditional university environment. “The key objective was to remove the need for an individual researcher to look to central IT services for account creation and instead to promote self-governance of a specific collaborative sphere,” McNeice says.

The pilot research sites have created a number of exciting possibilities for encouraging collaboration – not only through research work, but also partnerships with other institutions, enterprise alliances, and many other areas. McNeice says, “One of our main private-sector partners Farnborough Aerospace Consortium can work with our enterprise and academic people to develop a collaborative systems hub for aerospace enterprise development.”

The engagement is through a research and postgraduate portal called Post Graduate Space running on SharePoint Server 2007, which will act as the interface or gateway to the new research sites. “We’ll look to make provision of new research sites as an easy request or workflow so that new provision will be swift and timely,” McNeice says.

The university is finding the new workflow features extremely exciting and is using them to reengineer some of its business processes. “The move from manual to electronic processing through new direct workflows will change the way we handle slow day-to-day business processes,” McNeice says. “By publishing data directly into portal environments, our employees and students will be able to see information in real time.”

Enhancing internal communications and collaboration

Through the RDP, Kingston University is also learning to unlock the features of Office OneNote 2007, a note-taking program that allows users to collaborate in a more organised manner. “We see this as a key ingredient in tutorials, lectures, and library work for note-taking, compilation of facts and dialogue, and research,” McNeice says. “We have already begun trials with the solution running on a new generation of extremely light and portable tablet computers. As a result, we are starting to see the beginning of collaboration on the move, as well as the effective re-use of information.”

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Charting the latest trends in the market

8.1 Drivers and Inhibitors of Enterprise Content Management (ECM) Growth

One thing everyone can agree on is that the global market for ECM is growing and is set for even faster growth over the next three years. According to IT market research company Forrester Research, the drive towards compliance and process efficiency is fuelling the market. It is set to grow at a compound annual growth rate of 19 per cent to reach \$3.9 billion in 2008. ECM was the top spending priority in a survey of 200 IT decision makers.

In their white paper *Exploiting Content Management Systems Successfully*⁽¹⁾ industry analysts Strategy Partners International Ltd looked at the key applications where content management is important. Organisations are investing in web content management to build and extend brands, and for increased efficiency and reach of the supply chain. Users are linking ECM suites with CRM for increased customer satisfaction and retention, and to lower the cost of customer service.

Writing in the *AIM edoc* magazine about the prospects for ECM in 2007⁽²⁾ independent consultancy Doculabs highlighted the need to deploy ECM as an enterprise shared service rather than as a series of point solutions. This is the key to reducing the gap between addressable cost per seat and utilised cost per seat, reducing the cost of implementation and increasing adoption. This approach has already been adopted in the UK public sector but it is good to hear it being endorsed from the US. However, Doculabs point out a number of issues and problems which still need to be overcome. The biggest issue relates to packaging. ECM frameworks comprise a number of different components or modules and are very flexible, so the challenge is not about the technology but rather about the organisation's inability to package the services in a manner that ranges from a basic store and retrieve utility to more advanced revision control and automated workflow capabilities. A second related issue is charge back – what do organisations install and pay for centrally and what additional facilities do they charge departments for. Is there a base line facility? The third key issue highlighted is resource and capacity planning. It is not enough for an organisation to fund the software centrally, they also need to provide the resources needed to support the implementation. Doculabs wisely concludes that “if an organisation is to deploy ECM as a shared service, a team of dedicated ECM experts should be made available to the business units”. The lack of such expert resources is still one of the major inhibitors to the growth of the ECM marketplace in the UK.

The major software providers are now convinced there is a major market for ECM and are busy promoting themselves as the platforms of choice. In a major white paper entitled *Enterprise Content Management: Breaking the barriers to broad user adoption*⁽³⁾ Microsoft identify four key drivers. First is regulatory compliance which has moved ECM from being a nice-to-have system to being a must-have system. Enforceable document retention policies, systems for managing unstructured information and consistent records management are all key requirements from a legislative standpoint. Second, there is the rapid growth in the volume of unstructured and semi-structured electronic content that needs to be managed. Microsoft cite a study from Accenture which claims that more content will be created in the next two years than in the previous history of mankind. Third, there is the need to automate and streamline business processes to facilitate

content handling and replace existing manual paper processing. Fourth, Microsoft see organisations looking to ECM solutions to help with the process of authoring and publishing all this information to the intranet, extranet and Internet without burdening the IT department.

Apart from remarking that Microsoft themselves deserve a large share of the blame for encouraging this explosion in electronic content, we could not agree more with the analysis.

Oracle is also warning to ECM. Their white paper *Oracle Content DB: Content Management for the Rest of Us*⁽⁴⁾ charts the evolution of the content management market to the point where Oracle needed to respond to the challenge. According to Oracle: “content management products began to emerge about 15 years ago to support the creation, management and publication of unstructured data (or content) for users who specialised in content production in highly-regulated industries. However, the vast majority of content is actually used by those of us who are not content specialists (about 95 per cent of business users) and that content mostly resides on desktops and file servers – without any real management at all”.

Oracle sees three conditions which have created the need for solutions that bridge the huge gap between limited capability file servers and specialised, expensive and complex content management applications. First, the rapid and accelerating explosion of all types of content has driven a need to put better content management tools in front of all enterprise users to help them make sense of the flood of data, or at least keep them from drowning in it. Second, a series of corporate scandals focusing on the discovery, alteration or inappropriate destruction of documents and e-mails has dramatically increased awareness about the risks resulting from the proliferation of poorly managed content. Third, a plethora of government and industry regulations emerged that increased the costs of compliance as well as the risks of non compliance. The net result has been to transform content management from a niche market to a mainstream technology that serves virtually every user in an enterprise.

So 2006 was the year ECM finally became a mainstream application and a must-have for all organisations.

8.2 Platforms for ECM

Five years ago the content management marketplace was relatively clear cut. There were a series of specialists serving the different market segments – imaging and workflow, EDM, web content management, etc. Some specialists were bigger than others and some had a presence in most markets but it was still, in the words of Oracle and Microsoft above, a specialist market.

We have seen two major developments over the past 3 – 4 years which are beginning to change the ECM marketplace and shape it for the future. First, we have seen the emergence of the concept of enterprise content management and a resultant move towards merger and acquisitions as the specialists tried to become large enough and skilled enough to provide a complete ECM framework. 2006 saw more acquisitions and mergers than any previous year. Second, we have seen the major software companies making a determined move into the ECM marketplace and, interestingly, all of them have taken a different approach – each favouring an approach that plays to their strengths.

We are seeing the establishment of generic platforms for ECM.

In future, the market for ECM will increasingly be broken down into the platform providers and the application providers. There are also the EDRM suppliers and the point solution providers who will continue to target users with specific requirements.

At the start of 2007 we can identify at least four companies who are making a determined move to be platform providers. Confusingly, at least three of them are also bidding to be application providers, but that may change during the year. The four suppliers are Microsoft, Oracle, IBM and EMC.

Microsoft As widely predicted, Microsoft has launched Microsoft Office SharePoint Server 2007 (MOSS) as an integrated suite of server capabilities that can help improve organisational effectiveness by providing comprehensive content management and enterprise search, accelerating shared business processes and facilitating information sharing across boundaries for better business insight. Office SharePoint Server 2007 supports all intranet, extranet and Web applications within one integrated platform instead of relying on separate fragmented systems. Microsoft break SharePoint down into six server capabilities – collaboration, portals, enterprise search, ECM, business process and forms, and business intelligence.

In their white paper on ECM⁽³⁾ Microsoft claim that the comprehensive ECM capabilities delivered with SharePoint Server 2007 will deliver an ECM solution that breaks the barriers to broad adoption of ECM in an organisation. 'The Microsoft ECM offering provides organisations with an integrated solution for managing the entire lifecycle of different types of content, including documents, forms, images, e-mail messages, instant messages, etc.' They claim that user acceptance and uptake will be high 'thanks to an intuitive interface that integrates with common Microsoft applications such as Microsoft Office Word 2007, Microsoft Office Outlook 2007 and many types of Web browsers'. They further claim that 'the key components of a CM solution, such as web content management, records management, document management/collaboration, search and workflow, are provided on a unified platform based on the widely adopted Microsoft SharePoint products and technologies foundation'.

Microsoft also acknowledges that it will rely on solutions providers to provide elements of the ECM framework, and to develop vertical and compliance-specific business solutions. The following ECM capabilities and functions are currently provided by Microsoft partners:

- imaging, including batch and high volume scanning, OCR and ICR (Kofax)
- taxonomy management – tools for managing enterprise-wide metadata
- archiving for long term storage and e-mail journaling
- content integration
- digital asset management
- vertical and compliance-specific business solutions – vertical solutions for key markets such as finance, legal and professional services, government and utilities, compliance solutions for Sarbanes-Oxley, HIPAA and others.

At this stage few would regard Microsoft as having the most sophisticated products in any category but the integration with office products, the packaged nature of some of the offerings and their huge market presence means they will win a big share of the entry level ECM market.

Oracle Oracle also made some major moves in the ECM space in 2006. Oracle announced the general availability of Oracle Content Database and Oracle Records Database. These options to Oracle Database Enterprise Edition enable secure, easy-to-use content management. Oracle Content Database and Records Database are designed to facilitate the management of Office documents, PDFs, image files and other unstructured content.

Oracle claim that through a service oriented architecture (SOA) these products also assist content enabling of enterprise business processes and applications. As a result independent software vendors (ISVs) such as Kofax are building deep vertical content applications using the robust infrastructure of Oracle Content and Records Database.

These products are not brand new – they have been shipped as components of the Oracle Collaboration Suite as noted in the 2006 edition of this publication. However, their inclusion as Oracle Database options now gives them a higher profile and signals Oracle's determination to drive into the ECM space. Oracle is taking a lot of the proprietary facilities that ECM suppliers have developed on top of the database and building them into their database and middleware offerings.

With this move Oracle is positioning itself to be a platform provider. It is encouraging specialist ECM suppliers to use these new Oracle options as a platform for future product development. One major supplier – Open Text – has already committed themselves to follow that path, as outlined below. At the same time Oracle, as a leading provider of ERP software, is also well positioned to use its own platforms to develop content-enabled corporate applications in future. Oracle therefore wants to be a platform provider and application provider, which may also explain its acquisition of Stellent in 2006 (see below for details).

IBM IBM has always been a major player in the ECM marketplace. Its decision this year to acquire one of the other major players in the ECM and BPM market – FileNet – signals its intention to strengthen its position and become a defacto platform and application provider. After the acquisition IBM claim to be the industry leader in the growing ECM and business process management markets with more software and business partner solutions to help clients leverage their business processes to improve productivity and performance. IBM see the integration of ECM and BPM as bringing their clients and partners the broadest set of capabilities to meet their most-challenging requirements. It will accelerate the availability of:

- content-centric process management to improve productivity and increase ROI
- more vertical solutions to extend information for fast time-to-value
- enhanced IBM compliance solutions to help prevent legal exposure and minimise operational costs and risks.

This acquisition builds upon IBM's Information on Demand initiative, launched in February 2006, to address the growing market opportunity around combining IBM's software, services, partners and industry consulting expertise to improve clients' business performance. The Information on Demand strategy aims to provide clients with data exactly when and how they need it to improve their business processes.

According to IBM: "freeing up information contained in content management systems is critical to unlocking the potential of information to improve business processes and performance. Customers are making platform standardisation decisions for ECM and are buying solutions that help build their core enterprise infrastructures. This requires open standards, a broader, integrated set of content management capabilities, and better integration with business applications, which reduces total cost of ownership. SOA is an approach that treats elements of business processes and the underlying IT infrastructure as secure, standardised services that can be managed, reused and combined to address changing business priorities."

As companies go through this transformation process, the maturity of their information architectures can have a large impact upon their results. In fact, Gartner advises that you should "develop an enterprise information management strategy as part of your SOA architecture. You will waste your

investment in SOA unless you have enterprise information that SOA can exploit”.

IBM has invested \$3 billion over the last three years building an ecosystem that provides Information On Demand across clients' disparate systems and repositories. At its heart is IBM's Information Services and Information Accelerators that supply the core services required for managing and accessing all forms of information in an SOA approach.

Couple these with open industry standards, and information now becomes a service. Information as a service is IBM's vision of how information should be open and easily accessible to people, applications and business processes. This allows for improved agility, where information is no longer tied to proprietary systems, formats, or technologies.

By leveraging information as a service, developers can easily connect to information without having to understand the specific APIs and semantics of those systems. Consistency of data processing and quality is maintained by the services that provide the data. Now, application developers focus on the design of new processes and applications, knowing that they are getting the best possible data from the services. Information services are deployed by the people who best understand the information. These information management professionals simply select the information they want to share, specify the rules that govern that information, and publish flexible services that provide that information.

IBM offers a range of capabilities for deploying and managing information within a SOA that span the SOA lifecycle. The IBM Information Management portfolio delivers the necessary building blocks for an information infrastructure, enabling businesses to assemble, deploy and manage information to create insight.

EMC The fourth supplier with a claim to be a platform supplier and a different approach again is EMC.

EMC acquired Documentum in 2005. In 2006 they launched EMC Documentum 5.3 which is claimed to be the industry's first and only unified enterprise content management platform. Their platform is said to offer the flexibility and economy of a single release cycle, code base, security model and audit trail for all a client's content management applications.

At the end of 2006 EMC Corporation went further and launched the world's first embeddable enterprise content management platform – EMC Documentum OEM Edition – specially tailored for the OEM market. As part of this new offering OEMs will have access to a variety of EMC Velocity Technology and ISV Program resources to help them market and deliver ECM solutions to customers successfully.

Documentum OEM edition enables software developers to rapidly and easily implement Documentum as the content management foundation for any application that handles content. According to EMC: “Virtually every enterprise application today deals with some form of content: documents, XML, reports, electronic forms and more. Application vendors realise that building their own repositories and content platforms is very costly and can be a distraction to their core business. Partners use off-the-shelf databases for structured information and, similarly, their needs are better served by using an off-the-shelf content platform. Documentum OEM Edition enables OEMs to gain significant competitive advantage by reducing the R&D costs associated with designing a content repository and, instead, focusing more time on building applications”.

Documentum OEM Edition contains a preconfigured version of the EMC Documentum Content Server and has the same functionality and API as the version sold to enterprise customers. It also comes with a silent installer for easier embedding into the host application without introducing any new dependencies. Partners who purchase EMC Documentum OEM Edition can also leverage a wide range of best-in-class programs for building applications and solutions integrated with the Documentum platform through

the EMC Velocity2 Technology and ISV Program. Benefits are said to encompass technical support, access to training, application interoperability testing and certification. Specifically:

- EMC Content Management Developer Network – a technical resource that provides technical know-how and keeps users abreast of content management news.

- EMC Application Developer Program – helps ISVs, VSPs and SIs target, design, develop and go to market with successful offerings based on the EMC Documentum platform. As members, partners can submit their offerings to be considered for Designed for EMC Documentum? accreditation.

- Tech Support Partner Programs – a set of support programs to assist OEMs in building their applications on top of the Documentum platform and to enable them to provide first levels of support with a seamless escalation process back to the EMC Documentum support group.

- The EMC Velocity2 Technology and ISV Program enables technology companies to build solutions integrated with EMC platforms and develop applications that work with EMC technologies. Program participants receive technical support, access to training, application interoperability testing, and certification. Partners can market their integrations with EMC technology and participate in a wide range of joint marketing activities.

Missing from this group of platform providers at present is Open Text who are certainly one of the largest ECM providers. News of their acquisitions is provided below. Their strategic direction will become clearer over the next few months.

8.3 Industry News

2006 was a dramatic year with the entrance of the platform providers as described above and with an unprecedented volume of acquisitions and mergers as some of the specialists decided that growth was the key to becoming a major ECM framework provider. There were also some interesting new product and service announcements from some of the growing number of specialist suppliers. The entrance of Microsoft and Oracle and the general growth of the market will benefit any specialist supplier that can gain a large share of their market.

Adobe Systems Incorporated announced the immediate availability of Adobe Acrobat 8 Professional which allows users to convert any printable document into an Adobe PDF file – based on the new PDF 1.7 specification. Acrobat 8 Professional now supports one-button PDF creation from Microsoft Outlook as well as from IBM Lotus Notes. Users can create documents in PDF/A, the ISO standard for long-term archiving of electronic documents, or PDF/X, the ISO standard for high-quality, professional printing. Converting complex, large format documents, such as those authored in Autodesk AutoCAD software, into PDF is now faster and the resulting files are smaller and AutoCAD files and Microsoft Visio documents retain their layers during PDF conversion. Adobe has also announced a number of interactive forms solutions to complement and extend the value of leading industry ECM systems including Adobe LifeCycle Forms for IBM, Documentum and FileNet.

Alfresco Software Inc is one of a growing number of open source ECM software suppliers. One noteworthy point is that their software was developed by ex-Documentum and Interwoven employees. Alfresco Network claims to be the leading open source alternative for ECM. They offer two products – the Enterprise Network is fully supported with indemnity and warranty, and has benchmark certification for ten million documents repository. The Community Network is unsupported, has no indemnity or warranty and no benchmark certification.

Autonomy Corporation, the UK- and US-based enterprise search software provider that acquired Verity in 2005 and the electronic forms provider Cardiff Software, announced that the US Library of Congress had selected them for its enhanced website search features. The London Stock Exchange awarded Autonomy the 'Achievement of the Year' Award 2006 for the success of its acquisition of major competitor Verity. Autonomy announced that it has entered into a multi-million pound contract with the UK Government to deploy Autonomy IDOL server software. Finally, Cardiff, an Autonomy company, launched TeleForm v 10 which expands on their intelligent form capabilities. TeleForm now automatically classifies, extracts and validates data from any paper document or form type to improve data accuracy, reduce operating costs and accelerate business processes. Autonomy is a leader in Enterprise Search with a 15.7 per cent market share and, following the acquisition of Verity, they had six months revenue of \$117 million for the first half of 2006, up 200 per cent from the same period in 2005.

Civica acquired Comino Group, the local government and private sector document management software provider. Comino plc will continue to operate as a separate company and believe the change of ownership will present Comino with the opportunity to extend its reach in the public sector. Civica provides an integrated set of consulting, software and managed services and has a twenty-year history of delivering to local government, criminal justice, education and healthcare organisations.

DICOM Group's Kofax subsidiary announced that Ascent Capture, a leading information capture application will integrate with Microsoft Office SharePoint Server 2007 to offer SharePoint users access to a comprehensive production paper capture operation including document, data and Internet-based distributed capture. They also announced support for Oracle's content and records management technology products Oracle Content Database and Oracle Records Management Database. Dicom subsequently announced plans to support the Microsoft XML Paper Specification (XPS) document file format and Microsoft's Windows imaging architecture for production scanning and capture. Adding the XPS document format release script to the Ascent 7.5 product ensures that Kofax products will be compatible with the latest document formats. Finally, Dicom announced the availability of Kofax Ascent Xtrata Pro, a solution that works in parallel with Ascent Capture to classify and extract data from any document type.

Elision Ltd, a leading UK scanning and data capture bureau group, announced the acquisition of Sydoc UK Ltd, a UK-based scanning bureau that was formerly part of the Dicom Group. This will provide Elision with new capture centres in Plymouth and Rotherham to further extend their reach and their share of the UK capture services market which is predicted to grow at 22 per cent.

EMC Corporation launched Documentum 5.3 which is claimed to be the first unified and comprehensive ECM platform. The new version contains new content, process and repository services including the ability to conduct content searches across multiple repositories, a Documentum client for Outlook, new content transformation services and Documentum collaborative edition. EMC also announced next generation web content management software – EMC Documentum Page Builder – to simplify the creation, management and deployment of corporate websites. Finally, EMC launched EMC Documentum OEM edition as described in detail in Section 8.2, above.

IBM and FileNet Corporation announced in August 2006 that the two companies had entered into a definitive agreement for IBM to acquire FileNet, a publicly held company based in Costa Mesa, California, in an all-cash transaction at a price of

approximately \$1.6 billion, or \$35 per share.

In October 2006 IBM announced it had completed its acquisition of FileNet Corporation. FileNet's operations will be integrated into IBM's Information Management software business. IBM acquired FileNet to advance its Information on Demand initiative. With the FileNet announcement, IBM completed 20 strategic acquisitions in support of its cross-company Information on Demand effort. See Section 8.2, above, for details of IBM's ECM platform plans.

Iron Mountain, a leading provider of outsourced records and information management services from offsite paper storage to online data management, acquired the largest shredding company in the UK, **Secure Destruction Ltd**. The deal means that Iron Mountain's portfolio of records management services covers the full chain of custody taking documents through their entire life-cycle and eventual destruction. Iron Mountain also acquired US-based online backup and recovery specialist **LiveVault Corporation**. LiveVault is a leading provider of disk-based online server backup and recovery solutions for small and mid-size businesses and for corporations with remote offices. The acquisition makes Iron Mountain the largest provider of online backup and recovery services for PC and servers.

Google Inc announced the new Google Search Appliance featuring Google OneBox for Enterprise which gives corporations secure access to information in any application in the enterprise from the convenience of the Google search box. With Google OneBox for Enterprise, Google claims that businesses can unlock virtually all their information securely and simply. Google partners in the development included Cisco, Cognos, Employease, NetSuite, Oracle, Salesforce.com and SAS. Google subsequently announced new technologies to enhance and improve the search experience. The three new products – Google Co-op, Desktop 4 and Notebook – help users find and share more relevant information. They leverage user communities enabling users to share more information with others or benefit from others expertise. Finally, Google announced a new version of the Google Search Appliance that offers increased search capacity of up to 30 million documents as well as new advanced search functions and administrative support for 16 languages.

Immediacy, a UK based web content management provider, announced the launch of Immediacy Content Management System 5.2 to enable fast, simple and effective web content creation. With a new, easy-to-navigate user interface and an enhanced accessibility compliance checker the new software provides best-in-class accessibility for content creators and web site users.

In 2006, Immediacy also launched a new electronic document management system in response to customer demand. Immediacy DMS offers a user-friendly interface for accessing and viewing documents, as well as easy administration, categorisation management, task assignment and version viewing. Immediacy DMS uses 'web-based distribution and versioning' (WebDAV). An extension to established HTTP systems, it is designed to enable document management across distributed organisations.

Interwoven, the ECM solution provider, announced enhancements to their Interwoven TeamSite designed to make it easier to execute, manage and control complex projects that span multiple websites and multiple delivery channels. Included in the new version is full support for Linux, next generation workflow builder and FormsPublisher enhancements. Interwoven also announced that their Interwoven WorkSite collaborative content management platform will be fully compatible with Windows Vista, Exchange Server 2007 and the 2007 Microsoft Office system.

Microsoft launched Microsoft Office SharePoint Server 2007

(MOSS) with an integrated suite of server capabilities including collaboration, enterprise search, ECM and business intelligence. See Section 8.2, above, for details. **EMC Corporation** and **Microsoft** announced a new ECM alliance. EMC will bring to market solutions that seamlessly integrate the EMC Documentum platform with multiple Microsoft solutions and platforms including Microsoft Office SharePoint Server 2007, the 2007 Microsoft Office system, SQL Server 2005 and enterprise search solutions.

Open Text Corporation unveiled at the Microsoft SharePoint Conference 2006 a unified ECM platform which combines the ease of use and collaboration capabilities of Microsoft Office system products with the proven enterprise scalability, ILM and content management of Open Text's industry leading Livelink ECM suite. A Gartner study published in May 2006 ranked Open Text as the global market share leader in ECM with a market share of 13.2 per cent. In June Open Text announced that they will offer content management solutions on the Oracle Content Database infrastructure software. This partnership builds on a decade-long database integration that Open Text has with Oracle.

Open Text announced it had acquired **Hummingbird** in an all-cash transaction that valued Hummingbird at \$489 million. Hummingbird had themselves previously acquired **Valid Information Systems** in the UK. So in the UK Open Text suddenly owned three products – Livelink, Hummingbird Enterprise and R/KYV. Open Text announced that Hummingbird Connectivity would continue to trade as a separate company and announced an expanded web content management strategy including the integration of RedDot Solutions (acquired from Hummingbird) with Open Text's Livelink ECM – Web Content Management Server. Open Text announced it would reduce its worldwide workforce of 3,500 by 15 per cent and close or consolidate offices.

Open Text announced increased revenue figures for the first quarter of 2006/7 at \$101.2 million. In November Open Text announced Livelink ECM 10, the next major release of its ECM offering. New features included Enterprise Library Services, facilities to bridge business content with enterprise applications and flexibility for provisioning basic content services so organisations can build and deploy solutions on any basic content services while managing the enterprise wide retention of mission critical business content with ELS.

In November Open Text and Oracle announced that Open Text is creating an Oracle Solutions Group and developing a suite of solutions based on Oracle Database and Oracle Fusion middleware, extending the partnershi announced earlier in the year. Finally, Open Text announced that they had renamed Hummingbird Enterprise as Livelink ECM – eDOCS. They reaffirmed their commitment to it and to align it with the new capabilities they are rolling out in Livelink ECM 10. Open Text has accelerated plans to support the 2007 Microsoft Office system and Windows Vista with Livelink ECM – eDOCS DM. In the UK Open Text is due to release plans for the continued support of R/KYV. Overall it has been a very busy year for Open Text and further announcements are to be expected in 2007. Open Text now has a huge customer base of over 46,000 customers.

Oracle announced the general availability of Oracle Content Database and Oracle Records Database. See Section 8.2, above, for details of their ECM platform plans. In November Oracle announced that it had agreed to acquire Stellent Inc, a global provider of ECM software solutions through a cash tender offer of \$13.50 per share which valued the company at \$440 million. The acquisition of Stellent will complement and extend Oracle's existing content management solution portfolio. Stellent's revenues for the first 6 months of 2006/7 were \$66.1 million, an increase of 13 per cent over revenues for the comparable period the previous year. The acquisition is expected to accelerate the integration of Stellent's ECM solutions with Oracle Database, Oracle Fusion

Middleware, Collaboration Suite and Oracle Applications.

Peladon Software announced that it had been acquired by **DRS Data & Research Services plc**. DRS has been a leader in the data capture market for over 35 years. Peladon has developed document classification and data extraction modules for unstructured documents. The acquisition recognises the strength in the Peladon DocXP range and current R&D plus the experience in the team. The worldwide market for document and data capture software is estimated to be \$1.75 billion and, together, DRS and Peladon with their UK and US operations will be in a good position to further penetrate these market sectors.

The National Archives announced in October that it had merged with **The Office of Public Sector Information (OPSI)**. The new organisation will retain the name of The National Archives and will raise the stakes in information management across government. From good record keeping to the effective re-use of information it will use the expertise gained from both organisations to lead in information policy. TNA has formed a dedicated team to ensure the seamless flow of information from its creation in government to its arrival at the archives. The Seamless Flow programme is geared towards automating the transfer, preservation and display of electronic records.

Xerox announced a new upgrade to Docushare (version 5.0) and the launch of a new product, Docushare CPX. Docushare is aimed at small and mid-size companies. Docushare CPX builds on Docushare with four new software components – content-centric collaboration, content process automation, content assimilation and reuse, and advanced content and records management.

8.4 Courses, Conferences and Exhibitions

ALLM in the UK ran its **Document Management Roadshow** at a range of UK venues from 8–12 May and the **DocumationUK** conference and exhibition with Reed Exhibitions from 18–19 October at Olympia.

We welcomed public sector delegates to the Cimtech⁽⁵⁾ and The National Archives conference and exhibition **Records Management and ECM in government** in May 2006. We also ran a number of EDRM one-day courses promoting the JISC-supported EDRM System Implementation Toolkit methodology. Cimtech's 2007 programme of events⁽⁵⁾ begins on 19 April with **Electronic Document and Records Management**, our one-day course, repeated on 13 November. Our annual conference, **Enterprise content management in government and public bodies**, is again being organised with The National Archives and will be held on 22–23 May. All events will be held at the University of Hertfordshire's Fielder Centre in Hatfield, Hertfordshire. The 2007 ALLM **Document Management Roadshow** will be held 30 April to 4 May at Edinburgh, Manchester, Birmingham, Reading and London.

Documation 2007 will be held from 18–19 October 2007 at Olympia.

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Forthcoming events 2007

APRIL

16—19 AIIMexpo: The Enterprise Content and Information Management Event

Conference and Exposition. Boston Convention and Exhibition Center, Boston, MA, USA. Questex Media Group, Inc. 275 Grove Street, Suite 2-130, Newton, MA 02466, USA. www.aiimexpo.com

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Course. Fielder Centre, Hatfield, Herts. Cimtech Ltd, University of Hertfordshire, Innovation Centre, College Lane, Hatfield, Herts. AL10 9AB. Tel: 01707 281060, fax: 01707 281061, [www.cimtech.co.uk, c.cimtech@herts.ac.uk](mailto:c.cimtech@herts.ac.uk)

24—26 Infosecurity Europe 2007

Exhibition, Grand Hall, Olympia, London. Reed Exhibitions. Tel: 0208 271 2130, www.infosec.co.uk

29—1 May Records Management Today: Celebrating Our Successes

Records Management Society annual conference and AGM. Hilton Metropole Hotel, Brighton. Records Management Society, Woodside, Coleheath Bottom, Speen, Princes Risborough, Bucks HP27 0SZ. Tel: 01494 488566, fax: 01494 488590, www.rms-gb.org.uk/conference, info@rms-gb.org.uk

30—4 May AIIM Roadshow, Tame your Information Beast

Exhibition. Edinburgh, Manchester, Birmingham, Reading, London. AIIM, 8 Canalside, Lowesmoor Wharf, Worcester, Worcs, WR1 2RR. Tel: 01905 727600, fax: 01905 727609, www.aiimroadshow.org.uk, angela@aiim.org.uk

MAY

1—3 Internet World

Exhibition. Earls Court, London. Ithaca Business Media. Tel: 020 8232 1600, www.internetworld.co.uk

1—3 Enterprise Content Management 2007

Exhibition. Earls Court, London. Ithaca Business Media. Tel: 020 8232 1600, www.ecmshow.co.uk

18 Records Management 1

Course. London. PDP Conferences, 16 Old Town, London SW4 0JY, Tel: 0845 226 5723, <http://privacydataprotection.co.uk>

22—23 Electronic Document and Records Management in the Public Sector

Conference and exhibition. Fielder Centre, Hatfield, Herts. Cimtech Ltd, University of Hertfordshire, Innovation Centre, College Lane, Hatfield, Herts. AL10 9AB. Tel: 01707 281060, fax: 01707 281061, www.cimtech.co.uk, c.cimtech@herts.ac.uk

JUNE

6 Records Management: an introduction

Course. London. Aslib, The Holywell Centre, 1 Phipp Street, London EC2A 4PS. Tel: 020 7613 3031, www.aslib.com/training

12 Records Management 1

Course. Manchester. PDP Conferences, 16 Old Town, London SW4 0JY, Tel: 0845 226 5723, <http://privacydataprotection.co.uk>

13 Records Management 1

Course. London. PDP Conferences, 16 Old Town, London SW4 0JY. Tel: 0845 226 5723, <http://privacydataprotection.co.uk>

SEPTEMBER

18—19 Info Ireland

Exhibition. Burlington Hotel, Dublin. AIIM, 8 Canalside, Lowesmoor Wharf, Worcester, Worcs, WR1 2RR. Tel: 01905 727600, fax: 01905 727609, www.aiimroadshow.org.uk, angela@aiim.org.uk

OCTOBER

1 Records Management 1

Course. London. PDP Conferences, 16 Old Town, London SW4 0JY. Tel: 0845 226 5723, <http://privacydataprotection.co.uk>

17—18 Documation UK

Exhibition. Olympia 2, London. Reed Exhibitions in partnership with AIIM. Tel: 020 8910 7884, www.documation-uk.com

17—18 Storage Expo 2007

Exhibition. Olympia 2, London (co-located with Documation UK). Tel: 020 8910 7884, www.documation-uk.com

29 Records Management 1

Course. Belfast. PDP Conferences, 16 Old Town, London SW4 0JY. Tel: 0845 226 5723, <http://privacydataprotection.co.uk>

NOVEMBER

1 Records Management: an introduction

Course. London. Aslib, The Holywell Centre, 1 Phipp Street, London EC2A 4PS. Tel: 020 7613 3031, www.aslib.com/training

13 Electronic Document and Records Management

Course. Fielder Centre, Hatfield, Herts. Cimtech Ltd, University of Hertfordshire, Innovation Centre, College Lane, Hatfield, Herts. AL10 9AB. Tel: 01707 281060, fax: 01707 281061, www.cimtech.co.uk, c.cimtech@herts.ac.uk