DEVELOPING A DEFENCE
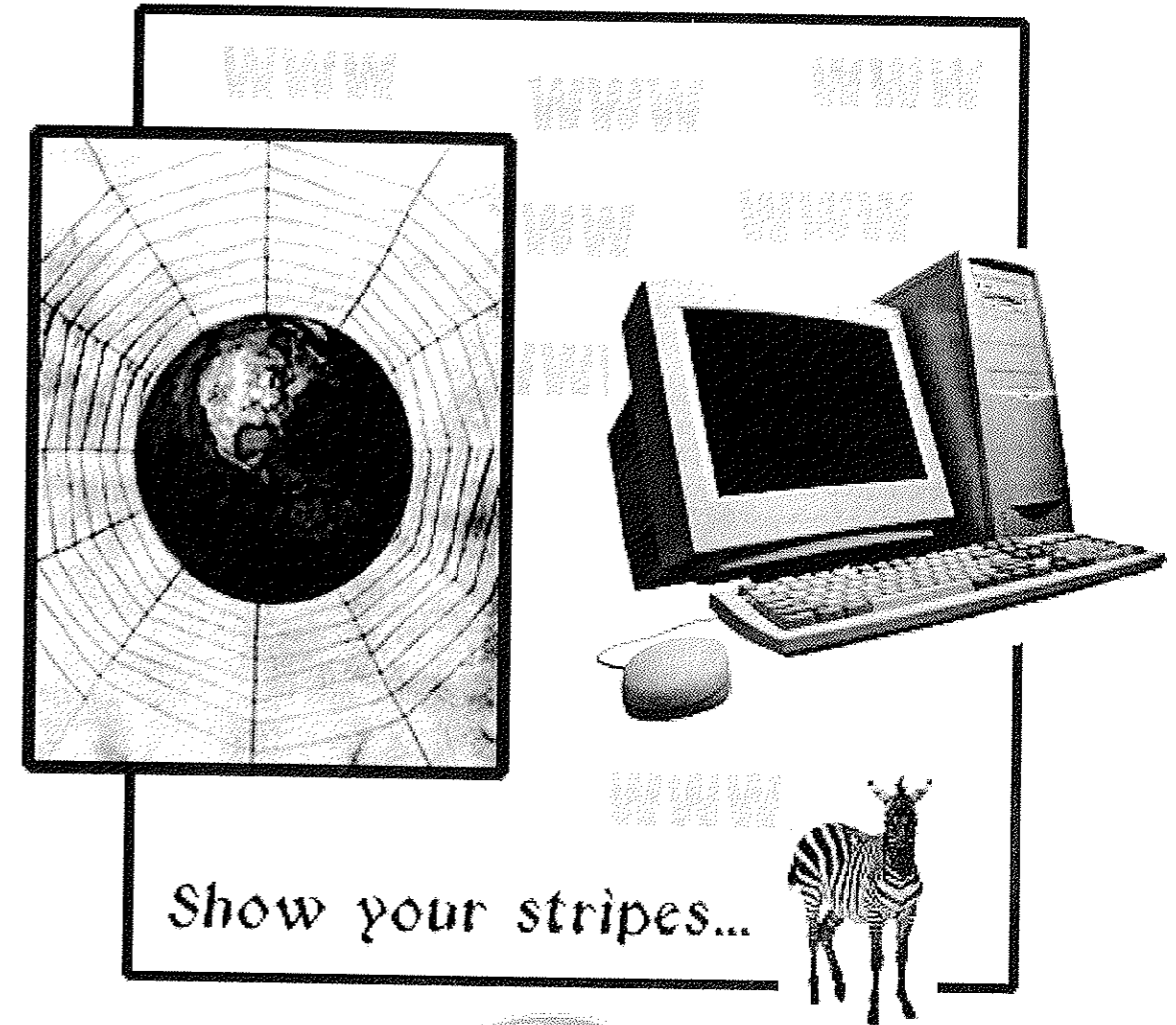# FACILITIES MANAGEMENT WEBSITE

JULY 2000

DEVELOPING A DEFENCE FACILITIES MANAGEMENT WEBSITE

A joint South Africa-United States project under the auspices of the Environmental Security Working Group, Defence Commitee of the SA-USA Binational Commission
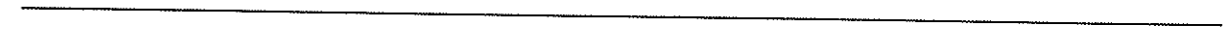
Publication ESWG/003

Show your stripes...

Partnering To Build
A South African Ministry Of Defence
Facilities Management Web Site

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	Foreword **Partnering to Build a South African Ministry of Defence Facilities Management Web Site**	

The relationship between the United States and South Africa, which has taken shape under the U.S.-South Africa Bi-National Commission, is a critical one to both countries. The collaboration we have forged in recent years has deepened our mutual understanding and served as a model for other nations.

International cooperation on topics of mutual interest reaps great rewards, including saving time and money and being able to learn from the past experiences of others. Such cooperation is all the more necessary in areas of dynamic change, and nowhere has change been more dynamic than on the world-wide web. Recognizing the opportunities this new information tool provides, one recent environmental security cooperative efforts between the South African Department of Defence and the United States Department of Defense has been the creation of this guidebook in the development of a web site. When dealing with environmental issues, defence establishments should be as transparent to the public as possible. They must maximize their ability to communicate internally and externally. An effective web site is a critical component in this regard.

This guidebook lays out a step-by-step approach for creating a web site. The first step involves identifying the overall requirements of the web site: what is its purpose, what kinds of information should be posted, who will be needed to help create the site, etc. Next, the guidebook explains each step necessary in planning the web site, from developing a plan to selecting the appropriate technology. The third step is to actually develop the web site, which includes creating the structure, designing the pages, and testing the system. The final steps are deployment and maintenance. As the guidebook points out, activating the site is naturally the main objective, but special attention must also be paid to maintaining the web site once it is operational.

Although its title indicates this guidebook is for a web site for the South African Department of Defence, the process identified here is applicable to any institution (government or non-government) in any country of the world that is interested in building a web site. The rapid growth of the world-wide web and people's increasing accessibility to it, makes a web site an ideal tool not only for people within the organization, but also for information-sharing with foreign colleagues.

Gary D. Vest
U.S. Co-Chair

Col Seakle K. B. Godschalk
South Africa Co-Chair

Environmental Security Working Group
U.S.-South Africa Defense Committee

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I. History of the World Wide Web

The World Wide Web began in March 1989, when Tim Berners-Lee of the European Particle Physics Laboratory proposed the project as a means to better communicate research ideas among members of the geographically dispersed organization. The phrase World Wide Web is a metaphor for individual pages that are combined to make up sites. Web pages are written in Hypertext Markup Language (HTML), which tells the Web browser how to display the page and its elements. The defining feature of the Web is its ability to connect pages to one another--as well as to audio, video, and image files--through hyperlinks. Statistics project that the number of internet users will nearly quadruple over the next five years, from 36.0 million in 1997 to 142.0 million by the year 2002. This represents an average annual growth rate of 79%.

II. Define the Requirements of the Web Site

The Web's evolutionary nature makes it important to keep an eye on the big picture when designing or modifying a Web site. Paying attention to the site's organization, using an easy-to-understand navigational toolbar, and maintaining consistent rules of style are important to ensure that no matter how much information is added, people can always find what they are looking for. Keeping the user community in mind is another crucial element of overall web site design. In addition, the diversity in technology plays a role as well. There are many variations in browsers, Internet connections, and other resources that people use to access a web site, all of which can affect what they see.

A web site needs to be crafted to meet the well defined needs of the specific target group; it needs to be supported with human, technical, informational, and financial resources and it needs to have measurable performance goals and reasonable costs given its intended uses and objectives. Further, understanding the practical tools for setting objectives, identifying stakeholders, setting priorities, specifying resources, and defining costs, benefits, and performance measures are also important. Building a web site is an ongoing process, not a one-time project with static data. Therefore, long-term editorial and technical maintenance need to be covered in plans for the site.

A. Purpose

Three main purposes of the web site were identified. The first, is to provide information. This allows for current and twenty-four hour access, as well as becoming a virtual file cabinet or data repository. The second purpose is to reduce costs. Posting to the web can reduce mailing and fax costs. The third purpose is to inform the user community. This entails information such as agendas and events.

B. Identify Information, Participants, Requirements and Partnerships

Information. It is important to identify the type and quantity of data applicable. This may be accomplished by conducting an inventory of current data holdings. A further result may be the establishment of an "information clearinghouse" or coordination unit that would be responsible for maintaining and disseminating environmental data and information. In addition, organizational staff may need to be trained to fulfill these tasks.

Participants. The web development team will need to set objectives, garner organizational support, perform cost/benefit analysis, define information content, analyze and implement security measures, design and manage the Web site, and keep it up to date. To be successful, the team will need to draw upon the expertise and enthusiasm of a broad cross-section of people and organizations. The participants may decide to give the organizational responsibility to a core group, having either ad hoc or official membership, i.e. a configuration management group.

Web Development Team: the following team members may help put a web site together (individuals may fill more than one role).

1. Program Sponsor: This is the person within the organization who takes responsibility for the project and will act as a liaison between the team and other participants.
2. Program Manager: This individual will organize the project schedule including release dates. They will assign tasks and see that they are completed.
3. Web Page Developers (Programmers): These individuals will write the code and build the site.
4. Web Graphics Specialist: Graphic artists will design or manipulate the images that will be put in the web site.
5. Database Administrator: Many web sites involve a database in one form or another. This individual will supervise and handle all the related database functions.
6. Content Expert: The content expert has functional expertise in the business area for which the site is being developed. This individual or group will be responsible for creating the content that will be placed on the web site.
7. Web Site Developer: These people will be responsible for taking the content created by the programmers, graphic artists and content experts and creating the finished product that the end user will see.
8. System Administrator: This person will oversee the set-up and administration of the computers that will act as the web servers.
9. Network Administrator: This individual will supervise and implement the network security and the web site's connections to the outside world.
10. Webmaster: This person will supervise and implement the web servers. They will supervise their operation and any security required.

Requirements. The web site should be simple, readable and direct. The home page is the initial point of access to the web site and should provide text which clearly describes the materials presented within the site. The Web lends itself to

informality, and therefore the entry page should be accessible, clear and easy to read.

In the web world simpler is better. Many web sites contain unnecessary gimmicks or too many graphics. Clean elegance seems to be the better path. It is clear that the sites most used and those most appreciated, are the ones which look good, load quickly, and point immediately to the information. Good content well presented holds a reader's interest long after the cleverest image goes stale.

Additionally, there are other requirements that should be adhered to in the development.

For example, the pages should be kept under 50KB (for both HTML and graphics) and definitely under 100KB, unless there's specific content that visitors will likely wait for. Many users still have 14.4 or 28.8-kbps modems that require several minutes for information to download. Second, many users still have monitors with 800x600 resolution, or even 640x480 current state of the art is 1600 x 1200 and it is still improving. Therefore, "flexible" design (for example, using tables with percentage widths for layouts) should be deployed. Third, while most users have monitors capable of displaying thousands of colors, using a browser-safe 216 color palette should be featured. Fourth, while public image is split roughly evenly between competing, command browser products (Microsoft's Internet Explorer and Netscape's Navigator), there is a further split those are using version 4.x of these browsers and version 3.x. More importantly, not every browser can take advantage of every feature that is possible to build into a web site. Advanced features that include automation, windows (panels), sound, and the like require the most advanced browsers. If one designs a service that uses advances features, it is important to ensure that your users can take advantage of them.

III. Planning the Web Site

A. Evaluate Information/Infrastructure
Members of the web development team need be trained in the fundamentals of web site design and management. Some of this expertise can be found within other government entities, local private sector, or university. Building upon this allows the web development team to address issues such as: core data sets (both content and accuracy), setting priorities for investments to build or upgrade the data infrastructure, creating mechanisms for establishing and adopting data standards, (i.e., naming conventions for menus and files), and outlining training priorities with an emphasis on web site design and management.

B. Create a Web Site Development Plan
Before selecting a single approach and deciding to implement it, it is advisable to look closely at similar experiences and devise a set of reasonable alternatives for the web site. Examine each possible approach to identify all strengths, weaknesses, and implications. Building a system prototype to show these ideas in more concrete form to users, partners, and other stakeholders and soliciting feedback is a useful approach. In addition, upon moving to construction, testing, and implementation utilizing a variety of web browsers before deciding how the finished product should be built is also advisable.

C. Establish a Configuration Management Process
Policies, procedures, and clearly assigned organizational responsibilities must be in place to ensure smooth delivery of services. Defining standard business requirements and standard data elements will help ensure uniformity of content and purpose.

D. Establish a Configuration Management Group
This group should take continuing responsibility for the accuracy of the information on the site and is responsible for testing changes and updates before they are implemented. It should represent stakeholders, provide a mix of specialized knowledge (on technical, management and policy topics), be able to work together toward a common goal, and form a strong cohesive unit capable of working cooperatively to identify and solve problems. In addition, it should oversee the selection and work of the web development team.

E. Evaluate and Select the Development Technology
Hardware for content developers, software for content developers, network and/or Internet access for content developers, and other vendor services (scanning, editorial) will need to be explored.

IV. Developing the Web Site

A. Data Model/Prototype
The prototype should make tangible all the ideas that both designers and users try to communicate to one another in words. The prototype will make it possible for both to see and understand the needs, functionality, and limitations of the design and to alter it as needed. It will also help shape the location and breadth of the content and structure of the web site.

B. Create the Structure
The structure should be easy to navigate. It should be necessary, informative, uncluttered, and take the user's point of view. In addition, tools such as buttons, email, and links can help users navigate the site and make it more functional and powerful in delivering the organizations message.

Information on a web page can be presented in several different formats. Each has its own features, advantages, and disadvantages. One of the challenges of designing a web site is matching the presentation format to the objective and audience. Effectively integrating graphics, text, downloadable files and forms to meet the objectives is essential to providing a usable and useful web site. For example, sometimes users are better served by having access to a document that

they can download in the native format and print locally for review rather than having access to the document on-line only. Further, sometimes a picture, diagram, or map is more useful than text.

The goal is to provide for the needs of all the potential users, by adapting web technology to their expectations, and never requiring the reader to simply conform to an interface that creates unnecessary obstacles. In addition, there are other recommendations. First, build clear navigation aids. Clear, consistent icons, graphic identity schemes, and graphic or text-based overview and summary screen can give the user confidence that they can find what they are looking for without wasting time. Second, do not create "dead-end" pages. Every web page should contain at least one link. "Dead-end" pages with no links to any other local page in the site can frustrate users and may also create a lost opportunity to bring users into other pages within the web site.

C. Design the Pages
The design should adhere to commonly accepted industry standards and should not rely on proprietary technologies. It should also take into account the current technical capabilities of the participating organizations. Fast downloads are the most important usability consideration in web design.

Hypertext documents are the hallmark of the web. Hypertext documents are electronic text files that have been tagged with Hypertext Markup Language (HTML). It is through the use of these tags that documents are prepared for presentation and linked with other information resources to form the web. Further, all documents should employ clear titles to capture the reader's attention, and have a consistent "look and feel."

Once the basics of HTML are understood, using a commercial HTML editor such as Microsoft's Front Page, Netscape's Navigator Gold, Adobe's Page Mill, or the AOLPress should be utilized. Some HTML editor's are free, while others need to be purchased, however for advanced web publishing it is often beneficial to buy an HTML editor.

D. Build the System
When building the system there are several things to keep in mind. First, identify yourself. Let the user know who you are and what they can find on the web site. Second, make it easy to communicate, i.e. include electronic mail links for visitors to use. Third, use templates. This allows menus and document pages on the site to have a consistent look and feel. Fourth, use graphics sparingly. Graphics are attractive, but too many graphics or files that are too large slow down the communications process and frustrate users. Fifth, as mentioned previously, avoid dead ends. Use navigation aids so that visitors do not get stuck in dead ends with no way to navigate around, (i.e. return-to-home links).

A more iterative approach of prototyping and phased implementation can also provide increased flexibility, and the feedback needed to reduce risk and increase the probability for success. In addition, it is important to design a scalable information architecture that can easily accommodate change and growth.

E. Test the System
Testing is an extremely important and often overlooked part of the process. Ample time needs to be built into the production schedule to find bugs, make revisions, and retest before launching. The need for testing resources and time are often underestimated, but given the host of new technologies, their growing complexity, and the problem of multiple browsers with diverse capabilities requires additional testing time.

The web site should be tested among project members first, then among a selected audience outside of the project team, and finally by the public. Test both the underlying soundness of the web site (does it work as intended?) as well as the user's response to the interface (is it easily understood and does it create the expected reaction?). Creating a formal testing plan is a useful way to manage the complexity of the testing process. Content creators should test their material to be sure it presents itself as intended. They also need to do proof reading to be sure the material is error free. Some specific things to test for are: Graphic file locations, (i.e., are the right graphics showing up in the right locations?). Links to other resources, (i.e., do they link to the proper place?). Ease of use including context statements, (i.e., is useful introductory information included on menus that link to content pages?). Response times for downloading graphics, (i.e., do they exceed acceptable limits for your intended users.) Usability on a variety of platforms that you have determined are in your target audience range, (i.e., do you need a high bandwidth connection, or will relatively slow modems be sufficient?)

V. Deploying the Web Site

Once the site has been built and tested, it will need to be installed on a computer connected to the Internet for others to access them. This can be done in two ways. Either load the services on agency computers and acquire a telecommunications connection to connect them to the Internet, or contract with an outside vendor to host your services and make them available to the larger Internet community.

A. Establish a Host Server
After the web pages have been built, they must be uploaded to the host server. There are two different file types that can be sent over the Internet: ASCII and binary. HTML source code is an ASCII format. However, pictures and graphics are binary file type. Specifics on uploading to the server will differ depending on the File Transfer Program (FTP) program chosen and if the Internet service provider's software includes a FTP program. The generic steps are:
1. Open your FTP program. This could be a stand-alone FTP program or your provider's software.

2. Select Binary or ASCII (depending on the file being uploaded).
3. Select the file that you want to upload.
4. Select where you want to upload your file.
5. Upload.

You will need to contact the Internet Service Provider (ISP) as to the specifics for uploading and the FTP address. Updating your web page is just as easy. Just upload the updated page with the same filename and it will replace the old one. However, before downloading any FTP software, first check to see if the ISP provides software for you. Two popular FTP programs are Cute FTP and WS FTP.

B. Utilize Operational Testing

Conduct testing of the web site prior to deployment in order to evaluate the operational effectiveness and suitability of the web site with respect to its objective. This may involve the Configuration Management Board, and may be done incrementally as the site is developed.

The web site needs to be checked on the major browsers and computing platforms used by a significant portion of the user community. The site should not crash or produce any unexpected results, i.e. links that do not work. If problems are identified, it needs to be fixed, worked around, or satisfied with an alternate version. In addition, the web site needs to be tested in terms of performance, i.e. does it do what it was set up to do?

C. Prepare for full-scale deployment

Transfer any modified data files to the server.

D. Field the System

Establish a domain name, register with search engines, and establish links from other web sites.

E. Promote the Web Site

Search engine registration is the most important of all methods of increasing traffic to a web site. It involves a lot of preparation in order to increase the relevance of a site to a specific topic in order to get greater visibility in search results. The ranking of a web site in search results is directly related to the feasibility of the site.

Another way to increase traffic to a site is to participate in a free banner exchange service. The basic principal that makes banner exchanges work, is that each member agrees to provide ad/banner space on their web sites for other members. This is a great way to get visibility for a site.

Web rings can also build traffic and gain exposure. A web ring is a group of web sites that all have some specific topic in common.

VI. Maintaining the Web Site

A. Continue the Configuration Management Process

Continue to advise and use the CMB to test new ideas and features.

B. Implement Back-up Procedures

There are several different ways that files can be selected for backup. The proper way depends on how the web site is used, how often files are changed, and the chosen backup method. A combination of the following different techniques may be optimal. First, copying all the files on the web site and saving them off-line can create a full backup. This is the simplest type of backup and yields the most complete information, but it requires the most time and storage space. Second, selective backups are more applicable when some files are changing much more rapidly than others, or when backup space is limited. Third, incremental backups are when only the files that have changed since the last backup are selected. It is similar to a selective backup, but the files are chosen based on whether they have changed recently or not, rather than an arbitrary selection based on directory or file names. It also allows for the time and space-saving advantages of a selective backup while ensuring that all changed files are covered. Commercial software may be able to perform any and/or all of these functions. The physical back-up performance can be done on another machine, (i.e. mirroring the information, as opposed to saving the information to a removal storage media which is easily transported). Additionally, back-up procedures should consider disaster recovery, (i.e. the process of restoring/recreating a system after a "disaster"). Depending on how the backups were performed and what software was used, recovery can be very simple or a great deal of work.

C. Update the Web Site

Every update to the web site or new document page needs to be tested before being added to a site. In addition, you should periodically test the site to be sure that you've included new links that will help your users, and that existing links still work both within the site and between your site and others.

D. Operate a Help Desk

Users of the system will need training and support to make effective use of the resources. User support needs to be continually updated and continuously available.

VII. Lessons Learned

The following lessons were learned during the course of the project:

A. Possibility of outsourcing. With the necessary funds, the project could have been outsourced to a company whose core business it is to design, develop, and implement web sites. This alleviates the problem of executing the task with unskilled personnel and insufficient infrastructure.
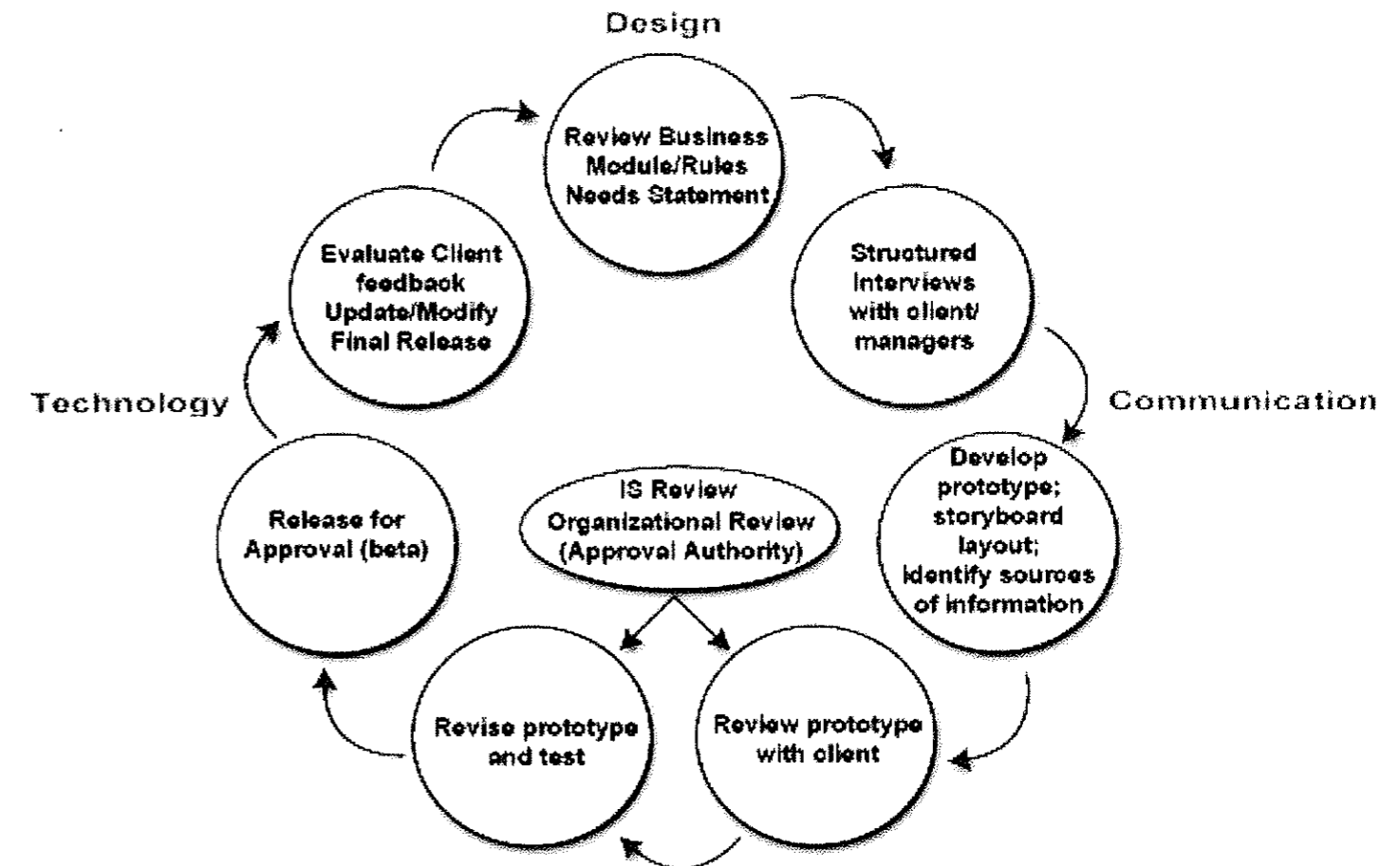
B. Financial constraints. It is imperative to determine if there are sufficient funds for the execution of the project and to compile a budget plan from the outset. Higher authorities should approve this budget plan and be convinced of the long-term benefits of the study.

C. IT Infrastructure. Sufficient IT infrastructure is one of the most important prerequisites for the successful completion of this project. An FTP server, ISDN line and networking between the Webmaster and the project team members are necessities.

D. Testing the site. Meticulous testing of the Web site and examining the final product with project team members, as well as other members within the DoD, prior to the official implementation, ensures that an error free product is launched. Editing of errors afterwards can prove to be a time consuming process, especially if there is not a sufficient IT infrastructure between the Web designer and the Webmaster.

E. Know and understand the company/department. The web site should fit into the structure of the DoD Web site. Proper knowledge of the structure of the DoD, as well as the information already prevalent, ensures that information intended for the Web site is not duplicated and subsequently redundant.

VIII. References

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http://info.med.yale.edu/caim/manual/misc/book.html

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http://www.ed.gov/internal/wwwstds.html

Yale Web Style Guide.
http://info.med.yale.edu/caim/manual/

World Wide Web Consortium.
http://www.w3.org/

Appendix A: Web Site Cycle of Development

There are four items that you will need to build a web page:

1. A computer with a web browser (Microsoft Internet Explorer or Netscape Navigator).
2. A text editor. Both PCs and Macintoshes come with text editors, i.e. Notepad on the PC and Simple Text on the Mac. Word processors can also be used, as long as the file is saved in a text format. For more robust abilities HTML editors like Microsoft FrontPage, Adobe Pagemill or Allaire's HomeSite may be used.
3. A web server to store the pages. This may be through your organization or through an Internet Service Provider (ISP).
4. File Transfer Protocol (FTP) software for uploading the web pages to a web server. Common programs include CuteFTP or WS-FTP for the PC or Fetch for the Mac.

Creating the Web Page:

The web page will contain HTML tags and text. The HTML tags describe the way the page will appear in the web browser. For example, you'll use an HTML tag to make text bold.
All HTML tags begin with the "less than" sign: <
All tags end with the "greater than" sign: >
Between the greater and less than signs are the tag name and any variables the tag uses.
The first tag you need to put into your file is the HTML tag:
    <html>
This tag tells the browser that this file contains HTML-tagged data.
You can use either upper or lower case letters for HTML tags.

Once the html tag has been inserted, the header needs to be created.
The header is the first part of the page. It is where the title of the page is placed. The title will appear in the bar at the top of the web browser:
    <head>
    <title>
    The title of the web page goes here
    </title>
    </head>
The last two tags above end with a slash (/). In HTML, the slash is to end a "container" tag.

The body is the second part of a web page. It contains all the information you see in a the web browser window:

    <body>

The next step is to create the web page headlines:
    <h1>How to Build a Web Page</h1>

The <h> code ranges from <h1> to <h7>, with <h1> being the largest and <h7> the smallest font size.

Adding Text to the Web Page:

Begin with a block of text like this:
```
<p>
This is a sentence.
<p>
```

The <p> tag acts like the "enter" or "return" in a word processing document. In addition, similar to word processor documents, HTML allows you make your text stand out.

Text can be made bold:
```
This example of <b>bold words</b> is not hard.
```

Similarly, text can be made italic:
```
Using italics is also <i>very easy</i> to insert in a sentence.
```

HTML also allows links to be added into your web page. Links are created with a special tag so that when a reader clicks on a link, they jump to another web page:

```
Click <a href="http://www.denix.osd.mil">HERE</a> to go to the DENIX Home Page.
```

The word "HERE" is surrounded by the link tags. The word "HERE" appears underlined or highlighted in the web browser showing that it is a link. The letter "a" in the tag stands for anchor, as in "anchor this link here." The phrase "href" stands for "hypertext reference." The equal sign "=" means that the following web address is the location the reader will jump to. The web address inside the quotation marks where the reader will go to. Finally, the tag ends the link.

Inserting email links are similar. The only difference is that the code tells the browser to create an email message instead of jumping to another web page:
```
Click <a href="mailto:youremail@address.mil">HERE</a> to send me an email.
```

The word "HERE" is surrounded by the link tags. The word "HERE" appears underlined or highlighted in the web browser showing that it is a link; actually its a send email command. The letter "a" in the tag stands for anchor, as in "anchor this link here." The phrase "href" stands for "hypertext reference." The equal sign "=" means that the following email address is the reference to use. The phrase mailto: tells the browser to open an email screen. The browser will then use the email address following the mailto command. Finally, the tag ends the link.

Once the body portion of the web page is built, the remaining open tags will need to be closed.

First, end the body:
```
</body>
```
Then, end the html:
```
</html>
```

Finally, save the file. Most text editor or word processor applications have a top "File" window tab that you can click on and then select the "save as" or "save as HTML" option. However the save as type needs to have a .htm or .html extension to become an HTML document. You can name the file anything you want as long as it ends with the extension .htm or .html. The .htm or.html extension tells the browser that this is a web page and should be viewed as one.

Here is how the sample page looks:
```
<html>
<head>
<title>
The title of the web page goes here
</title>
</head>
<body>
<h1>How to Build a Web Page</h1>
<p>
This is a sentence.
<p>
This example of <b>bold words</b> is not hard. Using italics is also <i>very easy</i> to
insert in a sentence.
<p>
Click <a href="http://www.denix.osd.mil">HERE</a> to go to the DENIX Home Page.
Click <a href="mailto:youremail@address.mil">HERE</a> to send me an email.
</body>
</html>
```

Here is how the sample page looks in a web browser:

How to Build a Web Page

This is a sentence.

This example of **bold words** is not hard. Using italics is also *very easy* to insert in a sentence. Click HERE to go to the DENIX Home Page. Click HERE to send me an email.