

Website Design and Usability

Introduction

In this seminar we are going to look at the design of a multimedia product. We can attack this topic from a variety of ways; as Project Management, as Project Design, as a technological exercise or as artistic interpretation. I shall try to incorporate all of these into this lecture without going into the fine detail in each one. You have a Project Management module so I shall only discuss the appropriate techniques for a multimedia endeavour. Several aspects of design have been mentioned as we progressed through the module and these will only receive a passing reference. It is my intention in this seminar to bring together the various strands of your studies and develop the concepts of appropriateness, interpretation (Dornan 2004) and ethics as applied to Multimedia production. Let us begin with a general overview of the processes involved and then we can move onto some more specific detail.

Process Overview

The building of the project process can be summarised in four steps; decide, design, develop and evaluate. The decision phase is where you determine the project goals and objectives. It is the stage in a development team where the brainstorming and research are conducted. The design stage sees the physical work of the project begin. Here we put together the flowcharts to help us visualise the content navigation. The screen design needs to be agreed and the storyboards created. Once the initial phases are settled we can develop the materials; animations, graphics, video and audio. We must also author the content and any software. Each of these steps has been accompanied by their own evaluation processes but the final stage is evaluation of the project as a whole. That is as brief an overview as I can manage but what is really happening?

It is easy for us in the grand isolation of the seminar room to forget that most commercial multimedia is the result of a team effort. Every team will have a project manager either designated from the group (your turn this week) or a person who specialises in putting the pieces together and on – time. Currently the multimedia world generally consists of small teams and there is a sense of

collective responsibility not found in larger organisations. Here the project manager is very much a 'hands on' person and not just the organiser. Most multimedia projects have a set purpose (the commonest is to teach), therefore our team requires a subject expert. Often this person will double as the instructional designer if the project is for educational purposes. Every project will require someone to take responsibility for Quality Control. In larger organisations a separate department might be used. In games companies a group of testers will be responsible for the quality. In educational multimedia, testing and quality control are achieved by giving free copies to educationalists in return for feedback. All non-trivial projects will require a programmer (perhaps several) to implement areas not covered by applications. Then we have the content providers; graphic artists, video producers, and music technicians. In this team we hope for a special ingredient to be present, talent. Without talent we are not going to get those aspects of look and feel that sells the product. This is the point where the good project manager knows their own limitations and that of their staff. A quality multimedia project will not be cheap. We have discussed the team and now we consider what needs to be done.

A lot of preparatory work is required before we can start development. What precisely is it we think is necessary and what exactly do the audience expect? Individuals producing multimedia often forget these two vital questions. Like any software engineering project we need to undertake some sort of needs analysis. Based on this information we can specify very broadly the content and objectives for our multimedia product. These are very varied; is it to entertain, or to educate or to inform? Each will require different emphasis and different approaches to the design. You would not expect a quiz on a music CD (you may, of course, include one) but you would expect some form of assessment on an educational offering. The next step is the provision of the tools for the job. Which authoring tools do you need? This might depend on the preferences and skills of the authors but it could be mandated by the materials. You cannot offer 3D animation based on a paint package. Alongside our choice of tools are the platform delivery choices. Stand alone CD or DVD? Perhaps delivery across the Internet? Each choice will affect the materials and content. Do not let anyone suggest to you that the same content can be offered across multiple platforms. We have in previous seminars seen the technology limitations to such an idea. Having made these decisions, we can turn to the planning stage.

When planning the project it helps to keep a clear picture of what precisely your intentions are. If you cannot write them down explicitly then you do not have a project. Write down the content outline so that you can control the scope of the project. From these you can decide on the look and feel of the production. Is it for a younger market? Does the material need to be linear or can it be random access? It is at this stage that you will need to decide how your subject is to be presented. By that I mean what theme or treatment will be given to the material? Another consideration is the amount and location of the interactivity you will

include. Without knowing the answers you will not be able to schedule the project. When these issues are determined you can turn to some practical work

Almost certainly your first practical task will be to produce a flowchart of the way the content is presented. (We will return to this later). When you have done that, a hypermedia storyboard can be created. I use the word hypermedia to remind you that our product is typically for the internet and so we need a special kind of storyboard that reflects the interactivity available. Use a piece of paper for each screen. Annotate each screen with a precise statement about each button or control. Make explicit where the button links to and what action is required. Determine which colours are needed and when; which fonts are needed and what are the sizes and shapes of screen objects. For each screen you will require a script and a consistent layout. The chances are that you will use an iterative approach to the project. Most small teams tend to be fully involved at all stages so that consensus is often a key to success. Therefore you will produce prototypes as you go. This can be very reassuring for the customer who can feel more involved with the development. If you are sensible you will get the customer to sign off as much as possible during these iterations. Multimedia customers are notorious for changing their minds having seen something new they like elsewhere and you cannot afford constant change, (unless of course they are willing to pay). When the final design iteration has been completed, and the customer has signed off the design, you can start on the content.

Content depends on the depth of the customer's pocket as well as on the decision as to what it is sensible to include. You will need to brief the specialists in graphics, audio and video as to what you need. This is where detailed planning pays off. Being unsure of which graphic you will use is not too much of a problem but being unsure of the quality and content of a video will disastrously affect the budget. Not only will you need to re-shoot but actors and film crews will have to be re-hired. They will only be available at certain times and there is no guarantee that the same person will be available for an extra week. This also applies to specialist video equipment. When you have all your materials, you can turn to the process of integration and testing.

Even when you have completed all of the above, there are still the little matters of the documentation, copyright clearance and sales and marketing of your product. We will change approach now and look at some of the HCI issues.

HCI Issues

Much of the technology based research into multimedia design is based on work in Human Computer Interaction (HCI). One particular set of guidelines were developed by Ben Shneiderman as Shneiderman's 'Eight golden rules of Interface Design' (Shneiderman 1998). These are general HCI rules but are easily adapted for Interactive Multimedia. The following eight points are his but the commentary for each is mine.

1. Strive for consistency
It is important that if you have the same control function in different pages then they should be located in the same place and operate identically. This is the principal all windows style systems operate on.
2. Enable frequent users to use short cuts
This is not so well represented on the web (but still consider F5 for Refresh and F11 for Full Screen in browsers) but refers to the availability of shortcuts such as the auto completion function on web browsers when selecting sites in the address bar.
3. Offer informative feedback
Every action should provide feedback for example the change of colour when a URL is selected on a web page.
4. Design dialog to yield closure
Show the user that after a sequence of actions is carried out they have achieved their objective. This is still not well executed in the web; due to its open-ended nature, it is hard to determine when to stop, yet elements of it are present in invocation of Plug-Ins such as Microsoft Media Player.
5. Offer simple error handling
On the web we select from menus avoiding spelling errors in selection or we can auto correct text.
6. Permit easy reversal of actions
Allow the user to go back and reselect an item.
7. Support internal locus of control
Help the user to remain in control. That is, let them be the choosers of the path wherever possible
8. Reduce short term memory load.
The web user is notorious for their short attention span and over lengthy access procedures should be avoided. A consequence of this overload is the easy manner in which you can forget that important item from just three pages before when browsing.

I am sure you all recognise the generality of the above points and we need to incorporate them as we build our project.

There are many guidelines available for designing web sites. Quite often they are not based on research or they do not address cross- cultural issues. (Boling et. al. 1997) yet they have core principles in common. The following paragraphs address the common principles considered to be good practice. A word of caution: Do not be a slave to rules; guidelines are guidelines.

Firstly some general concepts which could apply to any design: Simplicity, consistency. Clarity, balance and harmony (Misanchuk et.al. 2000).

You may feel that your first objective with a multimedia site is to gain attention but you will better retain that attention by maintaining simplicity. A first suggestion is that you use consistent fonts and keep them to a minimum. This also applies to colours. If you doubt this, look at any cartoon and count the colours used. You may be surprised by how few are needed. You should minimise the amount of text and graphics needed to explain or demonstrate your point. Bad choices in graphics can detract from, rather than add to, understanding.

Consistency means keeping the viewer's learning curve small. Once a viewer learns that a home button is located bottom right they do not appreciate trying to find it again on the next page. More academically, we would consider this to be an unnecessary increase in cognitive load. (Norman 1988). This applies to all interactions e.g. you should not require a viewer to type a command in one page and click a button in another. The grouping of similar objects in the vicinity of each other also helps.

Have you ever read a legal document? What you immediately wish for is clarity. What has happened is that clarity has been confused with precision which is the necessary hallmark of a legal or government document. I would argue that commercial contracts are a different issue ☺ You should stay away from jargon and fix your use of language at the level of the expected viewer. This does not stop you from using informal phrases or familiar examples. Although you should remember that a soap opera character may be popular in your part of the world but meaningless as a metaphor elsewhere.

Balance and Harmony sound like topics in Tai Chi but they have a valuable place in your presentation. Balance in this context refers to the layout of your page. You may have a large item (a video window) on one side of the page balanced by several smaller items on the other. Technically this is Informal Balance whereas the use of similar sized objects on either side would be Formal Balance. The concept of harmony is related to consistency and repetition. You should make sure that there are no unrelated items on a page. Your child's favourite toy in the bottom of a piece on horses is an example of a lack of harmony. Keeping pages similar in content and design helps this feeling of belonging together.

Having introduced the general concepts, we can now move to some specific ideas on keeping your users happy to stay with your multimedia site. These are culled from many different books on web and multimedia design and some of them we have mentioned in earlier seminars but they are worth repeating here. A good place to start is the W3C Web Content Accessibility Guidelines (W3C 1999).

When using text

Left justify the text. You do not know where or with what browser your work will be viewed and proportional spacing may not be available or understood if put through a translation application.

You should use mixed case. The use of only capital letters quickly gives the user a feeling they are reading or viewing an amateur production whereas all lower case also suggests laziness and confuses the grammar.

It is best to avoid long lines of text as these are not so easily read. (Consider why every newspaper uses columns). On the web it can lead to wrapping problems with the formatting and in multimedia it will displace the images from a more natural location.

If you have the space then use 'double-space' for line separation. This will aid clarity and be more visually appealing.

Keep sentences short and to the point similarly use short paragraphs. The idea is to give a sense of a 'punchy' production. Some times this is not feasible. For example when explaining a difficult procedure or dubbing for an audio track.

Do avoid blinking text. Not only is it irritating after a very short period but it will distract from the rest of the content.

You should use generic fonts or you will have to provide the font in your work. Not everyone can be guaranteed to have an extensive selection at their disposal and if your font is not available the browser will default to one it has. This can have a disastrous effect on the look and feel of your production. A font family that is always provided in the Windows system for all language and for many combinations of sizes and shapes is Arial. Being a non serif font it is also well displayed on screens where the resolutions do not approach that of the printed page. Font size is a thorny problem with many authors suggesting at least 12 point for web. There is no firm answer to this but you should remember to apply the desire for consistency and consider the whole effect if a larger font size on one page forces a style change on other pages.

Patterned backgrounds do not go well with text as there will be the possibility of aliasing with some screen window sizes. They are also less comfortable to read.

When using Menus

Firstly, a menu does not have to look like a pull – down list. There are other approaches that in certain environments can be faster. For example, a radially spaced set of options gives the user instant access to all options and the ability to select by moving the marker directly to their choice instead of stepping down a

list. See the paper by Kurtenbach and Buxton for a discussion of Hierarchic Marking Menues (Kurtenbach & Buxton, 1993).

Alternate choices should be used with care since most viewers are familiar with standard web choices. They expect the logo in the top left and menu choices to be in a bar across the top or grouped down the left hand side, so why risk alienating a user by increasing their learning curve? It follows that the menu options should be placed in a logical sequence. This should be obvious from our daily use of computer systems. We expect to find all the 'save' options grouped together but it is less obvious when there are alternate approaches to a task.

Let the user know what the menu is about by including relevant titles on the menu and have an exit option. As a rule you should try to keep the number of options per menu down which can be achieved by judicious use of sub-menus. Remember to check that selectors work and that any URL's selected exist and will continue to exist. Where ever possible they should be localised.

When using Icons and Bullets

In this internationalised world the use of icons has become common place for one very good reason; they replace a multitude of different words from different languages. It is also because of the world-wide market place that our design and usage of icons must be carried out with consideration for the ethics of other nationalities (Lang 2004). This places an additional burden on the designer beyond those normally associated with traditional products. Before considering the design problem let us ask why Icons are so popular. Unlike words they have the ability to relate graphically to a complete phrase thus reducing the space needed for information. A further reason is their exploitation of human pattern recognition capabilities, thus reducing the cognitive load. It should be recognised, however, that the last statement assumes knowledge of the system environment. For example, the belief that a map is a navigational aid related to the real world would be acceptable in countries without underground systems but not once you realise that the map only represents stations in a chain. Similarly, symbols recognised and accepted in one culture may be meaningless in another. Fortunately, efforts have been made to standardise many icons for international use. The International Standards Organisation has developed ISO/IEC 11581 with this in mind (ISO n.d.). Here are a few considerations for your design of Icons.

By using an icon, you are trying to get a message across and that message should be easily recognised therefore it is important to use common Icons. A house suggests home and we could use it to mean 'return to the home page' but could we replace that with a castle or a boat? Probably not; although they are both homes to some people. If it is not possible to use a resemblance icon then it maybe necessary to design an arbitrary one, e.g. the nuclear hazard symbol, in this case, the user must be taught its meaning either by a pop-up or some supporting text. This is very important when navigating through a complex site. There is nothing more frustrating than finding you have been left where you did

not intend to go. You should make your icon design simple and ensure they are placed in consistent locations. This enables recognition when reduced in size or for people with poor eyesight which is another reason to make them big enough for all users. Some times small icons are unavoidable such as on menu bars but for navigating around your multimedia product there is no excuse for poor visibility.

Two important icons should always be present; backup and exit buttons, but you may also have other permanent icons on your screens. In which case, they should be dimmed when not accessible.

There are some specific recommendations when designing for the international market. Try not to use graphics with text or that use a letter as these may not relate to the same function nor have any meaning to someone who uses a different script. There are International hotels that make this error when labelling the washrooms. ☺ Be aware that some graphics can cause offence e.g. Racial, political or religious environments. Finally, avoid using regional assumptions such as reading direction and monetary symbols.

When using Colour

We all appreciate that a certain percentage of people are colour blind and that we need to take care with colour choices. However being colour blind does not imply an inability to see the objects concerned. Changes in intensity values will give sufficient clues to enable discrimination. A restriction on the number of hues will help discrimination and it often helps clarity. If you look at a cartoon, you will see a lesson in restraint with no more than seven colours being used. Colours for text and backgrounds contrast can be tested with a variety of free tools (JuicyStudio n.d.). If you want to provide a quality 'look and feel' to your document, use consistent background and text colours. Dyslexic viewers also gain from good colour choices since some are able to benefit from putting a slight pink hue to the background. Do NOT use red backgrounds.

When using Graphics

We are creating a multimedia product so naturally we expect to use graphics. The question is when? Graphics should be used to enhance the programme not distract from it. This is best achieved through simplicity and consistency. It is the background graphics which will set the visual style for our project and over complexity will only detract from the content. Where graphics are content they should be used to illustrate difficult points that are hard to describe. One of our first concerns should be accessibility. All viewers do not have expensive machines and may not be able to view our graphics. In which case, we will need to provide an alternative. In the last seminar we saw some approaches to providing alternatives so we will not repeat them here. Once again, we should be consistent in the choice of graphic placement, area and size and do not forget to

add text labels to graphs and charts. Graphics, like audio and video begin to add considerably to the size of our product and we should track any changes carefully. It is easy to allow what seems like minor increases in file size to accumulate until we run out of media space. By that time we may have committed to a significant change in overall look and feel so that going back is a time consuming and expensive task. We need to keep control of these assets. Remember the legal requirements in some countries concerning accessibility and provide an alternate image or text descriptor.

When using Audio and Video

The simplest advice is to use only where appropriate. Audio has a way of becoming irritating very quickly if it is not to the listener's taste. As we have seen audio clips greatly increase file size and the data rate needed for transmission which indicates we should keep them short. Audio is often provided as an alternative to a video clip for the visually impaired. Where it is used as content then you should provide an alternate script for the hearing impaired. One important point is not to have audio that conflicts with text

You should use a conversational style for narratives since it sounds more relaxed and helps put the listener at ease.

Once you have decided to use audio and to a certain extent video without a sound track you are making decisions regarding language. The question is then about the need to localise your product in different parts of the world. This will include analysis of the scripts for translation problems or clarification of culture specific content. The costs can be significant since it will include costs for a producer, engineer possibly a language coach and actors.

Much of what was said about audio applies to video. We gave some operational tips in seminar 2 so we will only mention a few additional issues.

The two key points are, as in audio, only use when necessary and keep it short. Remember you will need control buttons and it is advisable to include a replay button for video. It is better not to automatically start sound or video on loading but wait for the viewer to select it. If the bandwidth is limited they will not be caught in an un-escapable trap waiting for the file to download before they can switch the audio or video off.

Navigation and Multimedia

The research on Navigation Systems focuses on cognitive demands and the efficiency of the system in giving control to the user. For a discussion read the paper by Hedberg, Harper and Brown (1993). This is a more comprehensive viewpoint than the usual information on structure that is provided. First let us discuss the general concepts and then we are free to consider the issues.

Multimedia and its delivery on the web are now so connected that the discussion will focus on hypermedia approaches to navigation. Every page of our product

contains links to other content. Traditionally it would be to the next and preceding pages of a work but as we know it can be to anywhere where there is a URL. This implies we can put a link on every page to every other page. This is a 'fully connected' scheme and it is evident that for even a small number of pages this soon becomes untenable as an approach. Four or five pages is the maximum for such a scheme before the links become cluttered on each page. We could extend this idea by using a navigation bar with small icons (like a menu bar) but then we are losing accessibility and increasing cognitive load. (Remember the number of options on graphics packages crammed into menu bars?)

For a classical discussion on the limits on our capacity for processing information that relates for much more than just navigation capabilities and had a profound influence in many aspects of Psychology and multitude of human activities, including programming, see Miller (1956).

Possibly the most popular navigation scheme is the hierarchical organisation. Certainly for larger businesses it is indispensable. The structure is familiar from organisational charts where each sub-division contains sub-divisions. For our purposes we have an entry home page which leads to sub-section home pages and so on. With this structure it is still necessary to provide links to the home page so that a viewer can retreat gracefully and quickly.

A final structure is the simple sequential ordering of the pages. We can see this on the bottom of the Google search results. (Although it could be argued that each of these links lead to a sub-section). Sequential access would still need a link to the home page or the tedium of going from the tenth page to the thirtieth would be too much for the viewer to tolerate.

These standard ways of navigating do not condense or focus the material on a web site to that which we are interested in. We still have to arrive by best guess as to what the site contains and to browse the site before finding the precise information we need. There is no guarantee that we will be successful in our search. A smarter approach would be to query by content or use content based navigation. We all use these approaches when using a search engine, for example Google. We can implement this in our web / multimedia site by providing a search facility. Most searches will use content based approaches and we can provide key words to aid the process. It would be better if we could provide relevance feedback so that the search could automatically be narrowed. For example as an academic we might only want academic sources to be listed and the search might be narrowed by our usage pattern e.g. we read certain pages for longer than others.

This works better for text than audio, images or video. Here we are still experimenting with navigational techniques. Even classification can be problematic. Do we classify David's picture of Napoleon (David n.d.) under white horses, history, oil painting etc. For one image the list becomes enormous. How

would you select or navigate to a particular clip in a film? If the navigation system could remember features such as colours, shapes and general spatial information then it might be possible to search based on description. Then I need not know the title but I could describe the scene. E.g. seven small men, tools, forest and underground might lead me to a clip from Snow White and the Seven Dwarves. For an introduction you might look at the paper by JR Smith and Shih-Fu Chang (1996).

This brings us to the end of our last seminar.

Links and References

Boling, E., Bichelmeyer, B., Squire, K., & Kirkley, S. (1997)

Visual design profiles: Making sense of web site design guidelines

[Internet] <http://www.indiana.edu/~iirg/ARTICLES/AMTEC/lit.html>

(Accessed: 23rd September 2010)

David J.L. (n.d.)

Bonaparte at Mont St. Bernard [Internet]

<http://www.globalgallery.com/enlarge/018-21289/>

(Accessed: 23rd September 2010)

Comment: the page says item is no longer available, but the image is there.

Dornan E (2004),

Road Map for Educational Multimedia Design [Internet]

<http://it.coe.uga.edu/itforum/paper80/paper80.htm#Cable>

(Accessed: 23rd September 2010)

Hedberg J.G., Harper B. & Brown C. (1993),

Australian Journal of Educational Technology, 1993, 9(2), 157-181.

<http://www.ascilite.org.au/ajet/ajet9/hedberg.html>

(Accessed: 23rd September 2010)

ISO (n.d.) The ISO 11852 standard [Internet]

http://www.iso.org/iso/catalogue_detail.htm?csnumber=40060

(Accessed: 23rd September 2010)

JuicyStudio (n.d.)

A web based colour analyzer tool [Internet]

<http://www.juicystudio.com/services/colourcontrast.asp>

(Accessed: 23rd September 2010)

Kurtenbach, G. & Buxton, W. (1993)

The limits of expert performance using hierarchic marking menus.

Proceedings of InterCHI '93, 482-487.

<http://www.billbuxton.com/MMEExpert.html>
(Accessed: 23rd September 2010)

Lang I. (2004)

Using symbols and Icons in Localisation [Internet]
http://www.translate.com/Language_Tech_Center/Articles/Using_Symbols_and_Icons_in_Localization.aspx
(Accessed: 23rd September 2010)

Miller G.A. (1956)

The Magical Number Seven, Plus or Minus two: Some Limits on our Capacity for Processing Information.
First published in Psychological Review, 63, 81-97.
<http://psychclassics.yorku.ca/Miller/>
(Accessed: 23rd September 2010)
and at many other sites.

Misanchuk E.R., Schwier R.A., Bowling E. (1999)

Visual design for Instructional multimedia ED-MEDIA 1999:
Proceedings of the World Conference on Educational Multimedia,
Hypermedia and Telecommunications, Seattle, Washington.

Norman D. (1988)

The design of every Day Things, Doubleday, New York

Shneiderman B. (1997)

Designing the user interface, 3rd edition, Addison Wesley; ISBN: 978-0201694970
<http://www.cs.umd.edu/hcil/pubs/books/dtui.shtml>
(Accessed: 23rd September 2010)
relevant text 'Eight golden rules of Interface Design' available from:
<http://faculty.washington.edu/jtenenbg/courses/360/f04/sessions/schneidermanGoldenRules.html>
(Accessed: 23rd September 2010)

W3C (1999)

W3C Web Content Accessibility Guidelines [Internet]
<http://www.w3.org/TR/WCAG10/>
(Accessed: 23rd September 2010)