ELDORADOC: promised land of gold?

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Abstract

This paper summarizes the main experiences in the starting period of the project ELDORADOC, a pilot study at the University of Groningen in the Netherlands aiming at the disclosure and distribution of refereed electronic documents.

ELDORADOC is one of the SURFDOC projects in the Netherlands where activities are initiated in order to gain insight in the technical, organisational and end user issues of the storage and disclosure of electronic documents. A brief overview of these SURFDOC projects is given.

ELDORADOC is based on a conceptual model that gave rise to several activities needed for the success of the project. Conceptual model and activities relevant to the subject of this paper are discussed, such as the role of the 'Open Library Network', the electronic document collections, document sources and how they are transformed to electronic collections, which document formats are appropriate, the interaction between the document store and requirements of software needed to disclose the material.

In a concluding chapter the problems we encountered (and the possible solutions we have in mind) will be discussed with the intention of triggering collaborative initiatives to enhance the quality of networked information.

I. Introduction

ELDORADOC is just one the projects in the area of electronic document delivery that are momentarily being undertaken in The Netherlands. To put ELDORADOC in the right perspective first an overview shall be given of the efforts that are being undertaken in this area. This effort is coordinated by SURFNET BV, our national academic network organisation, and is commonly referred to as the SURFDOC-project.

I.A. SURFDOC

SURFDOC consists of three main goals:

1. To establish a permanent collaboration between university libraries and computer centres.
2. To provide electronic documents to endusers in three academic institutes as a result of the collaboration of libraries and computer centres and to gain insight in the user responses (Server Project).
3. To realise technical facilities at five demonstration sites so that images can be received, scanned and sent to the user and to gain insight in the user responses (Images Project).

Collaboration between libraries and computer centres was triggered by facilitating a meeting of the two parties in the spring of 1993 and by forming a combined working group that set out to make an inventory of common goals and means. Besides this, in order to be eligible for funding of a Server Project, libraries and computer centres had to jointly commit themselves to the project.

ELDORADOC is one of the server projects, together with the following projects at other universities:

- University of Leiden: storage and disclosure of historic material (partially scanned and OCRed) as well as electronic periodicals or electronic versions of paper periodicals. The Leiden project is known as OASIS.
- University of Utrecht: several document collections of the Faculty of Arts and Literature will be stored and disclosed.
- University of Brabant: all the paper periodicals of ELSEVIER will be stored electronically as well and made available for on-campus users only. Besides these documents, a selection of the images of the "Topographical-Historical Atlas" will be stored and made available outside of the university campus as well.
- University of Nijmegen: negotiations are in progress with the publisher SPRINGER to make it possible to use RIGHTPAGES software to store and distribute periodicals and other documents.

With exception of the ELSEVIER material all the mentioned projects have in common that the periodicals and documents are free of copy right. In this way all the attention and efforts can be put into solving technical and organisational problems, instead of having to deal with troublesome publishers.

In the Images Project two scan laboratories were established at the Universities of Utrecht (for MacIntosh systems) and Leiden (for MSDOS and UNIX systems). In these laboratories hardware and software from commercial providers and the public domain have been tested within their own environment as well as in interoperatability situations. The first results of these tests prove that

there is a wide variety of software that enables users to work with scanned material. In the second phase of the project five additional sites will put the findings of the laboratory tests to use in situations that enable end users to receive and manipulate scanned images.

In March a (Dutch) report [1] appeared describing the progress of the various SURFDOC projects. This report will be translated into English and made available on the document server of SURFNET BV.

II. ELDORADOC

The project ELDORADOC (Electronic Library Documents: Online Retrieval And Delivery Of Contents) is a project of the University Library and the Computer Centre of the University of Groningen in The Netherlands. The project is an initiative of the University Board of Directors and is funded by the University and SURFNET BV.

The project aims at the disclosure and distribution of already available, qualified electronic publications that have been produced by staff and students of the University.

At the start of the project, in the summer of 1993, a conceptual model of how users should be able to find and retrieve electronic documents was agreed on by the participants:

- documents are primary disclosed by way of the 'Open Library Network' of the Dutch universities and secondary by way of new ('new' as seen from the view of the ancient librarian) protocols such as SR and Z39.50;
- after finding the document the information on the screen should be sufficient to enable the user to decide whether to retrieve the whole document or discard it;
- after receiving a document the user should be able to view the document without a specific word processor or print the document.

The documents are eventually to be stored on a dedicated document server, that is at least reachable by way of GOPHER and FTP. WAIS is to be used for the secondary disclosure of the documents, in case the document store is approached from the INTERNET side.

As soon as ELDORADOC contains a substantial collection of electronic documents a user survey is intended to be undertaken. ELDORADOC has been conceptualised by trying to imagine how an ordinary enduser would want to retrieve networked documents. The implementation of this concept has to be judged by real users.

The conceptual model gave rise to a series of activities that were defined as necessary for the success of the project. Activities relevant to the problems discussed in this paper will be briefly discussed. Before that the role of the 'Open Library Network' will be given some attention.

II.A. 'Open Library Network'

The role of the 'Open Library Network' is very important and the implication for ELDORADOC needs some clarification. Nearly all of the Dutch university libraries, the Dutch Royal Library and several scientific, public and special libraries cooperate in the area of library automation in the broadest sense of its meaning. PICA, a not for profit organisation, has been founded by the participants as early as 1969 for the development and implementation of library systems. In the past 25 years considerable effort and money have been invested in quite a sophisticated and complex library automation system for the Dutch libraries. A more detailed description on this achievement may be found in [2].

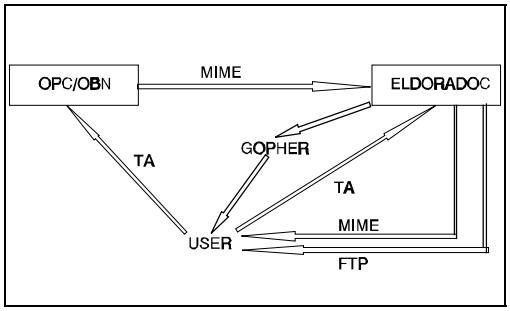
It should not be surprising that the University Library is very reluctant towards any initiative that might undermine the position of the PICA system as the only mechanism for the formal disclosure of scientific information. Their standpoint is, taken literally, that all the information sources relevant to scientific research and education (regardless of the medium on which they are presented) are the domain of the library.

On the other hand it was quite clear that they couldn't possibly disclose all the networked information that is available and is in use within the academic community. Even if you take into account that 95% of this information is garbage, the remaining 5% of the several terabytes of information still stands for an enormous amount of information that has to be catalogued. Library technical and organisational difficulties prohibit this endeavour.

Therefore a compromise was needed and found. It entailed that the library should only take refereed information sources into account. In this way a clear procedure could be established in order to decide whether electronic document collections should be catalogued and disclosed by way of the library system and be stored on the document server. To achieve this situation the PICA format used for cataloging documents had to be adjusted. Existing editorial boards were to be approached to take on the task of reviewing documents that are to be put on the document server.

A problem with this compromise is that at the application level there is no communication between the library system (VAX/VMS with X.25 connectivity) and the document server (RS6000 and

TCP/IP connectivity). Thus a user, after having found the reference to an electronic document, will have to start a separate interaction with the document server to actually retrieve the document. To resolve this problem the library system is being modified so that, if so instructed, it will be able to generate an email message addressed to the document server. This message contains the URL (Universal Resource Locator) of a document on the server and the email address of the person who wishes to receive a (MIME) email with the desired document. This is still in its developing phase at the moment. On the server side a mail based access method has to be installed and MIME has yet to be fully supported. When these features have been implemented the integration of ELDORADOC and the 'Open Library System' will be as follows:



A user may access the 'Open Library System' (OPC/OBN) with a terminal access protocol (TA) and find an electronic document catalogued on the system. If he wishes to retrieve the document a MIME message (with the URL of the document and the email address of the user) is delivered at ELDORADOC and subsequently (or in the quiet hours) a MIME message containing the document is delivered at the users mailbox. A user may also directly access ELDORADOC (by way of TA, GOPHER or FTP) and retrieve the document.

II.B. Electronic document collections

The first sources that were to be disclosed are dissertations produced by scientists of the University and mediaeval texts that have been collected and transferred into electronic documents by scientists of the Faculty of Arts and Literature. The dissertations will be taken as an example of how we went to work.

Each year 200 dissertations are presented at the University. The library receives 50 copies of each dissertation for cataloging and distribution purposes. Most of these documents are prepared by the scientists themselves, including the layout of the document. Preliminary enquiries suggested that at our university WORDPERFECT and LATEX were the most common used word processors and that all the dissertations should easily be transferred to POSTSCRIPT (why POSTSCRIPT was selected as the appropriate document format will be discussed further on).

At the end of 1993 all the authors of dissertations of the last two years were asked to cooperate in the project. Starting from november 1993 it is allowed to give the library an electronic document with the dissertation in stead of the paper version (paper versions are still mandatory for other than library purposes). Each electronic dissertation is stored on the document server in POSTSCRIPT format, together with ASCII versions of the bibliographical data, the summary and the table of contents. A typical GOPHER screen with the items of a dissertation will look like:

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   Leven, liefde en dood: ...;  B.Wesseling; 1993


<F> Leven, liefde en dood: ...;  ISBD-blok
<F> Leven, liefde en dood: ...;  Table of Contents
<F> Leven, liefde en dood: ...;  Samenvatting
<F> Leven, liefde en dood: ...;  Postscript
<F> Leven, liefde en dood: ...;  PDF
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The bibliographical data (ISBD-blok) are downloaded from the library system, the table of contents and the summary (Samenvatting) are extracted from the dissertation. With this set of GOPHER items an enduser is able to decide if he wants to retrieve the electronic dissertation.

Approximately 60 electronic dissertations were received by the end of March and no more than 10% was accepted in the collection. What went wrong? The main reasons for not accepting a dissertation were the following:

- POSTSCRIPT is less wide spread than first was thought. A lot of authors weren't able to deliver their document in the desired format and sent the WORDPERFECT or LATEX document instead.
- A good scientist isn't automatically a good typist or layout specialist. Documents received in the original word processor format couldn't be transferred to POSTSCRIPT because even the elementary requirements of well structured documents were not met. Although the authors claimed that if they printed the dissertation locally this resulted in 'camera ready' documents, this doesn't mean that the documents are also 'network ready'.
- Further we discovered that the 'final' versions we received from the scientists differed in minor ways from the paper versions of the publishers (drawings were on other pages, foot notes had been moved, etc). This caused some debate with librarians, as the electronic version

was no longer identical with the paper version and couldn't be catalogued as such. This was contrary to the format change (mentioned earlier) that treated electronic documents as identical to the original paper document.

- Even though a dissertation is completely made of electronically produced parts this doesn't mean that it is one electronic entity. Often we encountered documents where the text was made with a word processor and the figures and tables were made with totally different software and later literally glued into the spaces that were reserved for them. Scanning the figures and tables and incorporating the images into the document proved to be a very tedious task and could not be done a part of the project.
- Many dissertations (or parts of them) are also published on the commercial market. This wasn't new for us, but it is one of the reasons for not publishing a dissertation electronically.

The results of the survey with the dissertations didn't keep us from looking for other collections that could be added to ELDORADOC. At the time of writing this paper (april 1994) ELDORADOC consists of the following collections (next to the two already mentioned):

- The electronic bookshelves: already there are many electronic documents that have a certain standing within the user community. 'Zen and the Art of the Internet' [3] is an example of such a document. As of yet libraries have not bothered to actually collect and catalogue these documents just for the sake of collecting them. Although they have been archiving all kinds of manuscripts for the past centuries just for collection purposes, to my knowledge, librarians treat electronic documents as ephemeral information. Starting from the 17th of March existing electronic documents from the Internet are being refereed by local library committees and after being catalogued by the University Library they will be stored on the document server, not only for present use, but also for archiving purposes for later use. Such use might be a (hypothetical) scientific research, to be done in the first decade of the next century, intended to gain insight in the manner in which thoughts evolved concerning networked information.
- Academic lecture notes: inaugural addresses and scientific lectures will be disclosed and made available by way of ELDORADOC (in at least ASCII-format).
- Congress papers: papers of lectures that are presented at congresses organised by the university will be disclosed and stored in ELDORADOC if a programming committee expresses this wish. The first congress to be disclosed in this manner will be the '34th European Congress for Regional Studies' to be held in Groningen in August 1994. The outcome of these first networked congress papers will establish guidelines for coming events at the university.
- Documentation Centre of the Dutch Political Parties: the yearbooks of this centre are being made available by way of ELDORADOC.

These document sources are presented to the user with the following GOPHER screen in RUGCIS (our Campus Information System):

ELDORADOC

<F> Introduction
<D> Indexes
<D> Project information
<D> Dissertations
<D> Electronic book shelves
<D> Mediaeval texts

As with the first document sources that were selected all these documents are free of copy right restrictions. A collection that we are working on at the moment, and is worth mentioning here, consists of the scientific visualisations that are produced at the Visualisation Centre at the Computer Centre.

II.C. Document formats

As mentioned earlier next to ASCII, POSTSCRIPT was the only format taken into consideration for the documents in ELDORADOC. There were three reasons for choosing this format type:

- A POSTSCRIPT file is basically just plain lower ASCII, can easily be transported across any kind of network with any kind of application (FTP, email, GOPHER, W3) and can be viewed on a variety of platforms (MSDOS, UNIX, MACINTOSH and most vendor platforms).
- POSTSCRIPT files can readily be converted from most word processor formats.
- POSTSCRIPT was soon to be succeeded with a new format from ADOBE INC, namely PDF (Portable Document Format).

In fact POSTSCRIPT was just a stepping stone to PDF, a document format that is more suitable for networked information. PDF is a document representation that describes a document in terms of the pages it is composed of, together with hypertext links, annotation functionality, bookmarks, thumbnail views of the pages and text search functions. Additionally PDF is a full superset of POSTSCRIPT, so that conversions from the latter format to the first should not be a problem. As it

was rumored that ABODE INC would release the viewer to the public domain, the odds that endusers would have the necessary viewer were favorable. By increasing the installed base of the viewer, their commercially available DISTILLER software for making PDF would sell better.

Dissertations as well as other electronic documents have successfully been stored in ELDORADOC, first in POSTSCRIPT format and later, as soon as we received the ACROBAT software from ADOBE INC, the documents were also stored as PDF files. As we had hoped the conversion went without problems. As of yet, we haven't been able to correctly install the printer driver for WORDPERFECT that was part of the ACROBAT package.

Of course during the initial investigations SGML (Standard Generalized Markup Language) was considered as a possible document format. Especially in the commercial publishers world this format is thought to be the future standard for the representation of documents. During a recent visit to several universities and institutes on the East side of the United States there were some implementations of SGML document servers that were very impressing (such as at the "Electronic Text Center" of the Alderman Library at the University of Virginia). However for the following reasons we decided to refrain from using SGML as the document format for existing documents:

- A SGML document should be constructed as such from the beginning. Private communications with SGML experts, preliminary tests with INTELLITAG (the WORDPERFECT SGML word processor and experiences at other sites (see [5] for example) lead us to this conclusion.
- Until recently there were no public domain SGML editors known to us, commercial editors are still very expensive.
- Even with the proper editor, to write a document in SGML requires skills that are not present within the scientific author community. The layout quality of the dissertations we received proved that.

SGML will not be totally neglected as format for documents in ELDORADOC. In the following chapter I will discuss what kind of documents we have in mind for SGML.

Documents stored on the document server have to be retrieved and viewed. In the next section something will be said on the retrieval mechanisms, but first some words on our experiences with available viewers. As we wanted the barriers for the users to view the documents to be as small as possible we restricted our investigation to software available or to become available from the public domain: GHOSTVIEW and the ACROBAT VIEWER.

GHOSTVIEW is a common public domain POSTSCRIPT viewer for UNIX environments. It proved to be readily available on a variety of platforms at the university and, given a correct installation, users were capable of browsing through the ELDORADOC documents once they had retrieved them. However, a majority of the university users has a MSDOS/NOVELL platform and the GHOSTVIEW implementation for this platform is of poor quality: installation is tedious and once in operation, for no apparent reason at all, viewing stops and in some cases the system halts. It was decided not to support this product.

As it was expected that the ACROBAT viewer is to become available in the public domain, this was also tested. A INTEL-386 MSWINDOWS platform with at least 4 MB memory is mandatory for the viewer provided by ADOBE (there is also a MACINTOSH version but this wasn't tested). Actually an INTEL-486 with 6 MB memory is the minimum configuration if one wishes to view documents that have more than 5 pages. If one wishes to actually read the document behind the screen a high resolution monitor is also a necessity. For ordinary users this platform is certainly not (yet) an ordinary asset. Once installed (quite easily) the viewer performed without faults and is very easy in use.

II.D. Document server software

In conclusion to this overview of ELDORADOC a few words will be spent on the software used on the document server

From the outset of the project it was clear that the document store was to be part and parcel of RUGCIS, the campus information system of the University and should adhere to the rules laid down by the RUGCIS editorial board.

GOPHER is used as navigator software for RUGCIS and ELDORADOC is a directory subtree within the information structure. Users may retrieve POSTSCRIPT and PDF documents with their client or use FTP.

Secondary to the disclosure by way of the Open Library Network, search and retrieval tools were needed for those who access the document store from the INTERNET side. Two tools common to the GOPHER environment were tested: WAIS and VERONICA.

WAIS (Wide Area information Server) has been installed in conjunction with GOPHER in such a manner that users are able to perform keyword searches on the whole or parts of ELDORADOC. A

draw back of WAIS is that only file names and contents of file can be used for the indexing (and not the GOPHER menu items). Further more the freeWAIS implementation is not free of errors.

VERONICA was originally meant for the global disclosure of GOPHER menu items. However, present practice proves that it isn't scalable (at least it can't keep up with the rate that the GOPHER space is growing with). Asides from this, the quality of GOPHER servers on the network is disappointing, leading to numerous wrong hits (server error, access denied, etc) when using VERONICA. Furthermore in our view VERONICA shows the dark side on depending on public domain software: the 'developing team' in Minnesota consists of one person who, even though he is very capable, can't even keep up with corrective maintenance, not to speak of fulfilling new wishes, such as local VERONICA servers. A professional service cannot depend on this kind of support (with all due respect to the developer of VERONICA).

It is for these reasons that we do not use VERONICA within the ELDORADOC project. In another project at the Computer Centre we are studying the possibility of setting up a local VERONICA server, disclosing only the information available within RUGCIS.

III. Global problems and solutions

In the preceding chapter I have mentioned activities and some problems we encountered. In this final chapter I will try to distinguish some fundamental problems and mention paths leading to a solution. Some of these paths will take us way out of the project domain of ELDORADOC and are certainly not intended to be future activities of the project team.

III.A. Quality of information

The importance of the quality of the information that is being presented is vital in the acceptance of networked information as an effective tool for the scientific community. End users will only start to use electronic documents if the added value weighs up to the negative sides of the new technology. So added value has to be maximised and the negative sides have to be minimised. At present the quality of electronic documents can certainly be improved.

During the starting phase of ELDORADOC we have encountered this quality aspect in different disguises:

- the quality of the server infrastructure;
- the quality of the tools;
- the quality of the presentation of the information and
- the quality of the information.

The quality of the server infrastructure and the tools is beyond the scope of the SURFDOC projects. In the future the quality of the presentation of the information will be the responsibility of the editorial board of the Campus Information System (library and computer centre should both be part of this board and in Groningen this is actually the case). The quality of the information itself can only be safeguarded by using existing refereeing committees. I do not exclude an important role for publishers here.

Endusers are not in the habit of analysing their disapproval of the quality of information. If they disapprove of the quality of an electronic document too often, they will not try to rationalise their disappointment in order to find the reason of the poor quality. They will just discard the new information medium completely. It is therefore important that a collaborative effort is put into the improvement of all the aspects regarding quality of information.

Earlier the poor layout quality of the documents was mentioned. Authors of scientific (paper and electronic) documents are being encouraged to follow the DTP course of the Computer Centre in order to be able to structure their documents in a more coherent way. This course is based on the concept that authors should define the functional elements of the manuscript they are planning to produce in an early stage and then build a framework into which the text, tabels and graphics is to be added. Guide lines and tools (WORDPERFECT macros and styles) are made in advance and given to the people who follow the course. The course assumes that ultimately the document will be produced on a POSTSCRIPT printer. The ease in which POSTSCRIPT documents are converted to PDF was mentioned earlier. By promoting this course and making some minor adjustments (such as defining hypertext links in the document) in due time we hope to improve the layout quality. At the same time, by stressing the importance of the functional elements of a document, we expect that documents will just as easily be converted to SGML, given the availability of applicable convertors.

III.B. Rich man vs. poor man

The electronic highway, a term introduced by the Clinton/Gore administration in the United States, promises high bandwidth network facilities into houses and institutions. Not only in the US, but in Europe as well, a lot of publicity is being made

around the vast possiblities of the emerging new technology and the impact for society.

However during the first phase of ELDORADOC we have encountered several threshholds that might keep several groups of users from actually using the new technology. These threshholds (to be summarized below) could very well enforce a schism between user groups that are in procession of more than common desktop attributes and those who are not that fortunate. Work has to be done to lower the thresholds, the most important ones being:

- Bandwidth requirements: electronic dissertations can be up to 10 MB, meaning at least megabit network connections in order to be able to retrieve the document.
- Hardware requirements: the ACROBAT viewer (and others) requires a very powerful hardware platform. The past has proved that within time these platforms will become affordable. In the mean time viewers with less functionality might overcome this temporary difficulty.
- Software licenses: PDF and SGML are subject to licence policies. Especially during the initial phase of electronic document retrieval it is imperative that as many users a possible are able to view the documents. Public domain software or campus licenses are needed.

Taken one at a time, minor deficiencies in the requirements are not problematic. However in order to really profit from the added value of electronic documents all the requirements have to be met in some way. The accumulation of several deficiencies will create several (large) user groups within the academic community that will be excluded from information necessary for their work and education.

III.C. Postscript/PDF/SGML/?

The problems regarding the format in which documents are to be stored on the document server has been addressed extensively earlier. We have decided to resolve this problem supporting a multiformat platform and letting the author of the document decide how the document is to be stored. The only restriction that applies is the document being completely electronic. For documents that are electronic versions of existing paper documents POSTSCRIPT and PDF are the most promising formats as they are page oriented document representations. SGML is suitable for documents that, from the very beginning, are intended to be networked information.

In our opinion it is the intended use of the electronic document that defines the format to be used. This may be illustrated by the requirements scientists of the Faculty of Arts and Literature regarding working with electronic documents. They want to use the documents in collaborative working environments (needing closed user groups), where participants are able to retrieve parts (e.g. paragraphs or sentences containing a particular word) and annotate these parts to other (parts of) documents. Presumably SGML will be the best solution for this user group.

III.D. Integration

In the various activities and the problems encountered during this first phase of ELDORADOC it has become noticeable that electronic document delivery is something like a giant puzzle. All the pieces are there and all that is needed is a coordinated action to bring the parts together and let them interwork. The library system is already there and only needs to be laced with INTERNET functionality to have a professionally organised system for document disclosure and retrieval. The activities of ELDORADOC are related to several other projects going on in the area of network services, such as the introduction of MIME and the next generation of INTERNET navigators (GOPHER+ and W3). It is important that the results and the future plans of ELDORADOC (and other electronic document projects) are communicated with the teams of the related projects.

III.E. Libraries and computer centres

In a lecture (of a librarian) I once heard information technologists being described as juveniles who throw a handful of fruits of a brain storm session against the wall and see what sticks. In a lecture (of an information technologist) librarians were described as ancient wise people who, given any kind of problem, need several months of intensive meditation before daring to speak about modifying even the slightest part of their preciously built temple. These and other similar metaphors are usually left hanging without anything positive done with the observation.

During the SURFDOC projects libraries and computer centres of several universities have been thrown into each others arms and been forced to collaborate by way of financial stimulation. Neither ELDORADOC or OASIS (the project in Leiden) would have been possible if either library or computer centre would not have participated. Both organisations have been able to learn new procedures in the new area of networked information.

IV. Conclusions

ELDORADOC is (still) small and beautiful and to conclude this paper with a reference to the metaphor used in the title of this paper I will

summarize the conclusions of our experiences as follows:

1. If ELDORADOC is to become the undisputable haven of high quality networked information that we had in mind when we started with this project, the University Library and the Computer Centre will first have to put the gold there themselves and keep it there. In practice we'll have to:
   - adhere to high demands regarding the refereeing of documents to be included in ELDORADOC and
   - encourage authors of electronic documents to produce well structured documents, if possible independant of the ultimate document format.
2. The present vehicles needed to reach ELDORADOC need to be improved. The most important wishes are:
   - more integration of the 'Open Library Network' and the document server;
   - better and more user friendly retrieval platforms (W3 of GOPHER+);
   - more installed PDF (and later SGML) viewers integrated in W3 and GOPHER+);
   - enforcement of MIME as a generally accepted and implemented email function.
3. The choice of the document format to be used for electronic document storage should be left to the users as only they know what the use of the document will be.
4. One of the SURFDOC objectives (to establish a permanent collaboration between university libraries and computer centres) has certainly been established and proven to be a condition for the success of the project. The collaboration will be intensified in the future.
5. The quality of electronic document systems calls for more than technical management skills. Various solutions to problems are already available and only have to be put in place at the correct time. This calls for management skills of another level than usually present in network environments.
6. ELDORADOC might well be the metaphorical 'land of promised gold', but for the time being it is only for the happy few who have the hardware and bandwidth necessary for successfully mining the resources.

V. References

[1] M.A.M. Heijne, SURFDOC "Opslag, inzage en verwerking van elektronische documenten", SURFNET BV document, February 1994.

[2] A.C. Klugkist, The 'Open Library Network': Pica and SURFnet, Journal of Information Networking, Vol. 1 Number 1, 1993.

[3] B.P. Kehoe, Zen and the Art of the Internet, 1st edition, February 1992

[4] Ph.N. Smith et al, Journal publishing with Acrobat: the CAJUN project, Electronic Publishing, Vol. 6(4), 1-3 (December 1993)

[5] K. Dalal and E. Fox, Document Translation: Dissertations and Technical Reports, Technical Report 93-31, Virginia Polytechnic Institute, September 1993.

VI. Author Information

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