

Electronic document management

SCSI / RICS Guidance Note

1st Edition



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Foreword and Acknowledgments

It is with great pleasure that I introduce to you the *Electronic Document Management Guidance Note*. Produced by the SCSi Quantity Surveying Professional Group Committee, this guidance has been developed to offer an overview of the benefits of electronic document management (EDM) systems, and provides tools to aid the selection of an appropriate system for any size of business.

This guidance note has been adopted from the Royal Institution of Chartered Surveyors (RICS) *Electronic Document Management Guidance Note* for use in Ireland.

The SCSi would like to acknowledge the efforts of the following SCSi members for their assistance in producing this Guidance;

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SCSI / RICS guidance note

This is a guidance note. It provides advice to SCSI / RICS members on aspects of their practice. Where procedures are recommended for specific professional tasks, these are intended to embody 'best practice', i.e. Procedures which in the opinion of SCSI / RICS meet a high standard of professional competence.

Members are not required to follow the advice and recommendations contained in the note. They should, however, note the following points.

When an allegation of professional negligence is made against a surveyor, the court is likely to take account of the contents of any relevant guidance notes published by SCSI / RICS in deciding whether or not the surveyor had acted with reasonable competence. In the opinion of SCSI / RICS, a member conforming to the practices recommended in this note should have at least a partial defence to an allegation of negligence by virtue of having followed those practices. However, members have responsibility of deciding when it is appropriate to follow the guidance.

On the other hand, it does not follow that a member will be adjudged negligent if he has not followed the practices recommended in this note. It is for each surveyor to decide on the appropriate procedure to follow in any professional task. However, where members depart from the practice recommended in this note, they should do so only for a good reason. In the event of litigation, the court may require them to explain why they decided not to adopt the recommended practice. Also, if you have not followed this guidance, and your actions are called into question in a SCSI / RICS disciplinary case, you will be asked to justify the steps you did take and this may be taken into account.

In addition, guidance notes are relevant to professional competence in that each surveyor should be up-to-date and should have informed himself of guidance notes within a reasonable time of their promulgation.

Introduction

This guidance note has been prepared in response to the growth in electronic document exchange and storage. Without some form of structured methodology, the task of managing information through the traditional document lifecycle is virtually impossible. While there are a number of Electronic Document Management Systems (EDMS) providing the basis of a structured system, the question is, what form should this system take, and which system is best for you? While there is no single system, there are some general recommendations as to what constitutes good practice.

This guidance note aims to offer advice on what constitutes this good practice and to aid understanding of the issues associated with implementing an EDMS. It is not intended as a system review. However, you may find the guidance provided – and specifically the feature lists – helpful in selecting a suitable system for your business.

While this guidance covers many of the related issues around Electronic Document Management (EDM), it does not deal with any detail regarding general email management. This is really a whole topic in its own right and you are, therefore, advised to seek separate guidance and advice.

To assist in guiding you to the most appropriate EDMS features to suit your own business needs and requirements, this guidance note has classified expected levels of sophistication and functionality under the broad headings of Basic, Standard and Advanced. While there may be some overlap when considering your own requirements, the aim is to illustrate the range of functionality available.

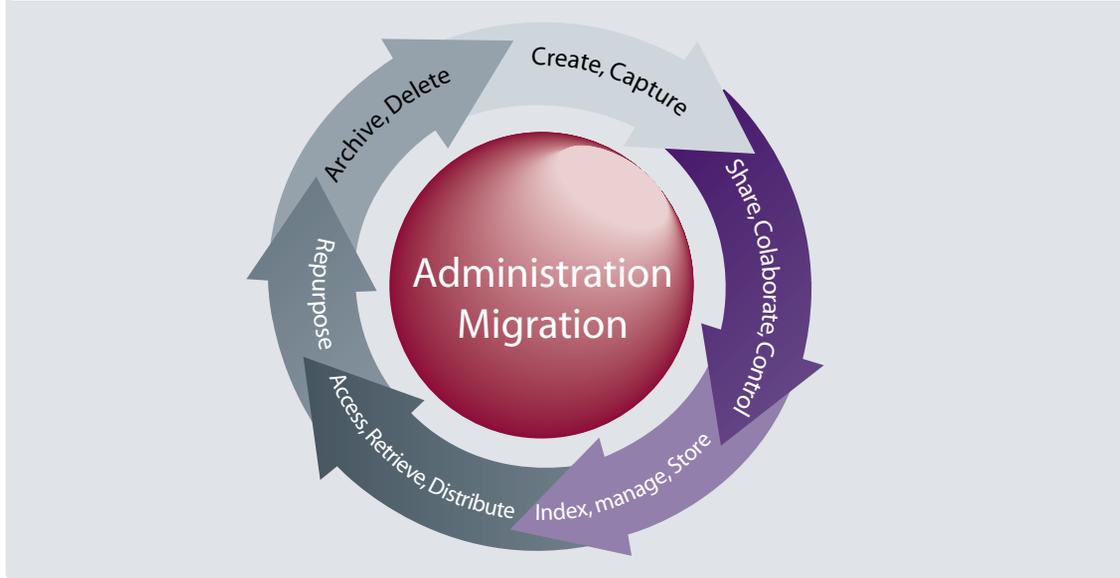
In addition to highlighting the main problems associated with managing documentation in the construction industry, this guidance note provides general advice to guide good practice when using the basic EDMS comprising standard network shared folders. A useful summary of the key legal issues and practical considerations you should be aware of is also provided, together with reference to relevant standards and published guidance for further reading.

Finally, to assist in evaluating commercially available EDM systems, this guidance note also provides a comprehensive features checklist.

1. Typical electronic document lifecycle

The following diagram and table identify the main stages that a document may go through, although not all are applicable to every document.

Figure 1: Document lifecycle



Stage	Description
Create	The making of a digital document within a software program.
Capture	Converting or digitising physical or analogue documents into digital format, usually by scanning and/or optical character recognition or receipt by email or other electronic means.
Share, collaborate, control	Sharing, collaborating and modifying in a work group via real time and non real time methods. Controlling the process by which documents are developed by defining set procedures.
Index	Cataloguing process or creating metadata via manual or automatic methods.
Manage, store	Managing and storing documents for rapid accessibility.
Access	Searching processes to find documents using classifications, metadata, full text or other search technologies.
Retrieve	Viewing documents from search results.
Distribute	Publish documents to intended audience.
Repurpose	Reusing and re-versioning documents for new products and/or cost savings through standardisation.
Archive	Storing documents and associated data off-line at reduced cost.
Deletion	Permanent deletion of documents and associated data at the end of their useful life or to comply with client obligations.
Administer	Managing users, resources, content types and structures.
Migration	Moving documents and associated data to a new system in a suitable format.

2. What are the problems associated with managing documents electronically?

2.1 Issues relating to the construction industry

The nature of the construction industry presents a number of particular factors which impact upon the management of electronic documentation.

Project-based information	Information is primarily centred around individual projects rather than in a static business structure. This greatly increases the management and control necessary to maintain network folders and email public folders.
Collaboration with contacts both internal and external to the organisation	There are large information flows – both in and out of the organisation to many different external organisations. These vary from project to project. Control of receipt and issue of documentation is complex.
Electronic tendering	Specific sets of documents are routinely issued to multiple tenderers requiring close process control of versions, amendments and receipt of tenders.
Drawings and models	Electronic drawing and model files pose particular problems of size, linked files and the importance of version control.
Document retention requirements	Documents may need to be retained for 12 years or more, depending on contract requirements and liabilities. Accurate archive records are essential.

2.2 Legal issues

The law imposes numerous requirements and responsibilities upon people and organisations that control information in whatever form it is held. Many of the risks stem from the problems inherent in the absence of a proper system of document control – not knowing what data is held, and not being able to locate the data that is stored – either efficiently or at all. In such circumstances, breaches of the law may well be inadvertent, but this will not provide any defence and is unlikely to be accepted as a mitigating factor.

Copyright	Many documents and images are subject to copyright. Electronic storage of documents makes it easier to disseminate copyrighted material on a larger scale than ever before. In a basic system where control and prevention of the issue and publication of copyright material relies on a manual process for accountability, there is the risk of breaching copyright belonging to another, or accidentally sending out valuable proprietary information.
Controlling access/security/confidentiality	Lack of proper access control makes it difficult or impossible to ensure that sensitive data is available only to those authorised to access it, leading to risks of inadvertent disclosure of propriety information or confidential client information.
<i>Data Protection Act</i> 1988 & 2003	Any organisation processing personal data is subject to the Act. Management and discovery of personal data in disparate locations is difficult and time consuming.
Rules of disclosure	The ability to locate with certainty all documentation on a particular project is limited, there is a risk that all applicable documentation is not disclosed and the process of disclosure is made more time consuming and expensive.
<i>Freedom of Information Act</i> 1997 & 2003	Particularly relevant for public organisations who have a responsibility to locate and make available documents on demand and to those who hold information on their behalf. More information about the Act can be found in section 5.1, 'Legal issues'.
Storage and archiving	Organisations may have a contractual obligation to retain information for periods after completion of a project. It is difficult to know if all relevant documentation has been collated and archived, and the archiving process is made more time consuming and expensive.

Further information on these topics can be found in section 5.1, 'Legal issues'.

2.3 Problems with basic system of shared network folders

The majority of organisations currently employ a system of shared network folders for project and administrative documentation. In addition they might typically have a separate email system with public folders for each project. Such a system presents a number of issues when trying to manage electronic documents effectively. The following table identifies some of these for each stage of the document cycle.

Create and capture	
Document receipt	No record of where documents originate unless a manual record is kept separately.
Share, collaborate, control	
Document availability	Direct network connectivity required. Remote access requires complex solutions.
Versioning	Only the latest version is kept by default in a given location – earlier versions are generally overwritten without record. Only a closely controlled policy of document version naming and storage location can address this.
Document duplication	Multiple copies of documents can exist in different file locations and email attachments. There is no control of which is the latest and correct one.
Index, manage, store	
Document location	Usually, no standard filing structure is enforced. Even if a standard project folder hierarchy is used, this is expandable without control. Document location is then at the whim of each user.
Expanding document or file size	File sizes are increasing without control to the extent that some become unusable, particularly when accessing remotely.
Access, retrieve, distribute	
Document search	Basic filename and date search are possible but slow, particularly as document stores grow.
Security	Control of access is complex. Cannot control at document level.
Publication	No record of publication and the relevant revision. Manual recording system is required.
Repurpose	
Quality management	Relies on manual procedures for use of standard documents, approval and issue.
Archive, delete	
Archiving	Archived files are moved to alternative media and leave no record of their existence. Manual referencing is required and is subject to error. (See section 5.3, 'Practical considerations'.)
Document deletion	Deletion is possible without any record of the file having existed.
email	<ul style="list-style-type: none"> ■ email is generally held in a separate system and cannot be related to associated documents in network folders. ■ Project emails can end up in a mixture of personal folders, user mailboxes and public folders. ■ If emails are saved as documents, email chains are lost and searching is difficult without the facilities of the email application.
Business continuity	Without strict control and intervention electronic documents end up in a variety of locations on a variety of machines, all of which must be backed up and available for restore in the event of a disaster. This problem is exacerbated in multi-site businesses.

3. EDMS features which can address these problems

3.1 Overview of the three main categories of the system

The following table lists document management system features grouped by the document lifecycle stages identified above. In addition to a brief description of each feature there is a commentary which is intended to elaborate on where and how this feature might be relevant to a business.

Some features are common to even the most basic of systems (including standard network file sharing environments). Others are only available in the most advanced EDM systems. The table below identifies the level of system where you might expect to find them.

Basic	This equates to a standard network file sharing environment using shared folders and some sort of standard folder structure for project and administration documents. The vast majority of businesses already possess this environment although they vary enormously with no standard methodology.
Standard	This represents a minimum feature set for a commercial EDMS.
Advanced	In addition to standard features, most commercially available EDM systems will have some more advanced features although few (if any) will have all of the features listed.

3.2 Complete feature list for EDM systems (by document lifecycle)

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
Document creation				
Document templates	Standard document templates used for the creation of new documents with automatic import of relevant metadata.	Of particular benefit for compliance with approved procedures. Of particular benefit with metadata from projects and contacts to improve efficiency of document creation.	Quality management Quality management	S A
Document capture				
Scanning management	The ability to automate the processing of scanned documents.	Scanned documents can be automatically stored in the correct location and/or sent to the correct recipient for processing. May require a specific scanning technology.	Document receipt	A
Optical character recognition (OCR)	The conversion of scanned text to searchable text.	Essential to permit the re-use of text from scanned documents. The original and OCR versions are both held against the document record.	Document receipt	A
email integration and management	The ability to store email within the EDMS in the same manner as any other document.	Of particular benefit for project-related organisations where all project data and documentation should ideally be in one place.	email	A
Document capture by email	The ability to automatically extract documents from attachments to emails for publishing to the EDMS.	Helps to ensure documents are correctly versioned and searchable.	email	A
Management of non-electronic documents	The ability to record the details of hard-copy documents.	The metadata is equally relevant and searchable, whether or not the document itself is electronic.	Document receipt Document location Document deletion, archiving	A

Share and collaborate	Description	Comment	Problem addressed	Level (basic, standard, advanced)
Document creation				
Document workflow (change, review and approval)	The ability to define in advance the route by which particular types of document are created, reviewed and approved prior to issue.	Of particular benefit for adherence to compliance procedures.	Quality management	A
Document mark-up	The ability to annotate documents and redline drawings without affecting the original.	Some applications, such as Microsoft Word, include features that track changes to a document. However, these usually alter the base document. In an EDMS this is an additional feature to document viewing allowing commentaries without changing the base document. Useful for collaboration during document development. Particularly useful for drawing review prior to final issue. Multiple redline layers are separately indexed by author.	Collaboration	A
Document commentary and rating	The ability for feedback by users on documents.	Particularly useful for standard templates, procedural and technical documents forming part of a knowledge base.	Quality management Collaboration	A
Document indexing				
Document numbering/ID	Defined document identification system.	Usually required where an absolute reference number must be assigned to every document.	Quality management	S
Linked and compound documents	The ability to link related documents in the EDMS and treat them as one if necessary.	This may need to be separately defined by project. Of particular use with drawings which have X-refs and linked Office documents using OLE and OpenDoc technologies. File locations in basic system must be managed manually and links can easily break.	Quality management Drawing management	B
		Links in advanced systems are managed by the system.	Drawing management	A

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
Manage documents				
Document version control	The ability to define how version numbering of documents will operate for any particular document.	All versions of a document are saved and subsequently available for viewing, with only the latest version displayed by default.	Versioning Drawings	S
Drawing management	The ability to deal with the complexities of drawings within the EDMS.	Electronic drawings have particular problems of size, linked files, version control and issue control which can present problems for many EDMS systems.	Drawing management	A
Image management	The ability to deal with images successfully.	Although images are just another type of file, they pose additional problems due to the way they tend to be viewed, grouped and used in the creation of new documents.	Expanding document file size	A
Audio and video management	The ability to save and manage and deliver audio and video files.	These can be very large files which require facilities for streaming rather than simply downloading complete files.	Document availability Expanding document file size	A
Access documents				
Document search	The ability to search the metadata of the document in addition to its title.	Metadata is indexed in the database making search much faster than using the Windows Explorer search.	Document search	S
Advanced indexing and searching	Document content is indexed and searchable.	In addition to standard metadata, the entire content of documents can be searched for key words and phrases. In the most advanced systems, these can be context sensitive depending on the operators used. Complex search criteria can be saved for future use.	Document search	A
Document viewing	The ability to view any document in the system without needing the original application that produced it.	Particularly useful for drawings, programmes and other files produced by specialist software. If the view is rendered by the server the requirement for fast network or remote links is reduced.	Document availability	A
Browsing by thumbnail	The ability to view multiple documents by representative images.	Important for drawings or photo management. Desirable for correspondence to determine the precise document required – browsing multiple pages is desirable for this.	Document search	A

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
Retrieve documents email documents to and from the document store	The ability to email a document directly from the EDMS or into the EDMS via a folder email address.	Of particular relevance where the contact database is available within the EDMS. Useful for publication of documents when no other means of access to systems is available.	Document receipt Publication email management	A
Distribute documents Document issue control	The ability to control and record the issue of documents from the system.	Of particular benefit where the contact, organisation and project databases are available within the EDMS. Of particular use in drawing issue or tender documentation issue.	Publication Quality management	A
Repurpose documents Document templating	Use of one document as template for another.	Timesaving through re-use without affecting original.		S
Archive Document archiving	The ability to take offline to archive both data and documents.	Useful to save space, provide to third parties or dispose of when redundant.	Archiving control	S
Delete Document deletion	Permanent removal of documents and associated data.	To save space. To comply with data protection or specific client requirements. Basic file shares permit deletion but with no record. Where proof of destruction is required, advanced systems maintain a basic record of the deletion of data.	Deletion control Deletion control	B A
Administer documents Change document properties Audit trails Document usage reports	The ability to edit the metadata of existing documents. Records all activity in respect of documents within the EDMs. Standard reports defined to report on all aspects of system usage.	Essential to correct mistakes in the filing of documents. All changes are recorded. Essential to know who changed what and when or who read what and when. Applies not only to the document itself but the metadata associated with it.	Quality Management Security Quality Management Legal admissibility	S S A S

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
Migration				
Export Documents and Data	Transfer of information from one system to another in common format.	Essential when upgrading to a new system. Requires both systems to comply with a standard format for data.		A
System architecture				
Web-based and remote access	Access the full facilities of the EDMS from a web browser.	Permits access to the system from any internet connection. This is a requirement for collaborative working so that remote users are not reliant upon installing bespoke software.	Document availability	A
Desktop-based access	Access the full facilities of the EDMS through a program interface running on each personal computer.	This normally requires the EDMS server to be available locally on the same network (unless fast inter-office connections are available). It is usually a requirement for direct access to the EDMS from common applications (see below).	Document availability	S
Multiple client platform support	Use more than one type of client operating system to access the EDMS.	Some systems can take parts of the system offline (e.g. a whole project) for working away from the office.	Document availability	A
Work directly from common applications	Load and save documents to and from the EDMS using the standard commands within applications such as word processors and spreadsheets.	The majority of systems are designed for a single type of client (usually windows running Internet Explorer). In a mixed client environment (Windows, Mac, Linux etc.) it is essential to source an appropriate solution.	Document availability	A
Web publishing	Formatting and publishing of certain data and documentation as part of intranet or website.	For basic network shares this is the only method of access to files. For an EDMS this is in addition to web-based or desktop access. This normally requires the EDMS server to be available locally (unless fast WAN connections are available) May be used to integrate with company intranet and/or website.	Document availability	B A A

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
System architecture (continued)				
Extranet	Provision of system to external users for inter-company project collaboration.	The ability to use the internal system for project extranets in lieu of an externally hosted system. Usually only a subset of the internal system functionality is made available to external users and limited by security features.	Document availability Publication control Collaboration	A
Portal to other systems	Flexible standards-based technology permits presentation of data from other database systems through unified front end.	Normally requires industry standard database as the basis of the EDMS.		A
Client-server database	A networked server processing data and document requests.	Provides efficient processing of system requests and minimises network traffic. A Single server provides management simplicity but may not provide the required level of performance and flexibility in a multi-location environment. A central database and document store simplifies backup and recovery in the event of a disaster.	Document availability Business continuity	S
Multiple database and document servers	Separate servers in multiple office locations.	Provides system scalability but requires replication between databases to ensure consistency and document availability.	Document availability	A
Caching of documents	Documents downloaded or uploaded at remote sites are copied and stored locally for fast access.	This is an essential feature for organisations with multiple sites unless fast WAN links between them are available or multiple servers are supported. The subsequent transfer of cached documents back to the main EDMS site can take place during periods of low activity.	Document availability Expanding document file size	A
Hosted solution	Instead of maintaining servers within the company network, the system is hosted and maintained externally by a data centre service provider.	This usually provides a high degree of protection against disaster. Such systems are generally web-based. They may, however, be less flexible in integrating with other company systems.	Document availability Business continuity	A

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
System architecture (continued)				
Encryption of stored documents	The physical storage of documents in the central repository in an encrypted format to prevent unauthorised access.	Documents are normally accessible only through the standard front-end interface. The user need not know where the actual file resides. Security could be compromised if the actual file repository is separately accessible, usually through backup procedures. Encryption of stored files prevents this and is invisible to the user.	Security	S
System data structures				
Flexible folder structure	The document folder structure can be amended at will to suit the end-user.	This can provide advantages of flexibility and disadvantages from lack of control. Some systems can provide for limited flexibility within a fixed overall structure.	Document location	A
Multiple taxonomies	The ability to define virtual folder structures for different purposes allowing a single document to appear in more than one folder. A security structure is defined which determines who has access to what.	This normally requires a fixed folder structure to be defined.	Document location Document search	S
Access control		Basic file shares can be configured for access rights but management becomes complex as the number of projects and folders increase. Normally based upon a combination of group and individual user rights which are applicable across projects at the folder level or which can vary between projects. Advanced systems permit control at the document level, not just the folder level.	Security	B
			Security	S
			Security	A

Category and feature	Description	Comment	Problem addressed	Level (basic, standard, advanced)
System data structures (cont')				
Custom metadata	The ability to define and link additional data fields to documents to aid in search and analysis.	The primary feature which sets a EDMS apart from any folder-based storage system. It is not just the document that is saved, but the relevant data associated with it.	Document search Data protection Disclosure Freedom of information	S
Project database	The extension of metadata to a complete project database for the business.	For the construction industry, an essential feature to permit project-centred storage, search and analysis of documents. This may be achieved by linking to a third party project database – see 'Portal' above.	Document search Data protection Disclosure Freedom of information Project-based information	S
Contact database	The incorporation of contact data as metadata for documents and projects.	A logical extension of the project database to permit an integrated view of all project and contact-related data and documents. This may be achieved by linking to a third party contact or CRM database – see 'Portal' above.	Document search Data protection Disclosure Freedom of information	A

4. Items for consideration in using a basic EDMS comprising standard network shared folders

This document focuses primarily on how a commercial electronic document management system might benefit your business. There are, however, some basic principles that should be considered when dealing with electronic documents in a standard network shared folder environment, which can be considered as the most basic form of EDMS.

Stage and feature	Recommendation
Document creation	
Templates	<ul style="list-style-type: none"> • Create a set of standard templates for common processes. • Ensure the IT policy is updated to mandate the use of standard templates unless an alternative is authorised.
Referencing	<ul style="list-style-type: none"> • Establish a document referencing system to include location in document store (including project if appropriate), author, publisher, date, version.
Document capture	
email attachments	<ul style="list-style-type: none"> • email attachments should be saved separately as documents in addition to maintaining the original email. • The attachment name should reference the email by date.
Document sharing	
Access control	<ul style="list-style-type: none"> • Determine appropriate security levels, define user groups and apply to folders using standard network access controls of groups, read only and read/write.
Document collaboration	
Document security	<ul style="list-style-type: none"> • Protect sensitive documents by encryption and/or strong password.
Document control	
Versioning	<ul style="list-style-type: none"> • Ensure that any version of a document that must be kept has its properties set to Read Only to prevent accidental deletion.
Document indexing	
Document storage	
Document naming	<ul style="list-style-type: none"> • Create a standard naming convention for documents to aid in search. • Document name should reflect content, date, version and origin (if applicable).
Standard folder structure	<ul style="list-style-type: none"> • Create a standard folder structure for all areas of the business. • If possible this should be in a single location or be replicated for separate offices if fast WAN links are unavailable. • Project folder structure should be standard at top level, even if sub-folders are allowed, to ensure consistency and aid in search.
email folders	<ul style="list-style-type: none"> • Where email is held in a separate system, public folders should match those in the document store as closely as possible.
Document access	<ul style="list-style-type: none"> • Determine access requirements to folders and apply appropriate network security.

Document retrieval	
Document distribution	
Document issue	<ul style="list-style-type: none"> A record should be kept of the issue of any document, including version, by project or other business area.
Document re-purposing	
Document as templates	<ul style="list-style-type: none"> Copies should be taken of documents for use on new projects, leaving originals unaltered.
Document archive	
Project archive	<ul style="list-style-type: none"> Chose appropriate archive system and media to suit file type and archive duration. Maintain a log of all projects which have been archived identifying the location of archive media.
Document deletion	
Project deletion	<ul style="list-style-type: none"> Maintain a log of all projects which have been deleted including the destroy date
Administration	
Business continuity	<ul style="list-style-type: none"> All data should be backed up regularly

5. Further information

5.1 Legal issues

5.1.1 Document management legal admissibility guidance

The same rules of disclosure apply to documents held electronically as to normal paper documentation. Where a large number of documents is to be disclosed or the electronic files are very big (for example, CAD drawings), it is entirely appropriate for disclosure to be done via a CD-ROM or DVD, or even a hard disk drive.

Typically, electronic documents will have the same evidential weight as original paper documents. It is unusual for there to be a challenge to the provenance of such documents, however, it may occasionally be necessary to prove the authenticity of an electronic document. By following the advice given in the BSI Code of Practice (BIP 0008), the risk of not being able to demonstrate authenticity is significantly reduced.

The rules of disclosure are complicated and can be difficult to interpret. The consequences of failing to comply properly with the rules can be significant and you should obviously take legal advice if you find yourself requested to disclose documents in legal proceedings.

There are a number of BSI standards and associated guidance that may assist with setting up a document management system that is capable of effectively supporting the disclosure process if necessary:

BIP 0008-1:2004 covers electronic storage of documents

BIP 0008-2:2005 covers documents communicated electronically (including email)

BIP 0008-3:2005 covers the linking of identity to an electronic document

BSI PD 0009-1,2,3 – Compliance Workbooks. These publications help demonstrate compliance with BIP 0008, by providing checklists of which controls from BIP 0008 have been implemented within the system. The Workbooks also assist in keeping a record of the documentation required by the Code of Practice. There are three Compliance Workbooks corresponding to the three sections of BIP 0008.

5.1.2 Intellectual property and copyright

Copyright is the right to control the use of original works and automatically comes into existence upon the creation of the work in question. There is no need for the creator of a work to register his copyright, nor is it necessary for there to be a copyright statement or for the familiar '©' symbol to be used. A 'work' can be any document at all. Copyright in work created by an employee usually belongs to his or her employer. It is common in construction contracts for the client to be granted a licence to use and reproduce copyright material produced in the course of a project. It is important to be able to locate such material and also to be able to specify what the client is entitled to use and what remains under the control of your organisation, which may well be valuable and reusable.

It is also important to know what material your organisation does and does not have the right to use and reproduce. It is very easy to assume that a document that has been received electronically, perhaps via email

or on a CD-ROM, from another member of the project team is free to be used in the furtherance of the project. Although the client may well have a licence to reproduce copyrighted material in the course of the project, it does not automatically follow that your organisation will have permission to do so (although many licences granted to clients permit them to grant sub-licences in the same terms to others). Your document management process should provide means to ensure that the copyright owner can be identified and users should be aware that the fact that material is held electronically does not in itself mean that it can be freely used, altered or disseminated to others.

A breach of copyright may lead to a claim for damages, or the aggrieved party may seek an injunction to prevent the use of the copyrighted material which, if granted, may cause a project to be halted altogether while a licence is obtained from the copyright holder.

5.1.3 Confidentiality

Information provided to your organisation may be subject to an obligation of confidence either under your professional obligation to a client, under the terms of your appointment or, in unusual cases, under the general law. It is very important, therefore, that your system of document management provides controls over who can access electronic data to reduce the risk of accidental or malicious disclosure of confidential information. You should also be aware of the danger of re-using documents that were originally produced for different clients, since the electronic files may contain 'metadata' identifying the original client or containing their confidential information.

A failure to protect confidential information may leave you open to being sued by the party that owns the information in question.

5.1.4 The Data Protection Act 1988 as amended by the Data Protection Act 2003

Personal information for business use needs to comply with the rules of the *Data Protection Act 1988* as amended by the *Data Protection Act 2003*, regardless of the 'system' of document management – manual or electronic. A breach of the Act is a criminal offence. Although it might be expected that HR departments would be the repository for 'personal data', the definition is very widely defined and interpreted and can include (for example) contact information for project team members that is stored on a project website.

The Act enshrines eight principles:

- Obtain and process the information fairly
- Keep it only for one or more specified and lawful purposes
- Process it only in ways compatible with the purposes for which it was given to you initially
- Keep it safe and secure
- Keep it accurate and up-to-date
- Ensure that it is adequate, relevant and not excessive
- Retain it no longer than is necessary for the specified purpose or purposes
- Give a copy of his/her personal data to any individual, on request.

A secure and well ordered information management system can help with compliance as for personal and confidential data, as it reduces the opportunity for theft or accidental loss, both of which are breaches of the Act, which may result in prosecution. It can also ensure that the management of subject access requests for such data can be effected in an efficient and cost effective manner.

Any organisation that processes personal data for business use is required to register as a data controller with the Data Protection Commissioner. The the Data Protection Commissioner's website (<http://www.dataprotection.ie/>) contains guidance on how to register, along with information about the responsibilities that affected organisations have.

5.1.5 The Freedom of Information Act 1997 as amended by the Freedom of Information (Amendment) Act, 2003

The Freedom of Information Act, 1997 (FOI) as amended by the Freedom of Information (Amendment) Act, 2003 requires public bodies to respond positively to requests for information from individuals. The Act specifies the maximum time that the public body has to respond to a request (typically 20 working days) and also sets out a charging mechanism. There is no restriction on who may apply for information to be disclosed: requests may come from private individuals or companies, and from anywhere in the world.

While it might appear that the Act is only relevant to public authorities, private companies may also be affected, because the Act states that information is held by a public authority if:

- it is held by the authority, otherwise than on behalf of another person, or
- it is held by another person on behalf of the authority.

Public sector organisations must be able to respond promptly to requests for information, have procedures in place for applying the exemptions (if applicable) in an appropriate manner on a case by case basis, and have a complaints procedure in place. They must also be able to quickly locate information that is held on their behalf by private sector third parties. Requests for disclosure cannot be made directly to private organisations, but must come through the relevant public authority. It is therefore important for private companies that deal with public authorities to be able to locate information requested by the authority in good time when a request is received. This may be a contractual obligation incorporated into the appointment between the authority and the consultant.

Although the Act is concerned with the disclosure of information, however, it does not automatically follow that all information held in relation to a project that involves a public authority is necessarily to be disclosed – information belonging to other third parties may either fall outside of the ambit of the Act or be covered by an exemption. A well implemented document control system will make it easier to discern which category information falls into.

The Act is 'policed' by the Information Commissioner and can be found on the Commissioner's website <http://www.oic.gov.ie/>

5.2 Standards and published guidance

5.2.1 BS ISO/IEC 27002:2005 – Security techniques. Code of practice for information security management

Information security applies to all business information and most particularly to documented information. This international standard covers the production of a security policy, organisation and personnel security, access controls and business continuity requirements, as well as compliance with legal requirements including intellectual property rights and those areas mentioned elsewhere in this document.

5.2.2 BS 7799-2:2002 – Information security management systems. Specification with guidance for use

Provides guidance to businesses on setting up an effective information security management system.

5.2.3 BS ISO 15489-1:2001 – Information and documentation. Records management.

Most EDM systems incorporate data records (projects, organisation, contacts etc.) in addition to documents. These should be managed correctly.

This International Standard was developed to standardise international best practice in records management. It provides guidance on managing records of originating organisations, public or private, for internal and external clients.

By implementing the International Standard, organisations will ensure that the appropriate attention and protection is given to all their records, and that the evidence and information they contain can be retrieved more efficiently and effectively, using standard practices and procedures. This will also support a quality process framework to comply with ISO 9001 and ISO 14001.

The International Standard is published in two parts. The first part provides general guidance on managing records of organisations. The second part is an implementation guide to the first part, and includes a methodology (Design and Implementation of Records Systems (DIRS)) which will facilitate the implementation of the first part.

It should be noted that BS ISO 15489 can be applied equally to records of all formats, including paper and electronic forms.

To assist with the understanding and implementation of the International Standard, BSI has also published:

- BIP 0025-1 *Effective Records Management – A management guide to the value of BS ISO 15489;*
- BIP 0025-2 *Effective Records Management – Practical implementation of BS ISO 15489;*
- BIP 0025-3 *Effective Records Management – Performance management for BS ISO 15489.*

5.2.4 ISO 82045-5:2005 – Document management. Application of metadata for the construction and facility management sector

This standard covers the specification and exchange of metadata associated with electronic documents. There are three parts relevant to construction:

- Part 1 – Principles and methods for use of metadata;
- Part 2 – Collection of metadata;
- Part 5 – Application of metadata for construction and facility management.

5.3 Practical considerations

5.3.1 Archiving

The technical issues relating to the long-term archiving of electronic documents are outside the scope of this section. However, consideration to the following should be given:

- storage time – how long is it necessary to keep the electronic files?
- accessibility – is the archive storage method capable of retrieving a file in the required time?
- file format
 - will the file type be readable by any software during the required storage time?
 - Will the software necessary to read the file be supported on an operating system and hardware combination that is still available?

Consideration should be given to use of alternative open-standard file formats which might provide greater longevity than proprietary software formats.

- storage media – will the media be readable by a suitable device after the required storage time? Is the media designed to last for the required period without deterioration?

5.3.2 Implementing a new EDMS

The issues concerned with the implementation of a new EDMS fall outside the scope of this section but recognition of the following is required:

- timescale – determine your deadline for implementation – this may well affect system choice and your overall approach;
- senior management support – essential for a successful implementation;
- supplier selection – is the system based upon proprietary technology and will the system supplier be around in five years time to support you?
- outsourcing – your legal and contractual obligations to your clients for data storage and retrieval must be reflected in your contracts for outsourced data management (if applicable);
- representation for all affected parties in the system design solution to ensure buy-in;
- testing – time and resource requirements;
- data migration – how will existing data be imported into the system and to what extent must it be cleansed first?
- change management – sell benefits of solution to all those affected to ensure take-up;
- training – do not underestimate the requirement for both initial and ongoing training;
- policies and procedures – ensure the data and operational requirements of the EDMS are enshrined in your IT policies;
- ongoing support – internal and external;
- ongoing development – EDM systems are rarely static and will evolve as business needs change.

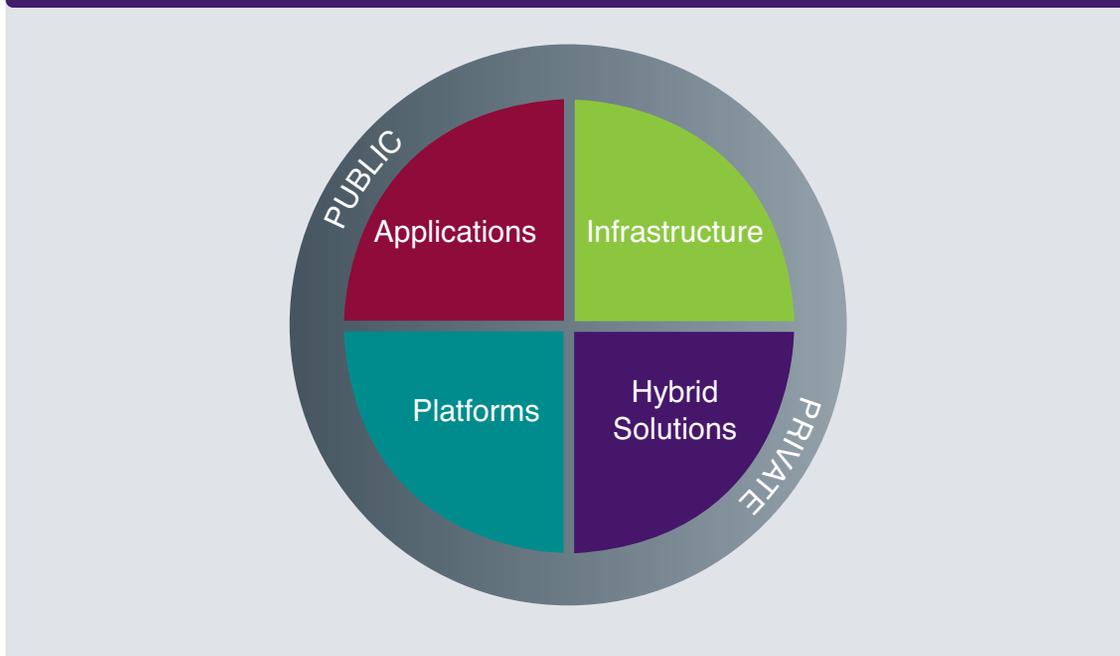
5.4 Cloud Storage / Computing

In the US the National Institute of Standards and Technology has defined Cloud Computing as:

"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

The Role of Cloud Computing in Commercial Property published by the RICS in February 2011, provided some background information on the use of Cloud Computing by Chartered Surveyors.

Figure 2: The cloud



Applications are often cloud based alternatives to desktop software. Common examples are Google Docs, which include cloud based word processing and spreadsheet software. Specialist software may also be cloud based.

Platforms provide cloud based infrastructure for the development of web based applications and generally is only relevant to software developers.

Infrastructure is the provision of computing power and online access to cloud based storage facilities.

Hybrids allows the mixing of PC based applications, web based applications, local file storage and web based cloud storage.

It is likely that a more widespread adoption of BIM (Building Information Modelling) will lead to an increased used of cloud based storage for both the Building Model and attached information.

Risks

The main risks that should concern practices using the Cloud are:

- Data Loss, from equipment failure or virus attack
- Data Confidentiality may be compromised in the event of a malicious attack from hackers
- Data Jurisdiction may be compromised by the physical location of the data storage outside Ireland

Data Loss can be alleviated by Cloud storage as Cloud storage providers often provide automatic back-up for all data stored thereon, but this is not always flawless and there have been data losses from cloud storage failures in the past. An independent back up system should also be used.

Data Confidentiality is arguably stronger on a cloud based system than on some firm's servers, but does require that you trust a third party with the firm's data. The weakest link is usually people and the use of less than secure methods for storage and retrieval of log-in details and passwords. Legal obligations to maintain strict control over the security of personal and commercial data remains with the business regardless of where the data is stored.

EU based businesses have obligations under data protection regulations to ensure that personal data is not transferred outside the European Economic Area (EEA) unless the country of destination ensures an adequate level of data protection. US data protection laws are significantly less stringent than those of the EU and the adequacy of data protection laws in other countries is often very inadequate or even non-existent. Some cloud service providers provide no guarantee as to the security of data. This issue should always be checked prior to signing up with a cloud storage provider.

Appendix 1: EDMS key questions checklist

For use in evaluating commercial EDM systems. Basic features have been ignored.

Standard EDMS feature	Brief description	Feature required	Feature included
Document creation			
Document templates	For the creation of new documents with automatic import of relevant media	<input type="checkbox"/>	<input type="checkbox"/>
Document indexing			
Document numbering/ID	Defined document identification system	<input type="checkbox"/>	<input type="checkbox"/>
Manage documents			
Document Version Control	Define version numbering of documents	<input type="checkbox"/>	<input type="checkbox"/>
Access documents			
Document search	Search document title and metadata	<input type="checkbox"/>	<input type="checkbox"/>
Repurpose documents			
Document templates	Use of one document as template for another	<input type="checkbox"/>	<input type="checkbox"/>
Archive			
Document archiving	Archive both data and documents	<input type="checkbox"/>	<input type="checkbox"/>
Administer documents			
Change document properties	Edit metadata of existing documents	<input type="checkbox"/>	<input type="checkbox"/>
Audit trails	Records all activity in respect of documents within the EDMS	<input type="checkbox"/>	<input type="checkbox"/>
Document usage reports	Standard reports on system usage	<input type="checkbox"/>	<input type="checkbox"/>
System architecture			
Single client platform	Typically Windows-based PC environment	<input type="checkbox"/>	<input type="checkbox"/>
Client-server database	Networked server processing data and document requests	<input type="checkbox"/>	<input type="checkbox"/>
Encryption of stored documents	To prevent unauthorised access	<input type="checkbox"/>	<input type="checkbox"/>
System data structures			
Access control	System and folder security structure	<input type="checkbox"/>	<input type="checkbox"/>
Custom Metadata	Define and link additional data fields to documents	<input type="checkbox"/>	<input type="checkbox"/>
Project database	The extension of metadata to project data	<input type="checkbox"/>	<input type="checkbox"/>

Advanced EDMS feature	Brief description	Feature required	Feature included
Document creation			
Document templates	Standard document templates with automatic import of project and contact metadata	<input type="checkbox"/>	<input type="checkbox"/>
Document capture			
Scanning management	Automated processing of scanned documents	<input type="checkbox"/>	<input type="checkbox"/>
Optical character recognition	Conversion of scanned text to searchable text	<input type="checkbox"/>	<input type="checkbox"/>
email integration and management	Store emails within the EDMS	<input type="checkbox"/>	<input type="checkbox"/>
Document capture by email	Extract documents from emails	<input type="checkbox"/>	<input type="checkbox"/>
Management of non-electronic documents	Record details of hard copy documents	<input type="checkbox"/>	<input type="checkbox"/>
Share and collaborate			
Document workflow	Document creation, review and approval routes	<input type="checkbox"/>	<input type="checkbox"/>
Document mark-up	Annotate documents for collaboration	<input type="checkbox"/>	<input type="checkbox"/>
Document commentary and rating	Document feedback by users	<input type="checkbox"/>	<input type="checkbox"/>
Document indexing			
Document numbering/ID	Defined document identification system by project	<input type="checkbox"/>	<input type="checkbox"/>
Linked and compound documents	Link related documents in the EDMS and process as one	<input type="checkbox"/>	<input type="checkbox"/>
Manage documents			
Drawing management	Deal with drawings within EDMS	<input type="checkbox"/>	<input type="checkbox"/>
Image management	Deal with images within EDMS	<input type="checkbox"/>	<input type="checkbox"/>
Audio and video management	Save, manage and deliver audio and video files	<input type="checkbox"/>	<input type="checkbox"/>
Access documents			
Advanced indexing and searching	Document content indexed and searchable	<input type="checkbox"/>	<input type="checkbox"/>
Document viewing	View any document without original application	<input type="checkbox"/>	<input type="checkbox"/>
Browsing by thumbnail	View any document by representative images	<input type="checkbox"/>	<input type="checkbox"/>
Retrieve documents			
email documents to and from the document store	email a document directly from EDMS or into the EDMS via a folder email address	<input type="checkbox"/>	<input type="checkbox"/>

Advanced EDMS feature	Brief description	Feature required	Feature included
Distribute documents			
Document issue control	Control and record the issue of documents	<input type="checkbox"/>	<input type="checkbox"/>
Delete			
Document deletion	Permanent removal of documents and data with record	<input type="checkbox"/>	<input type="checkbox"/>
Administer documents			
Audit trails	Records all activity in respect of both documents and associated metadata within the EDMS	<input type="checkbox"/>	<input type="checkbox"/>
Migration			
Export documents and data	Transfer of information from one system to another in common format	<input type="checkbox"/>	<input type="checkbox"/>
System architecture			
Web-based and remote access	Access full system from web browser	<input type="checkbox"/>	<input type="checkbox"/>
Desktop-based access	Access the full system from desktop program including offline mode	<input type="checkbox"/>	<input type="checkbox"/>
Multiple platform client	Support for more than one client operating system (Windows, Mac, Linux) and/or more than one browser	<input type="checkbox"/>	<input type="checkbox"/>
Work directly from common applications	Access EDMS files from within applications	<input type="checkbox"/>	<input type="checkbox"/>
Web publishing	Integrate with intranet or website	<input type="checkbox"/>	<input type="checkbox"/>
Extranet	Use for external collaboration	<input type="checkbox"/>	<input type="checkbox"/>
Portal to other systems	Can link to other systems	<input type="checkbox"/>	<input type="checkbox"/>
Multiple database and document servers	Separate servers in multiple office locations	<input type="checkbox"/>	<input type="checkbox"/>
Caching of documents	Cached at remote sites for fast access	<input type="checkbox"/>	<input type="checkbox"/>
Hosted solution	System hosted and maintained externally	<input type="checkbox"/>	<input type="checkbox"/>
System data structures			
Flexible folder structure	Folder structure can be amended to suit end user	<input type="checkbox"/>	<input type="checkbox"/>
Multiple taxonomies	Virtual folder structures for different purposes	<input type="checkbox"/>	<input type="checkbox"/>
Access control documents	Security structure extended to individual document level	<input type="checkbox"/>	<input type="checkbox"/>
Contact database	Extension of metadata to contact data	<input type="checkbox"/>	<input type="checkbox"/>

Other considerations	Description	Answer
Business requirements	What are the key business drivers that the project is addressing?	
Technology infrastructure	<p>What is the infrastructure required by the system under consideration and what upgrades would be required to the current infrastructure to support it? e.g.</p> <ul style="list-style-type: none"> • servers • storage • networking • wide area networking • backup 	
Time	What is the timescale required to implement the solution and what is the realistic timescale that the system supplier can achieve?	
Resources	What are the internal resources in staff and time necessary to define, develop and test the system solution?	
Cost	<p>What is the budget for the project and what are the projected implementation costs including:</p> <ul style="list-style-type: none"> • infrastructure upgrade • system cost (hardware & software) • design and implementation consultancy • internal team costs • training • ongoing support and maintenance 	

Appendix 2: Glossary

BS or BSI	British Standards Institution
Caching	Temporary copy of document and/or data for fast access
CAD	Computer Aided Design
CRM	Customer Relationship Management
Document	For the purpose of this guidance note this means any electronic file. This can include drawings, images, programmes, presentations and any other file capable of being stored and read electronically.
EDMS	Electronic Document Management System
ISO	International Organisation for Standardization
Metadata	The additional data associated with a document which defines its characteristics and allows it to be categorised correctly and searched within an EDMS
OLE	Object Linking and Embedding – a technology used to link data from separate documents
WAN	Wide Area Network – used in connecting together the local networks of separate branches of an organisation to provide a single overall network, usually with slower speed connections than the local network
X-Ref	A common data file which is referred by a drawing file and which is necessary to present the complete information for the drawing

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Members' services are diverse and can include offering strategic advice on the economics, valuation, law, technology, finance and management in all aspects of the construction, land and property industry.

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