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Internet Applications Development Issues and Strategic Considerations

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Abstract

This paper examines the development issues and strategic considerations involved in Internet Applications Development. The prevalent development environments are discussed highlighting their advantages and disadvantages. Issues regarding the development of Internet applications are viewed under the headings of human resource, organizational, technological, investment and Legal Issues. Lastly the paper gives an overview of the strategic implications for an organization considering the development of Internet Applications. These include security, quality and the look & feel of the application. This paper is not intended as a definitive resource on the area of Internet Applications Development, its aim is to highlight the areas of interest and concern for organizations considering a move into the area of Internet Applications Development.

Keywords: development issues, strategic considerations, Internet Applications Development, human resource issues, organizational issues, technological issues, investment issues, legal issues, security, quality, the look & feel.

1. Introduction

The aim of this paper is to highlight the issues that an organization needs to consider before entering the realm of Internet Applications Development. The research for this paper was conducted by referencing text books as well as journal articles and web resources. It is the authors' opinion that too many organizations enter into development of Internet applications without fully considering what is involved. This has lead to a plethora of applications, which are lacking in a number of key areas such as security, quality and look & feel. According to the Gartner Group, 1999, through 2002, there is a 0.8 probability that e-commerce software vendors will fail to prosper by reducing web security risks unless they also address users feelings of insecurity about web commerce.

The paper is divided into four main sections. Second 2 outlines the development tools available to organizations examining the benefits and drawbacks of these tools. Section 3 examines the issues facing an organization when choosing to develop an Internet based application, concentrating on the issues faced by the people, the organization, the technological issues, the cost and the legal issues. Section 4 then explores the strategic

considerations of importance for an organization involved in the development of Internet applications.

Development Tools

There are a number of development tools available for applications development on the Internet. It is beyond the scope of this paper to examine them all, therefore the most prominent tools, on the market at present, are considered.

Java

Java was introduced by Sun Microsystems in 1995 and instantly created a new sense of the interactive possibilities on the Web. Both of the major Web browsers include a Java virtual machine. Almost all major operating system developers (IBM, Microsoft, and others) have added Java compilers as part of their product offerings. Java is a programming language expressly designed for use in the distributed environment of the Internet. (Dietel & Dietel, 1999). It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces an Object Oriented model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a Web page. Applets make it possible for a Web page user to interact with the page because it is a tiny java program, that is dynamically downloaded across the network, and it can contain images, sound files and video clips. (Dietel & Dietel, 1999).The following is a diagram is a typical architecture for an existing PC environment using Java:
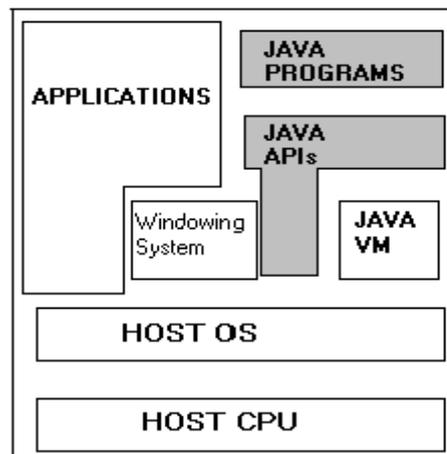
FIGURE 1: (Revett, M.C.,*et al.*, BT Technology Journal, 1997)

This diagram represents the typical systems architecture of a PC. The areas in white are the native elements of the system. The greyed sections are the java elements. In order to successfully implement Java on a host machine the Java VM must be part of the native element on the machine. The bottom two layers of this diagram are the host Central Processing Unit and the Operating System. To the left is the windowing system on top of which sits the native application programs. To the right sits the Java VM on top of which sits the Java API's and the Java Programs. Java is a widely used programming language for Internet Development. However there are other languages that are used to develop Internet Applications. These languages are known as scripting languages and it is important to understand how these work.

Scripting

In computer programming, a script is a program or sequence of instructions that is interpreted or executed by another program rather than by the computer processor. Scripting is an interpreted language, in other words it does not need to be compiled in order for the computer to understand it. There are a large number of scripting languages available. The paper will briefly describe four of the more commonly used scripting languages, Dynamic HTML (DHTML), Extensible Markup Language (XML), Extendable HTML (XHTML) and Javascript.

DHTML

"DHTML is the interaction of existing web technologies, primarily HTML, Style Sheets and scripting, to create web pages that can interact with the reader without depending on the Web server." (Darnell, et al., 1998) Dynamic HTML is a collective term for a combination of the new Hypertext Markup Language (HTML) tags and options, and programming that will allow users create Web pages that are more animated and more responsive to user interaction than previous versions of HTML. Much of dynamic HTML is specified in HTML 4.0. Simple examples of dynamic HTML pages would include, having the color of a text heading change when a user passes a mouse over it or allowing a user to "drag and drop" an image to another place on a Web page. In essence DHTML is about creating mini applications that run on the users computer instead of the traditional static Web Page that depends on the web server for it's updates. DHTML is a quicker and easier way to implement dynamic Web Pages (Darnell, *et al.*, 1998).

XML

"XML is a set of rules for forming semantic tags that break a document into parts and identify the different parts of the document." (Harold, 1998). XML is a meta markup language, in which users can make up the tags as they are required. These tags must be organized according to some general principals, but they are quite flexible in their meaning. Previously in HTML if the tags needed did not exist there was nothing to do but wait for the next version in the hope it would contain what was needed. XML (Extensible Markup Language) is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere. For example, computer makers might agree on a standard or common way to describe the information about a computer product (processor speed, memory size) and then describe the product information format with XML. Such a standard way of describing data would enable a user to send an intelligent agent (a program) to each computer maker's Web site, gather data, and then make a valid comparison. XML can be used by any individual or group of individuals or companies that wants to share information in a consistent way (Harold, 1998). The benefits of XML include :

- XML has the ability to work with HTML for data display and presentation (Harold, 1998).

- XML is a smaller language then Standard General Markup Language (SGML), the designers of XML tried to cut out everything in SGML that was not needed for web delivery, the result being a much simpler and slimmed down language (Harold, 1998).

- XML includes a specification for a hyperlinking scheme which is described as a separate language called Extensible Linking Language (ELL). It supports the basic hyperlinking in HTML but takes it further to extending linking (Harold, 1998).

- XML includes a specification for a style language called extensible stylesheet language (XSL) (Harold, 1998).

XHTML

As the World Wide Web Consortium describes it, XHTML (Extensible Hypertext Markup Language) is:"a reformulation of HTML 4.0 as an application of the Extensible Markup Language". XML is a structured set of rules for how developers might define any kind of data to be shared on the Web. It's called an "extensible" markup language because anyone can invent a particular set of markup for a particular purpose and provided everyone uses it (the writer and an application program at the receiver's end), it can be adapted and used for many purposes - including, as it happens, describing the appearance of a Web page. That being the

case, it seemed desirable to reframe HTML in terms of XML. The result is XHTML, a particular application of XML for "expressing" Web pages (www.whatis.com).

XHTML offers some advantages to the user, especially over the previous version HTML 4.0. According to the W3C again, the advantages are "*extensibility and portability.*" Extensibility means that as new ideas for Web communication and presentation emerge, they can be implemented without having to wait for the nextmajor version of HTML and browser support. New tags or attributes can be defined to express the new possibilities and, assuming some program at the receiving end can understand and act on them, new things may happen on the Web page that never happened before. Specific sets of extensions for XHTML are planned for mathematical expressions, vector graphics, and multimedia applications (www.whatis.com).

If extensibility is likely to lead to more complicated pages and larger programs, the portability advantage means that Web pages can now be made simpler than they were before so that small devices can handle them. This is important for mobile devices and possibly household devices that contain microprocessors with embedded programming and smaller memories. XHTML defines several levels of possible markup complexity and each document states its level of complexity at the beginning. Programs in micro devices might expect XHTML-coded files that state the simplest level of complexity so that they could be handled by a small program and memory.

Javascript

In a Press release from Netscape Communications and Sun Microsystems on the launch of Javascript, they are quoted as describing Javascript as follows: "*Javascript is an easy to use object scripting language designed for creating live online applications that link together objects and resources on both clients and servers. Javascript is designed for use by HTML page authors and enterprise applications developers to dynamically script the behavior of objects running on either client or server.*" (Danesh et al., 1996). JavaScript is a lightweight interpreted programming language with Object Oriented capabilities. The general-purpose core of the language has been embedded in Netscape Navigator, Internet Explorer and other web browsers embellished for web programming. The client side version of Javascript allows executable content to be included in Web pages, this means that web pages can include programs that interact with the user, control the browser and dynamically create HTML content (O'Reilly, 1998).

Javascript is touted as a scripting language, the implication being that scripting languages are simpler then programming languages. At first glance Javascript appears to be relatively straightforward, it does have a number of features designed to make it more forgiving and easier to use for new programmers.

However Javascript is a full-featured programming language as complex as any. Programmers can use Javascript for non-trivial tasks and need a solid understanding of the language to do this. There are two main types of Javascript, Client-Side Javascript and Server-side Javascript

Client-side Javascript – this is the more common variant of Javascript. It is when the Javascript interpreter is embedded in a web browser.

Server-side Javascript – This provides an alternative to CGI scripts. It goes beyond the CGI model because server-side Javascript is embedded directly within HTML pages. This allows executable server side scripts to be directly intermixed with web content (O'Reilly, 1998).

Many organizations have given into the fact that they cannot keep up with the pace of change and have begun to purchase Internet solutions from service providers, independent software vendors and value added resellers as part of IT outsourcing. This can lead to successful projects, but can also lead to increased dependency on the external provider and the tools selected (O'Reilly, 1998). Having looked at what the tools are offering to suppliers, it is pressing to consider the issues regarding Internet Applications Development that face the supplier.

Comparison Table:

	DHTML	XML	XHTML	JAVASCRIPT
Dynamic Content	X	X	X	X
Style-sheet Language		X		
Extensible		X	X	X
Portable		X	X	X
OO Capabilites				X

TABLE 1: Róisín Faherty, 2001.

Internet Applications Development Issues

There are a number of issues involved in choosing a development tool for Internet applications development. The main areas of strategic interest are:

- Human Resource Issues

- Organizational Issues

- Technology Issues

- Investment Issues

- Legal Issues

The Human Resource Issues

According to IOS/IEE 12207 1998 there are two groups of people involved in this section. The supplier i.e. those delivering the application and the acquirer i.e. those getting the application. Both of these groups need to be considered.

The supplier - The key aspects for the supplier's consideration include:

- Deciding whether to develop the application from scratch or to perform expensive custom back-end integration to legacy systems.

- Deciding on whether to face proprietary and vendor focused solutions which may lead to costly external business process integration difficulties.

- Trying to support open standards for example, Java, CORBA and IIOP in an environment where the Gartner group predict little or no support for these interoperable, open applications until after 2003.

- Dealing with problems and issues involved in integrating web applications.

- A realization that few suppliers have provided complete end-to-end e-commerce applications (Gartner Group, 1999).

The acquirer – The acquirer of the product needs to be considered by the organization the following key issues need to be addressed:

- Will the acquirer require retraining in the new application?

- Technology would need to be addressed, how would the supplier ensure that all of its acquirers would have sufficient software and hardware to enable the new application.

- Versioning Problems: the ability to transmit small applications and applets, over the network, together with the HTML pages of the Internet, allows the code to be run where it is needed and then be discarded after use.

The Organization

"IT has become a strategic resource as it brings about or facilitates major changes in industry sectors, in competitive behavior and in organizations' own strategy structure and functioning" (Earl, 1989).

In order for organizations to get applications implemented as quickly and effectively as they would like, there has been a shift in the way the organizations do their work. The organisational areas that need to change are:

Work units change: Groups of people will work together in order to perform an entire process. In terms of developing applications for the Internet teams comprise of groups of developers, graphic artists and technical writers.

Jobs change: This could be as simple as moving from writing code in C++ to writing code in Java or a scripting language.

People's Roles change: The structure of the employees' roles may change the organization may have to become "flatter" in order to accommodate the speed needed to produce the application. Managers need to have a more hands on role in the development process in order to outline the needs of the acquirer.

Job Preparation Changes: The employees will have to understand why the organization is changing in order to fully facilitate the change. People tend to find changes threatening, if proper communication is set up the change should be smoother and faster. The faster the change the faster the organisation can get stuck into the new business at hand i.e. developing Internet Applications.

Executives need to change: Flatter organizations move the senior management closer to the customers and to the people performing the companies value added work (Hammer, 1993).

Technology

In order to run and develop applications for the Internet there are some basic requirements:

Hardware – The acquirer will need a PC with at least 32MB of RAM and at least 8 MB hard drive. A sound card and speakers would also be required depending on the application. The PC processor should be a minimum of a Pentium 486, a modem will be needed and the cable

that connects the modem needs to be hardware handshake compatible, so that the modem can enunciate clearly when it talks to the Internet. As for the supplier they would need higher specification machine because they will also have to run the programming environments and possible hold large amounts of code. Here a PC with at least 64MB of RAM would be required and a minimum of a Pentium chip processor, especially where speed is essential in delivery of the product.

Software – Java:

- Java allows platform independence, this means that once the supplier provides an implementation of the Java VM and APIs for their host architecture the Java bytecode will run without modification on any platform (BT Technology Journal, 1997).
- Java is dynamic, due to the speed of adoption and the association with the Internet, the progression of Java has been very fast. There are new API's and tools being announced on a regular basis, and the power and flexibility of the Java capabilities are increasing rapidly (BT Technology Journal, 1997).
- Java provides a full and rich set of APIs. It provides all the basic feature sets required for a wide range of applications and has the ability to use more extensive systems on a dynamic basis (BT Technology Journal, 1997).
- Java allows users to incorporate new elements into a web page. However Java is not suited to working with the HTML contents of a web page itself.

Software – Scripting:

- Both Microsoft and Netscape browsers support JavaScript, but sometimes in slightly different ways.
- The writer of the interpreted program need not be concerned by low-level storage management considerations. On the other hand, an interpreted program cannot be as efficient as a *compiled* program, which has been processed by a language compiler. A language compiler converts source statements into something close to the strings of 0's and 1's that a processor ultimately is given to work on. Because this work is already done before a compiled program is run, it runs much more quickly.
- Interpreted programs are ideal for small tasks and for "gluing together" a succession of compiled programs that are run from the interpreted program (www.whatis.com).
- Interpreted Languages can allow the developer to generate scripts with errors and deploy them on a website, so it is vitally important that any interpreted language program be fully tested before it is deployed (Danesh, 1996).

- With most interpreted languages users need to revalidate any data submitted with a form on the server side in order to protect against the transmission of corrupt data (Danesh, 1996).

- Scripting allows users to work with the HTML contents of a web page directly, however if it was necessary to build an Internet based graphical pace invaders game then scripting would be an inappropriate tool for this job. (Danesh, 1996)

Another software issue other than the development tools involves the software required by the acquirer in order for the application to run. The acquirer would need a browser that works with the PC. The acquirer would also need a browser to load the application in a reasonable amount of time and with a view of all the components i.e. if the application had dynamic content then the required browser would have to be able to interpret this and display it to the user. Internet TCP/IP software would also be needed. Helper applications may also be required along with some sort of media player.

Investment

A major task to be performed during project planning is to estimate the cost of the system to be delivered. This paper will look at some of the cost issues that need to be considered by management before deciding which tools are appropriate to use. According to Ince *et al*.,1993, in general the cost of the project can be divided into:

- Staff costs, this includes the cost of development staff as well as any support staff that may be required.

- External sub-contractor costs, for example, the cost associated with subcontracting hardware development or security assurance to an outside company.

- Physical facilities cost this can include office space and furniture but in this case in would include purchase of development tool licences and hardware to run project.

- Consumable costs such as paper and disks that will be needed when developing the project.

- Traveling cost if members of staff need to travel in order to be trained for the project. (Ince *et al*., 1993)

- Acquirer Costs the acquirer will have considerable costs in setting up on the Internet if this is not already in place. There are also cost for the acquirer in relation to maintenance of any new technologies.

Legal Issues

Legislators have been slow to institute laws regarding the rapidly growing electronic commerce market. The government would prefer to allow the industry to regulate itself, so as not to slow down progress. For the most part existing laws on commerce can be applied to Internet commerce also. However when developing an Internet Applications there are some important legal issues that need to be highlighted. (Computer Weekly, 1997).

Jurisdiction on the WWW – This issue relates to where a person will be held responsible for any breach of the Law on the Web and also what law is to be applied to the person? (www.componentsonline.com/ecommerce.htm)

Copyright – A party is guilty of copyright infringement if they violate on of the five exclusive rights given to copyright owners under the Copyright Act. There are main areas that need to be considered here: obtaining images and text and developing code. Obtaining images the simple rule here is do not steal someone else's images, if an image is needed users will have to create it themselves, starting from scratch. Text issues are the same as those for images. Truly original text is fine to use but anything else may be subject to copyright laws. As with text and images it is usually a violation of copyright law to appropriate scripting or programming from someone else without permission. If a party makes it's scripts and programs available to the public then this can be used as long as any requirements set down by the developer are adhered to. (www.bitlaw.com/internet/webpage.html)

Domain Name – The selection and protection of a domain name may be the most important detail in the creation of a web site or application. Domain name function as the address for the site, and disputes over domain names have become more frequent as the Internet has grown. In order to protect a Domain name and to avoid loosing the domain name under the InterNIC domain name dispute policy, a domain name owner should obtain a trademark registration on their domain name. In order to get a domain name the name must first be available and then a registration can be filed with InterNIC.
(www.bitlaw.com/internet/webpage.html)

Trademark – A trademark is a word, image, slogan or other device designed to identify the goods or services of a particular party. Trademark infringement occurs when one party utilizes the mark of another in such a way as to create the likelihood of confusion, mistake and/or deception with the consuming public. When developing web sites it is important to

ensure that any trademark that does appear on the site cannot be misinterpreted or confused by the consumers in such a case there may be trademark infringement. (www.bitlaw.com/internet/webpage.html)

Defamation – The term defamation refers to a false statement made about someone or some organization that is damaging to their reputation. For a statement to be defamatory, the statement must be published to a third party, and the person publishing the statement must have known or should have know that the statement was false. While the Internet provides a new context in which a defaming statement can be made and published, there is little new law relating to Internet defamation other then the Liability for service providers. Nonetheless it is important to ensure that web development does not infringe on this law. (www.bitlaw.com/internet/webpage.html)

Linking and Framing – Links between pages are what makes the Internet what it is. Without widespread linking, the web as it's now known wouldn't exist. However there are questions about the legality of such connections. A person could pass off someone else's work as their own. Defamation can occur by linking to another person's page, for example, "Some http://www.badman.com idiot killed my cat, stole my invention and threatened to destroy the Internet." The person is not identified but the link itself provides the context that turns the statement into defamation. A link could lead to Trademark infringement if a consumer was lead to believe that the original page was in some way connected to the linked Trademark. (www.bitlaw.com/internet/webpage.html)

The development issues are important and need to be thoroughly assessed before embarking on Internet Applications Development. However there are other strategic considerations that are of concern to the organization. These are discussed next.

Strategic Considerations

The areas of strategic consideration in this paper are the areas of security on the Internet, the quality of the Internet application and finally the Look & feel of the application for the users.

Security

When developing applications for the web the security is of primary importance. "*The advent of the Internet has put corporate networks on a permanent state of alert against hacking attacks, e-mail viruses and other security infringements"(Irish Computer, May 2000).*

There is such pressure for companies to get applications on line that smaller companies are not giving the same amount of thought and resources to protecting their systems (Irish Computer, September 1999). In a report from the Gartner group, the following statistics on the perception of security are eye opening:

- 70 percent cited security as the main reason they are reluctant to purchase over the Internet.

- 45 percent were very concerned about the level of security on the Internet.

Rits (2000) information security recently revealed the finding of its information security survey 2000, which details the Irish companies that have prepared themselves for the rapid emergence of Internet applications in terms of technology security. The survey found the following:

- Lack of Data Protection Act compliance reviews

- No confidence in internal IT and IT security expertise to secure the organizations IT assets.

- A high percentage of companies with no authentication procedures for remote access.

- Over 50 percent had identified a security breach from external sources

- Poor third party controls (Irish computer, May 2000).

The most commonly used attacks by a hacker include:

- Contacting the helpdesk posing as an authorized user to extract passwords.

- IP address Spoofing, this is where the hacker sends data packets with a spoofed IP address from a remote site and bypass a filtering router if the firewall is not configured properly.

- A syn attack, where a server is flooded with a large number of open requests.

- War-dialing, where all numbers within a PSTN number range are dialed in order to establish a connection with a modem, which may be connected to the internal network.

Within the organization the security specialist must ensure that all avenues of attack are identified and safe guarded (Gartner Group, 1999). Most network level attacks can be clocked using a firewall, however most firewalls do not provide sufficient protection against "inband" attacks (Gartner Group, 1999). By manipulating parameters placed in forms, or the parameters passed to server CGI scripts, the security of the web server can be compromised (Gartner Group, 1999).

CGI scripts were designed so that almost anyone could initiate their execution with any input parameters and still ensure their safe operation. The problem with this lies with the unexpected input. Often, the web server or CGI scripts run with privileges beyond what is required to execute the services the user needs, and hackers could exploit these. It is unfortunate that even though it may be possible to avoid design and configuration errors the track record shows that secure design and configuration rarely occurs (Gartner Group, 1999).

There are companies who offer vulnerability assessments. Vulnerability assessments involve finding a weakness in a network and network hardening. A security consultant will go on site to patch up any soft spots, but one of the most frequently used test is known as penetration testing. This type of testing is carried out by a team of workers who try to compromise the network by any means possible (Irish Computer, April 2000). The team will use procedures and techniques that real hackers do, automated tools, live penetration attempts as well as a variety of conventional and unconventional access methods. The purpose of this testing is to find the problems and solve them before the application goes live on the Internet (Irish Computer, April 2000).

Security is a very important issue for Internet based applications, it needs to be fully considered and implemented in order to guaranteed the acquirer a safe environment.

Having discussed the issues around security, the next issues lie with the Quality of the application.

Quality

Quality is an issue in Internet Applications because of the speed required to build the application, is due consideration given to the quality of what is being produced? *"Software Quality concerns are quite broad, including, for example, correctness, robustness, readability and evolvability."(ACM Computer Surveys, December 1996).* By 2001 Application Development organizations that do not include specialists in art, public communications, emotional content, and sociology on their teams will produce applications whose poor quality will fail their e-business strategies in excess of 85 percent (0.9) (Gartner Group, 1999). Software quality is difficult to define, since the characteristics of quality contain a large subjective element, and often depend on the application being considered (Ince *et al.*, 1993). Certain characteristics may be determined by the user for example the ease-of-use and others may be determined by the developer for example maintainability. However high quality software can be characterized by the following:

Efficiency – this refers to the behavior of the system in relation to the resources of the computer system on which it executes. Most often the efficiency of a system is described in terms of its execution speed and storage use (Ince *et al.*, 1993). The efficiency of the Internet based product must at least match that of its predecessor.

Reliability – This refers to the number of errors in the piece of software, and hence is simply a measure of the number of times a software system fails to perform correctly (Ince *et al.*, 1993). This is important if an Internet application is being developed using one of the scripting languages detailed in section 3. As mentioned there it is possible to develop and deploy a scripted application with bugs and errors still in it. This is because there is no complier for these languages to catch these errors.

Testability - This refers to the ease with which a software system can be tested. For example if a system contains program units with large amounts of logic then it will be difficult to test and if it is difficult to test this may indicate bad design or implementation (Ince *et al.*, 1993). In relation to an Internet application testing would have to also include network tests to ensure the reliablility and speed of the network for users.

Maintainability – This refers to the ease with which a system can be changed once it is in operation (Ince *et al.*, 1993).

Usability – This refers to the ease with which the system can be used (Ince *et al.*, 1993). The users will expect to be able to use the product as easily as it's predecessor, if there are major changes to it's look and feel users may become frustrated.

Look & Feel

"The application front end must make a striking point why the application deserves the consumers' attention. If it fails to do so, the consumer might not try to explore the value of the offer hidden behind the interface" (Gartner Group, 1999). An application must have a unique face, it is important that organizations address new disciplines in application development for aesthetic appeal, ergonomic rationale, clearly communicated business messages and emotional content (Gartner Group, 2000).

Throughout their history application development organizations have employed professionals whose primary goal was to program business logic and data access. As a result of this many

web applications are poorly designed, difficult to navigate and visually unappealing (Gartner Group, 2000).

The Internet offers such a wide variety of choices that customers who feel unsatisfied with an application can simply look elsewhere. This threatens the Application development organizations with possible permanent loss of this customer (Gartner Group, 2000).

The following are important when designing a Web Application:

- **Personalization** – Applications must address customers according to their social status, profession, education, culture, individual needs and tastes. Applications should simulate a web counterpart for the consumer and establish a one –to- one dialog with them. There is a tool available to assist in this process know as Broadvision (see glossary).

- **Client Care** –Customer's should not be abandoned in any situation, they should be shepparded through to a satisfactory end.

- **Applications behavior** should accommodate all possible client site platforms – all brands and versions of browsers, computer types, operating systems and access devices. Applications should recognize the platform and appropriately adapt their interface.

There are a number of web authoring tools available now too, the most popular of which are by Adobe and Dreamweaver by Macromedia. Dreamweaver the Macromedia tools have excellent template and library facilities. This allows entire sites to be updated rapidly, if for example an address, logo or image has to be changed in every page of a site. Dreamweavers approach to page design is probably the best of all wysiwyg editors (Irish Computer, March 2000). The big drawback of this editor is the steep learning curve associated with it. On the other hand there is GoLive Adobes authoring tool. GoLive incorporates the Adobe approach to making programs easier to use. There are at least two ways of doing anything in GoLive but the program is biased to Drag and Drop.

With these and so many other web authoring tools on the market, while it would mean investment by organizations, there is no reason for web applications to have poorly presented front ends (Irish Computer, March 2000). In summary individuality, personalization and client care are the new criteria that together with the traditional application development criteria determine the success of Internet applications (Gartner Group, 2000).

Conclusion

This paper has looked at the history of applications development and the Internet. It has examined the Internet applications development issues facing an organization and finally it discussed the strategic considerations involved in building an Internet application. There are two main development tool categories that were discussed. Java and Scripting Tools. The scripting tools included

- DHTML
- XML
- XHTML
- Javascript

Java is best for large applications development for deployment over distributed environment like the Web. The Scripting tools are best for smaller applications. The scripting tools had a number of different features summarized in Table 2.

Comparison Table :

	DHTML	XML	XHTML	JAVASCRIPT
Dynamic Content	X	X	X	X
Style-sheet Language		X		
Extensible		X	X	X
Portable		X	X	X
OO Capabilites				X

TABLE 2: Róisín Faherty, 2000.

There are five main categories that organizations need to consider when deciding on Internet Development:

- People Issues

- Organizational Issues

- Technological Issues

- Cost Issues

- Legal Issues.

If an organization adequately addresses these issues before embarking on an Internet Development project many of the major problems that arise during these types of projects

will be already addressed or be planned for. However the organization must also consider some key strategic considerations:

- Security

- Quality

- Look and Feel

These considerations relate to the consumer, if the organization does not meet the needs of the consumer in these areas then the project is likely to fail regardless of how well it is implemented.

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