



# AC<sup>+</sup>erm Project

Systematic Literature Review:  
Technology Aspects



Arts & Humanities  
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The AC\*erm Project – Accelerating positive change in electronic records management' – is a research project carried out by the School of Computing, Engineering and Information Sciences in Northumbria University from 2007 to 2010. It aimed to investigate and critically explore issues and practical strategies to support accelerating the pace of positive change in managing electronic records.

The project focused on designing an organisation-centred architecture from three perspectives: (i) people, including vision, awareness, culture, drivers and barriers; (ii) working practices including processes, procedures, policies and standards; and (iii) technology in terms of the design principles for delivering effective recordkeeping.

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# AC<sup>+</sup>erm Output

## Systematic Literature Review Synthesis – Technology Aspects

### Background *General*

We have carried out a systematic literature review (SLR) of journal literature on electronic records management (ERM) published from 1996 to February 2009. SLRs aim for a more objective, rigorous approach to reviewing the literature. The objectivity and rigour comes from establishing elements *a priori* and following a standard process, particularly for assessing the quality of the literature and extracting relevant data.

We searched for variants of the term 'electronic records management' in the following databases: LISA (covering information studies and technology, library science and publishing); EBSCO's Business Source Premier (including coverage of business, management, engineering, law, health and art); and Web of Science (covering the sciences, social sciences & the arts and the humanities). We have reviewed 1,189 from a total of 1,756 items and selected 536, to date, for detailed review.

Information from the reviewed items have been organised into an Access database. Components of the database include: tickboxes for subject focus and for coverage of specific topics (such as model for ERM, change management) and a textual summary. Assessing the quality of the item has been through the use of tickboxes for resource type, approach type and reviewer evaluation. The use of tickboxes means that we can choose items from the database that cover specific topics only. The items on a specific topic are then synthesised by identifying themes from the summary and organising the items under appropriate headings.

Selected outputs from the SLR have been used to inform the initial questions for our Delphi studies as well as to provide practical information to enable action by users of the outputs.

### *This Output*

Contains items of literature which have been coded as having a main focus of 'process' or as containing coverage of specific technological topics. The items were chosen from the database on 2009/03/23. This output informed the questions for Round 1 of the Technology Delphi Study.

**Nature of Output** Brief summaries of items from the literature, organised under headings with bibliographic details.

## SYSTEMATIC LITERATURE REVIEW – SYNTHESIS OF TECHNOLOGICAL ASPECTS – 2009/03/23

Articles that have been coded as having a main focus of ‘technology’ or as containing coverage of specific technological topics.

Total number of articles: 203

Example of item ID code: \$1365 2008 HMM

Example of item ID code: \$1365 2008 HMM

- Character: # case examples, \* research, £ individual expert opinion
- Number = ID number from EndNote bibliographic database
- Date
- Weighting: Resource H M L / Approach H M L /Reviewer’s Evaluation H M L, where H = High, M = Medium, L = Low

*Notes:*

- Some items are duplicated under different headings.

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## **ELECTRONIC RECORDS MANAGEMENT SYSTEMS**

### **1.1 ERMS**

covers: ERM architecture models; principles for ERMS; method for designing EDMS based on using IM model; choice of ERMS; very thorough, step-by-step guidance for EDRMS implementation; EDRM Implementation Toolkit; EDMS and lack of RM functions; ERMS not the best solution; integration / interoperability of EDMS and ERMS; handling privacy within an EDMS; UK e-government initiatives; use of EDRMS in the police;

Key issues arising from the literature

- Are ERMS the best approach for RM, or should RM functionality be embedded in desktop/office software, line of business systems and Web 2.0 technologies etc

#### \$1365 2008 HMM

##### *ERM architecture models*

p.29 "all ERM products perform approximately the same functions. Their true differences lie deep within their design - in their architecture. Understanding those differences can inform ERM software selection decisions, but - more importantly - it can affect an organization's overall strategy for managing electronic records because a product's architecture will help determine what is possible, at what cost, and in what timeframe." 4 components of ERM software: e-records, metadata, classification scheme, retention rules. 4 architecture models to describe current ERM products. (1). Single repository model. All components kept within the ERM software. Records and metadata have to move out of original applications into the ERM software. Therefore become inaccessible and unsearchable by original applications. ERM software may have poorer search and security. (2). Replicated model. Classification scheme and retention rules in ERM software. Records and metadata replicated in both ERM and source applications. Effort to keep them synchronised, risks of version problems. (3) Catalog model. ERM contains classification scheme and retention rules. Records kept in original source application but metadata copied into ERM. Synchronisation problems. Metadata updates in ERM will lag behind that in source applications. (4) Delegated model. Records and metadata stay in source applications. ERM acts as an engine to associate the classification scheme and retention rules with the records. Source applications must be able to interface with the ERM. Range of issues including IT Issues - Size/scalability -Application integration - ERM system programming - Record/metadata synchronization - Application programming p.34 "the most effective selection approach is usually to minimize the ... very difficult ... issues, not to maximise the ... easy ... ones. This would lead most organizations to choose the delegated model."

*Gable, J. & Gemmer, B. (2008) 'The Importance of Architecture in ERM Software Selection', Information Management Journal, 42 (1), pp. 28-35.*

#### \$700 2000 HMH

##### *Principles for ERMS*

Three basic functional requirements for ERMS: (1) Automatic migration of docs and data from on-line to off-line media as dictated by stage in life-cycle; (2) Automatic deletion at end of retention period; (3) Permanent retention of archival records. Fourteen principles "provide a translation of the traditional principles associated with

records retention from visible media to electronic recordkeeping environments” [p40].  
(9) Determine whether data migration and deletion occur automatically. Does the system automatically control these processes, or is human intervention required?  
(11) Be highly selective about appraising electronic records as ‘permanent’ Electronic media, hardware and software do not have longevity of paper or microfilm and use of latter usually more practical for, long-term retention. However, e-records whose archival value depends on continued capacity for electronic manipulation would need to be retained in digital form. (12) Use COM or COLD solutions for lengthy retention requirements. Try to use stable and durable media for those records earmarked for long-term retention in digital form – best options Computer Output Microfilm (COM) for long term or Computer Output to Laser Disk (COLD) for medium term.

*Stephens, D. O. (2000) 'Electronic records retention: fourteen basic principles', Information Management Journal, 34 (4), p. 38+ (11 pages).*

#### \*510 2005 HHM

##### *Method for designing EDMS based on using IM model*

Proposed method uses XML-based information model, the Document Management and Sharing Model (DMSM), which aims to represent DM and business information through document metadata supported by Document Management and Sharing Markup Language (DMSML). Method aims to define guidelines and standard methodological approach to design, using DMSM, and deployment, using DMSML, within a support DMSML Framework (integrated set of tools). Info models are abstract and technology-independent; can be expressed in natural or formal ways, the latter having the advantage of being comprehensible to machines as well as humans. Evaluation of selected proprietary (FatWire, Documentum) and open-source (MARIAN, Xinco) EDMS products against the following requirements: open info model; standard compliance; model-driven design methodology. Method for EDMS design/development then applied in organisation. DMSML-based specs (classified documents of organisation) interpreted by CASE tool to generate automatic EDMS code. Utilizes DMSML Framework. User testing, supported by impact and usability questionnaires. DMSML Framework. Three parts: EDMS Configurator – user-friendly GUI to facilitate specification and generate DMSML instance document. EDMS Generator – deploying EDMS by uploading DMSML instance. DMS Web Application – provides basic EDM features through web browser. Designing and deploying an EDMS using DMSML Framework prototype. DMSML-based Specification: specification through GUI of folder structure and some metadata; life-cycle templates; access control policies. EDMS Generator processes DMSML specification to customize EDMS template. Possibility of creating open-source project based on DMSML Framework.

*Paganelli, F. & Pettenati, M. C. (2005) 'A model-driven method for the design and deployment of Web-based document management systems', Journal of Digital Information, 6 (3).*

#### \$587 2003 MMM

##### *Choice of ERMS*

Technology has raised the profile of RM for e-records. But need to distinguish between a record (and therefore an ERMS) and a document (and therefore an EDMS). P.18 “the problem is not with IT, but with companies not understanding what they want to do with it.” The choice of and ERMS must integrate with the content management system. Be aware of your specific IT needs when evaluating and procuring technology, and above all, remember that EDRM is more complicated than simply implementing new technology.

*Higgison, S. (2003) 'Electronic document and records management', Records Management Bulletin, (116), pp. 17-20.*



#### \$1403 2008 MMH

##### *Very thorough, step-by-step guidance for EDRMS implementation*

"The objective of this toolkit is to provide ... a 'one-stop shop' for ... advice of use during all the stages of a proposed or actual EDRM system implementation ... specific to the needs of the FE/HE sector. The key to the successful implementation of an EDRM system is to follow a proven methodology that provides you with a checklist of tasks and a logical sequence in which to complete them. ... The model used here is the JISC infoNet Project Management infoKit. The elements specific to EDRM systems came from a methodology developed by Cimtech... and the DIRKS methodology developed by the National Archives of Australia and summarised in ISO 15489. Technological issues include: Stage 1: Positioning. "... agree exactly what they mean by an EDRM system. ... see how the new system will integrate with their existing IT systems and applications." "Stage 6: Defining the statement of requirements. ... plan and produce the statement of requirements for the preferred EDRM solution. ... Step one - the Invitation To Tender ... Step two - the background to the requirements ... Step three - the functional requirements ... Step four - the technical requirements ... Step five - the service requirements ... Step six - the price schedule ...". "Stage 7: Procuring the solution. Step one - a review of the suppliers on the market. Step two - the notice and prequalification stages. Step three - the issue of the Invitation to Tender (ITT), clarifications and shortlisting. Step four - selecting the preferred supplier."

*JISC-InfoNet (2008). Implementing an Electronic Document and Records Management (EDRM) System.*

#### \$254 2004 MLL

##### *EDRM Implementation Toolkit*

JISC is developing a RM InfoKit providing guidance for the HE and FE sectors. Also an EDRM implementation Toolkit. P.121 "The concept of the MLE [Managed Learning Environment] involves the integration of all information systems within an institution which are connected to the provision of education for the learner, including student record systems and other business and administration systems. ... How will an EDRM system with its enterprise-wide ideology fit into the MLE architecture?"

*Bailey, S. (2004) 'Records management development tools in the FE and HE sectors', Records Management Bulletin, (120), pp. 11-12.*

#### \$580 2001 MMM

##### *EDMS and lack of RM functions*

P.10 "Many EDM systems have poor RM functions. Retention scheduling is seldom built in ...". EDM work at the document level rather than the file level, so contextual information is not preserved. Extend definition of document to include electronic forms. But problems with self-modifying documents, e.g. automatic date change when accessed, or share information automatically updated. Different renditions of a document, e.g. Word, PDF. Less clear what the original' of an electronic document is.

*Allison, D. (2001) 'The application of records management disciplines into electronic data management', Records Management Bulletin, (103), pp. 9-11, 13.*

#### \$336 1998 LML

##### *ERMS not the best solution*

Legal decisions in 1997 in US p2 "government agencies 'may not destroy electronic records created, received or stored on electronic mail or word processing systems' and that they must keep electronic records in their original form." Predict that NARA will therefore recommend agencies to install ERMS, creating a bonanza for the suppliers of such systems. Department of Defense specification for ERMS DoD 5015.2 certified ForeMost (from Provenance Systems) and Trim (from Tower

Software). P. 3 "Not only are ERMs anachronistic [based on library packages], they're also expensive and require that an organization have a sophisticated database system in place. Plus, many ERMs work in conjunction with document management systems, which aren't cheap either." But proprietary systems better than the in-house developed ERMS using mainframe tools or databases. ERMS don't solve the storage problem. P. 4 "a better solution is to put email and other non-mission-critical electronic records into the sort of 'nearline' (or even online) storage that CD-R provides so inexpensively, e.g. @CD-Rkive from SMS Data. P.4 "At the heart of the solution is an NT operating system extension that allows any email client to view and sort a virtually unlimited 'in box' of email stored on indelible CD-R discs." i.e. email is viewed as a storage not a management problem. But @CD-Rkive doesn't 'solve' problem of other types of e-records. As well as office documents there are groupware and dynamic Web content.

*Fritz, M. (1998) 'CD-R, @CD-Rkive, and the American way of records-keeping', EMedia Professional, 11 (10), pp. 48-50, 53-44, 56.*

#### \$1419 2006 MMM

##### *Integration / interoperability of EDMS and ERMS*

AIIM International. 2006. "This technical report provides a framework for the integration of Electronic Document Management Systems (EDMS) and Electronic Records Management Systems (ERMS). This report deals with what is required for EDMS and ERMS to integrate and interoperate."

*ANSI/AIIM/ARMA (2006). Revised Framework for Integration of EDMS & ERMS Systems (ANSI/AIIM/ARMA TR48-2006).*

#### \$1363 2008 HMM

##### *Handling privacy within an EDMS*

p.43 "an EDMS captures and manages document files. An EDMS, however, uses databases to manage these document files. So, at a basic level, there can be two categories of personal information in an EDMS: that contained in the document file as its content or metadata and that contained in the database in data tables as index data or metadata." Article suggests mechanism for handling privacy within an EDMS based on a taxonomy model, which adds in the data usage and privacy restrictions to the taxonomy used to organise and store the documents. Then use of the EDMS' tools to set up the required data structures and implement the access restrictions.

*Mooradian, N. (2008) 'Keys for Securing Private Information in an EDMS', Information Management Journal, 42 (2), pp. 42-51.*

#### \$343 2006 MMM

##### *UK e-government initiatives*

Brief summary of selected progress in UK e-government initiatives. Office of the Deputy Prime Minister including in its IEG (Implementing Electronic Government) requirements the adoption of ISO 15489 – viz increase in corporate EDRM (not EDM) projects which have long procurement and rollout processes and need considerable RM work before implementation at the user desktop.

*Grimshaw, A. (2006) 'Electronic document, records and content management in government: one year on', Information Management and Technology, 39 (1), pp. 12-18.*

#### \$521 2005 MML

##### *Use of EDRMS in the police*

Police forces are lagging behind in implementing EDRMS. (2005). Particular needs of the police forces include e.g. collection and assessment of evidence; large distributed organisations.

Gibney, A. (2005) 'EDRM: Are the police on the case? Or have they lost the scent?', *Records Management Bulletin*, (127), pp. 7-9.

## 1.2 ERMS - Technologies and Products

Key issues arising from the literature:

- Note historical development – articles range from 1999 to 2006
- Automated record keeping

### \$485 2006 LLL

*List of EDRM products*

'The EDRM marketplace', (2006) *Records Management Bulletin*, (132), pp. 11-17.

### \$562 2006 MLL

*List of companies providing EDRMS*

'Electronic data interchange and records management systems', (2006) *Information World Review*, (222), pp. 20-23.

### \$684 2003 MMM

*ERMS developments*

Reviews RM developments & developments in ERMS. Approaches to ERM (viz. Shared drives, back-end ERMS for non-current records; EDM/ERM for active records; Integrated solutions; ECM.

Hendley, T. (2003) 'Planning for electronic records management', *Information Management and technology*, 36 (2), pp. 84-88.

### \$654 2001 MLM

*ERM products*

Annual AIIM conference: workflow & ERM software products. Content management & web content management are synonymous (or will be). XML. content management for portals & of portals to connect people to people and people to information.

Hendley, T. (2001) 'AIIM show 2001: part 3: workflow and e-business process automation software', *Information Management and Technology*, 34 (6), pp. 280-283.

### \$71 2000 LML

*Products*

AIIM show. Includes: scanning, image & forms processing, workflow management & EDRMS.

Hendley, T. (2000) 'AIIM Show 2000: part 1 a review of the products and services', *Information Management and Technology*, 33 (4), pp. 169-175.

### \$27 1999 MLL

*EDMS*

AIIM European Industry Study on European Document Technologies 1998-2003. Current priorities are practical compliance and security. Followed by document archiving/retrieval and workflow. Knowledge management, web content and e-commerce expected to expand. Applications with processability (acting on internal document info rather than labels) is future trend. P.5 "widespread acceptance of the value of IDOM [integrated document and output management] technologies in improving business processes". Desktop imaging expected to grow fastest. But total revenues will be in enterprise workflow, document repository management and production imaging. Top three buying criteria are price/performance, standards'

adherence and high-quality support. P.6 Obstacles "Among users, IT skills' shortages as well as inability to chart clear RoI (Return on Investment) in information management projects rank highly while among vendors, perceived customer ignorance of available benefits rated highest."

*'European document technologies: AIIIM European Industry Study, 1998-2003', (1999) Inform (London), (218), pp. 5-7.*

#### \$599 1999 HLL

##### *TRIM*

Description of TRIM (Tower Software) electronic record keeping system at time.

*Raas, U. (1999) 'Electronic recordkeeping: more than electronic document management', Records Management Journal, 9 (2), pp. 117-129.*

#### \$73 1999 LML

##### *Products*

AIIIM show. Industry trends, new products/services.

*Hendley, T. (1999) 'AIIIM show 1999: part 1', Information Management and Technology, 32 (4), pp. 175-182.*

#### \$1331 1997 HHH

##### *Automated record keeping*

In June 1996, the National Archives of Canada issued its Guideline on the Management of Electronic Records in the Electronic Work Environment to all Canadian federal government institutions. Part of the Guideline contained a vision of automated record keeping in which records would be captured automatically based on the incorporation of record keeping rules in the design of automated work processes. As an illustration of this concept, the National Archives developed a demonstration prototype based on a project management work process situated within one of the operational activities of the department. "In summary, as the records and documents of a given project are created, they are encapsulated with metadata describing the characteristics of the task (inside a business process) that created the record, the activity supported by the task, and the accountable responsibility centre in the organization. This metadata together with the functionality supported in a record keeping system are designed to ensure the authenticity and reliability of the record for the length of time it is required to serve a business or accountability purpose. The intent of this prototype has been to explore the feasibility of accomplishing this record keeping task automatically and, in the process, to learn more about the overall concepts and issues associated with record keeping in the electronic work environment." (p283) In terms of what still need to know (at the time) says the model didn't include a record keeping component (i.e. supporting functionality such as expressed in the UBC and Pittsburgh projects). How should this be included? What would the functional requirements look like?" (p285)

*McDonald, J. (1997) 'Towards Automated Record Keeping, Interfaces for the Capture of Records of Business Processes', Archives and Museum Informatics, 11 (3), pp. 277-286.*

### **1.3 Case Studies of ERMS implementation – Public Sector**

#### #290 2006 MML

Comino (software supplier) account of EDM (document image processing, contact management and workflow systems) in Wakefield Metropolitan District Council. Benefits were better information access and sharing and better customer service.

*Dransfield, L. (2006) 'Fast Forward Vision at Wakefield', Information Management and Technology, 39 (1), pp. 19-20.*

#\*346 2006 MMM

NHS Pensions Agency use of EDM to improve customer service because agency staff have better access to more information. NHS Information Authority research project into issues of e-medical records.

*'EDRM in the NHS: delivering electronic medical records and improving service and access to information', (2006) Information Management and Technology, 39 (3), pp. 125-126.*

#487 2006 MLL

North Warwickshire Borough Council - implementation of an EDRMS. Specific needs - handling plans, searching Local Land and Property Gazetteer database and extracting info, managing workflow. Benefits - increased retrieval speeds, wider access, workflow streamlining, access by public.

*'EDRM in North Warwickshire', (2006) Records Management Bulletin, (133), p. 33.*

#503 2006 MMM

Newark & Sherwood District Council implementation of Hummingbirds' EDRMS. Implemented in revenues & benefits dept. (about council tax & benefits claims).

*'There's more to Sherwood than Robin Hood', (2006) Information Management and Technology, 39 (1), pp. 25, 27.*

#319 2006 HHM

Installing an ERMS at the French Ministry of Justice, called MESSENGER. Merging of two projects: to manage files, to manage mail.

*Loussouarn, O. (2006) 'Records management: A case study from the French Ministry of Justice', Records Management Journal, 16 (2), pp. 91-96.*

#502 2005 HHH

PRONI (Public Record Office of Northern Ireland) started on one of three lead EDRM implementation projects in Northern Ireland Civil Service (NICS) in summer 2003, the first phase of a NICS-wide implementation. Tower Software's TRIM Context. Process of deciding what records to move from old to new system. E-mails not included in transfer as e-mail capture too complex to be easily carried out by staff, and because this would be a benefit of the EDRMS.

*Smyth, Z. A. (2005) 'Implementing EDRM: has it provided the benefits expected?', Records Management Journal, 15 (3), pp. 141-149.*

#662 2005 HMM

NHS Purchasing and Supply Agency implementing an ERMS. p.84 "More than any other system, people feel that e-mail systems belong to them. ... getting them to move e-mail into the ERM system is a big issue. ... people are less willing to give up their e-mail folders than they are their shared drives."

*Gregory, K. (2005) 'Implementing an electronic records management system: a public sector case study', Records Management Journal, 15 (2), pp. 80-85.*

#284 2005 MML

Havebury Housing Partnership, West Sussex (not-for-profit but linked to local government). Use Easy Software (DMS) product for archiving invoices and managing personal files. Other aspects = backup and DPA compliance.

*'It's easy making documents work at Havebury Housing Partnership', (2005) Information Management and Technology, 38 (4), pp. 165-166.*



#### #432 2005 MLL

Leicester County Council is implementing an eDRMS in their social services dept with the plan of then rolling it out across the whole of the council. Requirements of system to handle structured data, unstructured data (e.g. scanned images, emails, video and audio recordings), paper and e-records, e-form based data collection e.g. via PDAs as well as PCs, mobile access.

*Forster, S. (2005) 'Electronic social care records: blueprint for EDRM?', Records Management Bulletin, (129), pp. 25-26.*

#### #516 2005 MMM

Stirling Council's implementation of Valid's R/KYV EDRMS.

*'Valid's EDRMs gives Stirling service. Meeting e-government targets using SCC procurement', (2005) Information Management and Technology, 38 (1), pp. 41-42.*

#### #732 2005 MMM

Competition Commission. EDRM implementation. Much metadata inherited automatically lessening burden on staff to add metadata. Really need dedicated workflow software so not adopted the document based workflow in the EDRM. CSF: Use of a consultant. P.43 "EDRM is more about leading and managing change than any specific technology, and leadership comes from the top."

*Kibby, P. (2005) 'The Competition Commission's story: a case study in EDRM delivery', Records Management Bulletin, (125), pp. 41-43.*

#### #480 2005 MML

UK Department of Constitutional Affairs - setting up an EDRMS. Handles paper records (in existing registries) and e-records in parallel. CSFs include: Ease of integration of system with Microsoft.

*'Department of Constitutional Affairs succeeds with EDRM project on time and on budget' (2005), Records Management Bulletin, (125), pp. 37-38.*

#### \$#768 2005 HML

Review of published/unpublished case studies showing benefits of implementing an ERMS/EDMS. These include: p.135 "established systems are robust and reliable, with very little downtime". Little in the literature about recovery after a disaster but p.135 "disaster recovery tests with several different EDRMS suggest that this technical aspect ... is also met successfully." p.135 "Most EDRMS are able to manage any type of record.... However not all of the record types ... are suitable for management by an EDRMS. The problems arise with records that could be described as multi-dimensional objects, such as databases."

*Johnston, G. P. & Bowen, D. V. (2005) 'The benefits of electronic records management systems: a general review of published and some unpublished cases', Records Management Journal, 15 (3), pp. 131-140.*

#### #570 2004 MML

Implementing an EDRMS at British Library Estate Directorate. CSFs include: Should have had a 'model office' prior to rollout so system set up could have been validated. Problems include: technical incompatibility; challenge of e-mail management; people wanted to duplicate their physical filing cabinet rather than using the EDRMS facilities fully.

*'A tower of strength in the British Library Estates Directorate keeps everything neat and trim', (2004) Information Management and Technology, 37 (1), pp. 19-20.*

#572 2004 MMM

Staffordshire County Council's implementation of Tower's TRIM EDRMS for social care records.

*'Managing Staffordshire's social care records', (2004) Information Management and Technology, 37 (4), p. 174.*

#786 2004 MMM

DTI's (Department of Trade and Industry) EDRMS project using TRIM software. Early indications show increased staff productivity, better quality information. EDRMS is crucial component of move to more flexible working and better information sharing.

*'EDRM with TRIM benefits the DTI', (2004) Information Management and Technology, 37 (1), p. 40.*

#### **1.4 Case Studies of ERMS implementation – Private Sector**

#472 2006 MMM

The Casey Group (construction & environmental services) description of implementation of The Content Group's ECM solution based on Documentum and scanning software for tighter control of information about client projects.

*'The Casey Group is safe as houses: with ECM from the Content Group', (2006) Information Management and Technology, 39 (1), pp. 34-35.*

\*#163 2006 HHM

Use of EDMS to facilitate e-collaboration in project-based industry. Based on a number of case studies in Scandinavia. Challenges of introducing e-collaboration into industries such as construction, where multi-participant temporary projects are the norm. Document production / dissemination has been revolutionized successively by copying techniques, word-processing, CAD, increasing dissemination in digital form, and finally the introduction of EDMS, now web-based. EDMS typically ASP (Application Service Provider) services developed by third parties. Early systems provided by copying shops and major CAD vendors, then c.2000 move towards more comprehensive systems integrating several different technologies (e.g. e-mail, DM), stalled through (a) lack of development resources and (b) realization of behavioural rather than technical nature of many problems facing introduction. Overall picture of increasing usage. End-users not to be treated as homogenous group but differentiated by attitude and IT skills; equal emphasis needs to be placed on technology, processes and people; lack of reliable data on economic impact of collaborative systems was a barrier to their introduction. Necessary complexity of metadata and folder structure within EDMS mitigated by industry familiarity with similar paper filing systems. No significant drop in paper usage, for a variety of reasons. Difficult to measure costs and benefits. Conclusions. Structuring metadata is a central issue, industry's familiarity with documentation standards proving helpful in providing basic framework. Constant reconfiguring of groups and personnel in project environment, and limited (re)training possibilities, demand either a move towards national standards or user-friendly systems.

*Bjork, B.-C. (2006) 'Electronic document management in temporary project organisations: Construction industry experiences', Online Information Review, 30 (6), pp. 644-655.*

#282 2005 MMM

Scottish Courage (division of Scottish & Newcastle) implementation of GDO's (Graphic Data Online) bureau service to scan invoices, filter problem ones and load into an EDM with workflow which Scottish Courage access via the web. Increased invoice processing efficiency & reduced costs.

*Monk, B. (2005) 'Scottish Courage toasts success: new GDP purchase invoice processing solution maximises efficiency and reduces costs', Information Management and Technology, 38 (3), pp. 131-132.*

#306 2005 MMM

John Joseph Financial Services (independent financial advisors), an SME, implementation of Invu's EDMS to move from paper to electronic files.

*'Buried under paper: Not any more', (2005) Information Management and Technology, 38 (4), pp. 173-174.*

#576 2005 MMM

Cadbury Bourneville Village Trust manages accommodation and village. Implemented Invu's EDM to better manage information on properties and tenants by moving from paper to electronic form.

*'Cadbury's Bourneville isn't just chocolate: Invu's EDM system keeps track of Bourneville Village Trust's tenants and residents', (2005) Information Management and Technology, 38 (2), pp. 75-76.*

\$#768 2005 HML

Review of published/unpublished case studies showing benefits of implementing an ERMS/EDMS. These include: p.135 "established systems are robust and reliable, with very little downtime". Little in the literature about recovery after a disaster but p.135 "disaster recovery tests with several different EDRMS suggest that this technical aspect ... is also met successfully." p.135 "Most EDRMS are able to manage any type of record.... However not all of the record types ... are suitable for management by an EDRMS. The problems arise with records that could be described as multi-dimensional objects, such as databases."

*Johnston, G. P. & Bowen, D. V. (2005) 'The benefits of electronic records management systems: a general review of published and some unpublished cases', Records Management Journal, 15 (3), pp. 131-140.*

#471 2004 MMM

Bayer Healthcare AG's use of Documentum (ECM) for managing research & development documents.

*'Bayer HealthCare standardises ECM platform', (2004) Information Management and Technology, 37 (3), pp. 131-132.*



## IT SYSTEMS IN THE HEALTH FIELD

### 2.1 E-Record Systems / Healthcare Systems

covers: electronic payment systems; health information infrastructure in the US; e-health records in the US; smart cards; database

Key issues arising from the literature:

- Examples of very complex systems used within complex settings

#### \$828 2007 LML

##### *Electronic payment systems*

Executives from US healthcare organisations giving tips on moving to electronic payment receipt and reconciliation. Challenges include: Not all organisations use such systems. System doesn't provide all the necessary information/facilities electronically. Problems with mapping across legacy systems. Individual payer organisations set up systems that efficient for them, not necessarily efficient for providers, and differences with other payers. Benefits include: Extra 'intelligence'. Faster, easier, more accurate, more secure. Concentrate staff on exceptions rather than routine work.

*'Provider Tips for Moving to Electronic Payment Receipt and Reconciliation', (2007) hfm (Healthcare Financial Management), 61 (6), pp. 1-4.*

#### \$844 2007 MMM

##### *Health information infrastructure in the US*

USA: appointment in 2004 of "first National Health Information Technology Coordinator with a 10-year goal of creating an interoperable health information infrastructure that would ensure that most Americans have secure electronic health records (EHR), and healthcare workers have quick, reliable access to them."

Definition: "[t]he electronic health record is not a simple computer application; rather it represents a carefully constructed set of systems that are highly integrated and required a significant investment in time, money, process change and human factor engineering" (Amatayakul, 2007). System components needed to migrate to EHRs include: electronic document/content management, clinical messaging, patient care documentation, e-medical administration records, clinical decision support, provider-patient portals etc. Concept of a portable patient health record. Highlights that some individuals may not have access to EHRs (either because their providers cannot afford the technology or they are in the lower socio-economic, older brackets.)

*Valerius, J. D. (2007) 'The Electronic Health Record: What Every Information Manager Should Know', Information Management Journal, 41 (1), pp. 56-59.*

#### \$672 2004 HLL

##### *e-health records in the US*

April 2004, US plans for introduction of electronic health records (EHRs) in 10 years. DP: Issue of privacy covered by Health Insurance Portability and Accountability Act. P.26 "In auditing more than 300 healthcare organizations for security accreditation, ... found just three with comprehensive security-management programs that enable them to comply with HIPAA standards."

*Swartz, N. (2004) 'A prescription for electronic health records', Information Management Journal, 38 (4), pp. 20-22, 24-26.*

\*51 1999 HHM

*Smart cards*

Placing patient records and associated data, e.g. tests, on a Java-enabled smart card that can interface with a Web browser to obtain new data. Within the card can be RM facilities, security and authentication and a clinical alert system. The card is a mobile database, and use of the Web means that there are no problems re incompatibility of systems.

*Chan, A. T. S. (1999) 'Web-enabled smart card for ubiquitous access of patient's medical record', Computer Networks, 31 (11-16), pp. 1591-1598.*

\*363 1999 HMM

*Database*

Developing a structured relational database for unstructured data about patient wounds and providing data visualisation and data mining tools to aid clinicians to improve care & wound-healing. Also to aid knowledge sharing.

*Sanchez, A. & Plassmann, P. (1999) 'Dynamic medical data fusion and data mining in the wound-healing process', Health Informatics Journal, 5 (4), pp. 213-216.*

## 2.2 Privacy and Security of Patient Data

\$1417 2008 LLM

*Privacy and security of online personal health records*

Online personal health records [PHR] business from Google. concerns about: privacy & security; misuse of system (to send spam); personal impact of inaccurate data in medical records; who can/has access, where are medical records stored now – offsite data warehouse.

*Havenstein, H. (2008) 'Google launches online personal health records project', Computer World, (21 Feb 2008).*

\$47 2006 MLL

*Privacy and security of patient data*

Putting information on the Web for health consumers, e.g. hospital activity data, hospital/doctor performance, costs. How best to ensure privacy & security of (patient) medical information in the context of its increasing access over the web. DM/RM implications include retention, disposal, redaction of metadata in publicly available documents. Challenge is to provide access to electronic medical information but protect against loss (hacking), theft, inappropriate access. Free metaware MS product (Trace!) that automatically alerts users to risk level of a document they're about to open by scanning for sensitive content (hidden or visible). Other software being developed creates 'audit trails' for individual documents to monitor every modification. Pros and cons of creating a unique patient identifier. 6 best practices for providing secure access to e-records: individual authentication of users; access controls; audit trails; physical secure & disaster recovery; protection of external electronic communications; system assessment (against attack/hacking).

*Koprowski, G. (2006) 'Paging medical information: examining access issues', EContent, 29 (7), pp. 30-35.*

\*207 2002 HHH

*Privacy and security*

Considers issues of privacy, confidentiality and security in context of clinical information systems and sharing information between different agencies (e.g. police, social services). Anderson has developed a security model for clinical information systems. 9 principles. 3 security logical languages were assessed for their

effectiveness in handling these principles: ASL, LaSCO, Ponder: with mixed success.  
*Aljareh, S. & Rossiter, N. (2002) 'Towards security in multi-agency clinical information services', Health Informatics Journal, 8 (2), pp. 95-103.*

#### \*409 2002 HHM

##### *Security of e-health records.*

Presents a user “authentication architecture” for healthcare information systems to protect information contained in e-medical/patient records. “user authentication remains a prerequisite for really secure information services especially in distributed systems. In this paper, an authentication architecture for healthcare environments is presented.” (abstract). Authentication protocol exploits benefits of symmetric & asymmetric cryptography without use of the classic public key infrastructure (PKI), thus avoiding its vulnerabilities.

*Chousiadis, C., Marvridis, I. K. & Pangalos, G. I. (2002) 'An authentication architecture for healthcare information systems', Health Informatics Journal, 8 (4), pp. 199-204.*

#### \$609 2000 HHH

##### *Confidentiality of electronic health records*

Proposes a model for the confidentiality (i.e. access control based assuming secure data transmission) of the electronic health record (HER) (summary) & electronic patient record (EPR) (full), which are at the heart of the UK National Health Service information strategy. A confidentiality system is needed to ensure no unauthorised search or editing of data and to include data sharing between agencies across the NHSnet, data aggregation to review clinical performance and tracking professional and organisational accountabilities. Important for clinical governance and personal data protection. Presents a UML (Universal Modelling Language) model of HER/EPR confidentiality, based on the NHS Healthcare Model (HcM), in the form of ‘class’ diagrams; at time of publication the model was being implemented using the Jasmine Object Oriented Database systems.

*Longstaff, J. J., Capper, G., Lockyer, M. A. & Thick, M. G. (2000) 'HER and EPR confidentiality based on accountability and consent: tools for the Caldicott Guardian', Health Informatics Journal, 6 (1), pp. 45-52.*

#### \$1255 1999 MMM

##### *Confidentiality of patient data*

Considers concerns (in 1999) about security issues of e-records, particularly in health care sector, and balance of benefits over risks of using technology. Benefits: seamless integration of services, facilitate and improve the delivery of health care, a new dimension to the relationship between doctors and patients, support for decision making. Risks: Privacy, confidentiality. “Patients assume that care providers are in control of the technology they use and that the technology is fit for the purpose, but there is no process of certification for this The law can offer little useful help: it has always trailed reality, often by a considerable margin The goal must be to prevent security breaches, because once they have happened the damage is already done as far as the patient is concerned.” “The contribution of computers to health care will be limited by the extent to which users and the community of patients come to trust them to manipulate data and support decisions while protecting their privacy” “technological glitches and communications problems affecting the availability of appropriate records and creates a potential nightmare concerning the quality and integrity (or safety) of the records themselves.” “Accepting the benefit of technology is easy; offsetting it against the risk is harder.” Conclusion; “Computer technology is complex and it is difficult to assess the risks to which data within a system are subjected without having considerable expertise; often that assessment cannot readily be made even by the suppliers of a system, and there is little independent

expert evaluation of software or systems. This must become a feature of accreditation for practices and institutions that use electronic patient data handling system.

*Neame, R. & Kluge, E. H. (1999) 'Computerisation and health care: some worries behind the promises', British Medical Journal, 319 (7220), pp. 1295-U1249.*

### **2.3 Case studies -Implementation of E-health Record Systems / Healthcare Systems**

#### \*1347 2008 HHH

##### *Hospital information system*

HealthSys which offers a complete package for e-patient records (EPR) patient admin (PAS) lab work etc. Installed in Norwegian hospital. 'Integration' has many different meanings to different people, e.g. flexible access to information, virtual market, integrated (continuity of) care, technical integration of applications. Results of case study presented as narrative account. The health authority's vision was of one standardised system. They set up a regional IT service. Consequences: increase running costs of a separate legal entity. Breakdown in close communication between / creation of a big gap between IT staff and hospital staff. Clinicians had a vision of single log in to see all the separate services. This achieved but at expense of extra effort by IT staff (to set up an ad hoc system translating between the new and old (in parallel) PAS) and lab staff who had often to input data manually between the two PAS. Political vision for regionalisation of services. E.g. streamlining all lab services so use same lab module in HealthSys. However microbiology services say this module is too simplistic and does not capture the complex and contextualised info they need. So refused to use it. Conclusion. P.235 "We also believe that broad rather than narrow technical evaluations if integration efforts should be conducted. It is not sufficient to evaluate particular instances of integration. Rather, integration needs to be evaluated a part of a larger portfolio of implementations and transformations in order to get a complete picture of where the vision has come from and where it is going."

*Ellingsen, G. & Monteiro, E. (2008) 'The organising vision of integrated health information systems', Health Informatics, 14 (3), pp. 223-236.*

#### \*1348 2007 HHH

##### *e-health record project*

Integrated healthcare services depend on integration of information, founded on electronic patient record (EPR), but there are major difficulties. Deployment of EPR particularly complex where (1) systems are intended to embrace multiple aspects, including best practice / regulatory frameworks, not just provide admin support; (2) constituent technologies complex and sophisticated (imaging, decision-support, etc); (3) NHS requirements are constantly emerging and changing. Integration of EPR generally seen in terms of (1) interoperability of new and legacy systems and (2) standardization of data, flows, etc across organisation. This means that deployment focus "may necessarily be on technical, data, and regulatory requirements, to the detriment of producing a system that successfully supports the work of those delivering care" [p48]. Ethnographic study at a 2-hospital NHS hospital trust of an EPR project. Using customisable-off-the-shelf (COTS) systems; among questions to be address is how much turns out to be 'off-the-shelf' and how much customisation is needed. Fieldwork showed that integration not just technical. Four types of integration identified, which have complex interdependencies: (1) Technical (disparate systems; core and modular systems); (2) Workplace procedures (generic process models; this generated tension between standardisation and supporting local

variants); (3) Work practices; (4) Wider organisational / NHS concerns and requirements. Which criteria should be used to decide whether integration is successful? e.g. successful technical integration could still be unworkable in practice. Problems in collecting information for design. Integrating system to work or vice versa? technical v process. Prioritising types of integration. "It is clear that having an integrated computer-based system of processes, that conform to (or integrate with) NHS requirements, has greater priority than having a system that meshes well with existing practice" [p54]. Integration: Who does the adjusting? The system or the user? Conclusion: integration and design. Research shows that analysts have problems with (1) understanding whether system fits well with practice; and (2) when practice should be transformed and when system should be reconfigured. Related issues: (3) integration with practice complicated by use of the COTS system in integrating organisational processes, and by need for technical integration and compliance with NHS requirements; (4) requirements for integration with working practices given lower priority; (5) when technical solutions cannot be found for usability problems, the latter are turned into training issues. Such problems raise doubts over whether EPR can actually bring the benefits of seamless healthcare service envisioned. "What we learn is that organizations like the Trust studied here need to find better ways to understand current work practices and better means to understand how and whether they might be evolved or transformed in relation to an emerging design. ... users need to be involved; their problems should not simply be considered as lower in priority, or as something that may be bypassed." [p56].

*Martin, D., Mariani, J. & Rouncefield, M. (2007) 'Managing integration work in an NHS electronic patient record (EPR) project', Health Informatics Journal, 13 (1), pp. 47-56.*

#### \*#1383 2008 HHH

##### *Hospital information system*

Paediatric hospital system in US using a commercial electronic health record (HER) system. p.719 "assess the usability of the EHR's functions in order to identify configuration and design changes that could improve the system's usability." p. 720 "Because a commercial system was used, parts of the system interface and functionality are dictated by the vendor's base product, and thus out of the immediate control of the implementation team." p. 722 potential solutions fell into one of the following categories: (1) Configuration changes to be made by the implementation team, (2) Design changes/enhancements to communicate to the vendor for future release, and (3) Suggestions for addressing these issues through training and communication, in instances where changes were unlikely to be made prior to rollout. ... a total of 134 potential usability issues. While most of the identified issues were expected to have a minor impact (57#), 13 (10#) of the identified issues were anticipated to have potentially severe consequences." p.723 "Fifteen percent of issues were related to consistency. ... Thirteen percent of issues were related to users being unable to notice or appropriately use a control to complete a task or perform an action. ... Ten percent of issues were related to limited flexibility and/or efficiency in completing steps or tasks. ... Seven percent of issues centered on confusion over what next step the user should take." p.724 "design trade-offs relevant to EHR implementations. Many of these tradeoffs also apply to other IT systems used in the healthcare domain." They comprise (quoted subheadings): (a) Legal requirements versus aesthetic and minimalist design, (b) Legal requirements versus error recovery, (c) Efficiency versus accuracy and consistency in data entry, (d) Consistency versus flexibility, (e) Patient safety versus efficiency. p. 725-6 "the complex nature of the clinical work domain". p. 726 "The fact that the client is dependent on the vendor to make some of the changes needed to improve system usability highlights the importance of developing a good relationship with the vendor and a two-way dialog about how usability of the system can be improved in the long



run. In fact, this dialog on usability should start before design, during the package selection. When selecting an EHR vendor, healthcare providers should include criteria related to clinician feedback on system usability and the vendor's capabilities and processes for evaluating and continually improving the usability of their product. If vendors receive usability feedback from a range of clients and potential clients, they have better data on the importance of and priorities for enhancing usability in future releases. EHR customers should encourage more vendors to utilize these user-centered design and HCI evaluation tools and techniques like the one presented here."

*Edwards, P. J., Moloney, K. P., Jacko, J. A. & Sainfort, F. (2008) 'Evaluating Usability of a Commercial Electronic Health Record: A Case Study', International Journal of Human Computer Studies, 66 (10), pp. 718-728.*

#### #1339 2007 HMM

##### *e-health records*

Case study at the Geneva University Hospitals. Looking at computerised patient records (CPR). In-house CPR system is used for all functions (clinical, admin, management, research etc.) and by all staff (clinical and on-clinical). Main focus of article is their process for rights management. This includes P.467 "A standardized and unified computerized access management allowing centralization of the definition of profiles and decentralization of the attribution to users. ... A standardized track&trace computerized system in charge of tracking and consolidating all access to identified data that allows all accesses to be reviewed. ... Authentication via personal smartcard and personal ID number." Java component-based architecture with components communicating via HTTP/SML protocols. The system is currently an institutional network but plan is to move to a trans-institutional network. This trans-institutional network seems possible p.470 "provided that the technicality of the highly distributed architecture is handled."

*Louis, C., Spahni, S., Cassoni, N. & Geissbuhler, A. (2007) 'Comprehensive management of the access to the electronic patient record', International Journal of Medical Informatics, 76 (5/6), pp. 466-470.*

#### #616 2004 HHM

##### *e-health records*

Data quality of e-patient records (EPRs). Context is implementation of a Greek national EHR system. Discusses three specific problems: data quality assurance (i.e. how to measure data quality); ensuring acceptance of data quality mechanisms; ensuring data accessibility and availability. Suggests intelligent interfaces, decision trees and mobile technology have potential to address these problems.

*Bamidis, P. D., Eaglestone, B. & Orfanidis, L. (2004) 'Data quality issues in electronic health records: an adaptation framework for the Greek health system', Health Informatics Journal, 10 (1), pp. 23-36.*

#### #731 2004 MMM

##### *NPfIT*

An early example of work around NPfIT (National Programme for IT in the NHS) at Salford Royal NHS Trust.

*'A "single patient view" at Salford Royal Hospital: SeeBeyond integration solution takes an NHS Trust into the twenty first century', (2004) Information Management and Technology, 37 (4), pp. 180-181.*

## OTHER TYPES OF IT SYSTEMS

### 3.1 Other Types of IT Systems / Technologies - ECM

#### \$827 2007 HHH

##### *ECM*

Non profit organisations and enterprise content management (ECM). ECM software products can capture both structured and unstructured content in all types of format. Technical components comprise a database of every document, templating software for capturing unstructured documents, business rules and roles for work flow to enable it to be automated, a Web server to deliver the content. Usually using XML. RM is a common application for ECM: implement enterprise. p.412 "Reification is the freezing and encoding of content for retrieval in a system. ECM reifies content into searchable usable information and workflows" P.413 "Commodification focuses on the reification of content as a separate, usable product that is its own valuable entity to be used, traded, or shared within or outside an organization. " Concerns: p.414 "Commodification can also create isolation from the meaning of work. Technology affects the ability of workers to make sense of their work and male cognitive choices. When technology structures and drives the work process, the ability for individuals to react and improvise can be limited severely. ... Making organizational work more like an assembly line can deskill organizational members as a result of restricted participation in work flow ... and replace the human knowledge process with an automated low-knowledge process that has difficulties adapting to change and solving problems." An individual organisation must consider p.415 "how an ECM system would change the organizational roles of members [clients as well as staff] and how that affects the meaning of the work they do for the organization."

*Iverson, J. & Burkart, P. (2007) 'Managing electronic documents and work flows: Enterprise content management at work in nonprofit organizations', Nonprofit Management & Leadership, 17 (4), pp. 403-419.*

#### #288 2006 MMM

##### *ECM*

Cheapflights (USA) using Percussion's Rhythmyx ECM software to improve timing and delivery of travel price & resort information on the web.

*'Cheapflights turns to Percussion Software: to upgrade flight and resort information to global travellers', (2006) Information Management and Technology, 39 (3), pp. 120-121.*

#### \$104 2006 MMM

##### *ECM*

ECM is a method of managing information "stored in different places, in different formats and affected by different regulations – and should be seen as a process, involving people, activities and technology that are all aligned to the true business need." "ECM strategies should be unique to every organisation because the needs, business drivers and processes of each organisation are unique".

*Fisher, G. (2006) 'Enterprise content management: achieving one version of the truth', Information Management and Technology, 39 (4), pp. 162-163.*

#### \$68 2001 MLM

##### *ECM*

Enterprise Content Management (ECM) defined as "ECM is the technology that provides the means to create/capture, manage/secure, store/retain/destroy, publish/distribute, search, personalise and present/view/print any digital content

(pictures/images/text, reports, video, audio, transactional data, catalogue, code). These systems primarily focus on the capture, storage, retrieval, and dissemination of digital files for enterprise use." p. 263. Evolved from applications such as Integrated Document Management (IDM) and Web Content Management (WCM). Key points: handles unstructured content, covers both paper and electronic content, integrates back- and front-office processes, can be delivered via Web, useful to web-enabled businesses. ECM is a growth market.

*Papworth, H. (2001) 'Enterprise Content Management: the bottom line', Information Management and Technology, 34 (6), pp. 262-263.*

### 3.2 Other Types of IT Systems / Technologies - SharePoint

#### \$1362 2009 HMM

##### *SharePoint*

Use of SharePoint (MOSS 2007) for RM. Was not intended as a RM tool. Though certified as compliant with DoD 5015.2-STD in 2007, the standard installation cannot be a RM solution without a lot of customisation and use of third party tools. ERM/ECM vendors are developing integrations with SharePoint.

*Gatewood, B. (2009) 'Selecting the Right Tools for Records Management', Information Management Journal, 43 (1), pp. 33-37.*

#### \$1413 2007 MLM

##### *SharePoint*

Applied Information Sciences Inc. has developed an DoD 5015.2 compliance add on pack for SharePoint. P.2 "Microsoft has since introduced a Records Center as a component of Microsoft Office SharePoint Server 2007, which provides a framework for creating and supporting formal records management capabilities. While the addition of the Records Center enables SharePoint Server 2007 to provide records management capabilities, many customers require a solution that also complies with the DoD 5015 standard. Microsoft [has extended] ... the records management capabilities of SharePoint Server 2007 to include the DoD 5015 records management compliance functionality [via an add-on pack]."

*Microsoft (2007) Records Management Solution Demonstrates Power of SharePoint As A Development Platform. Microsoft Corp.*

### 3.3 Other Types of IT Systems / Technologies - Automatic Classification / Categorisation / Clustering

#### \*826 2007 HHM

##### *Collaborative structuring*

Document repository system based on collaborative structuring. Authors' Collaborative Structuring System allows local hierarchies which are then merged into a consensus hierarchy. Also generates hyperlinks dynamically between documents, categories and repository users - a hyperlink network. System designed on top of open source system the Everything Engine.

*Wu, H. & Gordon, M. (2007) 'Collaborative Structuring: Organizing Document Repositories Effectively and Efficiently', Communications of the ACM, 50 (7), pp. 86-91.*

#### \*1342 2007 HLM

##### *Metadata*

DDI (Data Documentation Initiative) set up to provide contextual metadata for social science quantitative datasets. Digital data is machine-readable; metadata must be person-readable. Standardised metadata format can be used as a general tool for



extracting meaningful information from datasets. XML based.

*Rasmussen, K. B. & Blank, G. (2007) 'The data documentation initiative: A preservation standard for research', Archival Science, 7 (1), pp. 55-71.*

\*867 2006 HHH

*Automatic classification*

Automatic classification of documents/text. p.1156 "The paper proposes a new TC [text categorization] technique based on an existing state-of-the art feature clustering technique [Information Bottleneck] and a logic-based learning algorithm (Lsquare). The resulting TC system equally performs or outperforms one of the best performers in this task (i.e. SVM [Support vector machines]) as extensively verified through experiments. ... [the technique works best] on small training sizes where the training sets contain very few examples. This is suitable for applications where labelled training data is very limited, like in classifying personal e-mail messages or memos or in classifying and organizing document and files of a small organization."

*Al-Mubaid, H. & Umair, S. A. (2006) 'A New Text Categorization Technique Using Distributional Clustering and Learning Logic', IEEE Transactions on Knowledge & Data Engineering, 18 (9), pp. 1156-1165.*

\*868 2006 HHH

*Document clustering*

Document clustering technique for organising and providing access to information. "To manage this ever-increasing volume of documents, individuals and organizations frequently organize their documents into categories [e.g. folders] that facilitate document management and subsequent access and browsing. Document clustering is an intentional act that should reflect individual preferences with regard to the semantic coherency and relevant categorization of documents. Hence, effective document clustering must consider individual preferences and needs to support personalization in document categorization. In this paper, we present an automatic document-clustering approach that incorporates an individual's partial clustering as preferential information. ... with two clustering methods, pre-cluster-based hierarchical agglomerative clustering (HAC) and atomic-based HAC". The method proposed here is personalized and incorporates an individual's partial clustering based on their personal folders. The precluster-based HAC method outperformed the atomic-based HAC method.

*Wei, C.-P., Chiang, R. H. L. & Wu, C.-C. (2006) 'Accommodating Individual Preferences in the Categorization of Documents: A Personalized Clustering Approach', Journal of Management Information Systems, 23 (2), pp. 173-201.*

\$850 2006 LLM

*Automatic classification*

Intelligent electronic filing system software - KRIS Intelligent File (KIF) – that uses artificial intelligence to manage electronic documents. "The system is designed to read documents to determine their content and context, and then automatically classify and store the files for future searches and retrieval." It uses pattern matching and can classify data according to user roles and security access levels.

*'Singapore Tests Intelligent E-Filing System', (2006) Information Management Journal, 40 (6), pp. 10-10.*

\$1398 2006 MMM

*Automated Metadata Extraction.*

Many of models presuppose that metadata can be extracted automatically from RK systems, but it is not yet known whether the metadata in business systems can be extracted in this way. Likewise, encoded archival context (EAC) EAC assumes that contextual metadata can be found in websites, directories, etc. Work needs to be

done to see if any of this is really possible to automate.

*van Ballegoie, M. & Duff, W. (2006) DCC Digital Curation Manual: Archival Metadata. Digital Curation Centre (DCC) [Online]. Available at: <http://www.dcc.ac.uk/resource/curation-manual/chapters/archival-metadata/archival-metadata.pdf>.*

#### \*67 2004 HHM

##### *Automatic document classification*

Tested automatic classification techniques. Concluded that: p.1 "The methodology developed would enable web based applications or workflow systems to manage information more efficiently, i.e. by assigning documents to topics automatically or assisting humans in the process of doing so."

*Calvo, R. A., Lee, J.-M. & Li, X. (2004) 'Managing content with automatic document classification', Journal of Digital Information, 5 (2), p. No page numbers.*

#### \*166 2002 HMM

##### *Automatic categorisation*

Use of neural network software to categorize records according to retention period. E-mail and w/p documents. Hummingbird's Knowledge Manager Workstation. New paradigm – controls docs, not folders, indexing done on every non-trivial word and on phrases and concepts. Retrieval nearly instantaneous and foolproof allowing record managers to concentrate on retention rather than subject categorization. Material then stored offline by retention period, e.g. all material with the same period on the same disc for easy destruction at appropriate date. Under old paradigm, record managers spent a lot of time educating and persuading staff to do their filing; now electronic fileplans unnecessary so less time spent on that. Also gives record managers more power and control – instead of devising systems which it is then up to others to apply, they design systems and oversee implementation with expert staff.

*Schewe, D. B. (2002) 'Classifying electronic documents: a new paradigm', Information Management Journal, 36 (2), pp. 54, 56-59.*

### **3.4 Other Types of IT Systems / Technologies - Internet / E-communication**

covers: Web services, SMS, RSS, content management, messaging system, e-transactions, portals

#### \$1381 2008 HMH

##### *Web services*

"Web services are moving beyond being merely a computing technique used within an application programme. More and more they are being seen as products in themselves. ... They can be broadly defined as reusable components which operate independently but which can be used by many applications seeking to do the same thing. ... Web services also need to be constructed so that they can be consumed in any technological environment... we need to string them into sequences, which actually perform specified functions. ... The linking protocols that have been defined to do this are currently known as orchestration or choreography ... Enterprise information architecture advocates a modelling of the business and technical environment to ensure that a view across whole organizations is possible at an abstracted level. Increasingly, enterprise architecture is being linked to 'service oriented architectures' - that is a business model that involves organizations using a specific reference model of a framework to map and manage the uptake of many services which can potentially be defined. This view of organizations seeks to find

common elements across application environments and business lines, which define components that can be re-used from one application to another. Service oriented architecture is far more than the capacity to use web services (as defined above). It is a complete rethink of the way organizations conceptualise and structure their information systems.” Four areas for recordkeeping. p.14 "(1) Services as a document centric technology. (2) Orchestrations for business processes using services, incorporating recordkeeping. [Some of the components will be about capturing records so need to build in records processes.] (3) (Further away) delivering full recordkeeping functionality as a set of web services. (4) Interim strategies using specific web services [for separate RM tasks].”

*Reed, B. (2008) 'Service-oriented Architectures and Recordkeeping', Records Management Journal, 18 (1), pp. 7-20.*

#### \*1387 2008 HHH

##### SMS

SMS (Short Message Service) in banking service: “The study ... compares the usability of three types of message input format: Abbreviations, Numbers and Free-Form as alternatives for a Pull [customer initiated] SMS banking service. .../ The Abbreviations and Numbers versions of the service performed to generally equal levels in all metrics. Free-Form performed the worst as participants took significantly longer to complete tasks and it received significantly lower overall questionnaire and quality scores for satisfaction. The older age group found all three versions in general to be less usable than the younger age group.” (abs)

*Peevers, G., Douglas, G. & Jack, M. A. (2008) 'A Usability Comparison of Three Alternative Message Formats for an SMS banking Service', International Journal of Human Computer Studies, 66 (2), pp. 113-123.*

#### \*1372 2007 HLM

##### RSS

"Really Simple Syndication (RSS) feeds for the adaptation of web content for use in mobile phones."

*Garofalakis, J. & Stefanis, V. (2007) 'Using RSS Feeds for Effective Mobile Web Browsing', Universal Access in the Information Society, 6 (3), pp. 249-257.*

#### #195 2006 MMM

##### Content management

Salford City Council's use of Open Text's Livelihood web content management to support 24hour service delivery via the web. CSF/benefit=user friendly interface for staff and the public.

*Hyland, D. (2006) 'Being "better connected" at Salford: e-enabling public services', Information Management and Technology, 39 (1), pp. 23-24.*

#### #44 2004 MML

##### Messaging system

Bar-Ilan University, Israel - Research Authority (admin unit for administration of research grants) set up a messaging system to target e-mail messages to faculty members on their topic of interest. P.28 "In developing this system, we discovered the need to incorporate an improved ICT infrastructure. This infrastructure would enable us to create a university-wide research information management system fully integrated with other systems, such as financing and auditing."

*Cohen, D., Mackler, Y. & Zimmerman, E. (2004) 'New system improves management of grant information', Information Outlook, 8 (7), pp. 25-28.*

\$613 2003 HMM  
*e-transactions*

An example of a transaction that when conducted in the electronic environment leaves a digital trail which if done as traditionally in person or over the phone it would not do so. Library reference queries answered via chat, email or Web forms. Various types of private information are gathered during such transactions, including name, email address as well as content of enquiry. Information about the librarian may be included as well as the user. Therefore concerns about how to protect the privacy of such personal, sensitive information.

*Neuhaus, P. (2003) 'Privacy and confidentiality in digital reference', Reference and User Services Quarterly, 43 (1), pp. 26-36.*

\$97 2000 HML  
*Portals*

Corporate portals aka enterprise information portal (EIP) p.355 "software that provides user-customisable access to information and applications through a Web browser". Range of companies now entering the market. Collaborative portal companies, from DRM (Data Resource Management) sector. Business intelligence applications vendors. Enterprise information/corporate portal vendors, creating applications-specific packages. Portal framework vendors, adapting generic database platforms. Enterprise resource planning (ERP) vendors. Being sold to the IT manager as the Holy Grail. Information managers need to get involved in decision making for procurement. Managers might see this as the Holy Grail 'solution'.

*White, M. (2000) 'Enterprise information portals', Electronic Library, 18 (5), pp. 354-362.*

### 3.5 Other Types of IT Systems / Technologies - Various

covers: visual analytics, voice technologies, digital pen and paper, scanning, computer forensics, microfilm, Lotus Notes, new technological developments, BPMS, DRM, software for RM, data exchange, e-commerce, EDI, 'linked in place' architecture, data cleansing, overview of types of IT systems, electronic data capture, connectivity, smartcard

\$1360 2008 HML  
*Visual analytics.*

A method for visually reviewing, analysing and managing large data collections, particularly for litigation or regulator compliance.

*Carr, K. (2008) 'Techniques for Making Molehills out of Unstructured Data Mountains', Information Management Journal, 42 (5), pp. 43-49.*

\$1395 2007 HMM  
*Voice technologies*

(p764) "The voice communication infrastructure is going through a fundamental change that will have a profound effect on the communications industry and ultimately on how people communicate. ... With new technologies, voice signals are converted to data packets and become recorded information files that can be "stored, searched, manipulated, copied, combined with other data, and distributed to virtually any device that connects to the Internet." Therefore RM implications. (p765) "voice can become data files that can be edited, stored, searched, copied, and manipulated. The emergence of voice analytics, language translation, and other technologies will enable new opportunities for leveraging podcasts, MP3 files, voice mail, and a variety of audio or video data files." ?p no. "Because VoIP puts voice communication, text communication and documents on the same networks, servers, and end devices, a

truly unified portal could be designed for inbound communications, presenting them in the context of the tasks that relate to those messages. In addition, improvements in voice processing technologies (for example, speech recognition and speaker identification) would provide opportunities for personalized management of communication events and switching between text and voice modes.” ?p no. “Stored voice content should be leveraged similarly to other non-structured data for the underlying intelligence it contains.”

*Christensen, J. & Hughes, B. (2007) 'Voice-enabled IT transformation: The new voice technologies', IBM Systems Journal, 46 (4), pp. 763-775.*

#### \*1382 2007 HLH

##### *Digital pen and paper*

Construction industry. Development of product/system for snagging, i.e. Snags (defects) identified near to completion of the project that need to be resolved. Snagmaster - internet based digital pen and paper solution. Snagging records need to be retained for specified periods, and authenticity and integrity assured, through applying RM procedures to this data. Potential for use outside construction industry.

*Craig, N. & Sommerville, J. (2007) 'Records Management and Information Processing on Construction Sites Using Digital Pen and Paper', Records Management Journal, 17 (3), pp. 201-215.*

#### #565 2006 MMM

##### *Scanning*

Lufthansa's use of Metastore's business process management software for handling documents from its frequent flyer programme (enrolments and claims processing) Use of scanning and workflow.

*'Flying with Lufthansa is miles better: thanks to a little help from Metastorm', (2006) Information Management and Technology, 39 (4), pp. 168-169.*

#### #737 2006 MML

##### *Scanning*

Developing a set of guidelines and toolkit for staff at Worcestershire County Council to make informed decisions about scanning. Issues include: Legal admissibility - scanned in accordance with BSI BIP0008. Choice of hardware/software dependent on min/max size of documents, volume, need for colour. Need for pre- and post-scanning work, e.g. removing paper clips and staples, weeding, indexing. Need to also manage the electronic space - the Council is currently using network drives not an EDRMS. Resolution of 300 dpi, min 200, 400 for maps, plans etc. In TIFF format as non-proprietary. Need for backups - these are only run at intervals so paper kept for a month to be sure the electronic copy is save. Records needing to be stored for 5 years+ need digital preservation. Simple scanning produces a large file so optical character recognition (OCR) or intelligent character recognition (more useful for handwritten documents) might be used. Next steps for the council include: investigate using a scanning bureaux.

*McIntosh, H. (2006) 'Why don't we just scan everything?', Records Management Bulletin, (133), pp. 3-4.*

#### \$320 2006 HMM

##### *Computer forensics*

p.107 "The principles of computer forensics can be employed records management contexts in order to monitor the integrity, authenticity, reliability and completeness of records." p.109 "Computer forensics tools and principles can, for example, be used as the basis for auditing and monitoring records management, as well as aiding in the recovery of lost or damaged records."



Irons, A. (2006) 'Computer forensics and records management - compatible disciplines', *Records Management Journal*, 16 (2), pp. 102-112.

#### \$483 2006 MLL

##### *Microfilm*

Use of microfilm for storage is making a comeback. Benefits: Simple, can be read by human eye and with low-speed low-cost devices. Has potential longevity (100-500 years in controlled conditions). High-volume, high-speed scanners. Analogue version of digital files for long term storage and as a secure back up.

Varendorff, L. (2006) 'An ancient solution to a modern problem', *Records Management Bulletin*, (131), pp. 43-44.

#### \*273 2006 HHL

##### *Lotus Notes*

Looked at 3 construction projects and their use of a specific information management system (IMS) Sysdox, a Lotus Notes IT-based application. Sysdox can manage all project data from correspondence to architectural drawings. Databases are linked to intelligent mailroom function for routing of emails, faxes etc. Electronic links ensure only one copy of each document kept. Lockdown features, audit trails, history of document access available. Accessible via internet for offsite use. Conclusion. p.141 "Sysdox is an IMS that provides significant organisational benefits and improves process management."

Craig, N. & Sommerville, J. (2006) 'Information management systems on construction projects: case reviews', *Records Management Journal*, 16 (3), pp. 131-148.

#### \$204 2005 MMM

##### *New technological developments*

Holographic storage. Electronic paper/ink. Search engine with eigenvector analysis, i.e. connects related documents.

Andolsen, A. A. (2005) 'Emerging technologies: staying ahead of the curve', *Records Management Bulletin*, (126), pp. 11-12.

#### #225 2005 MMM

##### *BPMS*

Wells Fargo implementation of a business process management system completed in 2 phases - first to capture electronically incoming paper documents & second to automate the loan (i.e. business activity) processing. Significant cost savings.

Winzeler, S. (2005) 'Wells Fargo gallops ahead with automated loan processing', *Information Management and Technology*, 38 (4), pp. 169-170.

#### \$429 2005 MML

##### *DRM*

Problems caused by Digital Rights Management (DRM) and Information Rights Management (IRM) features embedded in new software. P.21 "as part of an electronic communication, the sender may, if it is wished, disallow the recipient's right to print, forward, copy or retain a business or legally-related electronic communication about a business transaction." This will be a serious barrier to proper record keeping.

Varendorff, L. (2005) 'Trojan horse programmes: is this the records and archive management Armageddon?', *Records Management Bulletin*, (125), pp. 21-22.

#### #748 2005 HMM

##### *Software for RM*

Electronic records management on a shoestring: case studies. Records manager in federal banking agency needed to convert manual records system into ERM system. Records manager asked IT to develop small bit of code so that whenever a set of papers was saved by an examiner, a copy would automatically go to a folder controlled and accessible only by the records manager. Law librarian of federal agency legal division. Software package used to synopsise legal cases. Need to get information from paper documents. Reviewed software product already used by division, which had several features not currently used including scanning and electronic document storage. Recommending expanding use of existing package because it was flexible, already familiar to staff, and had track record for service.

*Young, J. (2005) 'Electronic records management on a shoestring: three case studies', Information Management Journal, 39 (1), pp. 58-60.*

#### #717 1999 HMM

##### *Software for RM*

US Government agencies' ERM affected by series of federal court decisions leading to requirement to keep digitally born records in electronic, not paper, format and to treat e-mails as records. EPA (Environmental Protection Agency). Using draft of DoD standards and guidance from NARA. EPA's BPR solution and federal RM BPR recommended centralizing administration in a Combined Docket Facility (CDF). CDF not an ERM system as such: all regulatory dockets already known to be permanent records, so CDF does not need to be full (i.e. including creation) ERMS as only needed to maintain and transfer ERs. Incoming paper docs to be captured in CDF in optical image (reproducible and available on EPA website) and full-text format (searchable); incoming electronic docs retained in native format but also saved as optical image and in CDF uniform full-text format to allow uniform access. NARA accepts transfers only in certain formats. Paper records therefore only acceptable to NARA as original or converted to microform. ERs to be transferred in original format using prescribed transfer media. Optical disk storage. After scanning, paper records to be destroyed. Back-up copies of optical records to be stored off-site.

Recommended that CDF be prepared to integrate directly into any future HQ-wide ERMS. While IT systems design often does not take RK needs into account, this must be an element for federal IT systems, with legal RK requirements. New paradigms for life cycle modelling. Mandatory ERM requirements will force system designers to consider information life cycle as well as system life cycle. System designers must take entire records life cycle (as per schedules) into account. Records managers must take account of system life cycles when designing records life cycles / schedules. IT systems planners look to the future and accept changing technology as constant, records managers and archivists on the problem of permanence and change-resistant info formats. Recordkeepers fear not just obsolescence but extinction of systems, with data impossible to migrate because hardware, software, and human skills no longer exist.

*Van Wingen, R. S., Hathorn, F. & Sprehe, J. T. (1999) 'Principles for information technology investment in U. S. federal electronic records management', Journal of Government Information, 26 (1), pp. 33-42.*

#### \*812 2005 MHM

##### *Data exchange*

AdsML "an XML-based business that facilitates business and technical cooperation in the so-called advertising supply chain. Technically, it is a data exchange mechanism that supports "trading partners" as they swap data throughout the "advertising and advertisement" life cycle across all media.

*Christopher, L. C. (2005) 'The Long Road from Concept to Implementation', Seybold Report: Analyzing Publishing Technologies, 5 (9), pp. 5-11.*

#### #261 2000 MML

##### *e-commerce*

Raising profile of RM in the Historic Royal Palaces. Impact of e-commerce on the heritage sector. Emails and e-records will be the future 'historical resource', e.g. on work being carried out on the buildings. Use e-means to catalogue assets and make access easier. Own web site. CAD system holding plans and models etc.

*Catford, C. (2000) 'From basement to boardroom: Historic Royal Palaces: making records management matter', Records Management Bulletin, (100), pp. 17-19, 21.*

#### \$453 1998 MMM

##### *EDI*

EDI (electronic data interchange) from an RM perspective. E-records are often produced and transmitted without reference to any RM procedures. EDI is on the whole transaction based and is involved in e-business, e-commerce and e-administration. p.24 "From a records management perspective EDI is a form of recorded information, i.e. electronic records, which must be managed on behalf of the organisation throughout its whole life cycle." EDI can involve many different localities/countries and jurisdictions (therefore information law complexities) and languages. What record managers can do to become involved with EDI: focus on 'recorded information' not the media of records; particularly involvement in the design and implementation of EDI-based applications.

*Knoppers, J. V. T. (1998) 'Electronic data interchange (EDI) ('e-commerce' and 'e-business') and records management', Records Management Bulletin, (87), pp. 18-28.*

#### \$1351 2004 MLM

##### *'Linked in place' architecture*

Discusses idea of a 'linked in place' approach to managing records stored in multiple systems. Highlights debate about desirability or feasibility of ubiquitous RM - decision to implement ERMS is a dilemma for organisations – few "enable users to apply records management principles to data held in systems from other suppliers" (p1). A new approach is needed called 'linked in place' architecture which will enable RM capabilities to be integrated directly into business applications. (E.g. is IBM's DB2 Records Manager). Would enable linking financial records in finance system with correspondence about them elsewhere (in a RM system). But practical problems include maintaining the link when records in another system are migrated to a new version – security also an issue between the central RM system and the others it links to. Still some way to go before linked in architecture can be implemented.

*Buckley, R. (2004) 'The Missing Link', M-ID, (Nov 2004).*

#### \$#793 2004 MLM

##### *Data cleansing*

Use of data-cleansing initiatives and software to ensure reliability of business data. Effectiveness of business intelligence systems such as data warehouses and customer relationship management (CRM) diminished or nullified by inaccurate data. Group 1 Software Inc. Ensuring that the data is clean involves manual review and perhaps several passes through the software. One-off cleaning doesn't work in the long term, as data quality degrades over time; needs to be constant process. Various data-cleansing packages have appeared in recent years, some solely for use on CRM applications, other also capable of use with supply chain and inventory management. Elements to look for are: "data profiling, which helps analyze data and



find inconsistencies; parsing, which identifies different types of data and puts them in specific fields; standardization, which ensures consistency throughout the data; verification, comparing customer data against a universal master such as the U.S. Postal Service; matching, which links files that are related; and consolidation, which eliminates duplicate entries" [np, 4]. Because poor data the cause of so many CRM implementation failures, CRM vendors developing tools themselves, but limited only to CRM products. May have to use more than one vendor for complete business needs.

*D'Agostino, D. (2004) 'Getting Clean', CIO Insight, (42), pp. 72-76.*

#### \$414 2003 MMM

##### *Overview of types of IT systems*

Reviews the positives and negatives of typical IT systems which are referred to as "passive systems", viz. project planning, email, intranet/shared areas/web, file management/network folders/servers, document/content management, meetings. Does the same for "more advanced business systems which actively support work" i.e. workflow, enterprise systems (PDM, ERP, CRM...). Recommends working with current systems not replacing them and advocates using web technology to "provide visibility and control while allowing users to continue to use standard office tools" e.g. MS Outlook, Lotus Notes, MS Project and "harness the power of these [other] IT systems" (p159-160).

*Griffiths, A. (2003) 'Programme and portfolio management: the new competitive edge in product development and change management', Information Management and Technology, 36 (4), pp. 156-160.*

#### \$217 2001 HMM

##### *Electronic data capture*

Electronic data capture (EDC) and management systems. PR: Early systems - data entry on desktop computers at investigator site with disk or electronic data transfer to sponsor. Little cleaning, querying or manipulation of data. Next systems - linked data entry with data review/cleaning capabilities. Data transfer more sophisticated. Then exploitation of Internet access, with existing browser based applications with online or hybrid on/off line systems. E.g. clinical trials. Many systems using different operating systems and different software and database systems. Different data input mechanisms: laptop/desktop, hand held devices, scanning, faxing, interactive voice response, voice recognition. Goals of systems include: easy export of data to analytical systems; more accurate and useful data entry by edit checks and user prompts; rapid access to clean data remotely; audit trails, regulatory compliance, e-signatures etc. Integration trend because: Different types of input data, e.g. text, electronic, paper, test results etc. Data put into different types of clinical database management systems and associated systems such data warehousing/mining tools.

*Piazza, R. J. (2001) 'Integrated Web-based clinical data handling solutions', Drug Information Journal, 35 (3), pp. 731-735.*

#### #1250 2000 HMM

##### *Connectivity*

Managing data & information in the pharmaceutical sector by connecting individual 'component-based information systems' and combining it with workflow to effectively share, exchange and proactively manage information for competitive advantage (reduction in time to make decisions and get drugs to market). As the need for employees to work together increases, real-time interactive information sharing among the stakeholders in the research, development and marketing processes becomes a strategic need." "Clinical research management must connect applications (clinical trials management, clinical data management, clinical project management, electronic document management, medical information management

etc.) to optimize operations.... As organizations require more integrated applications to stay competitive, appropriate technologies must be used to avoid rigidity." Drivers include: corporate info systems (based on ERP - enterprise resources planning - software using networked business objects and component based architecture; information sharing among systems is a challenge); new data capture technologies ("New information technology architecture based on component-based information systems, component connectivity, and workflow management offers valuable tools to reengineer the information management process); internet (its advantages "can only be achieved with an appropriate IT/information systems infrastructure"); regulatory issues (encourage paperless process, need e-standards, signatures); global development (needs integrated database so data can be managed and shared across different countries). Includes an example of an interactive voice response system.

*Gomeni, R. (2000) 'Emerging technologies and business pressure: The driving forces for an information management reengineering strategy', Drug Information Journal, 34 (2), pp. 645-655.*

#### \*51 1999 HHM

##### Smartcard

Placing patient records and associated data, e.g. tests, on a Java-enabled smart card that can interface with a Web browser to obtain new data. Within the card can be RM facilities, security and authentication and a clinical alert system. The card is a mobile database, and use of the Web means that there are no problems re incompatibility of systems.

*Chan, A. T. S. (1999) 'Web-enabled smart card for ubiquitous access of patient's medical record', Computer Networks, 31 (11-16), pp. 1591-1598.*

### **3.6 XML**

covers: XBRL; use of XML within an ECM; use of XML for metadata systems; XML and business processes; XML and information architecture

#### \$840 2007 MMM

##### XBRL

XBRL (extensible Business Reporting Language) standards (taxonomies) for e-communication of business and financial data.

*Sinnett, W. M. (2007) 'Ask FERF About... XBRL', Financial Executive, 23 (2), pp. 65-65.*

#### \$803 2005 MML

##### Use of XML within an ECM

Use of XML to format unstructured content for management within an ECM. The management of content and data have remained distinct, despite waves of software industry consolidation, because of the fundamental differences between the two types. Organizations want to be able to manage their unstructured content more like data, so that they can query it, re-use it, and so on. This can be done cheaply and simply by XML. Unlike HTML, which has pre-defined tags, XML can be custom-built by users. XML queries also use standard language, not proprietary formats. Key benefits: (1) enables content re-use, within mainstream rather than specialist software settings (Microsoft Office supports XML). (2) Maximizes asset value. With XML, possible to easily recombine elements to produce customized targeted output. (3) Makes content machine-processible. (4) Compliance. Some barriers to development. To have effective content re-use, organizations need to carry out analysis of content sources and uses, develop schema elements, etc. Second barrier

lies in fact that XML not in itself a good authoring format; specialist tools exist, but to become pervasive, must be able to author XML in MS Office and other standard applications / suites. Third problem is that ECM software vendors are not interested in developing this sort of capability – they see XML as just another special content type. Vendors of XML content management software are happy to confine themselves to the publishing sector rather than move into the broader ECM world.

*Siluer, B. (2005) 'Content in the age of XML', Intelligent Enterprise, 8 (6), pp. 24-29.*

#### \*165 2003 HMM

##### *Use of XML for metadata systems*

Use of XML schemata accessed via a relational database to integrate elements using different metadata systems into a single flexible repository/catalogue. Proposal for use of multi-XML schema following XML standards to overcome weakness of object-oriented languages for info sharing and maintenance of relationships between class and entity. Model for system organization is the Unified Model Language (UML). System should facilitate quicker and more exact search and retrieval through the metadata.

*Chen, R.-S., Lu, K.-Y. & Yu, S.-C. (2003) 'Metadata management system: design and implementation', Electronic Library, 21 (2), pp. 154-164.*

#### \$172 2001 MML

##### *XML and business processes*

Use of XML to facilitate communication and integration of business processes. XML enables data to be captured once then re-used for many applications, saving time better used in other area. However, fluidity of XML content and data assemblage makes it essential that EDMS can create and save snapshots to preserve time-bound transactions, and not just underlying data. Ultimately, success depends on integrating business processes, not just docs or web pages, but need to start with the latter. Only solution so far is XML-enabled technologies. A further great benefit is ability to export records and metadata to other RK systems. Understanding XML crucial to EDM policies / implementation, but it is largely unfamiliar outside IM circles.

*Beesley, K. (2001) 'XML: solution for the future', Business Information Review, 18 (2), pp. 35-40.*

#### \$355 2001 HML

##### *XML and information architecture*

P.233 "The main barrier to effective information technology management lies in the need for applications to share information meaningfully, not in the reliability or security of the technology. This is because of the variety of ad hoc systems deployed ... and the way these systems are variously configured and used. It is this set of interchange and integration issues which XML best addresses, when applied with systematic architectural rigour." p.234 "it is important to think of the information technology architecture for an institution ... as a single architecture." p.234 "Architecture. The organization of a system embodied in its components, their relationships to each other, and to the environment and the principles guiding its design and evolution. \* Model. Represents the system from a set of concerns or a focus (e.g. a viewpoint of a stakeholder) ... \* Stakeholder. Any customer, user etc; individual, team, organization with interests in, or concerns relative to, a system. \* View. A rendering or representation - a picture - of a system representing a set of concerns, or viewpoint ... Viewpoint. A pattern or set of rules for constructing a view of an architecture for a specific stakeholder or domain". Viewpoints comprise: Business; Data; Systems; Deployment; Technology.

*Gardner, J. R. (2001) 'Information architecture planning with XML', Library Hi Tech, 19 (3), pp. 231-241.*

## E-COMMUNICATIONS

### 4 Email / E-communications

covers: alternatives to email; curating / archiving email; use of email; email management; email and EDRMS; email and legal issues

Key issues arising from the literature:

- We still can't manage email
- Email systems lack RM functionality
- Similar problems with newer forms of communication systems

#### \$1367 2007 HMM

##### *Alternatives to email*

P.27 "In some settings, blogs and wikis are already upstaging e-mail as internal communications, tracking, and management tools."

*Dearstyne, B. W. (2007) 'Blogs, Mashups and Wikis - Oh, My!', Information Management Journal, 41 (4), pp. 24-34.*

#### \$307 2005 MMM

##### *Alternatives to email*

Promotes alternative approaches to over reliance on email to do business, addressing risks/inefficiencies: 1) use of portal technology (DM, web content management & intranets) to give a single access point for users to share & publish information ; 2) contextual collaboration by putting all relevant office applications, calendars, instant messaging & groupware into a portal for instant sharing and groupwork.

*Alldis, D. (2005) 'Has your e-mail reached boiling point? Will your archiving system soon blow its top?', Information Management and Technology, 38 (4), pp. 179-180.*

#### \$418 2006 MMM

##### *Curating emails*

?p12 "curation of e-mail messages is often overlooked as: \* it is a type of record for which there is no parallel in the analogue world, and which is often not properly integrated into an overall record-keeping infrastructure".

*Pennock, M. (2006) 'Managing and preserving e-mails', Records Management Bulletin, (134), pp. 11-14.*

#### \$1397 2006 MMM

##### *Curating emails*

Standard for transmission for e-mail exists (RFC 2822) but is not widely known and standard file often converted to proprietary format by e-mail systems. Authenticity and Integrity of e-mails. Easier to tamper with digital than non-digital objects. Can address by embedding contextual metadata, preserving entire RFC 2822 file, e-mail server logs, applying security to access, monitoring to prevent obsolescence, media degradation etc. Issues for Creators and Recipients of e-mail messages. DoD 5015.2 specifies essential header metadata to be captured/retained, though ideally as much header data as possible should be saved. Further metadata can be added by customising e-mail client. Users should incorporate metadata (e.g. signatures) in content. Apply filtering to incoming mail. Issues for Curators of e-mail messages.

Integration of e-mail preservation into overall RM strategy. Best done through integrated ERMS or repository. Lack of evidence for long-term viability of pure e-mail repository 'solutions'. Options for preserving e-mail messages. Print to paper. Acceptability of this brought into question by US legal cases in 1990s. Convert to standards. Most popular current approach. Most relevant standards are preservation are PDF, TIFF, RFC 2822, XML. Dealing with Attachments. Importance of maintaining link between e-mail and attachment; preservation of attachment a difficult issue because of multiplicity of possible formats and types. Dealing with Digital Signatures. Signature must be validated at time of receipt as it will not be possible to continue to validate it over time. Long term storage and archiving. Desirability of digital repository. Now seen in context of policies, services, people etc and not just hardware and software. Encapsulation bundles together all content and contextual elements of the digital object (even where it consists of more than one file). Most effective when used in conjunction with conversion to standards. Fundamental aspect of OAIS. Implementing a solution to capture and preserve e-mails for specific retention periods. >10 years: migration to standard format (also consider for 5 years). Strategies best developed through collaboration between at least records pros, creators, IT. Use of XML best current technical solution. Future Developments. Still in a period of immaturity. — New client types, such as Google Mail (groups mails by threads, combines powerful search with labels which may cause re-think about classification / filing approach). Search improvement with Windows Vista throws up all docs (inc e-mails) as search results. — Visualisation allows different views: relationships and connections, "social landscapes" [p35], a different way of unlocking information contained in e-mail collections. — E-mail has been used for many purposes for which it was not designed and for which it is not well suited; use may decline and evolve with proliferation of other, more appropriate, technologies such as IM, RSS, wikis, blogs, VoIP, etc.

*Pennock\*, M. (2006) DCC Digital Curation Manual: Curating e-Mails: A life-cycle approach to the management and preservation of e-mail messages. Digital Curation Centre (DCC) [Online]. Available at: <http://www.dcc.ac.uk/resource/curation-manual/chapters/curating-e-mails/curating-e-mails.pdf>*

### \$316 2006 MMM

#### *Email archiving*

Implementing email 'archiving' technology. 'Archiving' means here 'offline storage' but with retention management. people have different ways of identifying what email to retain— achieving this with automated archiving criteria needs to be comprehensive and "only true forensic analysis solutions" can do this (p66). Gives a 10-step implementation approach.

*Hunt, D. (2006) 'Compliance or e-policy: meeting e-mail retention objectives without compromise', Information Management and Technology, 39 (2), pp. 65-67.*

### \*239 2005 HHM

#### *Use of email*

A questionnaire survey of corporate e-mail users in Singapore. One suggestion from users: proper email management systems.

*Chennupati, K. R., Foo, S. & Seow, B. B. (2005) 'Management of e-mails as official records in Singapore: a case study', Records Management Journal, 15 (1), pp. 43-57.*

### \$428 2005 MMM

#### *Email management*

P.11 "Organisations are being buried in e-mail and the tools in place to control them



are often inadequate and not fit for the purpose." p.12 "e-mail processes and procedures in many organisations have been allowed to develop in parallel with existing computer and manual systems with little or no effort to integrate." Technical solutions: channel incoming messages away from e-mail; introduce e-mail filters; use shared mailboxes; use e-mail archiving systems; introduce an EDRMS/ERMS. And set up an email policy, as part of a coherent IM policy.

*Aspinall, D. (2005) 'Controlling the e-mail mountain', Records Management Bulletin, (125), pp. 11-14.*

#### \*107 2004 MHH

##### *Email management*

Pilot study of email management at Loughborough University. p.28 " \* There is variation in the number of e-mail clients in use and the hardware on which they are run \* ... \* There are difficulties in gaining consensus on which technical solution would meet the needs of the university for the archiving of e-mail records \* Universities tend to lack, for e-mail, a longer-term policy that would integrate e-mail records into a broad university-wide records management system." CSF p.28 " \* That a single e-mail client should be in use across each institution, ideally within an integrated electronic records management system with a workable archive."

*Norris, M. (2004) 'Records management and email: results of a pilot study examining the management of email at a UK university', Records Management Bulletin, (118), pp. 25-28, 42.*

#### \$199 2004 MML

##### *Email management*

Implementing an email management system helps an organisation comply with legislation. p.5 "ROI is proven." Choose an established solution.

*Williams, I. (2004) 'Email solutions: improving system management and legal compliance', Records Management Bulletin, (121), pp. 3-6.*

#### \$200 2004 MML

##### *Email management*

To manage emails: Set up a management system. Easiest - print and file. Two types of technological systems: email security and message archiving. ERMS include emails as part of their core systems.

*Jeffrey-Cook, R. (2004) 'Email management', Records Management Bulletin, (121), pp. 7-8.*

#### \$377 2004 MMM

##### *Email management*

37 rules of strategic email management.

*Flynn, N. (2004) 'How to implement strategic email management: the 37 rules', Records Management Bulletin, (118), pp. 17-21, 24.*

#### \$586 2003 MMH

##### *Email management*

p.7 "An e-mail record (and its attachments) must be maintained in its original electronic format". And in its entirety, and viewable with its native e-mail application. Outgoing e-mails should be captured at the very moment sent. Printed hard copies have a lower legal status. Keeping everything forever creates risks. E-mail systems are inadequate RMS - problems with search, hold an authenticity. E-mail archiving systems are not RMS - problems with relevancy, retention, hold and audit trail. p.8 "While maintaining only those documents that are relevant, organisations must manage e-mails as documents of records in order to meet legal and regulatory requirements. To do so, organisations must: 1. Separate relevant e-mail records

from non-relevant and personal -mails. 2. Store the relevant e-mails ad their attachments as records in their original format. 3. Store the e-mails outside of the e-mail system as records to prove they are authentic documents of record. 4. Manage the lifecycle of e-mails within a Certified records management system."

*Datskovsky, G. & Moerdler, M. (2003) 'Solving the e-mail challenge: effectively managing e-mails as documents of record', Records Management Bulletin, (113), pp. 5-9.*

#### \$173 2001 MML

##### *Email management*

Tips on managing and using email by the individual, not at an organisational level.

*Cook, E. I. & Krieger, L. A. (2001) 'Eliminating e-mail clutter: strategies for virtual office management', Serials Librarian, 40 (3/4), pp. 225-231.*

#### #502 2005 HHH

##### *Email and EDRMS*

PRONI started on one of three lead EDRM implementation projects in Northern Ireland Civil Service (NICS) in summer 2003, the first phase of a NICS-wide implementation. Tower Software's TRIM Context. Process of deciding what records to move from old to new system. E-mails not included in transfer as e-mail capture too complex to be easily carried out by staff, and because this would be a benefit of the EDRMS.

*Smyth, Z. A. (2005) 'Implementing EDRM: has it provided the benefits expected?', Records Management Journal, 15 (3), pp. 141-149.*

#### #662 2005 HMM

##### *Email and EDRMS*

NHS Purchasing and Supply Agency implementing an ERMS. p.84 "More than any other system, people feel that e-mail systems belong to them. ... getting them to move e-mail into the ERM system is a big issue. ... people are less willing to give up their e-mail folders than they are their shared drives."

*Gregory, K. (2005) 'Implementing an electronic records management system: a public sector case study', Records Management Journal, 15 (2), pp. 80-85.*

#### \$805 2005 MML

##### *Email and legal issues*

Need to maintain emails as legal records.

*Martin, L. A. (2005) 'Emails and the Recordkeeping Obligations of Investment Advisers', Investment Lawyer, 12 (2), pp. 16-21.*

#### \$436 2004 HMM

##### *Email and legal issues*

Legal aspect of managing e-communications. Messaging and all other data captured electronically are treatable as records to the same extent as paper and other traditional media, and thus bring this data within the scope of existing laws affecting recordkeeping. Off-the-shelf messaging technology has little or no RM functionality, so if an organization depends to a significant extent on the use of messaging, it may need to invest in additional specialized software to manage it. If this is too complex or costly, other solutions (such as storing messages as word-processing documents or in the messaging system, or printing to paper) can be tried; in some cases, an organization may decide that the use of messaging is not desirable. Decisions also have to be made about retention and integration or lack of it into the overall corporate file-plan. There is no easy solution in the current state of the technology. In addition, control of messaging conflicts with the spontaneity and informality that make it so useful and popular in the first place, and these conflicting needs have to be balanced

by each organization.

*Montana, J. C. (2004) 'E-mail, voice mail, and instant messaging: a legal perspective', Information Management Journal, 38 (1), pp. 37-38, 40-41.*

\$586 2003 MMH

*Email and legal issues*

Email management. p.7 "An e-mail record (and its attachments) must be maintained in its original electronic format". p.8 "While maintaining only those documents that are relevant, organisations must manage e-mails as documents of records in order to meet legal and regulatory requirements.

*Datskovsky, G. & Moerdler, M. (2003) 'Solving the e-mail challenge: effectively managing e-mails as documents of record', Records Management Bulletin, (113), pp. 5-9.*

\$692 2001 HMM

*Email and legal issues*

Two key US lawsuits on email record keeping. Summary of key verdicts: p.7 "electronic versions of e-mail were records in their own right and that the existence of paper printouts did not invalidate their record status unless they included all significant materials contained in the electronic records. [such as metadata from headers etc., and receipt / usage data]". (i) p.12 "email technology can and does produce official records ... and arguments to the contrary - such as the continually cited telephone message analogy - will almost certainly lose in court." (ii) In practice not clear that people are printing out and filing email records. (iii) keeping paper versions is not adequate as a record keeping system for electronic records.

*Wallace, D. A. (2001) 'Electronic records management defined by court case and policy', Information Management Journal, 35 (1), pp. 4, 6-8, 10, 12, 14-15.*



## WEB 2.0

### 5 Web 2.0 Technologies

covers: Web 2.0 tools in the cloud; use of Web 2.0 tools; Blog - Records management futurewatch; Web 2.0 services and tools;

Key issues arising from the literature:

- Driver for use of Web 2.0 technologies - users' frustrations with IT systems within organisations

\$1361 2009 HMH

#### *Web 2.0 tools in the cloud*

Drivers: Lower or no initial cost. Reduced in house real estate and operational costs. Scalable applications of power and storage for peak demands. Easy collaboration across time and space. Users, particularly younger workers, are used to them from personal use. Benefits: (1) Tools simple to provide and maintain. (2) Little downtime. (3) Low costs. (4) Little effort to make them productive, as easy to use, familiar to staff, easy to swap to another application if it doesn't perform. (5) Facilitate collaboration. p.24 "One of the reasons Web 2.0 has found its way into organizations is because of users' frustrations with IT and the difficulty they have encountered in getting access to the tools they need. ... wikis infiltrate organizations because users have a need for the collaboration capabilities and can deploy one as easily as signing up for a [free tool] ... the 'shadow IT department' - users that use these type of tools at home and are comfortable enough with them to be able to provide them without, and even in spite of, the organization's IT department. And they are not easy to stop. ... IT departments that try to completely prevent the usage of these tools face a rapidly moving target." p.28 "At the core of these risks is the inability of many cloud/Web 2.0 vendors to meet regulatory and legal requirements." Security of information. Web 2.0 tools lack monitoring of use, and no guarantee that data is secure. Need user authentication, protection from vendor access itself, probably via encryption and public key infrastructure. Resiliency. Uptime, availability of service, corruption or loss of data. Data from many clients may end up in the same storage location and be backed up there with risks of insecure access. Not all Web 2.0 suppliers will wish to ensure resiliency, particularly not the free services. E-discovery more difficult if not impossible. As organisations do not know how the data is stored and accessed and cannot view it physically to track access and erasures. Would therefore need a contact with the Web 2.0 supplier to carry out this e-discovery task. Law lags new technologies by ~10+ years. Very difficult if not impossible for organisations to conduct computer forensics on the data, and may be impossible to obtain uncontaminated data. RM practices also lag behind technology. Web 2.0 tools developed without RM in mind. Users create and delete at will. Data stored and accessed via search. Managing Web 2.0. including RM. Enterprise versions becoming available to sit behind the organisation's firewall and within their RIM infrastructure. Web 2.0 tools generally use open protocols and data structures so easily to export from one solution to another, or apply RM controls. Select specific applications with due diligence. Involve records managers in this process. RM need to adapt their principles to Web 2.0.

*Cunningham, P. & Wilkins, J. (2009) 'A Walk in the Cloud', Information Management Journal, 43 (1), pp. 22-32.*

\$1412 2009 MMM

*Use of Web 2.0 tools*

"The Enterprise Social Software & Collaboration Report will help your team decide whether and where and how to apply which social media and collaboration tools in your enterprise."

*CMSWatch (2009) Enterprise Social Software Report 2009: Networking & Collaboration Within and Beyond the Enterprise.*

\$1427 nd LMM

*Blog - Records management futurewatch*

"Changes in technology are having a profound effect on the role of records management. The purpose of this blog is to give records managers and others interested in this area a 'heads up' as to what these changes might mean and how the profession needs to adapt to keep pace and maintain its relevance in the years ahead."

*Bailey (nd), 'Records management futurewatch' blog. Available at: <http://rmfuturewatch.blogspot.com/>*

\$1367 2007 HMM

*Web 2.0 services and tools*

P.27 "Web 2.0 is important to RIM professionals because it is accelerating and changing the way people work and the way records and documents are created." Also the term Enterprise 2.0. Benefits: spontaneity, originality, pooling of knowledge and information in team approaches, promote efficiency, reduce costs, broaden business applications, and provide competitive advantage. P.27 "In some settings, blogs and wikis are already upstaging e-mail as internal communications, tracking, and management tools." P.27 "Software investment costs may be modest, but metrics for return-on-investment have not been developed." P.27 "the tools are so relatively easy to use, the software so relatively easy to get, and the advantages so obvious, that employees may adopt them on their own, download software, share files, and set up collaborative systems outside of the regular business structure if managers delay too long." p.28 "Managers prefer to purchase and install a full suite of Web 2.0 tools for entire programs or the enterprise as a whole to having individual employees or groups procure their own, which would introduce the potential for silos and incompatibility. Managers worry about security with so many online participants. Confidential information needs to stay behind the firewall and be used appropriately within the company, There is a broader issue of monitoring content for accuracy and appropriate language." RIM challenges of web 2.0. p.28-30. "1. Assigning responsibility for managing and being custodian of the information. [creators/users can be both within and without the organisation] ... 2. Managing the creation, collection, storage, and dissemination of vast amounts of unstructured and constantly changing information. [wikis e.g.] ... 3. Controlling access to particular levels and types of information. [the balance between diversity / inclusivity and protection of sensitive information] ... 4. Protecting the security and integrity of information. 5. Providing access tools. [e.g. folksonomies] ... 6. Assessing the legal implications of vast amounts of information in scattered systems and databases. [Current legal rules pre-date Web 2.0 therefore need for court cases to establish precedents.] ... 7. Deciding how much information to make public. ... 8. Using the tools and techniques for RIM programs." But also familiar RIM challenges: including "Hype sometimes overshadowing reality \* Technology outdistancing policy \* Defining a 'record' in a complex electronic environment ... \* Deriving measures of efficiency and return on investment."

*Dearstyne, B. W. (2007) 'Blogs, Mashups and Wikis - Oh, My!', Information Management Journal, 41 (4), pp. 24-34.*

## STANDARDS

### 6.1 IT Standards, Frameworks, Architectures, Models

covers: SOA, e-government, technology adoption, data exchange, open archival system, interoperability in e-commerce, IT architecture

Key issues arising from the literature:

- RM not covered/included in many of these

#### \$1389 2008 HHH

##### SOA

Method of analysing, designing & implementing service oriented architecture (SOA) in context of software development. By using the IBM SOMA method.

*Arsanjani, A., Ghosh, S., Allam, A., Abdollah, T., Ganapathy, S. & Holley, K. (2008) 'SOMA: A method for developing service-oriented solutions', IBM Systems Journal, 47 (3), pp. 377-396.*

#### \$1390 2008 HHH

##### SOA

Model for software development. "Service-oriented architecture (SOA) is an information technology (IT) architectural approach that supports the creation of business processes from functional units defined as services. It has become a major focus in the emerging services computing discipline, which explores the ways in which IT can be used to develop and manage business processes efficiently."

Presents IBM's service-oriented modelling and architecture modelling environment (SOMA-ME) as a way to address these challenges.

*Zhang, L.-J., Zhou, N., Chee, Y.-M., Jalaldeen, A., Ponnalagu, K., Sindhgatta, R. R., Arsanjani, A. & Bernardini, F. (2008) 'SOMA-ME: A platform for the model-driven design of SOA solutions', IBM Systems Journal, 47 (3), pp. 397-413.*

#### \$1393 2007 HHH

##### SOA

The use of service-oriented architecture (SOA) as one of the key elements supporting business transformation at IBM. ... An SOA is a component model that interrelates the different functional units of an application, called "services," through well-defined interfaces and contracts between these services. The interface is defined in a neutral manner that should be independent of the hardware platform, the operating system, and the programming language in which the service is implemented. (p651) So, issue is are there information/records management processes (services) built-in. If not, how do RMs get in.

*Walker, L. (2007) 'IBM business transformation enabled by service-oriented architecture', IBM Systems Journal, 46 (4), pp. 651-667.*

#### \*1394 2007 HHM

##### SOA

Abs: The business architecture of a service-oriented enterprise can be adequately represented through five main architectural domains: business value, structure, behavior, policy, and performance." "the business architecture of a service-oriented enterprise is of interest not only for business design but also for the design of the

information technology (IT) solutions that affect all aspects of the operations of a business". (p723). Uses the Unified Modelling Language (UML). "business information defines business data from the business perspective rather than the IT perspective." (p724). ERM isn't an explicit part of this but could it be included in the model/approach?

*Nayak, N., Linehan, M., Nigam, A., Marston, D., Jeng, J.-J., Wu, F. Y., Boullery, D., White, L. F., Nandi, P. & Sanz, J. L. P. (2007) 'Core business architecture for a service-oriented enterprise', IBM Systems Journal, 46 (4), pp. 723-742.*

#### \*1346 2007 HHL

##### *e-government standards and protocols*

Desire of public administration to avoid vendor lock-in; addressed through standardisation in 1980s. Two standards/protocol sets – OSI (Open Systems Interconnection) from the ISO, POSIT (Profiles for Open Systems Internetworking Technologies) from US NIST (National Institute of Standards and Technology), developed after difficulties in finding adequate OSI-compliant rather than internet-compliant (TCP/IP) products and services. e-Government strategies released in OECD in late 1990s; one of the policy areas was interoperability (IO). Focus of survey (across Europe, Australia and North America) on methodological tools (frameworks, architectures) devised by e-Govt agencies in connexion with IO. Common feature of six frameworks studied: internet and WWW technologies at their core. Two different approaches – OSI-centred, organising standards like layers (eGIF, CCI, DIF); and POSIT-centred, organising around services (SAGA, IDABC AG, CIOC EAG). Different requirements for evaluation candidate technologies for inclusion in framework: eGU and KBSt require only that technical specs be open; IDABC insists on 'open standards'; US OMB (Office of Management and Budget) requires 'voluntary consensus standards'. Role of Enterprise Architecture (EA) in IO. More than just technical IO needed for true seamless delivery of govt services – other issues (e.g. organisational) as well. EA a comprehensive description of all key elements and relationships; aims to align business processes / goals and technical infrastructure. "Not all the e-government agencies examined have addressed the organizational issues, and not all agencies that have done it have used enterprise architectures" [p96]. Probably depends on the degree to which private-sector management practices have been adopted in agency – EA a tool borrowed from the private sector.

*Guijarro, L. (2007) 'Interoperability frameworks and enterprise architectures in e-government initiatives in Europe and the United States', Government Information Quarterly, 24 (1), pp. 89-101.*

#### \$679 2002 MML

##### *e-government IM model*

Government departments/agencies and local government need an integrated information management solution to meet the requirements of 'modernising government'. Model presented.

*Kirkman-Page, J. (2002) 'Creating an 'information management' solution', Records Management Bulletin, (109), pp. 13-14, 16.*

#### \$1392 2007 HHH

##### *IBM Technology Adoption Program*

Abs: "the IBM Technology Adoption Program (TAP), an effort by its technology and innovation team to formalize its innovation management discipline. ... focusing on three key areas: rallying the community, encouraging the technical investment supporting the community, and gauging the priority and value of new technology." "TAP is based on shifting the power of IT decision making into the hands of a

community of early adopters and innovators. In this way, TAP radically shifts how technology is identified, developed, evaluated, and transitioned". (p413)

*Chow, A. W., Goodman, B. D., Rooney, J. W. & Wyble, C. D. (2007) 'Engaging a corporate community to manage technology and embrace innovation', IBM Systems Journal, 46 (4), pp. 639-650.*

#### \*734 2005 HLL

##### *Data exchange standard*

[Abstract] - "Clinical Accounting InforMation (CLAIM) is a standard for the exchange of data between patient accounting systems and electronic medical record (EMR) systems. It uses eXtensible Markup Language (XML) as a meta-language and was developed in Japan. CLAIM is subordinate to the Medical Markup Language (MML) standard, which allows the exchange of medical data between different medical institutions." Chinese version developed.

*Guo, J., Takada, A., Niu, T., He, M., Tanaka, K., Sato, J., Suzuki, M., Takahashi, K., Daimon, H., Suzuki, T., Nakashima, Y., Araki, K. & Yoshihara, H. (2005) 'Enhancement of CLAIM (Clinical Accounting InforMation) for a localized Chinese version', Journal of Medical Systems, 29 (5), pp. 463-471.*

#### \$1420 2002 HMM

##### *Open Archival System*

p.1-1 "the International Organization for Standardization (ISO) Reference Model for an Open Archival Information System (OAIS). An OAIS is an archive, consisting of an organization of people and systems, that has accepted the responsibility to preserve information and make it available for a Designated Community. ... The term 'Open' in OAIS is used to imply that this Recommendation, as well as future related Recommendations and standards, are developed in open forums, and it does not imply that access to the archive is unrestricted." P.1-2 "This reference model does not specify a design or an implementation."

*Reference Model for an Open Archival Information System (OAIS). (2002) Consultative Committee for Space Data Systems [Online]. Available at: <http://public.ccsds.org/publications/archive/650x0b1.pdf>.*

#### \*1415 2001 HMM

##### *Interoperability in e-commerce*

INDECS (Interoperability of Data in E-Commerce Systems) . "The project focused on the practical interoperability of digital content identification systems and related rights metadata within multi-media e-commerce. It was an international effort intended to generate a formal structure for describing and uniquely identifying intellectual property (IP), the people and businesses involved in trading IP on the Internet, and the agreements people make about those online sales." "The <indecs> framework encompasses a metadata model, and a high-level metadata dictionary, principles for mappings to other schemas, and a Directory of Parties Proposal." Generic, "not to support any particular application, so that the standards and tools it leads to will be as powerful and durable as possible." put forward for formal standardisation. Rachel's note: This appears to have been incorporated into ISO Multimedia framework (MPEG-21). Certainly the aim was that INDECS would be used by other developers and standards.

*EU-INDECS (2000). INDECS: Interoperability of Data in E-Commerce Systems*

#### \$355 2001 HML

##### *IT architecture*

P.233 "The main barrier to effective information technology management lies in the need for applications to share information meaningfully, not in the reliability or



security of the technology. This is because of the variety of ad hoc systems deployed ... and the way these systems are variously configured and used. It is this set of interchange and integration issues which XML best addresses, when applied with systematic architectural rigour." p.234 "it is important to think of the information technology architecture for an institution ... as a single architecture." p.234 "\* Architecture. The organization of a system embodied in its components, their relationships to each other, and to the environment and the principles guiding its design and evolution. \* Model. Represents the system from a set of concerns or a focus (e.g. a viewpoint of a stakeholder) ... \* Stakeholder. Any customer, user etc; individual, team, organization with interests in, or concerns relative to, a system. \* View. A rendering or representation - a picture - of a system representing a set of concerns, or viewpoint, i.e. concerns of a stakeholder(s); ... Viewpoint. A pattern or set of rules for constructing a view of an architecture for a specific stakeholder or domain". Viewpoints comprise: Business viewpoint; Data viewpoint; Systems viewpoint; Deployment viewpoint; Technology viewpoint.

*Gardner, J. R. (2001) 'Information architecture planning with XML', Library Hi Tech, 19 (3), pp. 231-241.*

## 6.2 RM Standards, Frameworks, Architectures, Models

covers: ERM architectural models; MoReq; DoD ERMS requirements; e-records functional requirements

### \$1365 2008 HMM

#### *ERM architectural models*

p.29 "all ERM products perform approximately the same functions. Their true differences lie deep within their design - in their architecture. Understanding those differences can inform ERM software selection decisions, but - more importantly - it can affect an organization's overall strategy for managing electronic records because a product's architecture will help determine what is possible, at what cost, and in what timeframe." 4 components of ERM software: e-records, metadata, classification scheme, retention rules. 4 architecture models to describe current ERM products. (1). Single repository model. All components kept within the ERM software. Records and metadata have to move out of original applications into the ERM software. Therefore become inaccessible and unsearchable by original applications. ERM software may have poorer search and security. (2). Replicated model. Classification scheme and retention rules in ERM software. Records and metadata replicated in both ERM and source applications. Effort to keep them synchronised, risks of version problems. (3) Catalog model. ERM contains classification scheme and retention rules. Records kept in original source application but metadata copied into ERM. Synchronisation problems. Metadata updates in ERM will lag behind that in source applications. (4) Delegated model. Records and metadata stay in source applications. ERM acts as an engine to associate the classification scheme and retention rules with the records. Source applications must be able to interface with the ERM. Range of issues including IT Issues - Size/scalability -Application integration - ERM system programming - Record/metadata synchronization - Application programming p.34 "the most effective selection approach is usually to minimize the ... very difficult ... issues, not to maximise the ... easy ... ones. This would lead most organizations to choose the delegated model."

*Gable, J. & Gemmer, B. (2008) 'The Importance of Architecture in ERM Software Selection', Information Management Journal, 42 (1), pp. 28-35.*

\$1414 2008 HMH

*MoReq*

Model Requirements For The Management Of Electronic Records. Update And Extension, 2008. Prepared for the European Commission by Serco Consulting. functional requirements for the management of electronic records by an Electronic Records Management System (ERMS). Generic. Audience includes ERMS suppliers and developers: to test ERMS solutions for MoReq2 compliance. Includes a testing framework and an XML schema. The testing framework will allow software to be tested for compliance with the MoReq2 requirements.

*MoReq2 – Model Requirements Specification for the Management of Electronic Records. (2008) [Online]. Available at: <http://www.moreq2.eu/>.*

\$695 2002 HML

*MoReq*

Original version of MoReq a generic specification for ERMS, developed for the EU. RM profession still coming to terms with nature of ERMS; MoReq wavers between two views: (1) ERMS consists of EDMS with add-ons; (2) ERMS a separate system to capture and manage transactional records from business applications. The MoReq specifications, however, address the former option more convincingly than the latter.

*Cain, P. (2002). Model requirements for the management of electronic records (MoReq): a critical evaluation. Review of Fresko, M. & Waldron, I., Model requirements for the management of electronic records (MoReq). Records Management Journal. 12: 14-18.*

\$1416 2007 HMH

*DoD ERMS requirements*

DoD 5015.02-STD Version 3 April 25, 2007. Electronic records management software applications design criteria standard, US Department of Defense.

*JITC (2007) Design criteria standard for electronic records management applications (Version 2). Joint Interoperability Test Command [Online]. Available at: <http://jitc.fhu.disa.mil/recmgt/p50152stdapr07.pdf>.*

\*1401 2002 MHH

*E-records functional requirements*

List of functional requirements for e-records based on primary research by Indiana University.

*Requirements for Electronic Records Management Systems (ERMS). (2002). Draft document 4/19/02. Indiana University*

## PRESERVATION

### 7 Long Term Storage of E-records / Preservation

covers: retention / storage of patient data; email archiving; archiving of personal e-records; archiving and preservation of e-records; database of file formats; TNA's preservation strategy for e-records; case study of future proofing e-records; ERMS principles for retention; literature review of digital preservation; preservation of e-texts; Preservation Complexity Scorecard; case study of an e-archive; preservation of digital information; European national archives

Key issues arising from the literature:

- Are there any preferred approaches / methods / technologies?
- Note historical development – articles range from 1997 to 2007

#### \$1350 2007 MML

##### *Retention / storage of patient data*

Various electronic tools have been in use in the medical field for decades, but data implications still not well understood, especially as concept of 'lifetime' EHR has developed. Such a record will include contextual data as well as basic patient data. Questions as to what has to be kept, what can be discarded, what sort of access is required, where it is all to be stored, remain unanswered. No proven long-term solutions currently available. Contrast between 'best practice' proposals in archival/library and healthcare areas. Former favours regular migration of 'born-digital' material, but with consequent lengthy and frequent migration operations which disrupt service. Latter recommends two-level hierarchy – first, store on tapes or disks for c3 years; second, use microfilm for long-term back-up "with the ability to 'reactivate' the record in electronic form when needed" [p430].

*Scott, R. E. (2007) 'e-Records in health - Preserving our future', International Journal of Medical Informatics, 76, pp. 427-431.*

#### \$316 2006 MMM

##### *Email archiving*

Implementing email 'archiving' technology. 'Archiving' means here 'offline storage' but with retention management. People have different ways of identifying what email to retain– achieving this with automated archiving criteria needs to be comprehensive and "only true forensic analysis solutions" can do this (p66). Gives a 10-step implementation approach.

*Hunt, D. (2006) 'Compliance or e-policy: meeting e-mail retention objectives without compromise', Information Management and Technology, 39 (2), pp. 65-67.*

#### \$522 2006 MML

##### *Archiving of personal e-records*

Personal rather than corporate electronic records. There are very few guidelines for libraries dealing with electronic texts and artefacts acquired from individuals. Personal digital materials present major problems compared with their physical equivalent: they come in a variety of hardware and software, often obsolete. One approach is to transfer all the files to a digital repository and convert them to a single format, for instance using XML; but this copy is not the same as the original, which must also be kept. Web-based material presents another problem – how would a

library acquire items on a website, or blogs? Is it enough to provide a portal to these site, or should material be copied to a repository's own site and, if so, at what stage or how often? Sophisticated systems will be acquired to manage access levels, on top of the general question of providing search and display facilities for the user. UK Paradigm Project, carried out by Oxford and Manchester universities on the electronic personal papers of a number of politicians.

*Burrows, T. (2006) 'Personal electronic archives: collecting the digital me', OCLC Systems and Services, 22 (2), pp. 85-88.*

#### \$427 2004 MMM

##### *Archiving and preservation of e-records*

Issues involved with the archiving and preservation of electronic data. P.3 "To access a digital record requires the interaction of various items of hardware and software, combining to present the record to the user, typically on a computer screen. ... the record itself is this presentation or rendition of the information to the user ... Preservation of an authentic digital record means that we preserve the ability to present the information to the user in such a way that it passes on the message intended by the creator of that record." p.3 "A digital archive is a managed collection of digital records." Not just backing up. The archive must address the issue of evidence, e.g. metadata, digital signatures etc. Technology for digital archives comprise storage medium, hardware and software. Storage and hardware have finite lifetimes. P.4 "The biggest obstacle to digital preservation is changes in software, both in terms of operating systems and application software." Solutions: hard copy, museum of old technology, emulation, migration, standardisation: formats, e.g. use of XML, virtual machines. EDMS/ERMS not complete solution: handle records on short to medium term, but can't handle well large volumes of records, e.g. lab data, and not designed for long-term preservation. Use a system with a modular architecture to be more flexible and to cope with change and updating. And back it up/duplicate it for security. Organisations need to tackle the issue of digital archives.

*Roberts, W. (2004) 'Long term preservation of electronic information', Records Management Bulletin, (123), pp. 3-6.*

#### \$674 2004 MLL

##### *Database of file formats*

p.21 TNA's "PRONOM, a Web-enabled database of information on file formats and their technical dependencies, including hardware, software and operating systems." This type of information is crucial for long term preservation.

*Darlington, J. (2004) 'The PRONOM file format registry', Records Management Bulletin, (119), pp. 21-22.*

#### #119 2003 MLM

##### *TNA's preservation strategy for e-records*

Modernising Government white paper target: by 2004 all newly created public records will be digitally stored and retrieved. Article covers how TNA approached the task of managing these records. Physical storage costs in 2002 £142million. Potential savings if in future most of records are digital. Delivering a paper document to a reader costs £6, doing it via the Internet costs 13p. Different preservation issues for different types of records (passive and active (i.e. with embedded computer logic like macros, Flash, links etc.) files). For some time TNA unlikely to be receiving files from ERMS as these (i) do not exist in the source departments to any great extent and (ii) files are any case usually 30+ years old. Do receive records from public enquiries immediately after report produced, and these can include very challenging records, e.g. computer generated models. Issued guidance in 2002 about preservation of websites. p.118 "Government websites were becoming the prime means by which government spoke to the people, often in a direct and personal

manner. ... At the same time, increasing numbers of transactions were being conducted between the government and its citizens through the Internet." TNA p.118 "faced two issues: which websites to select and how to acquire them." Selected 50 core sites. Contract with Internet Archive to acquire the sites using its Wayback machine. p.119 "The digital archiving world seems to be divided into two competing theologies: those who believe in emulation and those who believe in migration." TNA in middle. Passive files: use migration, but sparingly (only when absolutely necessary). Active files: will have to develop emulations. But with very specialised records may only be able to supply users with bitstream versions. TNA working on developing standards in this area. p.119 "We have agreed a records management metadata standard. This has been incorporated in the e-government metadata standard (e-GMS2) and we are working to extend that to cover preservation and sustainability. Current electronic records management systems use in government need to conform to the records management standard and an XML version is being developed which will ensure long-term interoperability and the possibility of future migration." TNA has p.119 "developed a tape-based digital archive using Filetek StorHouse storage management software. Now looking at options for delivering digital records to their users.

*Thomas, D. (2003) 'Digital preservation at the National Archives', Information Management and Technology, 36 (3), pp. 116-119.*

#### #121 2002 HMM

##### *Case study of future proofing e-records*

Case study at State Records Authority of New South Wales on eRM. Produced guidance 'Future proof, Ensuring the accessibility of equipment/technology dependent records'.

*Findlay, C. (2002) 'Future proof: ensuring the long-term accessibility of technology-dependent records', Records Management Journal, 12 (3), pp. 87-93.*

#### \$700 2000 HMM

##### *ERMS principles for retention*

Fourteen principles "provide a translation of the traditional principles associated with records retention from visible media to electronic recordkeeping environments" [p40]. (11) Be highly selective about appraising electronic records as 'permanent' Electronic media, hardware and software do not have longevity of paper or microfilm and use of latter usually more practical for, long-term retention. However, e-records whose archival value depends on continued capacity for electronic manipulation would need to be retained in digital form. (12) Use COM or COLD solutions for lengthy retention requirements. Try to use stable and durable media for those records earmarked for long-term retention in digital form – best options Computer Output Microfilm (COM) for long term or Computer Output to Laser Disk (COLD) for medium term.

*Stephens, D. O. (2000) 'Electronic records retention: fourteen basic principles', Information Management Journal, 34 (4), p. 38+ (11 pages).*

#### \$37 1999 HML

##### *Literature review of digital preservation*

Conclusions include: Potential solutions are: migration, emulation and standardisation. P. 375 "However, these have proved to be inadequate to the task as they fail to fully preserve the dynamic, interactive, multidimensional and ephemeral nature inherent in digital documents." P.375 "... digital documents are causing a paradigm shift ... it is no longer possible to consider or treat these documents as single, self-contained, self-referential, fixed in time and space objects." Networking/Internet may provide solutions in the future.



*Parkes, M. (1999) 'A review of the preservation issues associated with digital documents', Australian Library Journal, 48 (4), pp. 358-377.*

#### #219 1999 HML

##### *Long-term preservation of e-records*

ERM in the Netherlands. 1991 Dutch General Auditor's Office MLG report on long-term preservation of e-records, resulting in the Dutch Digital Longevity Programme. 1995 the programme wrote a report, 'The end of the paper era' which stated that the problem was so large and complex that there was no single technical solution for all situations.

*Stephens, D. O. (1999) 'Archives and records management in the Netherlands', Information Management Journal, 33 (4), pp. 64-66, 68-69.*

#### \$745 1999 MML

##### *Preservation of e-texts*

Overview of traditional textual scholarship. Pre-digital texts have survived through their durability. Electronic records already outnumber these materials, but much greater risk of loss. Proliferation of electronic publishing brings problems comparable to those of printing revolution in 15C Europe. Paper can be left for years before processing, but ERs need to be migrated through hardware and software. Question is, how is this to happen? Preservation also important. Forms of electronic storage more economical, but risks connected with (1) protecting data from alteration and (2) obsolescence. Addressing (1) (e.g. through encryption or watermarking) incurs not insignificant costs. (2) poses an even greater challenge – there are already earlier electronic formats (e.g. wire spool audio recordings, punch-cards) in libraries and archives for which no equipment to play or decode them. "Most people involved in the technological development have paid little attention to what has come before" [p804]; problem accessing earlier versions of the same software, let alone cross-platform. Will archivists have to maintain hardware and software museums to cover all their collections? Possible solutions include Jeff Rothenberg's idea of 'bundling' ERs with software, combined with emulation to make the collection self-contained and accessible to future hardware.

*Zeidberg, D. S. (1999) 'The archival view of technology: resources for the scholar of the future', Library Trends, 47 (4), pp. 796-805.*

#### \$715 1998 HLL

##### *Preservation of e-records*

Descriptive of the state of play of e-records at the time. Not feasible to maintain museums of hardware and software – expensive and too many proprietary systems. Emulation and migration the only viable answers; migration is expensive and records may need re-appraisal on each successive migration. Necessary to appraise records at creation to ensure that records reflecting policies and functions preserved and stored on appropriate media. In 1990s, greater value placed by commentators on evidential than informational aspects of records. Schellenberg's idea of evidentiality depended on indivisibility of content and context, not viable in ERs. ERs easily modified, re-used, proliferated, can be interactive and dynamic. Whichever approach taken, essential that records (not just decontextualized data) are preserved in an ERKS. Many current proprietary electronic IM systems lack this, and up to records and information specialists to co-operate to ensure proper functionality. Records professionals need to demonstrate that corporate memory depends on good recordkeeping to secure agreement to RK functional requirements in systems. Conclusion: Preservation demands integration of descriptive metadata with ERM systems. Need to be able to identify records for migration and check media for degradation.

*McInnes, S. (1998) 'Electronic records: the new archival frontier?', Journal of the Society of Archivists, 19 (2), pp. 211-220.*

#### \$38 1998 MML

##### *Digital preservation*

Conclusions: Shift design of information systems to address p.94 "long term requirements for data migration and technology upgrade." p.94 "It has to be accepted that there will be continued reliance on paper and print for long term retention and accessibility." p.94 "Conclusions \* Long term archiving is more expensive than we thought. \* When will Bill Gates devote his wealth to good works to freeze technology? \* IT industry should study the downside of leap-frogging technologies, standards, and formats."

*Ashworth, J. & Mayon-White, B. (1998) 'The people's memory: the challenges of long term archiving', Information Technology and Public Policy, 16 (2), pp. 92-94.*

#### \*42 1997 HHM

##### *Preservation Complexity Scorecard*

Preservation Complexity Scorecard for an object helps identify the required preservation approach.

*Bennett, J. C. (1997) A framework of data types and formats, and issues affecting the long term preservation of digital material. British Library. Research and Innovation Report; (50) 1997, 46pp. ISBN 0712333126.*

#### #1328 1997 HHM

##### *Case study of an e-archive*

Describes & evaluates the electronic archive developed by Pfizer Central Research (pharmaceutical company). "the key factor in planning a migration process is in the successful identification of sources software applications and version numbers" (p303). One driver for migration is need to recall and re-examine data created previously as part of the 'evergreening' process (finding new/extended indications for compounds) to maximise R&D investment. Users are also provided with a mechanism to associate software file extensions with archived files. Software application information is therefore collected as part of the metadata description for each file. This is a critical component of our migration strategy. "we believe that users have a responsibility to initiate migration strategies by informing Records Management and Computing Services before systems or software are no longer supported, have been retired or get upgraded. In our environment users are often best placed to initiate these activities. ... A key vehicle in this process will be the retention schedule, which is not simply a tool to schedule the destruction of records. It could also be used to schedule software versions." (p305) "the key factor in migrating electronic archives will remain people." (p307)

*Binns, S. E., Bowen, D. V. & Murdock, A. (1997) 'Migration Strategies within an Electronic Archive: Practical Experience and Future Research', Archives and Museum Informatics, 11 (3), pp. 301-307.*

#### \$1329 1997 HMM

##### *Preservation of digital information*

In 1996, a task force commissioned by the Commission on Preservation and Access and the Research Libraries Group issued a report on preserving digital information. This stimulated research ideas and questions. "The underlying assumptions behind the research questions posed below are that exact replication of digital objects is rarely feasible or cost-effective and that archivists must accept some loss of information when migrating digital information from one generation of technology to the next. ... Systematic research should be conducted to define acceptable levels of

information loss during migration and to identify a set of minimal record attributes, which if not retained, would make investments in preservation pointless. These requirements will vary by format and by the circumstances of creation and use of the digital objects.” (p288) “Systematic research on migration should also examine the physical attributes of digital objects. Migration of digital objects with color encoding, compression, and encryption are examples of extremely complicated processes that require complex algorithms, software routines, and in some cases, specific hardware”. Identified 8 possible migration approaches: transfer to paper or microfilm; store in software-independent format; retain in the native software environment; migrate to a system that is compliant with open standards; store in more than one format; create surrogates; save the software needed for access and retrieval; develop software and hardware emulators. “The goals of migrating legacy systems are not entirely consistent with archival objectives because organizations often want to move an entire information processing environment from an aging system architecture to a new one. Generally organizations want to migrate not only data (or records) but also to retain the processing capabilities of the system. The recordkeeping community has not defined which functionality is necessary to retain and which should be disabled in an archival system. It goes without saying that the holdings of an electronic archive should not be manipulable by its users. “ (p289) “raises a series of specific questions about the relationships between electronic records and other digital objects. Are the requirements for long-term preservation of records fundamentally different from the requirements for other types of digital information? If so, how are they different? Do electronic records require fundamentally different preservation strategies from other types of digital objects, or are they a subset digital information that can be maintained in common systems provided that a few additional requirements are met? Is it feasible, useful, and cost-effective to apply the requirements for preserving electronic records (metadata standards, process controls, etc.) to other types of digital objects?”

*Hedstrom, M. (1997) 'Research Issues in Migration and Long-Term Preservation', Archives and Museum Informatics, 11 (3), pp. 287-293.*

#### \$709 1997 HMM

##### *European national archives*

Status of ERM in Europe at the time of writing. Largely covering work of the national archives. Differences between the countries, caused by factors such as different legal systems, different organisational structures and different views on RM and archives. This affects how they deal with e-records. Response is patchy and low key. P.206 "There is also a gulf between the major theoretical initiatives, mainly from North America, and the practical implementation of the results." P.209 "Specific legislation covering electronic records usually dates from the 1980s and 1990s." Data protection and privacy legislation is having a particular impact; also FoI. Likely to be greater harmonisation of such laws in the EU, and this will impact on eRM of archives. Resources devoted to eRM programmes modest and not often include IT specialists. Only 5 states had accessioned significant quantities of e-records. Most records were structured files usually from mainframe systems, and storage media typically nine track magnetic tape. Access restricted by time delay requirements, and many charge fees. No internet access. Access usually copy of file or printout. Research in Nordic countries between 1993/6 to look at access to e-records in public archives. p.211 "The conclusions were that the flat file formats should be separately stored as the 'original record', that online access was probably too expensive in access times, that DAT (digital audio tape) offered a good long term medium and that contracting out physical storage of electronic records was not viable" It appears that European archives have so far only accessioned government databases. P.214 "Future developments in electronic records in Europe must take account of four major factors ... The first is an increasingly supra-national legal system, the second is increasing

amounts of data flowing across national borders, the third is the conflicting demands of privacy and oneness, and the fourth is the spread of privatisation of state functions. These new conditions pose a challenge for increased co-operation across national boundaries, between the public and private sectors and between the different information professions."

*Mackenzie, G. (1997) 'Electronic records: the European dimension', Records Management Journal, 7 (3), pp. 205-216.*

## PEOPLE ASPECTS

### 8.1 Studies of User Behaviour / User Acceptance and IT Systems

covers: use of computer-based information kiosks for e-government; qualitative study of mobile working and use of mobile technologies on trains; qualitative study of end-user concerns about content sharing in social online networks and communities; innovation potential of ICTs in the public sector; use of EDRMS in English central government; use of the e-health record; user acceptance of an anaesthesia information management system; user acceptance of e-medical records system; ethnographic study of an organisational support system

Key issues arising from the literature:

- Understanding of how people actually use IT systems can be used in design and implementation of such systems

#### \*1345 2009 HHM

##### *Use of computer-based information kiosks for e-government*

Conclusions from research: Address citizens' behavioural intention (BI) and facilitating conditions (FC), make use of value-adding properties to cultivate performance expectancy (PE). Need to increase user-friendliness to address effort expectancy (EE) factor. Significance of social influence (SI) means that people will be more likely to use kiosks if others in their circle do so: means government should promote to early adopters who will then influence their groups. FC: provide resources in terms of accessibility, visibility, suitable environment/positioning, advice centres, lack of cost, alleviation of digital divide. Moderators showing significant effects on BI and use - PE had greater influence for men than women, SI for women than men. Govt could attract early female adopters through "content attractive to females" (p.163). EE stronger for older than younger, showing user-friendliness and education and important in attracting older users.

Wang, Y.-S. & Shih, Y.-W. (2009) 'Why do people use information kiosks? A validation of the unified theory of acceptance and use of technology', *Government Information Quarterly*, 26 (1), pp. 158-165.

#### \*1385 2008 HHH

##### *Qualitative study of mobile working and use of mobile technologies on trains*

p.913-4 "A key finding of the paper is that the 'anytime, anywhere' rhetoric perpetuated by the advocates and manufacturers of mobile technologies significantly under- estimates how contextual factors (such as connectivity, space constraints, noise levels and concerns about sensitive conversations being overheard) constrain the work tasks that mobile workers can carry out in locations such as train carriages. But, importantly, another key conclusion of the paper is that mobile workers are not powerless victims of the contextual circumstances they find themselves in. However, in attempting to deal with such contextual constraints, they are required to undertake work in adapting either the technologies they have, or the context they inhabit, to make it amenable to their needs. Examples of such adaptation work range from choosing where to sit (and how to organise baggage, technology and paperwork) to taking account of mobile phone network coverage in planning what tasks to carry out when. Thus, in aspiring to achieve the 'anytime, anyplace' ideal, mobile workers travelling on trains are often required to undertake (sometimes significant levels of) preparatory, adaptation work, before they can even begin to attempt to carry out the



work task that is their ultimate objective."

Axtell, C., Hislop, D. & Whittaker, S. (2008) 'Mobile Technologies in Mobile Spaces: Findings from the Context of Train Travel', *International Journal of Human Computer Studies*, 66 (12), pp. 902-915.

\*1386 2008 HHH

*Qualitative study of end-user concerns about content sharing in social online networks and communities*

Qualitative study of p.287 "end-user concerns regarding their contributions of multimedia content in social online sharing networks and communities." p. 296-7 "While the technical aspects of digital goods (i.e. its replicability and transferability) have presumably contributed to the notion of provisions in networks and communities as 'zero-cost' and non-rival, this paper has shown several indications of how the convergence of social networks and rich media affects end-user concerns with content provision. Firstly, if we lift the perspective to include, not only technical resources, but also the social layers of goods exchange, we get a more diverse view of sharing practices. It seems a risk to focus solely on the often presumed limitless, technical dimensions of digital goods. Social resources, particularly for an individual end-user, are not limitless. They use a different scale and unit of analysis, which indeed guide provision. ... Second, by taking the perspective of gifting individuals in communities we note that from their point of view, the ability to exclude others is very important. ... Third, a circumstance which is perhaps more prevalent in peer-to-peer networks - it depends on what type of digital content is referred to. Files, for example, are non-rival (can be copied without any party losing the content), but bandwidth and harddrive space cannot. Arguably, the provision of bandwidth and harddisk space is more accurately discussed as services rather than goods. Still, while bandwidth and harddisk space may at times constitute gifts themselves they are often also the technical means for gifting. That is, even for gifters of files (which are technically non-rival), the means for gifting them are not - they are scarce and thereby rival."

Skageby, J. (2008) 'Semi-public End-user Content Contributions - A Case Study of Concerns and Intentions in Online Photo-sharing', *International Journal of Human Computer Studies*, 6 (4), pp. 287-300.

\$1370 2007 HMM

*Innovation potential of ICTs in the public sector*

p. 105 "2.3. The innovation potential of ICTs. Technological developments can stimulate public innovation ... The added value of ICTs in the context of understanding public innovation can be understood from three perspectives. One perspective is the technological one. ICTs are perceived a set of tools or instruments that can be use to achieve specific goals. ... the capacities of ICTs to process increasing quantities of data and communications in a speedier and more intelligent way so as to achieve both efficiency and efficacy benefits. The second perspective focuses on the organizational qualities of ICTs to establish new ways to redesign the existing information, communication and working processes and relationship within and outside public administration, e.g. in terms of access and transparency. The idea of connectivity, enabling people to share information and communicate with each other at any time and in any place ... The third perspective is the conceptual perspective, showing us that the technological and organizational attribute of ICT can be used as a set of inspiring and conceptual lenses to look at existing practices or to develop new practices." p. 106. "3. Research into the effects of ICT in public administration shows hardly any general effects and changes. Changes are rather specific and context-driven. Effects are limited to the specific setting in which ICT is introduced. ... The most important reason why these effects are limited and context-driven is that the introduction of ICT in public administration is a social, value-driven intervention in a policy and organizational network, which influences the position,

interests, values and information) domains of the involved stakeholders. Thus, the introduction and use of ICT is not a neutral but a political intervention in a specific context. Choices with respect to ICT influence the access, use and distribution of information and communication and information relations and patterns between the actors in the policy network, and thus the subsequent effects that occur. The effects of ICT-driven innovations in public administration can only be understood sensibly by looking at the co-evolving interactions and relations between a diversity of actors, their practices values and technology within a specific and local (hence unique) environment. ... Research shows that the use of ICT in the public sector very often strengthens the existing frames of reference, power relations, structures, processes and positions within a policy sector. ... the innovative potential of ICT has not been fully exploited. An internal, technology determined, perspective on innovation prevails. ICT-driven innovation is primarily focused on the improvement of information processing. Efficiency gains (which have been substantial) have been the legitimising driver for this kind of process innovation, leading to a certain one-sidedness. Innovation strategies have been primarily defined as strategies to improve the 'machinery of government', ... in order to build a 'managerial state' ... a rather mechanistic public innovation agenda has emerged in many countries ... ICTs are also primarily be perceived a neutral set of tools, which can be used to (re)-design the cogwheels within the machinery of government. ICT-driven innovation has hardly been related to external developments and challenges ... An external, societal orientation is lacking. Thus, the potential of ICT-driven innovations in the public sector can be enhanced so as to provide a richer public innovation agenda, if public administration is able to connect its own, internal managerial innovation agenda to the broader societal agenda."

*Bekkers, V. (2007) 'Modernization, Public Innovation and Information and Communication technologies: The Emperor's New Clothes?', Information Polity, 12 (3), pp. 103-108.*

\*524 2006 MHH

*Use of EDRMS in English central government*

Qualitative results of questionnaire survey on use of EDRM by English central government organisations in support of Fol. p.21 "Recommendation 2: Organisations should ensure that all technology implementations have sufficiently-experienced project managers." p.21 "Responses were openly critical of the state of the EDRMS product and supplier market" p.21 "The limited size of the EDRMS field is further complicated by Government-set compliance requirements for products being sold internationally." p.21 "Recommendation 3: For all future cross-sector technology implementations, regulatory impact assessments should include a full consideration of the technology market place." p.21 "Recommendation 4: Where similar time-bound exercises are required in future, OGC should be immediately tasked with establishing a specific procurement framework to increase choice of both product and system integrator." p.21 "Recommendation 5: Future cross-sector technology implementations should be staggered across organisations to mitigate against a run on the market." p.22 "Recommendation 7: For future exercises, the government must ensure that a single organisation has explicit responsibility for advising on technology acquisition and implementation." P.22 "a number of indications ... that suggested many organisations didn't treat Fol and EDRMS as business issues, but were content to let the (mostly) information and IT specialists take the lead." p.22 "Recommendation 9: Organisations must ensure that project teams and governance arrangements for future technology projects have adequate business-user involvement."

*Greenaway, N. (2006) 'EDRM: acquisition and implementation across central government', Records Management Bulletin, (134), pp. 19-22.*

#653 2004 HHM

*Use of the e-health record*

Case study of work in a medical unit in a major metropolitan hospital. “the electronic health record, whether institution-based or lifelong, is often conceptualized in the same way as the paper-based record – as a passive information repository. Such a conceptualization of the record as repository deletes by omission another equally valid conceptualization of the record at work in the practical delivery of healthcare.” (p292) Study looked at “how clinicians ... re-presented and augmented clinical information to support their own roles in the delivery of care for individual patients. In particular, it distinguishes between the archival patient record [patient-centric] and the working patient record, of which the patient chart is but a part, that is locally evolved, maintained and used to support clinical practice. Such accounts are important for the future of technology in healthcare because any move to introduce technology radically impacts the very nature of that care. If we don't have better understandings of the richness and complexity in the practical accomplishment of work, then we won't be able to co-evolve the design of systems that will fit in with work and the design of new working practices that will take advantage of technology.” (p292) Conclusions: “Tailorability and flexibility can be considered at a level of granularity that takes account of the record at work, not just the archival record, and that supports the people on the ward floor who do the local processing and re-presenting of information to support their own practical engagement in direct patient care.” (p301)

*Fitzpatrick, G. (2004) 'Integrated care and the working record', Health Informatics Journal, 10 (4), pp. 291-302.*

\*1177 2003 HHH

*User acceptance of an anaesthesia information management system*

Results of questionnaire survey user acceptance of an anaesthesia information management system in a German hospital 5 years after implementation. Results were that: “users considered that automated data management led to better documentation and they did not want to switch back to manual documentation on paper. (p970); they had different opinions on error reduction using e-data processing; many were concerned about adequate data protection & disagreed on efficiency of the training programme. No evidence of savings on data entry time but could be due to lack of integration with other patient information systems. NOTE (p971): “systems administrators and users have different points of view. Administrators focus primarily on clinical data processing of which documentation is only a small part. In the context of a more efficient processing of data for statistical purposes the time saved by online data collection compared to conventional manual recording is most important. For the documenting medical staff this is of secondary importance, since they have to bear the additional burden of data entry.”

*Quinzio, L., Junger, A., Gottwald, B., Benson, M., Hartmann, B., Jost, A., Banzhaf, A. & Hempelmann, G. (2003) 'User acceptance of an anaesthesia information management system', European Journal of Anaesthesiology, 20 (12), pp. 967-972.*

\*625 2001 HHH

*User acceptance of e-medical records system*

People issues (user acceptance) of e-medical records system. “longitudinal study into primary care practitioners' views of an electronic medical records (EMR) system for maternity patients” (p103) in a New Zealand hospital context. Results include: low level of confidence in EMRs; use of system dependent on personal costs (time & money); would need to demo benefits to them & patients before they would use; less keen to use if only beneficiary were the organisation (interesting!) Perceived ease of use & usefulness were both very important; system's ability to improve patient care &

reduce or simplify respondents' work were more important than admin/legal benefits. security – very important to be confident about data security & accuracy; iv) use of info stored – to be used for patient care but less certain about use for audit, research or teaching, admin or finance. 82# "indicated that in some circumstances they would only enter limited and incomplete information into the system" and pass sensitive information by phone or in person (p105). Consistence with other research findings shows that "end-user participation in the initial system design would incline them to use the system" (106). "responses highlight the importance of considering not only the technical characteristics of the system, but also organizational politics and professional loyalties when implementing information systems."

*Handy, J., Hunter, I. & Whiddett, R. (2001) 'User acceptance of inter-organizational electronic medical records', Health Informatics Journal, 7 (2), pp. 103-107.*

#### \*39 1999 HHH

##### *Ethnographic study of an organisational support system*

Ethnographic study in an Australian University. Use of an organisational support system (OSS) based on email and intranet and its effect on consultative decision making processes. P.25 " New information and communication technologies, such as e-mail and Intranet, that provide new channels for communication and interaction, introduce new and uncertain variables in the power equation." There seemed to be a subtle change towards a more democratic and participative organisation.

*Cecez-Kecmanovic, D., Moodie, D., Busuttil, A. & Plesman, F. (1999) 'Organisational change mediated by e-mail and Intranet: an ethnographic study', Information Technology and People, 12 (1), pp. 9-26.*

## **8.2 Usability of IT Systems**

covers: use of computer-based information kiosks for e-government; e-health record system; SMS in banking; interaction approaches of Web applications

Key issues arising from the literature:

- Usability should be a key design criteria for IT systems

#### \*1345 2009 HHM

##### *Use of computer-based information kiosks for e-government*

Conclusions from research: Need to increase user-friendliness to address effort expectancy (EE) factor. EE stronger for older than younger, showing user-friendliness and education and important in attracting older users.

*Wang, Y.-S. & Shih, Y.-W. (2009) 'Why do people use information kiosks? A validation of the unified theory of acceptance and use of technology', Government Information Quarterly, 26 (1), pp. 158-165.*

#### \*#1383 2008 HHH

##### *e-health record system*

Paediatric hospital system in US using a commercial electronic health record (HER) system. p.719 "assess the usability of the EHR's functions in order to identify configuration and design changes that could improve the system's usability." p. 720 "Because a commercial system was used, parts of the system interface and functionality are dictated by the vendor's base product, and thus out of the immediate control of the implementation team." p. 722 "a total of 134 potential usability issues. While most of the identified issues were expected to have a minor impact (57#), 13 (10#) of the identified issues were anticipated to have potentially severe

consequences." p.723 "Fifteen percent of issues were related to consistency. ... Thirteen percent of issues were related to users being unable to notice or appropriately use a control to complete a task or perform an action. ... Ten percent of issues were related to limited flexibility and/or efficiency in completing steps or tasks. ... Seven percent of issues centered on confusion over what next step the user should take." p. 726 "The fact that the client is dependent on the vendor to make some of the changes needed to improve system usability highlights the importance of developing a good relationship with the vendor and a two-way dialog about how usability of the system can be improved in the long run. In fact, this dialog on usability should start before design, during the package selection. When selecting an EHR vendor, healthcare providers should include criteria related to clinician feedback on system usability and the vendor's capabilities and processes for evaluating and continually improving the usability of their product. If vendors receive usability feedback from a range of clients and potential clients, they have better data on the importance of and priorities for enhancing usability in future releases. EHR customers should encourage more vendors to utilize these user-centered design and HCI evaluation tools and techniques like the one presented here."

*Edwards, P. J., Moloney, K. P., Jacko, J. A. & Sainfort, F. (2008) 'Evaluating Usability of a Commercial Electronic Health Record: A Case Study', International Journal of Human Computer Studies, 66 (10), pp. 718-728.*

\*1387 2008 HHH

*SMS in banking*

SMS (Short Message Service) in banking service: "The study ... compares the usability of three types of message input format: Abbreviations, Numbers and Free-Form as alternatives for a Pull [customer initiated] SMS banking service. .../ The Abbreviations and Numbers versions of the service performed to generally equal levels in all metrics. Free-Form performed the worst as participants took significantly longer to complete tasks and it received significantly lower overall questionnaire and quality scores for satisfaction. The older age group found all three versions in general to be less usable than the younger age group." (abs)

*Peevers, G., Douglas, G. & Jack, M. A. (2008) 'A Usability Comparison of Three Alternative Message Formats for an SMS banking Service', International Journal of Human Computer Studies, 66 (2), pp. 113-123.*

\*972 2004 HMM

*Interaction approaches of Web applications*

Abs "usability of two interaction approaches used by Web-based application software. ... most users regarded the interview-based approach as a more desirable feature for a complex system. ... the reputation of the software applications and its producer, the ease of use of the software, and software support were important determinants in the selection of Web-based software. By contrast, visual presentation styles and graphics were unimportant factors." Usability of such systems is more important than traditional systems.

*Huang, A. H. & Post, G. V. (2004) 'Usability of Web-based systems - A comparison of two interaction approaches', Human Systems Management, 23 (4), pp. 193-201.*



### 8.3 Digital Divide

covers: use of computer-based information kiosks for e-government; health information infrastructure in the US; *IT infrastructure and the developing world*

#### \*1345 2009 HHM

##### *Use of computer-based information kiosks for e-government*

Conclusions from research: Facilitating conditions (FC): provide resources in terms of accessibility, visibility, suitable environment/positioning, advice centres, lack of cost, alleviation of digital divide.

Wang, Y.-S. & Shih, Y.-W. (2009) 'Why do people use information kiosks? A validation of the unified theory of acceptance and use of technology', *Government Information Quarterly*, 26 (1), pp. 158-165.

#### \$844 2007 MMM

##### *Health information infrastructure in the US*

USA: appointment in 2004 of "first National Health Information Technology Coordinator with a 10-year goal of creating an interoperable health information infrastructure that would ensure that most Americans have secure electronic health records (EHR), and healthcare workers have quick, reliable access to them." Highlights that some individuals may not have access to EHRs (either because their providers cannot afford the technology or they are in the lower socio-economic, older brackets.)

Valerius, J. D. (2007) 'The Electronic Health Record: What Every Information Manager Should Know', *Information Management Journal*, 41 (1), pp. 56-59.

#### \$727 1997 HMH

##### *IT infrastructure and the developing world*

Situation at time of writing. Now in 1997: nearly all documents in industrialised countries are created electronically, and developing countries are catching up. Changes more rapid in North America, but now happening in Europe and soon developing countries. IT infrastructure being donated to the developing world to deal with the digital divide.

Barry, R. E. (1997) 'Electronic records management...the way we were...the way we are: one man's opinion', *Records Management Journal*, 7 (3), pp. 157-189.

## LEGAL ASPECTS

### 9.1 Legal Issues / Regulatory Requirements

covers: e-health records, clinical/pharmaceutical systems, e-discovery, Web 2.0, email, e-communications, e-transactions in Australia, ERM in the US, ERM legal developments

Key issues arising from the literature:

- Establishing legal principles for e-records
- Legal practices lag behind technology

#### \$337 2008 MMM

##### *e-health records in the US*

US legislation for electronic health records (EHR) to promote their use. Technical barriers include: Restricted extent of 'safe harbor' – covers only IT software and services strictly associated with EHRs, not hardware and not software for ancillary functions (e.g. HR, payroll, billing).

*McGregor, F. (1998) 'Legal compliance issues on the digital area', Archifacts, (Apr 1998), pp. 40-50.*

#### \*1117 2006 MMM

##### *Pharmaceutical software in the US*

The validation of software (design) for use in a pharmaceutical GLP environment, as defined & required by the US FDA (Food & Drug Administration) and in compliance with its CFR 21 Part 11 rule on e-records and e-signatures. The latter places requirements for audit trails, e-signatures & authorised password control to assure data security.

*Matthijs, N., Dejaegher, B. & Vander Heyden, Y. (2006) 'Data-handling software for a GLP environment: Development and validation requirements', Lc Gc Europe, 19 (12), pp. 656-+.*

#### \$701 2001 HMM

##### *Clinical systems in the US*

US Food and Drugs Administration's (FDA's) Electronic Records/Electronic Signatures Rule 21 CFR 11 (Part 11). Looked at clinical research. (1) Large networked systems. Clinical systems tend to be large, complex and multi-functional, frequently sitting on mainframes or servers rather than locally. Variety of staff involved: large clinical d/b systems are interacted with by multiple staff, both users and systems / facilities support, sometimes at multiple locations. Security considerations: Large, cross-functional clinical systems need role-based access permissions and restrictions for different areas of the system. Large networked system has multiple entry points, making security more complex and expensive. (2) Lengthy data retention requirements. Systems in clinical environment tend to have a long life, used across many studies and programmes that can last for years in primary and continuation phases. Mandatory retention periods apply to some records, e.g. adverse drug experiences. Migration may be necessary with software/hardware obsolescence. (3) Increasing use of purchased software applications. FDA still expects end-user validation, even of off-the-shelf products – e.g., how the package fulfils defined business requirements, qualifications of the environment, etc. Software development methodology must have been documented

and quality-tested; purchaser responsible for ensuring that this has been done. Add-ons also to be taken into consideration. (4) Broader scope of covered systems. FDA Rule requires validation of any electronic system holding records required by regulations, not just those relating to data, adverse reporting etc – e.g., consent forms, policy documents, SOPs, records of meetings. Includes records captured by scanning or voice recording. Also covers activities such as monitoring. All systems, including small ones (e.g. Excel, Access) developed locally or individually, are subject to validation requirements. (5) Increased user base. clinical systems by far wider user base, including temporary staff, contractors, and patients. Has implications for training, support, access, and security. (6) Becoming paperless. With increasing likelihood of no paper documentation, mechanisms such as system redundancy need to be implemented to prevent data loss, and care taken with use of portable data-collection devices. (7) Identifying systems owners for cross-functional systems. "It cannot be stated enough that representation and involvement from the business end users are critical in a successful implementation of a validated system" [p728]. Part 11 compliance not the sole responsibility of IT/IM. Not always easy to determine system owner; high-level management sponsor and cross-functional project team key. (8) Delegation to external parties. It is necessary to ensure that the activities of external contractors / parties are validated in line with the sponsor's obligations and requirements.

*Olson, L. (2001) 'Electronic record challenges for clinical systems', Drug Information Journal, 35 (3), pp. 721-730.*

#### \$854 2006 HLM

##### *e-discovery*

Conclusions include that "extra care needs to be taken to preserve electronic data for anticipated or pending arbitration" (p15) which may include placing a litigation hold on routine recycling (of data storage media) or destruction.

*Warshauer, I. C. (2006) 'Electronic Discovery In Arbitration: Privilege Issues and Spoliation of Evidence', Dispute Resolution Journal, 61 (4), pp. 8-15.*

#### \$1367 2007 HMM

##### *Web 2.0 services and tools*

p.28-30. "6. Assessing the legal implications of vast amounts of information in scattered systems and databases. [Current legal rules pre-date Web 2.0 therefore need for court cases to establish precedents].

*Dearstyne, B. W. (2007) 'Blogs, Mashups and Wikis - Oh, My!', Information Management Journal, 41 (4), pp. 24-34.*

#### \$805 2005 MML

##### *Email*

Need to maintain emails as legal records.

*Martin, L. A. (2005) 'Emails and the Recordkeeping Obligations of Investment Advisers', Investment Lawyer, 12 (2), pp. 16-21.*

#### \$586 2003 MMH

##### *Email*

Email management. p.7 "An e-mail record (and its attachments) must be maintained in its original electronic format". p.8 "While maintaining only those documents that are relevant, organisations must manage e-mails as documents of records in order to meet legal and regulatory requirements.

*Datskovsky, G. & Moerdler, M. (2003) 'Solving the e-mail challenge: effectively managing e-mails as documents of record', Records Management Bulletin, (113), pp. 5-9.*

#### \$692 2001 HMM

##### *Email*

Two key US lawsuits on email record keeping. Summary of key verdicts: p.7  
"electronic versions of e-mail were records in their own right and that the existence of paper printouts did not invalidate their record status unless they included all significant materials contained in the electronic records. [such as metadata from headers etc., and receipt / usage data]". (i) p.12 "email technology can and does produce official records ... and arguments to the contrary - such as the continually cited telephone message analogy - will almost certainly lose in court." (ii) In practice not clear that people are printing out and filing email records. (iii) keeping paper versions is not adequate as a record keeping system for electronic records.

*Wallace, D. A. (2001) 'Electronic records management defined by court case and policy', Information Management Journal, 35 (1), pp. 4, 6-8, 10, 12, 14-15.*

#### \$436 2004 HMM

##### *E-communications*

Legal aspect of managing e-communications. Messaging and all other data captured electronically are treatable as records to the same extent as paper and other traditional media, and thus bring this data within the scope of existing laws affecting recordkeeping.

*Montana, J. C. (2004) 'E-mail, voice mail, and instant messaging: a legal perspective', Information Management Journal, 38 (1), pp. 37-38, 40-41.*

#### \$406 2000 HMM

##### *e-transactions in Australia*

"looks at issues facing recordkeeping in an electronic transactions environment, relating this to [Australian] Federal government operations. Recordkeeping principles were not considered in Australian government's development of the Electronic Transactions Act 1999 to support e-commerce by providing "that electronic and paper transactions are treated equally by the law through the specification of certain minimum requirements." (p97). Records professionals were not involved in developing the ET Act.

*Stuckey, S. & Liddell, A. (2000) 'Electronic business transactions and recordkeeping: serious concerns; realistic responses', Archives and Manuscripts, 28 (2), pp. 92-109.*

#### #717 1999 HMM

##### *ERM in the US*

US Government agencies' ERM affected by series of federal court decisions leading to requirement to keep digitally born records in electronic, not paper, format and to treat e-mails as records.

*Van Wingen, R. S., Hathorn, F. & Sprehe, J. T. (1999) 'Principles for information technology investment in U. S. federal electronic records management', Journal of Government Information, 26 (1), pp. 33-42.*

#### \$776 1999 HML

##### *ERM legal developments*

Major developments during the 1990s that have affected eRM, particularly legal admissibility and use of IT to improve court / legal operations. Include: PRO's approach to move to managing e-records and to see e-records as the original form. Preservation of e-records. Domination of Microsoft office applications.

*Tombs, K. (1999) 'A decade of change for legal admissibility: a personal view', Records Management Journal, 9 (1), pp. 47-59.*

## 9.2 Digital Signatures

Key issues arising from the literature:

- Legal standing of digital signatures established
- Methods for generating digital signatures exist: Are any preferred?
- Why are digital signatures not commonplace in the work place, and in personal use of commercial and e-government transactions etc.?

### \$1341 2007 HMM

#### *Re-use/adaptation of e-records and digital signatures*

Re-use/adaptation is one of the advantages of digital records but also leads to problems regarding reliability, integrity and authenticity. Asymmetric cryptography and digital signatures one of the most widely suggested solutions. Digital records in archives would need to be verified and digitally signed by archivist (VERS a well-known example). However, there are some problems. Digital signature proves authenticity in physical form (the untampered-with bitstream) but not intellectual form (identity of document) "Digital signatures prove the integrity of bitstreams, but not of documents" [p183]. Digital signatures inadequate from purely archival view; registration of essential metadata more important. "Digital signatures are time-bound" [pp185-186]. "The validation chain must remain available" [pp186-187]. Solutions for long-term archiving. Still a research topic. Four possibilities under investigation: (1) Re-signing after migration (2) Registration of validation (3) Preservation of original bitstream and validation chain (4) Certification of migration process.

*Boudrez, F. (2007) 'Digital signatures and electronic records', Archival Science, 7 (2), pp. 179-193.*

### \$301 2001 HMM

#### *Digital signatures*

The problems of achieving digital signatures are: acceptance; security; integrity; authentication. But irony is that paper documents also suffer from these problems too! Laws now accept digital signatures. Many technologies exist to create digital signatures so legislation is technically neutral. P.5 "Authenticity: by implication because originated as an email, but name in a document, logged on to a system with a password; by direct capture bitmap of signature using an electronic pad with encryption techniques to lock the document; password; biometrics combined with e.g. a password, or the bitmap pattern of the actual signature. Which is chosen depends on the importance of the documents. Easy to ensure that both signer and recipient have required technology within an organisation. Harder to do this between unrelated individuals and organisations. In this case use of public key infrastructure - i.e. use of public/private key encryption to validate the signature and lockdown the document. Such infrastructure needs: Certification authority - to provide the key pairs; registration authority - vetting the signer and then authorising the issuance of the key pair; certificate repository - keeping information about public keys and the identity behind them and the place to go to authenticate a signature. Depends on 'a chain of trust'. Many PKI applications and services., e.g. secured socket layer (SSL) on Websites carrying out electronic transactions. Need for some regulation and standardisation in this area. P.8 "Electronic signatures are bringing a newfound acceptance and authentication to digital documents. Ability and action, however, are very different things. So a final question remains: How long will we continue converting digital content to paper solely to manage its credibility and authenticity?"

*Minniham, J. (2001) 'Electronic signatures: a tutorial', Information Management Journal, 35 (4), pp. 4-6, 8.*



\*456 2000 HHM

*Digital signatures in the pharmaceutical industry*

Pharmaceutical industry. Use of electronic signatures for submitting to regulatory authorities. Electronic signatures use an algorithm-generated checksum (hash) as an identifier; the signature is easily detached from the document. Digital signatures combine such a checksum with private - public key cryptography. Electronic and digital signatures depend on security and access controls to software and computer networks, but because security is more integrated in the latter, they require less in terms of overall total system security than the former. The FDA, which regulates the US pharmaceutical industry, primarily adopts the electronic signature concept. Legal admissibility of electronic/digital signatures varies between jurisdictions. The complex technical issues raised impact on records management decisions, and whether signed documents are incorporated in the ERM system or generated (as electronic signatures) from stand-alone devices, with a physical output disk the stored within a RM system as if it were a paper document. Software is expensive, and records managers as potential purchasers may have to develop their expertise in this area to counteract the influence of IT. Results of survey. implementation of electronic/digital signatures was not carried out in order to submit to regulatory authorities, and that electronic rather than digital signature were preferred. Main driver was further integration of digital records into work practice. regulation, registration and technology availability were more significant than competitiveness or speed of marketing. rated the success of implementation – ‘moderate’ or ‘poor’, with none described as ‘successful’. Many co-operated with IT. ‘Effective use of resources’ and ‘planning for implementation’ were given as success factors, while ‘clear guidance from regulatory authorities’ and ‘prior experience of similar implementations’ had little influence. Government, regulatory and legal guidance the area of most concern, with technological issues of less importance, though this did not mean that implementation was without its problems. Developing and implementing systems lengthy and expensive; suggestion that products could be developed by large pharma companies in tandem with software developers, and that smaller companies could then use such products. One response to uncertainty and technical complexity was to retain hybrid system with paper signatures for regulatory requirements. Also concern about digital media longevity and storage, compared to microfilm. Vendor attempts to sell EDMS incorporating signature technology seen as aggressive and offering little scope to try out software or for records managers to get objective info about products. lack of working signature models compliant with regulations; poorly developed concepts from FDA; regulators preferred paper records and were suspicious of digital / electronic equivalents; regulators would only decide post hoc whether signatures were acceptable; still too much divergence between jurisdictions and therefore uncertainty as to whether signatures would be acceptable; financial risk; for UK regulatory agency, lack of direction and failure to understand the science; pharmaceutical companies holding back from developing their own signature systems until they saw if the first ones submitted succeeded or failed.

*Whitman, J. (2000) 'Electronic signatures in the pharmaceutical industry: wider issues dominate over the technical and practical?', Records Management Journal, 10 (1), pp. 35-48.*

\$178 1999 HMM

*Use of digital signatures*

Use of digital signatures, involving encryption, to enable electronic documents to attain a validity equal to that of paper documents. First desktop applications to use d/s were e-mail packages (Netscape, Outlook). Other apps now using signatures – groupware, workflow, EDM, but not yet word-processing. Future changes: may be a major move from fax and courier to secure e-mail; fax though very heavily used, not a secure method and can easily have bogus data inserted. Internet penetration to

approach that of fax in next year or two. Direct cost savings of e-mail over courier enormous, improved delivery times, indirect savings by cutting out intermediary. Won't have the paperless office, but more docs will be created purely digitally, and there will be no legally definitive hard copy.

*Wilson, S. (1999) 'Digital signatures and the future of documentation',  
Information Management and Computer Security, 7 (2), pp. 83-87.*

## IT SYSTEM ASPECTS

### 10.1 IT System Design

covers: e-health record system and design tradeoffs; method for designing EDMS based on using IM model; user acceptance of e-medical records system; US Federal IT systems and legal RK requirements;

Key issues arising from the literature:

- Understanding of actual work processes and user behaviour are key design criteria
- Involve records professionals in IT systems design
- Involve end-users in IT system design
- Design tradeoffs
- Consideration of both the information life cycle as well as the system life cycle

#### \*#1383 2008 HHH

##### *e-health record system and design tradeoffs*

Paediatric hospital system in US using a commercial electronic health record (HER) system. p.719 "assess the usability of the EHR's functions in order to identify configuration and design changes that could improve the system's usability." p.724 "design trade-offs relevant to EHR implementations. Many of these tradeoffs also apply to other IT systems used in the healthcare domain." They comprise (quoted subheadings): (a) Legal requirements versus aesthetic and minimalist design, (b) Legal requirements versus error recovery, (c) Efficiency versus accuracy and consistency in data entry, (d) Consistency versus flexibility, (e) Patient safety versus efficiency. p. 726 "EHR customers should encourage more vendors to utilize these user-centered design and HCI evaluation tools and techniques like the one presented here."

*Edwards, P. J., Moloney, K. P., Jacko, J. A. & Sainfort, F. (2008) 'Evaluating Usability of a Commercial Electronic Health Record: A Case Study', International Journal of Human Computer Studies, 66 (10), pp. 718-728.*

#### \*510 2005 HHM

##### *Method for designing EDMS based on using IM model*

Proposed method uses XML-based information model, the Document Management and Sharing Model (DMSM), which aims to represent DM and business information through document metadata supported by Document Management and Sharing Markup Language (DMSML). Method aims to define guidelines and standard methodological approach to design, using DMSM, and deployment, using DMSML, within a support DMSML Framework (integrated set of tools). Info models are abstract and technology-independent; can be expressed in natural or formal ways., the latter having the advantage of being comprehensible to machines as well as humans. Evaluation of selected proprietary (FatWire, Documentum) and open-source (MARIAN, Xinco) EDMS products against the following requirements: open info model; standard compliance; model-driven design methodology. Method for EDMS design/development then applied in organisation. DMSML-based specs (classified documents of organisation) interpreted by CASE tool to generate automatic EDMS code. Utilizes DMSML Framework. User testing, supported by impact and usability questionnaires. DMSML Framework. Three parts: EDMS Configurator – user-friendly GUI to facilitate specification and generate DMSML instance document. EDMS

Generator – deploying EDMS by uploading DMSML instance. DMS Web Application – provides basic EDM features through web browser. Designing and deploying an EDMS using DMSML Framework prototype. DMSML-based Specification: specification through GUI of folder structure and some metadata; life-cycle templates; access control policies. EDMS Generator processes DMSML specification to customize EDMS template. possibility of creating open-source project based on DMSML Framework.

*Paganelli, F. & Pettenati, M. C. (2005) 'A model-driven method for the design and deployment of Web-based document management systems', Journal of Digital Information, 6 (3).*

\*625 2001 HHH

*User acceptance of e-medical records system*

People issues (user acceptance) of e-medical records system. “longitudinal study into primary care practitioners’ views of an electronic medical records (EMR) system for maternity patients” (p103) in a New Zealand hospital context. Consistence with other research findings shows that “end-user participation in the initial system design would incline them to use the system” (106).

*Handy, J., Hunter, I. & Whiddett, R. (2001) 'User acceptance of inter-organizational electronic medical records', Health Informatics Journal, 7 (2), pp. 103-107.*

#717 1999 HMM

*US Federal IT systems and legal RK requirements*

US Government agencies’ ERM affected by series of federal court decisions leading to requirement to keep digitally born records in electronic, not paper, format and to treat e-mails as records. While IT systems design often does not take RK needs into account, this must be an element for federal IT systems, with legal RK requirements. New paradigms for life cycle modelling. Mandatory ERM requirements will force system designers to consider information life cycle as well as system life cycle. System designers must take entire records life cycle (as per schedules) into account. Records managers must take account of system life cycles when designing records life cycles / schedules.

*Van Wingen, R. S., Hathorn, F. & Sprehe, J. T. (1999) 'Principles for information technology investment in U. S. federal electronic records management', Journal of Government Information, 26 (1), pp. 33-42.*

## 10.2 Interoperability

covers: US e-health records; e-government standards and protocols; interoperability of EDMS and ERMS

\$337 2008 MMM

*US e-health records*

US legislation for electronic health records (EHR) to promote their use. Technical barriers include: Software interoperability requirements – may be impossibly stringent in light of state of standardisation / certification.

*McGregor, F. (1998) 'Legal compliance issues on the digital area', Archifacts, (Apr 1998), pp. 40-50.*

\*1346 2007 HHL

*e-government standards and protocols*

Desire of public administration to avoid vendor lock-in; addressed through standardisation in 1980s. Two standards/protocol sets – OSI (Open Systems

Interconnection) from the ISO, POSIT (Profiles for Open Systems Internetworking Technologies) from US NIST (National Institute of Standards and Technology), developed after difficulties in finding adequate OSI-compliant rather than internet-compliant (TCP/IP) products and services. e-Government strategies released in OECD in late 1990s; one of the policy areas was interoperability (IO). Focus of survey (across Europe, Australia and North America) on methodological tools (frameworks, architectures) devised by e-Govt agencies in connexion with IO. Common feature of six frameworks studied: internet and WWW technologies at their core. Two different approaches – OSI-centred, organising standards like layers (eGIF, CCI, DIF); and POSIT-centred, organising around services (SAGA, IDABC AG, CIOC EAG). Different requirements for evaluation candidate technologies for inclusion in framework: eGU and KBSt require only that technical specs be open; IDABC insists on 'open standards'; US OMB (Office of Management and Budget) requires 'voluntary consensus standards'. Role of Enterprise Architecture (EA) in IO. More than just technical IO needed for true seamless delivery of govt services – other issues (e.g. organisational) as well. EA a comprehensive description of all key elements and relationships; aims to align business processes / goals and technical infrastructure. "Not all the e-government agencies examined have addressed the organizational issues, and not all agencies that have done it have used enterprise architectures" [p96]. Probably depends on the degree to which private-sector management practices have been adopted in agency – EA a tool borrowed from the private sector.

*Guijarro, L. (2007) 'Interoperability frameworks and enterprise architectures in e-government initiatives in Europe and the United States', Government Information Quarterly, 24 (1), pp. 89-101.*

#### \$1419 2006 MMM

##### *Interoperability of EDMS and ERMS*

AIIM International. 2006. "This technical report provides a framework for the integration of Electronic Document Management Systems (EDMS) and Electronic Records Management Systems (ERMS). This report deals with what is required for EDMS and ERMS to integrate and interoperate."

*ANSI/AIIM/ARMA (2006). Revised Framework for Integration of EDMS & ERMS Systems (ANSI/AIIM/ARMA TR48-2006).*

### **10.3 Integration**

covers: integration and a hospital information system; integration and e-health records; integration of EDMS and ERMS

Key issues arising from the literature:

- Integration is a complex topic, and technological integration is only one component

#### \*1347 2008 HHH

##### *Integration and a hospital information system*

HealthSys which offers a complete package for e-patient records (EPR) patient admin (PAS) lab work etc. Installed in Norwegian hospital. 'Integration' has many different meanings to different people, e.g. flexible access to information, virtual market, integrated (continuity of) care, technical integration of applications. Conclusion. P.235 "We also believe that broad rather than narrow technical evaluations if integration efforts should be conducted. It is not sufficient to evaluate particular instances of integration. Rather, integration needs to be evaluated a part of



a larger portfolio of implementations and transformations in order to get a complete picture of where the vision has come from and where it is going."

*Ellingsen, G. & Monteiro, E. (2008) 'The organising vision of integrated health information systems', Health Informatics, 14 (3), pp. 223-236.*

#### \*1348 2007 HHH

##### *Integration and e-health records*

Integrated healthcare services depend on integration of information, founded on electronic patient record (EPR), but there are major difficulties. Integration of EPR generally seen in terms of (1) interoperability of new and legacy systems and (2) standardization of data, flows, etc across organisation. This means that deployment focus "may necessarily be on technical, data, and regulatory requirements, to the detriment of producing a system that successfully supports the work of those delivering care" [p48]. Ethnographic study at a 2-hospital NHS hospital trust of an EPR project. Fieldwork showed that integration not just technical. Four types of integration identified, which have complex interdependencies:

- (1) Technical (disparate systems; core and modular systems)
- (2) Workplace procedures (generic process models; this generated tension between standardisation and supporting local variants)
- (3) Work practices
- (4) Wider organisational / NHS concerns and requirements

Which criteria should be used to decide whether integration is successful? e.g. successful technical integration could still be unworkable in practice. Integrating system to work or vice versa? technical v process. Prioritising types of integration. "It is clear that having an integrated computer-based system of processes, that conform to (or integrate with) NHS requirements, has greater priority than having a system that meshes well with existing practice" [p54]. Integration: Who does the adjusting? The system or the user? Conclusion: integration and design. Research shows that analysts have problems with (1) understanding whether system fits well with practice; and (2) when practice should be transformed and when system should be reconfigured. Related issues: (3) integration with practice complicated by use of the COTS system in integrating organisational processes, and by need for technical integration and compliance with NHS requirements; (4) requirements for integration with working practices given lower priority; (5) when technical solutions cannot be found for usability problems, the latter are turned into training issues. Such problems raise doubts over whether EPR can actually bring the benefits of seamless healthcare service envisioned. "What we learn is that organizations like the Trust studied here need to find better ways to understand current work practices and better means to understand how and whether they might be evolved or transformed in relation to an emerging design. ... users need to be involved; their problems should not simply be considered as lower in priority, or as something that may be bypassed." [p56].

*Martin, D., Mariani, J. & Rouncefield, M. (2007) 'Managing integration work in an NHS electronic patient record (EPR) project', Health Informatics Journal, 13 (1), pp. 47-56.*

#### \$1419 2006 MMM

##### *Integration of EDMS and ERMS*

AIIM International. 2006. "This technical report provides a framework for the integration of Electronic Document Management Systems (EDMS) and Electronic Records Management Systems (ERMS). This report deals with what is required for EDMS and ERMS to integrate and interoperate."

*ANSI/AIIM/ARMA (2006). Revised Framework for Integration of EDMS & ERMS Systems (ANSI/AIIM/ARMA TR48-2006).*

## 10.4 Implementation of IT Systems - Who / What Has To Change

covers: case study of the implementation of a hospital information system; case study of the implementation of an e-health record system; integration of e-health records; use acceptance of a hospital information system

Key issues arising from the literature:

- IT systems designed / or adaptable to match work processes, user behaviours and preferences
- Organisations take the opportunity of a new IT system to change work processes, implemented through the system: users have to change
- Off the shelf systems / inflexible poorly designed systems can't be changed, so work processes and user behaviour have perforce to adapt to the system

### \*1347 2008 HHH

*Case study of the implementation of a hospital information system*

HealthSys which offers a complete package for e-patient records (EPR) patient admin (PAS) lab work etc. Installed in Norwegian hospital. Clinicians had a vision of single log in to see all the separate services. This achieved but at expense of extra effort by IT staff (to set up an ad hoc system translating between the new and old (in parallel) PAS) and lab staff who had often to input data manually between the two PAS.

*Ellingsen, G. & Monteiro, E. (2008) 'The organising vision of integrated health information systems', Health Informatics, 14 (3), pp. 223-236.*

### \*#1383 2008 HHH

*Case study of the implementation of an e-health record system*

Paediatric hospital system in US using a commercial electronic health record (HER) system. p.719 "assess the usability of the EHR's functions in order to identify configuration and design changes that could improve the system's usability." p. 720 "Because a commercial system was used, parts of the system interface and functionality are dictated by the vendor's base product, and thus out of the immediate control of the implementation team." p. 722 potential solutions fell into one of the following categories: (1) Configuration changes to be made by the implementation team, (2) Design changes/enhancements to communicate to the vendor for future release, and (3) Suggestions for addressing these issues through training and communication, in instances where changes were unlikely to be made prior to rollout."

*Edwards, P. J., Moloney, K. P., Jacko, J. A. & Sainfort, F. (2008) 'Evaluating Usability of a Commercial Electronic Health Record: A Case Study', International Journal of Human Computer Studies, 66 (10), pp. 718-728.*

### \*1348 2007 HHH

*Integration of e-health records*

Integrated healthcare services depend on integration of information, founded on electronic patient record (EPR), but there are major difficulties. Integration of EPR generally seen in terms of (1) interoperability of new and legacy systems and (2) standardization of data, flows, etc across organisation. This means that deployment focus "may necessarily be on technical, data, and regulatory requirements, to the detriment of producing a system that successfully supports the work of those delivering care" [p48]. Ethnographic study at a 2-hospital NHS hospital trust of an EPR project. Integrating system to work or vice versa? technical v process. Prioritising types of integration. "It is clear that having an integrated computer-based

system of processes, that conform to (or integrate with) NHS requirements, has greater priority than having a system that meshes well with existing practice” [p54]. Integration: Who does the adjusting? The system or the user? Conclusion: integration and design. Research shows that analysts have problems with (1) understanding whether system fits well with practice; and (2) when practice should be transformed and when system should be reconfigured. Related issues: (3) integration with practice complicated by use of the COTS system in integrating organisational processes, and by need for technical integration and compliance with NHS requirements; (4) requirements for integration with working practices given lower priority; (5) when technical solutions cannot be found for usability problems, the latter are turned into training issues. Such problems raise doubts over whether EPR can actually bring the benefits of seamless healthcare service envisioned. “What we learn is that organizations like the Trust studied here need to find better ways to understand current work practices and better means to understand how and whether they might be evolved or transformed in relation to an emerging design. ... users need to be involved; their problems should not simply be considered as lower in priority, or as something that may be bypassed.” [p56].

*Martin, D., Mariani, J. & Rouncefield, M. (2007) 'Managing integration work in an NHS electronic patient record (EPR) project', Health Informatics Journal, 13 (1), pp. 47-56.*

#### \*1177 2003 HHH

##### *Use acceptance of a hospital information system*

Results of questionnaire survey user acceptance of an anaesthesia information management system in a German hospital 5 years after implementation. (p971): “systems administrators and users have different points of view. Administrators focus primarily on clinical data processing of which documentation is only a small part. In the context of a more efficient processing of data for statistical purposes the time saved by online data collection compared to conventional manual recording is most important. For the documenting medical staff this is of secondary importance, since they have to bear the additional burden of data entry.”

*Quinzio, L., Junger, A., Gottwald, B., Benson, M., Hartmann, B., Jost, A., Banzhaf, A. & Hempelmann, G. (2003) 'User acceptance of an anaesthesia information management system', European Journal of Anaesthesiology, 20 (12), pp. 967-972.*

## **10.5 IT Systems Not Up To The Task**

covers: case study of the implementation of a hospital information system; investment decisions and health IT systems

Key issues arising from the literature:

- IT systems do not yet cope well with very complex situations, e.g. healthcare

#### \*1347 2008 HHH

##### *Case study of the implementation of a hospital information system*

HealthSys which offers a complete package for e-patient records (EPR) patient admin (PAS) lab work etc. Installed in Norwegian hospital. Political vision for regionalisation of services. E.g. streamlining all lab services so use same lab module in HealthSys. However microbiology services say this module is too simplistic and does not capture the complex and contextualised info they need. So refused to use it.

*Ellingsen, G. & Monteiro, E. (2008) 'The organising vision of integrated health information systems', Health Informatics, 14 (3), pp. 223-236.*

\*1349 2007 HHH

*Investment decisions and health IT systems*

Study to p.75 "understand IT investment decisions from the perspective of senior health system executives." Conclusions p.83 "... beliefs of senior health executives in regards to IT adoption. ... (2) lack confidence in the IT solutions available to them ... (7) do not believe that effective clinical IT exists. ... At the heart of these conclusions is a cluster of issues around technological drivers that seem to have significant impact upon the executives' decision-making. These drivers are: ... (3) the complexity of health IT."

*England, I. & Stewart, D. (2007) 'Executive management and IT innovation in health: Identifying the barriers to adoption', Health Informatics Journal, 13 (2), pp. 75-88.*

## 10.6 IT Adoption / Alignment / Investment / Value

covers: evaluating ERMS for purchase; investment decisions and health IT systems; Web 2.0 services and tools.; strategic alignment of IT; how to choose a system.

Key issues arising from the literature:

- The lack of measures / methods to demonstrate the business value of IT systems

\$1368 2007 HML

*Evaluating ERMS for purchase*

Besides the lists of features and functions an organisation wishes an ERMS to perform, there are other issues that need to be considered when evaluating such systems for purchase. p.28 "Integration with present and planned business and infrastructure environments that are already in place [real level of integration] \* Vendor partnerships [e.g. technology partners, systems integrator partners, reseller partners, risk if these breakdown] \* Operating systems and databases [same as the organisation, version used and how they have been configured] \* Web-based or client/server-based access of key functions \* Auditing and reporting \* Licensing [can be very complex] \* Company ownership [of the vendor, and its sustainability] \* Overall usability and training."

*Emery, P. (2007) 'Beyond Features and Functions: Evaluating ERM Software Alternatives in a Real-World Environment', Information Management Journal, 41 (1), pp. 28-35.*

\*1349 2007 HHH

*Investment decisions and health IT systems*

Study to p.75 "understand IT investment decisions from the perspective of senior health system executives." Conclusions p.83 "... beliefs of senior health executives in regards to IT adoption. ... (1) influence the diffusion of the innovation across the organization through their vision for IT and information within their organization (2) lack confidence in the IT solutions available to them (3) lead complex and fragmented organizations (4) face many conflicting demands for resources (5) find IT vendors act inappropriately (6) do not believe there is a compelling business case for IT investment (7) do not believe that effective clinical IT exists. Second, it appears that the executives belief about the current state of IT are more influential in the innovation adoption process than the executives' beliefs about their organizations. At the heart of these conclusions is a cluster of issues around technological drivers that seem to have significant impact upon the executives' decision-making. These drivers

are: (1) the value delivered by health IT (2) the compatibility of IT with health processes, particularly in the clinical setting (3) the complexity of health IT." Where benefits are not easily represented in financial terms, need other methods of measuring and presenting the benefits of IT innovation.

*England, I. & Stewart, D. (2007) 'Executive management and IT innovation in health: Identifying the barriers to adoption', Health Informatics Journal, 13 (2), pp. 75-88.*

#### \$1367 2007 HMM

*Web 2.0 services and tools.*

P27 "Software investment costs may be modest, but metrics for return-on-investment have not been developed." But also familiar RIM challenges: including "\*\* Deriving measures of efficiency and return on investment."

*Dearstyne, B. W. (2007) 'Blogs, Mashups and Wikis - Oh, My!', Information Management Journal, 41 (4), pp. 24-34.*

#### \*1374 2007 HHH

*Strategic alignment of IT*

p.228 "research has identified strategic alignment - defined as the interaction or fit between IT and business strategy - as a key ingredient in the search for greater value from IT. Besides fit, the information systems (IS) literature has also described alignment in terms of linkage, harmony, and integration - the common thread among these terms being that firms gain when business strategy is supported, stimulated, or enabled by IT. From a practical viewpoint, the importance or value of alignment is further evident in multiple executive surveys that, over the past decade, have repeatedly ranked alignment among the most critical and complex IT issues facing firms worldwide". Overall conclusion: p.253 "alignment is critical to firm performance but that these effects are ultimately reflective of the locus of alignment - namely, those processes where fit or alignment is tightest and whether these processes are critical or peripheral to the firm's strategic focus." p.255 "it is important to recognize that alignment does not mean the same thing to all firms. All firms might desire tight alignment but they do not all want the same alignment. ... tight alignment may be critical in some processes but not in others. ... if alignment is tightest in these key processes, there is potential for higher IT business value".

*Tallon, P. P. (2007) 'A Process-Oriented Perspective on the Alignment of information Technology and Business Strategy', Journal of Management Information Systems, 24 (3), pp. 227-268.*

#### \$216 2001 HMM

*How to choose a system.*

Choice of system depends on choices of: technologies (change in these - client/server technologies of 80s, desktop computers, networked desktops, internet, thin desktop computers served from central services, data warehousing and data mining, wireless/mobile technologies). To cope with these choices develop a strategy for producing a strategy: a process of selecting and implementing choices; evaluation of your needs; a process for decision making; a process for institutionalising an interactive evaluation and steering of your strategy; budgeting for the software as an ongoing annual expense. Also need to design and implement tactics. Includes: valid, reliable and easy to obtain metrics to measure the impact of the technology and its success; infrastructure development - hardware, data security and privacy, regulatory compliance, user support and training etc.; well designed and run pilot studies or bench tests; integration of system with older or parallel technologies.

*Waife, R. S. (2001) 'Transitioning clinical data management from the 1980s to the 2010s: strategies for corporate decision making', Drug Information Journal, 35 (3), pp. 713-719.*



## 10.7 IT Vendors / IT Marketplace

covers: usability of e-health record system; investment decisions and health IT systems; use of EDRM in English central government; XML software vendors; corporate portals

### \*#1383 2008 HHH

#### *Usability of e-health record system*

Paediatric hospital system in US using a commercial electronic health record (HER) system. p.719 "assess the usability of the EHR's functions in order to identify configuration and design changes that could improve the system's usability." p. 720 "Because a commercial system was used, parts of the system interface and functionality are dictated by the vendor's base product, and thus out of the immediate control of the implementation team." p. 722 potential solutions fell into one of the following categories: (1) Configuration changes to be made by the implementation team, (2) Design changes/enhancements to communicate to the vendor for future release, and (3) Suggestions for addressing these issues through training and communication, in instances where changes were unlikely to be made prior to rollout." p. 726 "The fact that the client is dependent on the vendor to make some of the changes needed to improve system usability highlights the importance of developing a good relationship with the vendor and a two-way dialog about how usability of the system can be improved in the long run. In fact, this dialog on usability should start before design, during the package selection. When selecting an EHR vendor, healthcare providers should include criteria related to clinician feedback on system usability and the vendor's capabilities and processes for evaluating and continually improving the usability of their product. If vendors receive usability feedback from a range of clients and potential clients, they have better data on the importance of and priorities for enhancing usability in future releases. EHR customers should encourage more vendors to utilize these user-centered design and HCI evaluation tools and techniques like the one presented here."

*Edwards, P. J., Moloney, K. P., Jacko, J. A. & Sainfort, F. (2008) 'Evaluating Usability of a Commercial Electronic Health Record: A Case Study', International Journal of Human Computer Studies, 66 (10), pp. 718-728.*

### \*1349 2007 HHH

#### *Investment decisions and health IT systems*

Study to p.75 "understand IT investment decisions from the perspective of senior health system executives." Conclusions p.83 "... beliefs of senior health executives in regards to IT adoption. ... (5) find IT vendors act inappropriately".

*England, I. & Stewart, D. (2007) 'Executive management and IT innovation in health: Identifying the barriers to adoption', Health Informatics Journal, 13 (2), pp. 75-88.*

### \*524 2006 MHH

#### *Use of EDRM in English central government*

Qualitative results of questionnaire survey on use of EDRM by English central government organisations in support of Fol. p.21 "Responses were openly critical of the state of the EDRMS product and supplier market" p.21 "The limited size of the EDRMS field is further complicated by Government-set compliance requirements for products being sold internationally." p.21 "Recommendation 3: For all future cross-sector technology implementations, regulatory impact assessments should include a full consideration of the technology market place." p.21 "Recommendation 5: Future cross-sector technology implementations should be staggered across organisations

to mitigate against a run on the market."

*Greenaway, N. (2006) 'EDRM: acquisition and implementation across central government', Records Management Bulletin, (134), pp. 19-22.*

### \$803 2005 MML

#### *XML software vendors*

Use of XML to format unstructured content for management within an ECM. Some barriers to development. Third problem is that ECM software vendors are not interested in developing this sort of capability – they see XML as just another special content type. Vendors of XML content management software are happy to confine themselves to the publishing sector rather than move into the broader ECM world.

*Siluer, B. (2005) 'Content in the age of XML', Intelligent Enterprise, 8 (6), pp. 24-29.*

### \$97 2000 HML

#### *Corporate portals*

Corporate portals aka enterprise information portal (EIP) p.355 "software that provides user-customisable access to information and applications through a Web browser". Range of companies now entering the market. Collaborative portal companies, from DRM (Data Resource Management) sector. Business intelligence applications vendors. Enterprise information/corporate portal vendors, creating applications-specific packages. Portal framework vendors, adapting generic database platforms. Enterprise resource planning (ERP) vendors. Being sold to the IT manager as the Holy Grail. Information managers need to get involved in decision making for procurement. Managers might see this as the Holy Grail 'solution'.

*White, M. (2000) 'Enterprise information portals', Electronic Library, 18 (5), pp. 354-362.*

## **ELECTRONIC RECORDS MANAGEMENT**

### **11 Historical Development of ERM**

covers: change in archivists' practice in France; IM challenges in the public sector; NARA initiatives in the US; overview of types of IT systems; Indiana University functional requirements for e-records; electronic data capture; VERS; e-records policy of Archives New Zealand; personal view of progress in ERM; e-transactions in Australia; evolution of DM; ERM theories and initiatives; ERM approach; ERM legal developments; model for ERM; state of play of e-records at the time; megashifts in RM; e-records; City of Philadelphia e-record project; ERM research agenda; National Archives of Canada guidance on ERM; ERM in the Netherlands; State of play with DMS at the time; State of ERM in Europe at the time; DLM Forum inauguration; progress in ERM; Australia's approach to ERM; Indiana University Project; archivists and ERM

note: articles range from 1996 to 2006

#### \$523 2006 HMM

##### *Change in archivists' practice in France*

France. Archivists have been aware of the need to get involved in managing information at an earlier stage, and not just collecting it into archives at the end of its active use. In the case of electronic records, this is needed so that necessary metadata relating to classification, creation, use, and format can be captured. interface between RM and archiving. Records transferred from RM system to external archival repository, which must then take over responsibility for managing records created in a variety of software and applications, including RM applications. This involves a switch from an RM to an RK system, necessitating the "homogenisation of the transfer format and the metadata format" [p78]. Software has been gradually acquiring functionality to deal with the electronic records life-cycle. Some software also developed to facilitate archival management and description in the business environment: e.g. Avenio, used for Town Halls and organizations with in-house archives. Electronic archiving has also been developed in the science and technology sectors, based on standards such as OAIS. Future developments will bring the different worlds closer, and they are already being drawn together through a flourishing electronic document software supply market.

*de Boisdeffre, M. (2006) 'The importance of records management in France', Records Management Journal, 16 (2), pp. 76-81.*

#### \$105 2006 MMM

9 tips on e-information security.

*Bradshaw, L. (2006) 'Keeping your information secure', Records Management Bulletin, 133, pp. 27-28.*

#### \$772 2006 MMM

##### *IM challenges in the public sector*

Brief summary of IM related challenges facing public sector: loss of know-how and knowledge assets through staff retirement & documents buried on user desktops; acceleration of e-gov initiative and move to enterprise architecture. Raises issues of security, records capture & systems capacity within mobile work context (using PDAs etc). Need to build IM practices into technology framework.

*McKinnon, C. (2006) 'Challenges facing the public sector: an infrastructure for 21st government', Information Management and Technology, 39 (4), pp. 179-181.*

#### \$520 2005 HLM

##### *NARA initiatives in the US*

Purpose of national recordkeeping in the US, and the current ways in which NARA (National Archives and Records Administration) is acting to enable this purpose to be carried out effectively. NARA has had to move from a focus on paper records to realizing that it must take the lead in developing ways of managing, preserving and providing access to electronic records, which form the bulk of modern government records. Initiatives include the Electronic Records Archive (ERA), re-engineering RM, and collaboration on the Persistent Archive Testbed (PAT - in collaboration with SDSC and other US archival institutions, investigating the creation of an 'archival grid' to allow disparate collections to be accessed and searched as though they were one and InterPARES (interdisciplinary project involving 20 countries addressing requirements for electronic records). NARA has initiated projects aimed at changing rather than simply adapting RM practice to deal with new technologies. Supporting creation of RM Profile in the Federal Enterprise Architecture (FEA), to provide framework for incorporation of RM requirements and principles into work processes and systems. Has sponsored development of requirements for RM Service Components (RMSC), i.e. software components affecting e-records creation and management, to allow inclusion of RM requirements early in processes and as integral part of agency enterprise architecture. Basis of long-term preservation to be included early in life-cycle by templates to define record characteristics, and preservation and service plans to be introduced.

*Weinstein, A. (2005) 'NARA enters new "ERA" of electronic records management', Information Management Journal, 39 (5), pp. 22-24.*

#### \$414 2003 MMM

##### *Overview of types of IT systems*

Reviews the positives and negatives of typical IT systems which are referred to as "passive systems", viz. project planning, email, intranet/shared areas/web, file management/network folders/servers, document/content management, meetings. Does the same for "more advanced business systems which actively support work" i.e. workflow, enterprise systems (PDM, ERP, CRM...). Recommends working with current systems not replacing them and advocates using web technology to "provide visibility and control while allowing users to continue to use standard office tools" e.g. MS Outlook, Lotus Notes, MS Project and "harness the power of these [other] IT systems" (p159-160).

*Griffiths, A. (2003) 'Programme and portfolio management: the new competitive edge in product development and change management', Information Management and Technology, 36 (4), pp. 156-160.*

#### \*1401 2002 MHH

##### *University functional requirements for e-records*

List of functional requirements for e-records based on primary research by Indiana University.

*Requirements for Electronic Records Management Systems (ERMS). (2002). Draft document 4/19/02. Indiana University*

#### \$217 2001 HMM

##### *Electronic data capture*

Electronic data capture (EDC) and management systems. PR: Early systems - data entry on desktop computers at investigator site with disk or electronic data transfer to sponsor. Little cleaning, querying or manipulation of data. Next systems - linked data entry with data review/cleaning capabilities. Data transfer more sophisticated. Then exploitation of Internet access, with existing browser based applications with online

or hybrid on/off line systems. E.g. clinical trials. Many systems using different operating systems and different software and database systems. Different data input mechanisms: laptop/desktop, hand held devices, scanning, faxing, interactive voice response, voice recognition. Goals of systems include: easy export of data to analytical systems; more accurate and useful data entry by edit checks and user prompts; rapid access to clean data remotely; audit trails, regulatory compliance, e-signatures etc. Integration trend because: Different types of input data, e.g. text, electronic, paper, test results etc. Data put into different types of clinical database management systems and associated systems such data warehousing/mining tools.

*Piazza, R. J. (2001) 'Integrated Web-based clinical data handling solutions', Drug Information Journal, 35 (3), pp. 731-735.*

#### #541 2001 HMM

##### *VERS*

Victorian Electronic Records Strategy (VERS) and implementation at Dept Infrastructure, Victoria. VERS concepts: capture digital content as close as possible to point of creation and convert to long term format, i.e. PDF; record as much metadata as possible from user, application, system etc., using XML, append digital signature to seal record resulting in the VEO (VERS encapsulated object); as many duplicates (authorised copies) can be made as required, VEO application independent. Also store the original format records for document-type records. Digital signature is via digital certificate with private/public keys. Doesn't protect the VEO from tampering but will show if tampering has occurred. The VEOs metadata and content will generate indexes for browser-based searching and access to the records, both internally and externally. Lessons learnt include: (i) not always appropriate to capture at point of creation, e.g. legacy database at point of decommission. (viii) Record keeping system needs to manage both hard copy and digital objects. Use of commercial products, e.g. TRIM (Tower Software) and Fulcrum/EIP (Hummingbird Corp). (ix) Need to set up application programming interface so actions can be carried automatically.

*Quenault, H. (2001) 'VERS implementation project at the Department of Infrastructure: Melbourne, Australia', Records Management Journal, 11 (2), pp. 71-82.*

#### #498 2001 MLH

##### *E-records policy of Archives New Zealand*

Article deals with a 1997 review of electronic records policy in Archives New Zealand (ANZ), and the major issues identified during the consultation phase, and the steps that will be taken to create a five-year strategy document. Committee formed to address technical and infrastructural issues raised, which were formats, migration, storage environment, version control, documentation. Further development of guidance, including 2000 'Recordkeeping framework' setting out principles for records systems, and advisory notices on e-mail as records, digitization/copying, managing web-sites. 1998 review identified implementation problems. 2001 review noted lack of substantial progress. NZ not alone in finding difficulty in implementing ER policy, and that minimal resources available for ER development.

*Cauchi, J. (2001) 'Whither Archives New Zealand's electronic records policy?', Archifacts, (Oct 2001), pp. 42-52.*

#### \$127 2000 MMM

##### *Personal view of progress in ERM*

Looking back over the 100 issues of the RMS bulletin, personal view. Comments on e-records: P.3 "Electronic mail and the Internet have radically changed the working environment, although the extent to which this has happened can be over-emphasised." p.5 "... there is an obsession with electronic records as such, which



fails to recognise that they still do the same things as their paper equivalents." p.5  
"Electronic records generate different challenges of identification, access, retention and storage. However, intellectual control, the meta-process, remains the same and the key is in the phrase record-keeping system." Establishing that there is a difference between EDMS and ERMS. Assumption seems to be that systems will be hybrid, i.e. both paper and e-records. Latest ERMS designed by records managers so better. P.9. "The primary problem with technology is that it is seen as a sort of philosopher's stone of records management. ... [managers] ignore the need to plan and manage records because 'technology will take care of the problem'. The cause of sound records management - and of the technology too, ultimately, because the implementation of RM might make it work - has been set back by the thoughtless repetition of the electronic mantra." Because of lack of effective ERMS people print out documents for use and for filing. Additionally, documents are printed for ease of reading. So paper is used more than ever.

*Emmerson, P. (2000) 'And yet...records management then, now and next?: a personal reflection', Records Management Bulletin, (100), pp. 3, 5-7, 9-10.*

#### \$406 2000 HMM

##### *E-transactions in Australia*

"looks at issues facing recordkeeping in an electronic transactions environment, relating this to [Australian] Federal government operations. It also challenges some of the archives and records professions' views and expectations about how others might see the importance in the detail of electronic recordkeeping, especially in an era of 'light-touch' legislation to enable the development and uptake of e-commerce" (abstract). Recordkeeping principles were not considered in Australian government's development of the Electronic Transactions Act 1999 to support e-commerce by providing "that electronic and paper transactions are treated equally by the law through the specification of certain minimum requirements." (p97) Believes that economics, and the "immense potential loss [of information and evidence] inherent in e-commerce is the trigger for governments to realise sound recordkeeping practices are needed. Records professionals were not involved in developing the ET Act.

*Stuckey, S. & Liddell, A. (2000) 'Electronic business transactions and recordkeeping: serious concerns; realistic responses', Archives and Manuscripts, 28 (2), pp. 92-109.*

#### \$174 2000 MMM

##### *Evolution of DM*

Evolution of DM from paper to electronic, through early EDMS in 1990s, which left work of RM/IM professionals unchanged. Failure of 1980s attempts to create 'paperless office'. Today's development is the compound document. DM the convergence of doc processing, imaging and info technologies, covers creation, modification, storage, retrieval. Includes user needs and organizational workflow Forms management a central aspect. Archival docs also important to corporate memory; formerly appraised individually by arch/RM, new principles needed to automate this. Indexing, searching, retrieving the weakest links in EDM. Enabling technologies – scanners, OCR, neural network recognology. In conjunction, these technologies will enable an EDMS to scan, index, modify, process, store and retrieve docs. era of work-process automation, workflow software, imaging and recognologies now here. How IM professionals increase document value for users, using EDMS capability. Valuing of docs [appraisal] will need to be done at design stage. Indexing – Rising interest in metadata, promises to bring order but standards evolving and many questions unanswered. predict "third wave" where EDMS are catalysts for BPR. Different RM/IM roles will converge, driving integration of technologies.

Keary, M. (2000). *Review of Megill, K.A. and Schantz, H., Document management: new technologies for the information services manager. Electronic Library. 18: 148-150.*

#### \$457 2000 MMH

##### *ERM theories and initiatives*

Building blocks for managing and preserving digital materials. Blocks: (1) Theories: Univ Pittsburgh. UBC. Continuum. (2) Initiatives: ICA committee on e-records. DLM Forum. InterPARES. TEAM project. IRMT modules. RLG. Australian initiatives. Canadian initiatives. USA initiatives. (3) Solutions: Early solutions (Computer museum. Optical technology. Shell concept.) Standards. Migration. Emulation. Metadata (OASIS, CEDARS). XML. Conclusions: p.65. "electronic records are difficult". P.65. "we must not see the problems as exclusively a technical matter for computer experts. They are at least as much a record keeping and record managing problem, which we as archivists and information experts must address." Focus on the solutions to hand that might work for 10/20 years rather than trying for solutions for 100 years ahead.

MacKenzie, G. (2000) '*Searching for solutions: electronic records problems worldwide*', *Managing Information*, 7 (6), pp. 59-60, 62-55.

#### \$442 1999 HMM

##### *ERM approach*

Approach: Electronic records should be managed by using the same principles and procedures used to manage traditional paper records.

To prevent the 'privatization' of records, PC hard drives will have to be modified and all PCs networked into an enterprise-wide system for managing documents.

2. Document accumulation. Keeping amount of files at the minimum necessary has always been a prime concern of RM; although storage is a less visible concern with electronic records, this principle is still valid: searches still takes longer the more documents there are in a file. This can in fact be an even greater problem with electronic records, as the visual evidence (a bulging file) no longer triggers decisions to weed, and because many software applications generate redundant copies and temporary files which add to the mass of 'real' documents that are past their retention date or which are only working files. E-mail presents a particular problem, both because it is easier to send than a paper memo and because multiple copies can be sent at one keystroke. Electronic filing space is also cluttered up with system files from obsolete programmes, downloaded applications no longer needed, etc. These problems should be countered by two basic RM procedures: avoiding the sending, duplication or filing of records unless it is necessary, and disposing of filed material in line with retention schedules. It is, however, more complicated to delete duplicate, superseded or temporary electronic documents than their paper equivalents.

3. Rational organization. Should not organize by document type, though that is encouraged by software applications that create default directories to store output, but by e.g. topic or file type (i.e. administrative or programmatic).

Sanders, R. L. (1999) '*Personal business records in an electronic environment*', *Information Management Journal*, 33 (4), pp. 60-63.

#### \$776 1999 HML

##### *ERM legal developments*

Major developments during the 1990s that have affected eRM, particularly legal admissibility and use of IT to improve court / legal operations. Include: PRO's approach to move to managing e-records and to see e-records as the original form. Preservation of e-records. Domination of Microsoft office applications.

Tombs, K. (1999) '*A decade of change for legal admissibility: a personal view*', *Records Management Journal*, 9 (1), pp. 47-59.

### \$123 1999 MMM

#### *Model for ERM*

Move to paperless environment. P.40 "One way records managers have approached the problem of managing paper in the digital world is to assign value to recordkeeping systems based on their sophistication ... paper occupies the low rung on the ladder, followed by microfilm products on the next rung, then a few hybrid approaches, and finally, at the top of the ladder, the very latest digital application. Records management applications that use items from the top rungs are successful, so the thinking goes ... There is a danger here on relying too heavily on such a model; when we do that, we allow the model to influence our thinking about a given records problem rather than letting our thinking, our rational assessment influence the model." "Evolutionary biologists have viewed life on earth using this [ladder] model.... Recently, however, ... a new model more in tune with evidence was generated. Instead of a ladder, ... views the evolution of life as being more akin to a bush, with many branches going off in many directions, but none standing out as a "highest" point".

*Kreger, L. (1999) 'Paper and the information age', Information Management Journal, 33 (4), pp. 38, 40-32.*

### #219 1999 HML

#### *ERM in the Netherlands*

1991 strategy for RM in the civil service 'Revolution in Records' - RM is part of the wider IM; emphasis is on business processes; content and usage takes precedent over form and media. Archives and RM are melding and the distinctions are disappearing. Adoption of the life cycle concept. p. 66 "records managers and archivists must work in close collaboration with IT specialists at the front end of the information life cycle, during what he refers to as the 'conception stage' - the time of initial systems planning before electronic records are created." The melding of archivists and records managers and co-operation with IT specialists p.66 "is absolutely essential during the new era of digital preservation." 1991 Dutch General Auditor's Office MLG report on long-term preservation of e-records, resulting in the Dutch Digital Longevity Programme. 1995 the programme wrote a report, 'The end of the paper era' which stated that the problem was so large and complex that there was no single technical solution for all situations.

*Stephens, D. O. (1999) 'Archives and records management in the Netherlands', Information Management Journal, 33 (4), pp. 64-66, 68-69.*

### \$715 1998 HLL

#### *State of play of e-records at the time*

Descriptive of the state of play of e-records at the time. Not feasible to maintain museums of hardware and software – expensive and too many proprietary systems. Emulation and migration the only viable answers; migration is expensive and records may need re-appraisal on each successive migration. Necessary to appraise records at creation to ensure that records reflecting policies and functions preserved and stored on appropriate media. In 1990s, greater value placed by commentators on evidential than informational aspects of records. Schellenberg's idea of evidentiality depended on indivisibility of content and context, not viable in ERs. ERs easily modified, re-used, proliferated, can be interactive and dynamic. Whichever approach taken, essential that records (not just decontextualized data) are preserved in an ERKS. Many current proprietary electronic IM systems lack this, and up to records and information specialists to co-operate to ensure proper functionality. Records professionals need to demonstrate that corporate memory depends on good recordkeeping to secure agreement to RK functional requirements in systems. Conclusion: Preservation demands integration of descriptive metadata with ERM

systems. Need to be able to identify records for migration and check media for degradation.

*McInnes, S. (1998) 'Electronic records: the new archival frontier?', Journal of the Society of Archivists, 19 (2), pp. 211-220.*

#### \$48 1998 HML

##### *State of play in ERM at the time*

Procedures in moving from paper to e-records system & likely development of legal guidance.

*Anderson, R. J. (1998) 'Safety and privacy in clinical systems: the state of play', Health Informatics Journal, 4 (3 and 4), pp. 121-123.*

#### \$597 1998 MMM

##### *Megashifts in RM*

OM 10 'megashifts' that are occurring in RM in the 1990s and beyond. P. 4 (1) "The shift from paper-based to paperless recordkeeping systems". P.5 (2) "The shift in the perceived value and strategic importance of electronic records as compared to those on paper." (3) "The shift from data processing to document processing as the predominate application in computing environments." p.6 (4) "The shift from static documents to dynamic 'virtual' documents." (5) "The shift in the lifecycle management of electronic records from undefined retention to a retention solution." p. 7 (6) "The shift from cost reduction to process improvement as records management's principal business objective." (7) "The shift from information media management to managing the accessibility of information." p.8 (8) "The shift from electronic records of short-term value to those having long-term archival value." (9) "The shift in records management from an administrative support function to an information systems function." p.9 (10) "The shift from records management to document management as the primary professional discipline for managing document-based information."

*Stephens, D. O. (1998) 'Megatrends in records management', Records Management Bulletin, (86), pp. 3-9.*

#### \$1086 1998 MMM

##### *State of play of ERM at the time*

ARMA studies found that: "many existing records management programs have become largely isolated from and irrelevant to the principal objectives of the organizations they serve for three major reasons". These are: 1) focus on inactive records that have served their primary purpose and hence not vital to support marketing or financial objectives; 2) association of records managers with paper records only; 3) lack of well-defined, consistent set of professional skills and experience so RM responsibilities vary from one organisation to another – implies no 'status' or 'standing'. Records managers had little understanding of ERM. Ways forward include: integrate document, file and RM with data processing and management information systems; address organizational information flows. Whilst records managers need to understand new technologies and the economics of them "the opportunity for records managers is in managing the operational feasibility and issues created through the implementation of these technologies". "it follows that the speed with which organizations move to less dependency on paper for business records is controlled by the office masses, not senior management. Eureka! With the realization that the people doing the office work have to feel comfortable with the new technologies, the whole game has changed and so has the agenda. To motivate these people to learn and use these technologies, they must see how it will be profitable to them. Since factors such as workload, computer literacy and personal motivation vary from person to person so will the motivation to move to less dependency on paper. While there must be organization wide advocacy of change, the opportunity and the tools must be presented independently to each individual for



them to integrate at their own comfortable pace. Records management has been returned to the people who do the work of the organization!" Records managers must take responsibility for re-educating themselves about technology. Records managers should not usurp MIS departments but cooperate with them for mutual benefit.

*Coulson, J. I. M. (1998) 'Our professional responsibility', Records Management Quarterly, 32 (4), p. 8.*

\*76 1998 MHM

*State of play with DMS at the time*

Survey of DM in UK local government.

*Williams, B. J. S. (1998) 'Document management in local government: the latest update: 'in 1998 authorities are chasing efficiency as hard as any other sector'', Information Management and Technology, 31 (1), pp. 17-20.*

\$460 1997 HMM

*E-records*

p.[1]. New computing techniques means that: "It is now common for an electronic business document to be made of numerous computer software and data components that are stored in several different distributed computer systems." p.[2]. The IT does not incorporate the tools for verifying accuracy and authenticity of information, nor for 'reconstructing' the original 'document'. E-records are "completely dependent on the software used to produce them and the availability of that software is critical to viewing, regenerating, or authenticating the content of a record or even its very existence." Users will be main custodians of information on their desktops so they will need access to IM/RM tools, with delegation of responsibility to them for their use. Such tools must be integrated into the day to day operation of the organisation's computer systems. Also need for digital signatures and encryption.

*Phillips, J. T. (1997) 'Do electronic objects create business risk?', Records Management Quarterly, 31 (1), pp. 37, 40-42.*

\*466 1997 MML

*City of Philadelphia e-record project*

Using Pittsburgh Project functional requirements to demonstrate possibility of incorporating RM functionality in two pilot implementations. The implementation of BPR exercises, particularly of IT processes, at all levels of government provide an opportunity for records managers or archivists to put recordkeeping functionality on the agenda, even though it is rarely taken into account by systems designers or managers. City of Philadelphia was undergoing significant IT systems design. Information and records are different things, and contentious issues exist around transform information systems into recordkeeping systems. The 'record-description-record' (RDR) approach stemming from the Pittsburgh Project has three elements: (1) define the contextual information needed; (2) obtain or create that information; (3) bind it to the content in a data structure. It is in some ways similar to the object-oriented (OOD) approach in software design – ERK software organized as objects with data structure and behaviour. Unlike OOD objects, however, the RDR electronic record does not contain within itself the software procedures typically associated with records, such as retention, retrieval, etc. The UBC project took a different approach, based on diplomatics and closer to a standard systems analysis view, in defining entities which are the equivalent of archival fonds. Unlike the RDR approach, much of the evidential value would reside in the system not the records themselves. The Philadelphia ER project (PERP) has gone with the RDR approach to allow for delivery of a functioning prototype within the funding timescale for the purpose of demonstrating ease of incorporating RK functionality at systems design stage. Written at early stage of project.



*Giguere, M. D. (1997) 'Automating electronic records management in a transactional environment: the Philadelphia Story', Bulletin of the American Society for Information Science, 23 (5), pp. 17-19.*

#### \$ 1330 1997 HMM

##### *ERM research agenda*

Research needed re systems implementation & design for ERM. (p293) "Our [archivists] efforts in the area of system implementation must focus on using the system to do what we cannot possibly do on our own: manage all record and non-record information in appropriate ways so that the business needs of the organization are met, the legal requirements are satisfied, and the history of the organization is documented and maintained. To do this, archivists will need to become involved at three levels: the organizational/professional level; the technological infrastructure level, and the system development and implementation level." "In order to take this role, archivists must have enough technical education to be able to understand and even suggest specific technology solutions." (p294) Suggested research issues are: "1. Push research based on the Pittsburgh Functional Requirements model. 2. Implement a model metadata system. 3. Develop software which will automate the management of typical office documents. 4. Evaluate server back-up systems and the application of hierarchical storage management (HSM) in support of archives and RM functions.

*Makarenko, A. M. (1997) 'Research Issues in Systems Implementation, Risks and Tradeoffs', Archives and Museum Informatics, 11 (3), pp. 293-301.*

#### \$1331 1997 HHH

##### *National Archives of Canada guidance on ERM*

In June 1996, the National Archives of Canada issued its Guideline on the Management of Electronic Records in the Electronic Work Environment to all Canadian federal government institutions. Part of the Guideline contained a vision of automated record keeping in which records would be captured automatically based on the incorporation of record keeping rules in the design of automated work processes. As an illustration of this concept, the National Archives developed a demonstration prototype based on a project management work process situated within one of the operational activities of the department. "In summary, as the records and documents of a given project are created, they are encapsulated with metadata describing the characteristics of the task (inside a business process) that created the record, the activity supported by the task, and the accountable responsibility centre in the organization. This metadata together with the functionality supported in a record keeping system are designed to ensure the authenticity and reliability of the record for the length of time it is required to serve a business or accountability purpose. The intent of this prototype has been to explore the feasibility of accomplishing this record keeping task automatically and, in the process, to learn more about the overall concepts and issues associated with record keeping in the electronic work environment." (p283) In terms of what still need to know (at the time) says the model didn't include a record keeping component (i.e. supporting functionality such as expressed in the UBC and Pittsburgh projects). How should this be included? What would the functional requirements look like?" (p285)

*McDonald, J. (1997) 'Towards Automated Record Keeping, Interfaces for the Capture of Records of Business Processes', Archives and Museum Informatics, 11 (3), pp. 277-286.*

#### \$709 1997 HMH

##### *State of ERM in Europe at the time*

Largely covering work of the national archives. Differences between the countries, caused by factors such as different legal systems, different organisational structures

and different views on RM and archives. This affects how they deal with e-records. Response is patchy and low key. P.206 "There is also a gulf between the major theoretical initiatives, mainly from North America, and the practical implementation of the results." P.209 "Specific legislation covering electronic records usually dates from the 1980s and 1990s." Data protection and privacy legislation is having a particular impact; also FoI. Likely to be greater harmonisation of such laws in the EU, and this will impact on eRM of archives. Resources devoted to eRM programmes modest and not often include IT specialists. Only 5 states had accessioned significant quantities of e-records. Most records were structured files usually from mainframe systems, and storage media typically nine track magnetic tape. Access restricted by time delay requirements, and many charge fees. No internet access. Access usually copy of file or printout. Research in Nordic countries between 1993/6 to look at access to e-records in public archives. p.211 "The conclusions were that the flat file formats should be separately stored as the 'original record', that online access was probably too expensive in access times, that DAT (digital audio tape) offered a good long term medium and that contracting out physical storage of electronic records was not viable" It appears that European archives have so far only accessioned government databases. P.214 "Future developments in electronic records in Europe must take account of four major factors ... The first is an increasingly supra-national legal system, the second is increasing amounts of data flowing across national borders, the third is the conflicting demands of privacy and openness, and the fourth is the spread of privatisation of state functions. These new conditions pose a challenge for increased co-operation across national boundaries, between the public and private sectors and between the different information professions."

*Mackenzie, G. (1997) 'Electronic records: the European dimension', Records Management Journal, 7 (3), pp. 205-216.*

\$725 1997 LMM

#### *DLM Forum inauguration*

Review of inaugural DLM forum in 1996. Forum is "A community of Public Archives and interested parties in archive, records and information management throughout the EU." (from Website).

*Tombs, K. (1997) 'Electronic records co-operation Europe-wide', Information Management and Technology, 30 (2), pp. 81-83.*

\$727 1997 HMH

#### *Progress in ERM*

Situation 10 years ago, i.e. 1987. Many people including record managers had no access to a personal computer or to email. Therefore IT people were setting the eRM agenda. Need to raise awareness of RM community to the problems and opportunities of ERM, and need to raise awareness of the IT community that there were problems with e-records and they need to work with record managers to solve them. Difficulties of communication between record managers from different traditions (Europe and North America e.g.) and between record managers and IT people. Concerns of users about the friendliness of systems. The potential of email to improve productivity of distributed team members therefore we need to embrace e-records. Change from this scenario very rapid, e.g. development of global community and communication tools, rapid cycle of development of IT tools, personal computers became ubiquitous in the workplace. These rapid changes left record managers behind in their attempts to develop eRM. Now in 1997: nearly all documents in industrialised countries are created electronically, and developing countries are catching up. E-records also being created by automated systems. Future IT developments could be e.g. voice messages and video reports on Web sites instead of written documents, wireless pocket computers with voice interfaces rather than PCs, biological or DNA-based machines to search the enormous amount of recorded

data. Record managers tend to argue against new technologies and the risks they pose to RM rather than finding ways to work with them. Changes more rapid in North America, but now happening in Europe and soon developing countries. IT infrastructure being donated to the developing world to deal with the digital divide. P.165 "the lesson of North America is that organizations will introduce new technologies when they see a business advantage to do so, or a lost advantage for not doing so, whether or not record managers are ready." We should learn from the experiences/mistakes of early adopters but this is rarely done. P.165 "ERM R&D is central to the success or failure of ERM implementation projects." ERM research has taken great strides in the last 10 years. Much research conducted in the US, but also in other countries. Considerable progress in ERM policies and guidelines, particularly in Australia. Record managers have become computer literate and are making growing use of the Web, so they are now aware of the issues and the technology personally. However, record managers are better at articulating the questions for eRM rather than giving answers. But now have reasonable agreement on the definition of an e-record. We have made good progress in developing the functional requirements for EDMS, however not so good at the next step of practical implementation of a system. Often avoid it by printing out the e-record for standard RM processes. True ERMS are now emerging (TRIM, GENCAT, Provenance). Making progress in developing international standards. The challenges we face include: p.173-176 "Getting on with practical implementation of electronic records systems"; "Paying more attention to changing work patterns and understanding and anticipating what those changes mean for the practice of archives and records management" e.g. development of use of word-processing by non-secretarial staff, spreadsheet systems and email, electronic data interchange (EDI) and workflow systems. In future could be development of multimedia records such as voice annotation of word processed documents, contextual information embedded in graphic displays and statistical tables, sound and video objects in business documents, Internet/intranet non-linear forms; such records cannot be printed and preserved on paper and won't necessarily follow the record lifecycle; "Working with other disciplines in tackling what are on the one hand opportunities afforded by new technology that on the other may present serious issues to overcome".

Barry, R. E. (1997) *'Electronic records management...the way we were...the way we are: one man's opinion'*, *Records Management Journal*, 7 (3), pp. 157-189.

#### #728 1997 HMH

##### *Australia's approach to ERM*

Australia's approach to eRM in the 1990s. Prior to 1990s recordkeepers had not addressed e-records. Emphasis on a registry system - in mid 1980s IT used to automate registry controls; recordkeepers pushed to include RM processes so that Australia now has world-class RM software. Development of the records continuum approach. Leading to AS 4390, the RM standard. P.197 "While the packages are now offering increased capacity to manage electronic documents, the majority of organisations are wary of the solutions proposed and have not yet integrated the electronic and paper worlds." Technological changes happening at an incredible rate. Computers on every desk, use of email, organisations interested in information dissemination and sharing. Working practices into smaller groups and teams not rigid bureaucracies. EDMS and workflow software. Intranets and extranets. Electronic commerce, electronic data interchange, document interchange. Information infrastructure being addressed at government level. RM often thought as relevant only to the paper world. Packages sold as addressing p.197 "all the information needs of organisations without the need for records management." Recordkeepers fighting to be heard. Trying to integrate different packages to address RM requirements. Traditional records management packages are document

management packages. Some strategic approaches, e.g. requests for packages for common government packages, government specification for RM software. Government archives involved in the strategic direction of electronic recordkeeping. Leading Australian archival institutions have adopted a policy of distributed custody for e-records. P.199 "This involves the organisation which created the electronic records maintaining them in their computing environment, migrating them to new hardware and software platforms as that environment changes. ... The archives institution exercises its responsibilities towards the records by setting standards and monitoring their implementation. It functions as the hub in a network of systems for maintaining and providing access to electronic records."

*Reed, B. (1997) 'Electronic records management in Australia', Records Management Journal, 7 (3), pp. 191-204.*

#### \*1400 nd MHM

##### *Indiana University Project*

Reviewed several large financial; and student record systems at the University. Characteristics of three types of primary system included in analysis: On-Line Transaction Processing (OLTP); Decision Support (DSS) / Data Warehouse; EDMS. Found that data managers very aware of regulatory and best practice requirements, but that systems had serious flaws as RK systems. Principal functionality lack: capture and preservation of inviolate records; regular migration; complete and detailed documentation; generation of sufficient metadata (particularly contextual, management, and audit trail). No system disposition and use histories available.

*Bantin, P. C. (n.d.) What Did We Learn About the Systems We Analyzed? White Paper. Indiana University*

#### \$720 1996 HML

##### *Progress in ERM*

"After 25 years of what has amounted essentially to inaction, electronic records management finally appears to have been rediscovered" [no page numbers available – html]. Legal rulings: (1) e-mails are records (2) ERs should be held in electronic form, not printed to paper. Need to manage electronic records first raised by Everett Alldredge, US Deputy Archivist, in late 1960s but largely ignored since. Pace of technological development means big catch-up requirement for records managers. Record types the same as always. only difference for creators is that they are using computers rather than pencil and paper. Management of electronic forms embryonic, but issues the same as for paper forms management, now focussed on items of information and interrelation between them. Policy and training directives now increasingly migrating to multimedia format. Mail management will have its electronic equivalent, with growing use of list servers etc. As with paper, involves organizing and allowing access to large volumes of information. Has tended, in electronic environment, to be the responsibility of a database administrator, who is not the owner. ERM involves " more changes in form than in substance", e.g. data warehouse little different in concept and processes from central filing systems 60–80 years ago. Problems with size and constantly changing data the same as those for large and active collection of e.g. index cards. Possible to control physical access to the latter, but less easy to control access to electronic equivalent; solution is to take snapshots at appropriately regular intervals. Complications through DP legislation, hacking, viruses. No infallible way to make systems completely secure; thus, part of records manager's role will be to ensure that active, archived, and backed up records are protected against unauthorized access or tampering. Records manager's role unchanged: organize and facilitate retention of records to be kept and disposal of those to be destroyed. Requirements for managing ERs include the necessity for (1) keeping supporting documentation relating to e-mail (e.g. electronic copies of drafts and revisions to attached documents and of calendars, distribution lists etc); (2)

recording transmission and receipt data; (3) “Records created on external systems. the records of electronic mail messages that are sent through the Internet and similar external systems should conform to the requirements for those messages that are transmitted through systems that operate only within a particular organization”. Records to be held in the long term should be transferred to a separate dedicated system and deleted from the active environment.

*Menkus, B. (1996) 'Defining electronic records management', Records Management Quarterly, 30 (1), pp. 38-42.*

#### \$656 1996 HMM

##### *Archivists and ERM*

View at the time. post-custodial ‘model’ for management. Location of records doesn’t matter. assure authenticity in the e-world, as in the paper world, but it will be achieved differently because over time every migration of a digital record “takes us further from the exact form of the original record”. Rejection of life-cycle model as inadequate for eRK.

*O'Shea, G. & Roberts, D. (1996) 'Living in a digital world: recognising the electronic and post-custodial realities', Archives and Manuscripts, 24 (2), pp. 286-311.*



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