



Intranets for SAIs

*An INTOSAI EDP Audit
Committee Project*



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*State Audit Institution
Sultanate of Oman*

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Intranets for SAIs

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1. Background

1-1 Over the last three to four years, the *Internet* has brought about fundamental, indeed revolutionary, changes in the functioning of organisations the world over. Governments have been no exception to this rule, with the increasing use of the Internet for providing on-line services to the public at large.

1-2 Side by side, the technologies, which support the public Internet, have been leveraged internally by organisations, both in the public and private sectors, through the creation of *intranets* on their corporate IT networks. **Conceptually, the intranet is a scaled down version of the Internet in size and scope, but without loss of functionality, which is restricted only to users within the organisation.**

1-3 At the 8th meeting of the INTOSAI EDP Audit Committee held at Harare, Zimbabwe in October 1999, the need for a research study on how SAIs can use intranets for getting better value out of IT was discussed, based on a proposal by SAI-Oman. It was felt that such a research study would be beneficial to SAIs with or without extensive experience in the use of IT. The Committee endorsed the idea and a Working Group, led by SAI-Oman and including the SAIs of Sweden and UK, was formed for conducting a research study on this topic.

1-4 SAI-Oman prepared a preliminary draft paper and circulated it in February 2000 to the other members of the Working Group (SAI-UK and SAI-Sweden) as well as the Committee Chair (SAI-India) for their suggestions. Based on the feedback received, a draft research paper on the topic, as well as a questionnaire for surveying use of intranets by SAIs, was prepared and was circulated in June 2000 to members of INTOSAI for (a) their comments and suggestions on the research paper; and (b) response to the survey questionnaire. Comments on the draft paper and/or responses to the survey questionnaire were received from 93 SAIs, listed in Appendix 1. A copy of the survey questionnaire circulated to INTOSAI members in available as Appendix 2.

1-5 Based on the comments and responses received, the research paper, which forms the body of this document, was presented at the 9th Meeting of the Committee at New Delhi in November 2000. Having taken note of further comments and responses received from Committee members, the research paper has now been finalised for circulation to INTOSAI members.

1-6 Electronic versions of this document are available on the Internet in two formats – Microsoft Word and Adobe PDF (Portable Document Format). These can be accessed at the following addresses:

Microsoft Word – http://www.sgsa.com/intosai_edp/IntranetStudy.doc

Adobe PDF – http://www.sgsa.com/intosai_edp/IntranetStudy.pdf

1-7 The comments and responses received from INTOSAI members are available in the form of a Microsoft Access database, which can be accessed at the following address:

http://www.sgsa.com/intosai_edp/IntranetResponses.mdb

1-8 Comments, suggestions and clarifications on this document are welcome, and may be addressed to SAI-Oman at the following address:

State Audit Institution, PO Box 727, Postal Code 113, Muscat, Sultanate of Oman; Fax: (968) 740264; Phone: (968) 736217; E-Mail: sages@omantel.net.om

2. Scope of the Study

2-1 This document is intended for senior and middle management in SAIs – decision makers in the field of IT, as well as potential “clients” for the intranet. Consequently, this paper has a managerial rather than a technical focus, although some technical aspects are covered in the appendices. IT staff with responsibilities for development and implementation will find this document useful from a conceptual point of view, but will need additional specific technical documentation for planning and implementing an intranet.

3. What is an intranet?

3-1 An intranet is just the organisation’s computer network, based on the communication standards of the Internet. This could either be a Local Area Network (LAN) – typically restricted to locations within an office building or a campus – or a Wide Area Network – which is geographically dispersed and spans organisational locations in different cities or even countries. It is a private version of the Internet, with “internal access only” web sites, which can be seen only by members of the organisation – unlike the public Internet. All that is needed for users to access this “intranet” is the same “web browser” used on the Internet, which acts as a universal window for all information on the intranet.

3-2 A list of definitions of a few other commonly used terms relevant to intranets is as follows:

World Wide Web (WWW or Web)	The most prominent component of the Internet; based on a technology, which enables linking of documents residing on documents residing on servers which are connected through the Intranet, but which may be physically located anywhere in the world
Browser	A client software, which is installed on a user's machine to enable him to access the Internet or Intranet
Web Server	A server software, which "serves" web pages which can be viewed by users with a web browser
Application Server	A "middle tier" software which acts as an interface between the web server and the database server or other applications
Firewall	Software that protects the internal network from unauthorised access through the Internet
DBMS	Data Base Management System
Extranet	An "extranet" falls between an intranet and the Internet. This is also an Internet standards based network, providing web-browser based access not only within the organisation, but also to specified third parties e.g. vendors, customers etc., but not to the public at large. In the case of an SAI, this could include access to or connectivity with an auditee agency's intranet. However, extranets are beyond the scope of this research study.

4. Features and Benefits of intranets

Time and cost savings	One of the biggest reasons why organisations move their documents and processes onto the Intranet is the reduction in cost and time of publishing and
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	<p>distribution.¹ The savings can be substantial even for small and medium organisations. Moreover, the intranet often results in a change from a “calendar-driven” publishing schedule to needs-based publishing, where changes to documents are made as needed and “uploaded” onto the intranet for immediate access by users.</p>
<p>Universal User Interface</p>	<p>The web browser (Netscape Navigator or Microsoft's Internet Explorer) can become the user's single window to all IT systems and information. This translates into lower Total Cost of Ownership (TCO), as the browser can serve as the interface for many applications. Also, training costs are lowered dramatically, since the end-user needs to learn only one interface. Even this may not be necessary in most cases, considering the familiarity of most users with the browser, on account of accessing the Internet.</p>
<p>Ease of use</p>	<p>The intranet provides an incredibly simple “point and click” way to surf through the web of hyper linked documents, starting from the corporate intranet homepage. All that the employee needs to know is how to use a mouse; he/she probably does not need even elementary keyboard skills – a major factor inhibiting extensive use of IT by end-users in many organisations.</p>
<p>Better Information Support for Decision Making</p>	<p>Because information is so much easier to access on an intranet using a web browser, it tends to get accessed more frequently and more widely by users throughout the organisation, and leads to widespread information dissemination and consequently more informed decision-making.</p>
<p>Cross Platform Connectivity</p>	<p>The Internet was designed specifically to enable communication across disparate hardware and software platforms, with a language called HTML (Hyper Text Markup Language) as the universal language of the web and browsers available for all common operating systems. Since the intranet is based on Internet</p>

¹ *There are other ways of electronically publishing and distributing documents, but the intranet is easily the most convenient and cost-effective method of doing so.*

	<p>technologies, users within the organisation working on different platforms – UNIX, Mac, Windows etc – can also share information with the same ease. Furthermore, from a developer’s point of view, there is no need to develop different interfaces for different user platforms, resulting in substantial savings in time and cost.</p>
<p>Dynamic Information</p>	<p>Users can access not only static information through the intranet, but also dynamically generated information from corporate databases; all that is needed is to build “web-enabled” front ends for legacy applications, enabling the user to use his browser to access existing computerised applications. For example, staff can view web pages containing auditee financial information, which are generated “on the fly” from databases containing up-to-date revenue and expenditure data. As and when the data changes, the web pages get updated automatically.</p>
<p>Multimedia Information</p>	<p>Intranets can be used for publishing not only text and graphics, but also audio, video and interactive applications– providing a powerful communications and learning tool for staff.</p>
<p>Changes in organisational culture</p>	<ul style="list-style-type: none"> • Information is now readily available – more than ever before – to everybody on the intranet, without the need for filtering and processing by various levels of management and staff. Incidentally, this can be a source of resistance, especially amongst middle management staff, who feel threatened by the loss of control and “power” over information, and a possible “flattening” of organisational hierarchy. • Information can be accessed not only from within the office but also from outside locations in the field using remote access (so long as the user is authorised to connect remotely) • Users can access information on their own whenever they want, resulting in a “self-service” culture in place of the earlier dependence on the IT Department or other staff members.

5. How to set up an intranet

5.1 The process of setting up an intranet can be divided into four broad stages, each with its own set of activities and issues:

Strategic Planning	<ul style="list-style-type: none">• Need for an intranet• High level vision• Sponsors and steering committee• Creation of a suitable Intranet Management Team
Pilot Project	<ul style="list-style-type: none">• Choice of pilot• Create an audience and recruit web publisher
Detailed Framework and Implementation	<ul style="list-style-type: none">• Content Specification• Technology• Budget and Schedule• Staffing and Outsourcing• Security• Testing and Training
Management and Maintenance	<ul style="list-style-type: none">• Content Contribution and Ongoing Development• Publishing and Technical Standards• Change Management• Funding• Performance, Maintenance and Backup• Legal Issues

6. Strategic Planning

6.1 Need for an Intranet

61-1 Why does the SAI need an intranet? "Intranet" is the latest technical buzzword going around, and just because other organisations have an intranet, your SAI may not necessarily need one. Some of the questions that could throw up the need for an intranet, could be:

- Has the top management considered the use of intranet applications in different audit processes, and the potential benefits therefrom ?
- Are internal users (management and staff) aware of intranets in other organisations, and have they been asking for an intranet here?
- Does the SAI need better tools for communicating information and/or collaboration, which could be met very well through an intranet?
- How can an intranet help meet organisational goals? Can it help to do things faster, better and cheaper? How does it compare with other possible solutions?
- Is the SAI implementing or proposing to implement new IT systems, which could be integrated into an intranet?

6.2 High Level Vision

6.2-1 Developing an intranet is not just a matter of creating a few simple web pages, or converting a Microsoft Word document into HTML format. It needs to be treated like any other software development project. Unlike other traditional software projects, an intranet is probably best handled in an evolutionary fashion, with lots of "prototyping". Nevertheless, this does not, by any means, underrate the need for systematic planning, or for that matter, any of the other phases of the system development process like requirements specifications, design documentation, formal testing and implementation.

6.2-2 At this stage, it is necessary to have a roadmap of the intranet for the future. This should cover the following issues:

- Will there be a single centralised intranet, or will individual departments be responsible for separate web sites or sections of a site?
- Will the intranet be a static one, or will it also include dynamic information, by linking to corporate databases? If so, what would be the approximate time frame for providing dynamic access?

- What do different levels of management and staff expect from the intranet? How will the intranet tie in with the information needs of the organisation?
- What is the anticipated scope of the intranet 1/2/5 years from now (even if this is likely to be way off the mark, this is still a useful exercise)? How is it proposed to integrate different applications – current and proposed – into the intranet? Setting the proper expectations for the intranet is very important.

6.2-3 For example, an organisation could visualise the following broad phases in the development of intranet use:

Phase I	Organisational units start exchanging information through the intranet, and make information more accessible and available.
Phase II	The exchange of information percolates to the individual with knowledge management and co-operation at a personal level.
Phase III	Different core processes and activities are improved using intranet applications, with role-based workflow.
Phase IV	Whole processes or activities are performed using the intranet, which is used to re-organise and reshape the work. The intranet is expanded into an “extranet”, leveraging links with suppliers, customers and other third parties.

6.3 Sponsors and Steering Committee

6.3-1 At this stage, it is necessary to have a senior management sponsor, who is willing to champion the need for an intranet. This should subsequently be handled by a full-fledged intranet steering committee, especially for medium to large SAIs. The senior management sponsor or steering committee will:

- Assess where the intranet can best help the organisation, and make sure it is deployed there
- Assist in determining the structure of the intranet from an information management perspective, giving due consideration to how users would access information and providing alternate “routes” for accessing information
- Support and encourage the deployment of the intranet

- “Push through” funding and resource allocations for the intranet
- Monitor the implementation for the intranet, and ensuring that other issues like infrastructure requirements, standards and policies go side by side with intranet development

6.4 Creation of a Suitable Intranet Management Team

6.4-1 Unlike typical software development projects, the intranet will not be just a one-off project. It needs to be maintained and kept up to date and constantly upgraded. It is therefore important to plan for an “intranet management team”, which will be responsible for managing the intranet with a medium to long term perspective. Such a team should typically include representatives from key user groups, as well as technical staff.

6.4-2 Responsibilities for the intranet need to be clearly demarcated, from the outset of the project.

- Responsibility for content should generally be that of the line Departments, not the IT Department;
- Responsibility for ensuring value and achieving the intended benefits should ideally be with a member of top management;
- Technical issues should generally be handled by the IT Department.

7. Pilot Project

7-1 The importance of a pilot project for intranet development cannot be overemphasised. The impact of the intranet is best demonstrated through a small pilot project or a “demo”, which will, in all probability, form the main vehicle to “sell” the concept of an intranet to different tiers in the organisation.

7-2 The resource requirements for the pilot project are relatively small. All that is needed is a spare desktop computer. Software for the web server, the web browser and for HTML editing for most operating systems (Windows / Mac / Unix), as well as plenty of literature on how to set up a web site, can be downloaded from the Internet free of charge. If the network conforms to the Internet communications standards (TCP/IP), there is the additional option of demonstrating the pilot project from anywhere on the network, which adds to its promotional value.

7-3 A sample set of steps for setting up a pilot intranet project is enclosed in Appendix – 3.

7.1 Choice of Pilot Project

7.1-1 The ideal pilot project would be a document or application, which

- is updated frequently
- needs to be reprinted and distributed widely
- is to be accessed by staff running different types of computers and operating systems
- requires minimal effort for conversion into a web-ready format

7.1-2 Typical candidates for a pilot project include a phone list or a widely used procedures manual. The temptation of doing heavy programming, or highly graphic oriented pages, which may take a long time to load on the user's computer, should generally be avoided. Also, at least initially, it may be appropriate to avoid applications involving data entry through forms or dynamic access to databases. If there is a constant need to "fix" persistent problems with forms or scripts, this will detract considerably from the effect of the demonstration. One can, however, consider using mock data to show the possibilities for dynamic access.

7.1-3 In many cases, it may be advantageous to consider extending the pilot project to a "mini" version of the whole system, at least in terms of structure and "look and feel". This would enable users to fully assess the potential of the intranet and encourage "buy-in" by users at an early stage.

7.1-4 Pilot projects are in the nature of demonstrating the "proof of concept" and often tend to be somewhat simplistic. To get a flavour of real-life implementations of intranets, in addition to the pilot project, it may be worthwhile for the intranet steering committee and other staff members involved to acquaint themselves with the experiences of similarly placed organisations (preferably in the public sector) who have implemented intranets.

7.2 Create an audience and recruit web publishers

7.2-1 In addition to spreading awareness about the potential of the intranet, generating enthusiasm and garnering support, the objective of demonstrating the pilot project is primarily two fold:

- to create a potential audience of users for the intranet
- to recruit "web publishers", i.e. potential suppliers of content for the intranet

7.2-2 It is probably a good idea to allow participants to brainstorm further applications for the intranet (this would be a good source for defining the requirements specifications for the intranet *proper*). Potential web-publishers

identified at this stage could form the nucleus of the intranet team, which would ultimately take over collective responsibility for content publishing and updating.

8. Detailed Framework and Implementation

8.1 Content Specification

8.1-1 After the successful demonstration of the pilot project, it is necessary to start formally documenting the requirements for contents on the intranet. It may be appropriate to adopt a modular or phased approach, spelling out the contents for the first phase in detail and only preparing an outline of the contents proposed for subsequent phases. It is also important to finalise the overall structure of the intranet and the different “routes” to be provided for user access.

8.1-2 It is important to consider the cost-benefit implications of migrating existing applications to the intranet. The value addition of a browser interface is usually the highest for new applications, while for successful applications operating on a non-web platform, a careful analysis of the costs involved in migration vis-à-vis the potential benefits of a web interface needs to be conducted before deciding on the conversion. Constraints like limitations of skilled resources, with the limited IT staff being used for both maintenance / conversion of existing non-web applications as well as development of new web-based applications, as also availability of funds, need to be considered.

8.1-3 It is also important to consider issues, which would facilitate ease of use of the intranet by users e.g.:

- developing a consistent feel and look across the intranet
- developing a site map as well as a search tool to assist users in locating information
- publicising the names of content authors and editors, with a view to encouraging staff to submit content.

8.1-4 This phase is a very important step in the development of the intranet. Users will very quickly abandon websites that lack content or are poorly designed. Experience has shown that the approach of “if you build it, they will come” may result in waning interest and consequently the investment in the development effort becoming merely an expense exercise.

8.2 Technology

8.2-1 From a somewhat simplified point of view, there are four groups of technological issues to be considered, additional details of which are discussed in the technical appendix (Appendix 4) to this paper:

<p>Network</p>	<p>The network must have TCP/IP (the Internet Standard Protocol) as one of its protocols, to run an intranet. The latest versions of common network operating systems support TCP/IP, but older versions may not.</p> <p>Further, the network must have enough capacity or “bandwidth” to support the projected requirements of the intranet. For example, multimedia (audio and video) can easily overload a network with inadequate bandwidth.</p>
<p>Remote Access</p>	<p>Notwithstanding the concerns related to security, remote access is of special importance to SAIs with a large number of field formations, which may be geographically dispersed. Connectivity options for remote access include dial-up telephone lines, ISDN (Integrated Switched Digital Network) lines, or leased lines.</p> <p>In contrast to the “direct” methods for remote access, it may sometimes be advantageous to provide remote access routed through the Internet, using virtually the same underlying technology for connectivity. This is called a “Virtual Private Network”, where the Internet <i>appears</i> to form part of the private corporate IT network.</p>
<p>Server Hardware and Operating System</p>	<p>A dedicated machine (at the very least, a high end desktop PC) would be required.</p>
<p>Server Software</p>	<p>The following software components are needed from the server side:</p> <ul style="list-style-type: none"> • Web server software, which is responsible for “serving” web pages on the intranet • Software for web site management and web application development • Application server software, for interfacing between the web server and databases or other applications (desirable, not essential) • A search engine for searching for text through web pages, and even through word-processed

	<p>documents, spreadsheets and databases</p> <ul style="list-style-type: none"> • A database server software, if dynamic access is to provided through the intranet and there is no existing database software • A firewall software, to act as a barrier between the intranet and the Internet. This is required only if the local network is connected to the Internet, or to an external network
<p>Client Software</p>	<p>The choice of the web browser to be installed on the user machines needs to be made. It is important to select a particular version of a web browser – not just the web browser – as the official intranet browser.</p>

8.3 Budget and Time Schedule

8.3-1 As stated earlier, developing an intranet cannot be equated with simply putting up a few web pages. Hence, even a simple intranet needs a formal budget and a time schedule; these formalise expectations and are important performance measures for assessing the success of the project. The budget should include costs on account of:

- Server hardware and software;
- Client software;
- Staff; and
- Training

8.3-2 For small intranets (typically those with static content), most of the time is spent in the process of installation and setting up the server and network. For larger networks, application development may be the most important factor determining the implementation schedule.

8.4 Staffing and Outsourcing

8.4-1 In the initial days of the World Wide Web (and the intranet), most organisations had just one staff member designated as the “webmaster”, who was responsible for everything related to the web site. This is generally no longer the case. Most SAIs will have to consider the following staff roles for the intranet, although some of them can probably be handled by the same person, depending on the size of the task:

Network Administrator	Will be needed for installing the web server, planning and setting up security etc.
Webmaster	Responsible for keeping content up-to-date; also the central contact point for intranet questions
Graphics Designer	Responsible for the overall “look and “feel” of web pages
Web Developer / Author	Develops web-enabled applications and prepares / updates content for the intranet
Database Administrator	Sets up access from the intranet-based applications to the databases
Editorial Board	Reviews and approves content before “uploading” onto the intranet
Intranet Management Team	Mix of representatives of key user groups and technical staff, responsible for overall management of the intranet.

8.4-2 The question of outsourcing intranet development is a difficult one for most organisations. The options available are either full outsourcing or a partnering solution. Some of the reasons for outsourcing intranet development include the following:

- Lack of in-house experience
- Lack of adequate human resources
- Access to professional, cutting-edge expertise and experience
- Lower operating costs
- Organisational constraints due to focus on other areas
- Budgetary constraints
- Tight implementation schedule

8.4-3 Some of the factors that need to be considered very carefully when outsourcing include the following:

- How do the costs compare between internal development and outsourcing?
- Does the organisation have any previous experience with the prospective contractors?
- What are the plans for maintenance of the intranet? How would knowledge transfer take place?

8.4-4 Where and when outsourcing is opted for, hereunder are some of the functions that could be outsourced:

- Intranet design and planning
- Networking
- Web site and application development
- Web-database integration
- Maintenance of intranet

8.5 Security

8.5-1 Security has long since been a major issue with web sites, whether on the Internet or the intranet. Some of the security issues that need to be addressed include the following:

Firewall	If the organisation's network is connected to the Internet or an external network, it must have a "firewall" – a software to control access to internal networks. Also, the intranet web site should never be hosted on the Internet web server.
Remote Access	Remote access to the intranet should be carefully controlled. This is particularly important if a Virtual Private Network is in use. . Also, extreme caution needs to be exercised if provision of remote access leads to connectivity with an external organisation's IT network
Authentication & Access Control	Except perhaps for very simple intranets containing only general information, intranets must have a mechanism for "authenticating" users and controlling access to different sections of the web site. This should be based on a security framework on a "need-to-know" basis. This is mandatory, when access is provided through the intranet to database applications

Encryption	Information passed between the server and the user in “clear text” form is liable to be intercepted from the network. This is a major security concern, especially when the username and password are transmitted in clear text. This can be controlled to a large extent, by “encrypting” communication between the server and the user, thus creating a relatively secure communication channel. Encryption is necessary when remote access is allowed, especially through Virtual Private Networks.
Virtual Private Networks (VPNs)	Increasingly, many organisations are creating Virtual Private Networks (VPNs), whereby part of the communication between internal users is actually routed through the Internet. Issues like strong encryption of such communication, flexibility and authentication assume importance.

8.6 Testing and Training

8.6-1 Intranets need to be subjected to the same testing processes as other software development projects:

- “unit testing” viz. testing of individual modules
- “integration testing” viz. whether different modules work together properly
- “system testing” viz. testing of the intranet as a whole

8.6-2 Users of an intranet require minimal training, since most of them would probably know how to use a mouse as well as a Web browser. However, even a couple of hours of training to users on the first few intranet applications can contribute positively towards user acceptance. Additional training on the structure of the intranet will help users in knowing where to look for information.

9. Management and Maintenance

9-1 Intranets developed without formal policies, guidance and strategies, result in chaos sooner rather than later. It is therefore important to frame policies and procedures governing the development and maintenance of the intranet at an early stage. Of course, it is equally important to ensure that these policies and standards are actually adhered to. Some of the important areas to be covered by specific guidance include the following:

<p>Content Contribution and Ongoing Development</p>	<ul style="list-style-type: none"> • Who can publish to the intranet? Do different departments have separate web sites or sections, or is all content “funnelled” through the webmaster? • What types of content can be published? What is the policy on personal home pages? • What are the procedures for content submission, review and approval? • What is the policy on the appropriateness of links?
<p>Publishing and Technical Standards</p>	<ul style="list-style-type: none"> • In what format is content “uploaded” to the intranet web? Are there standards for tools for content creation and conversion? • What are the standards for web pages in terms of layout, font, colours, use of links, naming conventions etc.? Are there standard templates for content? • What are the standards for scripting, programming and application and database interfaces? • Is there a security policy and procedures for controlling access to different sections of the intranet?
<p>Change Management</p>	<ul style="list-style-type: none"> • What are the procedures for updating content, and keeping information current? Who is responsible? • How is consistency ensured between the content in its original format and in the web-converted format? • How are updates to content by different authors controlled? How are backups of different versions of content maintained, just in case....? • How are changes to content logged? What are the security procedures in place? • How are updates tested?
<p>Funding</p>	<ul style="list-style-type: none"> • Where does funding for intranet content come from? How are common costs allocated or apportioned?

<p>Performance, Maintenance and Backup</p>	<ul style="list-style-type: none"> • What are the procedures for “broken link” analysis? This is an important issue, since users who repeatedly get “File Not Found” messages, may be demotivated from using the intranet. • What are the procedures for monitoring intranet usage, as well as its impact on hardware and network performance, and by whom? • What is the procedure for maintenance and backup of intranet data, and by whom? Is there a contingency plan?
<p>Legal Issues</p>	<ul style="list-style-type: none"> • What legal and copyright issues surround the intranet? • How are licensing concerns dealt with? • What are the policies on confidentiality and privacy?

10 Value for Money for the intranet

10-1 While it is important to measure the degree of success of the intranet, it may sometimes be difficult to specify precise quantitative measures of success, like ROI (Return On Investment). However, cost savings on account of reduction in publication and distribution of “hard copy” documents can be identified. Several organisations are also now using benchmarking matrices to measure success and identify areas for future development.

10-2 Logs of web site and page “hits” can provide

- evidence of usage of the intranet (hopefully to good effect !);
- identification of heavy and light users; and
- identification of most and least accessed pages.

Logging mechanisms should invariably be enabled for all intranets, whether small or large. It is, of course difficult to estimate the value of enhanced access to information, but anecdotal evidence of the value in different situations may also prove to be of some use.

10-3 One way to measure the success of the intranet, is a top-down approach, which could be adopted either for the SAI as a whole or for individual departments, involving:

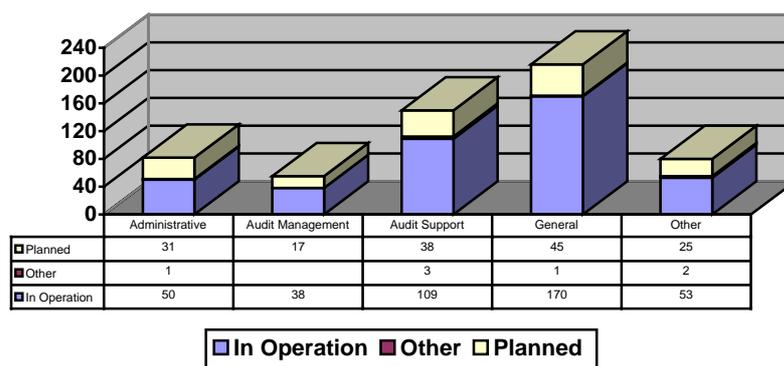
- identifying the core processes or activities performed;
- defining the objectives sought to be achieved by the use of the intranet e.g. time and cost savings; better information flow; effectiveness; organisational changes; business innovation etc.
- developing qualitative and quantitative measures for assessing the achievement of planned objectives.

11. SAI’s Experiences with intranets

11-1 This section is based on the responses to the survey questionnaire by INTOSAI members. Of the 93 SAIs who responded to the survey questionnaire,

- 50 SAIs (54% of the total responses) did not have an intranet. Of these, 29 SAIs have plans to implement an intranet in the near future. Some of the smaller SAIs had indicated that they had no plans to implement an intranet, in view of the small size of their organisations, or that they were expecting to be part of the Government-wide intranet.
- 43 SAIs (46% of the total responses) have intranets. Amongst these SAIs, 30 SAIs (70%) have a single centralised organisation-wide intranet, 1 SAI (2%) has a completely decentralised intranet, with individual departments maintaining and managing their own intranets, while 10 SAIs (23%) have a combination of the centralised and decentralised approaches.

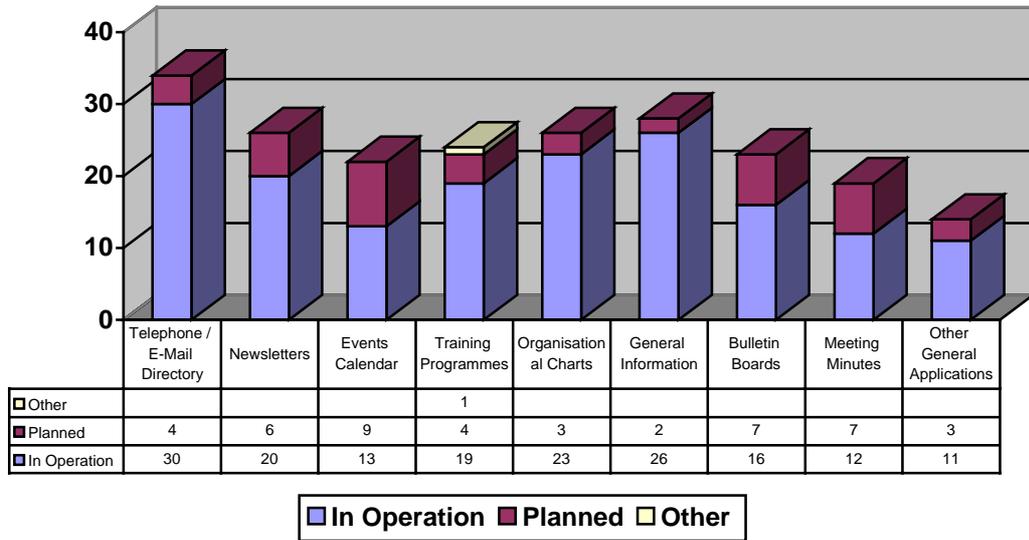
11-2 The following chart indicates the type of intranet-based applications implemented or planned for implementation by SAIs²:



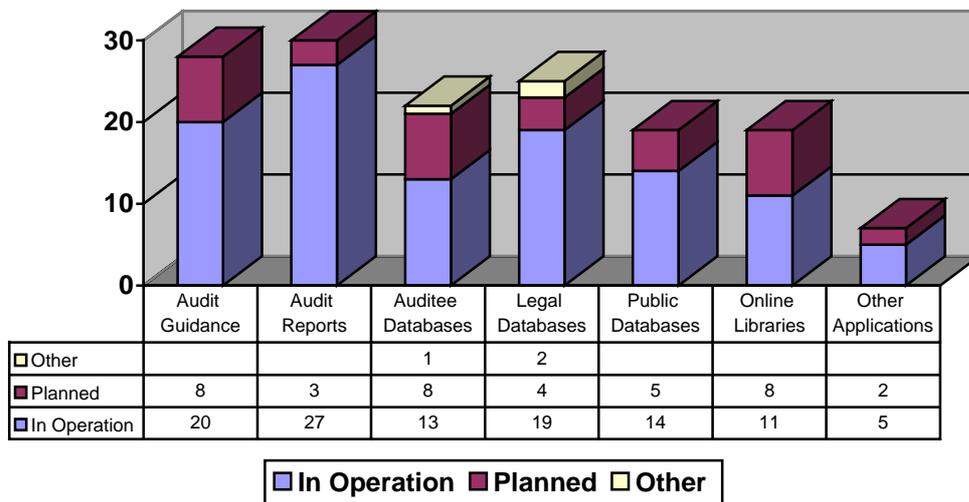
11.3 It will be seen that the major use of intranets is for general information, followed by information support for audit. A further breakdown by individual applications category-wise follows.

² This covers only those SAIs who have already implemented an intranet.

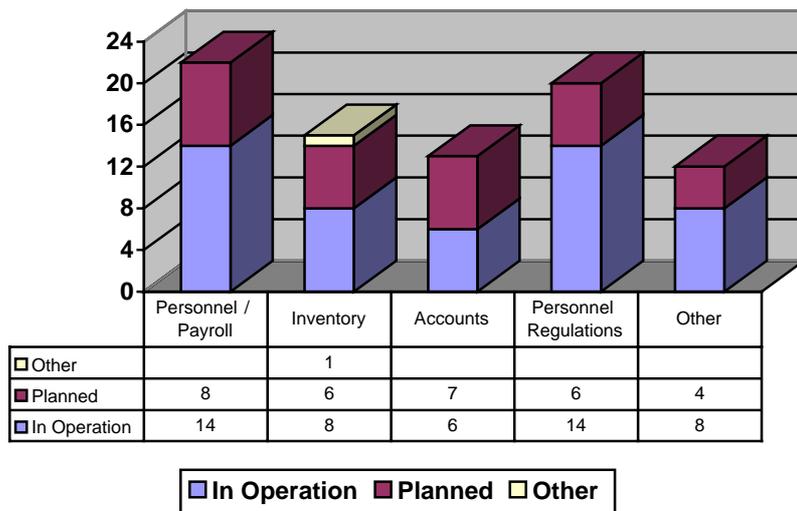
General Applications



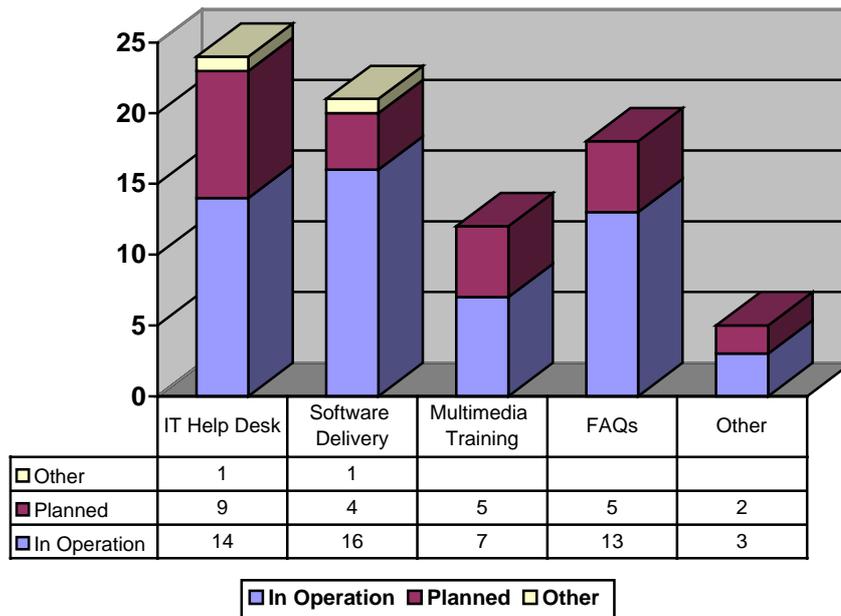
Audit Support Applications



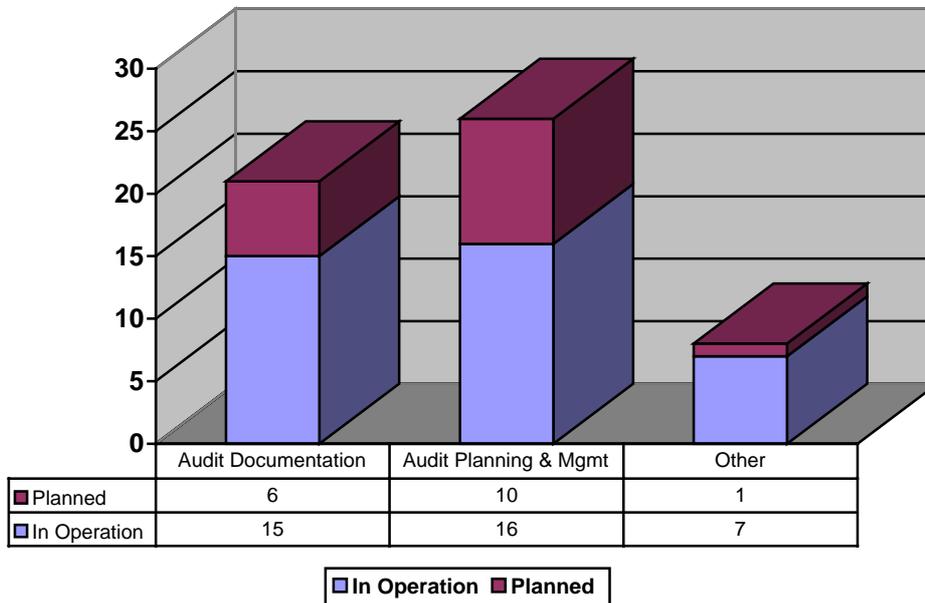
Administrative Applications



Miscellaneous Applications



Audit Management Applications



11.1 Benefits

11.1-1 Some of the benefits indicated by SAIs from their use of intranets include:

1. Better, faster and more “transparent” access
2. Better sharing of up-to-date information
3. Centralised access to corporate information, with powerful search capabilities
4. Reduction of e-mail overload; consolidation of internal communications.
5. Shortened learning time
6. User friendliness
7. Opportunities for innovation (not just doing things better, but doing things differently)
8. Reduction in costs, especially printing costs; reduction in paperwork; benefits personnel administration
9. Less management of applications required

11.2 Difficulties

11.2-1 Some of the difficulties that SAIs had faced while implementing intranets, included:

1. Lack of management involvement and commitment; difficulties in creating an appropriately empowered management team
2. A tendency to disregard organisational / behavioural aspects and the shift in organisational culture
3. User resistance (especially from senior staff) and the need for ongoing training ; lack of computer literacy amongst staff
4. Inadequate funding, especially for infrastructure (hardware, software etc.)
5. Limited availability of in-house skilled resources which are required for both web and non-web applications; SAI's procedures / systems for recruiting and retaining skilled personnel are inadequate; external resources are expensive
6. Lack of clear demarcation of responsibilities – lack of initiative from Departments to publish and maintain content; lack of interest from user offices; co-ordination issues
7. Tendency for users to print all the information and use the printouts, rather than accessing up-to-date information electronically
8. Lack of adequate user awareness about the intranet's potential
9. Users tending to expect immediate development of the intranet; placing excessive demands for additional information, not supported by adequate technical and financial resources.
10. Lack of regular updating of information
11. Lack of standards, making it difficult for users to locate information and interact with the site – it is much harder to standardise the intranet after lots of content and applications have been deployed
12. Non-adherence to time schedules (one SAI has suggested that it will take 50% longer to implement than planned ??)
13. Expense involved in maintenance
14. Multi-language support (code page / character set problems)
15. Problems of connectivity for large dispersed organisations

16. Other technical issues (differences in displays by different browsers; compatibility of different programs, systems and versions)

11.3 Suggestions

Some of the suggestions offered by SAIs who have implemented intranets, on what to do or what to avoid, include the following:

1. Treat the intranet project as an information providing matter, rather than a technical problem
2. Convince the management first of the necessity of an intranet
3. Ensure involvement of all user departments at the planning stage
4. Plan for organisation-wide education and training programmes.
5. Prepare a proper budget, so that all the necessary resources are available for a well thought out intranet project
6. Have a global plan for the intranet site, before implementation, to avoid having to change things afterwards
7. Establish a pilot group for the pilot project, a co-ordinating team to organise and gather requirements, and a “permanent” team for managing the intranet – all these groups need careful selection, with the right mix of skills.
8. Obtain access to the experience of those who have done it before - the Intranet is about sharing knowledge, not building websites.
9. Do not centralise the responsibility for content publishing, which could become a bottleneck; try to distribute the editorial tasks to the “owners” of the data
10. Ensure that information is available only on the intranet; if the information is also distributed on paper, the intranet will not be used
11. Ensure that information is kept up to date, and that potential users have means of accessing the information
12. Standardise / improve / re-engineer office processes, before the introduction of the intranet
13. Focus on the essential; be realistic; do not dwell on perfection
14. Build human resources for developing and using the intranet
15. As far as possible, use open standard products, rather than proprietary products.

16. Lay down standards early; this should include platform tools as well as browsers
17. Use a methodology along with prototyping (which is a common approach followed in intranet development)
18. Outsourcing and in-house resources (different SAIs have offered their own views). Outsourcing needs to be managed carefully – try for a “fixed price” deal
19. Be mindful of security
20. Minimise use of “gimmicks”; concentrate on good structure and search engine; use appropriate technology and graphics.

12. Conclusion

12-1 If properly planned, implemented and managed, intranets can prove to be extremely powerful tools for information distribution, from which the organisation can benefit substantially, with impressive returns on the resources invested. It is important to note that for an intranet (probably unlike an Internet web site), “content is king” – functionality is much more important than jazzy looks. Relevant, useful and up-to-date content, combined with speed of retrieval and simplicity are the key factors for a successful intranet.

Appendix 1 – SAIs who have responded to / commented on the paper / survey questionnaire

Albania	Estonia	Maldives	Sri Lanka
Algeria	Fiji	Malta	Sudan
Antigua and Barbuda	Finland	Mexico	Suriname
Argentina	Germany	Monaco	Swaziland
Australia	Greece	Namibia	Sweden
Austria	Guyana	Nauru	Switzerland
Bahamas	Hungary	Nepal	Tanzania
Bahrain	Iceland	Netherlands	Thailand
Bangladesh	India	New Zealand	Tonga
Belgium	Iran	Norway	Trinidad and Tobago
Bolivia	Iraq	Oman	Tunisia
Botswana	Ireland	Pakistan	Turkey
Brazil	Italy	Peru	Tuvalu
Brunei Darussalam	Japan	Philippines	Ukraine
Cameroon	Jordan	Portugal	United Arab Emirates
Canada	Kenya	Puerto Rico	United Kingdom
China	Korea	Qatar	U.S.A.
Costa Rica	Kuwait	Romania	Uruguay
Croatia	Laos	Rwanda	Venezuela
Cyprus	Latvia	Saint Lucia	Vietnam
Czech Republic	Lesotho	Saudi Arabia	Yemen
Denmark	Lithuania	Slovakia	Zambia
Egypt	Malaysia	Spain	Zimbabwe
Eritrea			

Appendix 2 - Intranets Survey Questionnaire (as circulated to INTOSAI members)

Please send your responses by fax, e-mail (preferred) or post to

State Audit, PO Box 727, Postal Code 113, Muscat, Sultanate of Oman
Fax: (968) 740264; E-Mail: sages@omantel.net.om.

We would also be happy to respond to any questions that you may have or clarifications that you might require.

Name of SAI	
Date of filling up questionnaire	
Contact Person 1 Designation Phone Fax E-Mail	
Contact Person 2 Designation Phone Fax E-Mail	

1. Does your SAI have an Intranet?

If your SAI does not have an Intranet, pl. go to Question No. 7

2. Is your SAI's Intranet:

(a) a single centralised organisation-wide Intranet ?

(b) decentralised, with individual departments maintaining and managing their own Intranets ?

(c) a combination of (a) and (b) ?

3. Technological Architecture

Local Area Network (LAN) / Wide Area Network (WAN), including Network Operating System	
Mechanisms for remote access by branch offices, field units or other parties	
Web Browser	
Web Server and Application Server Software (including Operating System Platform)	
Database Software (only for databases accessed through the intranet)	
Web Site Management and Application Development Software	
Intranet Text Retrieval Software and Search Engines	
Application Development Approach – API, Scripting Environment and Languages	
Security Architecture and Firewall	

4. What does your SAI use the intranet for? In case of **planned** intranet applications, please mark with a (P) :

<p>General Information</p> <ul style="list-style-type: none"> • Telephone / E-Mail Directory • Organisation-wide and departmental newsletters • Events calendar • Training Programmes, Seminars and Workshops • Organisational Charts • General Information and Corporate Brochures • Bulletin Boards • Meeting Minutes • Others (Pl. specify) 	
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<p>Administrative Information</p> <ul style="list-style-type: none">• Human Resources Management and Payroll Systems• Inventory and Asset Management Systems• Accounting and Financial Management• Personnel Manuals & Benefit Statements• Others (Pl. specify)	
<p>Audit Process</p> <ul style="list-style-type: none">• Audit Planning and Management Systems• Audit Documentation and Working Papers• Others (Pl. specify)	
<p>Information Support for Audit</p> <ul style="list-style-type: none">• Audit Policies, Procedures and Other Guidance• Audit Reports and Findings of Legislative Oversight Committees• On-line Databases on Auditees• Databases of Laws, Rules and Regulations• On-line Libraries• Controlled Access to Public Databases, including those provided by Commercial Content Providers• Others (Pl. specify)	
<p>Other Uses</p> <ul style="list-style-type: none">• IT Help Desk and Technical Support• Software Delivery• Multimedia based training• FAQs (Frequently Asked Questions) and User Documentation• Others (Pl. specify)	

Appendix 3 – Sample Steps for Setting up an Intranet Pilot Project

1. Get a spare desktop computer running Windows 95/98 or better still Windows NT Workstation, which you can use as the web server for the pilot project
2. Ask your network administrator, if your network supports the TCP/IP protocol. If not, can he set up the protocol on the pilot web server, and a few other user PCs. If not, while you can demonstrate the pilot intranet on the server itself, other users cannot access the pilot web site.
3. Install a web browser (Microsoft Internet Explorer / Netscape Navigator/ AOL) on the web server and on a couple of user PCs.
4. Get a copy of free web server software – Microsoft Personal Web Server or Apache Web Server. You can either download it from the Internet, or probably get it from CDs accompanying computer magazines. Alternatively, you can obtain evaluation copies of commercial web servers, which will work for limited periods of time (typically 30 to 45 days).
5. Install the web server software on the pilot web server.
6. Take a word-processed document that you would like to show on the intranet – a telephone list, a procedures manual or perhaps an audit report. Open the document using the word processing software (say Microsoft Word 97), and save it in “HTML” format in the default folder where your web site has been created
7. The web server installation would have set up a default home page with the name “default.htm”, “home.htm” or “index.htm” for your intranet site. Open this page using your word processing software and add your SAI’s name and also a link to the HTML document you have just created in step 6. Alternatively, you can use FrontPage Express, which is installed with Personal Web Server.
8. Your pilot intranet project is ready with a home page and one HTML document.

Appendix 4- Technological Options

*(Note: The listing of various products or vendors is only illustrative, and is not indicative of any preference for, or approval / disapproval of, any particular product or vendor. Since intranets are on the leading edge of technology, the information given in this appendix is liable to change rapidly with time. Therefore, we bear no responsibility for the veracity, currency or completeness of the information included here. **All information comes with a "caveat emptor" tag.**)*

Item	Options
<p>Server Hardware & Operating System</p>	<p>Generally, the choice of hardware and operating system will be based on the existing hardware and OS platform used in the SAI, unless you have good reasons for selecting a different platform. The exact configurations will depend on size of the intranet. Typical options include :</p> <ul style="list-style-type: none"> • An Intel Pentium Server with Windows NT, Linux or Novell Netware • An Alpha Server running Windows NT • An Intel Pentium , Sun Sparc, IBM PowerPC, Silicon Graphics, MIPS\ or HP Server with Unix <p>You may also need to plan for a staging or development server to ensure that applications (including changes) are fully tested in a controlled environment, before going "live". Another key requirement is to ensure a relatively high bandwidth connection between the web server and the corporate network.</p>
<p>Web Server</p>	<p>There is a variety of web server software for different operating systems (and flavours thereof!) – some of which are free and can be downloaded from the Internet. Features differ in terms of support for different scripting / programming languages, security architecture, add-ons like search engines, interfacing with other products etc. Typical options include:</p> <ul style="list-style-type: none"> • Microsoft Internet Information Server (IIS) on Windows NT • Netscape Fast Track / Enterprise Server on Windows 95/98/NT / Unix/ Linux • Lotus Domino Go Server on Windows NT , Unix, OS/2, AS/400, OS-390, Solaris • Apache Web Server on Windows 95/98/NT / Unix/ Linux • O'Reilly WebSite Pro on Windows 95/98/NT • Web Star for Macintosh Systems

<p>Web Application Servers</p>	<p>Web application servers are often used to minimise performance bottlenecks on the web server. They provide modular functionality, greatly facilitate connectivity to databases and other applications and often simplify application development. Products differ in terms of support for different database systems, web servers, programming interfaces and scripting/programming languages. Typical options include:</p> <ul style="list-style-type: none"> • IBM Web Sphere on AIX, Sun Solaris, Windows NT • Oracle Application Server on Windows NT, Linux • Lotus Domino Application Server on Windows NT , Unix, OS/2, AS/400, OS-390, Solaris • Allaire ColdFusion Server on Windows 95/98/NT
<p>Data Base Management Systems</p>	<p>It is preferable to use a “client-server” database, rather than a shared file database, except for very small intranets or for development work. Typical options for “corporate strength” Relational Data Base Management Systems (RDBMS) include:</p> <ul style="list-style-type: none"> • IBM DB2 on OS-390, Windows NT, Unix, Solaris • Oracle on Windows NT, Unix, OS-390 • Microsoft SQL Server on Windows NT • Informix on Windows NT, Unix • Sybase Adaptive Server Enterprise on Windows NT, Unix
<p>Web Site Management, Web Authoring and Application Development Software</p>	<p>There are a number of tools available for developing web based applications, authoring simple / static web pages as well as managing web sites; these vary in terms of features available, support for scripting etc. Some popular choices are:</p> <ul style="list-style-type: none"> • Microsoft Visual InterDev and Front Page on Windows 95/98/NT • Corel Webmaster Suite on Windows 95/98/NT • SoftQuad HoTMetaL Pro on Windows 95/98/NT • DreamWeaver on Windows 95/98/NT • NetObjects Fusion on Windows 95/98/NT <p>Standardisation of application development and web authoring software is important, especially where web page development is distributed, with a view to reducing setup, training and support costs.</p>
<p>Document Conversion Software</p>	<p>For good publishing management, you need to have tools for automated conversion of documents into web-ready format. Some options are:</p> <ul style="list-style-type: none"> • Skisoft Web Publisher • InfoAccess HTML Transit • Adobe Acrobat

<p>Web Browser</p>	<p>Popular browsers include:</p> <ul style="list-style-type: none"> • Netscape Navigator / Communicator on Windows 95/98/NT, Unix, Linux, Mac • Microsoft Internet Explorer on Windows 95/98/NT, Mac, Solaris • Lynx on DOS, Windows, Unix, Linux, VMS
<p>Search Engines</p>	<p>Common text retrieval software / search engines include:</p> <ul style="list-style-type: none"> • Microsoft Index Server on Windows NT • Live Link on Windows 95/98/NT, Solaris • Fulcrum Knowledge Network on Windows NT, Solaris, Unix • Verity Search 97 / Topic on Windows NT, Unix • Excalibur RetrievalWare
<p>Application Programming</p>	<p>There are several choices for the specifications for interfacing programs and scripts to the web server viz. the Application Programming Interface(API). These vary in terms of speed, support for different web servers and scripting environment and languages. Typical choices for the API include</p> <ul style="list-style-type: none"> • CGI (Common Gateway Interface) • Microsoft's ISAPI (Internet Server Application Programming Interface) • NSAPI (Netscape Server Application Programming Interfaces) <p>Typical choices for the scripting environment include :</p> <ul style="list-style-type: none"> • Microsoft's ASP (Active Server Pages) • Netscape's Live Wire <p>besides CGI programming and specific application server products.</p> <p>Choices for programming / scripting languages for the web include Java, JavaScript/JScript, Microsoft's VBScript, Perl.</p> <p>Another choice available to the developer is the use of XML for metadata based applications.</p> <p>Regarding database connectivity, there are two standards:</p> <ul style="list-style-type: none"> • ODBC (Open Data Base Connectivity) and • JDBC (Java Data Base Connectivity)

Security Approach and Firewalls	Regarding secure communication between the web server and the user computers, there are two major choices : <ul style="list-style-type: none">• SSL (Secure Socket Layer)• S-HTTP (Secure HTTP) Common choices for firewalls, which act as barriers between the local network and the Internet, include: <ul style="list-style-type: none">• Axent Raptor• CheckPoint Software Firewall• Trusted Information Systems Gauntlet• Secure Computing Firewall for NT
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A few web sites on the Internet, where additional information on intranets is available, include the following:

- Intranet Design Magazine (<http://www.innenergy.com/index.html> and <http://idm.internet.com>)
- Intranet Journal (<http://www.intranetjournal.com>)
- Intranet Reference Site (<http://www.intrack.com/intranet/>)
- Intranet Roadmap (<http://www.intranetroadmap.com>)