

MASSEY UNIVERSITY

TOWARDS THE PAPERLESS OFFICE:
AN INTRODUCTION TO ELECTRONIC STRUCTURED
DOCUMENT INTERCHANGE

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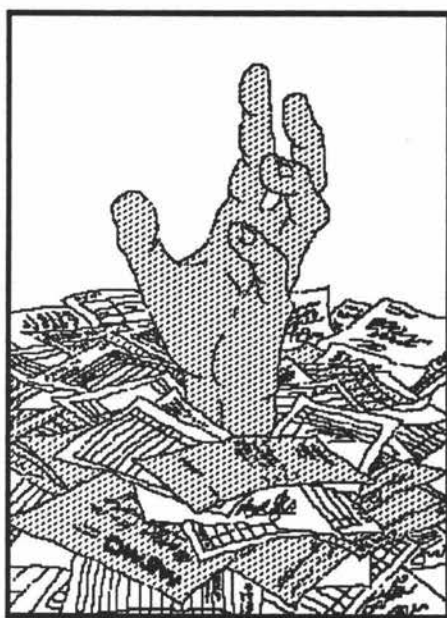
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Towards the Paperless Office:
An Introduction to Electronic Structured
Document Interchange

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To Mum and Dad.

*Without whose love and support
this would not have been possible.*

Abstract

Despite the advances in computing technology and office automation, and forecasts of the paperless office having become a reality by now, there remains the fact that very few companies would face less paper today than they did five years ago. Offices today are still deluged with paper because current office automation technology has failed to address one aspect of paperwork common in the office environment: the electronic equivalent to structured internal paper-based documents.

Electronic structured document interchange (ESDI) has been proposed as the last remaining technology in providing the complete infrastructure for the "paperless office." Complementing current electronic office system technology, including imaging technologies, electronic mail, and electronic data interchange, ESDI was designed to provide the electronic equivalent to structured internal paper-based documents.

Electronic structured document interchange is the intra-company computer-to-computer processing of business transactions in a format that allows the receiver to process the transaction by traditional business practices. Fundamentally, ESDI is a data processing concept that spans a single business enterprise, providing the complete electronic equivalent to the handling and processing of internal paper-based documents. The rationale being to take advantage of the benefits of electronic processing and delivery, while retaining traditional business practices. In some respects, ESDI systems have the potential to improve business practices by providing capabilities that are simply not possible with traditional paper-based systems.

This emerging technology, the justification for such a technology, and features of the technology, including details of the administrative ESDI system implemented at Massey University, are discussed.

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Introduction

Whatever happened to the "paperless office?" For the last decade, forecasts have suggested that the "paperless office" was to have been a reality by now. In other words, we should all be using computers at work and enjoying the advantages of sharing information electronically.

Despite the advances in computing technology and office automation, and forecasts of the paperless office having become a reality by now, there remains the fact that very few companies would face less paper today than they did five years ago. There is no doubt, however, that automation has changed our work lives. But the changes are occurring very differently from the way the office pundits predicted.

The most obvious change has taken place at the desktop level. In the early 1980s, very few office workers had personal computers. Today there are more than 35 million personal computers in use, many of them on office desktops. As more business people adapted to personal computers, many firms started to interconnect them enabling users to share information and printers. Others provided office automation applications from terminals connected to a host computer.

Today most of us rely heavily on computers. They allow us to be more productive through the use of electronic mail, word processing, calendaring, spreadsheets, and access to external databases. Our personal and office productivity has improved, even if we continue to process more and more paper.

In moments of frustration, we can visualise the ideal office of the future that provides access to information at our fingertips, eases global communication, and allows a full exchange of media (text, data, voice, images, videos, handwritten notes) with a customised personal interface.

Whether that ideal soon becomes a reality, we cannot become so infatuated with it that we ignore our current office environment. Useful and sophisticated technology that is

either currently available or emerging can make the office more productive and eat away at the paper mountain.

Storage technologies, imaging technologies, electronic mail, and electronic data interchange are some of the technologies currently available to automate the office and move it closer to the paperless environment. These technologies are discussed in Chapter 2, "Towards the Paperless Office."

Through the use of storage technologies and other records and text management tools, much of the proliferation of paperwork in the office has been contained. Records and text management tools allowed paper documents to be classified, organised, circulated, retained, stored, and easily retrieved, reducing the necessity for multiple copies of a particular document to be in circulation.

Imaging technologies and image processing provided the greatest potential to shrink the paper mountain. Image processing was a similar concept to the records and text management tools associated with paper-based storage technologies. Instead, however, paper-based documents were scanned through an optical scanner, which sent the digitised image to a computer. The computer then controlled the storage and management of these electronic equivalents to the paper-based document.

As more people adapted to personal computers and businesses realised the potential in networking computers, new technologies developed making office workers more productive. However, companies continued to generate enormous amounts of paper documents.

Electronic mail eliminated some of the paper documents generated within an office. Office workers simply keyed in the message at a terminal, added the person's name and a heading, and the message was transmitted to the recipient. Electronic mail offered improvements in delivery speed, reliability, security, and communication, compared to standard mail delivery.

Electronic data interchange, which enabled firms to conduct business directly by computer, virtually eliminated the generation and transfer of paper documents between companies. Using electronic data interchange a company generated standard business transaction data, transmitted it electronically to the receiving company, and the receiving company used the data as input to the receiving company's application, just as if it had been manually entered. Electronic data interchange provided the opportunity to improve productivity for the firm as a whole, while reducing the handling of paper documents.

Why then, were offices still deluged with paper?

Current office automation technology has failed to address one aspect of paperwork common in the office environment: the electronic equivalent to structured internal paper-based documents.

Structured internal paper-based documents are often transitory and proprietary in nature and hence are unsuitable to be replaced by any currently available electronic office system. These documents, being transitory in nature, often being passed from person to person during processing, are not suited to image processing, which is used solely for static documents. Neither are these documents suited to electronic mail systems because of their structured nature. Electronic mail systems allow for the delivery of free format text, where the layout of such text is inconsequential as no further processing is required. Electronic data interchange technologies would provide the closest electronic equivalent to structured internal paper-based documents. However, electronic data interchange is a well-defined business practice, and because the documents are for internal business use and are not sent between trading partners, and because of the often proprietary nature of the documents (providing no standard format), electronic data interchange cannot be used.

A new technology is required to provide an electronic equivalent to structured internal paper-based documents. A new technology, electronic structured document interchange (ESDI), has been proposed as the last remaining technology in providing the complete infrastructure for the paperless office.

Electronic structured document interchange is the intra-company computer-to-computer processing of business transactions in a format that allows the receiver to process the transaction by traditional business practices. Fundamentally, ESDI is a data processing concept that spans a single business enterprise, providing the complete electronic equivalent to the handling and processing of internal paper-based documents.

This emerging technology, the justification for such a technology, and the features of the technology are discussed in the final section of Chapter 2.

Realising the potential benefits that could be gained from electronic structured document interchange, Massey University, through initiatives from Management Information Services, proposed an ESDI implementation to facilitate the administrative functions of the University. The aim of the project was to set up at least one, and possibly more, fully functional systems utilising ESDI.

Chapter 3, "The Massey University Electronic Structured Document Interchange Initiative," describes the environment of the ESDI initiative, highlighting the needs for such a system and the appropriateness of the University for such a system.

Having set the aim of the initiative, to create at least one, and possibly more, fully functional systems utilising electronic structured document interchange, a development strategy for the on-Campus ESDI initiative was established.

The idea behind ESDI was to provide the complete electronic equivalent to the handling and processing of internal paper-based documents. The rationale being to take advantage of the benefits of electronic processing and delivery, while retaining traditional

business practices. In some respects, an ESDI system had the potential to improve business practices by providing capabilities that were simply not possible with the traditional paper-based business systems.

While it is easy to envisage the ideal paperless environment, an environment that initiates, processes, and archives electronic transactions as an integral part of traditional business practice, it is not as easily achieved.

It was decided that a systematic approach was required for the development of the on-Campus ESDI system. The idea was to implement the system in stages, with each stage increasing in functionality. The purpose of such a strategy would allow the system requirements and system development (design and construction) of the envisaged final stage to be adequately planned for, throughout successive stages, from early on in the development. The staged development is discussed in Chapter 4, "The On-Campus Electronic Structured Document Interchange Development."

The electronic equivalents of internal paper-based documents are a fundamental part of an ESDI system, and their simplicity and ease of use are critical to its success. These "electronic forms" must provide an effective and efficient replacement of paper-based documents in order to retain traditional business practices and to be preferred to the use of paper-based systems. To be effective, the electronic forms need to be easily constructed and should provide all the content of its paper-based counterpart. While, to be efficient, the electronic forms need to be easily edited and manipulated, providing all the functions common to the processing of paper-based transactions.

A mechanism was available within the Department of Production Technology to provide the desired electronic equivalent to paper-based documents. The mechanism was simple, in that an electronic representation of a paper-based document could easily be constructed, and powerful, in that the mechanism could effectively provide the functions common to the processing of paper-based transactions. This "forms engine" was the fundamental component of the ensuing on-campus ESDI development, and is discussed in Chapter 5, "Paper's Counterpart: The Electronic Form."

The intention of the first stage of the on-campus ESDI development, referred to as Single Form / Single Destination (SFSD), was to implement a particular electronic form whose destination was predetermined. The ESDI system, for this first stage, was very simplistic. The ESDI system would display a single rudimentary electronic form, the user would fill in the form details, and when transmitted, the form details would be delivered to the predetermined destination.

Cognisant of the aims of the initiative, the Class Roll Request Form was implemented. The purpose of the Class Roll Request Form was to initiate the extraction of class roll information residing on a database that was not a part of the Campus Network.

Using the ESDI system a lecturer or faculty administrator filled in the Class Roll Request Form details, and when transmitted, the form details were delivered to Management Information Services. Details of the SFSD implementation are given in Chapter 6, "A SFSD Example: The Class Roll Request Form."

Since ESDI replaces the paper document environment with an electronic one, management and auditors face the challenge of how to implement ESDI technology to attain business objectives and appropriately control its associated risks. Many of the controls used in paper document processing are simply not effective in the ESDI environment. Chapter 7, "Security Aspects of Electronic Structured Document Interchange," establishes the business risks associated with ESDI, and examines the associated control and security aspects.

As the on-campus ESDI implementation evolves, the need to reassess the controls over the existing environment and applications becomes more apparent, and the additional risks, that may derive from the implementation of ESDI because of the changes to systems, procedures, and operations, should be addressed.

The aim of the second stage of the on-campus ESDI development, referred to as Multiple Forms / Multiple Destinations (MFMD), was to increase the functionality of the ESDI system implemented in stage one by making a facility available that would offer a choice of electronic forms and a choice of destinations. Each electronic form would provide the equivalent of an internal paper-based document and could have a predetermined destination.

The ESDI system would function as follows: if the forms do not have a predetermined destination (or if there is more than one destination provided), a menu of destinations is displayed and the user selects the appropriate destination; a menu of available forms is displayed and the user selects the appropriate form; the form is displayed, and the user fills in the form details; finally, when transmitted, the form details are delivered to the proper destination.

The details of the MFMD implementation, and the Financial Transaction Request Form, are presented in Chapter 8, "A MFMD Example: The Financial Transaction Request Form." The purpose of the Financial Transaction Request Form was to enable a department to request the account status and transaction reports, for a nominated account number, over a specified period. Again, this information resided on a database that was not a part of the Campus Network.

In summary, the effectiveness of ESDI as a viable technology for the office is discussed in Chapter 9, "Discussion and Conclusions," along with recommendations for future work.