Western Australian Department of
Conservation and Land Management

Conceptual plan for the implementation of a corporate World Wide Web server for CALM

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20 March, 1995

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1. Executive Summary

Amongst the wide range of tools available on the Internet, it is the World Wide Web (WWW), a multimedia graphical interface using hypertext links to integrate text documents, images, sounds and databases, which has the most potential for integrating and presenting CALM's corporate data to itself and the community.

The proposed application of the WWW methodology for centralising access to corporate information yet maintaining flexibility and currency builds on standards, structure and tools from the Internet, and in so doing prepares the way for CALM to share its information not only internally, but to the state, the nation and the world Internet community.

The recent Select Committee on Science and Technology report to the WA Legislative Assembly particularly urged agencies performing research such as CALM to ensure that the Internet is accessible throughout the organisation.

The WA Government's Information Policy Unit recently identified some of the general benefits of using networked information services, including improved access to government information by clients, accelerated research, development or recovery time because of immediate access to expert help, and access to timely and relevant information for government.

In CALM this technology could be used for a variety of applications, including the dissemination of departmental information, presentation of technical reports, management plans, articles, online surveys, marketing or database searches.

It is important to note that a CALM Web can be used across the departmental WAN independent of any Internet connection as such. We would suggest that this is in fact the imperative of establishing the CALM Web, to effect real communication within the department.

There are clearly significant productivity gains to made by adopting the Internet as a tool for departmental information dissemination. They include *cost savings* from reductions in staff time handling enquiries, in paper usage and phone costs and *efficiencies* from increased speed of access to current information by staff and clients.

This discussion paper also identifies resources required to make these gains, design standards for the Web and management issues regarding custodianship and security. It makes a number of recommendations, summarised here.

- A CALM Internet Committee should be established to act as peak custodian of the CALM Web, and each Branch and Division should appoint a staff member who is responsible for maintaining and updating their Web pages.

- The department's firewall be implemented as a matter of priority, and a solution to the remaining departmental routing problems be found.

- Fully configure departmental mail routing software and upgrade the existing domain name server to facilitate rapid Internet access by CALM staff.

- Identify funds for the sourcing of Internet consultant services where required.

2. Introduction

The amount of information managed by CALM, particularly in digital form, is rapidly increasing. This paper outlines a strategy for presenting and disseminating corporate information, both internally to departmental staff and externally to clients, in a simple yet effective manner.

The proposed method for centralising access to corporate information yet maintaining flexibility and currency coopts standards, structure and tools from the world's network of networks, the Internet, and in so doing prepares the way for CALM to share its information not only internally, but to the state, the nation and the whole blossoming worldwide Internet community.

2.1 What is the Internet?

The Internet is a worldwide network of computer systems which has developed from defence and academic networks to include government and now commercial networks. Organisations and individuals connected to the Internet typically make use of the network to both obtain and provide information. There are a number of different tools designed to aid access, including e-mail, file transfer and remote login access. Most recently and significantly the World Wide Web presents information as hypertext documents linked to others around the globe in a graphical environment.

2.2 What is the Internet's Role in Government?

The Australian Science and Technology Council, in their document the *Networked Nation* (October, 1994) emphasises that whilst the Internet started life as a research data network it is now changing into a public information and communication network, with potential benefit for many community sectors. They note that the dividing line between the commercial and non-commercial Internet is becoming more and more obscure and increasingly, industry, government and the general community are using it because they recognise the national, competitive and other advantages of access to a global information and communication facility. Thus, the Internet is in transition from being a network being based purely on research data to one based on a wide range of information services to government, business and the community generally.

In Western Australia, the Select Committee on Science and Technology tabled *a Final Report* to the Legislative Assembly in late 1994 which contained 59 Recommendations aimed at encouraging greater coordination, collaboration and concentration of research effort in this broad arena (Thomas et al, 1994, *Select Committee on Science and Technology Final Report*).

Specifically the *Final Report* addresses information technology issues under Recommendations 31 - 35, commenting that it is essential to ensure that the State's business and research organisations can take full advantage of the rapid advances in communications technology. The *Final Report* observes that IT networks increase the capacity for collaboration between geographically

dispersed companies and institutions. They assist network formation and communication between the research environment and the market-place. They help create a national market for improved services, which in turn can enable companies to accelerate the commercialisation of technology.

By means of the Internet potential collaborators can be identified, problems solved, information gathered and issues raised. Databases and document repositories can be accessed, including information available in the conventional literature. The Committee *particularly urged* agencies performing research, such as the Departments of Conservation & Land Management, and Agriculture, and agencies administering research such as the Department of Commerce and Trade, to ensure that the Internet is accessible throughout their organisations, significantly increasing their effectiveness.

The WA Government's Information Policy Unit identifies some of the general benefits of using networked information services, including improved access to government information by clients, accelerated research, development or recovery time because of immediate access to expert help, and access to timely and relevant information for government. (*AARNet Usage and Security Guidelines* (Draft), December 1994.)

2.3 Description of Major Internet tools

A wide range of tools is available for use on the Internet. Some of these are generic tools suitable in a number of environments, others are specific to the Internet itself. The following are of special importance:
- **E-Mail** - Electronic mail and attachments transmitted from one computer system to a specific user or group of users at a remote system or systems.
- **FTP** - A protocol for file transfer between remote machines.
- **Telnet** - A terminal emulation application for accessing remote computer systems.
- **Gopher** - a text-based distributed information service that makes available hierarchical collections of information across the Internet.
- **Usenet** - a facility for receiving continuously updated news items selected by the user from a vast range of topics.
- **WAIS** - Wide area information services for accessing distributed data systems.
- **WWW** - World Wide Web, a multimedia graphical interface to the Internet using hypertext links to bring together in an intuitive and integrated environment text documents, images, sounds and databases.

3. Scope

While the range of Internet tools dicussed above are all useful in their own right, in our view it is the World Wide Web which has the most potential for integrating and presenting CALM's corporate data to itself and the wider community. It is this tool which is the primary focus of the present document.

The World Wide Web has been described as "a wide-area multimedia information retrieval initiative aiming to give universal access to a large universe of documents". What the World-Wide Web (WWW, W3) project has done is provide users on computer networks with a consistent means to access a variety of media in a simplified fashion. Using a popular software interface to the Web called Mosaic, the Web project has changed the way people view and create information -- it has created the first true global hypermedia network.
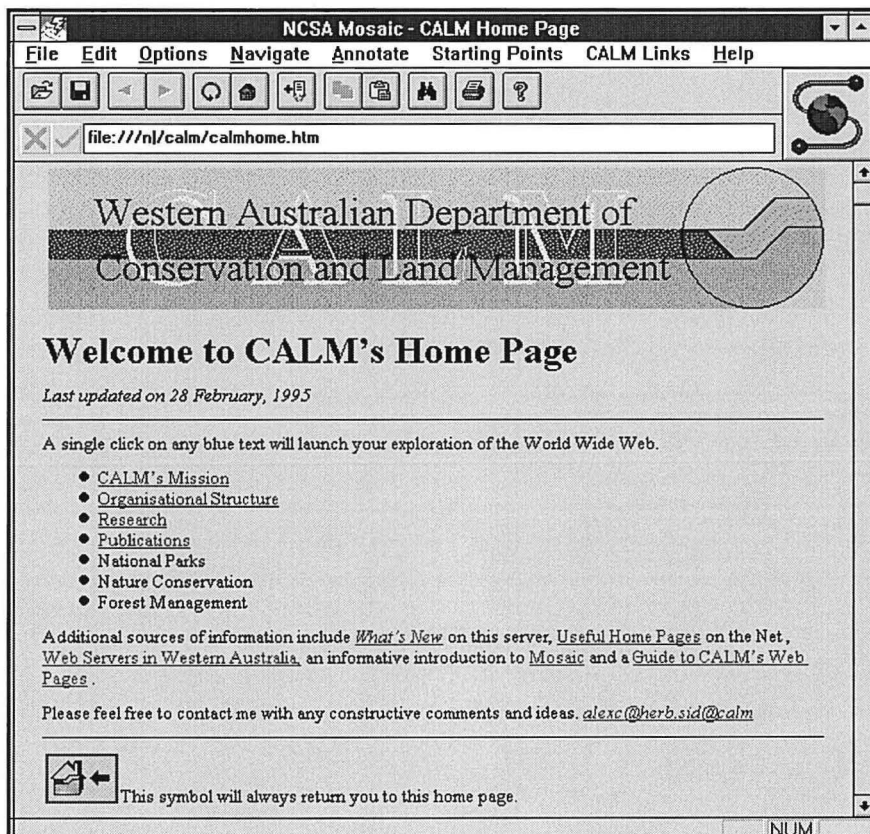

Figure 1. An example of the Mosaic interface, showing the prototype CALM home pages.

As such, a CALM Web could be used as a distributed information publishing and interactive services system -- essentially a multimedia, hypertext system. Web browsers, like Mosaic (see Figure 1) with their use of graphics, rich-text, familiar icons and navigational cues, can seamlessly integrate the complete range of Internet tools such as those listed above.

Thus this technology could be used for a variety of applications, including:

- dissemination of internal and public departmental information
- presentation of technical reports, management plans, magazine articles, etc.
- online surveys (using interactive forms)
- sales and marketing (using interactive forms)
- user-friendly database searches (using interactive forms)
- just about anything that could be presented in a multimedia environment

3.1 Audience

It is important to note that a CALM Web can be used across the departmental WAN independent of any Internet connection as such. We would suggest that this is in fact the imperative of establishing the CALM web, to effect real communication within the department.

Once the internal content of the CALM web is ensured, then facilitated access to external World Wide Web sites of use to departmental staff, and the provision of CALM corporate information to the external World Wide Web community becomes important. Under this latter arrangement an authorised subset of the CALM Web would be *mirrored* for Internet use, thus permitting only controlled external access to CALM's information and data.

3.1.1 Departmental

Over the last few years there has been a phenomenal growth in the use of personal computers by CALM staff to the point where few if any staff lack access to them. All metropolitan and an increasing number of regional centres now have established Local Area Networks (LANs) connected together via the departmental Wide Area Network (WAN). Officers at remote locations such as Karratha can readily connect to city-based LANs via high-speed modem and the telephone line.

Thus a CALM Web could be used by most if not all CALM staff for a wide range of information and data access. Notably, such a tool would afford staff a comprehensive view of the department, its structure and its function. It would allow officers to quickly retrieve the local information required to address a particular problem or issue and to identify those best able to assist with further knowledge or expertise. Just as important, a CALM Web would provide access to the Internet as a whole, placing similar information from around Australia and the world quickly and intuitively at their fingertips.

3.1.2 External

The Internet is becoming a fashionable, if not ever-present word in government, education and commercial circles. General Internet population estimates are in the 10 to 40 million range world-wide, with an undisputed growth of an average of 10% per month. According to The Internet Society, there are now 3,864,000 computers in 50,000 networks attached to the Internet as at December 1994. In Australia, AARNet's customer base is now estimated to be over 600,000, but as

they are no longer the only international link provider, the total number of users in Australia must be larger still.

Australia is the 5th largest user of the Internet, based on the number of host machines, behind the US, UK, Germany and Canada and before Japan, according to International Data Corporation (IDC). A profile of worldwide usage indicates that 55% of the traffic is for Research (including commercial research) purposes, followed by Commercial (33%), Defence (10%), Education (9%) and Government (7%).

The number of Web users world-wide is estimated at some 3 million people, and growth is at rates of close to 300% per month. Thus the establishment of a CALM Web has great potential to open a window on the department to external users thus providing CALM with a unique and powerful vehicle for general information dissementation, presentation of research findings, publicity and marketing.

3.2 Information

Documents which can be displayed using WWW may comprise text, still or video images, sounds, or interactive forms. Indeed, a characteristic of WWW browsers is their ability to integrate a range of such files into a truly multimedia document which not only presents information but allows the user to interact with it, moving from lead to lead, summoning text images and sound, or querying or even adding to data-bases via powerful SQL query functions. A strong feature of interactive use of data-bases is that user access is strictly controllable, thus providing the necessary security.

3.3 Data types

3.3.1 Documents

Text documents for display on WWW may comprise plain or formatted text. The former requires no special treatment. The latter must be composed using Hyper-Text Markup Language (HTML), a system of embedded codes which pre-determine the document's typography, including layout, headings and fonts. Text destined for HTML can be created by a variety of means including manually, by use of a familiar word-processor and a suitable macro, by use of specialized editing tools such as HotMetal.

HTML documents can be displayed, word-searched, printed, or captured to the user's hard disc from within the WWW browser.

3.3.2 Images

An HTML document can contain references to still images. Since image files are generally rather large, those for use in WWW documents are normally in a compressed format such as GIF or JPG. As with text, referenced images can be displayed, printed or captured to disc from within the WWW browser. Whilst several Web browsers contain their own image-viewing software, others rely on

calling third-party products of the user's choice. Some Web browsers are configurable so as to prevent the display of images, thus displaying documents more rapidly than otherwise.

Similarly, an HTML document can reference a video image file. Normally this would be in a compressed format such as MPEG requiring specialized software or even hardware to decode at the user end.

3.3.3 Databases

Whilst databases themselves cannot be directly viewed by means of WWW it is possible, through the use of interactive forms, to give access to the information they contain. In particular, by means of the Structured Query Language (SQL) facility of many modern databases (a feature of all major database software employed by CALM) it is possible to return a query result which is itself presented as an HTML document. This result can be displayed, captured, saved to disc or printed from within the Web browser. It is important to note that the kind of query that can be made of a database, its scope and extent are completely under the control of the form designer. This is, of course, an essential security requirement.

3.4 Interactive tools

An HTML document can be constructed in such as way as to comprise an interactive form to be filled in by the viewer. Such forms find application for marketing, creating and maintaining mailing lists, soliciting feedback and comment, presenting threaded news, allowing document or database queries.

An obvious use combining several of the above features might involve the marketing, sales, and to some extent the production of departmental publications. These could be advertised on the WWW by means of a series of mutually-referencing HTML documents containing text, photographic images, artwork, sounds -- and even video. Sample issues could be presented in this medium. By means of interactive forms, customers could add their name to the relevant mailing list for items issued gratis, order a book, pay the subscription for a journal (using an encrypted credit card number), comment on an article they have read, or even contribute a piece of their own (a letter, say).

4. Content

A major government department such as CALM inevitably generates and uses a large number of documents and databases. Incorporation of these in a highly structured and readily navigated CALM Web would do much to improve the ease of access to these documents by both staff and clients. Below we present a list of possible contents for both corporate and commercial use.

4.1 Corporate

4.1.1 Documents

- Departmental/Divisional Strategic Plans
- Policy/Mission Statements *
- Annual/biennial Reports
- Management Plans
- Acts and Regulations
- Press releases

- Newsfaxes
- Newsletters
- Special Reports
- Executive Diaries *
- CALM Admin. Instructions & Notices *
- Forms

    * not for external use

4.1.2 Data

- Staff information (CONCEPT)
- Data dictionary (by location and subject)
- SID - WAHERB, WACENSUS, DELTA

- LIB - TENIS (control access as necessary)
- Recreation & Tourism - TARIS
- Library catalogues

4.1.3 Images

- Flora and fauna
- Ecotourism e.g. facilities
- Maps
- Landscape designs

- Places, localities
- Staff
- Logos and banners
- Architectural plans

4.2 Commercial

4.2.1 Publishing

- *Landscope*
- Books and Calendars

- Management Plans and Reports
- CALM Visa Card

4.2.2 Ecotourism

- Prospectus
- Registration

- Interactive Bookings
- Comments/feedback

4.2.3 Business Units

- Annual reports
- Pricing schedules
- Contacts

- Mission statements etc.
- Advertising material

5. Cost Savings and Efficiencies

With the exponential growth in computer literacy and of the public's use of the Internet, an increasing number of clients will prefer to access such sources of information via the electronic media from their offices or homes. Further, many enquiries currently dealt with by staff on a manual basis could readily be dealt with by giving the clients themselves direct access via on-site terminals. This represents a major shift in work practice for staff and there will be a requirement for training and practice in this new technology. However, there are clearly signficant productivity gains to made by adopting the Internet as a tool for departmental information dissemination.

5.1 Cost Savings

- Reduced staff time handling enquiries
- Reduced paper usage
- Reduced ISD and STD phone costs
- Reduction in the duplication of effort in gathering data already available within CALM or elsewhere. This therefore requires a commitment for ALL pertinent corporate information to be made available in this manner, where available digitally. The concerted construction of a comprehensive Corporate Data Dictionary is essential in this context, particularly for flagging non-digital data/information sources.

5.2 Efficiencies

- Increased speed of information dissemination to staff and clients
- Quick and intuitive access to up to date information by staff & clients
- Uniform interface and environment for information access and retrieval
- Single source (one stop shop) for all digital corporate and external information
- Managed gateway to the Internet for staff
- Immediacy and ease of communication with professional colleagues globally
- Access to the latest public domain and commercial software
- Access to work-related mailing list servers
- Access to library catalogues and services

5.3 Effectiveness

- Communication of context for and relevance of SID research findings and their implications to operations and managerial officers.
- Communication of context for and relevance of LIB spatial datasets and their implications to operations and managerial officers.

5.4 Equity

- Equity of information dissemination throughout the department to all staff,
- Equity of information dissemination to other govt departments and the public.

6. Resources

The following is a discussion of the identifiable resources required to implement the CALM Web and its Internet extensions.

6.1 Hardware

The CALM Web implementation relies on the department's Wide Area Network (WAN) to provide connectivity between different centres via the ISDN telephone line or optic fibre. In remote centres without WAN connections, it is envisaged that a dial-in line will provide interim functionality (until access for these centres can be provided by the Internet itself).

Individual computers on the WAN will therefore already have a compatible network card and the appropriate Vines software. As the Web browser software is Windows-based, the computers must be configured appropriately to run Windows 3.1, i.e. a minimum of a 386SX with 2 Mb RAM and a VGA monitor, but preferably a 486DX 50 Mhz with 8 Mb RAM and SVGA or XGA monitor with a fast video card.

6.2 Software

Although other components of the Internet are text-based and require minimal hardware and software (e.g. the older applications such as e-mail, ftp and telnet), the Web is designed for a graphical user interface. Apart from Vines network software (including PC/TCP) which we take as given on the CALM WAN, the following software is required on each machine for viewing the CALM home pages.

- Windows 3.1 or Windows for Workgroups
- Windows extensions allowing 32-bit file access - W32S_OLE.EXE (freeware)
- Support for Windows sockets -WINSOCK.DLL version 1.1 or later (freeware)
- Additional Windows dynamic link library files - PCTCPAPI, WNET386 etc.
- A Web browser - Mosaic 2.09alpha (freeware) or Netscape v1.0 (shareware)
- A graphics file viewer - LView (freeware)

Additional software is required to assist preparation of HTML documents for presentation on the Web, although it is quite possible to do manually with a text editor and a working knowledge of the Hyper-Text Markup Language.

Shareware HTML editors such as *HoTMetaL*, *HTML Assistant* or *HTML Writer* are useful aids to automating the preparation of stand-alone Web documents. The freeware HTML document template CU-HTML, while not fully functioned, allows the simultaneous preparation of Word for Windows 6.0 documents for printing *and* writing as HTML files. This means that hard and electronic copies can be maintained from a single source document with all the inherent efficiencies this enables.

The standard still image formats for the WWW are GIF and JPG. Windows image editing and conversion tools such as *Paint Shop Pro*, *Converter* and

Photostyler have all been found useful at various stages of WWW image production.

As the sophistication of the CALM Web Pages increases, use of a public-domain programming language such as PERL to construct more complex HTML-enabled packages (e.g. interactive mapping on the Web) will be required.

6.3 Consultants

While CALM staff have, or will be gaining expertise in these areas, some aspects of implementing CALM's WWW pages will require the acquisition of specialist knowledge from external sources. Examples include application programming in PERL, the installation of proxy Web servers and the related consultation on firewall security issues, or advice on management of CALM's Internet Domain Name Server.

6.4 Staff

Implementation of a CALM-wide Web which will eventually extend to the wider community will require input from CALM staff at three levels.

1. Officers involved with maintaining and expanding CALM's IT infrastructure will need to become familiar with the critical hardware, firmware and software configurations required to maintain the Web throughout the department.

2. As the Web expands, each Branch and Division will need to appoint at least one staff member who is responsible for maintaining and updating that group's part of the corporate Web, and liaises as required with the body governing standards and protocols for the CALM Web.

3. A CALM Internet Committee will need to be formed, perhaps as a subset of the existing corporate Executive IT Committee, which acts as a peak custodian of the CALM Web, setting overall goals and strategies for its implementation as well as governing standards and protocols for the hardware, software and especially content. This latter will be especially crucial when a parallel (mirrored) copy of the CALM Web is made available to the Internet community, after CALM is officially regisered as an Internet site.

7. Design Standards

What follows is largely a summary of the current standards used for production of the prototype CALM Web pages.

7.1 Systems Design

The CALM Web pages are situated on a Vines service visible to all users of the WAN as network drive N. HTML files which are the basis of the Web pages are stored on this drive in a directory hierarchy approximating the CALM corporate structure.

The top directory of this hierarchy is N:\CALM. Images for use in the Web pages are generally stored in N:\CALM\IMAGES. The current versions of software required to access the CALM Web are stored in N:\MOSAIC.

NCSA Mosaic is the recommended Web browser and allows the system administrator to standardise the features of the CALM Web pages. To this end two lines have been added to the Vines Sample Profile on each network server in CALM's WAN.

- SETDRIVE N "INTERNET SERVICE@HERB.SID@CALM"

- SET MOSAIC.INI = N:\MOSAIC\MOSAIC.INI

The first line makes the N drive a standard across the WAN, and the second ensures that the Mosaic software initialises on all machines with the same settings, such as the display fonts, default home page, default image viewer.

An authorised subset of the CALM Web pages will need to be 'mirrored' on a separate computer, such as the Domain Name Server, for access by the Internet community. The implementation of 'parallel Webs' is an increasingly popular design for sites where enterprise-wide *and* public versions of the corporate information systems are necessary. The security issues affecting such a design are discussed in section 8.2 of this document (page 16).

7.2 Typographic Style

Hyper-Text Markup Language (HTML) is a subset of the ISO's Standard Generalised Markup Language (SGML), which provides a software-independent coding system for denoting typography in a document. HTML Document Type Definitions incude support for a range of headings, numbered and un-numbered lists, titles, horizontal rules, forms, tables and internal and external links to other documents, image files or text.

Each of these DTD's can be assigned a particular style, i.e. typeface, font and formatting and the specified styles can be stored centrally in an initialisation file, allowing standardisation of document page presentation. For example, the recommended Web browser for CALM, *NCSA Mosaic*, enables it's initialisation file to be stored and maintained on a network drive rather than the user's local Windows subdirectory, and referenced globally by all users.

A standardised template from which to prepare CALM Web documents is available using the Word for Windows 6.0 template CALMHTML.DOT, which is a customisation of the CU-HTML6.DOT HTML template developed by the University of Hong Kong. Standard page elements such as Title, CALM logo, and return links to the home page are present in the customised template, further enabling a consistency of presentation for the corporate Web pages.

7.3 Graphic Design

Note that images are time-consuming to download over any slow connection, and should be judiciously utilised. The following recommended formats are all aimed at minimising image file size while retaining sufficient image quality for a variety of ouptut devices.

The **recommended image format** is the very compact GIF 87A (Compuserve's Graphic Image File format) in interlaced mode. Interlacing enables Web browsers to display an image more quickly and flexibly. JPEG images are the second most common image format on the Web, and although its compression ratios are good, they are not yet as widely supported by software applications.

The **number of colours** used in an image depends on its required information content or accuracy of colour representation. 256 colours is the current standard.

Recommended sizes for images (width x length, in pixels) with examples from the CALM Web pages:

- banner logos (560 x 100) - e.g. on CALM Home Page banner
- small banner logos (400 x 80) - e.g. Landscope banner
- square logos (64 x 64) - e.g. CALM icon
- passport photos (120 x 150) - e.g. for staff bio pages.

7.4 Development and Presentation Tools

A discussion of current software tools used to implement the CALM Web pages can be found in section 6.2 of this document (page 12). Detailed instructions on software installation over the WAN can be found on the CALM Home Page in the *Guide to CALM's Web Pages* link.

7.5 The Prototype CALM Web

A prototype set of Departmental Web Pages has been developed during the preparation of this document to illustrate the functionality of this new vehicle for information dissemination.

The CALM Web Pages have been prepared using the above standards and are available for viewing by any member of staff providing their computer has been appropriately configured. These pages are already in use by some members of staff who enjoy partial Internet connectivity for whom it provides an elegant gateway for their exploration of the World Wide Web. The CALM Home Page is illustrated in Figure 1 above.

8. Management Protocols

We anticipate the need for an Internet Committee comprising major CALM stakeholders in the information arena, with representation from ISB, LIB, SID, CRD, i.e. a subset of the Executive IT Committee, together with appropriate co-opted staff as required.

Two critical concerns of the Internet Committee will be custodianship and security.

8.1 Custodianship

Custodians will take responsibility for content and accuracy of information provided and for the standard and style of its presentation. Note that custodians will be needed at a number of levels throughout the Department.

- Custodians for CALM's top level WWW information server must be appointed. This may well comprise the Internet Committee itself, at least in the first instance.
- Custodians at Divisional and Branch levels will in time need to be found as these bodies establish and maintain their own subset of pages on CALM's Web.

8.2 Security

CALM, like other agencies connecting to public networks, is accountable for:

- the ethical and appropriate use of the networks by staff
- a duty of care towards the information provided or accessed over the public information networks
- the privacy, confidentiality and copyright of any information accessed or provided
- adherence to normal record management practices in this new environment

Computing security is not a new issue for CALM and existing security protocols on corporate data servers and networks will adequately serve the CALM Web also.

However, once CALM is connected to the Internet via Bureau Services and registered with AARNet, CALM's corporate data security will be reliant on the implementation of a robust firewall. This is especially true currently, as no firewall security is provided to government by the Bureau Services site.

Once a firewall is in place at CALM, a proxy Web server will need to be set up so that CALM staff can still access Internet Web sites. External users will not be able to access the CALM Web directly as it is situated as a Vines service on the corporate WAN and is hence securely placed. To enable the publication of information on the Internet, an authorised subset of the CALM Web pages will need to be '*mirrored*' on the external side of the firewall.

Recent discussions with the Commonwealth Government's Environmental Resources Information Network (ERIN), which runs a major Australian Web

site, confirm that this strategy of parallel webs allows optimum sharing of corporate information for use by staff, while maintaining control of information to be widely and publically distributed over the Internet.

Detailed draft guidlines covering security and internet usage are now available from the Information Policy Unit of the WA Public Sector Management Office under the title *AARNet Usage and Security Guidelines* including:

- Overview.
- Site Security Handbook.
- Electronic Mail Good Practice.
- Security Overview.
- Password Security.

In the area of online commerce, several Web Browsers (notably Netscape) provide security measures to protect users account and PIN numbers, etc. by applying RSA encryption technology.

9. Recommendations for Action

1. A CALM Internet Committee should be established, perhaps as a subset of the existing corporate Executive IT Committee, to act as peak custodian of the CALM Web, setting overall goals and strategies for its implementation as well as developing and maintaining standards and protocols for the hardware, software and most importantly content and its presentation.

2. Each Branch and Division should appoint at least one staff member who is responsible for maintaining and updating that group's part of the corporate Web, and liaises as required with the body governing standards and protocols for the CALM Web.

3. The department's firewall be implemented as a matter of priority to ensure corporate data security and enabling CALM's registration with AARNet as an Internet site to be effected.

4. Solve the remaining departmental routing problems which currently prohibit access to the Internet by a number of centres in CALM.

5. Fully configure the Zoomit mail routing software to prepare CALM for AARNet registration and the subsequent availability of Internet e-mail.

6. Upgrade the existing domain name server to be able to facilitate rapid Internet access by CALM staff, and to provide adequate storage for and serve Web pages efficiently to the internet community.

7. Identify funds for the sourcing of expert consulting services to assist the timely development and implementation of the CALM Web.

10. References

Australian Science and Technology Council, (October, 1994). *The Networked Nation*, Australian Government Publishing Service, Canberra.

Information Policy Unit of the Public Sector Management Office, (December 1994) *AARNet Usage and Security Guidelines (Draft)*, Government of Western Australia.

Thomas, B. et al, (November, 1994). *Select Committee on Science and Technology Final Report*, Legislative Assembly of Western Australia, Perth.

11. Glossary

AARNET - Australian Academic Research Network

ASTEC - Australian Science and Technology Council

CALM - Department of Conservation and Land Management

CU-HTML - Word for Windows to HTML document converter template

DELTA - Descriptive Language for Taxonomy

Domain Name Server - resolves computer domain names and Internet addresses

E-Mail - Electronic mail between computer users, often at remote sites

Firewall - a computer providing secure and controlled access between networks

FTP - A protocol for file transfer between remote machines

Gopher - a text-based distributed information service across the Internet

HotMetal - HTML editor

HTML - Hyper-Text Markup Language, with which WWW documents are made

Hypertext - an interactive, self-referencing form of elctronic text

Internet - a worldwide network of computers facilitating information sharing

IPU - Information Policy Unit of the WA Public Sector Management Office

IT - Information Technology

LAN - Local Area Network

Mosaic - A freeware World Wide Web browser from NCSA

MPEG - a industry standard graphics file format for video

Netscape - A shareware World Wide Web browser

PERL - a common flexible C-like programming language

SQL - Structured Query Language

TARIS - CALM's Tourism and Recreation Information System application

TELSTRA - Australia's major telecommunications provider

TENIS - CALM's Land Tenure Information System application

Usenet - Internet news service

Vines - Banyan's Enterprise Networking operating system

WACENSUS - CALM's Census of WA Plants application

WAHERB - CALM's Herbarium Specimen database

WAIS - Wide area information services for accessing distributed data systems

WALIB - CALM's Herbarium Library database

WAN - Wide Area Network

WinSock - a Windows Dynamic Link Library facilitating PC/TCP tranport

WWW - World Wide Web, a multimedia graphical interface to the Internet

WWW browser - software to view HTML documents

12. Index