

**ELECTRONIC RECORDS MANAGEMENT:
A LITERATURE REVIEW**

**ALF ERLANDSSON
COMMITTEE ON ELECTRONIC RECORDS**

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Preface

This is one of a series of products that has been prepared by the ICA Committee on Electronic Records. The mandate of the Committee, which was established in 1993, is to undertake study and research, promote the exchange of experience and draft standards and directives concerning the creation and archival processing of electronic records. The three products are as follows:

Guide for Managing Electronic Records from an Archival Perspective. The Guide is designed to help archival institutions reposition themselves to address the management of archival electronic records. Part I begins with an overview of the technological, organizational and legal trends that are having an impact on the ability of organizations, including archives, to keep and manage records that are in electronic form. It continues with a discussion of key concepts such as “record” and “record keeping” describing how these are impacted upon in the electronic environment, and then proposes strategies for accomplishing the life-cycle management of electronic records. Part I concludes by describing - from the legal, organizational, human resources and technological perspectives - the implications for archives of repositioning themselves to manage archival electronic records. Over time, implementing the proposed strategies will require the crafting of tactics, including standards, which can be recommended for adoption by archives. Part II of the Guide represents a first attempt by Committee members to articulate such a tactical approach. It is anticipated that the contents of Part II will be expanded over time, and that it will form the basis for the development of a series of recommendations to guide archives at the “how to” level.

Electronic Records Programs: Report on the 1994/95 Survey. The purpose of the survey, which was generously supported by the Centre des Archives contemporaines [*Les Archives nationales de France*] and the National Archives of Singapore, was to compile a directory of those archival institutions that have established or are planning to establish a program to manage electronic records. The directory is intended to facilitate information sharing and to highlight problem areas that the Committee should address. It is also intended to serve as a baseline upon which progress in establishing electronic records programs at the international level can be assessed through time. As well as a report on the findings of the survey, the product contains detailed tables describing information on the organizational and legal frameworks for electronic records programs, their program structures, and their technical specifications, information holdings, and access provisions.

Electronic Records: Literature Review. Based on an exhaustive review of the international literature on electronic records, Alf Erlandsson of the International Monetary Fund produced for the use of the Committee a substantial document that provided an excellent overview of the evolution that has taken place in the concepts and strategies related to the management of electronic records from an archival perspective. The Committee concluded that because the literature review could help archivists understand the broad context within which strategies such as those discussed in the Committee's draft Guide have been placed, it should be made available more broadly. It is hoped that the literature review will provide an important tool for use in education and training programs that focus on electronic records. The literature review will be updated periodically.

All three products are available from the Chair of the Electronic Records Committee (see address below) in both electronic (WordPerfect 5.2, or ASCII) and hard copy form or by accessing the ICA web site at <http://www.archives.ca>. These products reflect the collective thinking of the members of the Electronic Records Committee based on four meetings, considerable work between meetings and extensive consultation with colleagues in a variety of countries that share a common concern about the management of archival electronic records. The members of the Committee are very grateful to the ICA Programme Commission and the Secretariat of the ICA for their support and assistance and to the national archives that provided their generous sponsorship of Committee meetings and travel. They are also grateful to Margaret Hedstrom of the University of Michigan (School of Information) who edited the Guide and Ginette Fauvelle and Cécile Sauvé of the National Archives of Canada for the preparation, formatting and dissemination of the various drafts of the Guide and for their assistance in the organization of the consultation session in Beijing.

Before making the products available formally to the international archival community, the Committee established a consultation process to solicit comments. An important step in the process was a one-day consultation session held during the ICA Congress in Beijing. Although the results of the process, which was concluded in September 1996, were incorporated into the final products, the Committee recognizes that changes in technology, record keeping and the role of the archives will require the products to be updated on a periodic basis. The Committee also recognizes that the successful implementation of electronic records programs will require the development of more detailed guidelines for use by archives in dealing at the practical level with the management of archival electronic records. Also, carefully designed standards strategies and the adoption of relevant training and education methodologies will be needed. These, together with strategies for facilitating the establishment of electronic records programs (e.g. based on pilot projects), should become the focus of attention in the future.

For additional information on the products of the Committee on Electronic Records please contact: International Council on Archives, Secretariat, 60 rue des Francs-Bourgeois, 75003 Paris, France.

The members of the Committee on Electronic Records are: Peter Anderson, Scottish Record Office; Niklaus Buetikofer, Federal Archives of Switzerland; Michèle Conchon, National Archives of France; Ivar Fonnes, National Archives of Norway; Hans Hofman, National Archives of the Netherlands; Gertrude Long, International Monetary Fund; John McDonald (Chair), National Archives of Canada; Steve Stuckey, Australian Archives; Ken Thibodeau (Secretary), U.S. National Archives and Records Administration; Pitt Kuan Wah, National Archives of Singapore.

Préface

Le présent document fait partie d'une série de trois produits préparés par le Comité du CIA sur les documents électroniques. Ce comité, créé en 1993, a reçu le mandat de mener des études et des travaux de recherche, de promouvoir l'échange d'expériences et de rédiger des projets de normes et de directives sur la création et l'archivage des documents électroniques. Les trois produits sont les suivants :

Guide pour la gestion des documents électroniques du point de vue archivistique. Le Guide est conçu pour aider les institutions d'archives à se repositionner de manière à régler le problème de la gestion des documents d'archives électroniques. Dans la Partie I, on fait un survol des tendances technologiques, organisationnelles et juridiques qui influent sur la capacité des organisations, dont les institutions d'archives, à conserver et à gérer des documents sous forme électronique. On poursuit la discussion des concepts clés comme le « document » et « la tenue des documents », on décrit l'influence du contexte électronique et on avance des stratégies pour gérer les documents électroniques pendant tout leur cycle de vie. Enfin, on conclut par une description des répercussions que le repositionnement des archives à des fins de gestion des documents d'archives électroniques pourrait avoir sur le plan juridique et organisationnel, sur les ressources humaines et sur la technologie. Au fil des années, la mise en œuvre des stratégies proposées nécessitera l'élaboration de tactiques, notamment de normes, qui devront être adoptées par les institutions d'archives. Quant à la Partie II, elle se veut une première tentative des membres du Comité pour formuler une telle approche tactique. On prévoit que le contenu de la Partie III sera élaboré plus tard et qu'il servira de fondement à l'élaboration d'une série de recommandations pratiques.

Programmes de gestion des documents électroniques : Rapport de l'étude de 1994-1995. L'étude, généreusement financée par le Centre des Archives contemporaines [Les Archives nationales de France] et les Archives nationales de Singapour, visait à dresser un répertoire des institutions d'archives qui ont mis en place – ou qui comptent le faire – un programme de gestion des documents électroniques. Le répertoire doit servir à faciliter l'échange d'information et à mettre en évidence les secteurs problématiques dont devrait s'occuper le Comité. Il doit aussi servir d'étalon pour évaluer à la longue les programmes de gestion des documents électroniques qui seront établis à l'échelle internationale. Ce document contient, en plus des constatations de l'étude, des tableaux d'information détaillée sur les cadres organisationnels et juridiques des programmes de gestion des documents électroniques, leurs structures et leurs caractéristiques techniques, des fonds de renseignements et des dispositions d'accès.

Documents électroniques : Analyse de la littérature. Au terme d'une analyse complète de la littérature internationale sur les documents électroniques, Alf Erlandsson, du Fonds monétaire international, a produit à l'intention du Comité un volumineux document qui donne un excellent aperçu de l'évolution des concepts et des stratégies concernant la gestion des documents électroniques du point de vue archivistique. Le Comité a conclu en disant que l'analyse devrait être plus largement diffusée puisqu'elle est susceptible d'aider les archivistes à comprendre le vaste contexte dans lequel se retrouvent les stratégies dont il est question dans l'ébauche du Guide du Comité. Il est à espérer que l'analyse de la littérature deviendra un outil important des programmes d'études et de formation qui portent sur les documents électroniques. Enfin, les données de l'analyse seront mises à jour régulièrement.

On peut se procurer ces trois documents en s'adressant au président du Comité sur les documents électroniques (dont l'adresse suit) soit sous forme électronique (WordPerfect 5.2 ou ASCII) ou sur support papier. On peut aussi accéder au site WEB du CIA à l'adresse <http://www.archives.ca>. Ces produits sont le fruit de l'effort de réflexion collectif des membres du Comité sur les documents électroniques qui se sont réunis à quatre occasions, de la somme considérable de travail qu'ils ont abattu entre ces réunions et de la longue consultation qu'ils ont menée auprès de leurs collègues dans une foule de pays qui partagent un même souci quant à la gestion des documents d'archives électroniques. Les membres du Comité sont extrêmement reconnaissants envers la Commission du Programme du CIA et le Secrétariat du CIA qui leur ont assuré soutien et aide ainsi qu'envers les Archives nationales qui ont si généreusement parrainé leurs réunions et leurs déplacements. Ils remercient aussi Margaret Hedstrom, de l'University of Michigan (School of Information), pour avoir révisé le Guide et Ginette Fauvelle ainsi que Cécile Sauvé, des Archives nationales du Canada, qui ont veillé à la préparation, à la mise en page et à la diffusion des diverses ébauches du Guide et qui ont aidé à organiser la séance de consultation à Beijing.

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Avant de diffuser officiellement ces produits au sein de la collectivité archivistique internationale, le Comité a mis en place un processus de consultation pour recueillir des commentaires. Une des étapes cruciales du processus était une consultation d'une journée pendant le Congrès du CIA à Beijing. Même si les résultats de cette consultation qui a été menée en septembre 1996 ont été intégrés aux produits finaux, le Comité reconnaît qu'à la suite des changements qui surviennent dans la vocation des archives ainsi que dans les domaines de la technologie et de la tenue des documents, il faudra constamment les mettre à jour. Il reconnaît aussi que la réussite de la mise en œuvre de programmes de gestion de documents électroniques dépendra de l'élaboration de lignes directrices plus détaillées à l'intention des archives en ce qui a trait à la gestion pratique des documents d'archives électroniques. De plus, il faudra élaborer des stratégies de normalisation bien pensées et adopter des méthodes de formation pertinentes. C'est sur ces méthodes jointes aux stratégies destinées à faciliter l'établissement de programmes de gestion de documents électroniques (à la suite de projets pilotes) qu'on devrait désormais porter l'attention.

Pour plus d'information sur les produits du Comité sur les documents électroniques, veuillez vous adresser au :
Conseil international des Archives, Secrétariat, 60, rue des Francs-Bourgeois, 75003 Paris, France.

Voici les membres du Comité sur les documents électroniques : Peter Anderson, Bureau des archives d'Écosse; Niklaus Buetikofer, Archives fédérales de Suisse; Michèle Conchon, Archives nationales de France; Ivar Fonnes, Archives nationales de Norvège; Hans Hofman, Archives nationales des Pays-Bas; Gertrude Long, Fonds monétaire international; John McDonald (président), Archives nationales du Canada; Steve Stuckey, Archives d'Australie; Ken Thibodeau (secrétaire), Archives nationales des États-Unis et Administration des documents; Pitt Kuan Wah, Archives nationales de Singapour.

Summary

This Guide is one of a series of products prepared by the ICA Committee on Electronic Records. The mandate of the Committee, which was created in 1993 and concluded its work in 1997, was to undertake study and research, promote the exchange of experience and draft standards and directives concerning the creation and archival processing of electronic records. In addition to the Guide, the Committee also produced the results of a 1994/95 Survey of ICA members, to determine those that have established or are planning to establish a program to manage electronic records, and a Literature Review designed to provide an overview of the evolution that has taken place in the concepts and strategies related to the management of electronic records from an archival perspective.

The Guide is designed to help archival institutions address the management of electronic records. Part I examines the technological, organizational and legal trends impacting on the ability of institutions (including archives) to manage these records, presents a discussion of the concepts of "record", "record keeping", "electronic record", and other related terms which were developed for the purposes of the Guide and proposes strategies for the management of electronic records. Part I concludes with some discussion about the implications for archives as they reposition themselves to manage electronic records of archival value. Part II of the Guide describes the first of a number of the tactics archives can use to implement the strategies described in Part I.

Part I is divided into four chapters. Chapter One discusses the significant changes that are taking place in information technology and the extent to which this is having an impact on record keeping and records management. Organizational trends are also examined from a record keeping perspective with special attention being given to the impact of re-engineering, downsizing and restructuring on the approach taken by modern governments to the keeping of their records. The evolution taking place in the legislative and policy environment is also examined in terms of their impact on the conception, creation, and maintenance of electronic records. Overall, the chapter defines the technological, organizational and legal landscape within which most modern archives operate today, and describes how that landscape will influence the strategies and options that archival institutions will need to pursue.

Chapter Two presents the basic concepts that constitute the framework for the strategies presented in the Guide. For the purposes of the Guide, the Committee developed the following concept of "record":

A record is recorded information produced or received in the initiation, conduct or completion of an institutional or individual activity and that comprises content, context and structure sufficient to provide evidence of the activity regardless of the form or medium.

The distinctive feature of electronic records is that the content is recorded on a medium and in symbols (binary digits) that needs a computer or similar technology to read and understand.

The concepts of "record" and "electronic record" are linked to the concept of the "archival function" which was defined by the committee as that group of related activities contributing to, and necessary for accomplishing the goals of identifying, safeguarding and preserving archival records, and ensuring that such records are accessible and understandable. These concepts are used to explain that traditional practices employed for managing records may not be sufficient to ensure authentic and reliable records and that if such records are to be preserved as archival electronic records, archives will need to position themselves at the conception stage, even before records are created.

Based on the concepts described in the second chapter, Chapter Three proposes strategies for accomplishing the life cycle management of archival electronic records. While recognizing that the legal mandates, the resources, and the circumstances of archives vary significantly, the Committee made the following general recommendations concerning the strategies that archives should pursue:

1. The archives should be involved in the entire life cycle¹ of electronic systems that create and retain archival

electronic records to ensure the creation and retention of electronic records that are authentic, reliable and preservable.

2. The archives should ensure that records creators create and retain records which are authentic, reliable and preservable.
3. The archives must manage the appraisal process and exercise intellectual control over archival electronic records.
4. The archives must articulate preservation and access requirements to ensure that archival electronic records remain available, accessible, and understandable.

Chapter 4 examines the strategies raised in the third chapter in terms of their organizational, legal and technological implications for archives. It explains these implications in order to help archives establish checklists of the things they will need to consider as they move into a position to influence policy, standards, and the design of record keeping systems. For instance, an archives that strives to position itself at the front end of the records life cycle may need to adjust its enabling legislation or identify new training and education requirements or even job requirements to ensure that it has the staff in place to accomplish the task.

Part II of the Guide, represents a first attempt by Committee members to articulate tactical approaches to the management of archival electronic records based on the concepts and strategies discussed in Part I. Section A contains the first in what is intended to be a series of discussion papers exploring issues associated with identifying and managing the various categories of electronic records commonly found in many organizations. The first paper focuses on records in a database environment. Section B is intended to elaborate upon the strategies described in Chapter 3 of Part I by presenting methods and tactics that can be employed by an archives to address the management of archival electronic records. The first contributions focus on preservation and access.

The work of the committee in preparing this guide was based on the personal knowledge and experience of committee members as well as an extensive review of the international literature. No specific references are included in the Guide because they are already contained in the comprehensive literature review mentioned above. The committee is grateful for the contributions that have been made by experts around the world either in the literature or through personal conversations.

Sommaire

Le présent document fait partie d'une série de trois produits préparés par le Comité du CIA sur les documents électroniques. Ce comité, créé en 1993 et dont les activités ont pris fin en 1997, avait reçu le mandat de mener des études et des travaux de recherche, de promouvoir l'échange d'expériences et de rédiger des projets de normes et de directives sur la création et l'archivage des documents électroniques. Outre le Guide, le Comité a également publié les résultats d'une étude menée en 1994-1995 auprès des membres du CIA, afin de déterminer lesquels d'entre eux avaient mis en place - ou comptaient le faire - un programme de gestion des documents électroniques. Une analyse de la littérature du domaine a été menée pour donner un aperçu de l'évolution des concepts et des stratégies concernant la gestion des documents électroniques du point de vue archivistique.

Le Guide est conçu pour aider les institutions d'archives à gérer les documents électroniques. Dans la Partie I, on fait un survol des tendances technologiques, organisationnelles et juridiques qui influent sur la capacité des organisations, dont les institutions d'archives, à gérer ces documents. On discute également divers concepts comme le « document », la « tenue des documents », le « document électronique » et d'autres termes qui ont été définis aux fins du Guide et on avance des stratégies pour gérer les documents électroniques. On conclut par une discussion portant sur les répercussions que pourrait avoir le repositionnement des institutions d'archives afin d'assurer la gestion des documents électroniques ayant une valeur archivistique. Quant à la Partie II, elle décrit la première de diverses tactiques dont pourraient se servir les archives pour mettre en œuvre les stratégies énoncées dans la Partie I.

La Partie I comprend quatre chapitres. Le chapitre I est une discussion des changements importants qui se produisent en technologie de l'information et leur incidence sur la tenue et la gestion des documents. On examine aussi les tendances organisationnelles du point de vue de la tenue des documents en accordant une attention spéciale aux répercussions de la restructuration organisationnelle et la réduction des effectifs sur la façon dont les administrations modernes conservent leurs documents. On se penche aussi sur l'évolution du milieu législatif et administratif, en raison de leurs conséquences sur la conception, la création et le maintien des documents électroniques. Bref, ce chapitre brosse le tableau technologique, organisationnel et juridique dans lequel évoluent la plupart des archives modernes et décrit comment ces facteurs influenceront sur les stratégies et les options que devront suivre les institutions d'archives.

Le chapitre II renferme les concepts de base qui forment le cadre des stratégies dont il est question dans le Guide. Aux fins du Guide, le Comité a défini le concept de « document » comme suit :

Un document est de l'information consignée, créée ou reçue au moment d'amorcer, d'effectuer ou de compléter les activités menées par une institution ou une personne et qui présente un contenu, un contexte et une structure permettant de prouver l'existence de ces activités, indépendamment de la forme ou du support.

Les documents électroniques ont une caractéristique distincte : étant consigné sur un support informatique et en symboles (chiffres binaires), leur contenu ne peut être lu et compris qu'au moyen d'un ordinateur ou d'une technologie assimilée.

Les concepts de « document » et de « document électronique » sont liés au concept d'« archivage », fonction qui a été définie par le Comité comme étant un groupe d'activités connexes nécessaires à l'atteinte des buts relatifs à l'identification, à la protection et à la préservation des archives, tout en veillant à ce qu'elles soient accessibles et compréhensibles. Ces concepts servent à expliquer que les pratiques traditionnelles de gestion des documents peuvent s'avérer insuffisantes pour assurer l'authenticité et la fiabilité des documents et que la préservation de ces documents en tant que documents d'archives électroniques suppose que les institutions d'archives se repositionnent dès l'étape de la conception des documents, avant même leur création.

Reprenant les concepts décrits au chapitre précédent, le chapitre III propose des stratégies visant à gérer les documents d'archives électroniques pendant tout leur cycle de vie. Même s'il reconnaît que les mandats, les ressources et les circonstances peuvent varier énormément entre les institutions d'archives, le Comité a fait les recommandations générales suivantes à propos des stratégies que ces dernières devraient poursuivre :

1. Les institutions d'archives doivent participer tout au long du cycle de vie¹ des systèmes électroniques qui créent et conservent des documents sur support électronique afin de garantir la création et la préservation de documents électroniques authentiques, fiables et durables.
2. Les institutions d'archives doivent veiller à ce que les créateurs se soucient de l'authenticité, de la fiabilité et de la durabilité des documents qu'ils créent et conservent.
3. Les institutions d'archives doivent exercer un contrôle intellectuel sur les documents d'archives électroniques et en gérer le processus d'évaluation.
4. Les institutions d'archives doivent formuler les exigences en matière de préservation et d'accès afin que les documents d'archives électroniques demeurent disponibles, accessibles et compréhensibles.

Dans le chapitre IV, on examine les stratégies soulevées dans le chapitre précédent et leurs répercussions organisationnelles, juridiques et technologiques sur les archives. On explique ces répercussions afin d'aider les institutions d'archives à dresser des listes de vérification des choses dont elles devront tenir compte pour se positionner de manière à influencer la politique, les normes et la conception des systèmes de tenue des documents. Prenons le cas d'une institution d'archives qui cherche à se positionner au tout début du cycle de vie : elle devra peut-être faire modifier sa législation habilitante ou cerner ses nouveaux besoins de formation ou même d'embauche pour s'assurer qu'elle a tout le personnel nécessaire pour s'acquitter de la tâche qui lui est confiée.

La Partie II du Guide constitue la première tentative des membres du Comité pour formuler des approches tactiques en matière de gestion des documents d'archives électroniques qui soient fondées sur les concepts et les stratégies discutés dans la Partie I. La section A renferme le premier document de discussion de toute une série portant sur des questions d'identification et de gestion des diverses catégories de documents électroniques que l'on retrouve dans bien des organisations. Ce document traite surtout des documents dans des bases de données. La section B vise à raffiner les stratégies décrites dans le chapitre III de la Partie I en présentant des méthodes et des tactiques dont pourrait se servir une institution d'archives pour gérer ses documents d'archives électroniques. Ces premières contributions ont d'abord trait à la préservation et à l'accès.

En préparant le Guide, les membres du Comité se sont inspirés de leur bagage de connaissances personnelles et de leur expérience et d'une analyse complète de la littérature du domaine à l'échelle internationale. Le Guide ne renferme aucune référence précise, puisque qu'on retrouve ces références dans l'analyse mentionnée ci-dessus. Le Comité tient à remercier les spécialistes du monde entier pour leurs précieuses contributions obtenues sous forme d'écrits ou lors de conversations personnelles.

¹/ Le « cycle de vie » des documents comprend trois étapes fondamentales : la conception, la création et le maintien (y compris la préservation et l'utilisation).

¹/ The "life cycle" of records comprises three basic stages; conception, creation, and maintenance (including preservation and use).

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Chapter 1

The Scope

*Without such an approach, we are convinced archivists in the information age are doomed to an antiquarian, curatorial irrelevancy. With such an approach, we feel archivists are positioned as never before to inject an archival agenda into public affairs and to preserve a rich corporate and societal memory.*²

This literature review (covering mainly 1992-1996) has been undertaken in order to identify and analyze the latest thinking and theories of leading experts in the management of electronic records, and the technologies that may help in formulating strategies in this field.

Developments are occurring in the electronic records world as fast as in that of office technology at large. Writers are already talking about the first, second, and sometimes third generation of electronic records. Therefore, it has been necessary to concentrate on identifying the most up-to-date writings on the subject, and trying to summarize what is the “latest say”³ in the ongoing search for solutions and best practices. The sad fact is, however, that very often what is *printed* is already obsolete or in need of updating - including this review. Therefore, much of the “literature” referred to in this review has been picked from--sometimes difficult to locate--sources in “Cyberspace”⁴, or has been found in grey or fugitive literature such as internal reports.

Much is being written about the modern technology landscape, and likewise a lot has been written about management of archives and records, but comparatively little is written about these two subjects together. The latest publications and reports combining the two subjects, as well as works written without reference to electronic records, but which describe technologies which potentially may be of crucial importance for finding a solution to the problems posed by electronic records, have been included, analyzed and commented upon here. The life-cycle⁵

^{2/} “Such an approach” refers to an electronic records policy adopted by the National Archives of Canada: a) that preservation of records in electronic format is essential to an understanding of Canada’s past and to the on-going continuity of government operations; b) that an electronic records program must be fully integrated with that for records in paper form emanating from the same source; c) that appraisal and description of electronic documents must be based on the archival principle of provenance and contextual analysis; and d) that archivists/records managers must progress from a reactive, *ad hoc*, servant relationship with records creators to an active, planned, strategic, function-oriented, research based approach. Terry Cook and Eldon Frost, “The Electronic Records Archival Programme at the National Archives of Canada: Evolution and Critical Factors of Success”, *Electronic Records Management Program Strategies, Archives and Museums Informatics Technical Report*, No. 18 (1993), edited by Margaret Hedstrom.

^{3/} The first version of this paper was prepared for the ICA Electronic Records Committee on the occasion of its second meeting held in Canberra in 1994. Since then it has been continuously updated, including for the Beijing ICA Congress in 1996. The “latest say” has turned out to be a moving target. Readers may thus notice the different layers in the development of the paper.

^{4/} Searches have been carried out using Internet and the World Wide Web.

^{5/} Since this paper was first drafted early in 1993, the concept of “life-cycle” - at least as the author of this paper has understood the concept - seems to have undergone a conceptual change, being replaced with, or compared to, the concept of “Records Continuum”. When this text was initially written, the author simply meant the cycle of records from the pre-creation to the final disposition stage (including the “archival” or non current stage), and did not see the concept of life-cycle as an expression for the professional bifurcation between records management and archives, something it seems to have been considered a synonym for by the writers cited below. An explanation of the concept of the records life-cycle similar to the author’s understanding was given by Terry Cook in a paper presented at the ICA Congress in Beijing in September 1996: “This was the origin of the American ‘life cycle’ concept, where records are first organized, maintained, and actively used by their creators, then stored for an additional period of infrequent or dormant use in off-site records centres, and then, when their operational use ended entirely, ‘selected’ as archivally valuable and transferred to an archives, or declared non-archival and destroyed”.

In contrast, the Australian archivists O'Shea and Roberts have explained the concept of "whole-life-cycle" (i.e. the records continuum) vs. the "traditional life-cycle" concept. They note that "...the idea and practice of managing records across *the whole life-cycle (or continuum)* rather than just within the archival institution has, of course, been with us for some time.... *This is the continuum approach*, and it brings into sharp focus the need to re-orient, what some might perceive to be, the traditional archival mission". They continue, addressing "the traditional life-cycle", which they equate with the traditional bifurcation between the management of active records (records management) and the management in archival institutions of archival records. reg O'Shea and David Roberts, "Living in a Digital World: Recognizing the Electronic and Post-custodial Realities", *Archives and Manuscripts*, Vol. 24, No. 2 (November, 1996).

David Bearman shares the Australian view, and explains: "Basically the records continuum model does this (enables us to formulate methods to control records as instruments of governance, accountability, memory, identity, and as authoritative sources of value added information) by rejecting the records life-cycle model of records management and replacing it with a model in which records include records of continuing value (e.g. archives) rather than having archives somehow come from records over time. The life-cycle model is rejected because it is records-centric, focused on custody and operational tasks, and makes unnecessary distinctions between records and archives based on the activity of selection. This has led to the para-professionalization of records management and the marginalization of archivists." David Bearman, "Managing the Record Continuum", *Archives and Museum Informatics*, Vol.10 (1996).

When the concept "life-cycle" is used in this paper, it should be understood that the author is referring to "the whole life-cycle", or records continuum. approach has been followed in this

presentation, and the materials identified will be discussed in that context - with the exception of Chapter 11 which is geographically organized.

Chapter 2

The New Paradigm

The Canadian archivist Terry Cook has, in a stylistically brilliant article, asked his fellow archivists and records managers to adopt "to a completely new paradigm, or intellectual framework" in the management of archives and records in an electronic environment. Cook describes a future archivist with quite different functions and responsibilities than those they are presently trusted with, and he sees a completely new role for archival institutions. He encourages his colleagues to rid themselves of their present "paper-bound" mind set:

My thesis, simply stated, is that archivists can no longer afford to be, nor to be perceived to be, custodians in an electronic world. We must stop being custodians of things and start being purveyors of concepts. We must stop serving, in the first instance, and start directing; stop rowing and start steering. We must get off the daily treadmill and start realizing that the supply of records, or evidence of actions and transactions and of their animating processes and functions, gives us unique power. We must stop fearing that the new age of increasing demands, ever more records to manage,

difficult computer records to cope with, even shrinking resources - that all these spell hopeless gloom - and start believing that traditional archival principles and theories, transformed into the corporate setting of the records creator and appropriately reconceptualised for an electronic world, may hold the key to prospering in the new environment we face. We must, in short, embrace with enthusiasm our context-based or provenance-based legacy, to which we have too often paid lip service only, and transform it from a physical and structure-centered mind set to one that is conceptual and process-centered.⁶

For many it may be difficult to accept the reality of the new paradigm. Archival institutions that have been functioning strictly as depositories for older records, and not been involved in what in the English-speaking world is called "records management", may find these new functions and responsibilities strange and difficult to accept. It means that they must deal directly with the originators of records in the corporate setting of the records creator, and start to proactively involve themselves in the administrative processes that create the records. Archivists may also have to be able to understand and actively participate in Enterprise Analysis and Enterprise Re-engineering in order to correctly identify and analyze functions, processes, activities, tasks and transactions in the agencies and bodies from where the records originate.⁷ They must accept the challenge to "stop rowing and start steering".

As the organizational setup of archival institutions in the world varies widely, the difficulties in responding to the challenge will differ from country to country.⁸ There are visible differences in *Organizational Cultures* within

⁶ / Terry Cook, "Electronic Records, Paper Minds: The Revolution in Information Management and Archives in the Post-Custodial and Post-Modernist Era", *Archives and Manuscripts*, Vol. 22, No. 2 (November, 1994). For an overview of the historical developments leading to these new concepts in archival theory and practice, see Terry Cook, "Archives in the Post-Custodial World: Interaction of Archival Theory and Practice since the Publication of the Dutch Manual in 1898". (Paper given at the XIII International Congress on Archives, Beijing, 1996).

⁷ / See David H. Thomas, "Business Functions: Towards a Methodology", from the University of Pittsburgh Recordkeeping Functional Requirements Project: Reports and Working Papers (September, 1994) (<http://www.lis.pitt.edu/~nhprc/>). Also of interest in this context is Wendy Duff, "Defining Transactions: To Identify Records and Assess Risks", from the University of Pittsburgh Recordkeeping Functional Requirements Project (<http://www.lis.pitt.edu/~nhprc/prog5.html>). See also "Analyzing Organizations - Enterprise Analysis", Module 3 of IST 4235, *Electronic Recordkeeping* (Edith Cowan University, Perth, Western Australia) (<http://liswww.fste.ac.cowan.edu.au/courseware/IST4235/IST4235.htm> - now only available in CD-ROM). This describes the top-down decomposition methodology.

⁸ / Angelika Menne-Haritz (in the introduction to *Information Handling in Offices and Archives* (K.G. Saur, 1993) has pointed out that cooperation and understanding between archivists over the world is hampered by fundamental differences in terminology and

countries as well as between countries.⁹ These differences must be analyzed and seriously considered by archivists when they attempt to control the new world of electronic records.¹⁰ Also, archives in those countries that have traditionally combined the management and control of current records still in the custody of the agencies (originators) with the management and

concepts. She refers to a recently held international symposium⁹“The symposium was held in English only. While this encouraged spontaneous discussion, it cannot be denied that it also led to serious misunderstandings, mainly because English archive terminology - and likewise the technical terms used in records management - sprang from a different tradition, with the result that English terms frequently denote something quite different from their ‘equivalents’ in the terminology of the other languages represented. Thus a straight translation is usually no guarantee of mutual understanding; to achieve this, the discussion partners must, at the very least, be familiar with the basic principles of the respective administration and archive structures involved. The more precise a technical discussion is intended to be, the greater the risk that the participants talk about different things. In our case, the semantic confusion prompted the suggestion that an investigation be carried out of the differences between European and American administrative traditions in their dealings with recorded documents.” David Bearman, who was present at the symposium, has tried to do just that in “Diplomatics, Weberian Bureaucracy, and the Management of Electronic Records in Europe and America”, *The American Archivist*, No. 55 (1992).

⁹/ David Wallace comments about “organizational culture”: “An assumption guiding this research stipulates that variables in organizations affect the way in which both software and hardware are utilized and may affect the degree to which recordkeeping functional requirements can be adopted. Essentially, this hypothesis argues that the type of culture an organization exhibits will have a tremendous impact on the course of action taken by archivists and allied professions to satisfy recordkeeping functional requirements.” David Wallace, “Satisfying Recordkeeping Functional Requirements: The Organizational Culture Variable”, (<http://www.lis.pitt.edu/~nhprc>).

¹⁰/ “Electronic record keeping functional requirements are not absolutes. Every organization must choose for itself the degree to which different systems, supporting different business functions, should satisfy the requirements. The basis for such decisions should be *an analysis of risks*, but even when a decision is made to satisfy a requirement, the methods employed will differ from one organization to the next. The variables in how an organization elects to satisfy its record keeping requirements are likely to reflect differences between organizations in their corporate cultures, business functions and information technology environments.” Module 9.0 of IST 4235, *Electronic Record keeping* (Edith Cowan University) (CD-ROM Electronic Record keeping).

custodianship of non-current, archival records, will have less difficulty in adjusting to the requirements of the electronic records world than archives in countries that have strictly separated the management and control of current records not yet in their custody from the custodianship of non-current “archival” records.¹¹

A readjustment to the demands of the new paradigm is unavoidable, as noted by David Wallace. “The traditional practice of passively preserving the record at the terminal stages of its life cycle will fall short of what is needed in the second generation. The record may not survive without early identification and intervention... what is needed is a reassertion of what archivists do and a reorientation of how and when we do it.”¹²

Fortunately, there seems to be a new and increasing awareness of the problem and a desire to take action in various circles. In addition to the ICA Electronic Records Committee, for which this review is conducted, several other bodies in different parts of the world are seeking solutions to and issuing guidelines for the management of electronic records. In addition to the work being carried out by the Universities of Pittsburgh in the U.S., British Columbia in Canada (in combination with the U.S. Department of Defense (DoD) and Edith Cowan in Australia, which are presented below (Chapter 5), a number of other projects have been identified.

In the United States, the Commission on Preservation and Access and the Research Libraries Group have jointly created a *Task Force on Archiving of Digital Information*. The Task Force, where the archives side is represented by Margaret Hedstrom, issued a draft report in September 1995.¹³ The purpose of the Task Force is to investigate the means of ensuring “continued access indefinitely into the future of records stored in digital form”. The University of Indiana has launched an “Electronic Records Project” and published a plan and progress report in Internet in December 1995.¹⁴

Margaret Hedstrom has made a summary of ongoing (and completed) electronic records research projects in the United States as of end of June 1996.¹⁵ She describes the initiatives taken by the National Historical Publications and Records Commission (NHPRC) aiming... “to improve the management of electronic records and enhance their chances for long term survival.” Hedstrom organizes her summary into five areas of research:

- functional requirements for recordkeeping;
- metadata standards and requirements;
- policy and program development;

^{11/} “While, for example, in France office records are called archival documents (*archives courantes*) and the records management in that country at least partly belongs to the task of an archivist, this is not the case in Germany. In Germany, office records are classified and filed in accordance with a plan by special records managers (*Registratoren*). So the German tradition in records management means that classified and formatted records are appraised by the archivist and transferred into the archives. The German archivists do not appraise the records for transfer into the archives until the records are no longer needed at the offices. As we can see, German archivists have in general only competence for the *archives historiques*, to borrow the French terminology which distinguishes between *archives courantes*, *archives intermédiaires* and *archives historiques*. They have hardly any influence on office records management and the ADP applications there.” Volker Trugenberger, “Automatic Data processing in Archives - German Experiences”, *Archivi & Computer* (3) (1993). Similar concerns were expressed by German archivists at the open session of the ICA Electronic Records Committee on the occasion of the ICA World Congress in Beijing in September 1996. (The Congress papers are yet unpublished).

^{12/} David Wallace, Op. cit.

^{13/} The Task Force’s progress report is published in Internet WWW (<http://www.-rlg.stanford.edu/ArchTF>).

^{14/} The Indiana University project: see <<http://indiana.edu/~libarche>>.

^{15/} Margaret Hedstrom, “Electronic Records Research Issues. A Summary of Recent Research”, Prepared for the Invitational Conference on Electronic Records, June 28 and 29, 1996, University of Michigan, (<http://www.si.umich.edu/e-recs/Research/NHPRCSum.html>).

organizational behavior, barriers, and incentives;

innovation diffusion and education.

Hedstrom mentions, *inter alia*, the Pittsburgh project (see Chapter 5, 1a. below) and its two follow-on projects undertaken in Philadelphia and at the University of Indiana, and also the project at the University of British Columbia (Chapter 5, 1c below), and she concludes:

It is obvious that a great deal has been accomplished under the NHPRC electronic records research agenda. What we lack is an evaluation of the usefulness of these findings from the perspective of organizations that are responsible in some way for preserving and providing access to electronic records. We need assessments from the administrators of archival and records management programs about the feasibility of putting the proposed policies, and models, into practice.¹⁶

Among projects undertaken in Europe should be mentioned the Swedish SESAM project, which has been described below in Chapter 5, 1a.

In Australia, a working group named *Towards Federation 2001* and chaired by Keith Parrot, has a similar agenda to that of the U.S. Task Force, and is developing “guidelines for the management of material in electronic format” and “provides a forum for the exchange of information relating to the preservation of electronic information”.¹⁷ The Australian Archives is working on a “policy for Electronic Recordkeeping in the Commonwealth Government”. It published an “exposure draft” in Internet in September 1995.¹⁸

Chapter 3

What Constitutes “Recordness”?

Before we look at tools and technologies that can help manage electronic records, we should look at the very concept of records and see how experts have defined what constitutes “recordness”.

In the traditional paper world, according to Richard Cox, the concepts of record and recordness have often been taken for granted or assumed to be self-evident: “A large portion of the archival and records management literature has seemed to suggest that the authors and readers know a record when they see one.”¹⁹

Richard Cox - referring to the American/Canadian archival world - also claims that not much “serious reflection about the theoretical dimension of a record” has been accomplished by archivists and records managers. The advent of the electronic record has dramatically changed that situation and caused a number of questions about what constitutes a record to be raised:

Is my record version one of my memorandum drafted for initial review, the second version sent to its intended

¹⁶/ Ibid.

¹⁷ / Concerning *Towards Federation 2001*, see the Australian Archives Home Page <http://www.aa.gov.au/AA_WWW/AA_Home_Page.html> or contact Keith Parrot (e-mail:<keith@aa.gov.au>).

¹⁸/ Concerning the Australian Archives project see the Australian Archives Home Page or contact Greg O’Shea (e-mail:<greo@aa.gov.au>). See also <<http://www.nla.gov.au/dnc/tf2001/backgr.html>>, and “Managing Elec-tronic Records - Shared Responsibility”, (http://www.aa.gov.au/AA_WWW/AA_Issues/ManagingER.html).

¹⁹/ Richard Cox, “The Record: Is it Evolving? A study in the Importance of the Long-View for Records Managers and Archivists”, (<http://www.lis.pitt.edu/~nhprc>).

audience, or the third version which has been modified by the recipient as he included the memorandum into a report? Or, are all three records? Is my record the spreadsheet of financial figures and sales trends retrieved at 9:31 A.M. or the spreadsheet called up three hours later when the figures have been modified? Or, are both legitimate records? Can we possess a record that is largely composed of text, images, and statistics loaded in from online bibliographical systems or transferred from documents created by other organizational staff?²⁰

Cox feels that the concept of record and recordness, which earlier was more or less self-evident, is now at risk of getting lost in the new electronic environment,²¹ and he tries to help archivists *rediscover* the “the fundamental notion of a record” by making an historical analysis. He points out that already the founding fathers of the principle of provenance, Muller, Feith and Fruin (1898), had clearly defined the concept of record as “organizational evidence”. The Dutch archivists were followed in the development of this “theory” by the English archivist Hilary Jenkinson and by the Americans Margaret Cross Norton and T.R. Schellenberg.²² All of them axiomatically equal a record with transactions and evidence. Cox concludes: “thus, by the mid-twentieth century, there was a firm sense of a record as a transaction and as evidence of transactions.”²³ Therefore, it should not be too difficult for professional archivists, trained in archival theory based on the Dutch doctrine, to accept a definition of electronic records as the product of a transaction, and to understand that electronic information that is not the result of a transaction does not qualify as a record, but rather constitutes a body of text created for a different purpose than a business transaction.²⁴

Further, archivists have traditionally been trained to preserve not only bodies of text or “documents”,²⁵ but also to preserve the systems (i.e. recordkeeping systems) which originating bodies (agencies, departments, etc.) have developed to keep, and make retrievable, records resulting from carrying out functions, processes, tasks and transactions for which these bodies are responsible. Such records are the result of transactions that took place recently, or a very long time ago. To understand them, for the purpose of reconstructing a chain of events, for accountability, or for proof (evidence), much more than the pure textual content and its structure must be preserved.

²⁰/ Ibid.

²¹/ Ibid. Cox notes: “These views often reveal that some essential dimensions of the record and its purpose have been lost or confused in the maze of computer and high tech wizardry.” He illustrates this by quoting from a U.S. National Archives study on the use of electronic databases in the Federal government: “First, the definition of databases utilized did not focus on the document but on ‘collection of data’, the aspect of being ‘computer-readable’, and its relevance to the agency using it. Second, a set of criteria proposed for appraising the electronic databases considered research value, content and coverage, state of the data, and relationship of data. There was no emphasis on the more basic notions of transaction or evidence.”

²²/ The author would here like to add Ernst Posner, German, Swedish, and finally, American archivist.

²³/ Richard Cox, Op. cit.

²⁴/ Compare the view of an Australian archivist in 1991: “So it is not so much the revision of archival theory or strategies that is required before they can be applied to electronic records, but rather an adequate understanding and acceptance of the archival mission together with the timing of the new-age appraisal that is the essence.” Glenda Acland, “Archivist - Keeper, Undertaker or Auditor: The Challenge for Traditional Archival Theory and Practice”, *Keeping Data, Papers from a Workshop on Appraising Computer-Based Records* (Sydney, October, 1990).

²⁵/ For the distinction between electronic record, electronic document and data see David Roberts, “Defining Electronic Records, Documents and Data”, *Archives and Manuscripts*, Vol. 22, No. 1 (May, 1994).

Seen in their context and preserved undisturbed in their original systems, they together mirror past transactions. They are the *remnants* of those transactions.²⁶ The implementation of the principles of provenance, *respect de fond* and *respect de l'ordre primitif* has made it self-evident that records are remnants of past (business) transactions, and that recordkeeping systems created by the originator must be preserved, undisturbed and in their original order, as evidence of what has taken place.²⁷

A paper from an Australian workshop on the management of electronic records of archival value illustrates the complexity of clearly defining electronic records by drawing a parallel to paper records:

The "record" is evidence of the occurrence of a particular transaction. With a paper "record" the content (i.e. the writing on the page) the media (i.e. the paper) the structure (i.e. how the writing is arranged on the page) and the context (i.e. the interrelationship between the item, the file, and the business in which the transaction is taking place) are all either physically linked or self evident to the human eye. With electronic records this is not the case. The elements we would need to bring together to have a meaningful electronic "record" (i.e. the content, context and structure) do not occupy the same physical space, in fact they are randomly located. Further, they are not evident to the human eye without the intermediary of "software" and "hardware". In essence it is really the act of recording and the transactional information that results which makes something a record, not the media on which it is recorded.²⁸

Records consist of content, structure and context. The three qualities must be captured and preserved together in order to meet the requirements for "recordness". The content must be put together with data about structure and context. We may call these data "metadata" (i.e. data about data). If the metadata are lost the item loses its "recordness" (i.e. evidential value) and becomes "business unacceptable" (useless as evidence). In an article

"Towards A Reference Model for Business Acceptable Communications", David Bearman describes a record as "a metadata encapsulated object":

We can envisage a record as a metadata encapsulated object, although in fact it might not be physically stored in this manner. When transmitted, the contents of the record are preceded by information identifying the record, the terms for access, the way to open and read it, and the business meaning of the communication.²⁹

In another article, Bearman compares the metadata encapsulated objects to "electronic envelopes containing business communications that would ensure that the envelopes could be opened by different computers in the future and their contents would still be accurate, understandable and meaningful."³⁰

^{26/} "Traditional archivists still think of records as outputs rather than transactions. Redefining the record as a transaction forces archivists to look at the types of transactions for which they must provide accountability rather than asking what kinds of records they should keep." The writer continues to explain that in the electronic world some transactions do not leave any "records" at all. A search in a database may be a decision-making process, but it results in no "record". So, the relationship between transactions and records, and their implications for archival data capture must be explored further: "Saving databases does not preserve evidence, only information. Evidence resides in the conjunction of structure, context, and data in a transaction." David Bearman, "New Models for Management of Electronic Records", *Electronic Evidence, Strategies for Managing Records in Contemporary Organizations* (Pittsburgh, 1994).

^{27/} See also: Alf Erlandsson, "The Principle of Provenance and the Concepts of Records Creator-Legal Development". Paper given at the First Stockholm Conference on Archival Theory and the Principle of Provenance (2-3 September 1993) (Skrifter utgivna av Svenska Riksarkivet 10, Stockholm 1994).

^{28/} *Papers from a Workshop on Managing Electronic Records with Archival Value*, Sydney (April 1993).

^{29/} David Bearman, <<http://www.lis.pitt.edu/~nhprc/prog6-5.html>>.

^{30/} David Bearman, "Virtual Archives", (<http://www.lis.pitt.edu/~nhprc/prog6.html>). Also printed in the *Second Pittsburgh Research Report* (School of Library and Information Science, University of Pittsburgh, March, 1995).

While fully agreeing with the concept of records as evidence, Angelika Menne-Haritz goes even further in defining evidence:

Evidence means patterns of processes, aims and mandates, procedures and results, as they can be observed. It consists of signs, of signals, not primarily of words. It might be in symbols such as crosses or lines, showing that a person, who has to assume responsibility for a certain task by description of his job, has really seen the paper, has read it and is aware of the underlying decisions. It might be the location of a certain text in the left hand corner at the top of a sheet of paper giving it the function of address. It might even be the following-up of papers in a file, indicating a sort of working order. Or it might be a certain cover of a folder, a certain handwriting, telling where the folder originates. All these are non-verbal signs, which must be interpreted in context to show their meaning. If you can understand them, they tell you how processes worked and who was responsible for which decision.³¹

In a very original definition of a record Menne-Haritz stated:

Records are not true. They are always purposeful, even if they do not name their purpose literally. No law can be strong enough to make people do something that has no meaning for their activities. They create records because they need them, not because someone ordered their creation. Accountability is a social benefit which is generally accepted in democratic societies. But the steering and controlling of cooperative decision-making processes is a very direct reason for the creation of records, because with their help all efforts can be effectively oriented to a common goal or purpose. That is the proper reason for the creation of records. Records are not made for posterity. Records are created because they are needed by those who create them, not as information collection but as intellectual working tools for the steering of cooperative decision-making processes. And records are therefore reliable. The better they have served their primary purposes of initiating and controlling cooperative, purposeful, intellectual work, the more they are authentic and trustworthy in elucidating those processes for secondary purposes, be it evidential or informational.³²

In the “information age”, our computer science specialists have more or less overlooked the important difference between information and record, and designed systems and tools for management of documents and records (even sometimes trying to issue guidelines for their management) without the benefit of archives and records management expertise. The conclusion is that in the electronic world, it becomes mandatory to distinguish between *information* and *records*:

Archivists and records managers must focus on evidence not information. The “Information Age” has been seductive for all of us in that it has put a new stress on managing vast quantities of information created from many and diverse sources and used in new and interesting ways.³³

^{31/} Angelika Menne-Haritz, “Appraisal or Selection Can a Content Oriented Appraisal be Harmonized with the Principle of Provenance”. Paper given at the First Stockholm Conference on Archival Theory and the Principle of Provenance (2-3 September, 1993) (Skrifter utgivna av Svenska Riksarkivet 10, Stockholm 1994).

^{32/} Ibid. The definition of a record, based on the European tradition of “diplomats”, is offered by Luciana Duranti and Terry Eastwood: “a record is testimony, produced on a medium in the course of a practical activity, of facts taken into consideration by the rules recognized as binding by a social group”. See Luciana Duranti and Terry Eastwood, “The Preservation of the Integrity of Electronic Records”. Draft paper (1995), a project funded by the Social Sciences and Humanities Research Council of Canada.

^{33/} Richard Cox, Op. cit.

Chapter 4

Records Creation and Archival Participation in the Design of Computer Systems

While important activity of organizations is everywhere going undocumented as a consequence of information systems that are designed not to be adequate record systems, archivists forego involvement in system design and implementation required to assure the creation of adequate documentation. They cling to the assertion that they lack sufficient authority, fail to notice when critical information systems are being designed and implemented, and have little advice to offer on how to implement systems in organizations in a way that will satisfy record-keeping requirements. (David Bearman and Margaret Hedstrom).

It has become a sort of axiom that archivists in the new (or not so new) world of electronic records must be involved in the design of systems for the creation, use and safekeeping of records produced by using computers.³⁴ As traditional archival methods for appraisal, arrangement and description applied at the end of the life-cycle of (paper) records cannot be applied to electronic records, the goal has been to build into the system, from the very design stage, features for identification of records - as well as for their appraisal, arrangement and description. In addressing the necessity for archivists and records managers to participate in the design of computer-based information systems, three main factors have been emphasized:

- 1) The need to understand and perform enterprise analysis and to clearly define the notions of function, process, activity, task and transaction and their mutual relationships, as well as the need to analyze and interpret variations in “organizational culture”;³⁵
- 2) The need for participation in the design of metadata systems (data dictionaries, information resources dictionary systems, etc.); and
- 3) The need to make sure that open standards requirements are met when systems are designed.

³⁴/ That this is often easier said than done, as shown by the Swedish study referred to below in Chapter 11, Sweden.

³⁵/ In the paper world archivists have done this *retroactively* by studying and describing “the organizational history” of the records-originating bodies in the context of arrangement and description projects - all as a consequence of “respect des fonds” and “respect de l’ordre primitif”.

4.1 Enterprise Analysis

David H. Thomas has compared the methods based on *organizational structure*, which archivists have traditionally used for analysis and description of records, to the use of *functions, processes* and *transactions*³⁶ as a basis for those activities:

In their literature archivists and records managers have tended to unify the concepts of organizational structure and business function under one definition, not recognizing that they represent two different and not necessarily identical aspects of an organization.

Writers such as Schellenberg and Norton underscore the need to use organizational function as the focus of record-keeping systems, but they link this function to the organizational structure. One reason for this confusion is that a great number of organizations have historically been organized along functional lines.³⁷

The link between organizational structure and business function has been broken with the introduction of electronic information systems.³⁸ Modern business structures do not necessarily have to be organized around functions. They are often arranged cross-functionally. Therefore, one must identify those functions, processes, activities and transactions to which the records bear evidence. In his article, Thomas tries to identify the characteristics that define a business function, and to suggest how analysis of these characteristics might inform archivists about the importance of a given electronic record. To identify “current attitudes and theories” regarding the concept of business functions, Thomas has also reviewed recent literature concerning this subject. Thomas concludes his review:

^{36/} Wendy Duff, another member of the Pittsburgh project, has analyzed the notion of transaction in depth: “A record in an electronic environment seems transitory, unstructured, and insubstantial, as its form and content alters with a click of a keyboard or a upgrade in the software that controls it. The preservation of these records require a proactive approach that identifies valuable records at their creation. Protecting the evidence captured in this new media requires a re-examination of old methods and development of new techniques, ones that ensure the management of authentic, reliable, and timely records. Developing requirements for the systematic capturing and preservation of evidence of essential transactions requires a thorough understanding of what constitutes a transaction”. Wendy Duff, “Defining Transactions: To Identify Records and Assess Risk”, (<http://www.lis.pitt.edu/~nhprc/prog5.html>). Also printed in the *Second Pittsburgh Research Report* (March, 1995). In her paper, Wendy Duff analyzes the concept of transaction in business environment, computing environment, and legal environment. She examines the Functional Requirements for Record Keeping, as defined by the Pittsburgh project [“At the heart of these requirements is the notion that one must capture, maintain, and migrate the content, structure and context of records for the creation and preservation of evidence”] in the light of the interpretations and definitions of a transaction. Duff stresses the importance of a transaction as essential to being able to distinguish between a record keeping and an information system. To this can be added David Bearman’s description of transactions: “Transactions are, by definition, communicated from one person to another, from a person to a store of information (filing cabinet, computer database) available to another person at a later time, or from a store of information to a person or to another computer.” David Bearman, “Towards a Reference Model for Business Acceptable Communications”, (<http://www.lis.pitt.edu/~nhprc/prog6-5.html>), also printed in the *Second Pittsburgh Research Report* (March, 1995).

^{37/} David Thomas, “Business Functions: Toward a Methodology”, (<http://www.lis.pitt.edu/~nhprc/Pub7.html>). Also printed in the *First Pittsburgh Research Report* (School of Library and Information Science, University of Pittsburgh. September, 1994).

^{38/} The Dutch archivist Hans Hofman seems to have a slightly different view on the importance of organizational structure in the context of electronic records. In a paper delivered at the “Playing for Keeps” Conference, Canberra (8-10 November, 1994) he addressed the relationship between a government agency’s mandate (“competencies”), network of functions and tasks to accomplish those functions: “In order to accomplish these tasks government has to establish organizations or agencies. It represents the way things are done. It is also important to follow and to track the information flows within and between government agencies and between agencies and civilians. Only if we know the *organizational structure* of government actions you know who are involved, which records are important and where the records are.” An interesting analysis of the relationship between organizational structure and functions/activities is given (and illustrated in a model) in a recent Australian article about “Records Continuum”. Frank Upward, “Structuring the Records Continuum. Part One. Post-custodial Principles and Properties”. *Archives and Manuscripts*, Vol. 24, No. 2 (November 1996). See particularly model on page 278.

Regardless of terminology used, these writers name three different aspects of business structure: one related to the mission of the organization, called the function; one related to how the functions are accomplished, called the procedure or process; and one related to actions, called the process or activity. David Bearman has proposed a similar

hierarchy that uses the terms *function*, *process* and *activity* for those listed above, respectively. In addition, he has added a fourth term *transaction*, that is more specific than activity, at which individual actions occur -- a level with which archivists often contend, since document creation frequently occurs at the transaction level.³⁹

Thomas concludes by noting:

The three problems outlined above - the changing uses of electronic information, the difficulty of capturing record transactions in electronic systems, and the separation of record function from the business structure - require that archivists find some other means than business structure to appraise electronic records. Instead of using structural criteria to appraise these records, archivists must consider what *functions* these records document, regardless of their position within the business organization. Therefore, in order to identify the archival nature of electronic records, it is important to understand the types of functions that businesses do, and to determine which of these functions are actually important and therefore need to be documented. Without an understanding of this, it is impossible to ascertain which electronic data document records of business transactions, and which do not.⁴⁰

4.2 Metadata Systems

As has been repeatedly mentioned above, the structure and context of an electronic record must be preserved *together* with its content. In other words, the content must be preserved with its metadata - data about data. To ensure that happens, archivists and records managers must work closely with their colleagues in the computer departments of originating offices or organizations.⁴¹ Numerous metadata are normally built into all systems, and the role of the archivist is to make sure that such metadata that preserve context and structure are captured and preserved together with the records content. This is particularly important as existing software applications generally fail "to capture a full complement of metadata required for record-keeping."⁴² Such metadata must be captured at the design stage of the system, and be maintained in active software environments.

Several of the most influential and prolific electronic records archivists have advocated a metadata system approach to the management of electronic records. These writings theorize that a metadata system approach will affect archival appraisal and preservation, and fundamentally alter arrangement, description and reference. What is clear is that *post hoc* description of electronic records systems will fail, given the amount of data likely to have to be evaluated. Provision for the creation and capture of accurate and comprehensive metadata *in the system design stage* (author's emphasis) provides the archival community with an operative strategy for capturing the crucial contextual information that provides an understanding of electronic records and record-keeping systems in which they reside.⁴³

³⁹/ David Thomas, Op.cit.

⁴⁰/ Ibid.

⁴¹/ The system designers as well as system administrators.

⁴² / David Wallace, "Managing the Present: Metadata as Archival Description", *First Pittsburgh Research Report* (<http://www.lis.pitt.edu/~nhprc/Pub10.html>) (September, 1994). Also published in *Archivaria*, No. 39 (Spring 1995). Concerning the discussion about the role of archivists/records managers in the design of metadata and its use for archival description purposes, see Chapter 7. below (Heather MacNeil's views).

⁴³/ David Wallace, "Metadata and the Archival Management of Electronic Records: A Review", *Archivaria*, No. 37 (Autumn 1993). Margaret Hedstrom stated already in 1989: "Contemporary records are too voluminous, their interrelationship too complex, and the time to appraise them too short, to allow archivists to review all potentially archival records on a case-by-case basis. Unless archivists refine and implement new appraisal techniques to shape the historical record as it is being created,

To make metadata systems include and preserve information about context (evidence) and structure, and include descriptive information as well as appraisal and disposition data, the archivist/records manager must, as has been noted above, work closely with data administrators and system designers. The metadata approach is based on a technology developed by data administrators. The tools, data dictionaries, can be described as “the central storehouse of data about an information system's data and data transformations”.⁴⁴ Data dictionaries are so designed that they can easily hold documentation relevant to archival requirements such as: appraisal criteria, provenance data, contextual information, audit trails, access restrictions, etc. It has been pointed out that, in principle, traditional archival descriptive systems are just “metadata”.⁴⁵

Conceiving metadata input in such a context should make it easier for archivists to start working with data administrators and system designers. As a result, archivists will be able to *capture* descriptive information about records systems instead of describing them from scratch.⁴⁶

A good deal of work has been done to specify the necessary metadata for preserving recordness and evidence. One of the products of the Pittsburgh project, “Metadata Requirements for Evidence: A Reference Model for Business Acceptable Communications”, specifies such metadata and states that:

⁴⁴/ Data dictionaries are documentation tools for metadata management constructed to hold such metadata as definitions of data-items (i.e., data elements, screens, reports, and processes). One can use a term familiar to archivists and describe a data dictionary as the system administrators “finding aid” or “descriptive inventory”. “As a resource, the dictionary is an organized repository of information describing the source, use, edit criteria, control, user responsibility and content of data within an organization.” Rom Narayan, *Data Dictionary: Implementation, Use and Maintenance* (Englewood Cliffs, New Jersey, 1989). “The information entered by the user is the data, whereas information on the rules for structuring and presenting this information, as defined by both the system and the system personnel within the software, is the metadata. In this environment there are two types of metadata: one describing *what* the data is and what it means; and the other indicating *where* the data can be found and how it will be retrieved. The first is data dictionary metadata; the second is directory system metadata.” David Wallace, Op. cit.

⁴⁵/ United Nations, The Advisory Committee for the Coordination of Information Systems (ACCIS), *Management of Electronic Records: Issues and Guidelines* (New York, United Nations, 1990) (ACCIS I). “Archives and records management control systems are information systems about information systems, or meta-data systems. The subject of our descriptive practice is the information systems employed in the conduct of corporate work. In traditional archival contexts we describe these systems by establishing what function they supported and the organizational units responsible for that function. We then describe the extent, scope and arrangement of the records.... The data elements required to give us... a synoptic overview are no different from electronic records: Transaction-Type-Text; Form-Type-Text; Creator-Organization-Unit-Name; Record-Date; Record-Volume; System-Access Method-Text.” See also IST 4235, Module 12.02, “Documenting Documentation”, *Electronic Recordkeeping* (Edith Cowan University) (CD-ROM Electronic Recordkeeping). Heather MacNeil claims that this wide use of the term metadata may cause confusion: “The tendency to describe metadata in metaphorical terms, e.g. in relation to archival inventories, has distracted attention from consideration of what metadata are in substantial, concrete terms.” “Metadata Strategies and Archival Description: Comparing Apples and Oranges”. *Archivaria*, No. 39 (Spring, 95).

⁴⁶/ Useful advice concerning how to define archival attributes in a metadata base system are offered in United Nations, The Advisory Committee for the Coordination of Information Systems (ACCIS), *Strategic Issues for Electronic Records Management: Towards Open Systems Inter-connection* (New York, United Nations, 1992) (ACCIS II). See also Rob Smith-Roberts, “Saving the Important Bits for Later: Data Management Principles & Metadata”. *Papers from a Workshop on Managing Electronic Records with Archival Value*, Sydney (April, 1993).

In addition to satisfying the requirements for evidence, business acceptable communications must carry metadata to satisfy the requirements of large scale, distributed implementations over long periods of time during which human memories of the contexts of creation will not suffice and software and hardware will have significantly changed.⁴⁷

David Bearman explains the relationship between the functional requirements for recordkeeping systems, its production rules and metadata. He concludes:

In effect it suggests that the definition of each functional requirement is the observables which follow from the production rules. These observables are properties of records which can be defined as classes of metadata, the values of which define the specific attributes of the unique record. These metadata, if retained inviolably with the content, ensure the evidential character of the record. The approach taken to standardization, therefore, is to imagine a “metadata encapsulated object”⁴⁸ as the product of any communication; e.g., a record equals a metadata encapsulated object whose metadata is defined as the metadata required to satisfy the functional requirements of record-keeping.⁴⁹

4.3 Standards

Writers on management of electronic records are unanimous in urging archivists and records managers to familiarize themselves with open system standards and endeavor to influence the standard-making bodies to make them aware of, and urge them to include, now often missing archival requirements in standards designs and texts. It has been stated that, “while none of the functional requirements for record-keeping can be satisfied using existing standards, they could in theory be satisfied with minor modifications to such standards”.⁵⁰ Archivists are also encouraged to work with system designers in their originating bodies to make sure that systems compatible with such standards are selected.

⁴⁷/ See Annex 3 below, and <<http://www.lis.pitt.edu/~nhprc/meta96.html>>. There is an abundance of useful information about metadata systems and their use in Internet. Since August 1993 there have been held “Metadata Workshops” arranged by the Center for High Performance Computing in Austin, Texas. It is reassuring to note that, at the second workshop, held in February 1994, the U.S. National Archives (NARA) was represented by Dr. Charles Dollar, who spoke about the need for “guidance to federal agencies to ensure information is stored, used, processed, in such a way that it will be accessible for long term use”. (See: http://www.llnl.gov/liv_comp/metadata/minutes/minutes-1994-02.html). These workshops continue to be held and archivists should be there to safeguard their needs and make sure their functional requirements for records and record keeping systems are understood and included in systems. (See also: <<http://www.cs.umanitoba.ca/~randal/CIKM95.html>>). The Lawrence Livermore National Laboratory, University of California, has created a metadata management tool called “Intelligent Archives” (!), which “provides integrated, intelligent tools for searching, organizing, and browsing scientific data, including text, images, animations, and sound”, (http://www.llnl.gov/liv_comp/ia.html). For more on metadata in Internet, see also <<http://www.seic.okstate.edu/gis/metadata.html>>, and “The Metadata and Data Management Information Page”, which is an information page about metadata and data management issues. It contains information on upcoming events, documents and meeting minutes from the IEEE Mass Storage Systems and Technology Committee sponsored Metadata Workshops: <http://www.llnl.gov/liv_comp/metadata/metadata.html>.

⁴⁸/ Compare Jeff Rothenberg’s extended records encapsulation for long term preservation of electronic records. See Chapter 9.

⁴⁹/ See Annexes 1-3. See also: David Bearman: “Towards a Reference Model for Business Acceptable Communications”, (<http://www.lis.pitt.edu/~nhprc/prog6-5.html>), “Virtual Archives”, (<http://www.lis.pitt.edu/~nhprc/prog6.html>), and “Record-keeping Functional Requirements. Interim Reflections on Tactics for Satisfying Record-keeping Functional Requirements”, (<http://www.lis.pitt.edu/~nhprc/prog3-5.html>). Also printed in the *Second Pittsburgh Research Report* (March, 1995).

⁵⁰/ IST 4235, *Electronic Recordkeeping* (Edith Cowan University) (CD-ROM Electronic Recordkeeping). See also Ken Thibodeau, “To Be Or Not To Be: Archive Methods for Electronic Records”, *Archival Management of Electronic Records, Archives and Museum Informatic Technical Report*, No. 13 (1991), edited by David Bearman.

The concept of open systems, as opposed to proprietary systems, has now (by December, 1996) been universally accepted in the world of information systems. The importance of open standards for archivists and record managers was addressed already in 1992 in a study sponsored by the United Nations.⁵¹ The report listed OSI standards in relation to the life cycle of electronic records, and found that two standards in particular support the creation stage: ODA/ODIF and SGML.⁵²

ODA/ODIF and SGML are standards that are necessary for meeting the requirement to preserve the original *structure* of records over time. ODA/ODIF is intended to facilitate the interchange of documents which are stored in digital form between heterogenous systems. It was mainly designed for office documents such as memos, reports, contracts or invoices. It provides mechanisms for representing both the logical structure and layout of documents produced by differing word processors, so that the receiver can then screen in the form specified by the sender. ODA/ODIF was created to be able to handle compound or "mixed-mode" documents.⁵³ SGML is similar to many desk-top publishing products, in that "markup tokens" (formatting commands) are embedded in an unformatted document, describing attributes like headings, paragraphs and content lists. The ACCIS report concludes:

There is a strong overlap between the goals of the ODA standard and those of the Standard Generalized Markup Language (SGML, also known as ISO 8879:1986) which was initially developed with the publishing industry in mind. In general, ODA is more suited to the exchange of office documents which are in a final form and are interchanged as a whole, whereas SGML is oriented towards complex structured objects.⁵⁴

For the purpose of being able to store office documents such as word processing documents created in proprietary formats over time, archives or agencies need to convert office documents from existing commercial software dependent formats (such as Word or WordPerfect) to a software independent formats such as SGML or ODA/ODIF, and also to convert back from such neutral formats to future proprietary formats. SGML documents are not dependent on any hardware, software, formatter or operating system. "Generalized markup" is codes or tags that describe the content of the text such as

⁵¹/ ACCIS II, Op.cit.

⁵² / Internet sources concerning SGML, see <<http://dxsting.cern.ch/sting/SGML.html>>, <<http://www.src.doc.ic.ac.uk/bySubject/computing.html>> and <<http://www.twi.tudelft.nl/TWI/Overview.html>>. See also <<ftp://th-darmstadt.de> [130.83.55.75] directory pub/text/sgml>. The printed literature concerning ODA/ODIF is very rich. One of the later monographs is: Wolfgang Appelt, *Document Architecture in Open Systems: The ODA Standard* (Springer-Verlag, 1991). See also S. Golkar et. al., "ODA Activities at University College London and their Relation to the PODA Project", (submitted to Computer Networks and ISDN systems, 1990). A "reader friendly" presentation of SGML can be found in: *SGML, An Author's Guide to the Standard Generalized Markup Language* (Addison-Wesley Publishing Company, 1991). The ACCIS II report also found that X.400 (MHS) and FTAM must be considered for transfer of information objects, and that IRDS plays a crucial role in the management of metadata. Numerous reports, studies and articles about OSI standards, particularly X.500 and ODA/ODIF, are available as Internet documents, mostly from the University College London, UCL.

⁵³/ For an excellent overview of ODA see Peter J. Robinson, "Office Document Architecture (ODA)," an Internet document (<ftp://cs.ucl.ac.uk/ietf-osi-oda>). ODIF (Open Document Interchange Format) specifies interchange for machine-to-machine transfer. It is based on ASN.1 transfer syntax (Abstract Syntax Notation One).

⁵⁴/ ACCIS II, Op. cit. It could be added that SGML has proven useful when organizations are offering documents to the general public via Internet using interfaces like Gopher or Mosaic.

“heading” or “title” or “footnote”. SGML provides a way to describe and validate the structure or hierarchy of a document through a *document type definition* (DTD). The well known HTML used by the World Wide Web is a DTD, and the SGML standard has recently got air under its wings because of its relationship to HTML.⁵⁵

Archives may request originating agencies to convert their textual records, produced in proprietary format, to neutral formats such as SGML or ODA/ODIF. A test of such conversion using ODA/ODIF has been carried out and described by the University College London (UCL).⁵⁶

This testing has revealed that the different converters can be used together to import and export documents between the different formats. However, this may result in some loss or changes (resulting from converter fallback procedures) of information. Some of these points have been highlighted through the testing of only a small number of documents.⁵⁷

From an archival point of view, it is mandatory that losses caused by the conversion process do not include losses of context-related metadata. Archival requirements must be met when conversion is considered. The most desirable scenario, from the point of view of preservation over time, would be that documents and office records were created in a neutral format, such as SGML, from the very beginning. That would eliminate the need for a conversion process. The question is obviously related to that of custody or non-custody by archival institutions. Conversion may be mandatory if electronic records are transferred to a central archival depository, while not necessarily so if they remain in the custody of the originating office/agency and are subjected to the technology migration of the “owner” institution.⁵⁸

Another standard of great potential for managers of electronic records is DFR (Document Filing and Retrieval).⁵⁹ It

⁵⁵ “When properly performed, SGML markup captures all the structural information needed to deliver documents in any medium -- paper, CD-ROM, or World Wide Web -- and to navigate those documents when the delivery medium is electronic”, (<http://sunsite.berkeley.edu/FindingAids/sgml.edu>) click on DynaWeb, click on Novell on their DynaWeb application. David Bearman notes in a paper from 1992 that SGML had been used in a NARA experiment with integrating into business systems an identification tool for finding those business processes whose records are archival and to employ automatic methods to the business processes which created them: “I was recently informed of a similar emphasis on automatic markup by the Office of Records Management at the United States National Archives. That office is exploring the possibility of defining elements in DTDs (Document Type Definitions) in SGML to assure business functional source labeling of information throughout its life-cycle.” See David Bearman: “Diplomatics, Weberian Bureaucracy, and the Management of Electronic Records in Europe and America”, *The American Archivist*, No. 55 (1992), footnote 24.

⁵⁶ A set of ODIF documents were selected for conversion into the given document format (WordPerfect, RTF or CDA). These include a number of ODIF files from different sources, with different sizes and selected at random. These documents include a number of layout styles, fonts, and other Q112 (=ODA) logical and layout structures that the report sets to determine whether their conversion is properly handled. The selected ODIF documents have been tested for their conformity to the Q112 (ODA) standard. See D. Sadok, A. M-Kohsari, P. Kirstein, “UCL Internet Report”, (Department of Computer Science, University College, London) (<ftp://cs.ucl.ac.uk/ietf-osi-oda>). This “ftp archives” contains numerous technical reports of how the project was carried out and evaluation of the products tested. These documents should be helpful for any archives interested in pursuing the issue of conversion of electronic records kept in proprietary format to ODA and ODIF.

⁵⁷ An Internet document <<ftp://cs.ucl.ac.uk/ietf-osi-oda>>.

⁵⁸ In this context it may be of interest to note that in an experiment run by the Library at Berkeley, the Society of American Archivists and the Library of Congress (The Berkeley Finding Aid Project), archival finding aids now are produced in SGML format and made “understandable” by Web browsers. SGML-encoded finding aids “are served by a special Web server (DynaWeb) that translates SGML into a form that most Web Browsers (like Netscape 1.2, author’s remark) can understand.” A special FindAid DTD (later renamed Encoded Archival Description-the EAD DTD developed by the Society of American Archivists and the Library of Congress) was designed, which was presented to leading archivists and computer specialists for evaluation and found to be achieving its objectives. See <<http://sunsite.berkeley.edu/FindingAids>>. There is also a “listserv” discussing standards for encoding finding aids: FINDAID. To subscribe: send message to listserv@library.berkeley.edu - [leave Subject blank] Message: Sub FINDAID <your name>.

⁵⁹ See ISO 10166.

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allows the implementation of an easy to use distributed information retrieval system similar to the Internet Gopher.
The

DFR protocol provides the ability to store and modify documents, control access, search on attributes, etc. The X.500 Directory standard and the Z39.50 protocol will be dealt with in Chapter 10.

From the continued writing below, it is apparent that practically all aspects of the life-cycle of electronic records must be dealt with at the design stage of such systems, particularly appraisal procedures and the design of recordkeeping systems and the use of international standards. Even systems for description and intellectual control of electronic records must be forged at the creation stage of the record.⁶⁰ It thus seems that the traditional bifurcation of the two disciplines of archivist and records manager may no longer be possible. Parenthetically, some have noted that it has been hard to see any justification for such bifurcation even in the paper world.

Chapter 5

Recordkeeping Systems

Recordkeeping systems are often confused with or described as “information systems” or “document management systems”. In accordance with the definitions of “record” and “recordness” given by the authors referred to above, it should be very clear that a recordkeeping system is *NOT* the same as an information system. An information system often consists of information that is not “records”, and all electronic “documents” do not qualify as “records”.

Record-keeping systems keep and support retrieval of records while information systems store and provide access to information. Record-keeping systems are distinguished from information systems within organizations by the role they play in providing organizations with evidence of business transactions (by which is meant actions taken in the course of conducting their business, rather than “commercial” transactions). Non-record information systems, on the other hand, store information in discrete chunks that can be recombined and reused without reference to their documentary context.⁶¹

A function or a business process is reflected in its records - the records are the remnants of the process and its transactions. Records originating from functions or processes have always been kept together in some kind of system, i.e., a “recordkeeping system”. Such systems are functioning, or have once functioned, as a tool for those carrying out a process and its transactions. Recordkeeping systems have concrete boundaries and definable properties, and they are critical to the preservation of the records’ provenance and evidential value. In the paper world, recordkeeping systems could be, or have been, anything from a simple filing system to a central registry.⁶² Recordkeeping systems in the electronic, as well as in the paper, world are designed for the use of operational staff in current office operations, and not for or by archivists or for external researchers. In the paper world, it is the archivist’s role to preserve this tool undisturbed (principe de l’ordre primitif) for future users, internal as well as external to the originating organization -

⁶⁰ / See, however, Heather MacNeil’s dissident view on the use of metadata for archival description (see below, Chapter 7).

⁶¹ / David Bearman, “Record-keeping Systems”, published latest in *Electronic Evidence, Strategies for Managing Records in Contemporary Organizations* (Archives and Museums Informatics, Pittsburgh, 1994). Also in *Archivaria*, No. 36 (Autumn, 1993).

⁶² / In his article “Diplomatics, Weberian Bureaucracy, and the Management of Electronic Records in Europe and America”, David Bearman gives a retrospective analysis of the European concept of registry systems. *The American Archivist*, No. 55 (1992).

provided the recordkeeping system resulted from a function or process that had been appraised as worthy of permanent preservation. In the electronic world this task of preserving the original order becomes even more demanding and complicated.⁶³

5.1 Research and Development Projects

5.1.1 The University of Pittsburgh Project

A project undertaken by the University of Pittsburgh, under the direction of Professor Richard J. Cox, has developed and tested a set of recordkeeping functional requirements and their applicability in electronic recordkeeping systems.⁶⁴

The major objectives of this research project were to develop a set of well-defined record-keeping functional requirements -- satisfying all the various legal, administrative, and other needs of a particular organization -- which can be used in the design and implementation of electronic information systems. The project also proceeded to consider how the record-keeping functions are affected by organizational policies, culture, use of information technology standards, and system design and implementations.⁶⁵

In a footnote to his article Cox adds:

It is the contention of this project that a focus on a precise definition of a record is the only viable and practical means for archivists and records managers to be able to contend with the vast quantity of increasingly complex record-keeping systems. This does not mean that there are not instances when the archivist (or even records manager) should be concerned with a wider range of documentation, but the emphasis must still be on recorded transactions providing

⁶³ / "As a matter of principle, when archivists do decide to retain records, they take special care not to disturb the relations defined by the record-keeping system. These relations in manual systems are limited to 'original order', but in automated environments may involve many types of relationships. They are evidence of how individual records were or could have been used within the record system and thus of what they meant in the context of the business process they document. In manual systems, accessioning records need not disturb this original order. In electronic records systems, however, removing records from the application which supported the relations among records and between the record and the actions which it documents runs serious risks of destroying the structure and context information that preserves the evidential significance of the record." David Bearman, "Record-keeping Systems", Op. cit.

⁶⁴ / The official name of the Pittsburgh project, which started in 1993 and was completed early in 1996, is "Variables in the Satisfaction of Archival Requirements for Electronic Records Management," (see <<http://www.lis.pitt.edu/~nhprc/proposal.html>>). It was funded by the National Historical Publications and Records Commission in the United States (NHPRC), which "vigorously supports activities to develop solutions to ensure that the evidence of our institutions and public and personal lives endures". See National Historical Publications and Records Commission, *Electronic Records Grant Suggestions*. The products of the Pittsburgh project are published in Internet WWW <<http://www.lis.pitt.edu/~nhprc>>. The list of *Functional Requirements, Production Rules Version of the Functional Requirements and Metadata Requirements for Evidence Reference Model for Business Acceptable Communications* are reproduced in Annexes 1-3 below. The project was completed in January 1996, and a "Literary Warrant Supporting Functional Requirements" was published in the project's Web "Home page". The introduction to the Literary Warrant states: "The requirements derive from the law, customs, standards, and professional best practices accepted by society and codified in the literature of different professions concerned with records and record-keeping. The Project compiled a compendium of statements drawn from authoritative sources of other professions that describe or explain the requirements of records and record-keeping systems. The statements of the 'literary warrant' are organized by profession and then by functional requirements." The professions are: 1. Lawyers, 2. Auditors, 3. Records Managers, 4. Information Technologists, 5. Managers, and 6. Medical Professions. The literary warrant is a substantial document (approximately 225 pages).

⁶⁵ / Richard Cox, "Putting the Puzzle Together: The Recordkeeping Functional Requirements", (<http://www.lis.pitt.edu/~nhprc/introd2.html>). Also printed in the *Second Pittsburgh Research Report* (March, 1995).

evidence. If the records are properly identified and managed, there will be more than enough documentation for the records creators, concerned parties, and other researchers.⁶⁶

The functional requirements developed by the Pittsburgh project are intended to assist the archivist, records manager, and other professionals concerned with the maintenance of records by providing an unambiguous, verifiable definition of a record.⁶⁷ For the archivist, this will be a means to ensuring that records created through electronic systems can be maintained for organizational evidence and for use by researchers. For the records manager this will be a means to ensuring that records necessary to be maintained for accountability⁶⁸ and legal purposes can be held as long as necessary. For all information professionals, the functional requirements will be the basis for distinguishing between recordkeeping and other information systems.

The first report of the Pittsburgh project stressed the understanding of the potential of the recordkeeping technology and the rediscovery of the fundamental mission of the archival profession to maintain evidence. The second report dealt with testing of the initially drafted recordkeeping functional requirements.⁶⁹ The project plan was built on the following assumptions:

- 1) functional requirements for electronic records are basically the same as for traditional paper-based records, but many functional requirements for electronic records will not be satisfied using traditional methods developed for paper records;
- 2) different degrees of risk are associated with the non-satisfaction of the requirements in different business applications;
- 3) different software applications will not dictate different recordkeeping functional requirements;
- 4) similar business sectors will have the same requirements: corporate cultures in different business sectors will determine the choice of tactics; and
- 5) an organization's corporate culture will become a determining factor in satisfying the requirements.

David Bearman, consultant to the Pittsburgh project, describes the functional requirements for recordkeeping as specifications of "recordness" or "evidentiality":

The specification defines thirteen properties which are identified in law, regulation and best practices throughout the society as the fundamental properties of records. These characteristics can be formally expressed as "production rules" or logical statements of simple observable attributes. The production rules and the functional requirements can be demonstrated to be satisfied by the presence of specific metadata, if that metadata is

⁶⁶/ Ibid.

⁶⁷/ Like the author of this paper, professor Cox has followed the discussions in various Internet professional discussion groups ("listservers") for archivists and records managers and found that there is widespread confusion about the definition of a record: "This has continued to be a particularly relevant need (education and training) as we followed active discussions about electronic records on the various archives and record management listservers. In general, there remains a tendency to define a record in a very fuzzy and unsatisfactory manner, as recorded information. There is also a tendency to include a very broad definition of electronic records, from word processing files to the most sophisticated multi-media system. Finally, there also continues to be wide support in the archives and records management communities to manage many electronic record-keeping systems by maintaining paper printouts or snapshots of the system, an approach that is more a confession of failure than it is viable administrative option." Richard Cox, Op. cit.

⁶⁸/ Concerning the notion of accountability, Cox and his colleagues, working with the State Archives of Vermont, designed the following definition: "Provide evidence so that the public can ensure that government carried out its responsibilities by ensuring (with due regard for their public trust) that its decisions, actions, and transactions are and were consistent with and supportive of legislative, regulatory, policy, procedures, and best practices." He concludes: "The more sharply defined concept of a record provided by the recordkeeping functional requirements is a significant supporter of such accountability." Richard Cox, Op. cit.

⁶⁹/ The final report of the Pittsburgh project is available in Internet: <<http://www.lis.pitt.edu/~nhprc.html>>.

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inextricably linked to and retained

with the data associated with a business transaction. This metadata guarantees that the data object will be usable over time, only accessible under the terms and conditions established by its creator, and have properties required to be fully trustworthy for purpose of executing business.⁷⁰

Bearman stresses that the requirements for recordkeeping are corporate requirements and that they are the foundations of good business practices crucial in reducing the risks that accompany poor recordkeeping:

Records oriented professionals within organizations, such as senior management, legal counsel, auditors, Freedom of Information and Privacy officials and archivists all require records, and not just information, for doing their on-going work. Organizations want to satisfy these documentary requirements in the normal course of business, but it has been difficult to do so in the computer based environments we have installed over the past several years because applications software sold by third parties has not met these requirements. Without explicit and testable specifications, these systems ("information systems") have failed to satisfy the requirements for recordkeeping and are, therefore, a growing liability to companies even while they are contributing directly to day-to-day corporate effectiveness. The functional requirements for recordkeeping dictate the creation of records that are comprehensive, identifiable (bounded), complete (containing content, structure and context) and authentic.⁷¹

Bearman and Ken Sochats, another consultant to the project, have applied formal methods of production rules and formal language of functional expression to define the functional requirements, by re-stating the functional requirements for recordkeeping as metadata requirements which will produce "a metadata model of recordness that should have important consequences for archival documentation practices".⁷² David Wallace, also a member of the Pittsburgh team, notes that: "Each of the thirteen functional requirements making up this model can be broken down into metadata specifications which themselves can be broken down into production rules that can be written into software code and incorporated into live systems."⁷³ This is important because, as Bearman states: "The professionals who manage electronic information systems demand that archivists articulate their functional requirements so that decisions can be made whether, to what extent, and how they should be satisfied."⁷⁴

The products of the Pittsburgh project have put in the hands of archivist/records managers an extremely useful set of requirements which, together with the production rules and the metadata, will help them to provide their information system colleagues with what they have been asking for. The functional requirements will advise the professionals who manage electronic information systems about what must be included in such systems in order to identify, capture and manage corporate records for the purpose of safeguarding and preserving evidence and for meeting normal requirements for accountability. These products will also be helpful in guiding the technology people in their selection and testing of application software as well as in the selection and use of standards. Concerning the implementation of the requirements Bearman advises:

Regardless of the implementation environment, the archival management of electronic records is an inseparable component of ongoing data management in electronic record-keeping systems. It should be approached first with a clear definition of what we want "archivally responsible" systems to do. Once we enumerate these functional requirements, we should ask when (in the life of the system) and how (by what means) we could intervene to satisfy

⁷⁰ / David Bearman, "Towards A Reference Model for Business Acceptable Communications", (<http://www.lis.pitt.edu/~nhprc/prog6-5.html>). Also printed in the *Second Pittsburgh Research Report* (March, 1995). See also Annexes 1-3, below.

⁷¹/ Ibid.

⁷²/ The Production Rules and the Metadata are reproduced in Annexes 2-3 below. See also David Bearman, "Formalizing Functional Requirements for Recordkeeping", (<http://lis.pitt.edu/~nhprc/Pub4.html>).

⁷³/ David Wallace, "Managing the Present: Metadata as Archival Description", (<http://lis.pitt.edu/~nhprc/Pub10.html>). Also printed in the *First Pittsburgh Research Report* (September, 1994).

⁷⁴/ David Bearman, "Record-Keeping Systems", Op. cit.

the requirements. Then we should test these intervention strategies⁷⁵ in installed record-keeping systems in the real world in order to refine heuristics that can be used by others.⁷⁶

An ambitious plan to implement a set of functional requirements, basically the same as those produced by the Pittsburgh project, has been worked out by a joint team from the Swedish National Archives and the leading pharmaceutical company in Sweden, Astra Inc.⁷⁷. The report, "SESAM, Philosophy and Rules concerning Electronic Archives and Authenticity", has been published in the form of a textbook, and was drafted by Ulf Andersson from Astra's Information Systems and Technology Department with input from archives expertise.⁷⁸ It takes the step from theory to practical implementation and should therefore be of interest to anyone asking how these things can be done in the real world. The goal is stated: "What to achieve. An environment that can produce, store, transfer, and maintain electronic business records which can be used as evidence whenever needed."⁷⁹

Andersson defines business records, legality and authenticity,⁸⁰ maintenance and migration, as well as metadata from the perspective of the corporate enterprise. Without referring directly to the Pittsburgh project, this project basically follows its approach. For example, instead of using the concept of "metadata encapsulated objects" in describing a record, under the heading "Vision for Electronic Archiving" it expresses the same idea in the following manner:

When...a business record (data or information) is to be archived, it is removed from the operational system as a self-identifying package. This means that all metadata necessary for future use of the content of the information package must be included in the record.... The logic and structure of the system and the users view on the information and the processes structure shall accompany the records as data.⁸¹

A part one, *Strategy*, is followed by *Conceptual Models for Electronic Archiving and Authenticity*, and the text ends with *Technical Aspects and Implementation*. It is illustrated with excellent and very illuminating and explanatory multi-colored charts, which to a large extent replace the narrative text and express the concepts in graphics superior to any text. Comments are made on standards, and the report concludes that SGML and the family of related standards will be a main tool in implementation of the project: "SGML and HyTime are chosen to carry context and content on the receptor and envelope levels⁸², (i. e. SGML will carry tagged metadata). It may also be used to

⁷⁵/ The strategies through which the requirements can be satisfied are: 1. Through *policy*; 2. Through *system design*; 3. Through *system implementation*; 4. Through *use of standards*; or 5. Through a *combination of these strategies*.

⁷⁶/ David Bearman, "Record-Keeping Systems", Op. cit. David Bearman reports from a meeting in February 1996 where implementation sites of the Pittsburgh project were discussed. He mentions as particularly interesting projects undertaken in the Philadelphia City Archives and at the Indiana University. Other sites for implementation are the Vermont State Archives, the State University of New York at Albany, and at the Environmental Work Environment in Canada - by the National Archives of Canada. David Bearman, "Functional Requirements for Evidence in Recordkeeping: Invitational Meeting", University of Pittsburgh, 1-2 February 1996, *Archives and Museums Informatics*, Vol. 9, No. 4 (1995).

⁷⁷/ The project plan is available in the Web: <<http://www.si.umish.edu/e-recs/Sesam>>.

⁷⁸/ "Information Systems at Astra AB has investigated factors concerning authenticity and long term storage of electronically stored information and data. It has been done in co-operation with Astra Legal Affairs, Corporate Security and the Swedish National Archives", (from the Preface), Ibid.

⁷⁹/ Ibid.

⁸⁰/ "The legal security of citizens requires that the integrity is guaranteed". Ibid.

⁸¹/ Ibid.

⁸²/ "Electronic business records should to a very high extent be self-explaining and self-identifying. Very few formats can hold enough metadata to achieve this goal. To be able to add this metadata records have to be put in envelopes with suitable format and syntax. The envelope has a specific information model." Ibid.

record. For some purposes SGML is mandatory, for some optional.”⁸³ Andersson describes the “Archival application” in the following terms:

The business records shall, after being archived, be accessible from Web-like tools. The files that carry the business records are stored on CD-ROM. To achieve a multi-user environment all information necessary for information retrieval and describing the content of the files on CD must be loaded in a database. This content and user related context is loaded from the information packages. The context of the information package is integrated with the superior contexts of the archives.... To allow for transfer of metadata from the information package to the archival database, it must be expressed with transferable syntax in a structured language as SGML (or STEPS⁸⁴).⁸⁵

Astra will also need the introduction of electronic signatures in order to make electronic records business acceptable, and Andersson points out some inherent difficulties in connection with future conversion of such signatures. He suggests they can be overcome - but not easily.⁸⁶

According to information the author has received from colleagues in Stockholm, an evaluation workshop was held during the Fall of 1996 concerning the SESAM project, and a report from the workshop will be forthcoming.⁸⁷

David Bearman, consultant to the Pittsburgh project, has addressed the implementation issues related to the Pittsburgh functional requirements for evidence in a paper given at the SAA Annual Meeting in 1996. He discusses metadata requirements and their possible implementation linked to Capture, Documentation, Storage, Identification, Management, Access Control, Retrieval and Delivery, and Use History.⁸⁸

5.1.2 The Edith Cowan University Project

An interesting attempt to convert the Pittsburgh functional requirements into a guide or textbook has been undertaken by the Department of Library Science and Information Science, Edith Cowan University, Perth, Western Australia. In the context of a project proposed to develop alternative modes of courseware to support its students, the department introduced a course in Electronic Recordkeeping as part of its Graduate Diploma of Science (Archives Studies) program in 1994. The course was produced in a multimedia CD-ROM format.⁸⁹ It is organized

⁸³ / Ibid.

⁸⁴ / STEPS: An ISO standard for describing context and representation.

⁸⁵ / Ibid.

⁸⁶ / “An electronic signature is an encoded checksum of the signed information. RSA algorithm is used for making electronic signatures. It consists of two keys, one public and one secret. The signature is encoded by use of the secret key. The public key gives the possibility to verify the electronic signature. The checksum is based on the binary representation of the files written on disk. The consequence of this is that the signature is lost when any conversion is done. From a legal point of view it is necessary to maintain signatures for long periods. Different formats will have different lifetimes. This will force us to do partitioned calculation of checksums. This will put extra demands on how to implement the logical structure on physical files...” (again, a possible solution is expressed in a graphic). Ibid.

⁸⁷ / Mr. Bjoern Lindh from the Swedish National Archives has informed the author that it will not be finalized until early 1997.

⁸⁸ / David Bearman, “Item Level Control and Electronic Recordkeeping”, (*Paper given at the SAA Annual Meeting in San Diego, 29 August 1996*). Issues and solutions from Bearman’s article have been quoted in various chapters below.

⁸⁹ / The courseware, called IST 4235, *Electronic Recordkeeping*, is described at <<http://139.230.164.66/Courseware/IST4235/IST4235.htm>>, and is sold as a CD-ROM by the University. (See also “New Directions in courseware delivery: Multimedia, CDROM and the Internet”, <<http://www.scu.edu.au/ausweb95/papers/education/omari>>).

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into seventeen “modules” or chapters with references to recommended background literature. The first six modules
are designed to make the reader

familiar with the technological and organizational background to the electronic records world, presenting such issues as Systems (information systems-organizations as systems), Enterprise Analysis, Information System Analysis, etc. Module seven introduces “Recordkeeping Requirements” and modules eight and nine tactics for the satisfying of those requirements in relation to organizational variables. After having read the whole document carefully, and having compared it to the two Pittsburgh Research Reports, it is the opinion of the author of this review that the work of Edith Cowan University has succeeded in translating into practical language the sometimes very abstract concepts in the Pittsburgh set of recordkeeping functional requirements so that they can be easily understood by archivists and records managers, as well as by their computer system colleagues. More importantly, this work describes how to implement the requirements in the real world. I quote the concluding two paragraphs of the course materials:

In the electronic age, records managers and archivists face a new threat. What they should be doing is often seen as the responsibility of information technology staff who generally lack the corporate perspective that is required to perform it. Their own experience and training is often inadequate to the challenges that are facing them, and the temptation is frequently to take care of business as it was, rather than as it is going to be. The value they could be to the organization as documentary risk managers applying the skills of internal consultants and trainers, technology assessors, and metadata auditors, is not understood.

But archivists and records managers also are confronted with an incredible opportunity. First, electronic information systems make possible better record-keeping practices than ever have been cost effective before. Second, the perspective which records managers and archivists bring to record-keeping functional requirements is a high level corporate management view and has very strong potential allies in the legal, audits and senior management staff. And finally, the basic principles of record-keeping and archives management continue to be a sound framework for electronic records management, which gives records managers and archivists tremendous advantage over others in the organization who are not yet aware that not all information is records and that most information systems do not keep adequate records to protect the organization or ensure it of the best chance to take advantage of opportunity.⁹⁰

5.1.3 The University of British Columbia Project

The British Columbia University project is based on the use of “diplomats and archival science”.⁹¹

A preliminary report on the project, which is expected to be completed in March 1997, is available on the Web: “The Preservation of the Integrity of Electronic Records”, Luciana Duranti, Principal Investigator, Terry Eastwood, Co-Investigator, Heather MacNeil, Research Assistant. School of Library, Archival & Information Studies. University of British Columbia, Vancouver, B.C. (<http://www.slais.ubc.ca/users/duranti>). Professor Luciana Duranti, the project leader, explains that the traditional European methodology of *diplomats*, as developed during the 17th Century as a method to test the *reliability and authenticity* of mainly medieval documents, can be used to analyze

⁹⁰/ Ibid.

⁹¹/ Duranti has commented that establishing functional requirements for recordkeeping systems has not been the main purpose of the UBC project; it is more concerned with the definition of records though functional requirements may become an end product (conversation with the author).

“individual self-contained entities”, while *archival science* can be used to study aggregations of such entities, and “analyses their documentary and functional relationships”.⁹²

The research project conducted by the University of British Columbia and the Department of Defense of the United States has proved that the concepts of diplomatics continue to have resonance and provide a powerful and internally consistent methodology for assessing the nature, reliability and authenticity of electronic records and for preserving their integrity.” Luciana Duranti, “Diplomatics of Electronic Records”. (Unpublished. Kindly provided to the author by Dr. Duranti in December 1996). Duranti describes the objectives of the project in the following manner: the specific objectives of this project, to be achieved using the diplomatic and archival sciences, are:

to establish what a record is in principle and how it can be recognized in an electronic environment;

to determine what kind of electronic systems generate records;

to formulate criteria that allow for the appropriate segregation of records from all other types of information in electronic systems that generate different kinds of information.

to define the conceptual requirements for guaranteeing the reliability and authentic-ity⁹³ in electronic systems;

to articulate the administrative, procedural and technical methods for the implementation of those requirements; and

to assess those methods against different administrative, juridical, cultural and disciplinary points of view.⁹⁴

^{92/} In a paper written for Brazilian archivists Duranti explains: “Why diplomatics? Traditionally, diplomatics has been used as a tool of documentary criticism for assessing the authority of records as historical sources. However, its original purpose was to determine the genuineness of archival documents for ascertaining the reality of rights or truthfulness of facts represented in them. Today, the ability to assess the reliability and authenticity of documentary products remains central to the value of diplomatics. Its fundamental aim is to determine 1) the extent to which a record is a legitimate product of its context, 2) the action that is realized within that context, and 3) the documentary procedures that put the action into effect.... The use of diplomatic principles and concepts as standards for the design of record-making, record-keeping, and record-preservation systems, and for the evaluations of the records produced, used, maintained, and preserved over the long time in electronic form does not imply that diplomatics itself has changed or that its previous uses should be dismissed. The validity and substance of every science, and by extension of the profession that claims it as its distinctive body of knowledge, reside in its applicability in different circumstances and for different purposes.

^{93/} The authors explain that: “Reliability refers to a record’s authority and trustworthness, i.e. its ability to stand for the fact it is about. The concept is linked exclusively to records creation. Authenticity, on the other hand, refers to a record’s reliability over time and is linked to the record’s status, mode, and form of transmission and the manner of its preservation and custody”. <<http://www.slais.ubc.ca/users/duranti.intro.htm>>

^{94/} Luciana Duranti and Terry Eastwood, “Protecting Electronic Evidence: A Progress Report on a Research Study and its Methodology”, *Archivi & Computer* (3) (1995).

Comparing the Pittsburgh and British Columbia projects, one can observe some clear differences. Duranti defines an electronic record as “any record that is made or received and initially set aside in electronic form.”⁹⁵ She does not base her definition on *transaction* as does the Pittsburgh school. Continuing to define “what is a record”, she refers to the “diplomats” definition of “archival document”, i.e. “a document produced in the course of a practical activity”, while a *document* is defined as “written evidence of juridical facts”, etc. Duranti explains that:

Users need to know that the record was made under *controlled circumstances* as part of the regular workflow, that it was made *within reasonable time* after the occurrence of the facts it is about, and that it was generated by somebody who was *competent* to make that specific record, with either the duty or the direct interest to make it accurate (author’s emphasis).⁹⁶

She differs with (or goes even further than) her Pittsburgh colleagues, arguing that it is not sufficient to just ensure authenticity of records “as they pass through various transmissions over time”:

To this end, most records creators have focused on records communication and records-keeping rather than on records-making, and many have accepted security measures, such as electronic seals and digital time stamping. However, the easiness of electronic records creation and the level of autonomy that it has provided to records creators, coupled with an exhilarating sense of freedom from the chains of bureaucratic structures, procedures, and forms, have produced the sloppiest records creation ever in the history of record making. Too many persons and too many records forms generated in too many different contexts participate in the same transaction; too much information is recorded; too many duplicates are preserved; and too many technologies are used. In other words, electronic records, as presently generated, might be authentic, but they are certainly not reliable.⁹⁷

In another article she observes:

Thus, instead of concentrating on ensuring the integrity of unreliable records, we should be concerned with ensuring the creation of reliable records. How can this be done? By establishing the most appropriate record forms for each type of action and defining its elements, by determining step-by-step controlled records creation procedures, and by assigning responsibilities for the creation of each record. Ultimately, the goal is to have restructured business procedures in which the record making and keeping functions is a highly regulated and integrated part of the usual and ordinary conduct of affairs.⁹⁸

⁹⁵/ In a forthcoming paper (kindly given to the author by Dr. Duranti in December 1996) to be published in the “Acta” of the DLM Forum in Brussels in 1997, Duranti offers the following definition: “A *record* is any document created by a physical or juridical person in the course of practical activity, where ‘created’ means made or received and retained (‘set aside’) in order to act or for reference. Its necessary and sufficient components are: medium, physical form, intellectual form, content, context, persons, action and archival bond.” In a footnote to the text Duranti, explains, inter alia that “archival bond” is the originary, necessary, and determined web of relationships that each record has at the moment of creation with the records that belong in the same aggregation (also called “documentary context” to distinguish it from the general context which is usually termed “administrative”). In “the third progress report”(late 1996) the following has been added after the word aggregation: “It is an incremental relationship which begins when a record is first connected to another in the course of action (e.g., a letter requesting information is linked by an archival bond to the draft or copy of the record replying to it, and filed with it. The one gives meaning to the other.” In a glossary attached to the WEB document “*set aside*” is defined as: “To retain records in order to act (i.e. transfer, respond, forward) or for reference”. Ibid.

⁹⁶/ Ibid.

⁹⁷/ Ibid.

⁹⁸/ Luciana Duranti, “Reliability and Authenticity; the Concepts and their Implications”, *Archivaria*, No. 39 (Spring 1995).

The most fundamental difference between the two projects is, however, their view on the long term custodianship of electronic records. While the Pittsburgh project concludes that electronic records can best be maintained over time by the originating body but under strict control from the archival authorities, the UBC project makes a clear distinction between the current/semicurrent records and inactive records and concludes that authenticity can only be guaranteed when the inactive records are under independent custodianship by professional archivists in an archival institution.⁹⁹ In her latest writings, and after the Pittsburgh project had been completed in early 1996, Duranti describes the differing perspectives of the two projects in this regard:

The Pittsburgh Project was a three year NHPRC funded project, the purpose of which was to develop and test record keeping functional requirements and their applicability in electronic record keeping systems. Although the Pittsburgh Project and the UBC-MAS project have similar aims, their perspectives are fundamentally different. The Pittsburgh project's identification of functional requirements reflects the continuum perspective. The requirements do not differentiate the needs of active and semiactive records from the needs of inactive records, and they are premised on a complete integration of responsibility, accountability and jurisdiction for the management of electronic records.... The requirements here (i.e., in the UBC project, author's remark) focus on the needs of active and semiactive electronic records and they are premised on an essential division of responsibility, accountability and jurisdiction at the point at which those records become inactive. The different perspectives taken in the two projects are undoubtedly a consequence of the different methods and assumptions adopted by each. The Pittsburgh Project's record keeping requirements are justified and validated on the basis of practical standards and practices that have developed within a particular juridical context. The record keeping requirements identified in the UBC-MAS project, on the other hand, are justified and validated on the basis of universal standards and practices drawn from the theory and methodology of diplomatics and archival science.... Although their differences are fundamental and, likely, irreconcilable, given the radically different perspectives, methods and assumptions on which they are based, the two projects share a common purpose: ensuring the integrity of electronic records. Implementation of the two models in a variety of organizational settings will demonstrate which approach offers the most effective means of achieving that purpose.¹⁰⁰

David Bearman points out that while the UBC project is working on functional requirements for automation of records management and archives functions, the Pittsburgh project worked out requirements for evidence in recordkeeping. He finds that the two projects have very different purposes:

Those who have been following the project (i.e. the Pittsburgh project, author's remark) will note a subtle but important shift in the way the results are being framed. In the place of the earlier formulations, initially functional requirements for electronic records management and subsequently functional requirements for recordkeeping, we have begun to use the term functional requirements for evidence throughout. This reflects a realization on our part that other groups looking at the functional requirements of records management systems, particularly those at the DoD and University of British Columbia, were focused on *the application functionality required to support a business process called records management* (author's emphasis). These business process requirements for automation of an archives or records management function include many sources of requirements, such as security, interface design, network management, search and retrieval, and application support which are completely absent in our model. While we believe that we have made it clear previously that we derived the requirements based on what constitutes a record, not on how it was managed, we felt that the new formulation (functional requirements for evidence in recordkeeping) makes the limitation we adopted more explicit. At the same time we believe it makes the specification more universal, because it has equal weight regardless of the specific business processes engaged in by the archives or records management unit.¹⁰¹

⁹⁹/ For details see Chapter 8 below.

¹⁰⁰/ Luciana Duranti and Heather MacNeil, "The Protection of the Integrity of Electronic Records: An Overview of the UBC-MAS Research Project". (Unpublished manuscript kindly provided to the author by Dr. Duranti in December 1996. To be published in *Archivaria*, Winter 1996-1997).

¹⁰¹/ David Bearman, "Functional Requirements for Evidence in Recordkeeping: Invitational Meeting University of Pittsburgh, 1-2 February 1996", *Archives and Museum Informatics*, Vol. 9, Number 4 (1995).

Bearman again stressed these differences between the two projects in San Diego, in August 1996:

It is important to understand that the requirements for evidence in recordkeeping are not the same as the requirements for an electronic records management system.... As an exercise in gaining a better understanding of the difference between requirements of the property of “recordness” and requirements of the application of records management, many of these *further requirements* (author’s emphasis) were identified... in workshops... in June-July, 1996.... I believe this confusion between records management systems requirements - that is the requirements of an application system designed to support the functions assigned to records management offices and archives - and the requirements of recordkeeping, has confused the debate over many years. It was one of the difficulties faced by the SAA CART committee which was charged with both electronic records and application technology, and it currently confuses the work of the Records Management Task Force of the U.S. Department of Defense, which is designing a records management application system but slips into trying to impose those requirements as the requirements for recordkeeping.¹⁰²

The UBC team has had an opportunity to test some of its theories in the project carried out by the United States Department of Defense (DoD) and its Records Management Task Force.¹⁰³ According to Luciana Duranti, the Task Force has, since 1995, been developing requirements for “records management support systems (both electronic and non-electronic)”:

Both the UBC research team and the DoD reengineering team were interested in interpreting archival and diplomatic concepts using a standard modeling technique (i.e Integrated DEFinition language). The templates developed by the UBC team provided the concepts to be interpreted, while IDEF provided the means of translating those concepts into activity models which show the relationship of their components from well identified viewpoints for determined purposes.¹⁰⁴

¹⁰²/ David Bearman, “Item Level Control and Electronic Recordkeeping”, (*Paper given at the SAA Annual Meeting in San Diego, August 29, 1996*).

¹⁰³/ The project started in 1993 aiming at the development of, “...a sound, comprehensive approach to managing records in the information age”. In its first stage, which was a Business Process Reengineering (BPR) effort, “a formal model of records management” was produced. On the basis of this model a long-term plan, to be accomplished by the year 2003 was worked out. In this undertaking the UBC team as well as the Pittsburgh team were consulted. By the end of 1996 the Task Force has designed models of the records management process: “There are three models, expressing the individual, organizational, and life-cycle view-points, that together form the necessary and sufficient basis for the RMA (Records Management Application, authors’ note). The DoD records management BPR developed the individual viewpoint model. It is complete, although refinements may be appropriate over time. The RMTF (Records Management Task Force) has worked with Lieutenant Colonel Mark Kindl and Dr. William Underwood...and Professors Luciana Duranti and Terry Eastwood...University of British Columbia, to develop a formal model of records management from the records creator’s perspective. This model applies the principles of archival science to the articulation of the records management process. This research has broadened and deepened the basis for enhanced records management to ensure that reliable, authentic, complete and timely records are available to commanders and decision makers. Work on the life-cycle model has only started. Initial exploration of this model involved collaboration with the Army Research Laboratory and the International Council on Archives’ Committee on Electronic Records”. Kenneth Thibodeau and Daryll R. Prescott, “Reengineering Records Management: The U.S. Department of Defense, Records Management Task Force”. (*Archivi & Computer* (1) 1996). Kenneth Thibodeau served as the Director of the Records Management Task Force, Daryll R. Prescott was Program Director for Research and Development. The statement that the UBC project as well as the Pittsburgh projects were consulted by DoD is also included in another article by Daryll A. Prescott et al. After mentioning the two projects it states: “Discussions have been held with staff of both projects and their technical publications have been reviewed”. (*Functional Baselines Requirements and Data Elements for Records Management Application Software, August 1995*).

¹⁰⁴/ See <<http://www.slais.ubc.ca/users/duranti>>.

Two sorts of models were developed, “activity models” and “entity models”. The activity models depict, in the form of charts, “all the activities associated with managing an agency’s records” such as “Create records”, “Handle records”, and “Preserve records”, and the entity models define – also as charts – such activities as “Office”, “Class”, “Procedure”, “Dossier” or “Record”.¹⁰⁵

In a yet unpublished paper (December 1996) Duranti and MacNeil explain how the UBC project benefitted from its cooperation with DoD:

Since the templates expressed diplomatic and archival concepts using scientific terminology not readily translatable into functional requirements for the creation, handling and preserving of reliable and authentic records, it was necessary to explicate those concepts in implementable terms. It was fortunate, therefore, to find that the US Department of Defense Records Management Task Force... was actively seeking a theoretical foundation for its reengineering effort. The (Task Force) contributed to the UBC-MAS research methodology its own standard modeling technique, IDEF, which was very useful for the purpose of analyzing and graphically representing the diplomatic and archival concepts and making their meaning comprehensible and provided the concepts to be represented, while IDEF provided the means of translating those concepts into activity and entity models which show the relationships of their components from well defined viewpoints and for determined purposes.¹⁰⁶

The “record-keeping and record-preservation system”¹⁰⁷ Duranti describes in her paper resembles in all its details a traditional central registry system using a function-based file plan (classification scheme) as well as a thesaurus.¹⁰⁸ In a progress report, Kenneth Thibodeau, the Director of the DoD Records Management Task Force, stated that 47

¹⁰⁵/ The UBC team also developed eight “Templates” analyzing archives and records concepts in detail. The first template “What is a Record in the Traditional Environment?” breaks down the concepts into a) Diplomats and b) Archival Science. Example: Under Template 1: “Record” under diplomats equals “archival document”, while under Archival Science it is stated that: “Archival science does not define ‘a record’, but ‘records’, because it only deals with aggregations”, *ergo* here “Records” = archival documents. The other seven templates are: “What is a complete record in the traditional environment?”, “What is a reliable record in the traditional environment?”, “What is an authentic record in the traditional environment?”, “What is a record created in the electronic environment?”, “When is a complete record created in the electronic environment?”, “How is a record created reliable in the electronic environment?”, “How is an electronic record guaranteed and/or proved authentic?” (Ibid).

¹⁰⁶/ Luciana Duranti and Heather MacNeil, “The Protection of the Integrity of Electronic Records: An Overview of the UBC-MAS Research Project”. (To be published in *Archivaria*, Winter 1996-1997, kindly provided to the author by Dr. Duranti, in December 1996).

¹⁰⁷/ Duranti defines a record keeping system and record preservation system in the following terms: “A *recordkeeping system* comprises a set of internally consistent rules that govern the making, receiving, setting aside, and handling of active and semi-active records in the usual and ordinary course of the creator’s affairs, and the tools and mechanisms used to implement them. In other words, *recordkeeping* is “keeping record of action”: as such, it is the presupposition for the existence and the first object of *records management*, which is the management over time, from the creator’s perspective and for its purposes, of the creator’s records, of the means used to control their creation (e.g. classification, registration, and retrieval instruments), and of the human, technological, and space resources necessary to their handling, maintenance, and preservation. Although the management is from the perspective of the creator and for its purposes, it serves broader social aims that go beyond the carrying out of specific affairs, encompassing legal requirements, administrative accountability, social accountability, and historical accountability. The *record-preservation system* is a set of internally consistent rules that govern the intellectual and physical maintenance by the creator of semi-active and inactive records over time, and the tools and mechanisms necessary to implement them. The *records system* of the creator thus comprises the creator’s records, and its recordkeeping and record-preservation systems, and is controlled by the creator’s records management function.”

¹⁰⁸/ The system should be designed to... “control all the records of an agency, both electronic and non-electronic” and it “assign(s) exclusive competence to the records office for the classification, profiling, registration, and consignment to the central records system of all...non-electronic records... and establish(es) the routine according to which the electronic system will generate a record profile form in connection with each record. The profile will serve the purpose of an annotation and be linked inextricably to the record.” The proposed profile has no less than 28 fields for electronic records and 21 for non-electronic records. A footnote (8) defines a record profile as: “one of the manifestations of the conceptual action of setting aside a document, an action which gives rise to the archival bond and which transforms the document into a record.” (Ibid)

functional requirements are needed to manage records. Of these, the team selected a set of baseline requirements common to all organizations: Baseline requirements are defined for the following functions:

Making Records	Storing	Transferring
Classifying & Assigning	Screening	Destroying
Disposition	Retrieving	
Indexing	Copying	

These requirements are truly FUNCTIONAL in nature: they specify functions that applications must perform. The baseline set also includes requirements for metadata about records and for system management.... The RMA baseline functional requirements define a base on which to build. Additional action will be needed to build a comprehensive system.... A valuable enhancement would be to add requirement for access to records which need to be retained for long periods of time.... Another general enhancement would be to add the capacity to satisfy NARA (the U.S National Archives and Records Administration, authors' remark) requirements for the transfer of historically valuable electronic records to the National Archives. This need is not addressed in the baseline because less than 5% of records are ever transferred to the National Archives.¹⁰⁹

Thibodeau also mentions the management of non-electronic records, noting that: "For records not in electronic form, the RMA will function as a registry system. To make the RMA fully functional in the operational environment, implementers will have to load the organization's records categorization schema and records disposition schedule into the application."¹¹⁰ He concludes:

Much more will need to be done to achieve the TO BE state for the year 2003... both organizational needs and information technology will continue to change. DoD must continue to shape its policies and procedures to optimize records management support to the accomplishment of mission. The principal work to be done is that of implementation: actually to realize the vision for the year 2003.¹¹¹

To the author of this paper, it is somewhat unclear how much of the UBC theories have actually so far been included in the DoD project. The word "diplomats" is not at all mentioned in the report by Thibodeau and Prescott. On the other hand, a yet unpublished (December 1996) progress report is said to be the result of work between the DoD team and the now reinforced UBC team,¹¹² and another unpublished article (December 1996) indicates that the cooperation between DoD and UBC is ongoing and will continue until the end of March 1997, and that by that time "the final findings of the research will be illustrated in detail in a monograph outlining also the project's methodology and hypotheses".¹¹³

¹⁰⁹/ K.Thibodeau et al, Op. cit.

¹¹⁰/ Ibid.

¹¹¹/ Ibid.

¹¹²/ Luciana Duranti and Heather MacNeil, "Protecting Electronic Evidence: A Third Progress Report on a Research Study and its Methodology". (to be published in *Archivi & Computer* (5), 1996, kindly provided to the author by Dr. Duranti in December 1996).

¹¹³/ Ibid.

The UBC project is split into two phases or categories of findings. One - already completed - addresses the problem of reliability and authenticity of current and semi-current records still needed by the originator. The theories of diplomatics were used as an underpinning for this analysis. The other phase - yet to come¹¹⁴

to identify the timing and form of reliable transfer of responsibility for the preservation of electronic records from the body producing them to an archival institution or program;
to determine methods of migrating electronic records from one technology to another;
to establish the form of preservation that will guarantee the continuing authenticity of electronic records;
to select appropriate methods for the continuing and reliable accessibility and retrievability of electronic records;
to develop standards for the archival description of electronic records; etc. Ibid. - is addressing the problem of preservation of archival or non-current/inactive electronic records. The analysis will be done in accordance with the theories of what is called "archival science". It, therefore, has a direct bearing on the so called "Records Continuum" question (or Custody versus Non-Custody question) which will be addressed in Chapter 8.¹¹⁵

Margaret Hedstrom has summarized the status of projects undertaken in the USA and Canada. Under the "functional requirement" type of projects she includes the Pittsburgh and the UBC projects, and four projects that are attempting to implement the Pittsburgh requirements: in the City administration of Philadelphia, at the Universities of Indiana and SUNY (the State University of New York), and in the state of Vermont. According to Hedstrom, in the Philadelphia project - which is developing policies, standards, and systems for management of electronic records in the City of Philadelphia - "the project staff used the functional requirements and the reference model for Business Acceptable Communications (from the Pittsburgh project, author's remark) to define the specifications for a new Human Resources Information System".¹¹⁶[si.umich.edu/e-recs/ Research/NHPRCSum.html](http://si.umich.edu/e-recs/Research/NHPRCSum.html)>.

She continues, "the most comprehensive test of the Pittsburgh functional requirements is being undertaken at Indiana University which is half way through (in June 1996) a two year project to establish archival requirements for Indiana University's electronic records in the area of Financial Management and Student Services".¹¹⁷ Hedstrom concludes:

The Pittsburgh functional requirements and the findings of the UBC project begin to define the functions and data needed to manage electronic records, at least for structured business processes. Recordkeeping requirements are a subset of requirements for an automated recordkeeping environment which also include requirements for security, compatibility, interfaces, standards and similar issues.... The projects are beginning to accumulate experience that can be used to assess the technological, conceptual and economic implications of creating and maintaining records in

¹¹⁴/ "...since the focus of the current research is on the methods necessary to ensure the integrity of electronic records from the point of view of the records creator, the UBC-MAS research team is in the process of proposing another research project, which will assume the point of view of the records preserver. Its overarching goal will be to identify, on the basis of diplomatic theory and archival science, a comprehensive methodology for preserving the integrity of electronic records from the moment in which they are no longer needed by the body producing them and for as long as they are needed by society at large. The proposed research project is envisaged as an international collaboration among Canadian, American and European archivists in recognition of the fact that the method of long term preservation must be applied across juridical systems, cultures and technologies and must constitute the foundation of international standards...". In a footnote, thus far (December 1996), the project objectives are:

¹¹⁵/ "In addition to articulating specific methods for ensuring the reliability and authenticity of electronic records, the research team has also identified broader management issues relevant to the maintenance and preservation of reliable and authentic (inactive) records. The separation into two phases is based on the research team's realization that the intellectual methods necessary for guaranteeing the integrity of electronic records while they are needed by the body which produced them are different from the intellectual methods necessary for ensuring their integrity when they are needed by society for purposes other than the ones for which they were created." Ibid.

¹¹⁶/ Margaret Hedstrom, "Electronic Records Research Issues: A Summary of Recent Research", (*Prepared for the Invitational Conference on Electronic Records, June 28 and 29, 1996, University of Michigan, <<http://www>*

¹¹⁷/ Ibid.

electronic form. It appears that the functional requirements can be used conceptually to evaluate the capabilities of systems to produce and preserve reliable records. We need reactions from people outside the archival community especially where related research projects are being conducted.¹¹⁸

5.2 Document Management Systems vs. Recordkeeping Systems

There is a quiet revolution occurring in information technology today. It's called "document management".¹¹⁹

Reports indicate that document management systems, designed to manage textual electronic information that may not necessarily qualify as records have been marketed as recordkeeping systems, and accepted by records managers as such, causing loss of context and evidential value in records "managed" by such systems.

It should be emphasized that computer systems developed or purchased to manage electronic documents need to be more than just systems for tracking the physical location of the documents. They should manage documents over their complete life cycle, based on their value to the organization. Complex compound documents should be able to be managed as a logical entity now and in the future and even if they are migrated through many changes in technology. This requires that a number of document attributes are selected that best describe the document content and the context in which the document was used, and that these attributes are managed along with the document. In a computer file server environment the management of document attributes would need to be automated as much as possible.¹²⁰

Charles Dollar notes that, in North America at least, there is "considerable confusion regarding what constitutes an electronic record vis-a-vis what constitutes an electronic document"¹²¹. He goes on to explain:

This confusion is heightened by the recent development of document management software systems, which focus largely upon individual and group development of draft material, versioning, review and approval, and correspondence tracking. One aspect of this ambiguity and confusion is an inadequate understanding of fundamental concepts of archival science and records management. Records are a subset of documents, which in turn are subsets of recorded information. Recorded information is any information that is embedded or stored on storage media. A document is a subset of recorded information whose information content is conveyed or represented through alphanumeric text or an image in which there are logical boundaries (e.g. a beginning and an end or some other defined range that give rise to discrete, identifiable entities). A record is recorded information that comes to existence as a by-product of a transaction conducted by an organization or an individual and is evidence of that action.¹²²

Vendors are marketing various "document management systems" designed for storage and retrieval of huge amounts of text without the ability to identify and preserve records and their metadata. Archivists and records managers must, therefore, proactively involve themselves in the choice of such application software and, by emphasizing the risks in non-compliance, convince decision makers that, in the best interest of their respective agencies or organizations, recordkeeping functional requirements must be met and included in what is marketed as "document management systems". In such an endeavor, archivists and records managers can successfully ally themselves with auditors, administrative security personnel, freedom of information and privacy officers, lawyers, and senior

¹¹⁸/ Ibid.

¹¹⁹/ Interleaf, "The Document Management Guide", (<http://www.ileaf.com/docman.html>).

¹²⁰/ Dagmar Parer and Keith Parrot, "Management Practices in the Electronic Records Environment", *Archives and Manuscripts* (May, 1994).

¹²¹/ Charles Dollar, "Trends in the Archival Acquisition and Preservation of Electronic Records: 1970-2000", Paper given at Moscow State University, Russia, January 4, 1996 (unpublished).

¹²²/ Ibid.

Among the many tools office automation has provided, word processing, electronic mail (e-mail) and database systems are probably the most widely used in public administrations, as well as in private enterprises all over the world. Daily, millions of documents are typed or drafted on word processors, and communications previously sent and received by regular postal mail, telex or fax are forwarded by electronic mail. Users are connecting to the Internet and other on-line services, where millions of documents reside which may be downloaded to the user's PC and intermixed with his/her office records residing on directories and subdirectories that proprietary systems provide. "The inadequacies of contemporary file systems -- especially the limited file attributes and (8+3) naming convention of DOS -- have never been more apparent, nor the need for powerful document management tools greater".¹²³

Word processing packages were not designed to emulate records management systems (read: recordkeeping systems, *author's remark*), neither are they designed to capture the contextual information traditionally captured by registry systems. On a PC, file titles may be limited to eight characters, with a three character extension. While external and internal labels can be attached to the document, and the use of subdirectories can help to go some way toward eliminating this deficiency, such facilities are still very limited as a means of recording information about the document.¹²⁴

Such tools may be acceptable for a person's private and personal records, but should not be accepted as an organization's permanent practice for storage and management of corporate business records.

An Australian records manager in a governmental agency points out that the widespread practice of staff keeping records on floppy discs or PC hard drives has become a serious threat to an organization's institutional memory, and must be discouraged and replaced by functioning recordkeeping systems, noting that: "Word-processing document management is conceptually no more advanced than nineteenth century letterbooks, another example of the conventions and procedures lagging behind the technological developments."¹²⁵

Against the background of the discussion above of what records are, what constitutes "recordness" and what recordkeeping systems are supposed to contain, it can be concluded that document management products in the market do not meet basic recordkeeping requirements and may even contribute to the continued loss of "institutional memory". Further, while general *information* has been confused with *records*, records have been considered non-records, as in cases where e-mail communicated records have been disqualified as records and considered equivalent to telephone messages.¹²⁶ Thus, archivists must be informed about what products agencies intend to install and must be involved at the design, piloting,

¹²³/ "Managing the New Document", *DATAPRO*, October, 1994.

¹²⁴/ Dagmar Parer and Keith Parrot, Op.cit. Experience indicates that such deficient tools are prevailing.

¹²⁵/ Anne Picot, "Electronic Records Systems in the Roads & Traffic Authority, NSW", *Archives and Manuscripts* (May, 1994).

¹²⁶/ David Bearman, "Managing Electronic Mail", *Archives and Manuscripts* (May, 1994). About the legal status of e-mail (in the U.S.), see Alf Erlandsson, "The Principle of Provenance and the Concepts of Records Creator-Legal Development". Paper given at the First Stockholm Conference on Archival Theory and the Principle of Provenance (2-3 September, 1993) (Skriifter utgivna av Svenska Riksarkivet 10, Stockholm 1994). David Bearman, "Record-keeping Systems", Op. cit. David Roberts, "Defining Electronic Records, Documents and Data," *Archives and Manuscripts* (May, 1994). Information systems in general and text information retrieval systems are described in Charles T. Meadow, *Text Information Retrieval Systems* (Academic Press Inc., Hartcourt Brace Jovanovich Publishers, 1992). See also Michael Buckland, *Information and Information Systems* (PRAEGER, New York, 1991).

and prototyping stages of so called “document management systems” in order to make sure that fundamental archival requirements for a recordkeeping system are met by the system.¹²⁷ Parer and Parrot have summarized what should be done in order to change the chaotic document management situation:

Organizations positioning themselves into an increasingly electronic environment will need to do more than acquire a suitable document management computer system. They will also need to define the management structures required to control the electronic environment and they will need to state clearly what levels of responsibility each officer must take when creating, using, transferring, or storing electronic documents.¹²⁸

In search of a system that could meet at least the interim needs for sound electronic recordkeeping, the National Archives of Canada participated in a government-wide project, the IMOSA, CIMA project. The Canadian project is particularly interesting as it tested “in the real world” some of the theories expressed by writers quoted above and below.¹²⁹ The IMOSA project developed a set of interim functional requirements for a system to be able to keep electronic records and engaged a vendor to include some of them in a marketed product (the “Foremost project”).¹³⁰ It was learned that over the long-term, functional requirements should be developed within the context of the needs of the business requirements of the organization, since as structured corporate applications are defined adjustments to *both* the hard copy and the electronic filing systems are expected. This will lead to systems that are more relevant to the needs of business.¹³¹ The overall conclusion of the project was that to be successful, archival requirements must be integrated smoothly with general business requirements in order not to cause inconvenient restrictions on the end user:

From the IMOSA experience, it was determined that users generally will resist any outside interference with what they considered to be their own information “turf” ... users will be resistant to change unless they can see some benefit and unless they can be convinced that managing information from a corporate perspective will not mean that they will lose control (i.e., their autonomy in carrying out the work of the organization will be respected even if the organizations interests in its corporate memory are met).¹³²

¹²⁷/ Parer and Parrot recommend that word processing and other electronic office records should be stored and managed on computer file servers -- a solution that is basically the same as vendors of “document management systems” have offered. But under one very important condition: such systems must meet records management and archival requirements. But, “sometimes these concerns have not been addressed and instead a technology solution has been sought”. Dagmar Parer and Keith Parrot, Op. cit.

¹²⁸/ Ibid.

¹²⁹/ It should, however, be noted that the Pittsburgh specifications for functional requirements for recordkeeping systems had not yet been developed. See John McDonald, “Information Management and Office Systems Advancement (IMOSA)”, *Electronic Records Management Program Strategies, Archives and Museums Informatics Technical Report*, No. 18 (1993), edited by Margaret Hedstrom.

¹³⁰ ¹³¹/ The FOREMOST (Formal Records Management for Office System Technologies) report described the functional requirements for managing information in office systems being planned for and installed in the National Archives and the Department of Communications. Later it was tested in prototype form in about 1,000 Canadian organizations. The product and the piloting of its prototype is described in: John McDonald, “Managing Information in an Office System Environment - The IMOSA Project”, *Information Handling in Offices and Archives*, edited by Angelika Menne-Haritz (K.G Saur, 1993).

¹³¹/ John McDonald, Op.cit. Concerning the business needs and changing business processes in this context, see also Heinrich Reinermann, “Changes in Organization and Process of Work in Administration”, paper given at the Symposium on the Impact of Information Technologies on Information Handling in Offices and Archives, Marburg, October 1991. Published in *Information Handling in Offices and Archives*, edited by Angelika Menne-Haritz (K.G. Saur, 1993).

¹³²/ John McDonald, Op.cit. A pilot test undertaken in the International Monetary Fund (1993) partly reconfirm McDonald's conclusions. To be accepted, the system must not add additional burdens on the end-user (for “archival purposes”) and emulation of existing filing systems turned out to be a way of just petrifying old procedures into new technology.

David Bearman found, in 1992, that the IMOSA project was a compromise between the European and the American approach to electronic records management. While the Europeans still use the central registry concept where human interference is needed for management of each individual electronic record, the Americans are searching for an automated and fully integrated solution. Bearman writes:

It is extremely interesting, therefore, to examine Canadian tactics which represent a middle ground between the European and United States strategies in part because their organizations share some of the characteristics of the traditional European bureaucracy and some of the American office. The Information Management and Office System Architecture (IMOSA) project reveals its dual policy/technology roots in its title and its co-sponsorship. The IMOSA approach looks on the one hand towards defining the “corporate memory requirements” and on the other hand towards writing a specification that it hopes will become a procurement standard for office front-end and rear-end systems. The technological solution itself reveals a duality since it both shapes the interface (so that the users identify the activity context in which they are working when they select software functions) and asks users to label explicitly corporate files based on an imposition of registry principles.¹³³

In a paper delivered at the Canberra “Playing for Keeps” Conference, in November 1994, John McDonald gave his retrospective view of what could be done in today’s situation vs. what one should look forward to. He first explained what the Canadians had done as a temporary solution (the IMOSA project) pending a full-fledged tool that could meet the recordkeeping requirements:

One of the most important products of IMOSA was the understanding that we gained of the evolutionary path that we seem to be on with respect to our use of office technologies. In the years since the introduction of office networks we have seen a rapid evolution in the sophistication of the tools that we are using but a very slow evolution in the application of these tools to the business processes of the organization. In many respects we are still in the wild frontier. We are still living in a world where creation, transmission, use and retention of electronic records is under the control of the individual user. In going out of our way to support the needs of individual users we seem to have neglected (or have yet to understand) the application of these technologies within the context of the business activities and processes of the organization. Based on the direction set by the IMOSA project, and in keeping with the stage we are at where the electronic world revolves around the individual user, we developed a guide to the management of information in user directories. In order to promote consistency among users and thus set the stage for greater user acceptance of common filing systems in the future, the guide suggests that the classification scheme be based on the functions and activities of the user.¹³⁴

McDonald continued by presenting what one could describe as a vision of the future:

This brings me to the dilemma that we are facing with respect to the solutions that we are developing today. The products that I have described may seem adequate in terms of where we are today, but from the perspective of those in the future, they will probably be seen as primitive and, from a record keeping perspective, totally inadequate. Why? Because the introduction of guides on the management of user directories, group space and even enterprise-wide automated records management systems *are being done outside of the context of how people normally work* (author’s emphasis).

¹³³/ David Bearman, “Diplomatics, Weberian Bureaucracy, and the Management of Electronic Records in Europe and America”, *The American Archivist*, No. 55 (1992).

¹³⁴/ John McDonald, “Managing Records in the Modern Office - The Experience of the National Archives of Canada”. Paper given at the “Playing for Keeps” Conference, Canberra (November, 1994).

What will this future look like? Right now my screen is full of icons that represent the “toolbox” of utilities (e.g. word processing, spreadsheet, e-mail, database, etc.) that I need to do my work. In the future, and as a program manager, I want a screen that contains icons that reflect my business.¹³⁵

Above all, just as I recognize my accountability for finance and personnel, I would like to think that I was able to carry out *my* responsibility for applying the record keeping rules of the organization in a manner that supported, directly, the accountability and business requirements of my program. Naturally, I would also like to think that I could count on a facilitator (the records manager?) to help me meet my responsibilities... all of the record keeping (tagging, storing, etc.) would happen automatically based on rules and criteria that were developed by the “records manager”, in consultation with myself and my managers within the context of the organization's need to avoid corporate amnesia. There would be no “filing” icon. *The rules for defining and establishing how the content, context, and structure of the records of the actions and transactions of my division's business activities are to be kept would have been set beforehand and designed into the applications - that is, behind the screen* (author's emphasis).¹³⁶

This is not a distant dream. It is beginning to happen now. And it is happening because vendors such as Microsoft, Lotus, WordPerfect, and others are recognizing that their future depends on the extent to which their products are truly supportive of the work of organizations.¹³⁷

McDonald's vision has to some degree been transformed into a Guide, issued in May 1995 by the Canadian National Archives: “The Management of Electronic Records in the Electronic Work Environment (EWE)”. EWE is defined as:

... a flexible, integrated work environment which is intuitive to the functions, work processes and information needs of the employee. The environment is comprised of a standard set of work tools at the desktop, thereby allowing the worker to create, manage, retrieve and re-use information intuitively and seamlessly at the right time, in the right

¹³⁵/ McDonald adds: “An example might help to illustrate what I mean and how this is relevant directly to record keeping. When I click on ‘development’, for instance, I want to be provided with options that permit me to establish a project (e.g. on a guide on essential records), monitor a project, write a memo on the project, or organize a meeting about the project. But rather than have to develop a project proposal, or a project control sheet or even a memo from scratch, I would like to see the project proposal form already set up (through the development of style sheets and macros based on the use of the word processing or project management software) in a way that reflects the format and rules that my division has decided upon for developing project proposals. When I click on the routing list for my proposal, rather than having to select from all of the names of the staff in the National Archives, I want to see the names of those people who normally receive ‘development’ project proposals. I also want to know, as the proposal is sent, that the record keeping rules that were designed into the applications for documenting and otherwise supporting the tasks associated with the management of development projects are respected.” John McDonald, Op. cit.

¹³⁶/ McDonald explains: “If I or any of my staff wanted to retrieve records then they could click on the ‘information locator’ icon which would serve as a corporate ‘gopher’ (again pre-designed) that would search for records, information, and data regardless of where they were located. The mechanics involved in enabling this to happen would be designed into the navigation utilities located behind the screen. The need for a central repository of electronic and even hard copy records would diminish with the increase in the sophistication of the tools that I could employ to access and retrieve not only records but any information that we needed to support our work. I would not care if I was dipping into the records office or the library nor would I want to. All I want to know is that I received or gained access to the information that I wanted and that it appeared before me in a way that was available, understandable and usable. Again I would like to think that I could count on a facilitator (the librarian?) to help me respond to my own access and retrieval needs, preferably by working with technical people and the records manager (i.e. the person who understands context) to develop and integrate the appropriate tools and place them behind the screen.” John McDonald, Op. cit.

¹³⁷/ McDonald, Op. cit.

place, in the right format, and in a cost effective manner. These functions will be performed regardless of media, irrespective of geographical location, and allowing for public access as required.¹³⁸

1. Guidelines on the Management of Electronic Records in the Electronic Work Environment.
2. Electronic Work Environment (EWE) - Vision.
3. Record Keeping in the Electronic Work Environment - Vision.
4. Managing Shared Directories and Files.
5. Automated Records Management Systems (ARMS) - A Requirement Checklist.
6. Electronic Records Management Initiatives in the Canadian Federal Government - A Directory.
7. E-Mail Policies in the Canadian Federal Government - A Directory.

The guidelines offer useful options for permanent as well as interim solutions, particularly in the management of e-mail. The section about Electronic Work Environment looks forward to a fully integrated work environment:

The fundamental restructuring of governmental programs and services and the increasing demand for more timely, accurate and quality information, both internally and externally to government, is providing the impetus for a renewed and more integrated electronic work environment. The

¹³⁸ / "The Management of Electronic Records in the Work Environment" (Exposure Draft issued by the Information Management Standard and Practices Division, National Archives of Canada, May, 1995). The draft consists of a collection of papers:

components of this vision must not be restricted to technology alone. People, management practices, support structures (organizational and technology), and culture must be

integrated and considered as key components of the EWE vision. Recordkeeping and accountability are built into

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The realization of this vision requires that *users* understand their responsibilities, have the right tools and are aware that records are being kept and can be retrieved. It also requires that *organizations* develop and disseminate rules, policies and standards for recordkeeping, that *management* understands and supports the role of recordkeeping, and that *the corporate culture* accepts and includes responsibility for keeping records.¹⁴⁰

David Bearman addressed the implementation of “Item Level Control in Electronic Record Keeping” in San Diego in August 1996. He expressed an optimistic view on the availability of systems like the one proposed by MacDonald.

At its most permissive, implementers provide users with value-added functionality launched by business process icons located in the user interface along with the familiar software application icons. The choice of business process methods would launch capture routines for the resulting transaction and users would be enticed to use the value-added service by their benefits. *Fortunately, 1996 seems to be the year in which workflow management tools with object oriented metadata assignment finally come into their own* (author’s emphasis) which, for archivists, means that a variety of off-the-shelf applications that can be set into user interfaces between users and the software environment in which they work. These interface managers can make the off-the-shelf application appear to be a series of business applications and to label the records communicated by conducting those business transactions according to the retention, indexing and access requirements of the underlying business requirement. Prototypes of such implementations, which can even be placed over legacy systems, have been done for John MacDonald at the National Archives of Canada, and by many others.¹⁴¹

¹³⁹/ Ibid.

¹⁴⁰/ The Canadian draft proposal also provides practical and useful “interim” rules and advice for “Managing Shared Directories and Files” - with an extensive appendix about Naming Conventions.

¹⁴¹/ David Bearman, “Item Level Control and Electronic Recordkeeping” (*Paper given at the SAA Annual Meeting in San Diego, August 1996*).

Bearman continues:

A variant of this option is being employed in “Intranet” implementations in which corporate users employ functions provided by the action officer to make requests for devices. Because the action office defines the types of requests, it can embed metadata into the resulting records. Likewise, in a distributed filing environment, records filed in certain places under particular headings would be given metadata attributes upon arrival at the filing server application. Records deemed to be lacking appropriate metadata to leave an organization’s boundaries, or even to pass outside the LAN serving one work group, could be assigned those attributes or returned to sender to provide the necessary descriptors.¹⁴²

5.3 Databases as Recordkeeping Systems - What Constitutes a Record in a Database

All the systems touched upon above deal with records generated in an office system environment (where networked PCs provide word processing, e-mail and group work capabilities -- as opposed to a database environment). But what about databases as recordkeeping systems? A lot has been written about databases, but practically nothing was found that analyzed databases and database systems from the point of view of *evidence of transactions*.

It is, however, possible to distinguish between two fundamentally different kinds of databases: those created solely for gathering or manipulating scientific data,¹⁴³ and those which are an integral part of an agency’s or organization’s administrative transactions. The former kind lacks recordness in the strict sense of the word, while the latter kind of databases reflect transactions and potentially have evidential value. Consequently, they can be considered meeting the requirements for “recordness”.

A Swedish study has made an effort to explain the difference between records and data as they have been accessioned in the Swedish National Archives.¹⁴⁴ Unfortunately it is only published in Swedish. It distinguishes between “electronic records”¹⁴⁵ and “electronic archive data”. It states that word processing documents, electronic mail, graphics, digitalized sound, pictures, etc. are *electronic records* because they are physically-logically limited (distinguishable) from other similar entities and informationally fixed (static). This category is also called “simple data structures”, which, it is noted:

... in their principle nature are, more or less, the equivalent to traditional paper records. If we shall be able to speak about an electronic record it must have interior as well as exterior limits.... In an electronic environment this can be translated so that the entity must be limited from and distinguishable from other similar entities. An electronic record must own some kind of physic-logic space-dimension.¹⁴⁶

The report defines in this context an electronic record as follows: “*An electronic record (den elektroniska arkivhandlingen) is physically-logically distinguishable from other similar entities and is informationally fixed*”

¹⁴²/ Ibid.

¹⁴³/ Ken Thibodeau distinguishes between two kinds of scientific databases, “observational” and “experimental”, both having informational value. Ken Thibodeau, “International Research: Appraisal and Preservation of Scientific Databases” (*Paper given at the XIII International Congress on Archives, Beijing, 1996*).

¹⁴⁴ / Anders L. Johansson, “Delrapport.Ett konceptuellt ramverk foer definitionen av elektroniska arkiv-handlingar” (*Systemutvecklingsprocessen, Fraagorna om laangsiktigt bevarande av data, RA 1995*). Translations from the Swedish done by the author.

¹⁴⁵/ “Elektronisk arkivhandling” (in Swedish).

¹⁴⁶/ “Because electronic records are physically-logically distinguishable entities with a fixed informational content they can be identified and be given account for through the different stages of the records life-cycle. In principle one can say that data- and computer-systems in such cases can be compared to microfilm readers”. Ibid.

(static).¹⁴⁷ It continues by analysing another kind of “record” which is not fixed and has no physical limitations. It is introduced as “electronic archive data” (Elektronisk arkivdata):

Electronic archival material that does not belong under the definition “electronic record” (elektroniska arkivhandlingen) is here called “electronic archive data”. Even for this category the central thing is how its is *presented* and used as part of an activity/function (verksamhet)... It is not a regular record, but it has grown out of an activity/function.

The fact that the positions (posterna) in different databases have been created as part of the originating agency’s activities qualifies it as being part of the records of the agency. So what is electronic archive data? The concept should be seen in the light of the concept of “complex data structures”. In this case the materialization’s outer and /or inner limitations can not be as easily identified (as in the case of the “electronic record”). The outer limitation is temporary and takes place with the help of some data manipulation tools. This means that the materialization cannot be limited and distinguishable from other equal entities. Consequently, it (the materialization) cannot be fixed (static) as to what concerns its informational content. The materialization of electronic archive data is, in other words, a *logical entity* while the electronic record is a *physical-logic entity*. This reasoning leads to the following definition:

Electronic archive data consists of processual combinations that physically-logically can not be distinguished from other similar entities and that can not be fixed when it comes to informational content.

It is in this context important to keep in mind, that it (the electronic archive data) is not a question of a fixed (static) record (arkivhandling), but it is a processual combination which in best case may be re-created. If this is not possible the contextual dimension may be lost.¹⁴⁸

The report concludes that while *electronic records* reflect what an agency/organization *de facto* has done through completed transactions, *electronic archive data* show what has been technically possible. One shows what has been done, the other what could have been done.

Archives all over the world have accessioned databases, seemingly not because of their evidential value, but rather because of their *informational* value. Such databases were created for their informational value -- as an information resource. Statistical databases are good examples of this kind of database.¹⁴⁹ Terry Cook and Eldon Frost have described the first generation of databases transferred to the Canadian National Archives as mainly consisting of statistical and survey files:

Thus the information they contained was central to the sociologists and statisticians using and often creating them, while the context surrounding their creation was of secondary importance. Similarly, for the first generation of pioneering electronic records archivists, “informational” value was emphasized in their theoretical

¹⁴⁷/ Ibid.

¹⁴⁸/ Ibid.

¹⁴⁹/ David Wallace states “not all electronic information systems are recordkeeping systems. Unfortunately, non-recordkeeping systems are the norm within organizations and reflect the dominant database design methodologies, which treat redundant data as wasteful and contributing to inaccuracy. The timeliness and reusability of the data is prized over its utility for organizational accountability. Such systems do not produce records because they were never intended to do so.” David Wallace, “Managing the Present: Metadata as Archival Description”, (<http://www.lis.pitt.edu/~nhprc/Pub10.html>). Also printed in the *First Pittsburgh Research Report* (September, 1994). Ken Thibodeau states that many national archives have accessioned “flat file” databases for up to two decades (he wrote this in 1991): “Their holdings consist mostly of data files, with a large proportion being survey and census data designed for numerical analysis. Procedures for transferring such files to an archives, accessioning them, preserving them, and providing access to them are well established and relatively simple.” Thibodeau seems, without explaining why, to assume that this material accessioned by archives is “records”. Ken Thibodeau, “To Be Or Not To Be: Archive Methods for Electronic Records”, *Archival Management of Electronic Records, Archives and Museums Informatics Technical Report*, No. 13 (1991), edited by David Bearman.

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commentaries and appraisal practices, whereas contextual “evidential” value was less important.¹⁵⁰

In his paper given at the Congress on Archives in Beijing, Ken Thibodeau explained the reasons why the U.S. National Archives (NARA) has accessioned numerous scientific databases, and on what basis they were selected. He explains that

in accordance with the legislation regulating NARA’s acquisition policies, records of informational value can also be accessioned, although they lack evidential/recordness character. He has found that there are two different criteria for accessioning such databases:

continued research value for the field for which they were created, and
for historical documentation

To assist the archivists at NARA in their appraisal of scientific databases, a close cooperation with the scientific community was embarked upon. A panel of experts helped evaluate no less than 10,000 databases. Nine hundred were selected as potential candidates for preservation and 430 were accessioned for their potential informational value. The evaluation was based on four criteria, research potential, content and coverage, the state of the data in the records, and their relationship to other data. Thibodeau explains:

The relevant framework for appraising these scientific data sets is not defined by business activities or the need for operational corporate memory of the sponsoring agency, but by the research community. Seeking the input of scientists in the appraisal of the data recognizes that the roles and the actions of academic researchers are at least as important as the functions of the agency that funded the research or launched the satellite.¹⁵¹

Thibodeau summarizes:

Estimating the informational value of records does not have the methodological uniformity of appraisal which considers only evidential value. But, in fact, restricting appraisal to evidential value does not solve any of the problems involved in trying to determine informational value, it merely ignores these difficulties. It creates an illusion of rigor and certitude at the expense of relevance and comprehensiveness. The ultimate goal of appraisal is to identify records that have enduring value... the goal of appraisal must be to ensure that we preserve those records that have the greatest potential usefulness over the long term or those records that best support the highest priority uses.¹⁵²

In another context Thibodeau has also addressed the *evidential* value of databases:

In the last few years, more and more electronic records have been appraised as permanent because of evidential value. There are two reasons for this. First, agencies are increasingly scheduling electronic records that are in a form other than that of databases. *Second, the databases being scheduled are different in character from those scheduled in previous decades* (author’s emphasis). Most of the major statistical databases, consisting largely of social and economic data, have already been scheduled. The databases on records schedules in recent years are

¹⁵⁰/ Terry Cook and Eldon Frost, “The Electronic Records Archival Programme at the National Archives of Canada: Evolution and Critical Factors of Success”, *Electronic Records Management Program Strategies, Archives and Museums Informatics Technical Report*, No. 18 (1993), edited by Margaret Hedstrom.

¹⁵¹/ Thibodeau, Paper given at the XIII International Congress on Archives, Op. cit.

¹⁵²/ Ibid. The policy described by Thibodeau has been criticized by other archivists, something that he points out in his paper. He refers particularly to comments made by Terry Cook, who argues that appraisal should never be based on “anticipated use”: “Terry Cook articulates an opinion undoubtedly shared by many archivists when he criticizes the expansive approach. But Cook goes beyond criticism to wholesale rejection of the consideration of the long term usefulness of records in appraisal. He asserts that an archival strategy which actively involves research communities is wrong because ‘it imposes on appraisal the *external* criteria of anticipated use’. He argues that this subjects archival appraisal to the transitory winds of research fads”.

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increasingly databases used in the administration of government programs. It has been clearly demonstrated that such transactional databases provide important and unique evidence of how government actually functioned. As such, they provide critical supplements to records of policy, which document how government intended to work, and reports, which show how the government thought it worked.¹⁵³

¹⁵³/ Ken Thibodeau, "Electronic Records Activities at the National Archives and Records Administration (U.S.)". Paper given at the "Playing for Keeps" Conference, Canberra, (November, 1994).

The Records Management Task Force of the U.S. Department of Defense (DoD), which had on its agenda “managing database information as records”, established an interim policy for the management of records produced from information maintained in electronic databases. The Task Force identified a data base as a record and as giving rise to the creation of additional records at the point at which information from a database is assembled, retrieved, and developed into a product used to conduct government business.¹⁵⁴ Thibodeau also addresses the problem of preservation of databases:

To preserve electronic records, it is also necessary to preserve the logical and conceptual structures of the records. In general terms, the logical structure refers to the way the data within a record is organized, while the conceptual structure refers to the way the data is presented to users of a record.¹⁵⁵ Preserving electronic records entails preserving logical structures and also the ability to present the data as it was presented to the original users of the record. This is true whether we are talking about large, complex databases, textual documents, or digitized photographs. It is necessary, then, to build on top of the structure for preserving physical files, additional structures to preserve the logical and conceptual characteristics of records and records systems. Depending on the complexity of the records, it may be necessary to elaborate many additional layers of structure.¹⁵⁶

Charles Dollar gives an additional perspective on the position taken by the U.S. National Archives on the archival value of databases:

As the appraisal criteria for machine-readable records were developed and codified in the late 1970s, none of the key players fully recognized or comprehended the significance of the criteria based upon the evidential and informational value taxonomy rather than archival science. In fact, it was not until the late 1980s that concepts and principles of archival science were even acknowledged as relevant and this was largely due to challenges that relational databases and E-mail posed for electronic records archivists. Given the fact that computers were being used largely to store and process non-textual databases, an emphasis upon “informational content” as opposed to “evidential value” was correct. It is worth noting that these non-textual computer files were considered “records” because they were “made and received” by government agencies and electronic archivists tended in many instances to equate a record with the making or receipt of “information objects” (to use a term in vogue in the 1990s), a view that archival science does not support.¹⁵⁷

A discussion about what is a record in a database has recently taken place with the Internet listserv “Recmgmt” as a forum. The discussion confirms that there is a wide confusion and uncertainty among colleagues concerning how to distinguish what, if anything, meets the requirement of recordness in databases. It seems to the author of this paper that one reason for this confusion is that many archivists still have the “first generation” databases described by Cook/Frost in mind when they raise the question of recordness/evidentiality vs. information in databases.

The listserv discussion was opened by Dave Mackler who referred to an ARMA meeting in Las Vegas where

¹⁵⁴/ Semi-Annual Report dated July 3, 1995.

¹⁵⁵/ Thibodeau explains: “In a personnel database, for example, the data might be organized into separate logical files, with one file containing a record identifying each employee, another containing employment history for each person, a third file identifying each department in the organization, a fourth describing each job series, and so on. The grouping of data into logically defined files, the structure of data elements in records within each such file, and the relationships among files are logical structures. The same data may be presented in different ways, and different subsets of data from different combinations of files may be presented to different users. A personnel specialist handling a promotion, for example, would see data identifying an employee presented on a personnel action form, while an administrative assistant arranging for training would see the same data on a training form. The agency's recruitment office might see aggregate data that summarized employee turnover by job category and grade.” Ken Thibodeau, Op. cit.

¹⁵⁶/ Ken Thibodeau, Op. cit.

¹⁵⁷/ Charles Dollar, “Trends in the Archival Acquisition and Preservation of Electronic Records: 1970-2000”. Paper given at Moscow State University, Russia, January 4, 1996 (unpublished).

management of electronic records had been on the agenda and the topic of records in databases had been raised: “When is an electronic database a record? When it is created?, every hour?, day?, week?, month?, year?, when it will never be updated

(modified) again? Just when does a records manager secure a ‘record copy’ of a database?” The question was raised again at the Cohasset Conference on electronic records:

We heard lots of great material but only one speaker, to my knowledge, addressed the when of electronic databases as records. The Pittsburgh academic evaluation of electronic records has determined that metadata on *every* transaction must be kept. This solution is not feasible in the real world. The volume of data, metadata, on every transaction, would require resources most of us could not even comprehend. Every time I update a database the data previously in a field that has been updated is gone. Consider large transaction based databases with changes every second. When does the records manager make a “record copy” of the database?¹⁵⁸

The subject triggered numerous contributions and various solutions were suggested. Databases could be captured as records when reports were generated, snapshots should be taken or it was stated that updated information in databases should be considered as disposable transitory records and *only* the database itself be considered a record (“the databases are treated as records in themselves”).¹⁵⁹ Richard Cox from the Pittsburgh project stated that they do not consider all information systems to be recordkeeping systems or to support records. Cox then advised those who are interested in the definition of records and recordkeeping systems to study publications by Bearman, Cox, Duff and Wallace¹⁶⁰.

Wess Jolley stated that all databases are different and cannot be approached the same way. He noted: “I think we will never reach a clear consensus of exactly at what point a database becomes a ‘record’, because every database is so different, and is dynamic in its own unique way. What might serve us better would be a set of criteria on how to develop policies for databases that address their individual needs.”¹⁶¹

Thomas Norris from the New York State Archives and Records Administration brought up the important question of the difference between *records* and *information* and “records management” versus “information management” in a database context:

My opinion is that records of all media derive from recordkeeping requirements--that is the need to retain information over time in order to prove a former reality. Therefore, if a database (or some part of it) is used to meet recordkeeping requirements, then it is a record for that purpose. It may not be a good record in that it may not meet those requirements satisfactorily, but, if so, that may be because it was not really designed for that recordkeeping, or was not designed well (usually the former). Given that the above assumption is correct... a database that is required to supply evidence in audits or legal actions will need to be constructed and managed in such a way as to ensure admissibility in and availability for those proceedings. A database that has no such application need not be so designed--even though it may still be used to meet internal recordkeeping requirements based upon operational use of information. Some databases, or more likely data files or elements in databases, possess only ephemeral value for any sort of recordkeeping requirements. Some data may be *information* (author’s emphasis) at best and not really a record at all. Wherever the database (or datafile or element) falls within the area of recordkeeping requirements, its retention, disposition, and management should

¹⁵⁸/ Listserv Recmgmt, 12/19/95, 12:01 p.m.

¹⁵⁹/ Compare Ken Thibodeau’s statement about relational databases in an article from 1991: “The specific structure of relational databases, embodied in tables and the relationship between tables, are aspects of the arrangement of electronic records which reflect the use of the data in the operating environment: that is, *they have records value*” (author’s emphasis). Ken Thibodeau, “To Be Or Not To Be: Archive Methods for Electronic Records”, *Archival Management of Electronic Records*, Archives and Museums Informatics Technical Report, No. 13 (1991), edited by David Bearman.

¹⁶⁰/ Listserv Recmgmt, 12/19/95, 1:55 p.m.

¹⁶¹/ Listserv Recmgmt, 12/20/95, 8:45 a.m.

be the result of a conscious decision. The higher the risk of the environment, the more important that the decisions be documented, whether through retention schedules or through management approved data management procedures. How these decisions are implemented (e.g., printing and retention of paper reports, automatic supersession by new data, etc.) should be based upon an assessment of the recordkeeping capabilities (including associated costs) of the full range of techniques and technologies available.

This is where records managers come in--it is our job to make and carry out decisions about records, as opposed to mere information. Librarians, for instance, manage and preserve lots of information, but they don't generally concern themselves with records in that they bear no responsibility for the evidential nature of the information they manage. I realize that records managers also are concerned with many of the same issues as are other information-related professions and some of us wear many hats. However, when we begin discussing such topics as databases as records, we are really getting down to the root of our profession as records managers.¹⁶²

Jim Connelly, Alberta, Canada, wrote that much of the present discussions on record/database are rooted in the fixation on the first generation of databases and on the tendency to always draw parallels between appraisal of data systems and appraisal of paper-based records systems. He urges archivists to "check our paper prejudices at the door". Connelly gave a retroactive overview of approaches to appraisal of databases from their first generation in the 1960s until the present time, and proposed a systematic modern approach based on appraisal of the function(s) the database supports. He summarizes his ideas as follows:

In essence, I believe that an accurate picture of a computer system can be created from an understanding of data stores, data flows, process flows and system interaction. (The latter is somewhat crucial in linked databases either internal or external to an organization and even more so when looking at the data matching requirements imposed on governments or privatized government functions.)

I do not completely espouse the Bearman principle that a record is only a record when it is in eye readable or human readable form. My words may be an oversimplification of a complicated issue. However I firmly believe that the metadata of records must be incorporated in scheduling information if only to avoid the problems of hardware and software migration that is becoming so rapid.

I believe that as in the trend to functional schedules for hard copy a similar high level approach to computer systems has merit (author's emphasis). Retention periods can be calmly discussed when business functions and datastores are identified. The retention of resulting outputs (printouts) can also be determined from a review of the corresponding functions. The retention of inputs (paper or electronic forms) can be determined from a review of datastore retentions. For those of you still believing in the snapshot world, I must say that the audit trail of datastores is always a topic at review sessions.

Please accept that there are no things - no concrete objects to which we can assign retentions. But there are concepts that the world of data administration has brought to light that we all can use in the struggle to help our businesses and governments manage their information.¹⁶³

Dave Mackler, who started the discussion, concluded two weeks later:

I know a lot more than I did 2 weeks ago and also know that I don't know the answer to this question. One thing I do understand is that the technology is here now that will, by leaps and bounds, increase the difficulty of managing "records" as the hardware and software support sharing of bits of data from a nearly infinite number of sources, which cannot be duplicated. Look at how "mirror" sites on the web work. RMs have a task of grasping a cloud in a gale with directions to hold it in place with chicken wire.¹⁶⁴

¹⁶²/ Listserv Recmgmt, 12/26/95, 8:36 a.m.

¹⁶³/ Listserv Recmgmt, 12/28/95, 2:29 p.m.

¹⁶⁴/ Listserv Recmgmt, 12/29/95, 4:41 p.m.

Electronic information systems like Geographical Information Systems (GIS)¹⁶⁵ constitute an additional type of database, where the definition of “recordness” becomes even more challenging. GIS is a hybrid system specifically developed to integrate vast quantities of diversely formatted data. It allows extreme latitude for combining information to support application specific queries, provide a wide variety of user interfaces and to display information in geographical or tabular manner. With one exemption¹⁶⁶, the author has seen no comments in the literature about the question of “recordness” and/or archiving of this important kind of information.

Chapter 6

Appraisal of Electronic Records

Appraisal and disposition practice in North America will not work in the electronic records world. The method of appraising records by examining them after they have been accessioned by the archives is not suitable for electronic records. Alternative approaches have been searched for, and it has been suggested that appraisal decisions might be better made based on analysis of business functions and processes rather than on analysis of individual records, files or series. Archival appraisal methodologies have, therefore, in some countries, undergone fundamental revisions, and this has caused a professional debate in the literature. The new approach is often described as “appraisal by function” as opposed to “appraisal by content”. Terry Cook has examined the theoretical and philosophical background of the new approach. He traces the appraisal by function concept to the theories of Professor Hans Booms, former head of the German Bundesarchiv and former president of the International Council on Archives:

Booms... held true to his essential insight that society, not historian users and not the state’s record creators, must generate the values that define “importance” and therefore archival significance and archival retention. This leads to the corollary that “archivists need to orient themselves to the values of the records contemporaries for whose sake the records were created”. Booms by 1991 asserted that society’s values were best identified not directly by research into societal dynamics and public opinions, however, but indirectly through an understanding of the functions of those key records creators designated by society to implement its needs and wishes. He asserted that “archivists require a useful analysis of records-creating functions to help them connect the documentary needs... with the records themselves”.¹⁶⁷

¹⁶⁵/ What Is A Geographic Information System (GIS)? An information system that is designed to work with data referenced by spatial or geographic coordinates. In other words, a GIS is both a database system with specific capabilities for spatially-referenced data, as well as a set of operations for working [analysis] with the data. (*Star and Estes*, 1990). A system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data which are spatially referenced to the Earth. (*Chorley*, 1987). Automated systems for the capture, storage, retrieval, analysis, and display of spatial data. (*Clarke*, 1990). A system of hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modeling and display of spatially-referenced data for solving complex planning and management problems. (*NCGIA lecture by David Cowen*, 1989). An integrated package for the input, storage, analysis, and output of spatial information analysis being the most significant. (*Gaile and Willmott*, 1989). GIS are simultaneously the telescope, the microscope, the computer, and the xerox machine of regional analysis and synthesis of spatial data. (*Abler*, 1988). (<http://www.census.gov/geo/gis/faq-index.html>). The practical use of GIS has spread almost everywhere in business and government. “The GIS market is one of the fastest growing computer application markets. Estimated to be a greater than \$2 billion market in 1994, the software segment is expected to continue a compounded growth rate of 18% a year”. See: <<http://www.gisworld.com/index.html>>.

¹⁶⁶/ “The combination of the APS and AERIC systems delineates an architecture for the preservation of electronic records which is basically pyramidal in form. The bottom layer of the pyramid is physical preservation and the top layer is access to the records. We believe that it will be necessary to construct other pyramids for different categories of electronic records, such as textual documents, geographic information systems, digital photography, etc. In each of these categories of records, the pyramid will start from the same base of physical preservation and build to access to the types of records comprised in the pyramid. In keeping with the desire to cover as broad a base as possible in each case, we believe that different pyramids may share more than one layer in common. For example, many geographic information systems (GIS) store attribute data in relational databases, so the AERIC software and metadata database will be used for those portions of GIS”, Ken Thibodeau, Op. cit.

¹⁶⁷/ Terry Cook, “Archives in the Post-Custodial World; Interaction of Archival Theory and Practice since the Publication of the Dutch Manual in 1898”. (*Paper given at the XIII International Congress on Archives, Beijing, 1996*).

Cook states that Booms' theories reinforced the earlier decision (1989) by the Canadian National Archives to adopt a "new" macro-appraisal acquisition strategy:

The older archival focus on the content of records, and on having that content directly reflect public opinion or user's needs or historical trends, has been replaced by a newer focus on the larger or "macro" context of the records, as revealed through their creator's functions, programmes, activities and transactions. In this way provenance has been rescued from the historical documentalist tradition and restored to its rightful archival place where records are linked to their context and creation.¹⁶⁸

After explaining his own archivo-philosophical and strategical approach - based on Booms' theories - Terry Cook explains:

The National Archives (Canada) has adopted a functional-structural research model that focuses on records creators, on the assumption that those creators, and those with whom they interact, *de facto* represent the collective functionality and functioning of society.

This is like Booms' "immediate transition" from amorphous societal functions to the concrete provenance-based institutional manifestations of those functions. I thus consciously placed my writings and the National Archives' appraisal methodology in a context-based, provenance-centered framework rather than in a content-based historical-documentalist one.¹⁶⁹ intent was to link recorded information with the organic context of its creation as a part of government business activity. That organic context of activity can no longer be determined, initially at least, by trying to read or understand billions of records in paper form, let alone their more elusive electronic counterparts. Rather the focus is first on the organic context itself, and thus on analyzing and appraising the importance of government functions, programmes, activities, and transactions. The appraisal conclusions so derived are tested before they are finalized by a selective hermeneutic 'reading' of the actual 'text' - but only after the macro-level appraisal of function has been completed."

Professor Angelika Menne-Haritz, director of the archive school in Marburg, Germany, has given additional interpretations of the historical development of archival appraisal methodology. In her address to the First Stockholm Conference on Archival Theory and the Principle of Provenance, Menne-Haritz gave an overview of the German approach to appraisal and its political implications during the postwar period. She also gave a historical retrospect of criteria for selecting records for preservation all the way back to antiquity. After having analyzed the differences between informational and evidential value as criteria for appraisal, and having explained the frequent misunderstandings of the American Theodore Schellenberg's interpretation of informational value,¹⁷⁰ Menne-Haritz addressed the concept of appraisal by function. She first pointed out that

¹⁶⁸/ Ibid.

¹⁶⁹/ Ibid. Cook continues his explanation of the Canadian policy of *appraisal by function* by explaining the revised concept of provenance, i.e. *functional provenance*. "This Canadian interpretation of provenance makes that principle more conceptual or virtual than physical or literal, as is appropriate for the age of electronic record. The 'new' provenance is also more functional than structural, as is fitting for an era where organizational stability is everywhere crumbling. But I insist that it is provenance nonetheless, whereby the contextual circumstances of records creation are again made the center of archivists' universe of activities rather [than] some external criteria. The Canadian approach is not, however, driven by the Dutch or Jenkinsonian literal principle of arrangement and description, which asserted an exact congruity between creator function, creator structure, and record-keeping system. Yet, the Canadian approach does recognize and respect the intent behind those older principles. That

¹⁷⁰/ Angelika Menne-Haritz explains: "There is a certain contradiction in Schellenberg's ideas and his words, that leads us in the wrong direction. But his incontestable merit was to analyze and formulate the analytical and theoretical basis for the distinction between primary and secondary values as aims of appraisal. Contexts are not merely seen as an archival research goal, but the production of evidence, which is needed as a basis for clear understanding of what happened, must be the aim of archival work. Archives, appraised and described according to this goal, can really reflect the community of primary purposes...on the basis of common functional origin." Angelika Menne-Haritz, "Appraisal or Selection. Can a Content Oriented Appraisal be Harmonized with the Principle of Provenance". Paper given at the First Stockholm Conference on Archival Theory and the Principle of Provenance (2-3 September, 1993) (Skrifter utgivna av Svenska Riksarkivet 10, Stockholm 1994).

the idea of appraisal by function is not new nor necessarily linked to electronic records. The Annual Conference of German Archivists in 1957 felt that the administration had grown so much that archivists could no more appraise records the old way:

At this conference it was proposed that agencies should be chosen for the preservation of their records according to the importance of their functions. The “principle of ranking records creators”, instead of appraising their records, was formulated. In this situation such ideas were a form of escapism. As a reply to the feeling of helplessness in the face of huge masses of records, archivists warned the profession of the danger of becoming pure administrators and argued in favor of historical research as a professional duty of archivists. Thus, they wanted to decide the importance of records creators from a historical viewpoint and to reduce the bulk of paper by disposing of all papers from the less important agencies.¹⁷¹

And she continued:

Today, electronic office systems enable us to see clearer. It is no longer the fear of being inundated by enormous amounts of paper, but awareness that nothing will be left for appraisal, if we do not formulate fundamental principles, which make us think about a theory to guide everyday decisions. We realize that we need to understand traditional archives more precisely, before we can apply their principles in an appropriate way to electronic records. Experience with electronic records sharpens our perception. We see, that it is not pure quantity that requires us to appraise. It is not space or costs. We have to reduce redundancy. We will then be able to make the intellectual working tools of organizations accessible and interpretable for archival research purposes. Thus, the aim of archival appraisal, as regards traditional material also, is not to reduce quantities, but to make archives eloquent and to facilitate research. These aims are sometimes obscured by the impact of tradition.¹⁷²

Menne-Haritz underlines that archivists must not limit their activities to evaluating records that have been created, but must make sure that important functions are “documented” (i.e. that records and evidence of their existence are created). Here she reflects the proactive attitude “*stop rowing, start steering*”:

To meet the challenges posed by modern documentation, archivists and their colleagues must become active participants in the creation, analysis and selection of the documentary record. Such tasks are regarded as the opposite to being simply keepers of records, as the traditional profession is seen in concept. To be a documenter requires a comprehensive understanding of the institution to be documented and of the nature of its documentary problems.¹⁷³

Like Terry Cook, Menne-Haritz concludes that appraisal by function cannot take place within the traditional framework of the principle of provenance:

So the Principle of Provenance is accepted as a methodological means for the arrangement and description of records. But it is not accepted as a basis for appraisal. Its usefulness for this task is completely denied. The notion of function has a meaning different from that needed for appraisal on basis of the archival Principle of Provenance. Here functions are understood as activities detached from organizations, persons or institutions that support them... the premise leads to a substitute for archival appraisal, by evaluating and ranking records creators according to their impact on social changes, suggesting that their respective records reflect the societal and historical impact of their activities. Appraisal needs a Principle of Provenance, which must be more than an organizational principle, an

¹⁷¹/ Ibid.

¹⁷²/ Ibid.

¹⁷³/ Ibid.

arrangement principle or a research principle. We need a Principle of Provenance that is a tool for analysis, presentation, and preservation of communities of primary purposes - not only similarities of concern or matter - on the basis of common functional origin.¹⁷⁴

She finally concludes:

To become sources for a secondary purpose, records must be described and appraised so that evidence is accessible and understandable. A representative image, not of society, but of the actual competencies and tasks of the records creating agency, shown by its written evidence, makes the necessary contexts accessible and hence the information content understandable. That is why redundancy must be weeded out. That is why evidence is an aim, not a tool for archival appraisal. The informational value of records will never, and cannot give a true, or even representative, image of society. Archivists are the only specialists who have the theoretical and methodological tools to make evidence accessible and thus provide the explanatory context to information.

Archivists are responsible for the contexts, not for the plain information. There are no other professionals for these duties. But if we do not accept them, others, not qualified for the job, will try to perform them for their own specific interests. They will usually not respect evidence but often destroy context without knowing what they are doing. History will then be disturbed because evidence is lost.¹⁷⁵

A somewhat more traditional approach to appraisal of electronic records seems to be taken by the U.S. National Archives (NARA), which may be explained by the fact that NARA has the world's largest collection of first generation "informational" databases in its custody:

In 1990, NARA assigned responsibility for appraising electronic records to the Center for Electronic Records, separating the appraisal of electronic records from that of other types of records by assigning responsibility for appraising electronic records at least in terms of who conducts the appraisal. However, that is not to say that electronic records are appraised apart from consideration of other records in the same organization. That is not the case. Rather, assignment of responsibility for electronic records to the Center allows a higher level of technical expertise to be brought to bear, simply because there is more technical expertise in the Center than elsewhere in NARA.

One difference that the assignment of this responsibility to the Center has made is that we have actually broadened the context in which records are appraised. The NAPA and NAS studies enabled us to look at records not only within the context of other related records in the same agency and of the legal basis, the organization, and the functions of the agency which create the records, but also in the broader context of inter-agency and government-wide activities. Without denigrating the principle of provenance or *respect des fonds*, it must be recognized that often, and increasingly, the relevant context in which records are created and maintained transcends organizational boundaries. Such transcendence can arise from multiple sources, including voluntary cooperation among agencies, the reliance by one agency on the special expertise, resources, or capabilities of another agency, legal mandates affecting either specific government functions or common areas of responsibility, or special circumstances such as natural disasters or armed conflict.¹⁷⁶

¹⁷⁴ / Ibid. David Bearman has made the same conclusion concerning provenance and uses the concept of "Functional Provenance": "Provenance... dictates that records are to be understood with reference to their origins in activity. As a shorthand archivists often equate the provenance of records with the organization in which records were created or received, i.e. the 'office of origin'. However, the provenance of archives is better understood by reference to the *function* of which they are evidence and the records system in which they were created, stored, preserved, and accessed by the organization...archivists must recognize function, and not organizational setting, as the locus of provenancial meaning". See David Bearman, "Record-keeping Systems", *Archivaria*, No. 36 (Autumn, 1993). See also David Bearman, "Diplomatics, Weberian Bureaucracy, and the Management of Electronic Records in Europe and America", *The American Archivist*, No. 55 (1992), where he used the concept "functional provenance".

¹⁷⁵ / Angelika Menne-Haritz, Op. cit.

¹⁷⁶ / Ken Thibodeau, Op. cit.

In addition to the desirability of appraising electronic records on the basis of function, there seems also to be a general agreement on the need to appraise electronic records prior to the creation stage of the life cycle. An Australian expert writes that “valuable records need to be identified early on in the process so that procedures required to manage, and ensure the survival of these records, can be built into the system”.¹⁷⁷

Greg O’Shea from the Australian Archives agrees:

The need to adopt this interventionist approach at the very outset of the records life cycle, which for electronic records is the system development phase, in order to preserve the archival record finally kills the notion that archivists are passive spectators at the genesis and over the formative years of the life of the record... the pressing needs of intervention to ensure that valuable electronic records are not lost dictates not only a more strategic approach to appraisal but also a more strategic approach to the whole field of archival practice. Traditional thinking and practice in relation to the intellectual control, custody, access, and preservation of records need to be thoroughly re-examined. Our continued relevance as key players in the information age depends on it.¹⁷⁸

Stephen Ellis and Steve Stuckey of the Australian National Archives maintain that whole government programs should be identified and their relative importance be appraised.¹⁷⁹ In that way, appraisal could be done without assessing the records themselves. Consequently, a recordkeeping system (see above) resulting from a business function would only indirectly be the object of appraisal.

The National Archives of the Netherlands also supports this approach to appraisal, and bases the retention and evaluation of information on its role in government activity.

Agencies are urged, first, to determine what processes are critical to their business missions and the task required to perform them; then, selection, documentation and appraisal of information generated or used in these activities should reflect the nature and assessment of the tasks. In general, information needed to reconstruct the critical functions of government is what should be kept.¹⁸⁰

The Dutch archivist Hans Hofman, in his address to an electronic records conference in Canberra, espoused the concept of appraisal by function.

The first and [most] important issue in this field is the shift to *functional appraisal*. As mentioned, the ideal situation would be if the archives are involved from the moment the electronic records are created or (even better) when the information system is conceived and developed. This means that the functions and actions of government agencies are appraised instead of the (electronic) records themselves. The focus of appraisal is on the mission and the primary

¹⁷⁷ / Dagmar Parer, “Australian Archives -- Preserve your Valuable Electronic Records”, *Electronic Records Management Program Strategies, Archives and Museums Informatics Technical Report*, No. 18 (1993), edited by Margaret Hedstrom.

¹⁷⁸ / Greg O’Shea, “The Medium is NOT the Message: Appraisal of Electronic Records by Australian Archives”, *Archives and Manuscripts* (May, 1994).

¹⁷⁹ / “We are identifying where in the hierarchy of the bureaucracy the real decisions are made and implemented, and concentrating detailed appraisal resources there.” Stephen Ellis and Steve Stuckey, “Australian Archives’ Approach to Preserving Long-Term Access to the Commonwealth’s Electronic Records”, “Playing for Keeps” Conference, Canberra (November, 1994).

¹⁸⁰ / T.K. Bikson and E.J. Frinking, “Preserving the Present: Toward Viable Electronic Records” (Sdu Publishers, The Hague, 1993). See also “Omslag in Opslag” (Revolution in Records) (Ministerie van Binnenlandse Zaken, Den Haag, 1991); “PIVOT/Rijksarchiefdienst, Van de vernietiging van archiefbescheiden naar de selectie van handelingen”, (Ministerie van WVC, Den Haag, 1992).

processes of organizations. The nature and the mass of electronic records make it necessary to approach them from a higher, more abstract level. In other words, it is not the records themselves that need our first attention, but the context in which they are created.¹⁸¹

Hofman's colleague Peter Horsman has described the Dutch project PIVOT, which was developed to deal with a serious backlog in appraisal and transfer of records (500 linear kilometers!). He summarizes the PIVOT approach by stating that "if a function does not contribute to such an act (*i.e. an act, which is considered to be worth to be documented for posterity*), the records produced by it are not worth to be kept. The evidential value of the records derives from the value of the function."¹⁸² Horsman states that the PIVOT method of appraisal is based on "organizational research", and not on inspection of the records.¹⁸³

This new concept has been adopted by Australian archivists: "Appraisal by function is still very much the focus of our approach to the appraisal of electronic records." Greg O'Shea states that the Australians developed this approach in cooperation with the Canadians and the Dutch, and he calls this approach to appraisal "functional/logical level appraisal".¹⁸⁴

An interesting case study of the functional approach to appraisal was carried out in the Australian Department of Immigration and Ethnic Affairs. It was found that the computerized systems the Department used to manage its electronic recordkeeping systems could be broken down into functional and housekeeping systems, and the appraisal could be limited to deal with the functional systems of the Department:

The class descriptions, organized by function, serve a threefold purpose. They act as a set of criteria to enable appropriate records to be selected. They also act as a method of describing the records and their retention periods. From an electronic records viewpoint they allow for continuing coverage over time through changes and upgrades in systems and applications. This stems from a recognition that functions, in the broadest sense, have far more stability than the systems used to manage them. In theory, by taking the macro view of the agency and its functions, we can select records without necessarily being concerned about their format. Increasingly, the preferred strategy will be to appraise an entire Department's recordkeeping system(s) by concentrating on its unique core functions as part of a mega-appraisal where focus would be on the selection of the most important records regardless of format.¹⁸⁵

Bearman and Hedstrom argue that traditional methods of surveying and scheduling records have been wasteful. One should not have to identify, list and schedule all records when only one to three percent are of archival value. They recommend concentrating instead on identifying the few that have to be preserved:

Reviewing 100 percent of records created in order to select the less than 3 percent which should be saved beyond the time they are needed for on-going operations is inefficient.... In focusing on scheduling records rather than on identifying the significant activity of the organization, archivists miss an opportunity to build a knowledge-base on the

¹⁸¹/ Hans Hofman, "Off the Beaten Track: The Archivist Exploring the Outback of Electronic Records", "Playing for Keeps" Conference, Canberra (November, 1994).

¹⁸²/ Peter Horsman, "Appraisal on Wooden Shoes. The Netherlands PIVOT Project" (Article kindly submitted by the author). PIVOT stands for (in translation) Project Implementation Reduction Transfer Period.

¹⁸³/ "The project staff reads laws, regulations, organizational reports, describing the governmental agencies, rather than the files produced by those agencies." Ibid.

¹⁸⁴/ Greg O'Shea, "The Medium is NOT the Message: Appraisal of Electronic Records by Australian Archives", *Archives and Manuscripts* (May, 1994).

¹⁸⁵/ Steve Stuckey comments on this case: "Suffice to say, however, that one thing we did learn was that we were generally surprised by how few records of ongoing value were created." Greg O'Shea, Op. cit.

structure and functions of the organization. Moreover, insisting on details of records disposal perpetuates the impression that archivists are bean counters rather than management partners.¹⁸⁶

A voice from an Australian business archivist joins those who argue for appraisal based on analysis of functions and work processes instead of appraisal of the individual records, files or series:

Now that electronic systems are performing more complex tasks and generating more complicated records, a rather more sophisticated approach to disposal is needed. Fortunately the technical tools in system design these days can deliver a more precise disposal program which differentiates between transactions and should enable us to preserve that small quantity of records worthy of long term retention.¹⁸⁷

Charles Dollar has summarized the fundamental different approaches to appraisal between, on the one hand, the U.S. National Archives and, on the other, the “appraisal by function school” as represented by the Canadians, the Dutch, and the Australians - and to a certain extent by the German theorists:

This debate can be compressed to this question: should selection focus upon the *functions* that give rise to the records or to the *content* (author’s emphasis) of the records themselves. The latter view reflected a basic assumption that because the chief purpose of preserving records in archives is to make these records available to researchers, information content is of primary importance. This assumption derives in part from the historic connection between archives and history in the United States and that the value of archives is their potential for scholarly research use.

Historically, this has been the position of the National Archives of the United States. In contrast, the National Archives of Canada takes a functional approach to archival appraisal. It adopted a “top down” view that includes the identification of the most important functions of government, an analysis of the administrative and documentary context of the records that these functions give rise to, and the selection of records that best satisfy evidentiary concerns.¹⁸⁸

Chapter 7

Intellectual Control of and Descriptive Practices for Electronic Records

In the paper world, after records have been created, kept and used by the originating office in a recordkeeping system, and later appraised as having permanent value by the archival authority, they have been subject to intellectual and physical control in an archival institution.

Again, these traditional ways and means are challenged in the electronic records world. Electronic records require sufficient descriptive data to render them available, understandable, and usable for as long as they have continuing

¹⁸⁶/ David Bearman and Margaret Hedstrom, “Reinventing Archives for Electronic Records: Alternative Service Delivery Options”, *Electronic Records Management Program Strategies, Archives and Museums Informatics Technical Report*, No. 18 (1993), edited by Margaret Hedstrom. Greg O’Shea has forwarded a similar view outlined at a 1992 workshop: “It is Australian Archives primary concern to locate or identify permanent electronic records. Provision of coverage for all other records, whilst important because of legal obligation to do so, should be a by-product of this process rather than a principal focus.” Greg O’Shea, “The Appraisal of Electronic Records by Australian Archives”, *Papers from a Workshop on Managing Electronic Records with Archival Value*, Sydney (April, 1993).

¹⁸⁷/ Anne Picot, “Electronic Records Systems in the Roads & Traffic Authority, NSW”, *Archives and Manuscripts* (May, 1994).

¹⁸⁸/ Charles Dollar, “Trends in the Archival Acquisition and Preservation of Electronic Records: 1970-2000”, Paper given at Moscow State University, Russia, January 4, 1996 (unpublished). The U.S. National Archives seems to be changing direction since Dollar wrote this. See: “Ready Access to Essential Evidence. The Strategic Plan of the National Archives and Records Administration 1997-2007”. (Issued by John W. Carlin, *Archivist of the United States*, July 1996 (<http://www.nara.gov/nara/vision/naraplan.html>)).

value. Traditional methods developed descriptive inventories, guides and other finding aids to manage records after they were

selected for permanent preservation, transferred to an archival repository, and arranged. These methods cannot be deployed in an electronic environment. The goal should be to harness the power of information technology while respecting fundamental archival principles. But archivists have insisted in utilizing traditional “narrative” description methods even in the electronic world:

Although data administrators developed automated systems called Data Dictionaries and Information Resource Directories to document and manage electronic recordkeeping systems, archivists have not adopted these automated systems, but have instead tried to employ traditional methods for describing electronic archival holdings. Unfortunately, the prose narrative and the simple data structures that archivists use in traditional finding aids cannot rigorously describe the myriad links of records with each other or transactions that are supported in automated systems. In addition, because they are constructed after the fact from evidence still visible after the records come into the archives, they also do not document the evolution of relations which take place over the life of a system. By failing to employ techniques of documentation available from the domain of systems design and management, archivists have overlooked a pre-existing source of documentation which would, if properly regulated, mitigate the need for archivists to engage in the post-hoc documentation of accessioned systems. More importantly archivists have missed the opportunity to maintain systems that serve as the repository of organizational memory of functions, structures, and events even though such databases are much needed by contemporary organizations and the data is necessarily present in an adequate archival information system.¹⁸⁹

One now looks for ways and means to define systems that can be automatic or self-descriptive. “Management of metadata is proposed as an alternative strategy to current descriptive practices.”¹⁹⁰ Archivists will need to exploit metadata that organizations generate about their records. In principle, this approach should be nothing new to archivists who always have been able to capture and utilize “metadata”. Even very old recordkeeping systems were equipped with some kind of retrieval or information locator tool, and it has been the archivist’s job to preserve or reconstruct such tools instead of creating new and “artificial” ways to use a recordkeeping system. We have all been using “metadata” without ever having heard the word. There are, however, different views on how metadata should be used in the context of archival description. One school (“the metadata systems approach”¹⁹¹) claims that archival descriptive elements should be included in the design of metadata systems - on the request of archivists. The other school feels that such interference would violate the very purpose of records and recordkeeping systems as they were created by the original users, and warns against confusion of metadata required for electronic records management purposes (which metadata are requested by the original users - in order to guarantee accountability and preserve the evidential value of records) and descriptive metadata (which may be requested by archivists in order to “automate” the archival description process). In the view of the author of this paper, the difference between the two schools is not that serious, as both agree that the main purpose of description is to preserve the *evidential value* over the *informational value*. The trend of the first generation electronic archivist to give preference to the informational value is equally discarded by both schools. Heather MacNeil finds that the advocates of the “metadata system approach” have repeatedly emphasized the importance of preserving the evidential value over the informational value and she concludes:

The emphasis on content over context may be characteristic of the approach to description taken by archivists dealing with the first generation of electronic records.¹⁹² For archivists dealing with the more traditional

¹⁸⁹/ David Bearman, “Record-Keeping Systems”, *Archivaria*, No. 36 (Autumn, 1993).

¹⁹⁰/ Margaret Hedstrom, “Descriptive Practices for Electronic Records: Deciding What is Essential and Imagining What is Possible”, *Archivaria*, No. 36 (Autumn, 1993).

¹⁹¹/ The “metadata systems approach” has been described as arguing “that metadata’s capacity to provide descriptive information about the context of electronic records creation will obviate, or reduce significantly, the need for traditional archival description.” Heather MacNeil, “Metadata Strategies and Archival Description: Comparing Apples and Oranges”, *Archivaria*, No. 36 (Spring, 1995).

¹⁹²/ “It may be true that the past descriptive practices for electronic records ignored their nature as evidence of actions and

records, however, the notion that description should be context - rather than *content*-oriented is hardly a revelation. Such an assumption

is embedded in the 1898 Dutch manual on arrangement and description (Muller, Feith and Fruin, author's remark) and it remains evident in most contemporary manuals of description.¹⁹³

Since organizations are increasingly creating extensive directories and data dictionaries¹⁹⁴ to document and describe elements and relations in their systems, it has been proposed that archivists should *find and capture*, not make, the information in their descriptive systems. Margaret Hedstrom writes:

Automated systems can capture not only information about the creator of the record and its content, but also a complete history of its creation and use. Given both technical and resource limitations, archivists must determine what we want systems to document and how much descriptive data is enough... as descriptive practices shift from creating descriptive information to capturing description along with the records, archivists may discover that managing the metadata is a much greater challenge than managing the records them-selves.¹⁹⁵

David Wallace refers to a study carried out by the New York State Archives which shows that most metadata systems do not contain all the archival metadata needed, because they had been designed without input from the archival side. It is therefore important that archivists/records managers actively participate in the design of metadata systems:

Underlying the metadata systems strategy for describing and managing electronic information technologies is the seemingly universal agreement amongst electronic records archivists on the requirement to intervene earlier in the life cycle of electronic information systems. Archivists must identify what is required to define and capture records as evidence within this environment... the requirements for records capture and description are therequirements for metadata. Clearly, archivists need to identify what types of metadata will best suit their descriptive needs, underscoring the need for the profession to develop strategies and tactics to satisfy these requirements. It is held here that the requirements for records capture and description are the requirements for metadata.¹⁹⁶

Wallace states, however, that the functional requirements worked out by the Pittsburgh project, "if properly implemented", can:

... provide a concrete model for metadata capture which can automatically supply many of the types of descriptive information both desired by archivists and required for elucidating the context out of which records arise. Satisfying these requirements will contribute to the development of a robust archival description process which integrates preservation of meaning, exercise of control, and provision of access, within "one principal multipurpose descriptive instrument", hinted by Luciana Duranti as a possible outcome of the electronic era.¹⁹⁷

transactions." Ibid.

¹⁹³/ Ibid.

¹⁹⁴/ The use of the IRDS standard (Information Resources Dictionary System) has been advocated by Charles Dollar as a potential instrument to replace traditional archival description systems. See Charles M. Dollar in *Archival Theory and Information Technologies: The Impact of Information Technologies on Archival Principles and Methods*, edited by Oddo Bucci (Arcona, 1992). See also the United Nations ACCIS Reports (1990 and 1992) (ACCIS I and II).

¹⁹⁵/ Margaret Hedstrom, Op. cit.

¹⁹⁶/ David Wallace, "Managing the Present: Metadata as Archival Description". Paper read at the Annual Conference of the Association of Canadian Archivists. Included in the *First Pittsburgh Research Report* (Sept. 1994) and <<http://lis.pitt.edu/~nhprc/Pub10.html>>. Also printed in *Archivaria*, No. 36 (Spring, 1995).

¹⁹⁷/ Ibid.

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And Wallace summarizes:

First and foremost, the promise of metadata for archival description is contingent upon the creation of electronic *recordkeeping* systems as opposed to continuation of the *data management* orientation that seems to dominate most computer applications within organizations.¹⁹⁸

He continues by recommending that the functional requirements presented by the Pittsburgh project as a model for recordkeeping systems and metadata model for description should be subject to further exploration through basic research.¹⁹⁹ Wallace sums up his evaluation of traditional archival description:

Traditional archival description undertaken at the terminal stages of the life cycle has had two deleterious effects on the archival profession. First, it has resulted in enormous and, in some cases, insurmountable processing backlogs. Second, it has limited our ability to capture crucial contextual and structural information through-out the life cycle of record-keeping systems that are necessary for fully understanding the fonds in our institutions.

This shortcoming has resulted in an inadequate knowledge base for appraisal and access provision. Such complications will become magnified as distributed computing and complex software applications expand throughout organizations over the next decade. A metadata strategy for archival description will help to mitigate these problems.²⁰⁰

Heather MacNeil has, however, warned against a hasty abandoning of the traditional archival description approach for an uncritical adoption of the “metadata systems” approach. She claims that adding artificial²⁰¹ metadata for archival description purposes would mean corruption of the metadata record itself and compromise its value as evidence. Such an approach would also put an additional burden on the original creator/user and cause possible user resistance:

A particular danger inherent in the metadata management approach is its advocacy for the creation as well as capture of metadata for archival descriptive purposes (in the manner Margaret Hedstrom and David Wallace have proposed, *author's remark*). Viewing metadata systems as tools for achieving archival purposes, rather than as tools for achieving the creator's purposes is dangerous because it encourages us to, in effect, privilege potential secondary use of metadata over their actual primary use: in so doing, we could reshape such use for purposes other than the conduct of affairs of which they are part. Since this runs directly counter to the administrative reason why a records creator would preserve metadata, it contravenes the archivist's primary duty to protect and preserve the inherent characteristics of archives -- their impartiality, authenticity, and interrelatedness -- which derive from the circumstances of their creation. These characteristics guarantee the document's probative nature, that is, their capacity to serve as evidence of actions and transactions. For archivists to introduce in the formation of metadata records requirements directed toward the future needs of the archivists and researchers rather than towards the current needs of the creator would contribute an element of self-consciousness²⁰² into the records creation process that is inconsistent with the preservation of the records' impartiality. If the impartiality of the metadata is compromised... the preservation of evidence will be defeated.²⁰³

¹⁹⁸/ Ibid.

¹⁹⁹/ Ibid.

²⁰⁰/ Ibid.

²⁰¹/ i.e. metadata required by the archivist/records manager and not necessarily needed by the user/creator.

²⁰²/ The expression “self-consciousness” should be seen against a quotation MacNeil included earlier in her text: “Archives are, in J.H. Hodson's words, the ‘unselfconscious byproduct of human activity, [and as such], they possess the objective formlessness of raw material, compared with the subjective roundedness of literary artifacts such as books’ or, we could add ‘archival inventories’.” Heather MacNeil, Op. cit.

²⁰³/ Ibid.

MacNeil feels that the archivist should not advise the records creator on *what* records to create but on *how* to create them. She stresses that she by no means wants to suggest that archivists have no role to play in the “design and maintenance” of metadata systems, but that she sees the archivist’s role differently than Hedstrom and Wallace:

... that role must be driven by our primary obligation to protect and preserve, to the extent possible, the essential characteristics of archives. As Jenkinson observed, more than fifty years ago, in laying out rules for archive-making, archivists must strike a “balance between the desire to provide for the needs of the Future and a determination to copy the impartiality of the Past,” in other words, we may shape the direction of the formation of archives of the future, as long as we do not alter their archival character. The creation and preservation of meaningful evidence of administrative actions and transactions, it must be underscored, is a benefit to the organization, a byproduct of which is the creation and preservation of better quality records for posterity. To advocate that organizations create and preserve such evidence because it is in their own interest to do so is as active and self-interested as archivists are entitled to be in pursuit of the objective of preserving, perpetuating, and authenticating documentary memory.²⁰⁴

Wallace notes that David Bearman seems to take a somewhat different position, pointing out that “Bearman’s argument centers on a methodological and operational reorientation wherein archivists would utilize the information about an organization and its recordkeeping system that was *originally created by the organization* (author’s emphasis) instead of drafting post hoc descriptions drawn largely off these same sources.”²⁰⁵

Bearman believes that in the future, archivists’ attention will shift from *creating* descriptions of records to *capturing* metadata and managing it to promote access, use, and understanding of archival records. As there is a lack of models, systems, and procedures for effective management of metadata about provenance and context, archivists must meet another challenge in the electronic world:

Metadata is a tool for control and migration of electronic information systems, but it also serves as a finding aid for access to and use of archival electronic records. Metadata can be used by remote users, across local and wide area networks, as easily as by on-site visitors to the archives. Because metadata is the tool that must be used to re-create the records in the system as evidence (e.g., the way they actually were when the system was being used actively), it is an essential intermediary to any retrieval and will be required by users, wherever they are, to document archival transactions.²⁰⁶

Wallace describes how this would work:

This process will incorporate systems and organizational documentation from active office settings directly into archival information systems designed to serve ongoing operational and organizational memory requirements. Through a metadata system approach, archivists can realign themselves strategically as managers of authoritative information about organizational record keeping systems, providing for the capture of information about each system, its contextual attributes, its users, its hardware configurations, its software configurations, and its data configurations. By linking documentation about these systems to the actual record-keeping systems themselves, archivists may come to find that their efforts will focus more on gathering and managing descriptions than creating them.²⁰⁷

In discussing the metadata strategies, MacNeil also warns against confusing management methods with descriptive solutions, and electronic records management requirements with archival descriptive requirements. She points out that metadata systems are management tools to preserve corporate memory and “accountability embedded in an

²⁰⁴/ Ibid.

²⁰⁵/ David Wallace, Op.cit.

²⁰⁶/ David Bearman, “New Models for Management of Electronic Records”, *Electronic Evidence, Strategies for Managing Records in Contemporary Organizations* (Pittsburgh, 1994).

²⁰⁷/ David Wallace, Op.cit.

record system”, while description captures and communicates knowledge about the context of records creation within an organization.

Record-keeping requirements for electronic records must address the need to render documentary relationships visible and to build in procedures for authentication and preservation: such measures will ensure that record-keeping systems meet the criteria for “integrity, currency and relevancy” necessary to the records creator. If these requirements are, met, the contextual information needed to support future archival descriptive requirements will be preserved as a natural consequence.²⁰⁸

MacNeil concludes: “Metadata systems cannot and should not replace archival description. Archival participation in the design and maintenance of metadata systems must be driven by the need to preserve them as archival documents, that is, as evidence of actions and transactions, not as descriptive tools.”²⁰⁹

The two seemingly different views on the use of metadata for archival description has been analyzed by a third party, Wendy Duff.²¹⁰ Like the author of this paper, Wendy Duff finds that Wallace’s and MacNeil’s papers agree on one essential point:

Both view records as being evidence of transactions and both assert that description must be context-oriented. The primacy of context, and the need for electronic systems to protect the context, content and structure of records goes unchallenged. The two papers agree on the importance of metadata. Metadata are essential if archivists are to maintain the integrity and authenticity of evidence of actions.²¹¹

So where do the two approaches differ? In the emphasis on the *impartiality* of metadata. MacNeil feels the impartiality is jeopardized if archivists/records managers are proposing additional metadata compared to those the original user was interested in. Wendy Duff states: “While both authors agree on what metadata are and their importance in protecting the integrity, authenticity, and preservation of records, they disagree on metadata’s potential to replace archival description. MacNeil warns archivists against jeopardizing the value of metadata to primary users by altering them to meet the needs of future or secondary users.”²¹²

Wendy Duff does not take sides in the controversy. She cautiously concludes that no one knows yet if total reliance on metadata systems for description of electronic archives will work, and she repeatedly stresses that additional research must be undertaken in order to:

... understand the impact that different descriptive systems have on the users before pursuing the course encouraged by metadata adherents. Research is required to investigate all of the various components of our descriptive processes. Wallace contends that systems can produce metadata that would eliminate the need for archival description. He may be right, but he will need to prove it. Build a system that uses metadata to meet all the descriptive needs of primary and secondary users. While the project being conducted at the University of Pittsburgh... moves the profession in the right direction, much work remains to be done. Before archivists abandon archival description, they require research that compares the retrieval performance of the two types of systems: one containing descriptions consisting of metadata and the other with descriptions supplied by archivists. If research discovers that metadata systems provide

²⁰⁸ / Heather MacNeil, Op.cit.

²⁰⁹ / Ibid.

²¹⁰ / Wendy Duff, “Will Metadata Replace Archival Description: A Commentary”, *Archivaria*, No. 39 (Spring, 1995).

²¹¹ / Ibid.

²¹² / Ibid.

sufficient retrieval, archivists should stop describing records and redirect their energies. Creating descriptions that are not needed is misdirected. However, archivists must first study their users' needs, identify processes that protect the integrity and impartiality of records, and ensure the capture of important contextual information.²¹³

Against the background of Wendy Duff's statement about the need for additional research, it should be noted that there are presently a lot of activities devoted to the creation of a "General International Standard for Archival Description". This work must also be considered in the context of description of electronic records. The ICA Ad Hoc Commission on Descriptive Standards had created a draft standard at its meeting in Stockholm, January 1993, which was adopted by the ICA in 1994 (ISAD(G)).²¹⁴ Another document ISAAR(CPF)²¹⁵ setting standards for "Archival Authority Record" was prepared for the Commission's meeting in the Hague, 17-19 October, 1994.

These standards include such issues as standards for data structure, data content and data value.²¹⁶ The Australian member of the committee, Chris Hurley, has in a recent article analyzed the developing need for standardization of what he calls "archival data" (i.e. archival description) in a networked and non-custodial environment.²¹⁷ Hurley, who seems to go even further than the school represented above by Wallace, concludes:

Developments in the networking suggest that standardization of information exchange protocols common to many other areas will be of more significance for accessing archival data (i.e. archival description, author's remark) than standardization of the way archivists arrange and present it. This makes our participation in the politics of emerging information networks (in which we are necessarily minor players) of paramount importance and requires that we move rapidly to a familiarity with the technology involved.

This participation will take place in a post-custodial environment where archivists can no longer expect to operate primarily as custodians, navigators or gatekeepers in relation to those who make, manage, seek, and access electronic records available on the networks. They may have a role in purveying and deploying their skills and knowledge in the management and use of archival data--viz. knowledge of recordkeeping, context and changing relationships through time.²¹⁸

Another project for developing a prototype standard for encoding archive and library finding aids has been undertaken by the "Berkeley Finding Aid Project". It is interesting to note that it is using the SGML (Standard Generalized Markup Language standard):

²¹³/ Ibid.

²¹⁴/ Introduction to Descriptive Standards: the General International Standard Archival Description. The author has used a printout from *Janus* (1994).

²¹⁵/ The International Standard Archival Authority Record for Corporate Bodies, Persons and Families. The Secretariat of the ICA Commission on Descriptive Standards (Ottawa, 1994). Draft copy provided by Commission member Wendy Duff.

²¹⁶/ "Data structure standards define what elements of information will be contained in the components of an information system, including input and output format.... Data content standards provide the rules to apply when entering information within each element defined in the data structure standard.... Data value standards provide lists or tables of terms, names, alphanumeric codes, or other specific entities that are acceptable for entry in a particular data element." From Wendy Duff's workshop program on the two standards obtained by the author in New York (June, 1995).

²¹⁷/ Chris Hurley, "Data Systems, Management and Standardization", *Archives and Manuscripts* (November, 1995). The Australian position to the ICA draft is interesting to note: "It is our view that the draft *Principles* confuse the theoretical basis for description with a statement of a particular application of those principles which results in a theoretical statement which is not flexible enough to admit alternative (equally legitimate) applications of those same principles in a variety of ways which can be encountered in archival practice, and, we believe, will be necessary to accommodate changing circumstances in the future." The Australian view has caused a lively debate between Hurley and Terry Eastwood from Canada. See *Archives and Manuscripts* (Vol. 23, Nos. 1 and 2, 1995).

²¹⁸/ Chris Hurley, Op. cit.

The latter technique (SGML), an international standard (ISO 8879), emerged from the analysis as being able to meet all of the functional requirements of archival finding aids, and as being supported by a large and growing number of software products that run on a variety of platforms. Based on these results, Pitti and his colleagues at Berkeley elected to test the use of SGML in encoding archival finding aids... By March 1995, a critical mass of encoding had been achieved, and the results (involving nearly 200 finding aids from 15 repositories) were shared with a group of 50 archivists and manuscripts librarians invited to a Finding Aids Conference jointly sponsored by the Library of the University of California at Berkeley and the Commission on Preservation and Access. Conference attendees observed that SGML encoding of local and networked online finding aids could simplify, improve, and expand access to archival collections by making it possible to link catalog records to finding aids, by enabling searches among pools of networked finding aids, and by allowing keyword retrieval to locate folders or items previously buried in container lists.²¹⁹

Chapter 8

The Issue of Custody or Post-Custody of Electronic Archives

“... electronic records present this stark, challenge to archivists: preserve your professional relevance and core principles only by discarding many of their traditional interpretations.” (Terry Cook).

As pointed out in the presentation above of the Pittsburgh and the University of British Columbia projects, one of the main, and most controversial, differences between their findings is the question of who shall manage electronic records that have ceased to be of use for the body that originated them - an independent archives²²⁰ or the originating agency²²¹. What started out basically as a discussion about physical custody has now (December 1996) widened to a more general debate concerning the so called “records continuum”, where the traditional bifurcation between management of current/active records (i.e. records management) and management of records as *archives in archives as a place* is the main object of discussion, and the physical custodianship may become more of a side issue.²²²

²¹⁹/ “Finding Aids for Archival Collections. Brief History and Progress Report”, (<http://sunsite.Berkeley.EDU/FindingAids>) or (<http://sunsite.berkeley.edu/EADhistory.html>). “This site presents the results of an experiment to render the archival finding aid in a standard platform-independent, electronic form”. About SGML, see also Chapter 4, 3. above.

²²⁰/ Or, at least, an independent archives body within the originating organization staffed with full-time professional archivists. This is the situation in many corporate and international organizations, which have no equivalent to “national archival institutions” to receive their archival holdings.

²²¹/ In this case (i.e. the non-custody alternative), the existing archival body would function as a policy-making, controlling and monitoring entity vis-à-vis those electronic records remaining in the custody of the originating agencies, as well as continue to be the custodian of the archival heritage created before the electronic age.

²²²/ This latest development is very clearly reflected in the November 1996 issue of *Archives and Manuscripts*, Vol. 24, No 2, which contains articles by Luciana Duranti and Terry Eastwood representing the custodial position, by Greg O’Shea and David Roberts representing the non-custodial position (explaining how and why it has been implemented by the Australian Archives and the Archives Authority of New South Wales), by Frank Upward who gives a theoretical model for the “records continuum” (the archivist must be involved in the *whole records life-cycle*), and by Adrian Cunningham who, in spite of having changed from supporting the custody position to now supporting the non-custody position, reserves his final judgement until later. The two latter writers are more concerned about the theoretical underpinning of the “records continuum” than the custody issue.

At least two governmental archival administrations have adopted the non-custody (or “post custodial”) approach and are presently implementing it - the Australian Archives and the Archives Authority of New South Wales in Australia.²²³ This has given rise to a lively debate, mainly between the Australians and the representatives of the British Columbia University project who reject the non-custody concept.

Terry Cook notes that “Peter Scott is the founder of the post-custodial revolution in world archival thinking”, and that the origin of the Australian concept of records continuum, and consequently of their acceptance of the post-custodial solution, is based on Scott’s theories and reinterpretation of provenance and rethinking of descriptive paradigms for archives.²²⁴

By taking the series concept “out of the archival cloisters” and applying it to current records in agencies, Cook believes that Australian archivists have been “helping to mend the Schellenbergian split between records managers and archivists, and between ‘current’ records and ‘old archives’”.²²⁵ Cook continues:

Needless to say, the Australian Jenkinsonians do not follow their master’s stance as keepers and custodians of records, but rather see archivists as active interveners, even auditors, in the archival document continuum. This may be a “logical progression” of Jenkinson’s maxim about the moral defense of archives, and the only way to achieve it in an electronic world, but it is a long way from the strategic implications of his original views. The Australian articulation anew of the accountability framework is very important, because it combines archival concepts concerning evidence and recordness with institutions’ own self-interest to protect themselves legally. It sanctions a potentially powerful strategy to get archival issues addressed by records creators at the front end of the records continuum, which is essential if archival records are to survive for the electronic era.²²⁶

The Australian position, and the debate around it, has been described and evaluated by Adrian Cunningham in two recent articles. The first article is addressed to a wider audience of archivists and librarians. He there summarizes the proceedings of workshops held in June-July 1996, at the Monash University Archives School in Australia:

Called “Managing the Records Continuum”, the intention of the workshops was to assess the progress that has been made in reinventing archives over the last five years, to bring participants up to speed with the very latest developments and to debate future directions.

The theoretical framework for the workshops was provided by the “records continuum” model which has been developed by Frank Upward, Sue McKemmish and their Monash colleagues. In essence, this model rejects the traditional “life-cycle” model of records which embodies a strict division between current and historical record keeping.²²⁷ The aim of the model is to promote regimens of integrated records management and archival processes. Rather than the life-cycle model which posits clearly defined stages through which records pass, the continuum model posits a continuous series of elements passing into each other in which no separate parts are readily discernible. For example, what used to be thought of as the historical record keeping end of the life cycle has been reconceptualised in such a way that historical considerations can now be accommodated from the moment records are created....

²²³/ Greg O’Shea and David Roberts, “Living in a Digital World: Recognising the Electronic and Post-Custodial Realities”, *Archives and Manuscripts*, Vol. 24, No. 2 (November, 1996).

²²⁴/ Terry Cook, “Archives in the Post-Custodial World; Interaction of Archival Theory and Practice since the Publication of the Dutch Manual in 1898”. (*Paper given at the XIII International Congress on Archives, Beijing, 1996*).

²²⁵/ *Ibid.* (footnotes 74-75)

²²⁶/ *Ibid.*

²²⁷/ See the author’s comment on this interpretation of the concept of “life-cycle” in footnote 4 above.

These strategies are based on the assumption that in the electronic environment archival organizations no longer have to assume physical custody of records in order to be able to fulfill the archival role of controlling and defending the records.²²⁸

Cunningham returned to the subject in the November 1996 issue of *Archives and Manuscripts*, now addressing the more narrow audience of Australian archivists, and, consequently, in a more informal style. After giving the “Chronology of a Debate”, he tells the story of how he originally was seriously against the post-custodial concept, and he finds that in retrospect, “I was probably unduly harsh in my criticism”. He describes how:

[In 1995] a far more confident archivist toured Australia making the most of every opportunity to vigorously beat as many of us as she could around the head with a Jenkinsonian stick of a different and much weightier kind. Like the 1954 Schellenberg visit and the 1991 Bearman visit, Duranti’s 1995 Australian tour had a major impact on the local archival scene.... No doubt Duranti herself relished the irony of out-Jenkinsoning the post-custodialists, who have always been keen to portray themselves as Jenkinsonians, or, sometimes, “neo-Jenkinsonians”.... Her visit forced the proponents of distributed custody to strive for new levels of rigour in justification for their arguments.²²⁹ And notes:

I have since taken the opportunity to reassess the meaning and substance of the... attack on post-custodialism. Over the same period the post-custodialists have responded (either consciously or subconsciously) to some of the more cogent criticisms, and have made small but nevertheless highly significant alterations in their thinking. As a consequence I now find myself no longer being confused and skeptical fence-sitter, but rather a mildly enthusiastic post-custodialist. I will however, reserve my wholehearted support for post-custodialism until after I have seen a few successful implementations of strategies which seem to me to look fine in theory, but which have yet to be put in practice... I have stated my preference in this commentary, but I may well have to stand corrected in five years time. This is a risk we all have to take as we journey out of the dark night of electronic records ignorance towards a new dawn of confidence, understanding and enlightenment.²³⁰

The position of the University of British Columbia (UBC) research team is summarized in a paper by Luciana Duranti and Heather MacNeil:

The research project’s affirmation of the need for a two-phase life-cycle approach to the management of records in both electronic and non-electronic form, and its assertion that responsibility for managing those records necessarily shifts from the records creator to the records preserver once the records reach the inactive phase, challenges the adequacy of the continuum approach as an appropriate managerial model for corporate records either in electronic or non-electronic form. The continuum approach is premised on the lack of desirability of separating records management and archival functions and promotes, as an alternative, the overlap and integration of those functions... The disadvantage of the continuum approach is that its advocacy of a complete integration of responsibility and jurisdiction fails to take into account the need to separate competence for long-term preservation, in order to ensure the reliability and authenticity of inactive records over time.²³¹

²²⁸/ Adrian Cunningham, “Ensuring Essential Evidence”, *National Library of Australia News* (November, 1996).

²²⁹/ Adrian Cunningham, “Journey to the End of the Night: Custody and the Dawning of a New Era on the Archival Treshold - A Commentary”, *Archives and Manuscripts*, Vol. 24, No.2 (November, 1996).

²³⁰/ Ibid.

²³¹/ Luciana Duranti and Heather MacNeil, “The Protection of the Integrity of Electronic Records: An Overview of the UBC-MAS Research Project” (*Unpublished, to be published in Archivaria, Winter 1996-1997, kindly provided to the author by Dr. Duranti in December 1996*).

And in yet another paper Duranti and MacNeil explain their position thusly:

The need for the life-cycle concept... reflects the research team's growing conviction that the intellectual methods for preserving the integrity of electronic records must acknowledge the existence of distinct competences with respect to the management of the records: that of the agency and that of the competent archival body. While the agency must have the authority and responsibility for creating records reliable and maintaining them authentic until they are no longer required for business purposes, the competent archival body must have the exclusive authority and responsibility for preserving the same authenticity the records had the moment in which their usefulness to the records creator expired.²³²

The UBC project has also found that there is a fundamental difference in the "intellectual methods" to be used by the creating agency and the archival authority in safeguarding the authenticity of records, and in this regard Duranti/MacNeil introduce a new argument for their theory, the impact and importance of *the arrangement and description functions* on the safeguarding of the authenticity of electronic records:

While records are being produced and used by the records creator, their reliability is ensured by procedural and technological methods aimed at the control of the trustworthiness of their authors and of their creation process and at the definition of their forms... When the records are no longer needed by the body which produced them, however, different methods are required to ensure that their reliability will remain the same,... i.e. that they will be and remain authentic. The authenticity of inactive records traditionally has been protected by physically transferring them to an archival institution or program and, once transferred, by *arranging and describing* them (author's emphasis). Arrangement and description serve critical authenticating functions for inactive records by preserving and perpetuating their network of documentary and administrative relationships. Documentary relationships are revealed and preserved through the identification of the levels of arrangement of the fonds and their preservation in structured descriptions, while administrative relationships are revealed and preserved through the administrative history of the fonds and its parts. The research findings show that these traditional methods continue to have validity and are, in fact, essential for the long-term authentication of inactive electronic records.²³³

After personally confronting the Australian post-custodialists during a visit to Australia in 1995, Luciana Duranti reiterated her position as defender of "*archives as a place*" (where records must be stored and guarded in order to guarantee their authenticity) in the November issue of the Australian archivists' periodical *Archives and Manuscripts*, Duranti begins her article by giving an interesting and very learned²³⁴ historical review of the concept of archives as a place, pointing at an unbroken tradition, based on Roman Law, from the Tabularium of the Roman Republic through the Middle Ages and the era of the new European monarchies, only to be broken by the French Revolution which caused a fundamental change in the functions of an archives institution. This historical expose is followed by comments on the post-custodial concept which, in her opinion, originated with Charles Dollar's theoretical works in 1992. "Is this vision realistic?" she asked. "Are we going to witness the end of a world-view that has inspired six thousand documented years of law and tradition, in the Middle East first, and in the Eastern and Western civilizations later? Is such an end inevitable? Is it desirable?"²³⁵

²³²/ Luciana Duranti and Heather MacNeil, "Protecting Electronic Evidence: A Third Progress Report on a Research Study and its Methodology", (Unpublished, to be published in *Archivi and Computer* (5) 1996, kindly provided to the author by Dr. Duranti in December 1996).

²³³/ Luciana Duranti, "The Preservation of the Integrity of Electronic Records", (Unpublished, to be published in the *Acta of the DLM Forum in Brussels in 1997*, kindly provided to the author by Dr. Duranti in December 1996). Compare the article by Heather MacNeil referred to in Chapter 7.

²³⁴/ Adrian Cunningham refers to her "encyclopedic knowledge of European archival history". Adrian Cunningham, Op. cit.

²³⁵/ Luciana Duranti, "Archives as a Place", *Archives and Manuscripts*, Vol. 24, No.2 (November, 1996).

She sees “*the archival threshold*” as a *sine qua non* for preserving the authenticity of records under the guardianship of an *independent archival authority*. She describes the archival threshold as “the space beyond which no alteration or permutation is possible, and where the written act can be treated as evidence and memory.”²³⁶

The abandonment of the connection between archival documents and a central official place of preservation under a distinct jurisdiction would imply the impossibility of exercising precisely that guardianship so dear to Jenkinson’s heart, the moral defense of archives, not only by the archivist but also by the people. There is no doubt in my mind that the moral defense passes through and is inseparable from physical defense.²³⁷

Other voices than the Australians and the representatives of the UBC project have joined the debate. Writers like Ken Thibodeau of the National Archives and Records Administration in the United States argue that it is preferable to continue to entrust established archival institutions with the preservation and custodianship of electronic records/archives, because the originating bodies would not sufficiently prioritize the preservation of noncurrent - but archival - electronic records, and thus jeopardize their survival.²³⁸ Thibodeau believes that the best guarantee for safekeeping such records is to put them in the hands of archival institutions like a national archives and concludes:

To preserve the historical truth of the records requires that they be removed from the operating environment and transferred to an archival environment. An archival environment, then, is one in which the records are protected from changes which would diminish or destroy their historical character. It would be shortsighted to suppose that we could serve the future by staying within the narrow scope within which each organization creates and keeps records. Even expanding from the direct instrumentality of records in the conduct of business to the management of risk is very small step in comparison to facing up to the difficult, but worthwhile, task of preserving records for the future.²³⁹

Edward Higgs, an Englishman with experience of management of current records, also feels that originating bodies are not to be trusted with long term custodianship of electronic records:

Can we trust data creators with the custodial function of archives? My experience is that this can be a high risk strategy. Staff changes, crises of accommodation or machinery, new departmental priorities, and so on, can suddenly place records at risk and decisions respecting them can be made without any consideration of long term archival policy. Will archivists always have such close working relations with client organizations that they can head off disasters? This also assumes that archivists are prepared to take on the management of minimum service level agreements with record creators. The issue here is not technological but commercial and organizational. If organizations only keep records for continued administrative use, there must come a time for them when electronic records cease to be worth keeping. No commercially oriented organizations want to carry unnecessary fixed overheads, especially those which do not aid their business objectives... Governments who want cheap flexible administration, low taxes, and re-election, will probably agree.²⁴⁰

Two representatives of archives that have accepted and implemented the post-custody concept, Greg O’Shea from the Australian Archives and David Roberts from the Archival Authority of New South Wales, have given their account of the post-custodial realities. They identify three phases in the development of policies and strategies for

²³⁶/ Ibid.

²³⁷/ Ibid.

²³⁸/ See: Charles Dollar, “Archival Theory and Information Technologies: The Impact of Information Technologies on Archival Principles and Methods”, (University of Macerata, Macerata, Italy, 1993). Ken Thibodeau, “To Be Or Not To Be: Archive Methods for Electronic Records”, *Archival Management of Electronic Records, Archives and Museum Informatic Technical Report*, No. 13 (1991), edited by David Bearman.

²³⁹/ Ken Thibodeau, Op. cit.

²⁴⁰/ Edward Higgs, “Information Superhighways or Quiet Country Lanes? Accessing Electronic Archives in the United Kingdom”. Paper given at the “Playing for Keeps” Conference, Canberra (November, 1994).

management of electronic records, non-custodial, custodial and post-custodial. The first phase covered the time before any archival institution paid attention to what we today call electronic records. The custody phase began in 1968 when the U.S. National Archives (NARA) began accessioning “data files”. Others followed suit, but have remained at this stage. The third phase is still in its initial stage, but it should be seen more as dealing with the “continuum” concept than with just the narrower problem of physical custody:

Generally speaking, post-custodialism represents both a dissatisfaction with the custodial thinking of the past and a new paradigm or intellectual framework in which to place that thinking. While the catalyst of this dissatisfaction and shift to a new paradigm have been the issues associated with electronic records and recordkeeping, the ideas and practice of managing records across *the whole life-cycle (or continuum)* (author’s emphasis) rather than just within the archival institution has, of course, been with us for some time.... This is the continuum approach and it brings into sharp focus the need to re-orient, what some might perceive to be, the traditional archival mission.²⁴¹

O’Shea and Roberts describe the prevailing situation in their institutions which have led them to accept the post-custodial approach:

To a significant extent, the practical difficulties for our respective institutions to maintain software dependent electronic records outside the computing environment in which they were generated provided the basis for the adoption of the distributed custody model... The technological argument is only one of a number supporting a post-custodial stance. For the purpose of current practical policy, however, neither of our institutions is in a position to promote the extensive transfer of electronic records to our custody, because we cannot ensure their accessibility and their integrity as evidence over long periods of time.²⁴²

Then a look at the future:

One of the developments which would overcome the software dependence of electronic records is the adoption of a standard for records as *metadata encapsulated objects* (MEO) (author’s emphasis) to ensure interoperability between recordkeeping systems environments. This would give them independence of specific custodial settings. While the MEO model is not primarily directed towards solving the problems of technological change, one result of its adoption would be to make it much easier for archives institutions to take electronic records into their physical custody. On the other hand it would make... alternative custodial models... equally easier.²⁴³

The two Australians conclude their article:

Our own experience, based on years of working with electronic records and data, physically and strategically, is that quite simply archival institutions alone *cannot* preserve electronic records of value. Where records are does not matter so long as they are appropriately created and the valuable are preserved (as authentic evidence of transactions) and remain accessible... the ideas and strategies are there. The challenge is for us all to work together and get on with the job, rather than indulging in academic debates.²⁴⁴

²⁴¹/ Greg O’Shea and David Roberts, “Living in the Digital World: Recognising the Electronic and Post-Custodial Realities”, *Archives and Manuscripts*, Vol.24, No.2 (November, 1996).

²⁴²/ Ibid. The Australian Archives accepted formally the non-custody approach in March 1995 by releasing “*Managing Electronic Records: a Shared Responsibility*”; and in September 1995, “*Keeping Electronic Records: Policy for Electronic Recordkeeping in the Commonwealth Government*”. The same policy was issued by the Archives Authority of New South Wales in July 1995. See: “*Documenting the Future: Policies and Strategies for Electronic Recordkeeping in the New South Wales Public Sector*”.

²⁴³/ Ibid.

²⁴⁴/ Ibid.

The policy of non-custodianship was also, and, to a limited extent, as a test case, introduced as an official policy of the National Archives of Canada in November 1993, when “certain categories of archival electronic records” were left in the custody of the originating agencies.²⁴⁵ Terry Cook reflects that “this illustrates the rapidity in electronic archiving where ideas tested out as radical proposals from a conference podium are now translated into working reality in a couple of years rather than a couple of decades.”²⁴⁶ He explains that the Canadian National Archives considers this approach as a “concrete test” of Bearman’s and Hedstrom’s assumption, and hopes that it will become “a learning mechanism”, not only for the Canadian Archives, but also for all interested archivists as well as client departments.

During 1996, on two different occasions, and in two different Internet “listservs”, archivists from all over the world expressed their views on the custody issue. The first one took place in February 1996, and used the American “Recmgmt” listserv as a forum for discussion, and the second took place in November 1996 in the Australian “archives” listserv. The tone and approach in these discussions are more informal than in official publications.

Luciana Duranti, the leader of the UBC project and main opponent to the non-custody approach, gave her reasons why she feels that records must be removed from the custody of those who created them in order to protect the records from being tampered with:

Some say: “We trust our civil servants”. If we do, why are we trying to hold them accountable through their records? If we don’t, why do we want to leave the primary means of keeping them accountable in their hands?²⁴⁷ Moreover, the suggestion or appearance of impropriety and the opportunity of committing it are as hurtful of the trust the people have in the records creators and thus in their records as the evidence of impropriety. This is why any doubt about the continuing reliability of the records should be removed by removing the records from those who have vested interest in either corrupting them or neglecting them. Custody is renounced on the basis of the completely unfounded assumption that it is cheaper to keep the records with the creator than to move them to an archival institution or program. I tend to believe that with the post-custodialist trend, the public is ultimately the loser, that is, everyone. The point that I am trying to make is that what the post-custodialists suggest is an abdication of the primary archival role and, fundamentally, an illusion. Real control is not possible without possession and, if it were possible, would be far more expensive than possession. At times I think that what makes archivists propose the abandonment of physical custody is faintheartedness in front of the challenge of electronic records.²⁴⁸

²⁴⁵/ The policy paper issued by the Canadian National Archives states as follows: “This policy paper addresses why the National Archives of Canada may wish to leave archival electronic records of the Government of Canada in government institutions rather than transfer them to the control of the National Archives of Canada.” Paper provided to the author by John McDonald.

²⁴⁶/ Terry Cook, “Leaving Archival Electronic Records in Institutions: Policy and Monitoring Arrangements at the National Archives of Canada”, *Archives and Museum Informatics*, Vol. 9, No.2 (1995).

²⁴⁷/ A case with some bearing on the situation Duranti warned against has occurred in the United States. The White House “webmaster” had, in 1996, created and made available to the public an “archives” of White House speeches. When a television show in Michigan in May 1996 tried to illustrate the use of this archives in a program it found, that the “archives” had disappeared from the Web - perhaps, for political reasons. The TV reporter writes: “My worst fear was that someone in the White House was afraid that this archives could be used to support ‘opposition research’. That’s a process common in modern campaigning...”. Upon finding out about the complaints by the TV reporter, the White House re-installed the archives and the then new webmaster explained to the journalist that “it was a mistake to remove it. We thought it had the potential for causing problems, but we have thought further and decided to restore it...”. The journalist concludes: “Unfortunately, the recent experience with the disappearance of the speech archives calls into question the wisdom of having a government agency maintain its own archives of news or historical materials....The real question becomes this: can we ever expect a particular government agency to exercise appropriate stewardship over archives of its own information?... If my interpretation of how agencies behave is correct, then there is an inherent conflict of interest in having an agency manage its own archives. A trusted third party -- whether it be the National Archives, or a major research library, or even C-SPAN-- has no such conflict of interest.” Rich Wiggins, “The Mysterious Disappearance of the White House Speech Archives. A Pioneering Application of Technology Vanishes”, (*Published in Firstmonday, Peer-Reviewed Journal on the Internet*, June 1996). <<http://www.firstmonday.dk/issues/issue2/whitehouse/index.html>>.

²⁴⁸/ Listserv Recmgmt, 2/9/96, 5:33 p.m.

The Australian archivist Greg O'Shea commented on Duranti's statement (quoted above):

The role of an archival institution should be to protect the archives from day one, not when they cease to be of current administrative value... the duty of the archivist is to facilitate the management of the records in an accountable way, *regardless of where they are located*, in other words engaging with the bureaucracy, and not stand back from the safe distance of the archival "keep". If archival institutions were to sit back and wait for electronic records to become non-current before looking at them they might find there weren't any records.²⁴⁹

In November, 1996 the debate resumed - this time in the Australian listserv.²⁵⁰ Steve Stuckey restated the reasons for the position of the Australian Archives:

The Australian Archives has been involved with the custody and management of electronic records for a significant length of time... Without much fear of contradiction I would say we are amongst the most experienced archival institutions in the world at managing electronic and other special formats.

... Anybody with even a passing knowledge of computer technology will have observed an interesting phenomena: rapid technological change. We noticed it a long time ago as our repositories began to fill with electronic media which became obsolete over very short time frames. In the 1970s we actually started to go down the path of acquiring the hardware to preserve, maintain and read these electronic media, but we soon discovered three significant things. Firstly, the costs of installing and maintaining the equipment and providing staffing were astronomical; secondly, the manufacturers of the equipment wouldn't support them as lines became obsolete; thirdly, we could not provide the technology to preserve and access the myriad technologies and formats being used by Government agencies. Our conclusion was that it seemed illogical and a massive waste of resources to attempt to *DUPLICATE* (note this) technological environments already in existence in Commonwealth agencies.

Commonwealth agencies for their part are responsible for complying with the law and accounting for their actions to the Parliament and ultimately the people. To do so agencies have a responsibility to create and maintain appropriate records in recordkeeping systems and to ensure they are available for accountability purposes as well as corporate and community memory. This requirement applies to any business transaction whether it is conducted manually or electronically... It is therefore obvious that the Australian Archives and Commonwealth agencies need to work cooperatively to ensure the creation and preservation of electronic records. That means agencies, using policies, standards, best practice and guidelines developed by the Australian Archives and others, maintaining electronic records on agency systems to meet agency and community needs.

Stuckey continued:

As David Bearman said in Melbourne and Canberra in June, custody isn't the issue (I seem to remember his words were "Custody is a good idea; someone should do it"); creation, capture and accessibility to evidence are. We would all be well served, given the enormous task before us, if we looked to the development of a common position for managing electronic records, rather than debating what I believe in the long run to be a side issue. If records are not appropriately created, captured into recordkeeping systems and kept accessible then no one will be able to have custody of them.

He concluded by stating that "the point to make perfectly clear is that the Australian Archives' policy is not non-custodial, it proposes a distributed custody model. We have the technological infrastructure in place to take limited quantities of electronic records, where they are sufficiently valuable and there is no other alternative."²⁵¹

²⁴⁹/ Listserv Archives, 2/14/96, 11:45 a.m.

²⁵⁰/ During the meantime (June-July), week-long workshops in Canberra and Melbourne devoted to the "Records Continuum" concept had been arranged by the Monash University Archives School. This probably put new life into the debate.

²⁵¹/ aus-archivists listserv, 11/7/96, 2:53 p.m.

Chris Hurley, another Australian, explained:

UBC²⁵² seems to me to be saying that their values, most of which I like, can only be achieved inside a boundary within the entity (called an archives). Post-custodialists say that not only is this unnecessary, it is undesirable - because it leaves important records outside the recordkeeping boundary. The recordkeeping boundary (within which we control or manage or implement, whatever you like, recordkeeping requirements) has to be as broad as the entity itself.²⁵³

He went on to note that “there is confusion about design and implementation issues. Pittsburgh took the post-custodial position through the essential first stage (well, part of it anyway) of articulating the design concept. At this level the question ‘who holds the records’ was found to be almost irrelevant. The question ‘who controls the records’ is much more important.”²⁵⁴

Duranti replied a week later that her position was expressed in detail in the article which appeared in the November 1996 issue of *Archives and Manuscripts*, and proceeded to explain:

It must be emphasised, particularly since both Stuckey and Hurley strongly imply that the UBC project is exclusively focused on asserting the need for archives to assume physical custody of electronic records, that the custody issue has come into play in the context of the research findings and has never been a focus of the research. It is only in the latter part of the research that the investigators have come to the conclusion that the solutions appropriate for ensuring the reliability and authenticity of electronic records while they are needed by the creator for carrying out its business purposes will not satisfy the need for ensuring authenticity once those records are no longer required by the creator to carry out those purposes.²⁵⁵

She continued:

The assertion of the continuing need for archives to assume custody of records once they are no longer needed by the creator was a logical consequence of the conclusion described above. Custody by the archives is, of course, only the starting point for ensuring the authenticity of records over the long term. In recognition of this, the UBC investigators are currently in the process of proposing an international collaborative research project which will seek solutions to the problem of preserving the authenticity of electronic records over the long term. It will address issues of technological obsolescence, the timing of transfer and so on.²⁵⁶

Terry Cook from the Canadian National Archives commented:

I would raise the issue of not mixing theory and strategy. The crucial part of her [Duranti's] case against distributed custody in her reply is that archivists are too few, too untrained, too easily beguiled by departmental IT experts, etc.,... to be able to monitor or audit records left in full distributed custody with their creator. Changes could be made to alter the record, she asserts, and the archivists would never know. Issues of training,

²⁵²/ i.e. the University of British Columbia project.

²⁵³/ aus-archivists listserve, 11/8/96, 2:16 p.m.

²⁵⁴/ Ibid.

²⁵⁵/ aus-archivists listserv, 11/15/96, 7:55 p.m.

²⁵⁶/ Ibid. Terry Cook writes: “... the implications for archival institutions of assuming physical custody of electronic records have yet to be worked out. As I indicated in my previous message, the UBC investigators plan to explore those implications in the context of a research project that is currently being proposed and which, if funded, will commence in January 1998; until substantive research exploring the implications for archival institutions of assuming physical custody of electronic records is completed, it is premature to conclude that archival institutions are not capable of preserving electronic records within a framework of physical custody”. aus-archivists listserve, 11/20/96, 2:55 p.m.

resources, numbers, technology audit trails, etc., are not, however, issues concerning theoretical principles on which she takes her stand;

rather, they are strategies and tactics, or technological problems. That is rather different, and far more debatable, and will vary from one jurisdiction and operational culture to another as to what is possible.²⁵⁷

In the November 1996 issue of *Archives and Manuscripts* Adrian Cunningham, who, as noted above, has taken a wait and see attitude, offers a vision beyond the custody controversy. He has concluded that any electronic recordkeeping system that was created without archival input (“in the absence of archival consideration”) cannot be archivally preserved. The Australians learned this the hard way when they accessioned the first generation of electronic records produced by systems that had been designed without archival considerations. He notes that in the early days the Australian Archives “made a valiant attempt at trying to achieve the impossible, but it proved beyond them, just as it proved beyond the capabilities of every other archives in the world. The mistake it made was to suggest that such records could be saved for posterity by the agency that which created them.”²⁵⁸

Cunningham means that not even the originating agencies can preserve, beyond their own administrative needs, electronic records from systems designed without archival considerations. (“they will do whatever they can to keep the system limping along”). To be able to preserve an electronic record system - in the custody of an archives or in the custody of the originating body - archival requirements must have been built into the system from the very design stage of the system. Cunningham concludes:

Instead of talking to agencies about custody, what the Australian Archives should have been talking about was good recordkeeping. With the completion of the research phase of the Pittsburgh project, archivists now have the detailed functional requirements for evidence in electronic recordkeeping. These together with the associated technical specifications for *metadata encapsulated objects* (author’s emphasis) and electronic recordkeeping systems design, make it possible for archivists to become meaningfully involved in designing archivally sound recordkeeping systems from the ground up.... Once good electronic recordkeeping practices become accepted and established (this is in fact our major challenge) *the custody becomes a non issue*. The real issues are archival control, the management of access and use, and the ongoing preservation of records of continuing value.... Archives can take such records into custody with ease and confidence, should that be deemed desirable. Equally, the records may be stored in a distributed environment with the archives exercising its control functions of physical and moral defense by technological means.²⁵⁹

One can, against the background of this lively debate, ask oneself to what degree archives all over the world really have accessioned electronic records up to now. From available literature one can conclude that, up to the present time, national archival institutions have only accessioned the first generation of electronic records, mainly produced in the mainframe world, but have not yet faced the challenge of accessioning PC-generated textual records from the networked client server world which today dominates the picture. This may, however, change. Over a year ago, a message in the “Archives” listserv informed the archival community that the U.S. State Department Advisory Committee (in the context of a declassification question):

... discussed the fact that the State Department central file - which includes telegrams between Washington and the embassies - for the period from July 1, 1973 to the present has been digitized. In 1998 the State Department expects to transfer the 1973 computerized central file to the National Archives. *This will mark the first time the National Archives will have received from an agency such a large collection of textual records in electronic format* (author’s emphasis). The Advisory Council members raised the issue whether the software that the State Department currently uses will also be transferred along with the data tapes. At the meeting, representatives from the National Archives stated that they are currently exploring strategies for handling electronic records, but indications were that there had been no agreement on the transfer of the software. An Advisory Board member

²⁵⁷/ aus-archivists listserv, 11/19/96, 9:19 p.m.

²⁵⁸/ Adrian Cunningham, Op. cit.

²⁵⁹/ Ibid.

Chapter 9

Storage Media

Possible storage media for electronic records--unless they are converted to paper or microform--are magnetic media or optical disk. Reliable international standards have been lacking for optical storage technology. An Australian study states:

It is obvious that because of the nature and complexity of the data the best method of archiving electronic records is by using some form of electronic media. At the present time there is no stable electronic media available which can be considered archival. Optical media cannot be considered archival as the life and stability of the media is not yet known. Reel-to-reel magnetic tape has been in common use as an archival medium for over 30 years but now with the advent of cartridge and cassette tapes this is becoming obsolete and the new form of magnetic media is in the same position as optical media in that it is an immature technology.²⁶¹

The above writer finds that it is not possible to choose a standard electronic medium for the transfer and storage of electronic records by the State Archives, and concludes that "... the only option open to the State Archives to ensure the continued preservation of electronic records of lasting value is the noncustodial archiving of these records."²⁶²

In July 1994 the technology research staff of the U.S. National Archives (NARA) published a paper: "Digital Imaging and Optical Digital Data Disk Storage Systems: Long Term Access Strategies for Federal Agencies".²⁶³ The paper does not address optical storage media for use by the National Archives, but how such media are used by the U.S. Federal agencies. A number of years ago, NARA had informed Federal agencies that, "due to the unsettled state of optical media technology and especially the absence of standards", it could not accession optical digital disks containing records of permanent value. This restrictive policy was, however, modified in 1994. The study is based on a nationwide onsite examination of 15 Federal agency digital imaging or optical digital data disk applications. The objective of the analysis was to identify critical management issues and relate them to technical trends and user experiences. The executive summary of the report states:

Long-term usability of digitally stored information, including scanned document images, digital data, and descriptive index data, will best be achieved by implementing a sound policy for migrating data to future technology generations, adhering to well-documented image file-header formats, and monitoring media degradation. System managers should create the technical and administrative infrastructure required to implement relevant information technology standards as they are developed. Ensuring that information stored on optical data disks will continue to serve the function for which it was originally intended for as long as it is needed requires a *long term commitment to open system architecture and adoption of a methodical approach to system component upgrade and data migration that guarantees the interoperability of current technologies with*

²⁶⁰/ Listserv Archives: NCC Washington Update, Vol.1, No. 61, December 14, 1995.

²⁶¹/ State Archives of Western Australia, "Electronic Records: An Investigation into Retention, Storage and Transfer Options," *LISWA Research Series*, No. 4, (1993). The literature on archival storage media for electronic records is not rich. See also: Janice Mohlhenrich, editor, *Preservation of Electronic Formats & Electronic Formats for Preservation* (Fort Atkins, Wisconsin, Highsmith Press, 1993). The following works may be of at least marginal interest: Muller, Nathan, *Computerized Document Imaging Systems: Technology and Applications* (Boston, Artec House, 1993). Starbird, Robert W., "A Manager's Guide to Electronic Imaging," (Association for Information and Image Management, LC call no. HF5737.S72, 1993). Thierauf, Robert J., *Image Processing Systems in Business: A Guide for MIS Professionals and End Users* (New York: Quorum Books, 1992). D'Alleyrand, Marc R., "Image Storage and Retrieval Systems: A New Approach to Records Management," (Marc R. D'Alleyrand, New York: Intertext publication, c1989, J. Ranade IBM series).

²⁶²/ Ibid.

²⁶³/ NARA Technical Information Paper No. 12.

NARA's in-house experience of storing electronic records goes back to the first generation of computer applications created in the mainframe world. NARA developed early for this purpose a system called Archival Preservation System (APS):

NARA has designed and developed a system for the physical preservation of electronic records called the Archival Preservation System (APS). The APS performs 4 basic functions: (1) it transfers electronic records from the media used by the records creators (or from a network) to a medium chosen specifically for archival preservation; (2) it writes the archival copies of physical files in conformance with standard specifications for physical recording and labeling of physical files; (3) it automatically tracks all of the media volumes it writes, the physical files it copies, and the processes performed on them; (4) finally, anticipating the obsolescence of all digital media, it facilitates the eventual migration of physical files to new preservation media.²⁶⁵

European archivists seem to prefer storage on magnetic tape. Again this may be so because the experience is more or less limited to storage of first generation electronic material--mostly statistical databases. The French National Archives performed a pilot test of the use of optical storage, but concluded that it was too labor intensive to do scanning and indexing. Obviously, they were scanning in paper documents.²⁶⁶ As pointed out below, Germany does not accept as legal evidence records stored on "electronic or optical media".²⁶⁷ Angelika Menne-Haritz devotes a whole article to "Optical and Electronic Storage Media in the Administration".²⁶⁸ In an article about machine-readable data carriers ("Maschinenlesbare Datentraeger"), Michael Wettengel gives an overview of existing electronic storage media and standards and/or lack of standards for such media. He also describes the best ways of handling the different media and their potential usefulness for archival storage. Because of the present lack of standards for optical media in general and WORM (Write Once Read Many) technology in particular, he concludes that "as archival medium, WORMs are therefore not suitable".²⁶⁹

An American researcher, Jeff Rothenberg, points out that magnetic media are very vulnerable, and has found that magnetic tape have a lifespan of one to five years, compared to 30 years for optical disk:

²⁶⁴/ Ibid.

²⁶⁵/ "The APS design is modular. It currently runs on a 486 personal computer using the OS/2 operating system. The system tracks volumes, files and processes using a relational database. On the input side, the APS can be configured to handle whatever media we need to read, provided that there is a driver for that medium which conforms to the Small Computer System Interface (SCSI) standard. We currently have APS units configured to process files received on open reel tape, 3480 cartridge, 4 mm and 8 mm tape cassettes, floppy disks, and Compact Disk-Read Only Memory (CD-ROM). Four of these six media have been added, under force of circumstances, in the last year, demonstrating the modularity and flexibility of the system. On the output side, the system uses a 3480 magnetic tape cartridge drive, because the 3480 cartridge is the medium we currently use for preservation. Besides its flexibility, the APS has demonstrated substantial gains in productivity as compared to performing the same processes on a mainframe computer." From a paper given by Ken Thibodeau at the "Playing for Keeps" Conference, Canberra (November, 1994).

²⁶⁶/ Michèle Conchon, "Diderot est mort!", *La Gazette des Archives*, No. 163 (4eme Trimestre 1993).

²⁶⁷/ See Chapter 11.2., below.

²⁶⁸/ Angelika Menne-Haritz, "Optische und Electronische Speichermedien in der Verwaltung. Konsequenzen fuer Theorie und Praxis der Archive", *Verwaltungsfuehrung Organisation Personalwesen (VOP)* (Heft6/1993).

²⁶⁹/ "Es bestehet somit eine grosse Gefahr, dass das gewaelte WORM-System technologisch 'ueberholt' wird und gespeicherte Daten entweder verloren gehen, oder unkalkulierbare Folgekosten fuer eine kuenftige Altdatenconvertierung entstehen". (There is a great risk that a selected WORM system may become technologically obsolete and that stored data will be lost, or that there will be incalculable cost for conversion of stored old data). Michael Wettengel, "Maschinenlesbare Datentraeger. Zusammenstellung archivrelevanter Normen und Standards elektronischer Speichermedien," *Mitteilungen aus dem Bundesarchiv* (2/1994).

Although digital information is theoretically invulnerable to the ravages of time, the physical media on which it is stored are far from eternal. If the optical CD in my attic were a magnetic disk, attempting to read it would probably

be futile. Stray magnetic fields, oxidation and material decay can easily erase such disks. Yet, neither the physical fragility of digital media nor their lemminglike tendency towards obsolescence constitutes the worst... problems.²⁷⁰

There seems to be agreement that the selection of medium and the life-span of that medium is not the most important factor in preserving electronic records over time. Technological obsolescence will sooner or later make any medium useless. Conversion and migration to new media must take place, making the selection of medium secondary, and “copying” will take precedence over physical preservation. Thus Rothenberg concludes:

Where does this leave my grandchildren? If they are fortunate, their CD may still be readable [the year 2045] by some existing disk drive, or they may be resourceful enough to construct one, using information in my letter [with the documentation, *author's remark*]. If I include all the relevant software on the disk, along with complete, easily decoded specifications for the required hardware, they should be able to generate an emulator to run the original software that will display my document. I wish them luck.²⁷¹

Rothenberg returned to the subject in an article about metadata in 1996. Modern complicated documents consisting of graphics, hypertext, and with linked structures will remain dependent on the software used to create them. He thinks that “simple text” or “numeric format” may be deciphered using “brute force”, but that will not work for more complex structures, and there is no reason to believe that some future software will do the trick:

It may be tempting to imagine that future software will be able to read old records and recreate the ways they were intended to be seen, but this is unrealistic. Software paradigms change every few years, and record-keeping paradigms themselves are evolving in response. Nor can we expect to reproduce the precise behavior of obsolete software in the future by interpreting a saved description of that software--the only description of software that can capture its functional richness *is the software itself* (author's emphasis). In general, viewing obsolete records as they were intended to be viewed requires running the actual software that created them.... The only general, long-term solution to this problem would appear to be a strategy that makes records self-contained and self-explanatory.²⁷²

Rothenberg's solution is to save records along with their original software, by encapsulating them with their original software and descriptions of the original hardware environment to allow future emulation of the required system. Additionally, “explanatory metadata” must be attached to explain how to use the emulated system and encapsulated software in order to view the record. Indices and other descriptive metadata should be included:

The hardware description would be used in the future to construct an emulator for the original hardware environment: this would be run on whatever computer happens to be available, in order to access the original records. The entire collection--records, software, and hardware description--would be encapsulated to prevent corruption. This in no way alleviates the media longevity problem: encapsulated records would still have to be copied to fresh media periodically, to avoid loss. It does, however, offer a solution to the software/hardware dependence problem, which has largely been ignored (or dismissed by wishful thinking).

The motivation for encapsulating records in this way is two-fold. First, it avoids corruption by marking the entire suite of saved information as inviolable. An encapsulated record must not, for example, be subject to lossy compression or modified in any way: it must be recognized as a saved bit-stream whose bits must be copied verbatim, whenever they migrate to new media. In addition, encapsulation ensures that all of the necessary components (software, hardware environment description and data) of a record remain contiguous: so long as the encapsulation is not violated, future readers can be assured of having all they need to access and understand saved records. Encapsulation introduces a problem, however: a prospective reader needs to know

²⁷⁰/ Jeff Rothenberg, “Ensuring the Longevity of Digital Documents”, *Scientific American* (January, 1995).

²⁷¹/ Ibid.

²⁷² / Jeff Rothenberg, “Metadata to Support Data Quality and Longevity”, (an *IEEE document*, (http://www.nml.org/resources/misc/m...enbeg_paper/ieee.data-quality.html).

read the record inside it. Furthermore, it is unreasonable to expect data administrators to open and read each encapsulated record every time they need to decide where to store it, how to index it, who should be allowed to access it, etc. The solution to these problems is to attach *annotation metadata* to the “surface” of each encapsulation, both to explain how to decode the obsolete records contained inside the encapsulation and to provide whatever contextual information is desired about those records.²⁷³

If Rothenberg is right, and this can be done technically, the implications for preserving *authentic* records in the electronic environmental would be considerable.

In the United States, a Commission on Preservation and Access has appointed a task force to search for ways and means for, and technological solutions to, the long-term preservation of electronic records. The task force’s mandate is to “ensure that information in digital format endures for future generations”, and the co-chairman of task force, Donald Waters, a librarian, writes:

Preserving the media on which information is electronically recorded is now well understood to be a relatively short-term and partial solution to the general problem of preserving digital information. Even if the media could be physically well-preserved, rapid changes in the means of recording, in the formats for storage, and in the software for use threaten to render the life of information in the digital age as, to borrow a phrase from another arena of discourse on civil society, “nasty, brutish and short”.²⁷⁴

Charles Dollar strikes a more optimistic note by predicting that future systems and technologies will be able to emulate obsolete operating systems and reconstruct systems that have lost their documentation and presently are unintelligible. He points at a case in Germany where this has been accomplished:

These technical tools include the capability of reconstruction of documentation for coded data elements in databases into a flat file structure. The successful effort by the Bundesarchiv of the Federal Republic of Germany to use digital technologies of the 1990s to reconstruct documentation to very important former East German electronic records is particularly instructive.²⁷⁵

²⁷³/ Ibid. Rothenberg’s proposal should be compared to the concept of a record as “a metadata encapsulated object” as described above in Chapter 5 under the University of Pittsburgh project. Rothenberg just adds more information to the capsule/envelope than the metadata Pittsburgh has proposed.

²⁷⁴/ Don Waters, “Some Considerations on the Archiving of Digital Information” (January, 1995) <<http://www.oclc.org:5046/>>.

²⁷⁵/ Charles Dollar, “Trends in the Archival Acquisition and Preservation of Electronic Records: 1970-2000”, Paper given at Moscow State University, Russia, January 4, 1996 (unpublished).

Chapter 10

Distribution and Access

10.1 Exchange and Dissemination of Archives in Cyberspace

Many archival institutions are now offering on-line information about their holdings in “Cyberspace” via public networks like Internet. The scholarly community is getting used to having access to networked information resources.²⁷⁶ Library catalogues from all over the world can be consulted from the researcher's workstation provided he/she has a modem. Archives' clients will demand the same service, and it is now a reality. There are numerous archival World Wide Web (“Web”) and Gopher sites in many countries. When the first draft to this review was worked out (summer 1994), an article from early 1994 counted 18 U.S. institutions that had on-line facilities. By the end of 1996, there is such an abundance of archival Web “home-pages” and Gopher sites in Internet - not only from the United States but also from other parts of the world such as Australia and Canada - that this author has lost count of them.

A very complete and continuously updated list of world-wide “Internet Resources for Archivists” has been constructed by the Utah State Archives and Records Services.²⁷⁷ It has links to such services as “Archives & Archivists”, and to a calendar of events “Archivist's Daybook”. It has links to the Web site of the U.S. National Archives and to those of its Regional Archives and Regional Centers, to the Presidential Libraries, to 29 State and Provincial Archives Web or Gopher sites in the U.S. and Canada, and to 120 University and College archives. It also has links to the following national archives Web sites: Australia (with links to commonwealth government archives, state government archives and territory government archives), Bolivia, Canada, Ireland and the Public Records Office of the U.K. Furthermore, it has links to professional associations, and records management, preservation and conservation services. There are also very active archives and records management discussion groups or “listservers” within Internet which provide an e-mail based forum for professional exchanges and discussions. The most active are located in the U.S., but there is one in Australia and another in Canada.²⁷⁸ There are also at least two listservers for records management and electronic records.²⁷⁹

The trend is clear. The “virtual archives” is already a fact, and archives all over the world are now available in Cyberspace. Scholars of all ages and nationality expect this service. Major archival institutions, as well as governmental agencies and organizations, are already providing access to their records and archives via Internet and other networks. But there are still some dissenting voices. Edward Higgs does not like the idea of archives in Cyberspace:

Is “accessing information anywhere in the world at the click of a mouse” really that exciting a prospect? As an archivist, and as an historian interested in the way in which archival texts are used, I am constantly amazed by the tunnel vision of many researchers. Historical debates, for example, often revolve around a restricted set of

²⁷⁶/ Concerning new scholarly research methods, see Avra Michelson and Jeff Rothenberg, “Scholarly Communication and Information Technology: Exploring the Impact of Changes in the Research Process on Archives”, *The American Archivist*, No. 55 (1992), and Avra Michelson, “Expert Systems Technology and Its Implications for Archives”, *National Archives Technical Information Paper*, No. 9 (March, 1991).

²⁷⁷/ See <[http://utstdpwww.state.ut.us/~archives/reference/! Archive.htm](http://utstdpwww.state.ut.us/~archives/reference/!Archive.htm)>.

²⁷⁸/ See <<http://WWW.MUOhio.Edu/~HarlanJB>>. The leading archival listserv (ARCHIVES) has the address “LISTSERV@miamiu.muohio.edu” and has discussion participants from all over the world. The Australian listserv opened up in 1995 and has the following address: <Majordomo@asap.unimelb.edu.au>. There is also a Canadian listserv for archivists (ARCAN-L):<Majordomo@srv.ualberta.ca> or <listserv@vm.ucs.ualberta.ca>.

²⁷⁹ / The records manager listserv is called RECMGMT and has this address <listserv@listserv.syr.edu> or <listserv@suvn.syr.edu>. The electronic records management listserv, <ERECs-L-Request@CNSIBM.ALBANY.EDU> or <listserv@uacsc2.albany.edu>.

sources, or approach those sources from a narrow theoretical perspective. One can see footnotes being chased and sources squeezed into the latest fashionable model. An alarming number of record users appear relatively unaware of the fine

net of inter-relationships that bind administrative entities and their records together. They assume, rather, that there is a record which answers each question. The really interesting discoveries in research are often made through happy accident whilst browsing through archival material, or when insights from one research field are applied to another. The very fact of being in an archive, talking to archivists and other readers in a quasi-social setting, is important for such cross-fertilization. Above all, an awareness of being surrounded by an archive in which meaning is dispersed across the whole, via administrative networks, rather than confined to its constituent parts, is a constant reminder of one's own ignorance. Will electronic finding aids based on nested menus and key-word searching merely exacerbate the tendency to "home in" on sources too precipitately, without the trouble of understanding administrative context and provenance? I may be able to find files showing that Department X out-sourced function Y but this does not necessarily explain the context within which such a decision was made. It may be necessary to consult the records of finance and Cabinet departments to discover why out-sourcing was the preferred option.²⁸⁰

A different, but related, subject is the management of records created and transmitted in the World Wide Web environment, Internet and /or Intranet. Organizations are doing business in both these environment. Business transactions are performed and evidential records created in many Intranet-applications. Questions are asked like "Are Web sites primary sources?" or "What are the appropriate strategies for preserving Web sites if they are archival?"²⁸¹ Mike Miller, of the U.S. Environmental Protection Agency, noted that, "at least on the Federal level, there are a number of agencies working on this issue. Most seem to be assuming that at least some of the material on the Web is original record and will need to be appraised".²⁸²

David A. Wallace concludes an article about archives and the "Information Super-highway" as follows:

The challenge remains to convince the rest of the society that the Information Superhighway is fundamentally about records, recordness and evidence transmitted as bit streams across distributed networks as much as it is about any of the other more visibly touted effects the information infrastructure are projected to have. The ability to deliver cultural heritage information and the provision of assistance to society in navigating the unsteady waters of electronic records management present the archival profession with two complementary yet distinct tracks upon which to locate themselves on the information superhighway.²⁸³

10.2 Information Locators as "Virtual Archives"

In a possible archival post-custodial environment, as well as in a continued custody environment, an "information locator system" or directory service will be needed in order for the public to locate and access public records kept in originating agencies and/or in archival institutions. There are several different ways to create such locators. One is based on the X.500 Directory Service standard, the other on a U.S. national (ANSI) standard, Z39.50. The Internet already serves as a sort of locator even for archival resources, but in a non-systematic way, too much depending on the power of the "browser" used.²⁸⁴

²⁸⁰ / Edward Higgs, "Information Superhighways or Quiet Country Lanes? Accessing Electronic Archives in the United Kingdom." A paper delivered at the "Playing for Keeps" Conference, Canberra (November, 1994).

²⁸¹ / Archives listserv 11/1/96, 9:26 p.m. - Questions raised by Rob Spondler in a message replied to by Mike Miller.

²⁸² / Ibid.

²⁸³ / David A. Wallace, "Archives and the Information Superhighway: Current Status and Future Challenges", *International Information and Library Review*, 28 (1996).

²⁸⁴ / One frustrated user of Internet and the Web writes: "It is a disservice to users (and ultimately to ourselves and our collections) to expect users to sequentially search a hundred and one Web sites to find out which repository holds the records they seek." Message in AUS_ARCHIVISTS listsev 2/28/96 from Adrian Cunningham, National Library of Australia.

The X.500 Directory standard²⁸⁵ can be used as an information locator in combination with interfaces like Gopher, which has a hierarchical text-based menu style, or combined with a Web browser like Netscape or Mosaic. Extensions to the X.500 schema, which was originally designed for “person information” such as e-mail addresses, can be produced to allow representation of various information object classes and attribute types about recordkeeping systems or archival holdings. The X.500 powerful search facilities can be tailored for “information objects” like archival finding aids or even full texts of records. The pulling together of such information into a single framework, accessed by standardized protocols, is seen as a key potential advantage of the Directory. Other potential advantages of using the X.500 standard are its robust security features, and the fact that it is designed to support and be integrated with other OSI services.²⁸⁶

In the United States, an information locator service (GILS) based on the ANSI Z39.50 standard is now under full development, with active involvement of the National Archives which has issued guidelines for its use,²⁸⁷ Ken Thibodeau stated in a paper given at the “Playing For Keeps” Conference, Canberra (November, 1994) that NARA “has sponsored a study and engaged in several inter-agency efforts aimed at establishing a Government Wide Information Locator System (GILS). NARA’s involvement in these efforts has led to two major changes from the initial direction of the GILS. Initially, the GILS was conceived as a system which would cover information products and services designed for dissemination. In spite of considerable resistance by other agencies, we have succeeded in getting the coverage broadened to include information systems which are, or include, federal records. Secondly, we have succeeded in getting archival standards for description of records adopted in the GILS. The GILS Core, which refers to GILS records which describe information resources in the Federal Government, is built on the information that NARA has prescribed for inventorying electronic records.” See also <<http://www.nara.gov/gils/gils/html>>. and which could be seen as a prototype “virtual archives”. I quote from NARA’s document:

The U.S. Federal GILS Core represents information resources in a comprehensive manner. Just as the card catalog helps users of libraries locate books, video tapes, manuscripts, maps and other information resources, a government information locator can assist the public in discovering information available from Federal agencies. The content of such a locator is not usually the actual information resource or service itself. Rather, it is a description of that resource, similar to the way that a catalog entry in a library identifies specific items. A locator tells the user what information is available, where the information is located, and how the user can obtain access to it.²⁸⁸

The NARA guidelines also stress that GILS can facilitate records inventorying and scheduling, as the originating agencies only have to describe their information systems once to satisfy records management and GILS requirements. “Existing inventories or schedules of automated information systems which conform to the descriptive standards provided in this guidance may be used to create GILS entries.”²⁸⁹

²⁸⁵/ X.500 can briefly be described as a protocol which specifies a model for connecting local directory services to form one distributed global directory. Local databases hold and maintain a part of the global database and the directory information is made available via a local server called a *Directory System Agent (DSA)*. The user perceives the entire directory to be accessible from the local server.

²⁸⁶/ OSI refers to the Open Systems Interconnection Reference Model, a communications reference model that has been defined by the International Organization for Standardization (ISO).

²⁸⁷/ The U.S. National Archives and Records Administration (NARA) was co-founder of GILS, together with the Administrator of General Services, the Public Printer and the Library of Congress. They established an interagency committee to advise the Secretary of Commerce concerning a governmental information locator (Paperwork Reduction Act of 1995).

²⁸⁸/ See Guidelines for the preparation of GILS Core elements ([Gopher=nara.gov:70/ 1/managers/gils](http://gopher=nara.gov:70/1/managers/gils)).

²⁸⁹/ Ibid.

The GILS project's potential importance for archives and records management was the subject of a letter, dated 6 December, 1993, to the GILS leadership from Professor Richard J. Cox, the leader of the Pittsburgh project for functional requirements for electronic recordkeeping systems. He stated that those requirements "are relevant to the GILS concept document". He continues:

Although the current document is focused on "information products"... the GILS conceptual design also incorporates all recordkeeping systems and is described as a means by which Federal agencies can satisfy "responsibilities to maintain an inventory of their electronic information dissemination products." While the current GILS document includes meta-data more appropriate for government publications, it could easily be revised to include meta-data about recordkeeping systems. This would assist the Federal government to develop better records management programs, and it would help the National Archives to develop new and better approaches to the identification and preservation of electronic recordkeeping systems. GILS, if broadly conceived and carried out, provides the first real opportunity for Federal archivists, records managers, and information policy makers to have an informed profile about Federal government recordkeeping and information systems, and, most importantly, it would serve the purpose of providing citizens with knowledge of public records which they have the right to request access to in our democratic society.²⁹⁰

Professor Cox also urged the GILS project to, in their next revision of their GILS document, "take into account the necessary distinction between information systems and recordkeeping systems. Not all information systems are recordkeeping systems."²⁹¹

While the purpose of X.500 and Z39.50 are very similar, they differ in that X.500 is an international standard and Z39.50 a national U.S. standard (ANSI). There are, however, already attempts to combine the resources of the two standards. Eliot Christian, the leader of the U.S. GILS project, wrote:

We (GILS) certainly want to facilitate access to the very large X.500 databases that act as locators, primarily for people but for other entities as well. My understanding is that Z39.50 is more general than X.500, so it makes sense to provide a gateway to allow Z39.50 clients to access X.500 databases. This is the approach being taken to integrate the United States Government-wide Electronic Mail program with GILS.²⁹²

Such gateways are already available. An Australian group announced in November 1995 that it had built a prototype gateway Z39.50 to X.500. The purpose was to demonstrate "how an information service such as GILS can use the Z39.50 information retrieval protocol to access data from an X.500 distributed hierarchical database".²⁹³

GILS-like projects are presently under way in several countries. Canada is building an information locator named "Government Information Finder Technology" (GIFT): "It is an infrastructure that delivers a search and retrieval capability to Government data and information in its original format over different government sites and locations." Users can reach GIFT via Internet.²⁹⁴ Focus Magazine wrote:

²⁹⁰/ A letter to Barbara Banks, Information Policy branch, OKRA, OMB, Washington D.C., published as an attachment to the *First Pittsburgh Research Report* (September, 1994).

²⁹¹/ The author has not been able to establish to what degree the proposals of Professor Cox were heeded and included in the GILS project.

²⁹²/ Eliot Christian, reply to Alf Erlandsson, 2/1/96, in Gils listserv.

²⁹³/ Message to the Gils listserv, 1/11/96, from Dr. Renato Ianella, University of Queensland, Australia. See also <<http://www.dstc.edu.au/RDU/ZXG>>.

²⁹⁴/ See <<http://www.gc.ca>> click on GIFT: "GIFT delivers a strong local and remote search and retrieval capability today... based on the Fulcrum Technologies search engine. This engine is based in the OSI CLI standards, it supports query languages such as SQL, SFQL and industry defacto ODBC compliance. It also supports defacto communication protocols such as TCP/IP, and standards based query protocol such as Z39.50.... GIFT can search and retrieve native documents such as Microsoft Word, Excel, WordPerfect, AmiPro, Lotus 123 etc. in their original format without any translation."

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By the end of the summer of 1995, GITS plans to bestow “GIFTS” on all Canadians, including its own employees. Everyone will be able to locate government information and services more easily... GIFT promises “transparent and seamless” access to authored documents across Government Departments, Committees, Agencies, etc. In simple

terms, “transparent and seamless” means that from their terminals, users can request GIFT to find instances of a

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According to Eliot Christian, information locator services are being implemented also in Australia and the United Kingdom, and he states that “as a part of a G7 Global Information Society Project, the U.S. is encouraging the creation of a Global Information Locator modeled on GILS”.²⁹⁶ A research group in Japan is considering what a Japanese GILS should look like and whether or not it should use the Z39.50 standard.²⁹⁷

Distantly related is a project started by the European Commission named “The Global Inventory Project”. It will “produce a multimedia inventory of national and international projects... relevant to the promotion and further development of knowledge and understanding of the information society.”²⁹⁸

Chapter 11

Electronic Records in Europe

The chapters above have relied heavily on North American and Australian writers. This is due partly to the fact that major significant work in the electronic records area is being undertaken in Australia, Canada and the United States, and partly to the (relatively) greater amount of published information emanating from those areas. This chapter attempts to add balance to the review by looking at developments in the European environment.

A survey of the situation in archives within the European Union carried out in October 1994 found that while most countries in the European Union have some kind of electronic records in their custody, their involvement in the management of those records varies widely. The majority of electronic records in custody were statistical databases (i.e. “first generation” flatfiles), and there were very few relational databases. Likewise, most regulations date back to the mainframe age. “Overviewing the European scene there is much difference in acquired knowledge and experience with electronic records between member states. Roughly one could say that most experience is concentrated in the Nordic countries and Switzerland”.²⁹⁹

²⁹⁵/ Article reproduced in the GIFT homepage, see note 216.

²⁹⁶/ Message to the GILS listserv, 12/1/95, from Eliot Christian.

²⁹⁷/ Message to the GILS listserv, 1/2/96, from Masahiro Kusunoki, The Japan Research Institute, Ltd., Tokyo.

²⁹⁸/ See <<http://www.ispo.cec.be/g7/projects/theme1.html>>.

²⁹⁹/ Hans Hofman and Michael Wettengel, “Electronic Records: the European Scene.” The result of a survey of activities on electronic records within the national archives in the European Union (3 October, 1994).

One writer concludes that archivists in European archives have underestimated the complications of what is called “the new paradigm”:

It should be pointed out, that until now European archives administrations have not been in a position to furnish the necessary technical support in this important effort of analysis and information. Besides, for a long time the massive impact of information science in the current records area has not been fully understood by archivists, and they have often tackled it without full awareness of the implications involved. This passive attitude has had negative consequences, both as regards the archivist’s professional image and in terms of a failure to take steps to preserve the records produced on the new media. We are called upon today to face new challenges for which our traditional training and principles constitute a solid but not totally adequate foundation. Instead, tackling the new complex system of information technologies calls for the development of a collective capacity for the creation

of sophisticated forms of organization. In this rich context, the efforts made to draw up and implement common rules based on archival principles - and the Principle of Provenance is the basic one - is the most effective weapon we possess in the battle to defend our hard-won role; not so much to defend a profession as to safeguard the memory of the collectivities, in which we play an active part.³⁰⁰

11.1 The Netherlands

A comparative study undertaken for the government of the Netherlands of how governmental agencies handle electronic records there and in Germany, Sweden, Canada and the United States, highlights the differences in the relationship between archival institutions and the governmental agencies for which the archival institutions so far have served as central depositories. While agencies heavily depend on their electronic records, the Dutch archives (for legal reasons) cannot explicitly recognize the evidential status of electronic records:

The growing use of electronic technologies to support a range of information tasks at all levels of government has not yet resulted in formal procedural changes for records and archives management... as a result, in most agencies, dual information systems are maintained. Electronic information in fact comprises the working records for a substantial proportion of government tasks. But it is information on paper... that will become the organization’s official records.³⁰¹

However, the report states that this principle of putting information on paper for official records purposes is known *not* to be followed by the agencies, with obvious negative consequences. Significant records “for the reconstruction of government processes”, are not becoming part of the official files and electronic recordkeeping systems do not meet archival requirements. Both systems become incomplete. “The underlying assumption that information in electronic systems has a straightforward paper equivalent goes unexamined; at the same time, this assumption obscures the need for a rigorous examination of records and archives concepts within electronic information environments.”³⁰²

11.2 Germany

The Bikson/Frinking study describes the situation with regard to management of electronic records in Germany, where the traditional bifurcation between archives and records management has more or less left it to agencies to deal with their electronic records without input from the Federal Archives:

³⁰⁰/ Maria Guercio, “Archival Theory and the Principle of Provenance for Current Records. Their Impact on Arranging and Inventorying Electronic Records.” Paper given at First Stockholm Conference on Archival Theory and the Principle of Provenance (2-3 September 1993) (Skrifter utgivna av Svenska Riksarkivet 10, 1994).

³⁰¹/ T.K. Bikson and E.J. Frinking, *Preserving the Present: Toward Viable Electronic Records* (Soler Publishers, The Hague, 1993).

³⁰²/ *Ibid.*

The final decisions about general document management are left to each minister in the respective ministries, regardless of recommendations from the Federal Archives. Ultimately then, at the national level, there exist only guidelines about records management, not legislative procedures, standards or requirements.³⁰³

Wolf Buchmann confirms Bikson/Frinking's evaluation. Comparing the situation in German state and federal archives with the development in similar institutions in the U.S. and Canada, he states that German archives up until now have only become involved with the utilization of computer technology in the administration of archives themselves, and have

not been actively dealing with the aspect of management and acquisition of electronic records.³⁰⁴ Buchmann finds this "deficit" in German archives all the more remarkable as at a comparatively early point in time (1967) the impact of computer technology for archives was discussed in German archival circles.³⁰⁵

Buchmann's statement should, however, be seen against recent information presented in an article by Michael Wettengel from the German Federal Archives (Bundesarchiv). He describes how that institution has recently accessioned numerous databases from the former People's Republic of Germany (DDR). In order to rescue historically important materials the Bundesarchiv had to act promptly. The material, preserved on magnetic tape, is poorly documented, which causes serious access problems.³⁰⁶

At the same time, one of the world's most advanced implementations of distributed office technology is under development in Germany, aimed at creating a virtual government office situation, with government agencies split between Berlin and Bonn.³⁰⁷ It is called the POLITeam project under leadership of the German Federal Minister for Research and Technology. The project started in May 1994. Its goal is to develop a telecooperation system to support cooperation among the governmental functions distributed between Bonn and Berlin, as well as intensification of European cooperation.³⁰⁸ The prototype has been developed in close cooperation with the users. An integrative groupware system that will provide comprehensive support to spatially distributed, asynchronous work is now under development. It

³⁰³/ Ibid.

³⁰⁴/ "Bei einem internationalen Vergleich, welche Prioritäten von den einzelnen Archivverwaltungen in der Auseinandersetzung mit DV-Fragen gesetzt wurden, wird deutlich, das die staatlichen Archive in des Bundes-republik sich über lange Jahre hinweg fast ausschliesslich mit DV-Anwendungen im Archiv beschäftigt haben und parallel dazu die Übernahme maschinlesbarer Daten vernachlässigt wurde, während etwa in der Vereinigten Staaten oder Kanada ganze Abteilungen der National archive für die Übernahme, Bewertung, und Benutzung dieser neuartigen Archivalienart aufgebaut wurden die heute zehntausende von Dateien auf Magnetbändern archiviert haben." Wolf Buchmann, "Archive und die elektronische Datenverarbeitung", *Ein Diskussionsbeitrag zu den Folgen der Einführung einer neuen Technologie fuer die Archive*.

³⁰⁵/ Ibid.

³⁰⁶/ Michael Wettengel, "Zum Stand der Archivierung maschinenlesbarer Daten im Bundesarchiv". Samples of material accessioned: The database created by the East German border guards documenting all "border incidents" (escape-attempts) from East Germany, 1 December 1971 - 30 September 1990 (43 magnetic tape reels and 596 tape reels, with information about prisoners).

³⁰⁷/ See Hoschka, P., Butscher, B., and Streitz, N.: "Telecooperation and Telepresence: Technical Challenges of a Government Distributed between Bonn and Berlin". *Information and the Public Sector* (1993). All other references to the POLITeam projects are from the POLITeam home page in WWW (<http://orgwis.gmd.de/POLITeam>).

³⁰⁸/ This part of the project is called "EuroCoOp and EuroCODE Projects". The following countries are participating: Denmark, Germany, Norway and the United Kingdom. The project is carried out in cooperation with European partners from industry and research within the ESPRIT project EuroCODE CSCW Open Development Environment. See also: Busbach, U. and Kreifelts, T., "Support for Meetings Using the EuroCoOp Task Manager". CSCW: the multimedia and networking paradigm. (*Aldershot*: Ashgate Publ., 1993), edited by S.A.Scrivner.

includes such features as workflow management,³⁰⁹ coordinated document and task management, notification and information service, registration and archiving, and an organization management system and a technical management system:

The workflow component supports cooperative and coordinated processes, for instance ministerial business, by the means of electronic circulation folders. The coordinated document- and task-processing facility supports the cooperative editing of arbitrary documents through a shared desktop. The notification and information service informs users individually of past and current events in their cooperative context. The registration and archival component meshes with cooperation support components. The organizational management system manages and provides information concerning the organizational context. The technical management system aids the technical and organizational management of the distributed system.³¹⁰

Against the background of what the Bikson/Frinking study, as well as Wolf Buchmann, have told us, it is not surprising that the German Federal Archives is not listed among POLITeam project “cooperation partners” and “project members”. Nevertheless, the project addresses at length “filing service and archiving”.³¹¹ Interestingly, it is noted that incoming and outgoing records are provided with “meta-information such as date of receipt, sender, description of contents etc.”.³¹² The system emulates a regular central registry in a governmental agency, in other words, what David Bearman calls “a recordkeeping system”.³¹³

³⁰⁹/ POLITeam is using “LinkWorks”, an object-oriented workgroup framework built on open client/server services supporting integration of custom and third-party personal, business and groupware applications into a secure and robust heterogeneous, multi-vendor environment “In POLITeam we use LinkWorks as a technical basis. Our installation of LinkWorks 3.0 at GMD was extended by an experimental gateway to WWW. The purpose was to allow a password secured access from outside the organization by means of standardized protocol.” It is stated that “integration of paper documents with electronic information in the context of a workflow is under prototyping. Paper documents are circulated as paper before - and not in image format. They are supplied with a barcode containing a reference number.” Every time a user gets a circulation folder, he can easily find the corresponding electronic version by simply using the barcode scanner in combination with a search tool integrated into the POLITeam environment. A circulation folder therefore consists of an electronic and a nonelectronic part linked together by the barcode. The two parts contain different documents - the first contains just the documents that are available electronically, the second all others. Ideally, the usage of electronic documents will increase over time when more users convert to use POLITeam for their daily work. To help make records business-acceptable, the workflow system includes digital signatures. The reliable authorization of documents by digital signatures plays an important role for the acceptance of workflow applications in business transactions. POLYTEam is using RSA encryption.

³¹⁰/ From a Web document: “Politeam” <<http://orgwis.gmd.de/POLITeam>>. See also Hoschka, P., Butscher, B., and Streitz, N.: “Telecooperation and Telepresence: Technical Challenges of a Government Distributed between Bonn and Berlin”, *Informatization and the Public Sector* (1993), <<ftp://ftp.gmd.de/gmd/cscw/PoliKom.ps.gz>>, (postscript version). Hoschka, P., Kreifelts, T., and Prinz, W.: “Gruppenkoordination und Vorgangsteuerung”, *Betrieblicher Einsatz von CSCW-Systemen, GMD-Studien* Nr. 230. Sankt Augustin: GMD, 1994, S. 91-112, edited by K. Kloeckner, <<ftp://ftp.gmd.de/gmd/cscw/Poli.DE.ps.gz>> (postscript version).

³¹¹/ See paper presented at Venice International Conference on Telecommunications - Games without Frontiers, Fondazione G. Cini, 29 June -1 July 1994, by P. Hoschka, T. Kreifelts and Wolfgang Prinz.

³¹²/ “Output to the archive requires that the document’s location of origin be recorded, meta-information concerning it be stored, and its text converted to a standard format to render it independent of any particular editing program. Filing means that a full electronic text is appended to the meta-information and transmitted to a storage medium which enables a time-independent retrieval of texts. It is most important that the texts are kept electronically with the meta-information and that one can access texts with any word processing system. The variety of texts to be archived (documents, legal texts, statistics) requires different structures’ (author’s emphasis) so that the storage should be done in different archives (within the archival component).” P. Hoschka, T. Kreifelts and Wolfgang Prinz, Op. cit.

³¹³/ Concerning “recordkeeping systems”, see Chapter 5. above.

The processing of incoming documents by the registrar involves the following steps: The registrar assigns a document reference (or document number, "Aktenzeichen") according to a numbering scheme (Aktenplan) (= "File-plan", author's remark) which is a predefined mapping from the content of a document onto a number. He keeps a pointer to this document in the file-card box (in his computer, author's remark). This procedure provides the registrar with the facility to retrieve documents by sender. The registry can be regarded as a directory of the documents circulated within the ministry. After having registered the document, the registrar searches for an existing circulation folder to which the document belongs or initiates a new one. The registrar forwards the circulation folder to the head of the responsible department who forwards it to the official in charge of the corresponding topic. After the required tasks have been performed... the circulation folder is returned to superior persons. The folders of completed tasks are returned to the registry and archived.³¹⁴

The projects group-ware (LinkWorks) has been provided with "new object classes" to model documents and circulation folders, both characterized by additional attributes representing the information kept by the registry.

Michael Wettengel described in an address in Hannover in September 1994 the use by the German government of information technology in general, and use of laser technology (WORM) in particular.³¹⁵ (13.09.1994) vormittags. He stated that German agencies, for legal reasons, cannot accept electronic records. Only microfilm has been accepted as a replacement for paper. Image based "Document Management Systems" have so far got very limited acceptance. Documents stored on electronic or optical media lack legal value (Urkundencharakter) and cannot be used as evidence in courts. Attempts to get these media accepted have so far been without effect. German courts feel that such media are not safe against manipulations. Wettengel explained the prevailing skepticism against "virtual documents" and against too much dependency on electronic systems as being rooted in a traditional and well regulated paper-based bureaucratic system in Germany, which is designed to guarantee the democratic right of the citizenry. He concludes that it will be unthinkable for the archives to accession records stored on optical media for legal, technological, as well as financial reasons.³¹⁶ Legal security and guarantees of civil rights are more important than administrative efficiency states Wettengel.³¹⁷

³¹⁴/ From the POLITeam WWW home page: "Registration of Documents."

³¹⁵/ Michael Wettengel (Bundearchiv, Koblenz), "Elektronische Buerosysteme und Archive", *referat auf der 34. Jahrestagung der Arbeitsgemeinschaft des Bundes und des Laender fuer Buerowesen (ABLB)*. In Hannover

³¹⁶/ "Für Archive wird diese Entwicklung hin zu Dokumentenmanagementsystemen die Erfüllung ihres gesetzlichen Auftrages, Archivgut auf Dauer zu sichern, nutzbar zu machen und wissenschaftlich zu verwerten, wesentlich erschweren. Angesichts des rachen technologischen Wandels und hoher Konvertierungskosten ist an eine Übernahme von Daten derartiger Systeme auf optischen Speichermedien im grossen stil nich zu denken." It should, however, be noted that the Bundesarchiv on 5-10-1994 issued rather detailed rules for accession, appraisal, closing (sic) conservation and use of machine readable data. And it states in the introduction that "maschinlesbare Dateien" are archival material (Archivgut) and that until now German archives have had only limited experience of dealing with that kind of material. For that reason the present rules are more detailed and fundamental than usual. The rules spell out the legal background, methods of access, confidentiality, appraisal, conservation, etc. See: "Anweisung für die archivalische Tätigkeit Nr.52. Übernahme, Bewertung, Konservierung und Benutzung maschinenlesbarer Dateien". *Bundesarchiv Gz: II 2-1433/11*, Koblenz 5 (September, 1994).

³¹⁷/ Wettengel refers to the U.S. Iran Contra case as an example of how citizens' legal rights can be jeopardized by modern office technology and compares in that context the archival system in the U.S. with that in Germany. "One should keep in mind that records management (die Verwaltung von Schriftgut) and the structure of the administration is basically different (in the U.S.) than in Germany. The governmental competence is much more limited in the U.S. - and American civil servants do not enjoy the same status as those in Germany (Nebenbei bemerkt: die amerikanischen oeffentlichen Bediensteten geniessen auch keinen unseren Beamten vergleichbaren Status). Wettengel, Op. cit.

The sharp differences in attitude reflected above toward modern office technology and the management of electronic records on the part of representatives of the German National Archives (Bunderarchiv) and the governmental agencies responsible for the POLITeam project are interesting.³¹⁸

Angelika Menne-Haritz, the director of the Archives Institute in Marburg, is more progressive in her support of proactive involvement of archivists in the design of automated office systems (Buerosystemen) by asking the question whether or not archival science (Die Archivwissenschaft) should limit itself to deal with the secondary use of records or actively involve itself in the primary use. She concludes, "only by concentration on the primary purpose of records as tools or as cooperatively useful thought and decision making instruments is it possible to ensure long lasting secondary use" (author's translation, the text in German reads *Nur durch Konzentration auf die Primärzweck von Unterlagen als Werkzeuge oder kooperativ nutzbare Denk - und Entscheidungsinstrumente is der Secundärzweck dauerhaft zu sichern*).³¹⁹ She agrees with the theories on records as evidence and the concept of "recordness" as expressed by David Bearman, as well as the concept of appraisal by function.

An article by Peter Bohl concerning the management of electronic records in the German federal state of Baden Württemberg also gives an encouraging picture. Archival authorities there are getting involved in the design stage of office automation systems.³²⁰

The majority of articles from German archival periodicals which have been reviewed deal exclusively with the problem of storage media.³²¹

11.3 Switzerland

Swiss archives are proactively involved in the management and control of electronic records. A paper concerning strategy and coordination of office systems in the Federal administration spells out the role of the Swiss Federal Archives, and establishes that electronic records shall be accessioned by the archives. The Federal Archives shall also advise and support agencies in the management of electronic information ("informationsverwaltung"), i.e., creation, registration and archiving of electronic records and data ("elektronischen Akten and Daten"). The paper recommends the adoption of open system standards (XOPEN). It also includes an interesting description of a standardized document management system for Swiss federal agencies, which includes "archives and registry" service. It has functions for records creation, registration, processing, printing, archiving and transmission.³²²

³¹⁸/ In a slightly different version of his 1994 presentation, Wettengel has, in 1995, included some comments about the POLITeam project (he does not refer to it under that name, but mentions it as "Informationsverbund Berlin/Bonn). He is still very reluctant to admit that modern office technology will have a serious impact on the functions of the Bundesarchiv, but admits that the archives must increase its advice to the records creating authorities, and if possible, get involved in the design of computerized information systems in the records creating agencies. Micheal Wettengel, "Ueberlieferung in Verwaltung ohne Papier", *Der Archivar*, H.1 (1995).

³¹⁹/ Angelika Menne-Haritz, "Optische und Electronische Speichermedien in der Verwaltung. Konsequenzen fuer Theorie und Praxis der Archive", *Verwaltungsfuehrung Organisation Personalwesen (VOP)* (Heft6/1993).

³²⁰/ See Peter Bohl, "Archival Requirements for Future Documentation in Administration". Paper given at the Marburg Symposium, 1991, published in *Information Handling in Offices and Archives*, edited by Angelika Menne-Haritz (K.G. Saur, 1993).

³²¹/ See Harmut Weber, "Moderne Speichertechniken und digitale Dokumentenverwaltung - Wege ins Informationsparadies oder in die Sackgasse?" *Der Archivar* Jg.46 (1993), Sp. 63-68. See also Arie Nabrings, "Bewertung und Archivierung elektronischer Dateien", *Der Archivar* Jg.46 (1993) Sp. 555-570; Michael Wettengel, "Maschinenlesbare Datenträger: Zusammenstellung archivrelevanter Normen und Standards elektronischer Speichermedien", *Mitteilungen aus dem Bundesarchiv*, Jg. 2 Heft 2, S. 84-90 (1994).

³²² / Bundesamt fuer Informatik: GEVER-STRATEGIE. *Strategie zur Koordination und Standardisierung von Geschaeftsverwaltungssystemen der allgemeine Bundersverwaltung. Von der Informatikkonferenz Bund (IKB) am 18. (Januar 1995) verabschiedet.*

11.4 France

Michèle Conchon, Head, Center for Contemporary Archives, Archives Nationales, writes that a program for preservation of electronic records in general, and databases in particular, has been around since 1978, but did not really take off until 1982.³²³ The project is called “constance”, and tapes are accessioned by the Center for Contemporary Archives (Center des archives contemporaines). At the end of 1992, the Center had accessioned 5,230 databases, representing approximately 4,500,000 magnetic tape reels. All reels are recopied every 5 years. Four archivists, assisted by information technicians, are assigned to the project. In one case, Mme Conchon touches upon the question of custody or noncustody. One of the agencies that transfer their “tapes” to the Center, the National Institute for Statistics and Economic Studies (INSEE), explained that it was not its mission to preserve “historical” material. The project experimented with storage on optical disk, but concluded that magnetic tape was superior. Again, we meet the title “Document Management System” for an image system (“un système de gestion électronique de documents”). It was called DIDEROT, and Mme Conchon entitles her article “Diderot est Mort!”³²⁴

It appears to the author that the Center is exclusively functioning as a depository for non-current databases (“archivage historique des fichiers informatiques”) and not at all involved in design or control of office automation environment systems.

11.5 Italy

An Italian colleague, Ms. Maria Guercio, archivist at the Central Italian Archives Services, Rome, has kindly described the electronic records situation in Italy in a letter from which I quote:

I send you a brief summary of the Italian literature on electronic records. It cannot be, for the moment, a big contribution because until now the public administration and also the private sector have not employed new technologies for recordkeeping. Since 1994 new legislation in Italy has recognized the legal value of records preserved on optical disk. Even if this law is not easy to follow, it is obvious that in some months archivists and managers will have to direct more attention, research and study to this issue. Some articles... comment on this recent legislation that worries archivists very much, because it makes possible the transformation of all traditional records to optical form... in electronic medium, without any authorization or specific control from archival administration. The automated systems will be guaranteed by technical rules, not integrated with a correct analysis and consideration of the diplomatic and archival elements. This is a serious limit in a country whose public administration has founded its behavior on the written document.

On Record Keeping Systems... the Italian situation is a bit late. The only study, which tries to define the correct requirements for recordkeeping in a technological environment is the article by Oddo Bucci and Stefano Pigiapoco, “Il flusso documentario sull’autostrada elettronica”, Macerata 1994, which tries to project the procedures and the organizational order with attention to the records system and the documentary flows. At the moment, there are a lot of groups studying and experimenting with recordkeeping systems which respect the archival requirements and combine, using the modeling techniques, a registry system, the records organization, the files flow and the administrative procedures.

11.6 Sweden and a Joint Project in The Nordic Countries

³²³/ See Michèle Conchon, “CONSTANCE A DIX ANS! Bilan et perspectives de l’archivage des fichiers informatiques aux Archives nationales”. “UNE GIRAFE EST NEE! L’archivage des fichiers informatiques de l’Institut national de la statistique et des études économique aux Archives nationales.” “DIDEROT EST MORT! Bilan d’une expérience d’archivage électronique de la documentation des fichiers informatiques.” (Texts publiés dans la *Gazette des Archives*, No. 163, 4eme Trimestre, 1993).

³²⁴/ “L’INSEE considérait, en effet, que l’archivage historique des fichiers n’entraîne pas dans le cadre de ses missions telles que les définit la loi.” Mme Conchon conclut: “En décidant de confier à CONSTANCE ses fichiers, qui représentent des milliards d’informations mais aussi des années de travail pour des centaines de personnes, L’INSEE a témoigné aux Archives de France une confiance, que nous avons ressentie comme la confirmation d’être sur la bonne voie et, malgré la charge de travail considérablement accrue, comme une consécration.” Michèle Conchon, Op.cit.

The Swedish National Archives (Riksarkivet) is not only the custodian of the country's archival records, but also the highest authority on records management in government agencies. For that reason it has been involved in the management of electronic records from the first generation of such records. It is directly charged with designing policies for the management of electronic records in governmental agencies, and is directly involved in shaping the legislation concerning electronic records. It is likewise - at least theoretically - involved in the design of information systems in the agencies. Compared to other European national archives institutions, the Swedish National Archives has, already back in the mid-1970s, declared electronic records to be "official records" with the same legal status as traditional paper records. Since that time, the National Archives has overseen and regulated the practical implementation of electronic records management programs in the agencies. It has issued detailed "Regulations and General Advice,"³²⁵ concerning the management of electronic records in Swedish governmental agencies, as well as rules for the long-term preservation of such records while still in the custody of the creating agencies and rules for their final transfer to the archival authorities. A leading Swedish archivist, Claes Graenstrom, writes:

When the use of electronic records was introduced in the Swedish administration the Swedish Government commissioned to a Committee to investigate the archival questions regarding this modern technique. The Committee was chaired by the National Archivist. This Committee produced several reports, the last one in 1976.³²⁶

Graenstrom explains that thanks to the work of the Committee, the original intention to dispose of electronic records as being nonrecords was changed at this very early stage. The reports declared electronic records to be the equivalent to traditional paper-based records, and prescribed that they should be transferred to the custody of the National Archives where they are subject to the same access rules as other Swedish records in accordance with the very liberal access rules of the Freedom of the Press Act. This makes the management of electronic records in Sweden somewhat unique from the international point of view. Graenstrom continues:

It must be emphasized that records/archives management in Sweden has been very much governed by the legal system, emanating from the Freedom of Press Act.³²⁷ The concept of making the access possible has dominated the discussion about archival and records management and has also been influencing and directing archival theory in Sweden. It is really not possible to fully understand the archival situation in Sweden without simultaneously considering the definitions and motives in the Freedom of the Press Act. For example, it is stated in the Archives Act that the archives in the public sector are composed of the public records (official documents) as referred to in the Freedom of the Press Act. All records, which include any representation in writing, any pictorial representation, and anything that can be read, listened to or otherwise comprehended only with the help of computers or other technical aids, are considered to be public records, provided they are created or received by an agency. Therefore, all electronic records that can be made human comprehensible (read, seen or listened to) are considered public records. Incoming electronic mail and available data in external databases are therefore considered to be public records.³²⁸

In 1995 the National Archives completed an interesting study³²⁹ to investigate why Swedish governmental agencies do not consider - or rarely consider - the long-term (archival) perspective in their information system planning and development, and, on the basis of this analysis, recommend ways and means to improve the situation and to find possible tools to do

³²⁵/ National Archives Statute-Book, ISSN 0283-2941, RA-FS 1994:2, and ISSN 0285-2941, RA-FS 1994:7.

³²⁶/ Letter 23 February 1996 from Claes Graenstrom to the author, who is deeply indebted to Mr. Graenstrom for his valuable contribution.

³²⁷/ Dating back to the 1760's, this is the oldest and most radical "Freedom of Information Act" in the world.

³²⁸/ Claes Graenstrom, Op. cit.

³²⁹/ Systemutvecklingsprocessen och fraagorna om laangsiktigt bevarande av data (RA 1995, *Skrifter utgivna av Svenska Riksarkivet 14*).

so. Five agencies with differing “organizational culture” were selected for the study, one a typical “bureaucracy”, and one described as an “ad hococracy”, and the rest something in between.

It was concluded, that the degree of concern the studied bodies had for long term preservation of their electronic records more depended on the degree of usefulness to themselves such long-term preservation may have than on consideration of existing governmental rules and regulations. But, it was found that even in a case where long-term preservation was an obvious practical *desiderata*, it had not been considered in the system planning and design.³³⁰ It was also found that system documentation very often was insufficient, sometimes because it was proprietary. Among the recommendations to tackle the problem were changes in competence requirements and improved training for archivists as well as for their colleagues on the computer and information system side. An interesting observation was that agency archivists (*verksarkivarier*) were more inclined to compromise on the implementation of requirements for long-term preservation of electronic records than their colleagues at the National Archives. The study includes two sub-reports analysing the theoretical concepts of electronic records and what was named “electronic archive data”. The sub-reports have been quoted above under Chapter 5, 3. above.

It can be concluded that the leading archival institution in Sweden - the National Archives (Riksarkivet) - is concerned with the practical aspects of managing of electronic records as well as with the conceptual and theoretical aspects. It may be seen as an advantage compared to countries where theories and advice in this field are produced mainly by universities and other institutions, but have limited impact in the governmental office environments.³³¹

The Swedish National Archives has also recently participated in designing an implementation plan for a set of functional requirements for management of electronic records, of a similar type to those produced by the Pittsburgh team. It was done for a Swedish pharmaceutical company Astra, Inc., in cooperation with the National Archives (The sesam project). The project has been commented upon above under Chapter 5, 1a.³³²

The Nordic countries have, during 1993-1996, completed a joint project to improve the accessibility of electronic records kept by archives in their respective countries³³³. The project was divided into the following sub-projects:

- to develop software for transferring database records with flat file structure to relational database format;
- to investigate technical possibilities for access to electronic filing system transferred to a Public Record Office;
- to investigate adequate storage media for long term storage of electronic records;
- to analyse different physical arrangements for long term storage of electronic records.

³³⁰/ The site was one of Sweden’s leading hospitals (St. Goeran’s hospital).

³³¹/ The conceptual and theoretical aspect has been approached by the Swedish National Archives in arranging conferences on Archival Theory. A “First Stockholm Conference on Archival Theory and the Principle of Provenance” was held 2-3 September 1993. The report from that conference has been repeatedly quoted in this paper. A second conference was held 30-31 May 1996 devoted to “Archival Science and the Concept of Record... the difference between archival records and public records in various countries”. A workshop on “Philosophy and rules concerning electronic archive and authenticity” was held May 22-24 in cooperation with a leading Swedish pharmaceutical company. Within the framework of EU and “INFO 2000” a conference “Access to Public Information. A Key to Commercial Growth and Electronic Democracy” was held in Stockholm 27-28 June, 1996.

³³²/ Denmark, Finland, Iceland, Norway and Sweden.

³³³/ The final report was published in 1996: “To Preserve and Provide Access to Electronic Records”, (*TemaNord 1996:549, Published by the Nordic Council of Ministers, 1996*).

The report confirms the impression that European archives have so far only accessioned first generation electronic records - generally described as governmental databases.³³⁴

Sub-project 1 concluded that the conversion from flat file to relational database - undertaken by the archives authorities - will create a "virtual database structure", that differs from the one used in the originating agency, and that, therefore, the relational version must be considered a "user copy version" and the original flat file version must be preserved as an "original". The second sub-project concluded that on-line access to the converted databases may be too expensive (because of the disk space requirements) but that transfer from back-up media could be done in less than 30 minutes. The third sub-project concluded that:

For many of the criteria no significant differences can be found between the data media... chosen for appraisal. When differences have been observed, they are sometimes uncertain or their importance is difficult to evaluate. However, three data media have been selected as the most suitable for long term storage: DAT-DDS, 8mm and DLT. All of them have MP-tapes (Metal Particle Tapes) which means that high temperature and polluted atmosphere are some times to be cautious of.³³⁵

Finally, the fourth sub-project came to the conclusion that servicing of storage of electronic records was not a viable alternative and recommended that archival institutions should continue to do so "in-house".

11.7 Finland

The former archivist of unesco, Dr. Markku Jarvinen, the author has received a list of articles on electronic records published in Finland. Mr. Jarvinen has kindly translated the titles to English.³³⁶ Copies of the articles were not available for review.

³³⁴/ See also Anders A. Johansson, "Delrapport, Begreppet arkivhandling". En empirisk ansats (Systemutvecklingsprocessen, RA 1995, page 110), where he confirms that in Sweden the archival institutions mainly have dealt with simple structured data, i.e. what Terry Cook calls "first generation of electronic records" (author's translation).

³³⁵/ ThemaNord, 1996:549.

³³⁶/ Harju, Virpi, "ARKKI - Valtion taidemuseon asiakirjahallinnon tiedonhallintaohjelmisto" (Information management program for state art museum records), *Arkistoviesti* (1/1995) pp. 45-52. Kangaspunta, "Olavi, ATK-aineistojen pitkaaikaissaailytyksen kustannusvertailu" (Comparison of cost for long-term preservation of computerized data), *Selvitystyö Valtionarkiston tilauksesta* VTT, Espoo. Kilkki, Jaana, "Kuvailu ja FINNMARC - Arkistolaitoksen tiedonhallinnan tulevaisuuden visioita" (Description and FINNMARC - Future visions for information management within state archives administration), *Faila* (2/94) pp. 2-9. Lehtonen, Jari; Luoma-aho, Jarmo, "Atk-rekisterit Suomen Elinkeinoalaemaen Keskusarkistossa" (Computerized registers at the Central Business Archives of Finland), *Liikearkisto* (3/1993) pp.15-18. Pieskae, Kari, "Elektroninen arkistointi" (Electronic archiving), *Valtion Teknillinen Tutkimuskeskus*, Espoo. Valtiotieteellisen tiedekunnan kirjasto (by State Technical Research Centre). Rastas, Pirkko, "Dokumentista dataan, informaatioyheiskunnan arkistolaehteet" (From document to data, archive sources of the information society), *Keskusteluja professorin kanssa* (Eds: Tuhkanen, totti; pispala, Elina; Virtanen, Keijo) Turun Yliopisto - historian laitoksen julkaisu, turku, pp. 429-448. Rastas, Pirkko, "Asiankaesittely-jaerjestelmaet, elektroninen arkisto ja sen hallinta" (Case handling systems, electronic archives and its control), *Arkisto - Arkistoyhdistyksen julkaisu* Vol. 5 (Eds. Maenaee, Markku; Syrjo, Veli-Matti; Taskinen, Pirkko) Arkistoyhdistys ry., c/o Valtionarkisto, Helsinki, pp. 67-82. Saarenheimo, Juhani, "Saehkoinen asiakirja ja diplomatiikka" (Electronic document and diplomatics) *Arkisto - Arkistoyhdistyksen julkaisu*, Vol. 5 (Eds. Maenaee, Markku; Syrjo, Veli-Matti; Taskinen, Pirkko) Arkistoyhdistys ry., c/o Valtionarkisto, Helsinki, pp. 99-118. Vihonen, Lasse, "Kohti digitalisoituja arkistoja" (Towards digitalized archives) *Liikearkisto* (4/1993), pp.33-34.

11.8 Russia

The present status of archives and electronic records in the Russian Federation has recently been analysed by a Russian archivist, Tatyana Moiseenko.³³⁷ After summarizing “the state of the art with respect to the archiving of electronic records in Russia”, Moiseenko reviews methodological concepts and practices as discussed in recent Russian archival literature. Though there is some, but somewhat unclear, legislation concerning the various state archives’ responsibilities viz-a-viz electronic records, prescribing that such records shall be preserved and transferred to state archives, the legislation has had very limited effect. Most archives are unwilling and/or unable to accession electronic records. The reason is a serious lack of funds as well as manpower. The break-up of the former Soviet Union amplified this problem. Moiseenko refers repeatedly to the ongoing discussion in the archival community concerning custody or noncustody, and seems to agree that noncustody of electronic records by archival institutions would be a preferable solution in Russia. The dilemma is, however, that the archive services of the originating agencies/departments do not have sufficient resources to preserve electronic records over time.

Moiseenko first states that back in the 1960s-1980s, and in spite of a relative backwardness in respect of information technology in comparison to Western countries:

... there were many information systems and data bases of technical and scientific information, mainly in the enterprises and institutions dealing with “high technologies”, such as space and military industry, aircraft and metallurgy... most were produced on mainframes. The files were usually intended for the inner needs of the staff of the departments and ministries. They were practically never interconnected, there were many redundant duplicates and some were complementary.³³⁸

This situation is now changing rapidly. Office automation, based on PCs and networking, is now dominating the picture and consequently producing modern text-based electronic records.³³⁹ The content of databases has changed from mainly technical and scientific information to hold also business correspondence, reference information, and staff records, not only in the public sector but also in private banks, stock-exchanges, private mass media, etc. Moiseenko refers to a rich Russian literature on the subject. A directory of existing databases in Russia contains information about approximately 30,000 databases - most of them in the public sector.

Moiseenko explains that the State Archival Service of the Russian Federation consists of more than two thousand state archives and documentation centers. Before records are transferred to these archives, they are kept at departmental archives of ministries, departments and offices. These archival institutions have until now only been accessing paper-based traditional records. The question of possible accession also of the electronic records has not been settled:

Nowadays the Russian archives (as national archives in many other countries) are confronted with a difficult dilemma: to begin the centralized storage and preservation of electronic records or to let them stay in the organisations that produced them, thereby running the risk that they may be destroyed. At the moment the state archives in Russia (with a few exceptions) do not provide (yet) the mass storage and long term preservation of electronic records.³⁴⁰

³³⁷/ Tatyana Moiseenko, “Russian Archives and Electronic Records”, *A Report for the INTAS project on History and Computing, Draft distributed on the occasion of the international workshop Archives in Cyberspace* (Moscow, 4-6 January 1996). The draft has kindly been provided to the author of this paper by Mr. Hans Hofman.

³³⁸/ Ibid.

³³⁹/ “In many offices and ministries computers became today as ordinary as telephones. Large and small businesses as well are increasingly using ‘office automation systems’ to communicate externally and internally.” Ibid.

³⁴⁰/ Ibid.

The situation is not better in the local ministry and department archives where electronic records presently have to be kept:

Departmental archives and archives of different organisations, which must provide the temporary storage of documents, are in a particularly bad condition, in spite of the fact that many of these are attached to ministries. About half of the departmental archives do not have a special storage place, and in many of them there is no special staff responsible for these tasks. Under these conditions it is extremely difficult for many archives to provide the appropriate preservation conditions for documents on electronic media, and especially their 'rewriting' (conversion to new media or data formats) according to new technology standards.³⁴¹

In the second part of her paper, Moiseenko reviews what recently has been written in Russia about management of electronic records. Her presentation indicates that Russian archivists are very much keeping abreast of topics discussed in archival literature in other parts of the world. I will just mention a few such topics: archivists involvement in the creation stage of electronic records;³⁴² are databases information or records;³⁴³ preservation of context and structure and the evidential value of records and of metadata (she does not use this term);³⁴⁴ custody or noncustody; appraisal by function;³⁴⁵ and archives in cyberspace.³⁴⁶

The former archivist of UNESCO, Dr. Markku Jarvinen, provided the author with a list of articles on electronic records published in Russia. Mr. Jarvinen has kindly translated the titles to English.³⁴⁷ Copies of the articles were not available for review.

³⁴¹/ Ibid.

³⁴²/ "Another direction is to stimulate the participation of archivists in the design of documentation systems." Ibid.

³⁴³/ "Some authors...even consider that within a living computer system there are no historical records, as such, there is only 'current information'." Ibid.

³⁴⁴/ "In discussion about archiving of electronic records, Western archivists tend to stress that it is very important also to know *how* data was and could be used in institutions during their life-cycle. What could contemporary bureaucrats and officials do with electronic records? Who had access to a particular database? Who was responsible for the checking and preservation of the data? To answer these questions and to understand the context in which the data was used, historians will need not only the data itself ('flat files'), but also documentation. Some Russian authors also consider it necessary that for records with a longer term value, this information will need to travel with records throughout their life-cycle". Ibid.

³⁴⁵/ "Recently a new concept of 'appraisal by function' appeared. The advocates of this notion among Russian archivists consider it necessary to pay attention mainly to the function of automated systems, rather than to the files and series of documents themselves." Ibid.

³⁴⁶/ "Electronic networks ,especially the Internet, will offer great prospects for the access to archival collection and databases. Rosarchiv, the Research Library Group (RLG) and the Hoover Institution are discussing a trilateral agreement in order to make Russian archival materials, much of which have never before been available in the West, accessible via the RLG information network (RLIN)." Ibid.

³⁴⁷/ (Tatyana Moiseenk's paper also contains a bibliography but without translation of the titles of Russian works), Kuznetsov, S.L., "O nekatoryh problemah avtomatizatsii deloproizvodstva I sozdaniya elektronnykh arhivov" (About some problems in automation of records management and creation of electronic archives), *Otsetstvennyye arhivy* (1/1995) p.18. Mihailov O.A., "Gipertekst problizajetsa k arhivam" (Hypertext approaches archives), *Otsetstvennyye arhivy* (1/1995) pp. 24-26. Derusova E.V., "O vnedrenii avtomatizirovannoj arhivnoj tehnologii v RGAE" (Of introduction of the automatized archives technology in RGAE [Russian State Archives for Economy]), *Otsetstvennyye arhivy* (2/1994) pp. 104-107. Tanonin V.A., "Informatsionnoje obstsestvo I arhivy na masinnyh nositeljah" (Information society and archives on machine carriers), *Otsetstvennyye arhivy* 1/1994, pp. 14-18. Sokova A.N., "Soversensstvovanije deloproizvodstva - sag na puti informatizatsii Rossii" (Development of records management - step on the way of informatization of Russia). *Otsetstvennyye arhivy* 6/1993, pp. 17-21.

11.9 Other countries

We will complete this expose of the European scene with a voice from Bulgaria:

In a large range of institutions the local computer networks create the possibility of rapid decision-making without leaving behind any traces (traditional or other records). Where should the archivist come in? Maybe there is a historical analog from the 17th century when the first filing system appeared on the records.

The archivist will be helpless if he does not combine his efforts with those of the specialists and designers of the automated systems, at least for the records covered by The State Archive Filing Act. In this way the machine-readable documents will turn into machine-readable archives and will not be lost irretrievably for history.³⁴⁸

After all, it seems that the differences between the European and Anglo-Saxon approaches (as represented by Canadian and Australian archivists in particular, but also by U.S. archivists) to the management and “archiving” of electronic records is noteworthy, but not impossible to bridge. The basic approaches are the same. Sweden’s National Archives seems to be more involved in the management of electronic records than most other archives, and Russian archivists have in principle and theory accepted the U.S.-Canada-Australia approach.

Angelika Menne-Haritz summarizes the situation: “The technology comes from the USA and Japan. The concept of evidence... has its basis in the European administrative tradition with records as tools for decision making--even if the principle was formulated in America.”³⁴⁹

³⁴⁸/ Amalia Raceva, “The Influence of Computerization, The Case of Sofia State Archive”, *Janus* (Jan. 1994).

³⁴⁹/ Angelika Menne-Haritz, *Information Handling in Offices and Archives* (K.G. Saur, 1993).

Epilogue

“... I believe that the focus of archival endeavor will soon shift its emphasis from the actual record to the record-creating process; from analysis of the properties and characteristics of individual documents to a better understanding of business functions, activities, tasks, transactions and work flows which cause documents to be created; from the appraisal of records for their inherent or research value to the macro-appraisal of the creator’s key functions, programmes, and activities, and the selection for continued preservation of the most succinct records that mirrors these; from the arrangement, description, and preservation of physical objects to the contextual understanding of the information systems and related documentation of the records creator; from the archives being a supplicant agency hoping for cooperation from records creating institutions to becoming an auditing agency that monitors creator’s performance in maintaining and servicing the archival record left under the creator’s control;.... from physical provenance centered on the office of origin in a hierarchical structure to a conceptual provenance focused on the functions and business processes of the records creator within shifting, temporary, even “virtual” organizations; in short, from the resulting record or product to the creative act of authoring intent behind it. The new post-custodial paradigm replaces our traditional intellectual focus on the physical record - that thing which is under our control - by focus on the context, purpose, intent, interrelationship, functionality and accountability of the record and its creator and of its creation processes, wherever they occur. All this goes well beyond the traditional archival custody of records, and the custodial mindset, and may thus be termed post-custodial.” (Terry Cook in Beijing, 1996).

Annex 1

Functional Requirements for Recordkeeping

Organization - Compliant

1. Compliant: Organizations must comply with the legal and administrative requirements for recordkeeping within the jurisdictions in which they operate, and demonstrate awareness of best practices for the industry or business sector to which they belong and the business functions in which they are engaged.
 - 1.a) External recordkeeping requirements are known.
 - 1.a1) Laws of jurisdictions with authority over the record creating organizations are known.
 - 1.a2) Regulatory issuances of entities with administrative authority over the record creating organizations are known.
 - 1.a3) Best practices of recordkeeping established by professional and business organizations within the industry and business functions of the organization are known.
 - 1.b) Records created by organizational business transactions which are governed by an external recordkeeping requirements are linked to an internal retention rule referencing the documented law, regulation, or statement of best practice.
 - 1.c) Laws, regulations, and statements of best practice with requirements for recordkeeping are tracked so that changes to them are reflected in updated internal recordkeeping instructions.

Recordkeeping Systems - Accountable

2. Responsible: Recordkeeping systems must have accurately documented policies, assigned responsibilities, and formal methodologies for their management.
 - 2.a) System policies and procedures are written and changes to them are maintained and current.
 - 2.b) A person or office is designated in writing as responsible for satisfying recordkeeping requirements in each system.
 - 2.c) System management methods are defined for all routine tasks.
 - 2.d) System management methods are defined for events in which the primary system fails.
3. Implemented: Recordkeeping systems must be exclusively employed in the normal course of business.
 - 3.a) Business transactions are conducted only through the documented recordkeeping system and its documented exception procedures.
 - 3.b) No records can be created in the recordkeeping systems except through execution of a business transaction.
 - 3.c) Recordkeeping systems and/or documented exception procedures can be demonstrated to have been operating at all times.

4. Reliable: Recordkeeping systems must process information in a fashion that assures that the records they create are credible.
 - 4.a) Identical data processes permitted by the system must produce identical outcomes regardless of the conditions under which they are executed.
 - 4.b) Results of executing systems logic are demonstrable outside the system.
 - 4.c) All operational failures to execute instructions are reported by the system.
 - 4.d) In the event of system failures, processes under way are recovered and re-executed.

Records - Captured

5. Comprehensive: Records must be created for all business transactions.
 - 5.a) Communications in the conduct of business between two people, between a person and a store of information available to others, and between a source of information and a person, generate a record.
 - 5.b) Data interchanged within and between computers under the control of software employed in the conduct of business creates a record when the consequence of the data processing function is to modify records subsequently employed by people in the conduct of business.
6. Identifiable: Records must be bounded by linkage to a transaction which used all the data in the record and only that data.
 - 6.a) There exists a discrete record, representing the sum of all communications associated with a business transaction.
 - 6.b) All data in the record belongs to the same transaction.
 - 6.c) Each record is uniquely identified.
7. Complete: Records must contain the content, structure and context generated by the transaction they document.
 - 7.a) Accurate: The content of records must be quality controlled at input to ensure that information in the system correctly reflects what was communicated in the transaction.
 - 7.a1) Data capture practices and system functions ensure that source data is exactly replicated by system or corrected to reflect values established in system authority files.
 - 7.b) Understandable: The relationship between elements of information content must be represented in a way that supports their intended meaning.
 - 7.b1) Meaning conveyed by placement or appearance of data are retained or represented.
 - 7.b2) System defined views or permissions are retained and the effects are reflected in the record are represented.
 - 7.b3) Logical relations defined across physical records are retained or represented.
 - 7.b4) Software functionality invoked by data values in the content of the record are supported or represented.

7.c) Meaningful: The contextual linkages of records must carry information necessary to correctly understand the transactions that created and used them.

7.c1) The business rules for transactions, which minimally locate the transaction within a business function, are maintained.

7.c2) A representation of the source and time of the transaction which generated a record is maintained.

7.c3) Links between records which comprised a business activity are retained.

8. Authentic: An authorized records creator must have originated all records.

8.a) All records have creators which are documented.

8.b) Records creators must have been authorized to engage in the business transaction that generated the record.

8.c) A knowledge-base of persons authorized to engage in business transactions is maintained and either operates as a control over system functions such that transactions could not occur without being authorized and/or documents the authorization of the creator as part of the record.

Records - Maintained

9. Preserved: Records must continue to reflect content, structure and context within any systems by which the record are retained over time.

9.a) Inviolable: Records are protected from accidental or intended damage or destruction and from any modification.

9.a1) No data within a record may be deleted, altered or lost once the transaction which generated it has occurred.

9.b) Coherent: The information content and structure of records must be retained in reconstructable relations.

9.b1) If records are migrated to new software environments, content, structure and context information must be linked to software functionality that preserves their executable connections or representations of their relations must enable humans to reconstruct the relations that pertained in the original software environment.

9.b2) Logical record boundaries must be preserved regardless of physical representations.

9.c) Auditable: Record context represents all processes in which records participated.

9.c1) All uses of records are transactions.

9.c2) Transactions which index, classify, schedule, file, view, copy, distribute, or move a record without altering it are documented by audit trails attached to the original record.

9.c3) Transactions which execute a records disposition instruction whether for retention or destruction are documented by audit trails attached to the original record.

10. Removable: Records content and structure supporting the meaning of content must be deletable.

- 10.a) Authority for deletion of record content and structure exists.
- 10.b) Deletion transactions are documented as audit trails.
- 10.c) Deletion transactions remove the content and structural information of records without removing audit trails reflecting context.

Records - Usable

11. Exportable: It must be possible to transmit records to other systems without loss of information.

- 11.a) Exporting protocols should be reversible or the lost functionality should be represented in a fashion that produces the same result in the target system as in the originating environment.

12. Accessible: It must be possible to output record content, structure and context.

- 12.a) Available: Records must be retrievable.
 - 12.a1) The system must be able to retrieve the record of any transaction at any later date.
- 12.b) Renderable: Records must display, print or be abstractly represented as they originally appeared at the time of creation and initial receipt.
 - 12.b1) The structure of data in a record must appear to subsequent users as it appeared to the recipient of the record in the original transaction or a human meaningful representation of that original rendering should accompany the presentation of the original content.
- 12.c) Evidential: Records must reflect the context of their creation and use.
 - 12.c1) A human meaningful representation of the contextual audit trail of a record must accompany all displays or printed output.

13. Redactable: Records must be masked when it is necessary to deliver censored copies and the version as released must be documented in a linked transaction.

- 13.a) The release of redacted versions of a record is a discrete business transaction.
- 13.b) The fact of the release of a redacted version of a record is an auditable use of the original record and therefore results in creation of an audit trail with a link to the transaction which released the redaction.

Annex 2

Production Rules Version of the Functional Requirements

The project staff have borrowed a technique from the field of artificial intelligence to formally express each functional requirement in the language of production rules. This formal language enables the researchers to state each specification in such a way that it is recognizable and when implemented will be observable and therefore testable within a system. The production rules also ensure that the specifications have the following characteristics:

- unambiguous, rather than abstract
- precise as possible
- consistency of expression
- defined to a specificity that is measurable

RECORD KEEPING REQUIREMENTS Satisfied:

- ORGANIZATION Compliant
- SYSTEM Accountable
- RECORDS Functional

ORGANIZATION Compliant (1.0):

- EXTERNAL REQUIREMENTS Known (1.0a)
- Linked EXTERNAL REQUIREMENTS INTERNAL -RULES (1.0b)
- Updated EXTERNAL REQUIREMENTS INTERNAL RULES (1.0c)

EXTERNAL REQUIREMENTS Known (1.0a):

- LAWS Identified (1.0a1)
- REGULATORY ISSUANCES Identified (1.0a2)
- BEST PRACTICES Identified (1.0a3)

LAWS Identified (1.0a1):

- Has Jurisdiction LEGISLATIVE-AUTHORITY ORGANIZATION (1.0a1a)
- Equivalent RECORD KEEPING LAWS INTERNAL RULES (1.0a1b)

REGULATORY ISSUANCES Identified (1.0a2):

- Has Legal Authority REGULATOR ORGANIZATION (1.0a2a)
- Has Administrative Authority REGULATOR ORGANIZATION (1.0a2b)
- Equivalent RECORDKEEPING REGULATIONS INTERNAL RULES (1.0a2c)

BEST PRACTICES Identified (1.0a3):

- Has Purview PROFESSIONAL ORGANIZATION
- BUSINESS FUNCTION (1.0a3a)
- Equivalent RECORDKEEPING BEST PRACTICES INTERNAL RULES (1.0a3b)

Linked EXTERNAL REQUIREMENTS INTERNAL RULES (1.0b):

- Creates TRANSACTION RECORD (1.0b1)
- Equal Identifier(RECORD) Identifier(RETENTION_RULE) (1.0b2)
- Equal Identifier(RETENTION RULE)Identifier(EXTERNAL REQUIREMENT) (1.0b3)

Updated EXTERNAL REQUIREMENTS INTERNAL RULES (1.0c):

- Track EXTERNAL REQUIREMENTS (Changed EXTERNAL REQUIREMENTS) (1.0c1)
- Equivalent EXTERNAL REQUIREMENTS INTERNAL RULES (1.0c2)

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SYSTEM Accountable:

- SYSTEM Responsible (2.0)
- SYSTEM Implemented (3.0)
- SYSTEM Reliable (4.0)

SYSTEM Responsible (2.0):

- MANAGEMENT Formalized (2.0a)

MANAGEMENT Formalized (2.0a):

- Defined TRANSACTIONS MANAGEMENT METHODS (2.0a1)
- Defined TRANSACTIONS POLICIES (2.0a2)
- Defined TRANSACTIONS PROCEDURES (2.0a3)
- Defined TRANSACTIONS RESPONSIBILITIES (2.0a4)

Defined TRANSACTIONS POLICIES (2.0a2):

- POLICIES Written (2.0a2a)
- POLICY CHANGES Written (2.0a2b)
- POLICY CHANGES Maintained (2.0a2c)
- POLICIES Up-to-Date (2.0a2d)

Defined TRANSACTIONS PROCEDURES (2.0a3):

- PROCEDURES Written (2.0a3a)
- PROCEDURE CHANGES Written (2.0a3b)
- PROCEDURE CHANGES Maintained (2.0a3c)
- PROCEDURES Up-to-Date (2.0a3d)

Defined TRANSACTIONS RESPONSIBILITIES (2.0a4):

- Equal Identifier(AGENT) RESPONSIBILITIES (2.0a4a)

Defined ROUTINE MANAGEMENT METHODS (2.0a5):

- ROUTINE MANAGEMENT METHODS Written (2.0a5A)
- ROUTINE MANAGEMENT METHODS CHANGES Written (2.0a5b)
- ROUTINE MANAGEMENT METHODS CHANGES Maintained (2.0a5c)
- ROUTINE MANAGEMENT METHODS Up-to-Date (2.0a5d)

Defined SYSTEM FAILED MANAGEMENT METHODS (2.0a6):

- SYSTEM FAILED MANAGEMENT METHODS Written (2.0a6A)
- SYSTEM FAILED MANAGEMENT METHODS CHANGES Written (2.0a6b)
- SYSTEM FAILED MANAGEMENT METHODS CHANGES Maintained (2.0a6c)
- SYSTEM FAILED MANAGEMENT METHODS Up-to-Date (2.0a6d)

SYSTEM Implemented (3.0):

- SYSTEM In Effect (3.0a)
- Creates TRANSACTION RECORD (3.0b)
- Documented SYSTEM Employed (3.0c)

SYSTEM In Effect (3.0a):

- Processed By TRANSACTION PROCEDURE (3.0a1)

SYSTEM In Effect (3.0a):

- Processed By TRANSACTION EXCEPTION PROCEDURE (3.0a1)

Documented SYSTEM Employed (3.0c):

- Functioning SYSTEM At all times (3.0c1)

SYSTEM Reliable (4.0):

- OUTCOME Consistent (4.0a)
- SYSTEM Logical (4.0b)
- FAILURES Evident (4.0c)
- FAILURES Corrected (4.0d)

OUTCOMES Consistent (4.0a):

- Equal PROCESS (Transaction Time1) PROCESS (Transaction Time2)) (4.0a1)

SYSTEM Logical (4.0b):

- Equal TEST(SYSTEM LOGIC) (BUSINESS LOGIC) (4.0b1)

FAILURES Evident (4.0c):

- Create FAILURE RECORD (4.0c1)

FAILURES Corrected (4.0d):

- PROCESSES Recovered (4.0d1)

PROCESSES Re-executed (4.0d2):

RECORDS Functional:

- RECORDS Captured
- RECORDS Maintained
- RECORDS Usable

RECORDS Captured:

- RECORDS Comprehensive (5.0)
- RECORDS Identifiable (6.0)
- RECORDS Complete (7.0)
- RECORDS Authentic (8.0)

RECORDS Comprehensive (5.0):

- Create TRANSACTION RECORD (5.0a)

RECORDS Identifiable (6.0):

- Equal Identifier(RECORD) Identifier(TRANSACTION) (6.0a)

RECORD Unique (6.0b)

RECORDS Complete (7.0):

- Content(RECORD) Accurate (7.0a)
- Structure(RECORD) Understandable (7.0b)
- Context(RECORD) Meaningful (7.0c)

Content (RECORD) Accurate (7.0a):

- Equal Content (TRANSACTION) Content (RECORD) (7.0a1)

Content (RECORD) Accurate (7.0a):

- Equivalent Content (TRANSACTION) Content (RECORD) (7.0a1)

Structure (RECORD) Understandable (7.0b):

- DATA PRESENTATION Represented (7.0b1)
- SYSTEM VIEWS Represented (7.0b2)
- LOGICAL RELATIONS Represented (7.0b3)
- FUNCTIONALITY Represented (7.0b4)

Context (RECORD) Meaningful (7.0c):

- BUSINESS RULES Maintained (7.0c1)
- TRANSACTION DOCUMENTATION Maintained (7.0c2)
- RECORD LINKS Retained (7.0c3)

RECORDS Authentic (8.0):

- Create RECORD AGENT (8.0a)
- Equal Permission (AGENT) TRANSACTION (8.0b)

RECORDS Maintained:

- RECORDS Preserved (9.0)
- RECORDS Removable (10.0)

RECORDS Preserved (9.0):

- RECORDS Inviolate (9.0a)
- RECORDS Coherent (9.0b)
- RECORDS Auditable (9.0c)

RECORDS Inviolate (9.0a):

- Equal Content(RECORD ?T1) Content (RECORD? T2) (9.0a1)

RECORDS Coherent (9.0b):

- SYSTEM Changed (9.0b1)
- Equivalent Structure (RECORD? T1) Structure (RECORD? T1) (9.0b2)

RECORDS Auditable (9.0c):

- Use RECORD TRANSACTION (9.0C1)

RECORDS Removable (10.0):

- DELETE Authorized (10.0a)
- DELETE Audited (10.0b)
- DELETE Complete (10.0c)

DELETE Complete (10.0c):

- Content (RECORD) Deleted (10.0c)
- Structure (RECORD) Deleted (10.0c)
- NOT Context (RECORD) Deleted (10.0c)

RECORDS Usable:

- RECORDS Exportable (11.0)
- RECORDS Accessible (12.0)
- RECORDS Redactable (13.0)

RECORDS Exportable (11.0):

- Equal RECORD? SYSTEMA RECORD? SYSTEMB (11.0a)

RECORDS Accessible (12.0):

- RECORDS Available (12.0a)
- RECORDS Renderable (12.0b)
- RECORDS Evidential (12.0c)

RECORDS Available (12.0a):

- Content(RECORD) Available (12.0a)
- Context(RECORD) Available (12.0a)
- Structure(RECORD) Available (12.0a)

RECORDS Renderable (12.0b):

- Equivalent Display (RECORD? T1) Display (RECORD? T2) (12.0b1)

RECORDS Evidential (12.0c):

- TRANSACTION HISTORY Rendered (12.0c1)

RECORDS Redactable (13.0):

- CONTENT REDACTED SYSTEMS VIEW Masked (13.0a)
- CONTENT RELEASED NOT (CONTENT REDACTED) (13.0b)
- Equal RECORD (CONTENT RELEASED + CONTENT-REDACTED) RECORD (13.0c)

OBJECTS DERIVED FROM REQUIREMENTS

AUTHORITY

Type: ADMINISTRATIVE (Rule - Business Rule)

- LEGAL (Rule - Law)
- PROFESSIONAL (Rule - Best Practices)
- REGULATORY (Rule - Issuance)

AGENT.CREATOR = AGENT

- Identifier - Unique
- Type - (PERSON, SYSTEM, ORGANIZATION)
- Responsibilities

ORGANIZATION

- Business Logic
- State - Management
- Policies
- State (In Effect, Not In Effect) POLICY CHANGE
- Procedures
- Internal Rules
- RETENTION RULE
- Process

RECORDKEEPING FUNCTIONAL REQUIREMENTS

- External Requirements

RECORDS

- Identifier - Unique
- Content
- Context
- LINKS
- Structure
- Data presentation

SYSTEM

- DATA STORE
- FUNCTIONALITY
- KNOWLEDGE BASE
- LOGICAL RELATIONS
- Outcome
- SYSTEM LOGIC
- MANAGEMENT METHODS
- EXCEPTION PROCEDURE
- permissions (Business Rule - Agent Responsibilities)

SYSTEM VIEWS

- State (Operating, Failed)

BUSINESS TRANSACTION

- Identifier - Unique
- Data

Annex 3

Metadata Requirements for Evidence: A Reference Model for Business Acceptable Communications

In conformity with the functional requirements for evidence, we assert that evidence can only be made by compliant organizations using responsible, implemented and consistent recordkeeping systems. Records captured by such systems must be comprehensive, identifiable, accurate, understandable, meaningful and authorized. They must be maintained inviolate, coherent, auditable and removable. And to be used they must be available, renderable, evidential, exportable and redactable.

In addition to satisfying the requirements for evidence, business acceptable communications must carry metadata to satisfy the requirements of large scale, distributed implementations over long periods of time during which human memories of the contexts of creation will not suffice and software and hardware will have significantly changed.

The following reference model proposes a six layer structure of metadata designed to satisfy the functional requirement for evidence and the requirements of business acceptable communication and support the effective management of any record over long periods of time.

I Handle Layer

Declares the data that follows to be a record, assigns values indicating the provenance of the record, and provides terms by which the contents of the record can be discovered.

- I.A. Record Identification Metadata (Not Repeatable) Consists of a unique identifier made up of three data elements (Record-Declaration, Transaction-Domain-Identifier, Transaction-Instance-Identifier).
 - I.A.1. Record-Declaration [Mandatory] Identifies the data as a record. This data element consists of a bit stream asserting that what follows is a record. The presence of the record declaration can be determined without opening the record, but if the record is opened it loses this value.
 - I.A.2. Transaction-Domain-Identifier [Mandatory] Uniquely identifies the domain from which the record originated with sufficient specificity to identify the transaction-type and the organization responsible.
 - I.A.3. Transaction-Instance-Identifier [Mandatory] Uniquely identifies a transaction instance with date, time and necessary sequence identifiers.
- I.B. Information Discovery Content Metadata (Repeatable) Provides descriptors considered necessary to retrieve the record at a later date.
 - I.B.1. Content-Description-Standard [Optional, except in cases of privacy act defined content] Identifies standards governing content-descriptors. Privacy controlled content must be identified according to privacy act standards.
 - I.B.2. Content-Descriptor [Optional] Provides terms used by the office of origin/receipt to describe or index the record.
 - I.B.3. Record-Natural-Language [Optional] Identifies the natural; language of the record (e.g. English, French, Portuguese)

II. Terms & Conditions Layer

Invokes controls over access to, and use and disposition of a record. Identifies restrictions imposed on access and use and where to resolve them.

II.A. Restrictions Status Metadata Identifies whether any restrictions must be resolved before permitting access, use, or disposition.

II.A.1. Access-Rights-Status [Mandatory] Defines if there are access restrictions which must be resolved.

II.A.2. Use-Rights-Status [Mandatory] Defines if there are use restrictions which must be resolved.

II.B. Access Conditions Metadata (Repeatable) Identifies the conditions for access to the record and how to satisfy them.

II.B.1. Access-Conditions-Resolver [Mandatory for records with access restrictions] Identifies any resolvers that must be satisfied access requester meets conditions regarding payments, permissions, proof of identity or other restrictions on access.

II.B.2. Resolver-Terms [Mandatory for records with access restrictions] Defines terms for access in a way that is recognized by the resolver.

II.C. Use Conditions Metadata (Repeatable) Identifies the conditions for use of the record and how to satisfy them.

II.C.1. Use-Conditions-Resolver [Mandatory for records with use restrictions] Identifies the resolvers that must be satisfied user meets conditions imposed on use and that the recordkeeping system is notified of how to impose such restrictions.

II.C.2. Use-Terms (Mandatory for records with use restrictions)

II.C.2.a. Use-Citation [Optional] Consists of textual information supplied by the creator or owner of the record detailing limitations on use.

II.C.2.b. Redacted-Record-Rule [Mandatory if content view must be restricted]. Identifies views that are permitted to different users. It may be executed algorithmically or may require human intervention to produce a releasable view.

II.C.2.c. License-Terms [Mandatory for Licensed Data] if the data is licensed, this data enables the proper resolution of use of the record according to the guidelines set by the license.

II.D. Disposition Requirements Metadata (Not Repeatable) Identifies the conditions regarding retention and disposition of the records according to policy.

II.D.1. Removal-Authority [Mandatory] Identifies under whose/what authority a record (whole or in part) may be purged from the system. The identification of this authority resides with the record and is established at the time of the record's creation.

II.D.2. Retention-Policy-Citation [Optional, unless retention-period-end-time is unspecified] Comprised of textual information identifying the organization's internal policy/policies for record's retention - indicates the specific policy number(s) governing retention.

- II.D.3. Retention-Law/Regulation-Citation [Optional; unless retention-period-end-time is unspecified] Comprised of textual information regarding the legislative or governmental law(s)/regulation(s) governing record retention (ex. Code of Federal Regulations) - indicating the specific legal/regulatory policy number, version, dates issued, dates effective, etc.
- II.D.4. Retention-Law/Regulation-Authority [Optional; unless retention-period-end-time is unspecified] Comprised of textual information identifying the issuing organization that has jurisdiction over the law(s)/regulation(s) governing records retention.
- II.D.5. Retention-Period-End-Time [Mandatory] Indicates scheduled retention period end date (mmddyyyy) for the record. This information is determined at the time of the record's creation. If unspecified (frequently indicated as (99999999)), the record must contain citations to policy, regulation and authority (II.D.2-4).
- II.D.6. Disposition-Instruction-Code [Optional] Identifies the methods that apply to the ultimate disposition of the record.

III. Structural Layer

Consists of metadata about data structure designed to permit the record to remain evidential over time and to be migrated to new software and hardware dependencies as necessary.

- III.A. File Identification Metadata (Repeatable for each file) Enables the identification of individual files that comprise the record and affords the ability to verify their authenticity.
 - III.A.1. File-ID [Mandatory] Identifies each file that makes up the record. This affords the ability for the system to bring together all of the parts to form the whole.
- III.B. File Encoding Metadata (Repeatable for each file) Identifies the encoding pertinent to the individual files that comprise the record.
 - III.B.1. File-Modality [Mandatory] Identifies the file modality (i.e. text, numeric, graphic, geographic, image, sound, video, multimedia etc.).
 - III.B.2. File-Data-Representation [Mandatory] Identifies the data encoding standards used by the file (i.e., ASCII, EBCDIC, or UNICODE character data, ASN.1, CCITT Group III raster, etc.)
 - III.B.3. Data-Codes [Mandatory if non-standard methods of representation are used] Indicates specifically how the data is encoded when registered methods are not being used. For example, for vector data whether it is topological, spaghetti, chain-node, etc., for raster data the number of dots per inch and their bit density, for sampled data the number of samples per second, etc.
 - III.B.4. Compression-Method [Mandatory] Identifies the method of compression, if any, that was used (ex: None, JPEG, MPEG, Quicktime, LZW, etc.). If the method complies to a specific standard, this may consist of only the identification of that standard (name, version, etc.), otherwise the method may need to be defined in technical detail.
 - III.B.5. Encryption-Method [Mandatory] Identifies the algorithms used by the record originator to encrypt the record's content. All records are stored in the de-encrypted form in which they would have been read by recipients.
- III.C. File Rendering Metadata (Repeatable for each file) Identifies how the record appeared in order to recreate it as it would have been viewed at the time of receipt.

- III.C.1. Application-Dependency [Mandatory, Repeatable] Indicates which applications, if any, the record is dependent upon. If there are dependencies, the name of one application, the version, and registration information is recorded in each occurrence of the field at the time of record creation. This information is intended to serve as a pointer to a registered library maintained by the creating organization or a public entity such as the Copyright Office or Patent Office.
 - III.C.2. Software-Environment-Dependency [Mandatory - Repeatable] Indicates what software, including operating systems and API's, if any, the record is dependent upon. If there is a dependency, the name of the software package(s), the version, registration information, and display information (such as font sets or other software dependent attributes) is recorded at the time of record creation.
 - III.C.3. Hardware-Dependency [Mandatory - Repeatable] Indicates what hardware, if any, the record is dependent upon. If there is a dependency, the hardware needed, model number, configuration, and output information (such as printers or viewers required or other hardware dependent attributes) are recorded at the time of record creation.
 - III.C.4. Rendering-Rules [Mandatory - Repeatable] Identifies the procedures necessary to enable the record to be displayed, printed, or otherwise represented as it had been at the time of creation (macros, dimension, spatial reference data, etc.) - may operate at different levels.
 - III.C.5. Representation-Standard/De Facto Standard [Mandatory - Repeatable] Identifies any standard(s) applied to the file that affect how the file is rendered (ex: SGML, Postscript, TIFF, etc.).
 - III.C.6. Representation-Standard-Version [Mandatory - Repeatable] Identifies the version number or date used to identify which version of the standard was used.
- III.D Record Rendering Metadata Applicable to the record as a whole, once files have been correctly rendered according to their own rule.
- III.D.1. File-Linking-Rule/Standard [Mandatory] Identifies the rules or standards required to enable the necessary linkages between files that make up the record. Contains textual information regarding the actual rules or standards applied.
 - III.D.2. File-Interchange-Standard: Version [Mandatory] Identifies the standard(s) (including identifying the appropriate version) employed by the record to enable file interchange.
- III.E. Content Structure Metadata Defines the structure of the contents of the record.
- III.E.1. Content-Structure [Mandatory] Indicates whether the content of the record is structured or unstructured.
 - III.E.2. Content-Data Set [Optional] If the content is identified as being structured, the data set indicated how it is structured (i.e. what type of data set was used, ex: DTD, etc.). This consists of the actual name of the data set definition. If a data set definition is neither registered or a well-known registered identity, then it will need to be registered.
 - III.E.3. Application-Dictionary [Mandatory, if structured and no content data set] Identifies the data dictionary for the entire database. This consists of the actual data dictionary itself - or it could take the form of a set of referential integrity controls.
 - III.E.4. Delimiters/Labels [Optional, good practice] Consists of the actual delimiters/labels used throughout the data.

- III.E.5. Data Value-Lookup Tables [Mandatory, where present - Repeatable] Consists of the authority file containing the values of the codes used throughout the record.
- III.E.6. Data View-at Creation [Mandatory, if partial view] Identifies how the application viewed the record at the time of the record's creation. This is the redaction subset of the data dictionary.
- III.E.7. Version-Relationships [Mandatory, if prior version exists] Consists of any Record-Identifiers of previous versions of the record.
- III.E.8. Set-Relationships [Mandatory, if other set members exist] Identifies the record as belonging, for business purposes, to an overall set of records. Can consist of the classification of that set, or the Record-Identifier(s) of other records.
- III.E.9. Dynamic-Relationships [Mandatory, if higher/lower exists] Identifies what data is required from other records/files in order to populate other values. This is active in set relationships where a record cannot be opened unless the contents of other records are available.
- III.F. Source Metadata Identifies the source of the record and documents relevant circumstances of data capture.
 - III.F.1. Data-Source [Mandatory] Identifies the source that created the record; eg. to the recordkeeping system.
 - III.F.2. Data-Source-System-Documentation [Optional] Identifies or consists of the documentation that outlines the conditions needed to create the record - contains information on the data processing function.
 - III.F.3. Data Capture-Instrument-Type [Mandatory, if instrument captured source data] Identifies the type of instrument was used to capture the data (i.e. light recording, sound recording, temperature recording, location recording, etc.) and the specific instrument used (manufacturer, model number, etc.).
 - III.F.4. Data Capture-Instrument-Settings [Mandatory, if instrument captured source data] Identifies the settings, calibration, etc. were in effect when the data was captured.
 - III.F.5. Source-Data-Natural Language [Optional] Identifies the human language of the record (ex: English, French, Portuguese, German, etc.).
 - III.F.6. Source Data-Quality [Optional, good practice] Identifies the degree of reliability of the data generated by the source.

IV. Contextual Layer

Identifies the provenance (i.e. the person, system, or instrument that is responsible for generating the record) of the record and provides data that supports its use as evidence of a transaction.

- IV.A. Transaction Context Metadata Identifies the transaction of which this is a record.
 - IV.A.1. Originator-Identification [Mandatory] Identifies the organization/person/ system that initiated the transaction and the time of the transaction
 - IV.A.2. Recipient-Identification [Mandatory] Identifies either the office/person/ system that received the transaction and the time of receipt.
 - IV.A.3. Copy-Identification [Mandatory] Identifies whether the copy encapsulated by the metadata is the sender's or the recipient's copy.

- IV.A.4. Business-Transaction-Type [Optional] Identifies the type of transaction (its business functional context).
- IV.A.5. Business-Transaction Procedure Reference [Optional] Identifies the originating organization's specific policy/policies and/or procedure(s) (i.e. business rules) governing this type of transaction. May consist of citations or of the actual policy/policies and/or procedure(s). In either case it should note the relevant version, effective dates, etc.
- IV.A.6. Linked-Prior Transaction [Mandatory, if applicable] Identifies the Record-Identifier(s) for transactions that are part of the same business activity.
- IV.A.7. Action-Requested [Optional, good practice] Identifies if an action was requested as a result of the transaction. Could enable links to past transactions if they occurred.
- IV.A.8. Recipient Specific-Configuration Data [Optional, good practice] Identifies the permissions and views that the recipient would have had. May reference the data dictionary.
- IV.B. Responsibility Metadata Identifies the organization, units and individuals responsible for the recorded transaction.
 - IV.B.1. Originating-Organization [Mandatory] Identifies the organizational unit engaged in the recorded transaction - from the legal entity down to the specific office of origin.
 - IV.B.2. Authorization [Optional, good practice] Identifies the source of authorization for specific office(s)/position(s)/individual(s) authorized to engage in the identified transaction.
- IV.C System Accountability Metadata Certifies the procedures and systems logs of the system during the period of operation.
 - IV.C.1 System Audit-Responsible [Mandatory] Citation to most recent system and procedure audit transactions which contains evidence of the system being responsible.
 - IV.C.1 System Audit-Implemented [Mandatory] Citation to most recent system and procedure audit transactions which contains evidence of the system being implemented.
 - IV.C.1 System Audit-Consistent [Mandatory] Citation to most recent system and procedure audit transactions which contains evidence of the system being consistent.

v. Content Layer

Contains the actual data engaged in the transaction.

- V.A. Content [Mandatory*] Contains the content of the record.
 - V.A.1. Content-Created [Optional*] Contains the content created by the transaction.
 - V.A.2. Content-Incorporated [Optional*] Contains identifiers of records incorporated into the content or the actual data contained in these records.

VI. Use History Layer

Documents evidentially significant uses of the record subsequent to creation; typically these will include indexing, redacted releases, and record disposition/destruction under record retention authority, but other uses (for eyes only viewing, etc.) may be recorded. This layer occurs at the end of the physical record to permit adding of entries without having to open the record.

VI.A. Use History Metadata (Repeatable) Identifies the history of use of the record - the type of use, when it was used, and by whom. Also indicated any redactions of the data.

VI.A.1. Use-Type [Mandatory] Identifies how the data was used: viewed, copied, edited, filed, indexed, classified, sent, disposed, etc. This involves identifying the various types of use permitted by the system.

VI.A.3. Use-Instance-Time [Mandatory] Identifies when the data was used - i.e. the date and time the data was used.

VI.A.4. Use-Instance-User [Mandatory] Identifies who or what used the data on a given date at a given time.

VI.A.5. Use-Evidential Consequences [Mandatory if redacted on release] Identifies the impact of a particular use (for example, may identify the part of the record released, the terms used in indexing, the importance of a specific view what part of the record was viewed).

* Note: Although it is possible to conduct a transaction that adds no new data content to existing records (e.g., only forwards pre-existing material, without so much as a cover note), and it is possible to have transactions which do not incorporate previously existing records, it is not possible to have a transaction without any content. Thus the "Record" cluster is mandatory, although the metadata items in it are both optional. The "Content" level is therefore also mandatory. (- Final Draft, January 31, 1996).

Annex 4

A Bibliography Distributed in Internet by the Australian Archives:¹

1. "Managing Electronic Records - A Shared Responsibility". This paper, "designed as a statement of the strategy the Australian Archives is proposing for the management of electronic records in the Australian Government administration," was issued by Mr. George Nichols, Director General of the Australian Archives, in March, 1995.
2. Dagmar Parer and Keith Parrott, "Managing Practices in the Electronic Records Environment," *Archives and Manuscripts, the Journal of Australian Society of Archivists*, V. 22, No. 1 (May, 1994). - This article has been quoted in the review (in its printed version), see page 29, footnote 66.
3. Keith Parrott, "Keeping Electronic Records for Keeps," Pacific Rim ARMA International Conference, (1995). Parrott addresses such issues *what is a record* ("Is the Medium the Record?) - *Accountability - Preservation - Access*.
4. Stephen Ellis and Steve Stuckey, "Australian Archives' Approach to Preserving Long-Term Access to the Commonwealth's Electronic Records." - This article has been quoted in the review, (in its printed version), see page 56, footnote 129.

There is also a bibliography:

Electronic Records Bibliography, 1992-1995

Compiled by the Australian Archives Library.

Archives and Electronic Records: an introduction, Bulletin of the American Society for Information Science, 20 (October/November 1993).

Australian Society of Archivists, Annual Conference, Electronic Recordkeeping session, 9-11 May, 1994'. *Archives and Museum Informatics* 1994; 8(2): 145-148.

Bailey, C. Canadian archivists speak out: results of the surveys conducted by the ACA Select Committee on Electronic Records'. *Archivaria*. 1993; 36: 136-165.

Barry, R. E. Best practices for establishing good defendable practices and procedures for digital document management. Chaired by A. M. Hendley'. *OIS Document 93 Management. Proceedings of the Tenth Annual Conference 1993 Jun*; London. London: Meckler; 1993: 19-24.

Barry, R. E. *Managing organizations with electronic records. Information Management and Technology*. 1993 May; 26(3): 115-121.

Bearman, D. 'Archival data management to achieve organizational accountability for electronic records'. *Archives & Manuscripts*. 1993 May; 21(1): 14-28.

Bearman, D. Conferences: NAGARA'. *Archives and Museum Informatics*. 1993 Jun; 7(2): 10-13.

³⁵⁰/ See <http://www.aa.gov.au/aa_www/aa_home_page_html>, or <<http://www.aa.gov.au>>. From there select "Archives of Australia" and then "Gopher" and select "Electronic Records".

ICA Studies/Études CIA - Electronic Records Management: A Literature Review

Bearman, D. Functional requirements for record keeping systems'. *Archives and Museum Informatics*. 1993 Jun; 7(2): 3-5.

Bearman, D. New models for management of electronic records by archives'. *Cadernos BAD*. 1992; 1992(2): 61-70.

Bearman, D. Record-keeping systems'. *Archivaria*. 1993; 36: 16-36.

Bearman, David. Electronic evidence: strategies for managing records in contemporary organizations. Pittsburgh, PA: *Archives and Museum Informatics*; 1994; ISBN: 1 885626 08 8. A collection of articles previously published between 1989 and 1993 in a variety of periodicals and reports.

Bearman, David. The implications of *Armstrong v. Executive of the President* for the archival management of electronic records'. *American Archivist*. 1993 Sep; 56: 674-689.

Bearman, David. Introduction'. *American Archivist*. 1994 Dec; 57: 18- 19. Introduction to a special issue of *American Archivist* edited by Lawrence Dowler and Margaret Hedstrom.

Bearman, David. Managing electronic records'. *Archives and Museum Informatics*. 1993 Dec; 7(4): 13-16.

Bearman, David. Managing electronic mail'. *Archives and Manuscripts*. 1994 May; 22(1): 28-50.

Bellyuk, Jayne. Ancient Science: Modern Machines'. *Archives and Museum Informatics*. 1993 Dec; 7(4): 17-19.

Bikson, T. K. ; Law, S. A. Electronic information media and records management methods: a survey of practices in UN organizations'. *Information Society*. 1993; 9(2): 125-144.

Bikson, T. K. and E. J. Frinking. *Preserving the present: toward viable electronic records*. The Hague, Netherlands: Sdu Publishers, 1993.

Bikson, Tora K. Organizational trends and electronic media: work in progress.' *American Archivist*. 1994 Dec; 57: 48-68.

Branger, P. J.; Duisterhout, J. S. Electronic data interchange in medical care: an evaluation study'. In: *Assessing the value of medical informatics: proceedings, Fifteenth Annual Symposium on Computer Applications in Medical Care*, (a conference of the American Medical Informatics Association); 1991 Nov; Washington, DC.: McGraw Hill Health; 1992: 58- 62.

Brown, J. H. Electronic records management in the Humberside police' in: Chaired by A. M. Hendley. *OIS Document 93 Management. Proceedings of the Tenth Annual Conference*; 1993 Jun; London. London: Meckler; 1993: 437-440.

Brown, Thomas Elton. A decade of development: educational programs for automated records and techniques within the Society of American Archivists'. *American Archivist*. 1993 Jun; 56: 410-423.

Bruns, P . The USMARC community Information format: a history and brief description'. *Information Technology and Libraries*. 1992 Dec; 11(4): 387-396.

Campbell, T. Possibilities for the international sharing of retroconverted map files'. *IFLA Journal*. 1994; 20(1): 46-52.

Challen, Helen. Optical imaging technology: the impact on records management functions'. *Informaa Quarterly*. 1994 May: 21-23.

Charrier, P. Le centre technique de la Bibliotheque de France' [The technical centre of the Bibliotheque de France]. *Bulletin d'Informations de l'Association des Bibliothecaires Francais*. 1992; 154: 19-24.

The Commonwealth of Pennsylvania: electronic records management'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 18.

Cory, Kenneth A.; Hessler, David W. Imaging the archives: now is the time'. *Library and Archival Security*. 1993; 12(1): 7-15.

Cox, Richard J. The American archival profession and information technology standards'. *Journal of the American Society for Information Science*. 43 (8) Sept 1992, 571-575.

Cox, Richard J. The roles of graduate and continuing education programs in preparing archivists in North America for the information age'. *American Archivist*. 1993 Jun; 56: 444-457.

Cox, Richard J. *The first generation of electronic records archivists in the United States: A study in professionalization*. New York, Haworth Press, 1994.

Crockett, M. The theory of electronic records and archive management: a preliminary outline'. *Journal of the Society of Archivists*. 1993; 14(2): 135-140.

Cunningham, Adrian. The archival management of personal records in electronic form: some suggestions'. *Archives and Manuscripts*. 1994 May; 22(1): 94-105.

Daniels, Margaret. Computer-aided design and drafting systems and the records of architecture'. *Janus*. 1992; 1992(1): 31-33.

Davidson, Jenni; Moscato, Luisa. Towards an electronic records management program: the University of Melbourne'. *Archives and Manuscripts*. 1994 May; 22(1): 124-135.

Duggan, M. K. (Univ. Of California, Berkeley, Ca). Electronic information and applications in musicology and music theory'. *Library Trends*. 1992 Mar; 40(4): 756-780.

Du Rea, M. V.; Pemberton, J. M. Electronic mail and electronic data interchange: challenges to records management'. *Records Management Quarterly*. 1994 Oct; Vol. 28, issue 4: 3-12, 72.

Duranti, Luciana. Commentary on R Weissman's paper 'Archives and the new information architecture of the late 1990s'. *American Archivist*. 1994 Dec; 57: 36-40.

Eastwood, Terry. Educating archivists about information technology'. *American Archivist*. 1993 Jun; 56: 458-466.

Eaton, Fynnette L. The National Archives and electronic records for preservation' in: Mohlhenrich, Janice, editor. *Preservation of electronic formats and electronic formats for preservation*. Fort Atkinson, Wisconsin: Highsmith Press; 1993: Chapter 3, pages 41 - 61.

Electronic records'. *TIP Applications*. 1994 Apr; 7(9): 9-11.

Emmerson, P. Developing a records management policy and programme in an electronic environment' in: *Proceedings of the 7th Annual Computers in Libraries International Conference*; 1993 Feb; London. London: Meckler; 1993: 22-26.

Fagerlund, L. (United Nations, New York, NY). The United Nations: electronic records management'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 19-20.

Frost, E. (National Archives of Canada). National Archives of Canada: current archival activities in electronic records'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 13-14.

Garland, S. Approaches to integrating paper and electronic records - some personal experiences'. *Records Management Bulletin*. 1993 Aug; 57: 20-22.

Gilliland-Swetland, Anne J. Archivy and the computer: a citation analysis of North American periodical literature'. *Archival Issues*. 1992; 17(2): 95-112.

Gilliland-Swetland, Anne J. From education to application and back: archival literature and an electronic records curriculum'. *American Archivist*. 1993 Jun; 56: 532-544.

Goerler, Raimund E. Towards 2001: electronic workstations and the future of academic archives'. *Archival Issues*. 1992; 17(1): 11-22.

Hedstrom, M. Descriptive practices for electronic records: deciding what is essential and imagining what is possible'. *Archivaria*. 1993; 36: 53 - 56.

Hedstrom, M. ed. Electronic records management program strategies'. *Archives and Museum Informatics Technical Report no. 18*. Pittsburgh, PA: *Archives and Museum Informatics*, 1993.

Hedstrom, Margaret. Introduction to 2020 vision'. *American Archivist*. 1994 Dec; 57: 12-16.

Hedstrom, Margaret. Teaching archivists about electronic records and automated techniques: a needs assessment'. *American Archivist*. 1993 Jun; 56: 424-433.

Hendley, Tony. Digital mass storage options: their potential for electronic document management and distribution'. *Information Management and Technology*. 1993; 26(1): 22-32.

Henry, Linda J. An archival retreat in electronic records: acquiring computer literacy'. *American Archivist*. 1993 Jun; 56: 514-521.

International Association for Social Science Information Service and Technology: electronic records management'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 26.

Its 10 o'clock: do you know where your data are? Technology Review January 1995: 48-53. (Available from the journal's World-Wide-Web server at URL:<<http://web.mit.edu/afs/athena/org/t/techreview/www/tr.html>>).

Jones, Ray; Seale, Colleen. Three electronic networks: their potential international roles for library communication'. *Collection Management*. 1992; 15(3/4): 425-437.

Jones, Richard L. Directions in intelligent electronic document management'. *Informaa*. 1993 May: 4-7.

Kanter, S. L.; Miller, R. A.; Tan, M.; Schwartz, J. Using POSTDOC to recognize biomedical concepts in medical school curricular documents'. *Bulletin of the Medical Library Association (US)*. 1994 Jul; 82(3): 283-287.

Kesner, Richard M. Employing the case study method in the teaching of automated records and techniques to archivists'. *American Archivist*. 1993 Jun; 56: 522-531.

Kesner, Richard M. Teaching archivists about information technology concepts: a needs assessment'. *American Archivist*. 1993 Jun; 56: 434-443.

Lincoln, T. J.; Essin, D. J.; Ware, W. H. The electronic medical record: a challenge for computer science to develop clinically and socially relevant computer systems to coordinate information for patient care and analysis'. *Information Society*. 1993; 9(2): 157-188.

Loewen, Candace. The control of electronic records having archival value'. *Archivaria*. 1993; 36: 64-73.

Love, J. P. The ownership and control of the U. S. Securities and Exchange Commission's EDGAR System'.

ICA Studies/Études CIA - Electronic Records Management: A Literature Review
Government Publications Review. 1993 Jan; 20 (1): 61-71.

MacLelland, M. The archival electronic record in the nineties: recent initiatives at the National Archives of Canada. *Archivaria*. 1993; 36: 281- 287.

Magnell, Glenn W. Electronic information management system appeals to United States Supreme Court'. *Inform*. 1993 Mar; 28-30.

Management of electronic records in the federal government'. *Informaa Quarterly*. 1994 May: 10-11.

Managing electronic records: a shared responsibility'. *Australian Archives*, March, 1995. ISBN 0642225362

McDonald, John. Archives and cooperation in the information age'. *Archivaria*. 1993 Mar; 35: 110-118.

McDonald, John. Commentary on R Weissman's paper 'Archives and the new information architecture of the late 1990s'. *American Archivist*. 1994 Dec; 57: 42-45.

McDonald, John. The ICA Electronic Records Committee'. *Archivaria*. 1993; 36: 300-301.

McDowall, Duncan. "Wonderful things": history, business, and archives look to the future'. *American Archivist*. 1993 Mar; 56: 348-356.

McGovern, N.; Ruller, T. (National Archives and Records Administration, Washington,DC). Archives and electronic records: an introduction'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 9-10.

McIntosh, Lowrie W. Information technology and public record: emerging issues in the next five years: providing guidelines and forecast data for planning'. *International Journal of Micrographics and Optical Technology*. 1992; 10(4): 187-190.

McKemmish, Sue. Understanding electronic recordkeeping systems: understanding ourselves'. *Archives and Manuscripts*. 1994 May; 22(1): 150 - 162.

Meggitt, Anthony. Electronic Document Management'. *Informaa Quarterly*. 1994 May: 16-19.

Miller, Page Putnam. Controversy continues over status of National Security Council electronic records'. *Archival Outlook*. 1993 Mar: 6-7.

Minton, Carolyn. Technology: what a dilemma!' *Records Management Quarterly*. 1994 Jan: 38,40.

Mohlhenrich, Janice (editor). *Preservation of electronic formats and electronic formats for preservation*. Fort Atkinson, Wisconsin: Highsmith Press; 1993; ISBN: 0917846 17 6.

Morelli, J. Trends in the use of electronic records in business'. *Records Management Bulletin*. 1994 Apr: 61: 17-19.

National Archives and Records Administration. *Digital imaging and optical data disk storage systems: Long-term access strategies for Federal Agencies*. *Technical Information Paper 12*. Washington, DC: NARA, 1994. (NTIS publication no 95142105 also available from the NARA gopher:at URL:<[http:// www. nara.gov](http://www.nara.gov))

National Historical Publications and Record Commission. Electronic Records Grants Guidelines. Washington, DC: National Historical Publications and Record Commission; 1993 Jan.

The need for the preservation of Australian-created electronic information: a position paper'. *Australian Academic and Research Libraries*. 1992 Dec; 23(4): 197-205.

New York State Archives and Records Administration: electronic records management'. *Bulletin of the American*

ICA Studies/Études CIA - Electronic Records Management: A Literature Review
Society for Information Science. 1993 Oct; 20(1): 16-17.

New York State Archives and Records Administration. *Guidelines for the legal acceptance of Public Records in an emerging electronic environment*. Albany, NYSARA, 1994. 35pp.

Newcombe, T. Starting from scratch: electronic medical records'. *Inform*. 1993 Jan; 7(1): 26-29.

Oppenheim, C. Electronic copyright'. *Information Management Report*. 1993 Jan; 9-14.

Oppenheim, Charles. *The legal and regulatory environment for electronic information*. Wiltshire: Infonortics Calne; 1992;ISBN: 1873699050.

O'Shea, Greg. The medium is not the message: appraisal of electronic records by Australian Archives.' *Archives and Manuscripts*. 1994 May; 22(1): 68-93.

Parer, Dagmar; Terry, R. Managing electronic records: Papers from a Workshop on Managing Electronic Records of Archival Value'. *Archives & Manuscripts*. 1993 Nov; 21(2): 276-280.

Parer, Dagmar. Government electronic records: an Australian Archives perspective'. *Australian Library Journal*. 1993 May: 142-149.

Parer, Dagmar; Parrott, Keith. Management practices in the electronic records environment'. *Archives and Manuscripts*. 1994 May; 22(1): 106-122.

Parrott, Keith. Keeping electronic records for keeps. A paper delivered at the Pacific Rim ARMA International conference, 1995. (Available on the Australian Archives gopher at URL:<gopher://aa01.aa.gov.au>

Peasley, Jennifer. Australian-created electronic information: preservation issues and guidelines'. *Australian Library Journal*. 1993 May: 137-141.

The Pennsylvania State University: electronic records management'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 21.

Phillips, John T. Virtual records and virtual archives'. *Records Management Quarterly*. 1994 Jan: 42,44-45,60.

Phillips, J. T. Faxing by computer'. *Records Management Quarterly*. 1993 Oct; 27(4): 44,46-49.

Phillips, John T. *Organizing and archiving files and records on microcomputers*. Prairie Village, KS: ARMA International; 1993.

Picot, Anne. Electronic records systems in the Roads and Traffic Authority, NSW. *Archives and Manuscripts*. 1994 May; 22(1): 52-66.

Reed, Barbara. Electronic records management in transition'. *Archives and Manuscripts*. 1994 May; 22(1): 164-171.

Renehan, M. Unassailable evidence: the nexus between recordkeeping and public sector accountability.' *Archives & Manuscripts*. 1993 May; 21(1): 62-76.

Roberts, David. Defining electronic records, documents and data'. *Archives and Manuscripts*. 1994 May; 22(1): 14-26.

Rondenel, Stephanie. Images of a gone world'. *Inform*. 1994 Mar; 8(3): 22-24.

Ross, Seamus and Edward Higgs (ed) *Electronic Information Resources and Historians: European Perspectives*, Halbgraue Reihe zur Historischen Fachinformatik Series A: Historische Quellenkunden, Band 20 (Published simulataneously as British Library Report 6122) Max Planck Institut fur Geschichte, 1993. ISBN 3928134957.

Rothenberg, Jeff. Ensuring the longevity of digital documents'. *Scientific American*. January, 1995: 42-47.

Ruller, Thomas J. A review of information science and computer science literature to support archival work with electronic records'. *American Archivist*. 1993 Jun; 56: 546-559.

Schaeffer, R. The information age revisited'. *Archivaria*. 1993; 36: 13-15.

Shinn, H. W. The electronic archive'. *Archivaria*. 1993; 36: 296-299.

Simpson, H. The challenge of information and records management in large corporate organisations'. Chaired by A. M. Hendley. *OIS Document 93 Management. Proceedings of the Tenth Annual Conference*; 1993 Jun; London. London: Meckler; 1993: 259-264.

Skupsky, Donald S. Establishing retention periods for electronic records'. *Records Management Quarterly*. 1993 Apr: 40,42-43,49.

Skupsky, Donald S. The law of electronic mail: the impact of the White House case on you!' *Records Management Quarterly*. 1994 Jan: 32,36-37,40.

Smith, H. T. Open systems & electronic document management'. Chaired by A. M. Hendley. *OIS Document 93 Management. Proceedings of the Tenth Annual Conference*; 1993 Jun; London. London: Meckler; 1993: 45-50.

Society of American Archivists'. *Archives and Museum Informatics*. 7(3) Fall 1993: 11-14.

The Society of American Archivists'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 23.

Taylor-Munro, Doug. Machine readable archives: two steps'. *Machine Readable Records* 1992; 8(2): 1

Theofanos, M. F.; Phillips, J. T. Digital signatures: signing and notarizing electronic forms'. *Records Management Quarterly*. 1994 Apr; 28(2): 18-22.

Treadwell, W.; Cogswell, J. A. The machine readable data center: a model approach to data services in academic research libraries'. *Library Hi Tech*. 1994; 12(1): 87-92.

The University of Pittsburgh: electronic records management'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 21.

Upward, Frank; McKemmish, Sue.' Somewhere beyond custody'. *Archives and Manuscripts*. 1994 May; 22(1): 136-149.

U. S. National Archives and Records Administration'. *Bulletin of the American Society for Information Science*. 1993 Oct; 20(1): 11-12.

Walch, Victoria Irons. Automated records and techniques curriculum development project'. *American Archivist*. 1993 Jun; 56: 468-505.

Walch, Victoria Irons. Commentary on T Bikson's article 'Organizational trends and electronic media: work in progress'. *American Archivist*. 1994 Dec; 57: 76-81.

Walch, Victoria Irons. Innovation diffusion: implicatons for the CART curriculum'. *American Archivist*. 1993 Jun; 56: 506-512.

ICA Studies/Études CIA - Electronic Records Management: A Literature Review

Wallace, David. Metadata and archival management of electronic records: a review'. *Archivaria*. 1993 Autumn, 36: 87-110.

Warnow-Blewett, Joan. Commentary on T Bikson's article 'Organizational trends and electronic media: work in progress'. *American Archivist*. 1994 Dec; 57: 70-74.

Weissman, Ronald F. E. Archives and the new information architecture of the late 1990s'. *American Archivist*. 1994 Dec; 57: 20-34.

Williams, Robert F. Document disposition of optically stored records'. *Inform*. 1993 Feb: 35-45.

Working meeting on electronic records management, Pittsburgh, PA, 8-10 April 1994. Archives and Museum Informatics' 1994 8(2): 138 - 141.'

Zoellick, P. A. The CGIAR CD-ROM Project'. *Quarterly Bulletin of the International Association of Agricultural Information Specialists*. 1992; 37(1-2): 59-64.