

The Singapore Experience in Computerisation of the Legal Sector

Paper by the Attorney-General's Chambers of Singapore

Introductory Overview

1 This paper gives an account of the origins and evolution of Singapore LawNet which had its humble beginnings with the computerisation of the Attorney-General's Chambers. As the road to computerisation has not always been broad and easy, this paper will discuss some of the implementation issues and difficulties encountered which may be common to other Commonwealth jurisdictions. Finally, this paper seeks to give our views on the solutions adopted and the lessons learnt. The key factors which have contributed to our progress will also be highlighted.

A. ORIGINS AND HISTORICAL EVOLUTION OF LOWNET

1. *Computerisation of Registry of Companies and Businesses*

2. The very first Government Department to embark on legal computerisation was the Registry of Companies and Businesses as early as 1981. The computerisation of the Registry provided the public with an instant information service for print-outs of the particulars of any registered company or business. It also meant that defaulters who failed to file their returns were detected early under the computerised system. The time taken for registration of companies was reduced from 49 days under the manual system to just 9 days under the computerised system.

11. *Computerisation of AG's Chambers*

3 Not surprisingly, the Chambers' computerisation project started with that fount of all lawyers' learning - the library. In September 1985, the Attorney-General's Chambers proposed a Joint Law Libraries Computerisation Project to the Registrars of Supreme Court and the Subordinate Court. This Proposal was submitted in May 1986 to the Ministry of Finance (Budget Division) and the National Computer Board ("NCB"). This led to a closer look at what seems painfully obvious on hindsight ie the computerisation of the Chambers as a whole. As a first step towards this goal, a system study was initiated in January 1987 by the Chambers with assistance from NCB.

4. The Task Force that conducted the study included both legal officers and Information Technology ("IT") professionals.

5. This study aimed inter alia:

- (a) to identify the computerisation and information requirements of the Chambers; and
- (b) to map out a 5 year computerisation plan for the Chambers and estimate the manpower and equipment resources needed to implement the plan.

6. The subsequent approval by the Treasury of the development proposal paper for obtaining the required funds has today resulted in the following systems that have been completed and implemented:

(1) Legislation System

Singapore Statutes Database

- Singapore Subsidiary Legislation Database

(2) Library System

Lexis is also available in the Library

(3) Periodicals Index Database

(4) Malayan Law Journal/Singapore Law Reports Index Database

(5) Debt Recovery System

(6) Advice Management/Opinion Database System

(7) File Management System

(8) Index of Treaties and Conventions Database System

7. Projects that are currently under development include: Enhancing the Singapore Statutes and Subsidiary Legislation System and the Work Assignment System. The projects that are awaiting development include: Crime Opinion Database System, Case Data Management System and Case Text Management System.

8. The \$4.3 million system was launched on 5 January 1990 as a showcase of what IT could do for the legal profession. The local press prophesied that the initiative would propel the legal profession into the computer age (Singapore Straits Times; 5 January 1990). A detailed description of the systems can be found in Appendix A.

III. *LawNet is Born*

9. The first system that was developed and which came on line was the Statutes Database. It occurred to the officers who developed the system that it would be a

waste of the S\$100,000 spent in converting the data alone if it were confined to use within the Chambers. LawNet was thus first conceived and mooted in 1989 as an on line legal database open for public access in the same mould as LEXIS. The motivation was not entirely utopian as the public subscriptions helped to pay for the manpower needed to amend and keep the Database up to date. The Statutes database was launched under the LawNet umbrella in July 1990 by the then Attorney-General Mr Tan Boon Teik. But we had a larger vision.

10. The vision was to computerise the whole legal sector in Singapore. To bring all service providers in the legal field to the lawyer in one single screen at the touch of his fingertips. A concept paper was prepared in Feb 1991 by the NCB in consultation with the two legal officers responsible for the Chambers' computerisation project. The concept paper was endorsed at the highest levels by the Chief Justice, the Law Minister and the Attorney-General. Soon thereafter, the plans were unveiled when Professor S. Jayakumar, the Minister for Law during the Budget Debate on the estimates for the Attorney-General's Chambers on 15 March 91 announced that -

"... a very significant computerisation programme called LawNet, which will cover the Ministry of Law, the Attorney-General's Chambers, the Judiciary, the Law Society and even the Law Faculty's resources. A LawNet National Council will soon be formed to provide a national umbrella, as it were, to integrate and coordinate these computerisation efforts in the entire legal sector. And the members of this Council will be the Chief Justice, the Attorney-General, the President of the Law Society, the Dean of the Law Faculty, (Chairman of the NCB), as well as myself".

11. The Minister's announcement was in response to the concerns expressed by Dr. Arthur Beng, the Chairman of the Government Parliamentary Committee (GPC) for Law and Home Affairs that lawyers may be faced by a multiplicity of networks and databases operated by different agencies. Prof Jayakumar also added that the programme will provide a "one-stop service by providing a single window into all the various laws and legal information required in law practice...when LawNet is in place, it should bring about a revolution in legal services".

12. Just a week after the Minister's announcement, Chief Justice Yong Pung How also mentioned in his speech to newly admitted lawyers at the mass call on 23 Mar 91 that a "proposal is now being developed to set up an integrated computer network for the whole legal sector which will apply the advances of information technology to the provision of legal services. Even the introduction alone in the next few years of electronic filing and handling of court documents will change forever the way in which lawyers in Singapore work...".

13. To provide the support needed for a project of this size, the Treasury was once again supportive and agreed to finance the formation of a full-time LawNet Secretariat, comprising technical and administrative staff, to undertake the development, promotion and management of LawNet. The LawNet Secretariat has a Project Director (a senior legal officer), a Technical Director, two technical staff from the NCB, an Executive Officer, a stenographer and a clerical officer. LawNet is expected to be fully established by 1997. An organisation chart of LawNet can be found in Appendix B.

B. SCOPE OF LOWNET

14. LawNet is an ambitious attempt to build a strategic national information network within the legal sector that will form part of the information technology infrastructure of Singapore. It does not exist as a single computer system. It is a computer network that integrates existing systems located in and operated by various organisations: the Judiciary, Attorney-General's Chambers, Ministry of Law, Registry of Companies as well as the private sector. As LawNet leverages on the systems of these organisations concerned, the costs of operating and maintaining LawNet services is significantly reduced.

I. LawNet Modules

15. LawNet comprises 6 modules, reflecting the 6 broad areas of law and legal practice. These are:

1. Litigation Module
2. Legal Research Module
3. Conveyancing Module
4. Corporate Law Module
5. Intellectual Property Module
6. Integrated Law Office Module

A detailed description of the scope and services of the LawNet modules can be found in Appendix C.

II. Implementation of LawNet

16. The LawNet services are in various stages of implementation, ranging from services already in operation to imminent launches and feasibility studies. The following services are currently available in LawNet:

Litigation Module

- Bankruptcy Search System
- Supreme Court Notices
- Subordinate Court Notices
- Writ of Execution Search
- Company Winding Up Search

Legal Research Module

- Statutes
- Subsidiary Legislation

- Cases Index
- Case Law Database
- Treaties and Conventions Index

Conveyancing Module

- LotBase System
- Property Tax Requisition System by Inland Revenue Authority of Singapore

Corporate Law Module

- BizNet

17. LawNet is an integral part of IT 2000, the national computerisation masterplan. IT 2000 envisages the transformation of Singapore into an intelligent island where IT is pervasive in every fabric of society. LawNet will revolutionise the way lawyers work in Singapore. It will take away from lawyers the tedium of having manually to perform those tasks that the computer can do more efficiently and effectively. It will give lawyers more time to apply their minds to those tasks that require them to think and reflect upon. It will also enable lawyers to work, not only with greater speed and efficiency, but also with greater confidence that their output is comprehensive and accurate.

C. DIFFICULTIES AND PROBLEMS ENCOUNTERED - IMPLEMENTATION ISSUES

18. The following are some of the implementation issues and difficulties encountered which may strike a common chord in those who have attempted legal computerisation:

- (1) Co-ordination and communication between lawyers and computer professionals;
- (2) Choosing the right hardware and how to avoid obsolescence;
- (3) Choosing the right vendor;
- (4) Choosing the right software and designing the system;
- (5) Data conversion and maintaining the Data base;
- (6) Getting good technical staff support;
- (7) Training;
- (8) Licensing and other intellectual property issues.

1. Co-ordination and Communication

19. Co-ordination and communication between the two sets of experts; the experts in law (users) on the one hand and the technical computer experts on the other part is vital. LawNet would not have got off the ground without the commitment and technical support of the National Computer Board. Unless one comes across the rare animal who is both a lawyer and an information

systems professional, the IT professionals usually cannot tell lawyers what they want. The lawyers have to recognise that they probably know more about computers than the programmers know about law. Time and again, it has been proven that no matter how large a law office is, it needs to have lawyers directly involved in the supervision and direction of its computerisation efforts to ensure success. It is probably easier to teach lawyers about computers than to teach computer professionals about law. Lawyers must be patient enough to explain the mysterious workings of the law to the IT professionals and the quirks in a system purportedly based on logic and reason. For example, in developing our Statutes Database we had to explain to the IT professionals such simple concepts as the difference between an Act and regulations and what are sections, subsections and schedules. As the turnover in the computer industry is high in Singapore, one has to ensure that these skills once imparted are passed on. Lawyers must also be able to grasp the implications of technical advice. In our experience most softwares which a law office would utilise are fundamentally similar in design and capabilities to common PC-based softwares such as word processing, database management and spreadsheet softwares. By interposing the same concepts on a larger scale, one can readily grasp the technical implications of the more useful application systems.

II. Choosing the Right Hardware

Hardware configuration

20. The decision on hardware would depend on a variety of factors, chief of which is the size of the organisation. However one factor should be common to everyone irrespective of size, and that is **capability for expansion**. No matter what the present size of any office is, experience has shown that in the area of IT, there will always be the need for expansion and the buyer should not lock himself into a system which does not allow him to expand.

21. Cost is of course the primary factor. Not only does computerisation involve high capital costs but the annual maintenance costs and manpower required to keep it running can be quite substantial. The size of the office is the main factor which will determine the hardware it will opt for.

22. In this age of open systems, compatibility with other hardware systems is very important. For example, the hardware should be compatible with that of the National Printers so that direct conversion of legislation for printing can be effected. Compatibility with the publishers of law reports will allow for speedy publication of law reports. Needless to say, the hardware should also be compatible with other Ministries and Departments to allow the computers to talk to each other. Information and data can thus be easily transferred from one Ministry's system to another. For example information on treaties and Conventions can be

transferred from the Ministry of Foreign Affairs to the Ministry of Law.

Large Law Offices

23. A large law office will naturally look to acquiring a system that will achieve more at a higher performance level because it needs it to achieve a higher level of integration than a small office. Typically, a large office can opt for one of two hardware options; that is, a multiple server local area network platform or a minicomputer based infrastructure. Computer technology is advancing so rapidly that any yardstick for deciding which is the better approach may become obsolete in a short time. Law offices are advised to seek professional opinion and acquire consultancy before jumping into acquisition. For the very large offices, the organisation's growth potential, the amount of data required to be stored and operated on as well as the machine's performance level may mean that a minicomputer set up is more appropriate.

24. The next decision is whether to opt for dumb terminals, ie terminals which are controlled by the host computer. Under this circumstance, all operations are carried out by the host computer and if more than one terminal is logged on at the same time (which is usually the case) the host is powerful enough to serve all of them at the same time. However if too many users are logged on and performing operations which require a great deal of computer processing time, then each individual user will suffer a perceptible delay in response from the host computer. Dumb terminals, unlike microcomputers, do not contain a central processing unit and require no emulation software in order to communicate with the host computer and are usually cheaper than microcomputers. The Central Processing Unit or CPU is the "brain" of the computer. A microcomputer (such as a PC or a MacIntosh) has a CPU and its own operating system and is capable of performing its own computer operations.

25. Another alternative is to link a network of PCs to the host computer. This may be a higher cost solution but the host can be freed from having to run applications which can be run on the PC. Since the arrival of personal computers, computer processing power is right on the desktop of anyone who cares to explore it instead of some huge machine tucked away in the basement of a building. Word processing for example became so popular because of it. It is our experience that it is not practical to run word processing from the host. Word processing users demand quick and consistent response from the computer. Response from a host computer, even if it is normally fast, is subject to changes as the load on the host fluctuates depending on how many users are logged on. Users of word processing do not take lightly to such fluctuations and frustration often results. Also host computers sometimes shut down, sometimes intended as when there is maintenance to be

done or some software is being loaded or upgraded, but most times unintended due to some breakdown in hardware or software. It may be necessary to keep certain basic functions such as word processing operational all the time and this is only possible with a PC configuration.

26. One compromise is to have PCs and dumb terminals in combination. Dumb terminals are provided to those who require to operate only applications resident on the host while PCs are provided to the others who need to use PC based applications such as word processing. This is the configuration in the Chambers. The system revolves round a VAX 6320 supermini computer. Connected to this host computer via a Vaxserver 3500 and another Vaxserver 4200 are 160 PCs, 6 dumb VAX terminals, and 22 network printers (12 laserjets and 10 dot matrix). In addition we have another 7 slave (ie, connected to one PC and driven only by that PC) laser printers for printing of more sensitive and highly classified documents. The Vaxserver 3500, which acts as the server for the Local Area Network in the Subordinate Courts, is connected to the VAX 6320 via a high speed 64KBPS diginet leased line. The Supreme Court and Subordinate Courts Libraries are linked to the VAX 6320 via local multiplexers and leased telephone lines. At each of these libraries there are a Personal Computer, a VAX terminal and a printer. In addition a 19.2 Kbps diginet leased line connected to the AGC VAX to the SNS VAX mainframe allows the legal community to gain access to the Legislation, Cases Index and Treaties Index Databases.

27. This is also the configuration in most of the large law offices that a team from the AG's Chambers visited in the U.S. However there is one notable exception in the Boston office of Testa, Hurwitz and Thibeault, which has about 100 attorneys. Its computer system consists of a host computer linked to dumb terminals and it has no PCs. They informed the team that they have encountered no difficulties with this configuration.

Smaller Law Offices

28. It may not be economical for smaller law offices to procure and maintain a minicomputer system. Yet the same integration issues are present in the larger ones. Fortunately Local Area Network (LAN) technology can solve this problem at a cost that is affordable to them. A LAN linking all PCs to a server makes communication between PCs possible. Common data can be stored and even some common applications can be run on the server. Also document printing can be sent by each PC to common printers via the server. Applications such as E-Mail are also available in most LANs. As smaller offices could potentially grow into large offices, such a network is capable of expansion into a minicomputer based system by adding a minicomputer which acts as a super server. In this connection, choice

of software becomes a crucial consideration. Offices should bear in mind the advantage of portable software that can operate under different hardware and software environment.

Avoiding Obsolescence

29. One can never accurately predict the future. The computer system can be the victim of its own success in that the usage increases so dramatically that it puts tremendous strain on the resources. The result is a consequent deterioration in performance which means that either the whole system slows down or down-time becomes more frequent and prolonged. There are several solutions to this problem. Firstly one can "tune" the system to ascertain the bottle-necks which could be cleared. For example, recently we conducted a tuning exercise which revealed that the system was significantly slower in the morning because that was the time back-up of the data was performed. The back-up consumed a lot of computer resources. With the existing tape-drive hardware, back-up took up the whole morning. Once we changed the tape-drive to the latest cartridge drive, the back-up time was reduced to just 1 hour which meant that the system is now much faster in the morning. Another solution is to plan from the outset for the capability for expansion. The hardware should ideally be able to increase its capacity by merely adding on additional equipment. One need not actually have to replace the existing computer with a new computer in order to upgrade. In the AG's Chambers, the supermini computer we purchased was upgraded by merely slotting in additional hard disks (to increase the memory by 2.5 gigabytes) and adding an additional Vax server to serve our prosecution branch at the subordinate courts. One has to bear in mind that replacing hardware may not be desirable just because of the cost of replacing hardware but it may also mean that one is not able to transfer to the new hardware the effort invested in data conversion and application systems developed over the years.

III. Choosing the Right Vendor

30. One critical consideration in evaluating which software, system or hardware to procure is the question of vendor support. Support includes training for users, resolution of any problems in the software, upgrading of the software when new versions are released and carrying out any customisation. One would do well to ensure that the product is supported by strong vendors established in your jurisdiction. Law offices are not in the business of supporting software and before deciding on any major software purchase they ought to obtain an assurance of continued technical support from their vendors. Otherwise one may end up with a "lemon". Widely used software and standard hardware can usually be supported by most computer vendors and offices in Singapore. The risk of failure or termination of sup-

port usually occurs in the highly specialised software systems where the number of users is low.

31. It is also useful to get a vendor who is able to enter into an over-all responsibility agreement. The highly specialised nature of the IT industry is such that not one vendor can provide you with all the components of the system. However, in order to avoid the situation where each blames the other if something goes wrong, our experience has shown that an over-all responsibility agreement forces the joint-venture partners to solve the problem for the customer. Because of the transient nature of computer processes it is extremely difficult to say where the fault lies without a great deal of tests. The software vendor may blame the hardware and the hardware vendor may in turn blame the communications line.

IV. Choosing the Right Software and Designing the System

32. It is always useful if one can obtain the services of a consultant with hands-on experience in designing a legal computer system in another Commonwealth jurisdiction. This common Commonwealth heritage is a powerful advantage as it is quite likely that statutes, law reports and contracts from anywhere in the Commonwealth will look pretty much alike. We were particularly fortunate that the consultant our vendor had brought in was involved in developing the legislation database offered by what was known then as CLIRS (Computerised Legal Information Retrieval System) which was initiated by the Australian Federal AG's Department. The blue-print of the Database design developed by our Australian colleagues proved itself when the reasons for particular aspects of the design became clear when the system was in actual operation. It certainly saved us the heartache and anguish of learning through trial and error. We also purchased the same software called STATUS which has served us well since 1989.

33. As stated above, it is indeed useful if one is able to tread a well-trodden path by adapting *mutatis mutandis* the designs and systems adopted by other Commonwealth jurisdictions. As EM Forster put it, "fools rush in where angels fear to tread". Nevertheless one should never be afraid to innovate and adapt. But it must be for sound and well thought-through reasons. Unlike a judge who can be persuaded by eloquent arguments, computers work on cold logic. "Rubbish in - rubbish out" is the cliché applied to computers which is nevertheless painfully true. Do not be afraid to change work or office systems in order to facilitate computerisation. If a law office is inefficient because of a poor or non-existent work system, the computer cannot create order out of chaos. Computers are primarily designed around manual work systems. The difference is that they can perform routine functions a thousand times faster. For example, if the office has a poor filing system with no

logical categorisation of files, computerising the system will not make the file system any more efficient. However it will enable the registry officer to search for the file numbers very quickly. Having located the file number, one has still to locate the physical file.

V. Data Conversion and Maintaining the Database

34. There is not much point in having a database with very little data in it. The bottleneck will lie in data conversion. In Singapore because of high labour costs, data entry (ie the typing of information into the computer) can be an expensive affair. At the Chambers the following policies were adopted to overcome this problem:

- (a) standardising the word processing software. WordPerfect was used throughout to produce all documents;
- (b) choosing a system which will enable conversion of WordPerfect documents into the format required by the host computer. This meant that documents which were created in WordPerfect could be loaded into the host computer without having to retype them;
- (c) designing application systems (such as the Case Management System) with data transfer capability so that data need only be entered once.

35. For large quantities of data that need to be typed into the computer there are companies which will undertake such work. They are paid on the basis on the amount of data entered. To ensure accuracy, it is recommended that the data be entered a second time, what is known as key stroke verification. This procedure throws out most errors in the first run of data entry and produces almost perfect results. Most of the actual work is carried out in lower labour cost countries where typist time is cheaper than in Singapore. When using such data entry services one should make clear the data entry rules to the company and obtain a trial set of data to ensure that the result fulfils the requirements before embarking on the bulk of the data entry.

36. An alternative to manual typing is the use of Optical Character Readers (OCR). An OCR first scans a document like a photocopy machine and stores the image in a PC. It then converts this image into data with a character recognition software. This state of the art technology has improved by leaps and bounds over the last few years. The costs have also fallen just as dramatically. We have seen prices of high performance systems tumble from six to five and even four digits in the space of 5 years. However OCRs cannot yet achieve 100% accuracy except in perfectly printed documents. Manpower is also required to prepare documents for scanning. The use of OCR is not viable where the source of the data is old, faded or poorly printed documents. There are even hand-held OCRs available in the market.

37. We have also embarked on creating a data link with the Singapore National Printers so that legislation can be conveyed to the Printers electronically and the final printed version can be released to us electronically for the purposes of updating our Legislation Database.

VI. Getting Good Technical Staff Support

38. Getting good technical support staff and ensuring continuity is always a recurring problem in keeping the system going. No single computer expert is a know-all as different systems and different software require equally different expertise. The more complex the system, the greater is the number of support staff required. Simplicity is the key-word to controlling costs. It is thus important that as far as possible, law offices should ensure that the vendors are able to provide long term technical support for both hardware and software. Obviously PCs are much less costly to maintain than mainframes or minicomputers. For the majority of the small and medium offices in Singapore, a PC based network would probably serve them well with a minimum amount of support required. This is especially when the processing power of PCs has grown by leaps and bounds over the last few years from the XT to the 486 IBM compatibles and now the Pentium chip has arrived. Moreover the manpower pool of IT professionals in Singapore is limited and in great demand. The large offices (with a minimum of 200-300 attorneys) visited in the U.S. typically have a Computer Department with a minimum of 8 to 10 systems officers. The computer staff in Chambers comprises 8 computer professionals (Information Systems Officers) seconded from the National Computer Board and 3 computer operators. Directions and policies are set by 2 senior legal officers who act as co-directors of the Computer Department. These 2 officers provide the bridge between the users and the IT professionals. The Systems officers are mainly involved in developmental work as this stage as the Case Management System is still under development as well as miscellaneous application systems and the continual improvements to the existing systems.

VII. Training

39. For the computerised law office to succeed, training is of the utmost importance. Most lawyers are conservative in their approach to computer technology. The system should therefore be as user-friendly as possible. This can be achieved through selecting software which are menu-driven with step by step prompts. Computer Aided Instruction (CAI) packages can also be purchased for users to learn at their own pace in the privacy of their rooms. In Chambers training is staggered so as not to disrupt operations, and provided in stages, from the very basic computer appreciation courses to word processing to computeraided legal research. Training for users was in some cases arranged with the vendors of the software but most were conducted in-house by the Information Systems Officers. There

is a training room in the computer centre equipped with a computer projector and sufficient terminals for every trainee.

40. For commercially available software it is possible to obtain training from any of a number of commercial training schools. There is also no lack of computer training programmes in Singapore organised by agencies such as the National Productivity Board involving the Skills Development Fund. For specialised systems often the vendor will be able to provide training. In many instances it may be economical to train a core of persons who can then train all other users in the office - the "train the trainers" principle. Wherever possible at least two persons should be familiar with any application system to cater for staff turnover.

17. Licensing and Other Intellectual Property Issues

41. The other issue which was not obvious to us when we first started out was that changing to a more powerful machine involves not only the higher hardware costs but also the licensing costs of running the same software on a more powerful machine. The licence purchased for the software is usually for that capacity of hardware and an upgrade in hardware often means an upgrade also in software. The opening of the Legislation Database did not pose any problem as the copyright resided in the AG's Chambers. However, the opening of the Case Law Database involved the working out of a commercial agreement between the network service providers and the publishers of the law reports. One has to be aware that the sharing of information may sometimes be impeded by intellectual property rights.

D. KEY SUCCESS FACTORS

42. The following are what we perceive to be key factors that were instrumental in our progress:

- (1) Adopting the right approach
 - avoid a false start
 - start small then you can afford to make mistakes
- (2) Networking to bring people closer
- (3) Integration for a winning combination
- (4) Setting realistic goals
- (5) User-friendly and people orientated system

1. Adopting the Right Approach

43. Computerisation of the law office requires a change in work attitudes and office procedures. For such a project to succeed, it is imperative that the higher echelons of the office are totally committed to the project. In the Chambers, the success can be largely attributed to the strong support given by the Attorney-General, the former Solicitor-General and Senior State Counsel.

44. Do not throw good money in after bad. Because one

learns very much through trial and error in this new field, the willingness to admit one's mistake and change course is important lest the mistake becomes the albatross round the ancient mariner's neck. For example, there were at least two instances in the earlier days where we had to write off years of work and costly investments because to continue would have meant getting deeper into the quagmire. In one case the software we had purchased for file management came with the integrated package tendered for. Because of the restrictions of the software, the design was so restrictive as to create more work than it would have saved. Moreover, we had invested months of data conversion into the system. At the end of the day we had to make the hard headed decision to abandon the software and redesign the whole system round another far superior software.

45. Adopting the right approach is thus essential to avoid a false start and the expensive mistake of investing in obsolete equipment which affords little room for expansion or in unsuitable software which lead to dead ends. There are two key words to the successful implementation of a computer system - "networking" and "integration". The larger the law office, the more importance should be attached to these two concepts. Lawyers should realise that these concepts apply whether one has a personal computer ("PC") based system or a mainframe computer.

II. Networking to Bring People Closer

46. A stand alone PC system can only serve one user performing one task (unless a multi-tasking operating system is used) at any one time. This can be quite a restriction. A network of PCs has many advantages. It enables all the PCs on the network to 'share' printers and to make use of the disk space residing in the server (usually another PC on the same network) for file and data sharing purposes. Application software such as word processing, time and billing, client database, case management, etc., can be installed onto the server and be accessed by several users at the same time. Even small offices with 2 lawyers and a secretary stand to benefit from a network of three PCs and a printer instead of keeping them as stand alone machines. PC local area networks have become the *de facto* standard for integrating microcomputers and peripherals in today's modern office.

47. In terms of productivity, networking will reduce unnecessary wastage of time in moving around the office performing tedious functions. For example, in the Chambers, the network enables legal officers to communicate with and send electronic mail to each other from the ground floor to the first floor and across the street to the computer centre at Colombo Court. When the extension to the Prosecution branch at the Subordinate Courts is completed, E-mail as well as data transfer capabilities will be extended there. Hence urgent messages can be sent instantaneously without having to

despatch clerks and data can be sent both ways through high speed lines. Often lawyers are in court and cannot be contacted over the phone and E-mail is useful for ensuring the person gets the message. Furthermore, Data need not be physically carried in diskettes within or out of the office thereby minimising the risk of loss yet speeding the transfer. This will help ameliorate the increasingly high costs of labour by reducing the need for office attendants.

48. Networking also allows the printing of documents on a shared network printer without the officer having to leave his room and carry a diskette around. This will optimise the use of printers and allow investment in one or a few heavy duty high quality printers capable of desktop publishing such as a laser printer. Contracts and other legal documents can also be circulated electronically and amended by a team of lawyers. Precedents of legal documents such as contracts and forms can also be stored on the network so that a lawyer need only select a model and make the necessary modifications on his PC and send it for high quality printing without leaving his room.

49. In the Chambers officers have the capability to fax documents through the PC in the comfort of the office to a selected number of addressees without any human intervention. One need not stand by the fax machine and wait for the line to be free. This facility is known as *Mailfax*. The Chambers has a Local Area Network (LAN) of about 85 Personal Computers linked by the Digital Corporation's (DEC) *PCSA* software. This enables network printing to be carried out. An officer linked to the LAN can send a print job to any of 8 network printers spread out throughout the building and the document is printed without his leaving the office. *PCSA* also enables files to be transferred from one PC to another by means of virtual drives located at the Micro Vaxserver 3500. (A virtual drive is a common drive or directory holding documents to which all pcs on the same network has the same access. It is much like one large hard disk being shared by many pcs.) In this way documents typed by typists can be 'deposited' in a virtual drive and the writer is alerted to check and make amendments without the need to print numerous drafts and without either person leaving his or her desk. This system also cuts down on the consumption of paper in the office. Provision has also been made for officers to access the AG's Chambers Computer System from their homes through the use of modems.

III. Integration for a Winning Combination

50. Integration is important because a law office will need more than one software and more than one database. However, these application must be able to interface or "talk" with one another. As the partner of a New Jersey law firm described it:

"Given a little education, most attorneys intuitively grasp the concept of computer systems integration. Just as success in a legal matter depends on more than a single piece of evidence, an outstanding computer system is really the sum of its parts - how they are integrated into a winning combination."

(Merrill, Charles R.; Integrating Office Systems into a Winning Combination; Legal Technical Newsletter; Vol. VII, No. 5, September 1990.)

51. Integration is extremely important in the context of data conversion. Once data is keyed (or typed) into the computer, one would want the same data to be used by the different computer systems without the need to retype them, especially when secretarial time is expensive. A reduction in unnecessary duplication of data conversion will also ensure greater accuracy of data and the time spent in duplicating data entry could be better utilised in checking the data. For example, data on a firm's clients captured on the firm's client database should also be used for the file management or case management databases. As another example, case citations or summaries contained in a firm's research database should be easily converted into word processing document format in order for those citations or summaries to be used in skeleton arguments or written submissions without any necessity for time consuming retyping and proofreading.

52. An example of integration in action in the Chambers is the ability of the user, at the touch of a few keys, to convert a statutory provision he has found in the Statutes Database (eg section 5 of the Civil Law Act or section 304A of the Penal Code) into a word processing document so that he can incorporate it into his written court submission or draft legislation. This will eliminate much unnecessary copy typing.

53. The System was designed so that with one ID and password a user can gain access not only to the Electronic Mail facility but to all the other applications listed above and to future applications that will be added to the system, all via a single menu. By the use of macros (programs which execute a series of computer commands in one or two keystrokes) the systems are made as user-friendly as possible by using menu screens rather than commands. As one information systems coordinator in a Washington D.C. law firm succinctly put it: "The PC pilot project told us that the typical user did not want to learn DOS (commands). Instead he/she wanted to push one button to do most tasks and agreed to come to training if it was provided. While we attempted to provide all of these items, not all tasks could be reduced to one keystroke." *(Ramsey, Donald R.; Comprehensive Networks Can Solve Law Firm Needs; Legal Tech Newsletter; Vol. VII, No 4 July 1990.)*

11. Setting Realistic Goals

54. As most lawyers start off with very little knowledge of computers, it is always easier to start small and aim for realistic goals. Our experience has been that we learn a lot along the way and our perceptions and ideas change as we grapple with the technology. One should not forget that technology also changes rapidly. Hence an ambitious start may mean that one may be saddled with a lot of obsolete technology. Obviously one should start with the easiest projects first. The early success of these projects will help bolster morale and convince users of the utility of computerisation. In any case, one has to bear in mind that the more senior lawyers and support staff may not be able to cope with a sudden flood of technology pervading into every area of the law office.

55. One should do the easy things first. In our experience we had to decide whether to start off with the statutes database or the legal opinions database. On hindsight we made the right choice of starting off with the statutes database because we had authoritative and well structured documentation on which to design the system. There was no need for retrospective capture and tracing of documents. All the statutes were printed on high quality documents unlike the typewritten carbon copied legal opinions rendered in the Jurassic era before the evolution of the word processor. We would strongly urge any jurisdiction to start off with the computerisation of their legislation and case law first. If one finds the case law too voluminous to handle, one can gain a lot of value out of computerising (as we did) just the subject index and citations of the law reports. With today's technology such a database will fit in nicely into a PC's 150MB hard disk memory and become accessible to a number of users through a Local area network.

56. Following this principle, it is not surprising that in the LawNet project, the legal research module was the first to complete its work. The other modules such as electronic court document handling required more complex consideration of work systems and the reliability of more sophisticated technology. For example, the trademarks and patents system require imaging technology which is able to search and distinguish between graphics and designs. EDI technology also poses legal issues such as authentication, admissibility and other evidential issues relating to electronically transmitted documents. We would not encourage any law office to start off with an EDI or graphic imaging system without first building more straightforward textual databases.

1. User-Friendly and People Orientated System

57. Unless there is a significant breakthrough in the commercial application of artificial intelligence, one has to recognise that computer systems have severe limitations and are inherently unintelligent. One has to de-

sign a system in a meticulous and tedious step by step fashion. Computers cannot think and fill in the gaps if the work system is inherently flawed. They are only highly sophisticated means of communicating, storing and retrieving information. As the old saying goes "rubbish in-rubbish out". Hence it would be extremely difficult to design a system which can track and take in all the variations and permutations in civil procedure like a White Book. Neither can a computer system draft contracts although there are document assembly programs in the US which can assemble or put together clauses in a loosely jointed document.

58. Many organisations have seen their computers becoming white elephants because of the failure to gain users' acceptance. The best hardware and software in the world is useless if the lawyers all suffer from technophobia. What is also not so apparent is that training is equally costly. A program which is designed to be so simple to use that any lawyer can pick it up in a matter of hours will result in substantial costs in training later on. Training costs and user acceptance can also be gained by standardising the commands or menus. What is most frustrating to a lawyer is having to learn different commands for different systems. In the Chambers we have striven to have similar commands for almost all the legal research systems in production. Once a legal officer is trained in one system, he should be able to use the other systems without any additional training. Ideally the systems should be menu driven and as easy to use as any computer game for children.

59. The surest way to repel users is to design a system that will generate more work after computerisation than before under the previous manual system. For example, a file management system should not result in the registry officers having to perform multiple data entry and manual record keeping. The registry officer should only need to enter the particulars of any file once into the computer. The system should then be used to print out labels for the files, bar codes and any other documents required.

E. THE LAWNET APPROACH

60. LawNet is an integral part of IT 2000, the national computerisation masterplan. IT 2000 envisages the transformation of Singapore into an intelligent island where IT is pervasive in every fabric of society, woven into work, play, education and home. The approach taken in LawNet, to integrate the IT requirements in the legal sector with central coordination, is designed to achieve the objectives discussed below.

61. Firstly, LawNet will fully exploit the benefits of computerisation. The process of computerisation involves more than just investment in hardware and software. It requires time to be spent by senior management in evaluating the project and determining the extent

and nature of computerisation. It entails training of staff on new work procedures and computer application systems. It involves conversion of manual records into electronic data, which can be expensive. In order to amortize the high investment in money and manpower, all possible aspects of an organisation's operations should be computerised. Also data should be transferable across application systems to avoid further data entry. LawNet seeks to do all these by computerising most of the external operations of law firms and integrating them with the firms' in-house systems.

62. Secondly, costs are kept to a minimum by the dispersion of computers. The computers in the network are not established and maintained for the sole purpose of providing the services in LawNet. They are procured mainly for the internal operations of the organisation concerned. The provision of the LawNet services is only an ancillary part of the acquisition. As such, the LawNet component comprises only a small fraction of the cost of establishing and maintaining the computers.

63. Thirdly, under central coordination, LawNet is able to establish standards in respect of user interface, data formats, response times, documentation, etc. This will result in greater ease of use throughout the spectrum of LawNet services.

64. Finally, by taking the lead in making available an integrated network for the legal sector, LawNet will spur law firms into making the investment in computerisation that they may otherwise be hesitant to do. The chicken and egg problem is resolved by the government taking the initiative. Firms will have, in addition to the benefit of computerising their internal operations, access to external systems of immediate benefit to them. With the involvement of LawNet in the development of the inhouse system itself, firms will have the assurance of a system that will fully integrate with LawNet.

F. BACK TO THE FUTURE

What does the future hold?

I. *Electronic Document Interchange*

65. The Times of London, in a special series on "**Law in the 1990s**" predicted that the next stage in the legal application of technology is in the area of the communications revolution - the ability to send information electronically. This is known as **Electronic Document Interchange**, or **EDI**. In Singapore this technology has been applied in **TradeNet**. EDI is a means by which documents may be transmitted electronically from one computer to another without the need for printed paper. Already Customs declarations are made electronically by EDI in TradeNet. There is no reason why court documents cannot be filed and served by EDI. In this manner the days of time wasted in physically carrying documents for filing in court and for service and in searching for them, of printing numerous copies of

documents, of storing piles of such documents both in the courts and in law firms will be forever gone.

66. Whilst we are of the opinion that much technical and legal groundwork has to be covered before EDI can replace the physical exchange of documents in legal practice, this is the direction in which the legal profession must go if it is to become competitive in the global context. The Judiciary is exploring the possibility of the electronic filing of court documents. The Chief Justice in his speech at the mass call spoke of the introduction of the electronic filing and handling of court documents in the next few years. Enhanced Electronic Filing of company registration documents will be offered by the Registry of Companies and Businesses under BizNet. The same can be applicable to the Registry of Titles and Decds, Registry of Trade Marks and Patent and many other government departments where documents are filed.

II. *Imaging*

67. Image Management Technology is another exciting possibility for law firms as it has the ability to retain on the computer an image of the original document warts and all, including comments scribbled by the senior partner. It can be likened to a photocopy of the document in electronic form in a CD disk like the compact disk. Some of the major advantages in implementing image management are faster retrieval, better document control, reduced use of paper, improved work flow, reduced storage cost, etc. An almost exact copy of the document can be retrieved and printed out at any time through a laser printer. It is as good as a photocopy of the original document and possibly more acceptable as evidence than a mere print out of textual data. However imaging technology entails a great deal of data and storage requirements are very high. It also requires a large amount of computer processing. In both these areas the technology is marching inexorably forward. Computers are getting more powerful without a proportional increase in cost. Data storage capabilities are improving all the time, and CD ROM technology is enabling large amounts of data to be stored cheaply. Also manufacturers are able to squeeze in more and more data into the conventional magnetic disk drives. Certain legal applications such as a patent and trade marks Database must utilise document image technology simply because the Database comprises mainly graphics and designs which cannot be captured on a textbased software. The Registry of Companies and Businesses in Singapore has an imaging system to store and retrieve documents. There are no longer stacks of files on the desks of the Registrars. The AG's Chambers has also used imaging technology to manage and retrieve the voluminous documents in an ongoing multi-million dollar construction arbitration.

III. *Litigation Support*

68. In one litigation on intellectual property rights, in-

volving 1 million pages of evidence with half of them in Japanese. imaging was used in the U.S. by Bickel and Brewer attorneys to track and marry the English translation with the original Japanese documents. At the trial, the attorneys would rush from the courtroom to the imaging station and retrieve documents referred to at the trial and print an exact copy in seconds. It was then enlarged into a 3" x 5" trial exhibit to refute opposing counsel's statements quoted from the applicable document. The whole process took 5 minutes which contrasted sharply with the opposing counsel's retrieval time of an hour or more. The total system cost the firm US\$180,000 with an annual maintenance fee of \$14,500.

69. In Singapore at the hearings of the committee of inquiry in August 1992 into the fire in the engine room of the MT Stolt Spur at the Floating Dock of Sembawang Shipyard, a multimedia system was used to project vivid computer graphics in motion and photographs of the ship on a screen to facilitate the leading of evidence on technical issues to both the committee as well as witnesses. This multi-media system was also used in a subsequent inquiry in November 1992 into the explosion at Ginza Plaza.

Appendix A

COMPONENTS OF THE ATTORNEY- GENERAL'S CHAMBERS COMPUTER SYSTEM

Legislation System

Singapore Statutes Database (completed July 90)

Subsidiary Legislation Database (completed November 92)

This system enables on-line full-text retrieval of Singapore legislation and also retrieval of indices to the historical development of each legislation. The system will allow for tracking of the status of Bills sent for printing. In addition, desktop publishing facilities are provided to enable editing and formatting of draft Bills before printing.

- *Library System (completed December 90)*

The operations that are computerised include:

- (i) acquisitions
- (ii) cataloguing
- (iii) circulation
- (iv) serials management
- (v) information retrieval

- *Periodicals Index Database (completed 1991)*

- *Malayan Law Journal/Singapore Law Reports Index Database (completed July 92)*

- *Debt Recovery System (completed 1992)*

This system keeps track and manages claims made for and against the Government (eg accident claims, breach of contract) and recovery of monies owing to the Government (eg hospital bills). Features of the system include:

- (i) automatic generation of demand letters and reminders
- (ii) tracking and generation of payment records and automatic issue of receipts
- (iii) computation of costs and interest on payment made by instalments

- *Advice Management/Opinion Database System (completed July 92)*

This system provides for capture and online retrieval of the full-text of previous legal advice given by the Chambers officers. In addition, the information captured includes precedent contracts, agreements and other legal documents of reference value.

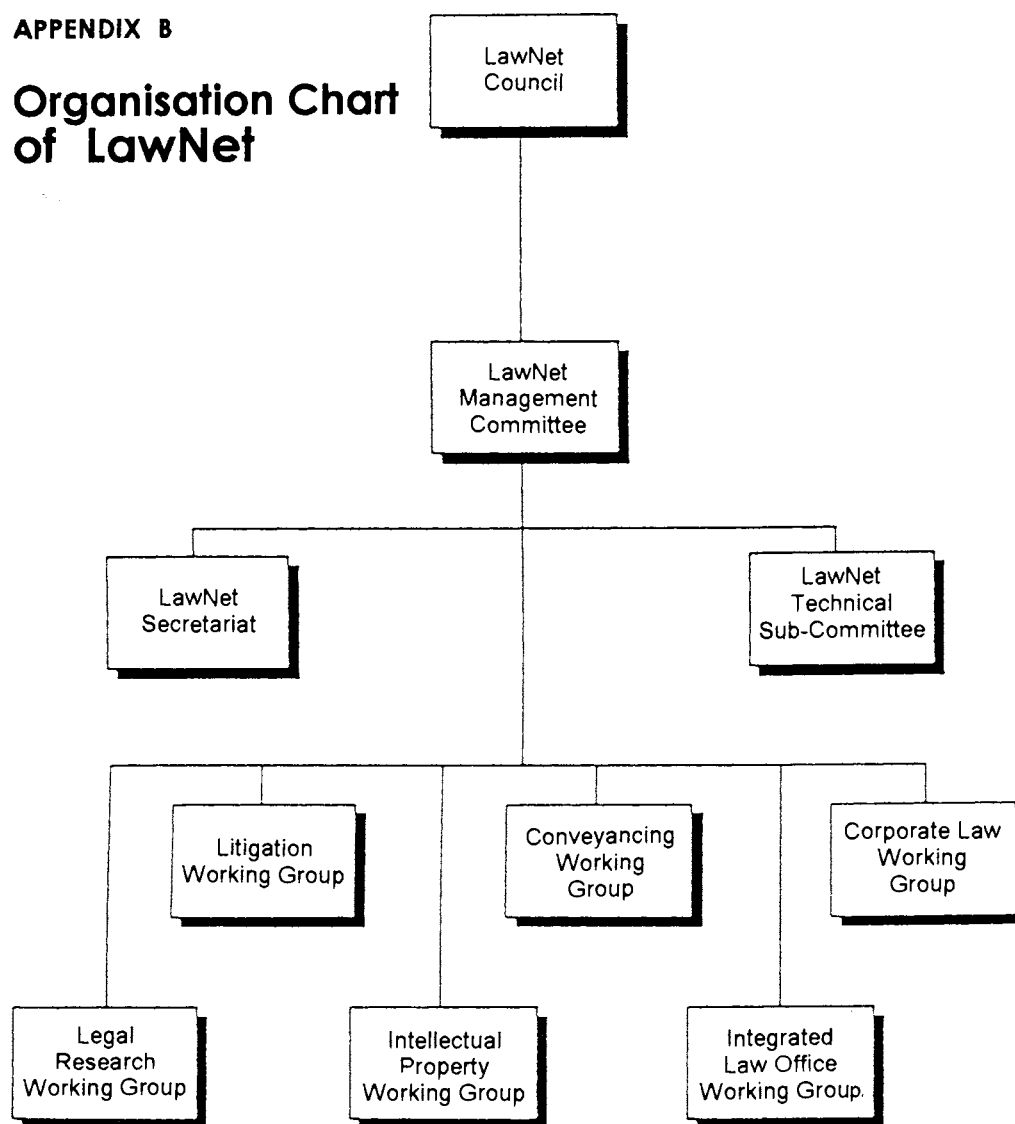
- *File Management System (completed July 92)*

This system provides better control, easier maintenance of file records and more effective tracking of movement of the files. Computerised cross-reference indices are maintained and would enable more com-

ORGANISATION CHART OF LAWNET

APPENDIX B

Organisation Chart of LawNet



plete searches for files in a much shorter time. Bar codes are used for recording file movement which saves time and eliminates human error.

- *Index of Treaties and Conventions Database System (completed July 93)*

Projects that are currently under development include: Enhancing the Singapore Statutes and Subsidiary Legislation System, and Work Assignment System. As for the projects that are awaiting development include: Crime Opinion Database System, Case Data Management System, and Case Text Management System.

Appendix C

DESCRIPTION OF LAUNET MODULES

LITIGATION MODULE

The Litigation Module computerises the litigation process by providing a system that links the computers of the Supreme Court and Subordinate Courts with law firms, permitting many court transactions to be made through the computer. The module consists of 3 systems, the Information Services System, Electronic Court Document Handling System and the Litigation Electronic Mail Network System. These systems when fully implemented, will reduce the manpower required to retrieve information from the Courts, as well as to prepare and file litigation documents to the Courts. On the part of the Courts, the time taken for filing and processing these documents will also be reduced, thus enabling the Courts to respond more quickly to the needs of lawyers.

Information Services System

This system contains information in the court registries that is required by legal practitioners. This information is stored in a computer and accessible through LawNet. In civil matters, the lists of originating processes, execution processes, appeals, and other information required by the court rules to be kept are available. In criminal matters, information on charges and bail are stored. The system also contains information on the status of cases such as dates and results of hearings, parties, solicitors, as well as the court diaries. There is also a database of Practice Directions currently in force and court circular. Other information such as Powers of Attorney registered, Bills of Sale, Bankruptcy list and Practising Certificates are also stored in the system.

Electronic Court Document Handling System

The Electronic Court Document Handling System computerises the submission and processing of court documents. This system permits documents such as originating processes, pleadings, summons and other litigation documents to be filed electronically from the solicitor's office. Where the other party is represented by a solicitor the system can even serve documents electronically. Naturally the implementation of this system entails significant changes to the court rules.

Litigation Electronic Mail Network System

The Litigation Electronic Mail Network links solicitors to the courts and to one another. This facilitates exchange of correspondence and documents between all parties. It also enables the courts to send out notices to solicitors, and facilitates transmission of urgent notices on hearings.

LEGAL RESEARCH MODULE

The **Legal Research Module** provides users with electronic databases of the laws of Singapore. Both Singapore laws and precedent information is available. Data is stored in full text and can be searched by easy to use menus. Materials retrieved can be downloaded to law firms' computers. At present, Singapore Statutes, Subsidiary Legislation, Treaties Database, Singapore Law Reports, Malayan Law Journal, Unreported Supreme Court Judgments and CLAS News are available.

CONVEYANCING MODULE

The **Conveyancing Module** computerises the conveyancing process. It comprises 3 systems, the Lot Base System, the Singapore Titles Automated Registration System. With these systems, a lawyer will be able to carry out most conveyancing transactions and have them processed electronically.

LotBase System

The LotBase system contains information on land area, State Title number, lot history, system of land registration and address of all land lots. Users are able to obtain this information from LotBase through the computer.

Singapore Titles Automated Registration System

Under the Singapore Titles Automated Registration System users can carry out searches on land titles, encumbrances, Powers of Attorney deposited with the Land Titles Registry, caveats and Strata Title Plan schedules.

Integrated Legal Requisition System

The Integrated Legal Requisition System computerises the entire legal requisition process. The user submits a single form electronically. The system sends requisitions to 11 different authorities in 5 Ministries. The computers in these authorities process the requisitions and in most cases provide replies electronically within hours. Under this system the amount of manual processing is drastically reduced in the lawyer's office as well as that of the authorities. In addition the processing time for these requisitions is greatly reduced.

CORPORATE LAW MODULE

The **Corporate Law Module** is primarily concerned with the needs of the business and corporate world. Its systems include Electronic Information Service, Strategic Business Information Service, Electronic Filing Service and Business Bulletin Service.

Electronic Information Service

The Information Service system includes the following databases:

- (i) Instant Information Service
- (ii) Directory of Establishments
- (iii) Companies' Financial Commitments

- (iv) List of Disqualified Persons

- (v) Name Search

Strategic Business Information

The Strategic Business Information Service provides financial information on companies registered. The information includes key figures from the profit and loss statements, balance sheets, and financial ratios which reveal the financial stability of the company.

Electronic Filing Service

This system enables the electronic filing of forms prescribed in the Companies Act. This obviates manual filing and processing of such documents and enables data to be rapidly and accurately loaded into the database for subsequent search by interested parties.

Business Bulletin Service

This system enables notices under the Business Registration and Companies Acts and general announcements to be made electronically to the corporate community. It also enables listed companies to make notices to the Stock Exchange of Singapore.

INTELLECTUAL PROPERTY MODULE

The **Intellectual Property Module** is concerned with the area of Trade Marks, Copyrights and Patents. Under this module, users will have access to the computerised database of trade marks of the Registry of Trade Marks. Users will also be able to file Trade Mark applications electronically. Other services include a Singapore Patents database and research materials on trade marks, patent and copyright laws.

Appendix D

ATTORNEY-GENERAL'S CHAMBERS' SOFTWARE AND APPLICATION SYSTEMS

The following software and application systems have been established in the Attorney-General's Chamber:

- *STATUS*, an information storage and retrieval software. It is used for the Statutes & Subsidiary Legislation Database, PERIND (a periodicals index), a Cases Index and Opinions Database and a Treaties and Conventions Index Databases.
- *ORACLE Database Management System* a database management system to develop the file management systems.
- *ATLAS*, a library operations and catalogue software.
- *ALL-IN-ONE*, an office automation software used for electronic mail and time management.
- *WORDPERFECT*, a PC based word-processing software.
- *ACCESS TO LEXIS, INFO ONE and Government Databases such as Registry of Companies and Businesses and Registry of Vehicles*. On-line searches of these databases can be conducted by telephone dial-up through modems.