

Computerising the Legal System

The Development of Computerisation in the Commonwealth

Memorandum by the Commonwealth Secretariat

1. Increasingly steps are being taken by Commonwealth countries to computerise aspects of their legal systems. Applications of computer-technology have included the computerisation of statute books and case-law, of registers of title to land and of prison records, and the development of software tailor-made for legislative drafting, for treaty registers and for use by court registrars. Whilst some of these developments are taking place in the private sector, most are within the domain of governments. In some jurisdictions progress has been rapid and remarkable. In others scarcity of resources has meant that conditions have not hitherto been favourable to large scale computerisation. A recognition of the significance and value of computerisation is however common ground.

2. It is also likely that a number of jurisdictions are inadvertently passing up present passing-up opportunities to develop electronic legal data-bases. These will be jurisdictions where word-processors are employed to produce legislation and/or court judgments but where the resulting computer files are not being archived methodically in order to build up what in time may be, for example, a computerised full text series of law reports¹. With the cost of computers ever reducing and their capabilities ever increasing, such a concept is within the realistic expectations of all.

3. There are 2 broad areas of Commonwealth interest:-

- (i) Maximising the use of existing technology in the interests of enhanced mutual assistance. This includes encouraging (a) the recording of primary legal materials - statutes and decisions of the higher courts - on computer disks at the time of their enactment or delivery; (b) the recording of existing primary legal materials; (c) Commonwealth-wide access to data-bases already created or being established; and (d) the application of CD-ROM technology;
- (ii) Promoting and assisting the general development of computerisation in the legal field throughout the Commonwealth through the sharing of experience and coordinated action.

MAXIMISING USE OF EXISTING TECHNOLOGY

Recording of primary legal materials

4. In many member states the recording of legal materials in a "computer -friendly" form i.e. on a word-processor hard or floppy disk is a recent development or

one which is now taking place. It is however a development which is to be welcomed and encouraged. The recording of new statutes and case-law opens the way to the more involved undertaking of computerising the entire corpus of the law of a jurisdiction. This in turn renders law-revision activity easier and more cost-effective. The potential is also opened up for access to the computerised materials by government departments, practitioners and the judiciary through software developed for the purpose, for international on-line facilities, and for the application of CD-ROM technology.

Accessing on-line facilities

5. Given the use made in research and in the preparation both of legislation and cases for trial of comparative Commonwealth legal material, there would be clear mutual advantage if developed systems, and particularly those that are "on-line" to practitioners and others, could be made available to users in other Commonwealth countries and, where possible, on the most favourable terms. However, it must be noted that "on-line" costs can be considerable (particularly in terms of international dialling where the system is not available through the established network which provides access through local calls) and that accordingly the CD-ROM option discussed below can be a much cheaper mode of accessing information where this is available on disk.

6. In the context of sharing data bases, the initiative taken by the Law Reform Commission of British Columbia in creating a data base with references to law reform materials in the Commonwealth - and by then making it available across the Commonwealth at no charge - is not only to be warmly welcomed, but hopefully may have set a standard others will wish to follow.

7. Such an approach would call, in some cases at least, for international accessing to be borne in mind at the time when the systems were being designed or updated. Consideration would need to be given to compatibility and to the preparation and dissemination of instruction manuals to facilitate access and searching by those outside the jurisdiction, although much of the software now in use is so "user-friendly" as to reduce these requirements almost to the mundane (and such manuals would probably be required within the jurisdiction in any event). Naturally, if accessing by other governments were to have resource implications for the receiving government, it might need to examine how these costs, or part of them, could be recovered. However, the expectation would be that any such costs would be minimal. The volume of requests for information

would be unlikely to be large, and the fact that the Commonwealth is spread across nearly every time zone in the world would mean that a significant amount of this use would be likely to take place at times of day (or night) when local users would not themselves be accessing the system.

Using CD-ROM technology

8. The capacity of CD-ROM to store vast quantities of information is considerable. CD-ROM refers to a "read-only" disk which in appearance is identical to an audio CD but which in fact is capable of storing up to 220,000 pages of printed text (i.e. 650MB or the contents of 1,500 double-density floppy disks). From the Secretariat's own point of view, it is likely that, sooner rather than later, the Secretariat may need to have recourse to publishing the Commonwealth Law Bulletin on CD-ROM. Under such an arrangement, each recipient government department would have a relatively inexpensive CD-ROM reader (cost approx. £300), plugged in to (or an integral part of) virtually any PC. The whole of the series would be contained on a single CD-ROM, and could be searched etc readily through software contained on the disk with the full text being brought up on the screen. A replacement disk would issue every three months or so. Eventually, such a system could build in to an "on-line" service, so that governments who wished could enter the central system at Marlborough House and search and retrieve information fed in to the system but not yet incorporated on an issued disk.

9. The capability of CD-ROM is such however that it may be possible to think in terms of the production of a single CD-ROM disk that could hold the combined statute books or other legal materials of a number of Commonwealth jurisdictions. The inability to amend issued CD-ROMs (a new disk must be issued instead) places limits on their value, at least in the context of an area of rapid legislative change, but such disks would remain enormously valuable research tools for all Commonwealth governments at a significant discount to on-line facilities. That is not of course to question the use of on-line facilities for checking on the most up to date legal position.

10. A number of jurisdictions have their statutes on a data-base. The Commonwealth Secretariat would be happy to facilitate the exchange of information with a view to assisting the development of individual or cooperative CD-ROM projects and would encourage national governments to give the Secretariat details of their legal computerisation programmes.

GENERAL DEVELOPMENT OF LEGAL COMPUTERISATION

11. The question of cost is clearly uppermost in the minds of all those looking to increase the application of

computer technology to their legal systems at whatever level of technical sophistication. A thorough and pragmatic analysis of the desired objective at each level of development is required and the extent of both the initial financial outlay and ongoing costs should be researched fully before any step is taken.

12. Once a full needs-assessment has been made and preliminary costing done the broader question of the financial structure which will support the computerisation programme undertaken must be addressed. A consideration of involvement of the private sector or at least commercialisation of the government's information service is inevitable. Whilst such matters are outside the scope of this paper it is hoped that a developmental government policy will not in practice be hampered by the niceties of private sector agreements.

13. The mutual benefit in the exchange of information and ideas and the possibility of fruitful cooperation in developing and commercialising computerised legal data bases is obvious. It is suggested that Ministers may wish to further the discussion at last year's meeting of Senior Officials of national experience in the development of legal data-bases. Ministers are also now invited to implement the recommendation of that meeting and formally to establish a Commonwealth Legal Computerisation Committee. The Committee would be comprised of experts from those Commonwealth jurisdictions with the greatest experience in this field who would oversee and stimulate the co-ordinated, efficient and orderly development of computerisation of legal systems within the Commonwealth. The precise terms of reference of the committee are appended to this paper at appendix A.

14. Attention is also drawn to the Pilot project outline - Computerisation of justice functions of small jurisdictions at appendix B. This is a paper by the Foundation for Responsible Computing which emerged from the 1991 meeting for Senior Law Officers of small Commonwealth Jurisdictions. It deals, in notable detail, with a procedure for approaching computerisation, possible supply sources and approximate costings.

APPENDIX A

ESTABLISHMENT OF THE COMMONWEALTH LEGAL COMPUTERISATION COMMITTEE

Recommendation as agreed by the Meeting of Senior Officials

In the light of developments in Commonwealth countries as described in the discussions, the Meeting decided:

- (i) That Law Ministers be invited to establish a very small group of highly-experienced experts to serve as a Commonwealth Legal Computerisation Committee.
- (ii) That the actual experts be drawn from the four or five Commonwealth jurisdictions with the greatest experience in the computerisation of legal systems and the development of legal data bases.
- (iii) That the Committee be a standing Committee and have terms of reference enabling it to:
 - (a) oversee pan-Commonwealth developments in these fields with a view both to securing maximum efficiency and to ensuring that dissimilarities which could eventually lead to disruption in exchanges of legal information are avoided;
 - (b) foster the orderly development of regional co-operation in these areas (including with relevant non-Commonwealth countries);
 - (c) inter alia assist in developing approaches to legal computerisation particularly suitable for small jurisdictions;
 - (d) advise individual governments ad hoc;
 - (e) foster such transfers of technology between Commonwealth countries as may be appropriate;
 - (f) assist in developing any publication programmes that may become desirable;
 - (g) assist in advising on any necessary amendments to relevant legislation to accommodate technical developments (eg evidence, data protection, computing).
- (iv) The Committee should be serviced by the Commonwealth Secretariat and report both periodically to Law Ministers and Senior Officials through the Commonwealth Secretary General.
- (v) That the Committee be self-financing.
- (vi) That the Committee pay special attention to the Pilot Project Outline - Computerisation of Justice Functions of Small Jurisdictions.

APPENDIX B

FOUNDATION FOR RESPONSIBLE COMPUTING

PILOT PROJECT OUTLINE COMPUTERISATION OF JUSTICE FUNCTIONS

OF SMALL JURISDICTIONS

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COMPUTERISATION OF JUSTICE FUNC- TIONS OF SMALL JURISDICTIONS

Outline of a Pilot Project

Background - The Cyprus Meeting

In August of 1991, a five-day Commonwealth Meeting, hosted by the Government of Cyprus, was held in Nicosia for Senior Law Officers of Small Commonwealth Jurisdictions (the Cyprus Meeting). At the invitation of the Commonwealth Secretariat, the Foundation for Responsible Computing (FRC or the Foundation) organised the fourth day of the Cyprus Meeting, which was devoted to Computers and the Law Pitfalls and Possibilities for Smaller Jurisdictions.

In response to a number of papers² presented on behalf of the Foundation, a fruitful discussion involving all attendees produced a consensus and recommendations for action duly reflected in the Report of Meeting, the relevant portions of which are reproduced in Appendix A hereto. In particular, the opportunities for a small developing state presented by the automation of its justice functions were considered by the Cyprus Meeting to be of such importance that a pilot project was envisaged whereby the Commonwealth would assist one or more small developing states in the computerisation of its legal system. In that regard, the FRC was invited by the Commonwealth Secretariat to prepare a working paper for such a pilot project, in pursuance of the requirements formulated at the Cyprus Meeting, to be presented to the Meeting of Senior Officials of Commonwealth Law Ministries to be held in Singapore from 30 March - 2 April, 1992 (the Singapore Meeting).

Project Overview

The participants at the Cyprus Meeting, as a result of their own reviews and considerations, were unanimous in identifying a list of critical operational areas where functions should be automated, and in expressing their

over-all need for computer- and telecommunications-based tools to allow them to bridge time and distance in liaising and coordinating activity, sharing experiences, working collaboratively, and accessing commonly needed resources (such as Privy Council decisions) on a timely basis. The elements specified by the Cyprus Meeting as priorities for action³ are accordingly addressed in the present paper, together with suggestions on order of implementation, possible supply sources, and approximate costings.⁴

The nature and traditions of the common law system invest the project for automation and electronic communication between Commonwealth jurisdictions with a particular resonance. The heritage of common law binds this community across oceans and continents, time zones and centuries, so that the task of making this great body of law and precedent more readily accessible inspires both awe and prudence. To carry out this task will require skill, perseverance and willingness to learn, so that the benefits of the modern technological revolution in communications may be made to serve the needs of the peoples and governments of the full range of Commonwealth jurisdictions.

With this aim in view, we have examined the underlying applications that would be needed to automate the various operational areas and we have also considered the necessity to lay the groundwork for an open architecture enabling the most efficient and effective execution of this project. Larger scale implementations will follow if the initial stages are successful, as well as subsequent implementation of additional functionality in a complementary fashion. In this examination we have taken into consideration the current state of the art as well as cost elements in terms of their impact on the small jurisdictions in whose interest the project is initially designed.

Succeeding in a project of this nature requires not only thoughtful planning but also the exercise of stringent discipline. Our recommendation is first to take the time necessary (probably from four to six months) to define an architecture, or common technology platform, within the framework of which operational applications would then be implemented. In the balance of this paper we outline the key elements of the project.

Planning the Project

The underlying assumptions on which planning could usefully proceed are set forth in the FRC's *Guide to Effective Procurement Techniques* presented to the Cyprus Meeting,⁵ and these elements are accordingly not repeated in the present paper.

As explained at some length in the FRC's *Guide to Effective Procurement Techniques*, a working group or steering committee (Working Group) needs to be established at the outset in order to ensure a timely, cost effective systems acquisition process. This approach is

the more important in the present context as compatibility between systems in the various jurisdictions must be assured if the project is to achieve maximum advantage to the users.

The Working Group coordinates the entire procurement process and takes responsibility not only to assess technical options and the suitability of the hardware and software products selected for the tasks at hand, but also to identify and monitor user requirements and preferences, to identify suitable vendors and supervise the contractual negotiating process, and to plan for an orderly implementation, comprehensive acceptance testing, and adequate post-implementation review and support (including user training and vendor support). For optimal results, therefore, the composition of the Working Group must include: at least one senior policy individual of the client department or ministry, who has command of the broad goals and objectives of the project; managerial personnel from each department whose operational areas are involved or directly affected by the outcome of the project (i.e., delivering or receiving services that will be automated); technical personnel into whose jurisdiction maintenance and support of the new system(s) will fall; a project manager (which may be an individual but preferably, for obvious reasons, would be a firm of information technology consultants); and a legal advisor experienced in hardware and software contracting, as well as in the request for proposals (RFP) process.⁶

To ensure compatibility (and therefore ultimate project success) in the multi-jurisdictional context of this project, it will also be essential for the Working Group to make its deliberations and decisions available to each of those jurisdiction(s) which, while not the immediate subject of the pilot project, have already automated administration of justice functions (or will be automating such functions during the anticipated timeframe of the pilot project). The reports of the Working Group could, for example, issue in the Commonwealth Law Bulletin. Interested jurisdictions could arrange with the Commonwealth Secretariat to receive texts and/or copies at an earlier stage than publication. Similarly, interested jurisdictions could be represented at meetings of the Working Group at appropriate stages of the project.

I. Defining a Common Technology Platform

Technological advances over the past five years or so with increases in power of microprocessor chips, decreases in component size, and declining prices have greatly enhanced the feasibility of projects such as this, by facilitating a general migration away from the expensive mainframe technology of former years to what has come to be called distributed or network computing. Over the same period, significant advances have been made in standardisation, particularly in hardware and operating systems, such that it is possible for prudent

users to define a technology platform that is vendor-independent⁷ and that will allow maximum flexibility, as time goes on, in adopting new technology without discarding the old.

Achieving a framework that will enable compatibility and information sharing should be possible if four common architectural building blocks are employed:

- a common *relational database*;
- a common *network operating system*;
- a standard set of specifications to be met by *network servers*; and
- subject to any flexibility permitted by the network operating system, a standard *network workstation*.

The objective will be greatly facilitated if, in addition, a common suite of application software is adopted for applications that contemplate data exchange (e.g., word processing, desktop publishing).

Database Management System (DBMS)

For computers, the workhorse of information storage and retrieval is application software known generically as a Data Base Management System (often shortened to "DBMS"). There are basically three kinds of DBMS: hierarchical, network and relational. Where they differ is in how they store records, which has a significant impact on their ease of use, their ability to retrieve information quickly, their ability to unify separate domains of information, their ability to handle heavy processing throughput, and the amount of memory they require. Success in achieving the strategic benefit sought by the Commonwealth of improving information delivery capability will depend on the type of DBMS chosen.

In most common use are hierarchical systems, which store information in a vertical hierarchy resembling an inverted pyramid or "tree" structure. In a true hierarchy, records at one level are accessible only through the records below them. There are at least two disadvantages to this system, as follows:

- to retrieve information from the depths of such a database, or to perform even the most perfunctory programming or maintenance tasks, a user must be intimately familiar with the structure of the trees (a formidable requirement when the database is large and complex); and
- because there are no cross-links between trees, a user must either accept slower response times or allow data to be duplicated in more than one tree, significantly increasing storage requirements.

A network database structure permits horizontal links to be established between the various levels in what is otherwise a hierarchy, cutting down on the duplication of information, but complicating the process of retrieval. With network systems an even greater premium is placed on the user's understanding of the data structure,

which can become so complex that very specialised training is required to work with it.

In a relational database structure, data is organised in tables, each row of which constitutes a record. A column from one table can be included in other tables, forging a relational link between all the tables in which the column appears. The result is that:

- duplication of information is kept to a minimum, since only relational links need be repeated, with the advantages of greatly improving the ability to update, minimising the opportunity to introduce error into the database, and virtually eliminating inconsistencies between databases;
- training requirements are lessened, since a knowledge of the database structure is unnecessary to achieve success in retrieving the desired information; therefore a broader range of users can benefit from the resource and administrative personnel and secretaries as well as lawyers will be able to use the relational DBMS quite readily;
- separate domains of information can be readily unified into a single database by the simple expedient of a relational link, with the result that each new application can work with *all* of the information stored under the relational DBMS, without any conversion, copying or re-keying; and
- reporting flexibility is completely unlimited.

In our view, a relational database, incorporating the SQL database language⁸ an accepted international standard, is the correct choice for the Commonwealth as a common database environment, not simply because of its storage efficiency and its reporting flexibility, but because of its unparalleled ability to unify separate domains of information.⁹ Moreover, a number of the leading relational databases offer compatible versions that operate on a multitude of technology platforms (i.e., combinations of hardware and operating systems), which may more readily facilitate the trans-jurisdictional adoption of the relational database.¹⁰ The Working Group should direct its attention, at the earliest possible date, to the selection of an appropriate relational database product, giving due attention to technology platforms already in place.

Network Server

The functionality of the microcomputer, while well suited to the needs of individual computing, does not, however, lend itself to the additional requirements engendered by the complex environment of many users performing a variety of tasks, sharing and competing for resources. For the network to succeed in meeting the needs of users, at their desktops, the abilities to share stored data, to manage competing needs for computing resources and to process communications functionality formerly provided within the unified structure of the mainframe or minicomputer must still be accommo-

dated. In the network computing architecture, these requirements are assigned to servers, computers that are connected to the network so that they are available to be shared by many users.

Computers designed as servers¹¹ outwardly resemble the central processing unit of a minicomputer, physically downsized but typically more powerful. The specific configuration (power, capacity, size) of a server tends to be defined by its role¹² and the roles of servers generally are considered to fall into three classes:

- *file servers*, which provide users with the ability to share stored data, and to control printers and other peripherals;
- *communications servers*, to manage network users and resources and to process intra-workgroup and inter-workgroup communications; and
- *application servers*, which are used to handle applications that are not optimally addressed at the desktop (for example, for reasons of horsepower, or the need to provide multiple concurrent access).

The role of a server is accomplished most effectively within network computing architecture by relatively inexpensive systems specifically designed¹³ to function as servers on a network (hereinafter, "network servers").¹⁴ These network servers offer multiple independent data communication channels and other features providing redundancy, reliability, data integrity and security of a calibre formerly associated only with large and expensive systems, and the ability to run industry-standard network operating systems (like Novell NetWare and UNIX).

We recommend that the Working Group should, at the earliest possible date, identify appropriate specifications for a range of network servers (which may be capable of being met by more than one manufacturer). Such a range would then form the basis for future purchases by all participating jurisdictions.

Network Operating System

The keystone of network computing, the network operating system must provide the means for integrating the various types of dissimilar computing resources minicomputers, mainframes, network servers and microcomputers and multiple network topologies into a unified system. With an astute choice of network operating system, the role of a server (particularly an application server) can also be accommodated, within certain parameters, by minicomputers, mainframes and even high powered PCs, with the happy result that, in many, if not most, cases, participating jurisdictions will not be compelled immediately to abandon investments in older hardware. Rather, they may convert, during a transitional phase, on a basis that recognises the economic life,¹⁵ if not the useful life, of existing equipment.

There are probably no more than half a dozen products, at most, that bear review and a key selection factor will be the range of equipment and peripherals which each can support. The Working Group should direct its attention, at the earliest possible date, to the selection of an appropriate network operating system.

Desktop Workstation

In a network computing architecture, word processing and most applications¹⁶ will operate at the desktop, meaning that an intelligent desktop microcomputer will assume much of the processing burden. That provides a number of benefits¹⁷ provided that an appropriate choice of desktop microcomputer is made.

It is generally accepted, since a 1987 report¹⁸ issued by the Gartner Group, a respected North American think tank, that there is much benefit in standardising upon a desktop workstation and in adopting a graphical screen display, or user interface as it is often called. The magnitude of the benefit was analysed in some detail by Gartner Group, through an examination of both the acquisition costs, including interest expense (hard costs) and the ongoing training and support costs (soft costs) of providing a desktop microcomputer and a defined set of applications to knowledge workers. Based on a life-cycle model developed in order to properly compare one-time and ongoing costs, their conclusion was that hard costs comprise only 28% of the life-cycle cost per desktop unit in a five-year period, with the balance 72% going to soft costs. The study also showed significantly lower soft costs associated with workstations that provide a graphical user interface, as well as consistency of screen layout¹⁹. The intuitive nature of a graphical user interface combined with consistency of screen layout²⁰, with the result that users tend to be familiar with, and regularly use, more applications and incremental training time for new applications is significantly lower.

The Working Group should recommend standardisation of ongoing purchases on a specific workstation incorporating a graphical user interface.

Application Software

Soft costs are also much affected, adversely, by an unnecessary diversity of application software. Operational efficiency also suffers as a result of excessive diversity, particularly where the application affects regular data exchange, such as word processing software and desktop publishing (DTP) software. Moreover, if existing equipment is to be kept for its economic life, and maximum flexibility assured for the selection of new equipment, key application software should be capable of running on a number of technology platforms. The Working Group should recommend standardisation of ongoing purchases of key application software on specific products, giving appropriate weight in selection to availability on a variety of technology platforms.

II. Implementation of Specific Applications for Commonwealth Jurisdictions

As a result of the consensus expressed by the participants at the Cyprus Meeting, we have accepted the list of critical operational areas requiring automation, so that we have essentially taken as done the initial phases of what would normally be undertaken as a needs assessment. Attention, and the discussion which follows, have accordingly been focussed upon the most advantageous prioritisation and staging. However, a further elaboration of the functionality desired in conjunction with each application or grouping of related applications (i.e., the detailed phases of the traditional needs assessment) should still be undertaken,²¹ in conjunction with a review of the functionality available in operational applications in use in relevant settings (e.g., government departments, law schools and universities, large law firms). For example, there are a number of applications developed in law firm and law school settings, oriented to the tracking and annotation of statutes and statutory provisions, linking of related cases and legal concepts in multiple jurisdictions, and general legal research tools and resources, that may be particularly responsive to the goals and objectives of departments of the Attorney-General and Justice in a small-state setting. Moreover, some large Commonwealth jurisdictions, such as Canada²², have compiled comprehensive catalogues of operational justice-related systems which will greatly facilitate such a review. The FRC stands ready to assist the Working Group or individual jurisdiction(s) in identifying resources relevant to particular applications under consideration.

Prioritising and Staging Functions to be Automated

One should not underestimate the scope or significance of the project contemplated. This is a management project of some complexity that will profoundly impact the department(s) and ministry(ies) involved in each participating jurisdiction, and it should be implemented in progressive stages, so that users at all levels are comfortable with the techniques and results as work progresses. Indeed, proper staging will be crucial to success.

In this project, the following factors must be given due consideration in identifying which applications must come in advance of others, and which may, or should, be grouped together:

- the relative complexity of the particular application;
- the existing expertise of the relevant user community;
- the importance of the services which will depend on the application;²³
- the importance of the application to the achievement of the departments or ministries broader

goals and objectives;

- the dependency of the particular application on other applications to be implemented or other aspects of the project;
- the potential to achieve improved services, cost savings, cost displacements and other efficiencies; and
- the motivational importance of an early success with obvious benefits.

Internal Publishing Capability for Statutes

On the basis of the foregoing factors, we would recommend beginning with the establishment of internal publishing capability for statutes desktop publishing to use the commonly applied phrase, or DTP. This is a mature and (relatively) inexpensive²⁴ application that may be readily implemented and mastered at appropriate staff levels without unduly complex training. Moreover, the alternative of outside professional publishing is well known to be very expensive. Thus one can achieve not only early success but also demonstrate the advantage of cost displacement, so that cost savings on outside publishing may be applied to fund ongoing elements of the larger project.

In addition to hardware, which will have been selected with the demands of this application in mind, and DTP software, this project element will entail conversion to electronic form of the entire legislative series of the particular jurisdiction. If the statutes have previously been typeset by a publisher using modern typesetting software, it may be possible to procure the data files created by the publisher and electronically read them in to the format of the selected DTP software²⁵. This is the most advantageous situation and should be explored as a priority. Alternatively, commercial services now exist to enter text on a large scale, either by scanning if the subject matter is of clean typeset or typewritten quality or by keyboard entry.²⁶

Publication in Electronic Form

It is widely regarded as fashionable to publish electronically, and there are certainly benefits to be enjoyed over paper in terms of space saving, portability and stability of the medium. However, commercial publishers and many who enjoy the in-house ability to publish electronically are very candid in admitting that a paperless society is still far away, and one must *always* make publications available in paper as well as in electronic media. Indeed, if this is not done, a fundamental principle²⁷ of the common law access to the law will effectively be denied, since those lacking the specialised equipment will not be able to exercise their right of access to the law.

The desirability of electronic publications in the Commonwealth context can readily be appreciated with re-

spect to the availability and convenience of omnibus legislative series (perhaps including the laws of several jurisdictions). As far as databases are concerned, the cost of the electronic publication often compares quite favourably to on-line access charges.

Assuming that ²⁸ some consideration will need to be given to the desired characteristics of the publishing medium, be it CD-ROM,²⁹ laserdisc, WORM,³⁰ or one of the newer "erasable" high-density media.³¹ The appropriate data file format must also be considered in this context, as the format in which data is stored is independent of the storage medium. For example, the ability to read a CD-ROM depends not only on having a CD-ROM reader but also on the ability of the application software possessed by the user to read the data file format in which the information is stored, which ties back in to the selection of application software discussed earlier in this paper.

Draft Legislation and Bills

The availability of statutes in electronic form provides a foundation for other important applications affecting draft legislation, bills and repealed legislation. It would be a relatively simple matter, but of obvious importance, to adopt the use of DTP format for draft legislation and bills.³²

One would also be in a position, as a next step, to equip legislative draftsmen with some of the powerful drafting programmes that facilitate not only increased productivity but consistent quality and workproduct sharing, both within and between jurisdictions (inter-jurisdictional sharing of legislative workproduct being of obvious benefit and importance in the Commonwealth context). This potential is of particular significance to the harmonisation of enabling legislation to carry out multilateral treaty obligations, bilateral extradition treaties, and similar exercises with Commonwealth-wide application.

Treaty Registers, Repealed Legislation and Court Records

The next major step, however, is the introduction of a database application in the form of a document management and indexing system³³, so that the various chunks of text can be put away when not in use and found when needed.

The design of the document management and indexing system should permit inclusion of abstracts of any document, so that it can point to useful items that are not in electronic form on the network.³⁴

It should also facilitate what is called full text indexing, as well as abstraction or cataloguing of entries so that not only the abstracts but also the actual text of documents can be searched, using a variety of well-established and new search engines (including artificial intelligence software).

The document management and indexing system

makes it immediately possible to establish such things as the desired treaty registers, the historical file of repealed legislation and a system for handling court records, both active and archived.

Access and Retrieval Capacity

Once a document management and indexing system is in place, it becomes quite feasible to add the next level of productivity tools. Software programs that provide a linking capability (called hypertext) between discrete items of text, graphics, and even voice and animation (usually referred to as multimedia) are now widely available at ever-decreasing cost³⁵, and are being incorporated by large law firms into important information management tools³⁶. The information management tools³⁷ combine with the "addressing" power of the document management and indexing software to make it possible to annotate and cross-reference at will.³⁸

Thus, one might create cross-reference links³⁹ between a statutory provision and its predecessor provision (now repealed but still relevant⁴⁰), to the relevant portion(s) of any white paper or other official or unofficial explanatory material, and ultimately to decided cases, as well as to relevant provisions or terminology and decided cases of other Commonwealth jurisdictions. Thus, in the context of sentencing practices, one might compare the effect upon, for example, incarceration and recidivism of a particular legislative approach in one jurisdiction to results in a second jurisdiction employing the same approach, and then to results in a third jurisdiction employing a different approach to the same problem.

Collaborative Applications

An area of importance to the participants in the Cyprus meeting was the ability to work collaboratively with their colleagues in other jurisdictions, and a variety of relatively simple and inexpensive applications—electronic mail, computer bulletin boards and computer conferencing—can be implemented to facilitate this, once the basic technology platform is defined and compatible application software identified. It does not depend upon the prior implementation of the applications described above and might therefore proceed in parallel. Moreover, it may serve as a considerable incentive to adopt the common platform.

An example of the potential of computer bulletin boards was much in evidence in Cyprus in the context of Privy Council decisions. Electronic mail has a particular potential in, for example, extradition proceedings, money laundering, and other manifestations of transnational crime.

Conclusion - Leveraging With Technology

This paper has for reasons of space and terms of reference concentrated on the architecture and on the tech-

nology needed to carry out the design agreed on by the working group for the pilot project. The establishment of a common technology platform is the proximate stage of a wider purpose to make the heritage of the common law accessible to the peoples of Commonwealth jurisdictions and to bind them more closely through the devices of modern communications systems. The architecture and techniques are simply tools available for this end, and the crucial component for the process is and will always be the commitment and the will of the managers and the users of the system to serve their communities as effectively as their abilities permit.

Innovation and particularly mechanical innovation can also nurture the Luddites and the inflexible nay-sayers who tend to nest in bureaucracies. Cost conscious managers in the various jurisdictions have already been made aware of the costs of resistance when understanding of the benefits and economies of information technology has not been absorbed into the approach of system users to their work patterns. The method of involving all levels of users into the systems acquisition process through the device of the working group has been found to be effective in large as well as in smaller work places and jurisdictions, and the initial and enthusiastic contribution of the Senior Law Officers, acting as a working group at the Cyprus Meeting, has served as a spur in the preparation of this paper as a first contribution to the application of computer technology to meet their specified requirements. The realisation of the project will depend on their sustained interest and in the interest, understanding and flexibility introduced and maintained at all levels of government service as the work of innovation proceeds.

The possibilities for future applications open out from the introduction of the common technology platform, which will enable important strategic benefits allowing the Commonwealth to build on the success of the pilot project. It will be possible, for example, to implement distributed support for the Commonwealth network, in the sense that a particular jurisdiction with a particular expertise may be assigned responsibility by a network secretariat - the permanent successor of the Working Group - for, say sentencing databases,⁴¹ thus facilitating the creation of centres of excellence. Similarly it will be possible to leverage, for the benefit of all the jurisdictions participating in the Commonwealth network, the collective knowledge, experience and capability, and, perhaps most importantly, budgets, in bringing world-class technology to bear in addressing the ongoing needs of the Commonwealth. It is a worthy task.

In summary, the pilot project outline proposes the following sequential pattern:

1. A Working Group is established to coordinate the project process, and disseminate the deliberations and decisions of the Working Group to interested Common-

wealth jurisdictions;

2. The Working Group assesses technical options, defines a common technology platform, and selects the most suitable computer hardware and software products for the tasks at hand;

3. Desktop publishing, which provides a basis to establish internal publishing capability for statutes, is suggested as a priority, beginning with existing legislation.

4. The following priorities are suggested for the sequential elements enumerated in our terms of reference:

- (a) publication of omnibus legislative series, ultimately including the laws of several jurisdictions, in electronic media;
- (b) extending internal publishing capability for statutes to incorporate draft legislation and bills;
- (c) the introduction of a relational database application in the form of a document management and indexing system to organise the collection of statutes, draft legislation and bills;
- (d) extending the document management and indexing system to establish the desired treaty registers, historical file of repealed legislation, and handling of court records.

5. Additional possible scope for the project includes the collaborative applications, electronic mail, computer bulletin boards and computer conferencing.

EXTRACT OF MEETING REPORT

**FOURTH MEETING OF SENIOR LAW
OFFICERS OF SMALLER COMMONWEALTH
JURISDICTIONS**

Nicosia, Cyprus, 19-23 August, 1991

Computerisation and the Small State

- There is a need for the preparation of model laws to govern the operations of computer systems to ensure that the necessary national legislation is both effective and uniform, so as to enable a jurisdiction to benefit from the case law and experience of other jurisdictions in a particularly complex and challenging area of the law.
- It is essential to ensure that small states in particular are enabled to take full advantage of the considerable opportunities presented by computer technology, with special reference to such matters as:
 - legislative drafting;
 - law revision;
 - treaty registers;
 - court records;
 - case law; and
 - desktop publishing.
- It is vital, especially for small jurisdictions, to enjoy access (and, where possible, on-line access) to relevant legal data bases as these are developed in other Commonwealth jurisdictions. There is thus a need for systems to be developed which are compatible and for access to be enjoyed on the most favourable terms. The Commonwealth Secretariat should pursue these matters on a pan-Commonwealth basis.
- Some small states may wish to consider the feasibility of moving to a paperless legal system, with an electronic statute book and law reports, and with consequent economies in printing and other efficiencies.
- The evaluation, purchasing, installation, training, maintenance and development of computer systems are particularly complex tasks for small developing jurisdictions and are matters on which technical assistance should be available from aid agencies for those who require it. There is considerable scope for exchanges of information and experience in this area, and a need for future meetings to keep the matter under review. In particular, the Commonwealth Secretariat should be invited to explore the feasibility of fully computerising developing small states initially by means of pilot projects.

REFERENCES

1. A notable exception is understood to be Botswana, where superior court judgments are being kept on floppy disks for this eventual purpose.
2. Most relevant to the present paper is *Safety in Numbers - A Guide to Effective Procurement Techniques* (hereinafter "the FRC's *Guide to Effective Procurement Techniques*"), a paper jointly prepared by Steen Frandsen, Managing Partner of Frandsen van Beek, a management consulting firm, and Harold Ross, a legal officer with the City of Calgary. Other papers were *Admissibility of Computer-Produced Evidence* by Robert MacKinnon of Osler, Hoskin & Hoskin & Harcourt, a Canadian law firm, and *Critical Legal Issues of Technology for Governments and Institutions*, by Brian Bawden, President of FRC.
3. See Annex A to this paper. The immediate essential elements have been identified as: legislative drafting; local law reports; drafting of judgments; a treaty register; historical file of repealed legislation; handling of court records.
4. We ask indulgence for putting forward a detailed and technically complex proposal, but the consequences of a superficial approach can be particularly costly in this type of endeavour. Particular care has therefore been taken to explain technical concepts, to set forth options in clear terms, and to identify the terms of art in a management context, with the result, ironically, that the presentation may appear to be simplistic to the sophisticated reader.
5. See footnote 1 above.
6. For a discussion of this process, see Part One of the FRC's *Guide to Effective Procurement Techniques*, entitled Using the Request for Proposal (RFP) to Manage the Acquisition and Procurement of Computers and Telecommunications.
7. Vendor independence is synonymous with an ability to choose the best tool for the job. Just as significant, however, is the danger of relying on a single vendor in an industry that is rapidly rationalizing, as declining prices and the advent of standards make the industry increasingly competitive.
8. SQL (sometimes pronounced "sequel") is an acronym that stands for Structured Query Language. Originally a proprietary language developed by IBM, SQL has become an accepted worldwide standard and, in the view of industry commentators, SQL is and will continue to be the de facto standard for database languages into the next century.
9. To state the other side of the argument, the conventional wisdom is that relational databases are slower than hierarchical. In our view, and without meaning to sound trite, that depends a lot on the task at hand. For high volume iterative processing, hierarchical databases can have a speed advantage because, quite simply, a good programmer will set up the inverted pyramids of information to favour the process by presenting the information in the order required for processing, duplicating information into as many inverted pyramids as need be, at the expense of storage space. On the other hand, for searching and reporting (which will represent its primary use in the Commonwealth context), the advantage is completely reversed and the relational database has a vast superiority of response time, storage efficiency and reporting flexibility. Any speed advantage of a hierarchical database is lost as soon as the advantage of presentation order is lost which, of course, is exactly what happens in the context of searching and reporting.
10. Oracle and Informix, respectively, are probably the industry leaders in this regard.
11. It is possible to press into service as "servers" the central processing units of existing mainframes and minicomputers, if the network operating system supports the particular technology and if it makes sense to do so from an economic point of view. See the discussion under the heading "Network Operating System".
12. A server is to a mainframe or minicomputer as a specialty shop is to a department store; it derives its advantage from being ideally and uncompromisingly suited to its task, with no unnecessary over head. The specialty shop servers which may be physically very distant are then brought together by the network to which they are connected in what the user perceives as an electronic shopping mall.
13. Modular design readily permits a particular system to be configured with components optimally suited to its role, whether as a file server, communications server or application server, and thus two servers that appear outwardly identical may look radically different once the cabinet is opened.
14. Leaders in this field include NetFrame Systems, Sun Microsystems, Fujitsu/ICL, IBM, Compaq, and Digital Equipment Corp., among others.
15. Recent experience has demonstrated that equipment turnover from older minicomputer and mainframe systems has an increasingly shorter cycle, particularly in an environment of rapidly declining prices for new equipment of greater power and capacity, as relatively high maintenance costs for older equipment can easily be re-allocated to finance replacements.
16. The need for shared access and the processing speed to be derived from an extraordinarily powerful computer invariably dictates assigning the principal processing chores for the relational database to an application server. See discussion *infra*.
17. Desktop microcomputers effectively networked offer numerous advantages over mini- or mainframe computing, including: cost, both of hardware and software; independent performance (simply stated, each desktop microcomputer has exclusive use of its own processing chip and, in contrast to a minicomputer or mainframe, the activities of other users on the network do not degrade the processing performance of that chip); access to a wider variety of software applications (from a programmer's point of view, the relative simplicity of microcomputer operating systems makes it technically easier to write software for the desktop microcomputer, and a significantly larger base of users makes it financially more viable); the ability to add capacity to the network incrementally; minimal exposure to single points of failure (it is a problem of some magnitude when a mainframe host that provides processing capability to scores, if not hundreds, of users fails); the ability to keep individual "spares" on hand; the flexibility to upgrade and re-allocate equipment on a user-by-user basis.
18. Strategic Analysis Report dated 5/20/87, "End-User Computing - Measuring and Managing Change", a limited distribution publication of Gartner Group, Inc., Stamford, Connecticut.
19. These criteria are met, most notably, by Apple with its Macintosh line of microcomputers and by microcomputers built to the so-called IBM standard with sufficient power to run Microsoft Windows software. There are several Unix-based graphical interfaces (Motif and NextStep are two) which may bear review, but there is, as yet, a paucity of application software written for these environments.
20. Interface consistency ideally means that the same functions in different software products always bear the same nomenclature (for example, the editing functions of *cut*, *copy* and *paste*), are identically positioned in the menu of functions (ie. grouped under the heading *Edit*), and are activated by identical keystroke combinations. Made popular by the Apple Macintosh, it was joked that a Macintosh user didn't take the shrinkwrap off the instruction manual for the first few weeks of using the software.
21. WordPerfect, for example, offers versions that run on, and seamlessly exchange files between computers using the DOS operating system, DOS with Windows, OS/2, Macintosh OS and Macintosh A/UX, UNIX, Data Generals OAS/VS and Digital's VMS, among others.
22. For a thorough treatment of needs assessment, see *A Guide to Computerization of Information Systems in Criminal Justice*, United Nations Publication, Series F, No.58 (forthcoming).
23. The Departments of Justice and Attorney General of Canada, in August 1990, published the *Directory of Canadian Justice Information Systems* which covers court systems, police systems,

- correctional systems and research systems in use in the administration of justice at the federal, provincial and municipal levels in Canada. The Directory is available from the Research and Development Directorate, Department of Justice-Canada, Ottawa, Ontario K1A 0H8.
24. One must realistically assess the possible impact of interruption of those services in the event of unforeseen difficulties and incorporate contingency planning where appropriate.
 25. For preliminary budgeting purposes, it is realistic to anticipate a cost of \$Cdn12,000 for a fully equipped DTP workstation (micro-computer, printer and software).
 26. Commercial publishers in the English-speaking world would generally provide text files written in the North American or international version of ASCII. ASCII (rhymes with passkey and stands for American Standard Code for Information Interchange) is a binary language capable of representing the letters of the alphabet, the numerals of the decimal system, and the control functions of an ordinary typewriter keyboard; for publishing purposes, text files are tagged with SGML (Standard General Mark-up Language) to show formatting and other specialized instructions not available in ASCII. Specialized parsing software is available to read in the files to the desired format.
 27. For preliminary budgeting purposes, it is appropriate to anticipate a range of charges from \$Cdn1.00 to \$Cdn3.00 per page for either scanning or keyboard entry.
 28. There are generally considered to be eight principles, or expectancies, forming the internal morality of the common law, of which access to the law, or promulgation, is one. The other seven are: generality (of application); clarity (of meaning); compatibility (or non-contradiction); prospective effect (or the presumption against retroactivity); constancy; feasibility (or not requiring the impossible); and congruence (between the law and official action). See Fuller, L.L., *The Morality of Law*, Yale University Press, 1969.
 29. A process called mastering is involved, which is expensive unless the cost is amortized over numerous copies. It may be feasible, in light of recent technological advances and price reductions, to consider the purchase of a mastering system (approximately \$Cdn40,000) if it was to be made available to a number of jurisdictions. In-house mastering could have the effect of significantly lowering the cost of publishing in electronic media.
 30. An acronym which stands for Compact Disk Read-Only Memory. CD-ROMs are non-erasable, which is increasingly seen to limit the applications to which they may efficiently be put.
 31. WORM stands for Write Once Read Many. Like CD-Roms, WORMS cannot be erased, and therefore they cannot be annotated and must be replaced in order to be updated.
 32. Erasable optical disks, with density of storage comparable to CD-ROM, have recently become available. Erasable high-density media offer a number of advantages for in-house publishing, including the ability to edit, annotate and update.
 33. Appropriate technical and procedural safeguards would be needed to assure the integrity of the final texts of the Acts following Royal Assent.
 34. For preliminary budgeting purposes, a figure of \$Cdn500 per workstation, with a minimum of \$Cdn25,000 may be used for the acquisition of the basic software, but it must be borne in mind that this application is likely to require customization.
 35. This provides a means of incorporating and enhancing the usefulness of established paper-based libraries. For example, one may have attended a conference or meeting where a useful paper was delivered. Upon returning from the conference, one places the paper in the departmental library and completes an electronic reference card in the document management and indexing system, identifying keywords and other relevant criteria. As a result, the material can readily be accessed in a wide range of contexts.
 36. One of the larger manufacturers, Apple, has for years included a stereophonic sound capability as a standard feature of its computers and has now become the first to include a multimedia software package, *QuickTime*, as a standard feature.
 37. A leading Canadian law firm has co-developed with a commercial software firm a text and graphics hypertext application for contractual precedents, statutes and literary content (opinions, research, articles and the like), to which voice capability will soon be added. The FRC would be happy to supply further information.
 38. For preliminary budgeting purposes, a figure of \$Cdn 750 per workstation, with a minimum of \$Cdn25,000 may be used.
 39. In a hypertext environment, secondary information (annotations, cross-references and the like) is "nested", that is, the information is not brought to screen unless requested by the user. So that a user will know when there is secondary information available in respect of text on his screen, the existence of links to secondary information is indicated by the presence on the screen of a small symbol, or "icon". Typically, in a graphical user interface, the user "points" to the icon with his pointing device, or mouse, and "clicks" (depresses the button on the mouse) to call the secondary information to the screen. The secondary information generally appears in its own "window" on the screen, where, depending on the access privileges granted to the particular user, it may be read, copied, amended or printed, and then "put back".
 40. The existence of each such cross-reference would be indicated on the screen by an icon and could be called up by a single key-stroke.
 41. Note that legislative text, once captured in electronic form, is never erased from the system; rather its status is altered.
 42. See, in this connection, the ongoing work of the United Nations Criminal Justice Branch in relation to the computerisation of criminal justice statistics.