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Planning and Creating a Government Web Site: *Learning from the Experience of US States*

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Planning and Creating a Government Web Site: *Learning from the Experience of US States*

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Abstract

This paper reviews the history and explosive growth of Internet use and, in particular, the development of the World Wide Web, which has attracted millions of users. It identifies the significant external factors - such as telecommunications infrastructure and government legislation - that will impact the development of this medium in the future.

The advent of these new technologies coincides with increasing demands for public access to government information. The tools of the Internet provide a vehicle for improved information sharing among branches of government as well as with the public. The paper describes the different stakeholder groups who may be involved with and affected by this process.

Many governments have created, or are seeking to create, a Web presence. A set of information delivery principles and Web site design criteria are therefore presented. These criteria are then used to evaluate the Web sites of forty-eight US State governments, providing insights into both best and worst practice for government. The paper concludes with some details of the strategic approaches to Web site development that governments may need to adopt.

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INTRODUCTION

Many governments today operate in an environment of ever-increasing public need and declining, or at best, stable revenue streams. Citizens, taxpayers and all sorts of government constituents and special interest groups are crying out for increased government accountability. They want government to improve services, cut waste, streamline existing activities, and provide greater public access to information. The use of the Internet is already beginning to change the way government operates in response to these constituent mandates.

Government use of the Internet has the potential to provide better government service. As reported in the *PIPER Letter*, "when government delivers information, in many cases it is delivering the government service itself. This new interactive medium, with its built-in measurements and feedback loops, allows government to 'relate' to individual constituents with a new depth and frequency. It can add an entirely new dimension to government's relationship to its stakeholders."[2]

The hypothesis of this paper is that a properly constructed government Web site will lead to real improvements in information sharing, standardisation of computer systems, and service delivery. These three areas, while not identical, are related, as improvement in one will benefit the other two. Attitudes to democracy will be a key driver in the level of openness and accessibility to information provided by government. Such a process would define all programmes government-wide, aid in collecting meaningful data, provide universal access for citizens to information, and ultimately offer a relatively simple mechanism for the provision of many state services at a much lower cost to the taxpayer.

The Commonwealth of Kentucky's Web site contains a goal statement which is a concise example of the philosophy and commitment governments are making to Internet technology as a way of improving government service: "Our goals are to:
- Develop the Commonwealth's public sector communications network as a widely accessible, affordable infrastructure resource which can be used to break through the barriers traditionally imposed by geography, demographics, or ability to pay.
- Provide the capability to transport information in any electronic form (voice, video, data, image or radio) among public sector agencies, educational institutions, economic development interests and governmental institutions."[3]

Clearly, the Internet offers a unique opportunity to streamline the delivery of government services, enhance communication with its citizenry, and serve as a catalyst for empowering citizens to interact with government.

The growth in popularity and ease of access to the Internet appears to coincide with pressures from public interest groups and some legislatures for more access to public information. The need for some governments to embrace this new technology is in

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[2] *Public Information in the Digital Age.* (1995, December). The PIPER Letter, URL http://www.webcom.com/~piper/9512/index.html.

[3] Commonwealth of Kentucky World Wide Web Services. Welcome to the Commonwealth Data Center Web Server. URL http://www.state.ky.us.

part driven by the legislative mandate that all agencies provide public access to information. Meeting the requirements of this mandate often proves difficult using the *ad hoc* methods and controls of the past.

Despite the passage of freedom of information legislation in many countries, there is still a resistance to sharing information by people within government who want to limit access to their data. The control of information is an elitist perspective. However, according to novelist Tom Clancy, "the more information available to the average person, the greater the synergy that develops from it."[4]

If implemented, the tools of the Internet provide a method for improving the sharing of information with the public, as well as improving the efficiency of internal communications. Proper use of the technology will increase opportunities for citizens to participate in government by voicing their opinions and concerns.

The development of the World Wide Web (WWW or just 'the Web') has created a platform-independent mechanism for the transfer of documents, the ability to search large databases, to enter basic transactions, and even the ability to run applications. Governments are often frustrated in their efforts to co-ordinate and manage information by the wide variety of hardware and software platforms owned within the public sector. Internet technology offers a unifying platform on which the collection of data for internal and external use can be built. It has been adopted by hundreds of thousands of content providers and tens of millions of users. The presence of a large user community makes a compelling case for the preparation of an information framework that takes advantage of this technology.

In a very short period of time, many government officials will realise that the growth of Internet technologies will have a major impact not only on how information is presented to the public, but on how business is conducted among government agencies and the general public. Internet technology may set the stage for the online public services of the future.

In order to understand the context in which governments are likely to develop public information, the research reported in this paper includes a review of the Internet's origin, its rapid growth and the technologies that influence its character and utility. Governments will also need to understand the internal and external factors that may affect the establishment and operation of a government Web site. An overview of current Internet issues gives content providers an insight into potential change. Current issues include changes to the telecommunications infrastructure, security and privacy, copyright protection, and universal access. A stakeholder analysis looks at those affected by the creation of a government Web site and their possible attitudes or values. Internal to the organisation are the legislature, and individual government agencies. External stakeholders - potential customers of the information presented - are the news media and the general public.

The analysis section begins with an explanation of the methods used to evaluate Web sites. The research included an online review of forty-eight US State government Web

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[4] Clancy, Tom (1995). *Vonnegut and Clancy on Technology*, Inc. Magazine, VirtuMall Inc., p. 4.

sites. The best examples are evaluated to gain insights into how governments can develop their presence on the Internet. Finally, the paper suggests a policy that governments might adopt to co-ordinate the development of information and to bring about stakeholder co-operation.

SECTION I - Current Trends

A Brief History of the Internet

The origin of the Internet in 1969 can be traced to cold war research. The United States Department of Defense Advanced Research Projects Agency (DARPA) set out to create a robust mechanism for computer-based communications.[5] The original network was called ARPANET. Its objective was to construct a communications network able to withstand disruptions that would take place in the event of nuclear war. The network was designed to allow multiple destination paths and to enable lower-level communications software to utilise alternative paths at will. In addition, the network offered a built-in mechanism for load balancing as well as the ability to bypass inactive circuits.[6]

Initially the Internet provided four basic network services: remote access (Telnet), file transfer (FTP), mail, and news. To promote education and research activities, access was generally free. The concept of a free public network, rather than a private, commercial one, was a clear part of the culture surrounding the network.[7] Academics and students used the network to exchange information, to share software, and to discuss and debate issues.

During the 1970s, other academic organisations around the world began to construct similar networks to ARPANET using the same software available in the United States. The military, in particular, realised that it would need to create a more secure network than the experimental ARPANET. The military wanted to maintain its own secure telecommunications system and also maintain links to the public networks. To make this possible, an *internetting* project was initiated to link together these networks; hence the name the Internet.[8]

An inter-networking protocol was developed to work with the original transmission control protocol. This combination of transmission control and an Internet protocol, abbreviated to TCP/IP, is the dominant standard for computer-based communications today. The benefit of the TCP/IP standard is that it is supported by virtually every computer and software manufacturer in the world. Whether the intention is to publish material or services for world-wide access or to confine them to an organisational environment, a wide choice exists in hardware and software. By enabling a rich interconnection of computing and communication environments, TCP/IP offers a simple mechanism for communicating from both present and future information systems.

By 1986, the National Science Foundation (NSF), an independent government agency established to promote science and engineering, had taken the lead role to put together

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[5] Cerf, Vinton G., *Computer Networking: Global Infrastructure for the 21st Century*, URL http://www.cs.washington.edu/homes/lazowska/cra/networks.html.

[6] Auerbach, Karl & Wellens, Chris (1995, October). *Internet Evolution or Revolution,* LAN Magazine, p. 60.

[7] Miller, Steven E. (1996). Civilizing Cyberspace *(*p. 48). New York: Addison-Wesley Publishing Company.

[8] Miller, Steven E. (1996). Civilizing Cyberspace *(*p. 45). New York: Addison-Wesley Publishing Company.

a high speed backbone with a transmission rate of 1.5 Megabits per second (Mbps). It established a mechanism for regional and local commercial providers to offer access outside government and academic communities. Government subsidies helped to support the technology while demand grew. By 1989, backbone speeds were increased to 45Mbps. In April 1995, NSF support for the Internet backbone was withdrawn and the Internet is now operating using commercial telecommunications providers.[9]

The Growth of the Internet

The level of traffic generated on the Internet has been growing rapidly. One of the most remarkable features of the Internet is the flat fee policy. In the flat-fee model, users are charged for the size of the 'pipe' or maximum rate of transmission rather than the actual amount of data transmitted.[10] For modem users, of course, charges may be based on connect time. While allowing users open access to any site, the Internet enables world-wide communication without the overhead of a toll system similar to the long distance telephone network now in place. The institution of long distance charges on the Internet would be impractical, since it would be impossible for users to predict the charges resulting from a given connection.

Other key factors contributing to the growth of the Internet are its:[11]
- Ability to link physically dissimilar networks;
- Role as the world's *de facto* electronic mail system;
- Use of public domain protocols (standards) that are universally supported by manufacturers;
- Growing acceptance by mainstream business and society (*.com* domain hosts established by private corporations have long surpassed *.edu* domains established by universities in the US);
- Two-way communication, whereby one can be both an originator and a consumer of information; and
- Ability to realise dramatic gains in the functionality of existing computer systems.

Surveys conducted on a regular basis show an exponential increase in the growth of Internet hosts, networks and domains (see Figure 1).[12] A host is simply any computer with a TCP/IP address, although not all addresses have full Internet access. For example, the three largest online service providers, America OnLine, CompuServe, and Prodigy, offer Internet access to their combined total of ten million subscribers.[13] The number of hosts associated with their service is a relatively small number that does not reflect their large subscriber volume.

Until its discontinuance in April 1995, it was possible to document the traffic on the NSFNET backbone. Figures indicated that the amount of data moving across the

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[9] Cerf, Vinton G., *Computer Networking: Global Infrastructure for the 21st Century*, URL
   http://www.cs.washington.edu/homes/lazowska/cra/networks.html.

[10] Miller, Steven E. (1996). Civilizing Cyberspace *(*pp. 48-49). New York: Addison-Wesley Publishing
   Company.

[11] Pfaffenberger, Bryan (1994). Internet in Plain English (pp. 219-221). New York: MIS Press.

[12] Zakon, Robert, *Hobbes' Internet Timeline*, URL
   http://info.isoc.org/guest/zakon/Internet/History/HIT.html.

[13] *11.3 Million Now Use OnLine Services - Study*. (1996, January 19). Newsbytes, p. 23.

backbone also grew rapidly. "Total NSFNET traffic grew from *195 million* packets in August 1988 to almost *24 billion* in November 1992, a 100-fold increase in four years. During November 1992, the network reached its first *billion-packet-a-day* mark."[14] The last traffic measures available in April 1995, showed a monthly total of 59 billion packets. Twenty one percent of those packets were generated by the World Wide Web, making it the largest single Internet service.[15]

FIGURE 1 - GROWTH IN INTERNET HOSTS, NETWORKS AND DOMAINS
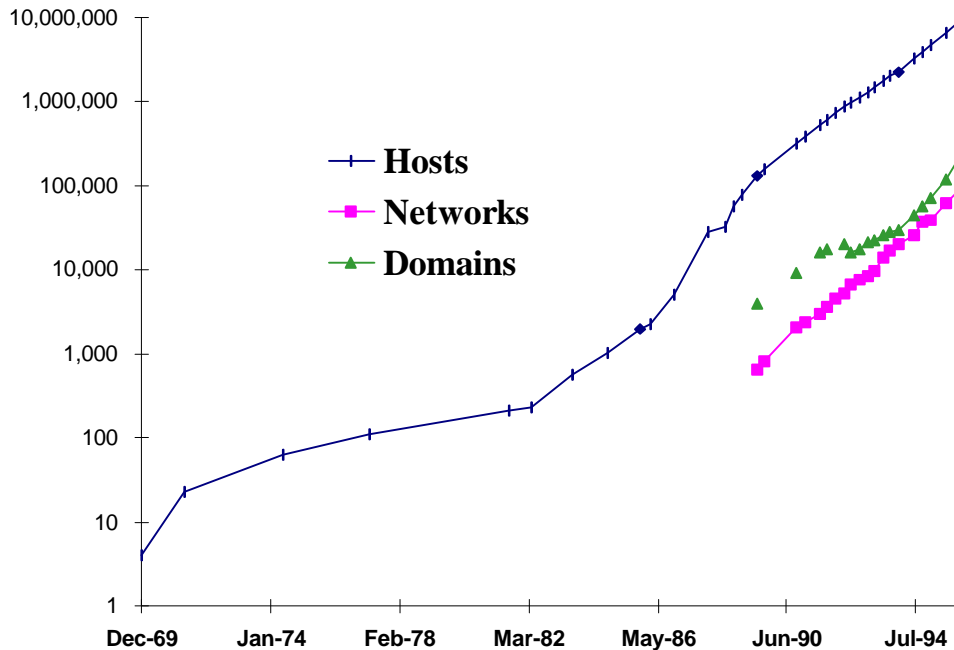
It is difficult to determine the actual number of Internet users, but growth rates are clearly high. International Data Corporation estimated the total number of users in the US alone at 8 million in January 1996.[16] A more recent study estimates nearly 20 million users at the end of 1997, with predictions that there may be five times as many worldwide by the year 2000.[17]

The Enabling Technology

The World Wide Web and the Internet are commonly considered to be synonymous. "In actuality, the Web is a collection of protocols and standards used to access the information on the Internet. On the other hand, the Internet is a physical medium used to transport the data. The World Wide Web defines and unifies the 'languages' used to retrieve data on the Internet."[18]

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[14] *T-1 Ends.* (1992, December 2). NFS Press Release. URL http://www.merit.edu/nsfnet/news.releases/t1.ends.

[15] *GVU's NFSNET Backbone Statistics Page.* URL http://www.cc.gatech.edu/gvu/stats/NSF/merit.html.

[16] McKendrick, Joseph (1996, February 16). *IDC Charts the World Wide Web*, Midrange Systems, p. 36.

[17] Silverthorn, Sean (1996, February 5). *The Web Guessing*, PC Week, p. A12. *Web Has Reached Mass Market Proportions,* International Data Corporation, URL http://www.idc.com/F/HNR/17a.htm

[18] Richard, Eric (1995, April). *Anatomy of the World Wide Web*, Internet World, Vol. 6, No. 4, p. 28.

The World Wide Web was introduced in 1991. Developed at CERN, a particle physics research centre in Switzerland, the WWW is a distributed hypertext system that operates on a client/server model. Web servers store available documents as plain ASCII text. These documents contain markup tags and follow a standard known as Hypertext Markup Language (HTML). The hypertext feature of HTML provides support for linkage instructions, or URLs (Universal Resource Locators), and allows direct access to pages on other Web servers. In contrast to earlier connection-based protocols, the Web permits a seamless connection to any Internet address. The client programs that run on the user's computer, providing access to the Web, are known as browsers. The Mosaic browser, written for graphical user interfaces, became the prototype for many imitators, such as Netscape Navigator. This software family supports a mixture of text, sound, graphics, images, video, animation and binary (executable) files.

The information provided to users by Web servers is not limited to static files. Several methods exist to forward requests to other server processes that are able to extract information from large database systems and format it for the user. This technique permits simple transaction processing and is the foundation for electronic commerce via the Internet.

Software developers have been working to advance the capabilities of the Web by creating special viewers. For example, there are special viewers for *Postscript* documents or for executing multimedia presentations. Viewers are usually given away free by software developers, in hopes of marketing their development system. For the past two years, Sun Microsystems has been promoting an Internet development system called *Java*, that permits platform-independent software to be executed directly via the Web.[19] More elaborate software tools, such as three-dimensional virtual reality generators, require far more bandwidth than the standard text-based Web page. With enhanced display features, the Internet is an attractive marketing medium with a wide global audience.[20]

Government Use of the Technology

The ultimate value of the Internet to government operations and constituent interests might best be demonstrated when viewed in terms of the available options to collect and distribute information:[21]

> *Point to point*
> A single user sends a message to a single receiver (e.g. electronic mail). Government examples: a citizen provides an opinion to a legislator on a prevailing policy issue; a government agency notifies a client of a grant-award the same day they approve it.

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[19] *Develop Web Applications that Sizzle,* Sun Microsystems, URL http://www.sun.com/960325/feature1/index.html

[20] Panettieri, Joseph C. (1995, September 18). *Make way for e-commerce,* Information Week, p. 70.

[21] December, John (1996). *Units of Analysis for Internet Communication,* Journal of Computer-Mediated Communication, Vol. 1, Issue 4, p. 46. URL http://www.usc.edu/dept/annenberg/vol1/issue4/december.html.

Point to multipoint
A single user sends a message to a number of specific receivers (e.g. mailing lists).
Government examples: a foreign business requests information concerning economic development opportunities within the country, and the request is sent on to a number of potential business partners; a national development committee sends project updates to public and private sector participants.

Point to server broadcast
A single user sends a message to a server that makes the message available to any user interested in that topic area (e.g. USENET news).
Government examples: during a severe storm, emergency management officials can get real-time storm updates provided by the meteorological service; government agencies can sponsor forums for collaborative work on policy and programme issues.

Point to server narrowcast
A single user sends a message to a server that makes the message available only to an authorised group of users.
Government examples: persons seeking professional licenses may check the status of their application; government agency administrators may exchange confidential information.

Server broadcast
A server contains stored information. This information is broadcast in the sense that the server provides this information to any requesting client. Users can observe this information anonymously.
Government examples: a citizen can access the government's Web site; a public sector organisation provides a single point of contact for its customers to access its programmatic activities.

Server narrowcast
A server provides information to only a specific set of authorised users.
Government examples: the judiciary provides a dedicated, subscription-based server for the dissemination of court decisions; practising lawyers can subscribe to the judiciary server for access to information as soon as it becomes available.

SECTION II - Environmental Monitoring

As participants on the Internet, governments will need to be aware of national Internet-related issues. If the Internet becomes an effective means to distribute information, the viability of the technology will be a public concern. Current issues of concern to developers of Web sites include changes to the telecommunications infrastructure, security, copyright protection, and universal access. The evolution if not resolution of these issues will impact the future development of available information services and will have an impact on the appropriateness of this medium for government.

Telecommunications Infrastructure

The condition of national (and international) telecommunications infrastructure is a critical determinant of the viability and utility of government Internet-based services. It has therefore been the principal focus of state attention in deliberations about the Internet. Deregulation has been seen as a key tool in many countries seeking to upgrade their telecommunications infrastructure. However, a balance of state and market will still be required in many circumstances, though with the state taking a more promotional than regulatory role. The experience of the United States is indicative of the political difficulty in balancing state and market.

Due to the prior interests of Vice President Al Gore, the Clinton Administration was instrumental in focusing public attention on the idea of a future National Information Superhighway in 1994. The administration produced a *Strategic Planning Document* that placed the highest priority on information technology because "any nation that dominates information technology will be a leading superpower of the 21st century."[22]

The administration sees an active role for government, citing the prior success of the state in the development of a High Performance Computing and Communications (HPCC) programme, sponsored legislatively by then Senator Gore in 1986. This program was responsible for the development of the high speed (45Mbps) Internet backbones that are in place today.

However, the continuing federal budget deficit combined with opposition from congressional Republicans to government interference in the free market process has limited activities to existing research projects. Although these projects involve US$2bn-worth of federal research funds, this is a scant commitment when applied to a nationwide communications infrastructure. In 1996, the US Congress passed The Telecommunications Act. The act attempted to reduce government regulation and control, recognising that communications technologies had advanced to the point where the transmission medium no longer defines the type of service. The act did not provide government funding for constructing an infrastructure.

Futurists such as George Gilder and Microsoft's Bill Gates speak enthusiastically about what they expect to be a communications revolution that will take place over the next

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[22] *Strategic Planning Document - America in the Age of Information,* National Science and Technology Council, URL http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/cic/cic-pl-1.html.

ten years.[23] They believe that a convergence of telecommunications services will occur as each form of communication is converted from analogue to digital format.[24] However, this revolution can only take place if the economic and political environment is conducive to support the expansion of the telecommunications infrastructure.

By placing responsibility for managing the Internet backbone with telecommunications companies, the commercialisation of the Internet is likely to accelerate and a period of change and competition is underway. Of course, that is not a guarantee that competition will continue to be the norm. There is a high cost associated with building independent data networks that reach every household. The consolidation of competitors may restore local monopolies that restrict the range of services available to the public.

The large infrastructure investments increase the likelihood that competitors will merge until several massive communication service providers dominate the industry. The providers might be far different from traditional communications providers, as the experience of television indicates. While AT&T dominated the telephone industry before its break-up in 1984, it controlled only the transmission medium, not the content. Broadcast television stations have, in effect, controlled the use of their channel license and in so doing have concentrated on the lowest common denominator for programming. Cable operators, although forced to provide limited public access on their systems, have followed a similar path and while many systems routinely advertise more that 100 channel capability, a large percentage of these channels are dedicated to pay per view and premium entertainment services. The danger of entertainment-oriented system design is that it allows for a high speed channel in one direction only, thereby limiting information providers to those organisations who control the source of the high speed data stream.

In the US, then, there has been a massive expansion of the telecommunications infrastructure, but the interaction of government and commerce remains an area for conflict, with a continuously shifting boundary of responsibilities. The same outcomes of conflict and shifting responsibilities are seen world-wide, and they will ultimately determine the extent to which an infrastructure exists to support government use of the Internet.

Security and Privacy

To support commercial and governmental transactions the Internet must offer a secure environment in which such transactions can take place. In a packet switched network the precise path from one site to another is unknown; therefore, the possibility exists for those packets to be examined, imitated, or diverted, resulting in the loss of personal information that may be used to commit fraud. The developers of Internet software have been working to construct secure transaction systems.[25] However, public trust remains low, and some government agencies have also become involved.

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[23] Gates, Bill (1995, December 7). *Bill Gates Internet Strategy Workshop Keynote*, URL http/www.msn.com/bgates.htm.

[24] Lazowska, Ed. *Computing Research: Driving Information Technology and the Information Industry Forward*, URL http://www.cs.washington.edu/homes/lazowska/cra/future.html.

[25] Haight, Timothy (1996, February 15). *Thinking through Web payments,* Network Computing, p. 85.

The development of secure network systems using large key cryptography has been opposed by law enforcement officials in a number of countries, notably the US. US government regulations, for example, have prohibited the export of cryptography technology since World War II.[26] The fear is that if criminals obtain technology from which information cannot be decoded, it would be impossible for law enforcement officials to track their activities. Government security agencies have asked that a second key be available that would permit the equivalent of government wiretapping. However, the global nature of the Internet makes it highly unlikely that a security system with a *back door* known only to the US government will be universally adopted.

In addition to security, an increase in electronic commerce as well as other types of transactions raises concerns about privacy. The information collected about users in an all-digital environment is potentially immense and the ability to develop personal profiles from past transaction records could result in instances where life and health insurance are denied or employment is refused because of such profiles.[27] The full impact of participating in an electronic marketplace that can be monitored and analysed has yet to be fully understood.

Copyright Protection

The ease with which digital information can be replicated has threatened the viability of conventional copyright laws. Information is no longer bound to a physical object such as a book or a vinyl disk that is difficult to reproduce. Digital information can be replicated with no loss of quality. Software tools can be used to modify or transform content from one form to another. The material may be transmitted quickly to any location on the network.

At the same time, there needs to be a further clarification of what constitutes fair use. Fair use has traditionally allowed the transfer of material purchased and has allowed the purchaser some degree of ownership over the material. However, many software and content developers have taken the position that only the original purchaser has any right to use material and has no right to transfer it to others. If this concept had been applied to books, there would be no libraries, and books would have to be burned rather than sold or given to others.

Universal Access

If access to the Internet becomes essential for conducting ordinary day-to-day business, then it will be necessary to ensure that the average citizen has such access. The doctrine of universal access has, for example, been behind regulatory efforts to maintain low local phone rates at the expense of business users who pay the bulk of long distance charges. The strategy has been successful in a number of countries, with near universal access for phone services being achieved in many of the industrialised nations. At present, the costs of obtaining Internet access (including the hardware) are

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[26] Adams, Susan (1996, February 26). *The code breakers,* Forbes Magazine, p. 100.

[27] Miller, Steven E. (1996). Civilizing Cyberspace *(*p. 265). New York: Addison-Wesley Publishing Company.

too high to bring about universal access and the computer systems used are too difficult to set up and manage.

The minimum functionality that will constitute access has been changing and will continue to do so. On the one hand, access is becoming easier, with options to use TV sets for display and alternate access methods such as satellite and coaxial cable. On the other hand, data transfer requirements continue to rise with the complexity of online materials. Universal access, therefore, is a moving target. Whilst access rates are likely to improve, universal access is still a long way off. So, if governments are going to encourage use of the Internet for access to information and services, then there is a corresponding obligation to ensure that public access points exist throughout the country.

SECTION III - Stakeholder Perspectives

Information systems are social systems, and Web sites are no exception. Therefore, when planning Web site development, there needs to be a clear understanding of the social milieu within which that site exists. This understanding is best created through an awareness of the different stakeholder groups who have a stake in the Web site. The identity of these stakeholder groups will differ from country to country, but typical groups include: senior political figures, the legislature, and public sector organisations within government; and the news media and citizens outside government.

The interests of these groups will differ from situation to situation, but there follows an example of stakeholder identity and interests taken from the State of Connecticut in the US.

Senior Political Figures

In Connecticut these include the Governor, Lieutenant Governor, Secretary of State, Attorney General, Comptroller, and Treasurer. As elected officials they all have an interest in some level of participation in the development of a government Web site. First and foremost, they wish their constituents to perceive that they are managing their responsibilities. Failure to participate might be seen as an omission that reflects poorly on their office. Hence, not surprisingly, all of these offices have begun to develop Web sites.

In addition, the Secretary of State, who has responsibility for recording and publishing basic State and municipal data, implementing the State Election Laws and promoting voter registration, will wish to offer a volume of online information related to the administration of the office.

The Legislature

The most sought after legislative information is the status of proposed legislation. In pre-electronic form, this information is typically made available directly from the offices of the legislature or by subscription to a private information service. Making this information available electronically via the Web can reduce the number of routine queries that legislators receive. They would be able themselves to use the service from home or office, and would find this beneficial since they need access to State information to understand the programmes they are creating and funding. Not surprisingly, several legislative Web sites have been sponsored by the Connecticut legislature and by its two major political parties.

Public Sector Organisations: State Agencies

The State Library is the official State archivist and has been actively seeking to make information such as General Statutes available for online searches.[28] This agency views the development of the Internet as an electronic extension of the library. Internet technology has the capacity to span both the function of the traditional library in maintaining historic information and the capacity of the media to provide current

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[28] Moran, John M. (1996, March 20). *Barriers remain to electronic access*, The Hartford Courant, URL
    http://www.courant.com/news/barr0320.htm

information as soon as it is generated. Libraries have an important role to play in ensuring that there is universal access to online information by placing access terminals within their facilities.[29]

State agencies are required to provide public access to non-confidential government databases. The law requires that agencies provide the information in whatever format it is requested by the user.[30] The State's Office of Information and Technology has required agencies to submit lists of public access databases in order to construct a mechanism for public access to electronic information. The hardware and software independence granted by Internet technology provides an opportunity to address this requirement via the creation of Internet servers containing copies or subsets of existing databases.

Public sector organisations have other reasons for adopting this technology. It has internal uses as well as external ones, and government agencies have been using 'intranets' for meeting agendas and minutes, procedural manuals and regulations, internal staff contact details, training materials, bulletin boards, etc. Agencies can also prototype their external applications as intranet applications.

Thanks to the benefits they bring, Web sites have been developed by a substantial number of Connecticut State agencies. For example, the Department of Economic Development (DED) has responsibility for promoting industrial development within the State. Tourism is a major industry that benefits from low cost exposure, and promoting tourism is already a predominant activity on a number of government Web sites. DED has a major interest in the development of an attractive, easy-to-use site that features the benefits of visiting and living in the State.

News Media
The media would like to see as much raw data available on government Web sites as is possible, since this makes their background research work quicker and easier. They also have a commitment to freedom of information, to which the Internet is often seen as a major contributor. In Connecticut, for example, a news media editor chairs the State Council on Freedom of Information. Media sources - newspapers, radio and television - also themselves provide information via their own Web sites.

Citizens
The general public has a stake in how its government functions. Those most interested in government activities will want as much detail as possible about specific programme areas. Welfare claimants want information about how, where and what to claim; job seekers want ready access to employment information; business people want information on government regulatory and promotional measures; and so on. In addition, citizens in general want to receive information about the performance of government, but also want to provide information about their viewpoints by participating in political discussion. It is therefore important that Internet-enabled

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[29] Miller, Steven E. (1996). <u>Civilizing Cyberspace</u> (p. 250). New York: Addison-Wesley Publishing Company.

[30] Freedom of Information Act, CGS Ann. §§ 1-19a (1994).

applications should provide the opportunity for input from citizens to government, as well as presenting static material as an output from government to citizens.[31]

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[31] Miller, Steven E. (1996). <u>Civilizing Cyberspace</u> (p. 232). New York: Addison-Wesley Publishing Company.

SECTION IV - Good Practice in Web Site Creation: Analysis of US State Government Web Sites

As demonstrated above, there are any number of serious and compelling reasons for governments to create a presence on the Internet. However, the online environment is a dynamic and challenging arena and *'doing it'* and *'doing it well'* require two very different levels of planning and collaboration.

This is particularly true where governments seek to create a single and integrated Web presence. Such an approach has much to recommend it. Compared with a 'free for all' approach in which Ministries, departments and agencies all create their own separate sites, the integrated path is:

- more customer-focused,
- easier to use,
- cheaper to create, and
- less likely to create inconsistencies and duplications.

However, governments tend to be a loose affiliation of large and small, geographically diverse and programmatically unique organisations. Developing an all-inclusive and consistent representation of a many faceted organisation can be a daunting task - online or off.

Before evaluating specific efforts at creating a presence on the Internet, an examination of the principles for information delivery on the Internet will provide a useful framework for analysing those efforts.

Information Delivery Principles on the Web

The World Wide Web has achieved explosive growth in activity, traffic, data, servers and information. However, the ability to produce high-quality, meaningful information, with low levels of 'noise' and redundancy is still in its infancy. Harder still, for government efforts, is to be able to craft good information and then use it to (a) invite citizens to take a more active role in their government, and (b) improve planning, policy analysis and decision making in government operations.

According to John December, "Ultimately, the challenge for a Web information provider is to acknowledge the dynamic nature of Web information and recognise that information quality is not just a set of outward characteristics or design decisions, but a part of a continuous process in which content and presentation are adjusted to meet user needs. Webs that more completely articulate information so that it can become knowledge may be the key to the Web's continued growth."[32]

One of the key elements which was evident in analysing the Internet efforts of US State governments, is the extent to which these governments' Web presentations

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[32] December, John (1994, October 1). *Challenges for Web Information Providers*, Computer-Mediated Communication Magazine, Vol. 1, No. 6. URL http://sunsite.unc.edu/cmc/mag/1994/oct/webip.html.

appeared to have a very direct focus on user needs. With regard to general content and style considerations, a key distinction seems to be:

- whether the government was presenting itself as a functional bureaucracy to its users/customers, i.e. 'This Is What We Do' (from the inside out), or
- whether the government tried to view itself as a user/customer would, i.e. 'How May We Help You?' (from the outside in).

The latter approach does not presume that a user has a significant amount of institutional knowledge about the organisation itself (i.e. knows exactly which agency or functional unit can solve his/her problem). Rather, the better government presentations anticipate a lack of knowledge of the organisation and assume a 'subject matter' approach to guide the user to the appropriate topic or subject matter area, and only then to the organisational unit which can help solve the problem.

The following methodology can be generally applied in the development process of a Web site.[33] However, one can use these principles in a reverse-engineering sense to evaluate, analyse, contrast and compare existing government Web sites:

1. **Audience:** Is it clear for whom the Web site is intended: government employees or user/customers (constituents, special interest groups, etc.)?

2. **Purpose Statement:** Is there a statement of the site's purpose or a clear articulation of the reason for and scope of the site's existence?

3. **Objectives (list):** Does the Web site meet the specific goals of the purpose statement?

4. **Web Specification:** Is there a clear sense of organisation regarding what pieces of domain information will be presented as well as any technical or policy limitations on that presentation?

5. **Domain Information:** What is the breadth and depth of the knowledge and information in the subject domains presented in the Web site?

6. **Web Presentation:** How well have both style and content elements been used to present the information delivered to the user?

Evaluation Criteria

Key Elements in the Evaluation

It was beyond the scope of the present research to cover all six of the areas just listed in its evaluation of the Web sites of forty-eight US State governments. Instead, the main focus was on evaluation of site design and page layout. The sites were therefore evaluated on the basis of seven key criteria, as defined in Table 1[34].

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[33] December, John & Ginsburg, Mark (1995). HTML & CGI Unleashed. Indianapolis: Sams.net Publishing.

[34] December, John & Ginsburg, Mark (1995). HTML & CGI Unleashed. Indianapolis: Sams.net Publishing.

TABLE 1 - DESCRIPTION OF KEY CRITERIA USED TO EVALUATE PRESENTATION OF US STATE GOVERNMENT WEB SITES

Criterion	Description
Retrieval Time	Time to download page(s)
Readability	Use of background colours and texture
Flexibility	Options available to users (text vs. graphic interface, etc.)
Semantics	Coherent use of symbolic or graphic meaning
Aesthetics	Coherent style to help users focus on content
Layout/Organisation	Context cues: page length, layout, and typography
Advanced Display Features	Use of image maps, forms, multimedia, virtual reality, or other

Site Design And Page Layout Concepts

Beyond the conceptual framework of the Web site is the actual presentation of the information itself. How well is the site organised? Web site users are most comfortable with a sense of predictability and structure. According to the *Web Style Manual* created by the Yale Centre for Advanced Instructional Media, "The users' perceptions of and assumptions about the organisation of your World Wide Web (WWW) site can have a major impact on the usability of your page and site design....Proper World Wide Web (WWW) site design is largely a matter of balancing the structure and relationship of a menu or 'home pages' and individual content pages or other linked graphics and documents. The goal is to build a hierarchy of menus and pages that feels natural and well-structured to the user, and doesn't interfere with their use of the Web site or mislead them."[35]

Government Web presentations were evaluated with regard to their *overall* site organisation. The *Web Style Manual* defines two 'bookends' of the spectrum of site organisation that are pictured in Figures 2 and 3.[36]

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[35] Lynch, Patrick S., *Web Style Manual,* Yale Center for Advanced Instructional Media, URL http://www.med.yale.edu/caim/stylemanual/M_I_3.HTML

[36] Lynch, Patrick S., *Web Style Manual,* Yale Center for Advanced Instructional Media, URL http://www.med.yale.edu/caim/stylemanual/M_I_3.HTML

FIGURE 2 - EXAMPLE OF A WEB SITE WITH **NO STRUCTURE**

M = Menu or "home page"   D = WWW page or document
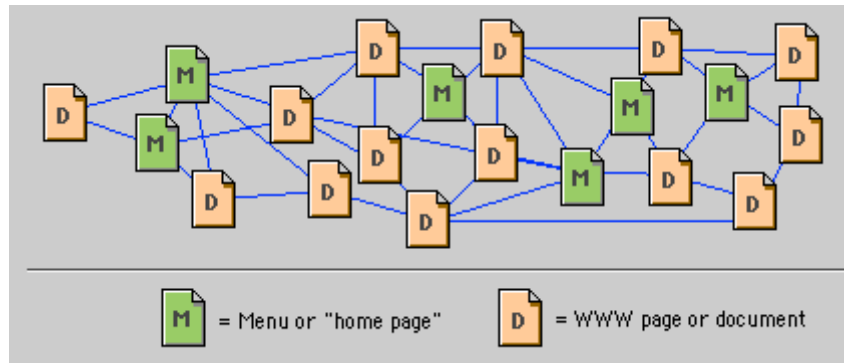
FIGURE 3 - EXAMPLE OF A **HIGHLY STRUCTURED** WEB SITE

Home Page

Major submenus

Indivdual documents
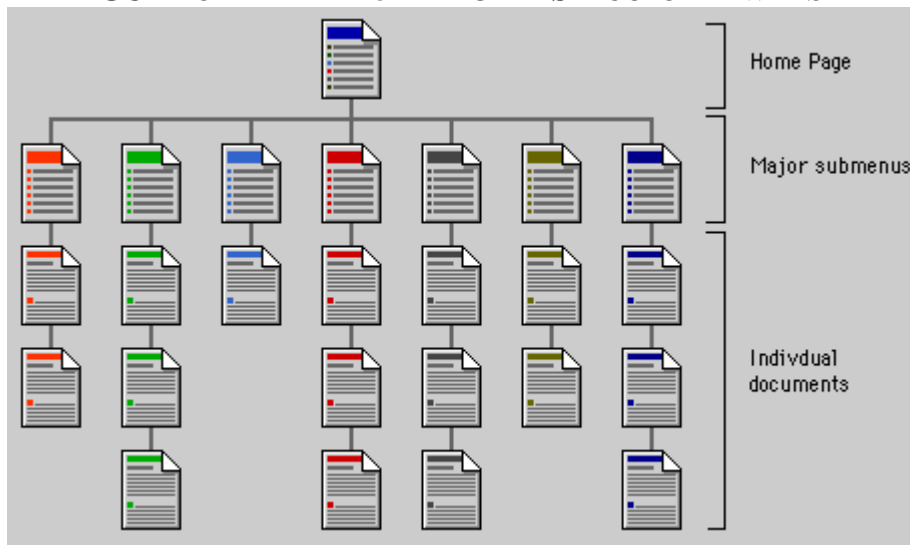
Individual page design is also very important. Page designers are advised to employ a universal grid, or template. Grids and templates make use of standard headers, icons and navigation tools to improve the legibility of the page. This page layout standardisation also gives give a consistent look to the presentation and allows the user to identify easily and quickly what the subject matter is and who is responsible for maintaining the page, as shown in Figure 4.

FIGURE 4 - EXAMPLE OF PAGE LAYOUT STANDARDISATION[37]
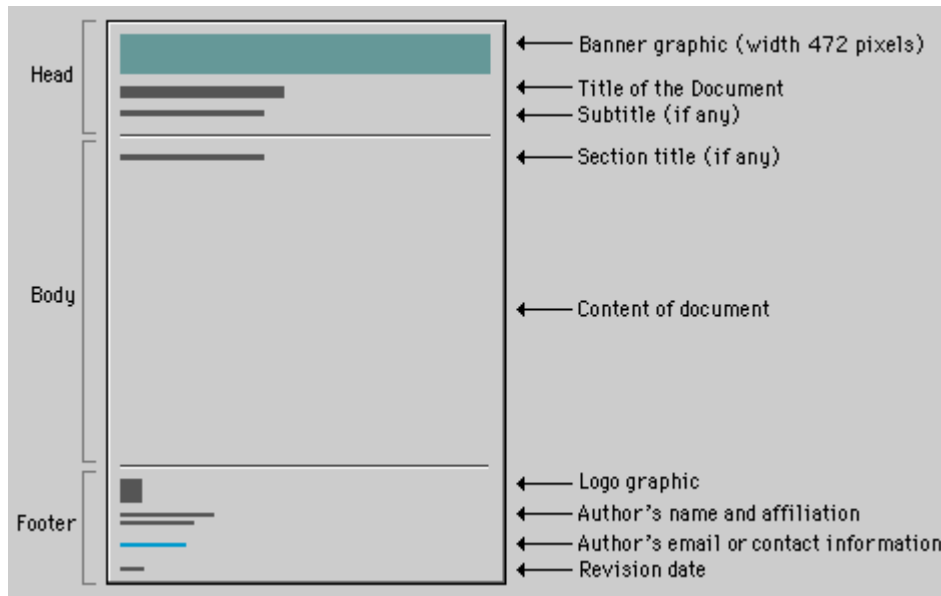
Examination of Web sites revealed a number of home page presentations with common design problems, exemplifying problems described in *HTML and CGI Unleashed*[38]:

1. **The Page from Outer Space:** A general lack of navigation and information cues.

2. **The Monster Page:** A page with long access time required (text or graphics).

3. **Multimedia Overkill:** A page with overly complex information and texture.

4. **Uneven Page:** A page with an uneven information structure.

5. **Meaningless Links:** A page with a lot of links which fail to add meaning to the information presented.

6. **'Clown Pants':** A page where units of meaning are scattered haphazardly (see Figure 5).

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[37] Lynch, Patrick S., *Web Style Manual,* Yale Center for Advanced Instructional Media, URL http://www.med.yale.edu/caim/stylemanual/M_II_5.HTML

[38] December, John & Ginsburg, Mark (1995). HTML & CGI Unleashed. Indianapolis: Sams.net Publishing.

FIGURE 5 - EXAMPLES OF A CLOWN PANTS PAGE AND A STRUCTURED PAGE[39]

Clown Pants Page   Structured Page

Summary of Web Site Results

The Rating Scale

At the time of evaluation, forty-eight US State government Web sites were assigned an overall rating between 0 and 5 (*0=none, 1=poor, 2=fair, 3=good, 4=superior, 5=excellent*) using the seven general criteria mentioned above. Admittedly, this was a subjective exercise. If time had allowed, a more scientific approach would have been used to minimise the individual bias of the survey, such as a group scoring model. Web sites also change continuously, and the results presented will not necessarily reflect site style and content at the moment this paper is being read.

Summary of Overall Ratings

The results of the evaluation process appear below (see Figure 6) and, in fact, generally follow a normal distribution curve. Twenty-seven of the forty-eight were given a rating of three, or 'good', which is considered to be average. Eight sites were deemed to be 'superior' and four sites were considered to be 'excellent' examples of what a government presence on the Internet should be. No government site received a ranking of one.

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[39] Lynch, Patrick S., *Web Style Manual,* Yale Center for Advanced Instructional Media, URL
    http://www.med.yale.edu/caim/stylemanual/M_II_1.HTML

FIGURE 6 - SUMMARY OF US STATE GOVERNMENT WEB SITES BY OVERALL RATING
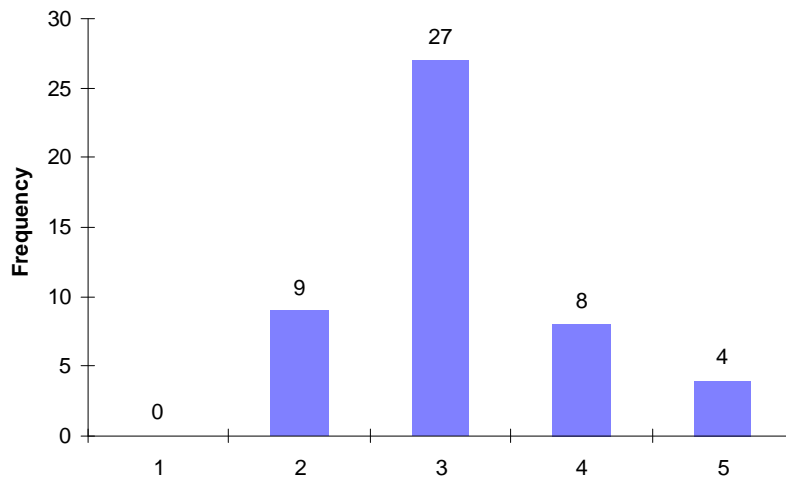
Summary of Site Content Features

In addition to the key criteria used to evaluate the Web sites, another thirty specific features and subject matter 'domains' were identified that might be present on a site. The inclusion of an item indicates that the site designers have at least presented the topic. As might be expected with a new technology, the level of detail provided varies significantly among the sites. No standards exist for the format of material and many sites will be substantially redesigned as they are developed. The universe of features is a useful demonstration of the prevailing level of technical and content-related issues. Generally, the features list addresses what government home page designers felt was significant to include in the site whether or not they had the capacity to implement it fully. The features and their frequency of presence are presented in table 2.

TABLE 2 - FREQUENCY OF FEATURES USED BY US STATE GOVERNMENT WEB SITES

Category of Features	Number of States Using Feature	% of Total States
E-Mail Feedback Component	43	90%
State Agency Directory	42	88%
Executive Branch	34	71%
Tourism Promotion	32	67%
Legislative Branch	29	60%
Primary/Secondary Education	28	58%
Colleges and Universities	28	58%
Economic Development	23	48%
Judicial Branch	21	44%
Flexibility	20	42%
What's New Page Feature	20	42%
Local Government/Municipalities	20	42%
Personnel Recruitment	19	40%
Libraries	19	40%
Search Engine or Index	18	38%
State Summary	13	27%
Advanced Display Features	12	25%
Information Policies	11	23%
Coordination	11	23%
What's Happening Page	11	23%
Local Businesses	11	23%
Help for New Users	10	21%
Overall Strategy	10	21%
Technology Standards	7	15%
Budget and Financial	6	13%
Procurement/Bidding	6	13%
Press Releases	3	6%
Site Map Layout	2	4%
Actual Data Resources (FTP)	2	4%
Museums	1	2%

The most common component is e-mail feedback which indicates that some level of user interaction is supported by the site. The State agency directory feature is a close second. This generally provides a guide to State agencies via tables of each government organisation with departments, staff and phone numbers. This function is comparable to the government information pages of the telephone book; however, the technology allows for more flexible presentation of information. By appearance, traditional organisational breakdowns of government - the executive (71%), legislative (60%) and judicial branches (44%) - are in keeping with expectations, given their respective magnitudes and/or service delivery responsibilities.

Traditional State government marketing areas - i.e. tourism promotion and economic development - were also in the top half of features found. As one might expect, primary and secondary education, colleges and universities and libraries - subject areas State governments tend to point to with a sense of 'pride' - also make the top half of the features list.

Certain features which tend to be resource-dependent - either human or technical - are scattered throughout the list. The use of site-specific search engines (38%), a very

useful feature, is likely to grow as government sites increase in importance (and traffic volume), and as resources are made available to maintain and upgrade them. Another very useful feature, the What's New page (42%), simply tracks additions, deletions and revisions to specific site pages. As the government sites grow, this indexing feature will become more and more labour intensive - but also more and more necessary. Help pages (21%) have been developed to varying degrees. Again, as these sites grow in popularity or necessity, help features will have to expand accordingly.

In addition, there are two other site design parameters which are important from an administrative management perspective:
- a 'date of last revision' indicator, and
- a page counter.

Thirty-four of the forty-eight sites include a date of last revision feature. This feature provides a vital cue to users about the age of the material which they are viewing. Despite controversy, the page counter feature is a necessity when constructing a site. Much has been written about the validity of what constitutes an actual 'hit' on a specific page. Current research demonstrates that most hit rates are dramatically overstated.[40] However, applying a 'log scale' perspective (does the page receive 10, 100, or 1000 hits per month?) provides a sound simple basis for measuring the benefits of maintaining specific subject matter within a Web page presentation or of reallocating resources to another area of promise. Despite this, only fourteen of forty-eight sites used page counters within their presentations.

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[40] *Public Information in the Digital Age*. (1995, December). <u>The PIPER Letter</u>, URL
   http://www.webcom.com/~piper/9512/index.html.

Individual Government Web Site Ranking by Key Criteria
The ratings for the top twelve US State government Web sites, as rated at the time of
evaluation, appears in Table 3, using the first six of the key criteria listed earlier in
Table 1.

TABLE 3 - Top Ranked Sites by Key Criteria

State	Overall Site Rating	Retreival Time	Readibility	Flexibility	Semantics	Aesthetics	Layout/Organization
California	5	4	4	N	4	4	5
Washington	5	3	3	Y	3	4	4
Virginia	5	4	4	N	4	5	5
Minnesota	5	3	5	Y	5	5	5
Michigan	4	4	4	N	4	4	3
Florida	4	3	4	N	3	4	3
Massachusetts	4	4	4	N	4	4	4
Wyoming	4	2	3	Y	3	2	2
Montana	4	4	4	Y	4	4	4
New Hampshire	4	4	4	N	4	4	4
South Dakota	4	4	3	Y	3	3	3
Hawaii	4	3	4	Y	3	4	4

Learning By Example

Based upon the research conducted for this study, the 12 States identified in Tables 3 and 4 represent the 'best practices' of the forty-eight government home page presentations at the time of evaluation. To varying degrees, each Web site has incorporated the above-mentioned principles for information delivery, using the accepted site and page design standards necessary to create a first class Web presentation.

TABLE 4 - States Demonstrating 'Best Practice' in US State Government Web Sites

State	Rating	Unique Features	Comments
California	Excellent	Downloadable data from State statistical publications	Good layout with excellent topic/category organisation; all other State servers prominently identified
Washington	Excellent	Good image map, index and layout	Excellent Help Page; layout and footer concept; templates used throughout
Virginia	Excellent	IT clearinghouse concept; government budget information readily available	Clean, excellent layout/organisation with good balance and good content
Minnesota	Excellent	North Star concept; all project transactions supported online via listservs etc.	Information index and text-based options page; best layout, organisation and approach; best approach to customer content
Michigan	Superior	Awarded Top 5% badge	Good layout; comprehensive content
Florida	Superior	Links to Florida community network and freenet	Good layout and organisation; public access page for advisory groups
Massachusetts	Superior	Reference Shelf and Forum subject matter concepts	Excellent layout/organisation; comprehensive content
Wyoming	Superior	Awarded Top 5% badge; text option upfront; many large images; graphic changes with each access	Other online services available, well-organised layout; good footer concept
Montana	Superior	Montana conditions; 'Montana OnLine'; creative search feature	Disclaimer note; unique 'Around the State' search feature; good symbols
New Hampshire	Superior	'Webster' project; government information by subject index	Good layout/organisation; consistent format; good sub-page layout
South Dakota	Superior	Image Map State Agencies Organisational Chart	Excellent layout and templates; large image maps with good five second response time
Hawaii	Superior	Site Road Map	Good layout/organisation; excellent symbols

SECTION V - Government Strategy for Web Sites

The first step in the development of any government-wide strategy towards a Web site is the recognition of a need for a uniquely identifiable presence on the Internet. For some governments, Web presence has developed in an ad hoc, organic way that creates many different sites, each of which presents government information on the World Wide Web. These multiple sites are in many cases redundant and lack a co-ordinated framework for linking among them. In these situations, there may be a perceived need for both a single point of 'official' access for the government and a co-ordinated approach to managing the content available through the official home page. The objectives of this integrated approach are to:

- Establish a master or welcome government home page for accessing all government information which is available on the World Wide Web.

- Make the government Web site and pages with official links from it appear as consistent in format, inter-linkages, and functionality as possible.

- Ensure information available through the government Web site is structured in such a way that users can logically and quickly step through it to the specific information they need.

- Provide quality assurance in preparing information for the government Web site and all organisations or agencies linked to that site.

The government's Internet address - sometimes of the format *http://www.gov.xx/* - may well be registered in the name of one public agency. That agency is a logical point at which to construct the mechanism for management of the site. In order to represent the interests of the previously-discussed stakeholders, the agency would be well advised to appoint an Advisory Committee that would enforce the standards developed to manage the site and major links. The work of this committee is discussed below.

Government Web Site Goals
Major goals to be achieved through the implementation of a government Web site are:

- To build a user-friendly place on the Internet available to citizens for access to and dissemination of government information and services.

- To gain the experience necessary to build a foundation for improved access to government information and delivery of services through the use of information technology.

- To promote the country to the rest of the world in a manner that enhances tourism, economic development opportunities and other national or regional interests.[41]

Administrative Framework

The administration of the government Web site on the Internet requires the formation of a general framework upon which government information is built. The top-level components of the government Web site are defined as the Welcome Page and the Domain Home Pages, as highlighted by the shaded area in Figure 7. The Welcome Page is meant to be the highest level of reference or menu with the subsequent Domain Home Pages or menus branching from that to describe the resources of government. The highest level should be identified by the official government domain address.

FIGURE 7 - GOVERNMENT WEB SITE: TOP-LEVEL GENERAL FRAMEWORK
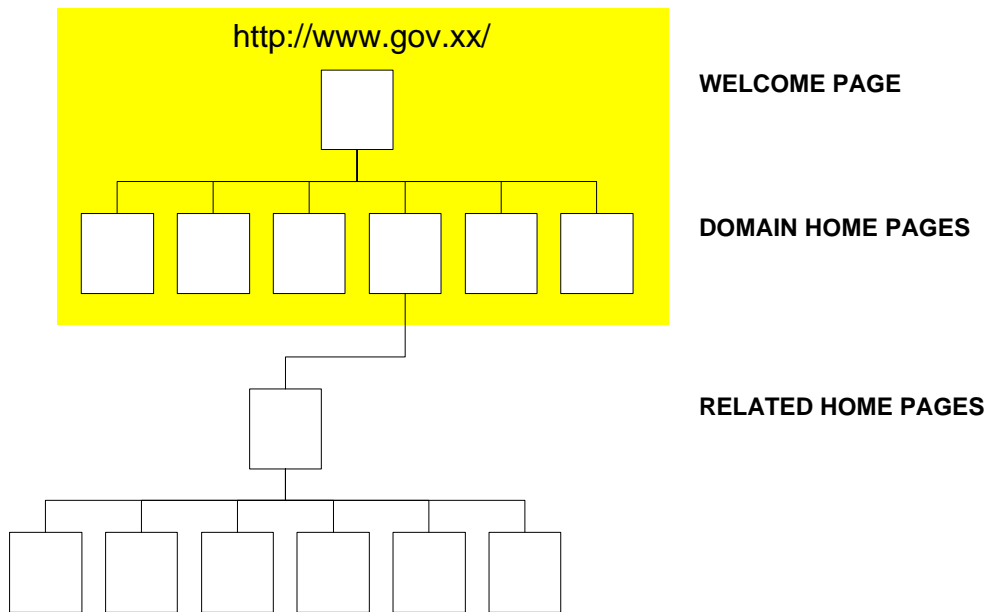
The framework shown in Figure 7, illustrates how the three specific types of home page relate to each other. These three page types are:[42]

> ### Welcome Page
> The Welcome Page is defined as the single access point at the apex of the government Internet information hyperspace. This page contains a list of the available high-level Information Domains (i.e. subject categories), online cross-references (or hyperlinks) off to Domain Home Pages for these subject categories, and some instructional information for getting started.

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[41] *South Carolina WWW State Home Page Policy.* (1995, December 6). State Budget and Control Board Office of Information Resources, URL http://www.state.sc.us/nis_itg/hmpg_policy.html.

[42] Feinler, Elizabeth (1994, March). *A Suggested Framework for Administering NASA'S Web Information Hypermedia*, NASA Ames Research Center, URL ftp://nic.nasa.gov/pub/www-framework2.txt.

Domain Home Page
A Domain Home Page is the first home page linked to by each subject category listed on the Welcome Page. The Domain Home Page provides an overview, context and/or index to that particular subject category, online cross-references (or hyperlinks) to specific information covered under that subject category, and instructions (if needed) for continuing down the information tree.

Related Home Page
Related Home Pages are defined as any additional pages that are not a Welcome Page or a Domain Home Page. For example, individual government agency presentations.

Because the government Web site will be widely accessed by many users, both within and outside the public sector, it is important that there be in place a mechanism to structure and monitor the content and organisation of the Web presentation. The mechanism will ensure that the site represents an accurate, overall picture of the resources of government rather than one that is piecemeal, misleading, or incomplete.

Government Web Site Advisory Committee
The establishment of a government Web site Advisory Committee can provide the policy direction and the framework required to develop and manage the implementation of the site. Members can include representatives from both the internal and external stakeholders, and it should be recognised that additional stakeholders are likely to step forward as the Web site evolves.

The Advisory Committee can take responsibility for the oversight to develop the format, content and organisation of the Web site. It can also develop a co-ordinated approach to the structure, organisation, and location of government agency Web pages and their linked contents within the government's overall Web presence. However, the Advisory Committee would not be responsible for specific approval or authorisation of content for a particular government agency's pages. That function is best left to the individual agencies.

Continuous Improvement
Web site assessment should be an ongoing activity of the Advisory Committee and the government agency charged with site responsibility. The assessment can be based not only on how well contributing government agencies have met with published guidelines, but also on how well the government's efforts compare to other national government sites. This will require a continuous monitoring function to survey, report and act on other government Web sites.

Assessment of the government's own site should recognise that static sites are unlikely to hold the attention of users and that Internet methods and practices are changing rapidly. It is not likely that the methods of 1998 will be satisfactory even five years from now. By continually re-evaluating the potential of the technology, projects can be developed that extend its reach to a wider range of information and services.

SECTION VI - Insights/Lessons Learned

The World Wide Web introduces new concepts of presentation, delivery and organisation into the business of providing government information for public use. The necessity to organise the information into a coherent whole often runs counter to existing government cultures, where individual government agency ownership of programmes and their related information prevents co-ordinated efforts to publicise or evaluate the work of government.

The development of a Web site will assist in defining the many linkages that exist between government agencies, which are often poorly defined in the real world. It will make evident areas of duplication and overlapping responsibility. It will demand greater government accountability, and greater objectivity in the justification of decisions. It will change the culture from *need to know* to *right to know*.

In these many ways, then, a Web site will change the way that information flows within government, and between government and citizens. By changing information flows, the site changes the balance of cultures, of relationships, and of power. As such, site development must be recognised as a political process as well as a technical one. Indeed, it is likely that the main barriers to Web site development and exploitation by government will be political rather than technical.

In technical terms, an integrated approach to government Web site development requires the establishment of a co-operative process that encourages the collaborative exploration of information technologies and the development of common system design and implementation standards, including data standards. While it will not be fiscally practical to convert every legacy application to the new standard, conformance with uniform system requirements could more easily be made a part of every new or rewritten system.

The establishment of a properly constructed government Web site represents a start toward a real or perceived flattening of the bureaucracy. The democratic attitudes of the citizenry, and the existence of channels for expression of those attitudes, will be a key driver in the level of openness and accessibility to information provided by its government. Where a democratic environment exists the Internet is likely to be used as a tool that can enable the publication of details about all government programmes, the collection and dissemination of meaningful data about those programmes, the provision of universal access to information for citizens, and ultimately the development of a relatively simple mechanism for the provision of many government services at a lower cost to the taxpayer. Conversely, where a democratic environment does not exist - for example where democratic aspirations are suppressed by government - the Internet is likely to be seen by government more as threat than opportunity. In such cases, Internet-enabled applications are less likely to be exploited.

Where government is attempting to created a single, integrated Web presence, it can try to find incentives that will encourage the participation of its constituent agencies. Such measures can include:

- Technical: provision of space for pages on a central Web server; funding for telecommunications infrastructure within government, for example to ensure that appointed officials and senior managers all have Internet access; provision of Web browsers and Web authoring tools.
- Consultancy/advice: centrally-provided assistance with the process of planning, developing and maintaining Web pages.
- Training: awareness training for senior staff; technical training for Web authors and site managers; access training for government staff and citizens.
- Regulation/legislation: treating email correspondence with the same priority as posted letters; digital signature legislation to give email the same legal force as paper documents; freedom of information legislation that includes electronic formats.

The Internet has already received extensive publicity - not to say hype - over the past few years. It is therefore easy to understand why so many people are excited about the possibilities that it offers for tracking and organising the flood of information that is available to us. The development of this technology is an exciting and dynamic area with many possibilities. The full potential may not ever be achieved, the benefits may be fewer than currently imagined, and those benefits may come at a price in terms of new forms of fraud and privacy invasion.

Nevertheless, the Internet is surely part of a pending information revolution that cannot help but stimulate one's imagination. Governments have an opportunity to harness this 'wave of creativity' and to use what the Internet provides - particularly Web sites - to re-invigorate and even re-invent their internal and external relations.

APPENDIX

TABLE 5 - URLs for US State Government Web Sites Evaluated

State	URL http://www.
Alabama	state.al.us
Alaska	state.ak.us
Arizona	state.az.us
Arkansas	state.ar.us
California	ca.gov
Colorado	state.co.us
Connecticut	state.ct.us
Delaware	state.de.us
Florida	state.fl.us
Georgia	state.ga.us
Hawaii	hawaii.gov
Idaho	state.id.us
Illinois	state.il.us
Indiana	state.in.us
Iowa	state.ia.us
Kansas	ink.org
Kentucky	state.ky.us
Louisiana	state.la.us
Maine	state.me.us
Maryland	mec.state.md.us
Massachusetts	state.ma.us
Michigan	state.mi.us
Minnesota	state.mn.us
Mississippi	state.ms.us
Missouri	state.mo.us
Montana	mt.gov
Nebraska	state.ne.us
New Hampshire	state.nh.us
New Jersey	state.nj.us
New Mexico	state.nm.us
New York	state.ny.us
North Carolina	state.nc.us
North Dakota	state.nd.us
Ohio	ohio.gov
Oklahoma	state.ok.us
Oregon	state.or.us
Pennsylvania	state.pa.us
Rhode Island	state.ri.us
South Carolina	state.sc.us
South Dakota	state.sd.us
Tennessee	state.tn.us
Texas	texas.gov
Utah	state.ut.us
Vermont	state.vt.us
Virginia	state.va.us
Washington	wa.gov
Wisconsin	state.wi.us
Wyoming	state.wy.us

Note: Nevada and West Virginia were excluded from the evaluation