



GUIDELINES FOR MULTIMEDIA DEVELOPMENT

(With Emphasis on Browser-Based Media)

DRAFT Revised: January 2003

With further amendments: February 2004

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1. Introduction

1.1 Definition of Multimedia

In the simplest form of definition, **multimedia can be described as:** *Two or more media combined to provide information about a subject or concept.*

[Also see Definition of 'New Media' in s.4]

1.1.1 Media (both digital and analogue) can be any of the following:

Text, drawings, graphics, photographs, film, video, wireless, audio, animation, VR, web, and so on...

1.1.2 Interactive multimedia:

A distinction should be made between '**interactive**' multimedia and non-interactive multimedia.

Interactivity relates to communication between the multimedia system and its user; i.e. it requires input from its audience. Interactive media may also be accessed in various sequences by the user, whereas non-interactive multimedia tends to be linear in sequence and involve a 'passive' audience (e.g. watching a film is generally a passive occupation and it is shown as a linear medium).

1.2 What Multimedia is NOT:

Multimedia, in the most general terms, serves as **a tool for interpretation and for the documentation and delivery of content** (q.v. 1.3, 1.4) and should not be confused with the following:

- Multimedia itself cannot provide meaning
- Multimedia is not the same as content
- Multimedia projects are not IT projects
- Multimedia is not by definition interactive (see: New Media s.4)

1.3 Roles of Multimedia:

Within the museum context there are two potentially distinct roles for multimedia:

a communications tool

e.g. structuring and interpreting knowledge about resources, artifacts and collections

a documentation tool

e.g. databases and systems that record or capture and/or preserve multi-layered information, such as ADLIB, Gallery Systems, MultiMIMSY 2000

1.4 Why Multimedia?

In the widest context, **multimedia is a form of interpretative system providing a broader range of information.** For example, it can place a particular work in more than one context, e.g. timelines. It makes it possible to introduce comparisons or detailed examinations (e.g. microscopic level detail). It also supports innovative learning tools and feedback mechanisms, such as participative spaces on the web.

Particularly in relation to museums, multimedia aids in the interpretation of collections which are not accessible, e.g. storage items, or in the reaching of audiences who are not physically in the Museum, e.g. virtual visitors, geographically excluded. Multimedia further provides interactivity for a wider scope of audience; e.g. different interfaces for different audiences, such as language screens or separate children/adult entry points.

Significantly the growth of media channels has made it possible to support the dissemination of collections in many ways, e.g. online catalogues, kiosks, e-publications, CDs, WAP pages, etc.

1.5 Issues...

Evaluation has shown that multimedia applications within a gallery, for instance, may alienate users, rather than entice participation or interactivity. Sometimes a complex or overly graphic interface may overshadow content and, thus, the interpretative function is lost.

Additionally, those multimedia applications which are content heavy or overly technical are harder (1) to maintain and (2) to sustain interest.

The cost benefit of using multimedia to enhance collections may also not be matched by investment, particularly in the areas of maintenance and resourcing.

1.6 Other criteria...

Some basic criteria to bear in mind before embarking on discussions of multimedia development:

- Must be fit for 'purpose' (choice of media and content should relate to and complement each other)
- Must not present problems for interpretation (e.g. complex architectures, design, etc.)
- Should be based on proven technology
- Should use open platforms
- Should use recognised standards (e.g. W3C)
- Must enhance the subject, not distract
- Should be based on need!

2. Multimedia Development

2.1 Development (an overview)

Multimedia development falls into three areas:

- Concept
- Design
- Production

2.1.1 Concept:

A clear concept is important, particularly with non-linear or interactive forms of multimedia. Hence changing the concept during any subsequent stages can be time-consuming and costly.

Some basic questions to ask at this stage:

- What will it be about?
- What should it be called ("branding!")?
- Who will be the user (audience)?
- What do we want to give the user?
- What will interest the user, i.e. encourage exploration?

The **concept phase is crucial because it impacts on both design and production and the overall raison d'etre of the proposed project**. So careful thought must be given to the implications of, for instance, including heavy layering or extra information. Design will be directly affected by such inclusion, and production may over extend itself if resourcing and configuration issues arise because of these additional considerations.

Thus, it is recommended that a **full business plan approach** be undertaken, incorporating:

- Aims and objectives
- Project goals
- Outline of proposed methodology
- Description of proposed application (format, media, etc.)
- Content levels (e.g. general, specific)
- Target audiences
- IPR issues
- Staff resourcing
- Partners (IT, content, etc.)
- Timescale (including promotion and release date)
- Budget
- Marketing
- Sustainability

2.1.2 Design:

Design is a complex area in the development of multimedia, however it is often recommended to keep the design simple and adhere to usability guidelines wherever possible. This means that **design elements must be comprehensible and support the drive for user intuitiveness**.

Designers must be cautious of the conflict between direct comprehensibility and powerful interface, although both are applicable depending on the concept and intended purpose of the multimedia product. A **flowchart** and/or design grid or **storyboard** is essential before any design implementation is undertaken.

Recommended actions to address at the design stage:

- Storyboard the content/screen elements
- Approve a specification (media type, format, standards, etc.)
- Construct a flowchart or architecture of components
- Map out the navigation (menus, tiers, etc.)
- Decide on form of inquiry/searching
- Consider icon labels
- Decide on user tools, pointing devices, etc.

Simple flow diagram for web/kiosk design (also see 2.2. 'Architecture')

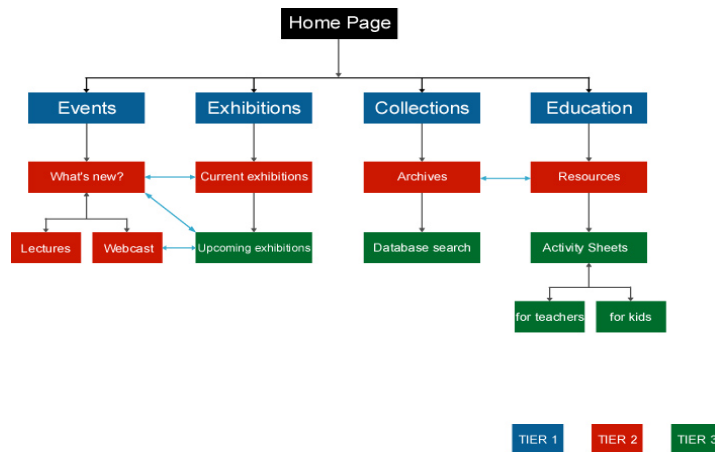


Figure A1 - Schematic diagram of a museum website

2.1.3 Production:

The production period is dependent on the concept and design processes being harmonised through **agreement and appropriate resourcing, scoping and development time**.

It is thus essential that **issues of workflow are planned out**, and that the project team recognise their projected deliverables and outcomes. Project management software to plot milestones and workflow activities is suggested for any production time-scale or size.

Additionally, a post-production period should be included in the overall development plan for quality assurance, testing, tweaking, and evaluation.

The production phase, including post-production, should take into consideration the following:

- Mapping milestones
- Workflow
- Prototyping
- Progress reporting
- Monitoring
- Testing
- Evaluation (production and post-production)
- Review processes

2.2 Basic Architecture

Digital information has no standard or required physical form and is, therefore changeable (and interchangeable!). The format of a particular digital media, for instance, can determine the arrangement, delivery and management of the information, as well as how it may impact on the way a user responds to and/or interacts with that information.

However, **digital media**, itself, is a highly abstract and largely invisible form to the user and **requires both a structure and appropriate interface to give it added form and to make the information accessible**.

This highlights **two basic challenges** in the design of a multimedia application:

- Informing and guiding the user through a complex body of information

- the creation of a visual rhetoric appropriate for interactive display and function

In designing a multimedia application, it is not possible to predict in advance how every particular combination of text, graphics, audiovisual material, and other elements will interact.

To begin, the multimedia author should **establish a consistent substructure or series of templates** (representing a grid or meta-architecture) which allows him/her to plug in text, graphics and other content for each proposed menu screen without having to consider every design issue.

Without an underlying substructure, the layout and, particularly the navigational structure may appear confusing to the user.

2.2.1 Sample Architectures:

2.2.2 Linear

In a linear structure, the user navigates sequentially, moving from one screen/page to the next, e.g. a 'slideshow'.

Example of a linear model

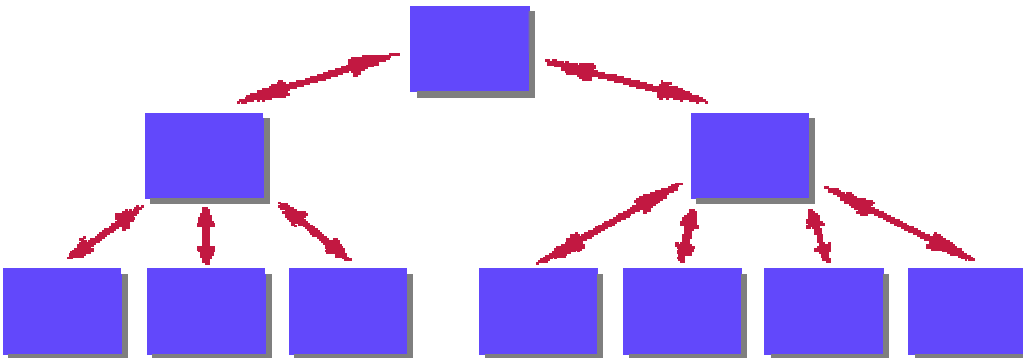


2.2.3 Hierarchical

An hierarchical approach is a 'top-down' architecture and provides the foundation for a primary navigation system and basic content management process.

There are several types of hierarchy or organisational structures that can be defined by **'breadth'** (number of options at each level of the hierarchy) and **'depth'** (number of levels in the hierarchy)

Example of a hierarchical model :



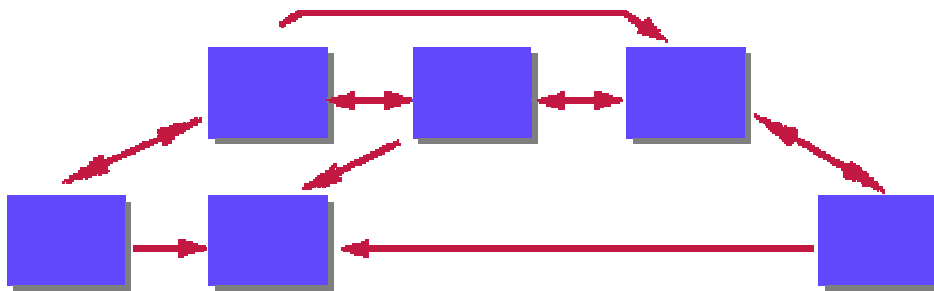
Hierarchical content models that have **large breadth and short depth** allow for growth in content and additional hierarchical levels (especially for web development). However, a drawback is the number of menu (tier) options and the shallow content depth.

By contrast, hierarchical architectures that have **short breadth and large depth** are useful for content heavy sites or applications. Some of the tiered content may also lend itself to databasing. Problems with this model concern the number of levels or 'clicks' to reach desired content, and the restricted growth for additional content or levels.

2.2.4 Hypertext

Architectures may also incorporate a **hypertext** approach that allows for non-linear navigation and linked items, as well as making links between items wherever they sit in an architectural framework. Hypertext can be effectively incorporated into hierarchical and databased models. It also permits lateral and vertical navigation.

Example showing hypertext or non-linear model

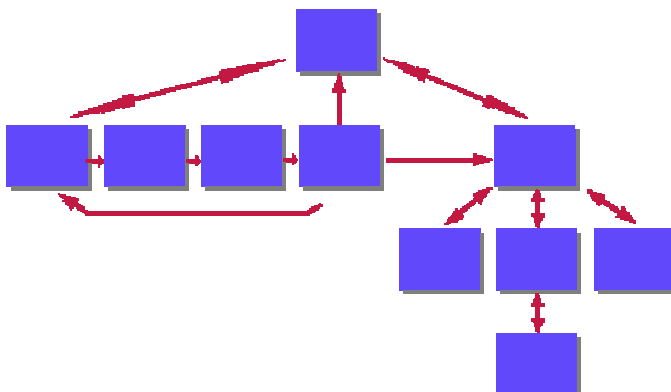


2.2.5 Databased content

Databased content for multimedia applications allows for defined data structures, and as a consequence, searching is also structured and can be based on controlled vocabulary and indexing and field specific searching. Template design lends itself to databased models.

Databasing is recommended for subsites or defined/grouped sections of a content heavy application, or certain **'hybrid'** architectures, e.g. combination of hierarchical and linear.

Example of a hybrid model



2.3 Graphic User Interface (GUI):

Once the architecture is in place and/or agreed, the multimedia author or programmer can start considering the graphic user interface and its relationship to the application and its function. In general, **the visual structure of a GUI should consist of standard objects**, for example, buttons, icons, text fields, windows, and pull-down or pop-up screen menus.

These interface objects must convey specific messages to the user about the functional possibilities and capabilities of the software in use. **Consistency in form and function is fundamental** in achieving this.

Consequently there should be standard functions on any multimedia application for the user to rely on and/or to refer to. The following must be standard on any browser or global navigation feature:

quit, help, back, search, menu (home), print

Graphic interfaces must also offer a visual and functional theme or metaphor to the user; i.e. **iconic labelling**. By emulating the look of iconic objects, such as a magnifying glass or printer symbol, functions of an application are made visible and placed into a logical, predictable context. Successful iconic labelling should be simple systems that do not require the user to learn any new procedures.

The **user** should also feel to be **in control of the interface**, and should not feel that the application has made decisions for the user. Well designed interfaces must have consistent error handling mechanisms and provide simple error messages as part of the functionality.

In terms of **response time**, even small gaps in time (0.25-0.50 seconds) between the user's actions and any reaction from the application can cause a misunderstanding between the desired cause and effect, and/or force the user to assume that the application has failed to understand an action. Visual signals that provide feedback must be part of the fundamental design features.

In regard to larger image or **document areas** which fill a 'window', the multimedia author should be sensitive in how information may be layered in relation to a topic, e.g. by programming the hiding of windows or other objects until the user requests that specific information. Window size and content layout (e.g. text font, size, etc.) are complementary considerations and need to be decided at the design stage.

Presently, **layering techniques remain limited** as superimposing objects is still the primary means of visual layering in GUIs, unless use of frames and similar devices are incorporated. Similarly, the illusion of three-dimensional space is limited, and results in complex, confusing screen displays when windows are layered. The employment of VR has not reached ease of use to fulfil a satisfactory information or content management role, although it is recognised as a powerful and complementary tool to text.

3. Recommendations

3.1 Functionality (General):

Functionality must be founded on the premise that a multimedia application is rendered '**user intuitive**' and encourages exploration. This requires consistency in form and function throughout the life-cycle of the application (e.g. from design to public use). Jacob Nielsen and other usability experts and accessibility advisors have

written considerably in these areas and are listed in the appended bibliography. A sample of functional criteria follows below:

- Standardisation of functions: all functions listed in same order, in same position through application
- Consistency in order of basic functions/tasks
- Consistent error handling and easy reversal of actions
- Consistency of prompts, error messages
- Comprehensible error messages
- Avoid multiple screens, multiple overlapping of screens
- Universal DOS function F1 for Help
- Response time for a user to receive a 'physical sign' of the result of an action not to surpass 1.0 second in duration
- Quick Loading (or indication of loading times)

3.2 Design:

Consistency is also essential for design. Any design features should adhere to **usability standards**. A selection of recommendations follow:

- Visually present tasks of application by iconic labelling, etc.
- Functional features, button, scroll bars and navigational bars are identified as working functions instead of images
- Consistency in layout (e.g. design, colour, etc.)
- Consistency in terminology (e.g. menus, commands)
- Consistent titling/headers
- Font size readable
- Content layout is sensitive to screen size/view area
- All images have descriptive alternative text (e.g. ALT tags in web)
- Hyperlinks have descriptive headings or descriptive alternative text where applicable
- Simple background colours to allow enough contrast for users with vision disability
- Video and audio clips have text equivalent, or closed-captions if possible

3.3 Searching:

Searching should include at least two of the following types:

Boolean, proximity searching, indexed searching, semantic searching, keyword searching

Choices should allow for both structured and free-text searching options in order to accommodate any level of user.

Additionally, other search features could encompass:

- An option to browse indexes
- Truncated searching
- Retrieved records should show numbers returned
- Search histories saved for refining, re-selection
- Search terms highlighted in retrieved set

3.4 Navigation:

Each navigation bar or frame should have these basic options (i.e. global navigation elements):

quit. help. back. search. menu (home)

Other suggested recommendations:

- Menus should not exceed seven options or tiers
- Menus should give some indication of architectural framework (e.g. breadth and depth)
- Inclusion of table of contents or index to aid in navigation through content
- Pull-down menus to be used sparingly so not to hide other 'options' or compact too much information
- If frames are used, consider issues of separating navigation from content, or from other independent windows

3.5 Multimedia formats and functionality:

A selection of the most common multimedia formats follow. Recommended to refer to the NOF Technical Standards and Guidelines available on the People's Network site which provides a more detailed list of criteria.

[www.peoplesnetwork.gov.uk/content/technical.asp]

3.5.1 Animation:

Moving images have the following uses, but a screen or web page should not include permanently moving animation so not to distract the user from interpretative text.

Animation is recommended for:

- Showing principles of science, e.g. states in transition
- Indicating dimensions
- Illustrating change over time
- Multiple objects or active areas activated by a cursor or pointing device
- Visualising 3D structures

3.5.2 Video:

Video should be delivered using MPG, Microsoft AVI, ASF or Quicktime formats. It should be noted, however, that videos on some websites remain of poor quality due to bandwidth constraints, restricted playing time, and small viewing areas.

Nonetheless, video can be an effective supplement to text and images and provides an enhanced user experience.

Video is recommended for:

- Demonstrations
- Production/drama clips
- Video conferencing
- Lectures
- Trailers

3.5.3 Audio:

Audio should be delivered using MP3, RealAudio, Microsoft WAV or Sun AU formats.

Audio has several benefits:

- It offers a commentary that supplements text
- It can be more descriptive and practical to include than what can be incorporated in text, e.g. music clips, language phrases
- Audio files are smaller to load than video and less fidgety than video plug-ins.

3.5.4 Text:

Depending on the media of choice, text-based content should be delivered as XHTML 1.0 or HTML 4 in most cases, though the use of XML with other DTDs could be appropriate.

Additionally there are the options for delivery in proprietary formats such as PDF, RTF or Microsoft Word.

3.5.5 Web (general)

There are many issues concerning functionality and web development that have been addressed in a separate document, and touched upon in the sections above.

However, some general considerations and recommendations are bulleted below. It is also recommended to review the W3C Guidelines and other standards listed in the bibliography:

- Open file formats
- Browser compatibility
- W3C and RNIB guidelines for accessibility
- Work within a standard format e.g. HTML, XML
- Ensure Web usability, navigability and extensibility
- Develop interoperable solutions
- Follow agreed metadata standards e.g. Dublin Core
- Investigate other emerging standards and recommendations, such as Collection Level Description

3.5.6 Images:

A separate document on images and digitisation is currently being authored, but proposed formats for digital surrogates are provided below:

Archival quality/Preservation:

The master file will be created and stored in TIFF format, an open non-proprietary format which is lossless and will allow for the maximum reuse.

A file size of 50mb for colour files and 18mb for greyscale files has been selected, although this is an approximate size only and will ultimately depend on the resource type being digitised and the appropriate archival resolution for each (e.g. colour transparencies ≥ 1200 dpi, monochrome print or document ≥ 600 dpi).

Web:

Images should be provided on the Web as GIF (for line-drawings) or JPEG (for photographs) formats. PNG may be an alternative format to GIF.

Overall, the JPEG format is preferred, as it is one of the standard image formats recognised by Web browsers. JPEG also supports a greater bit depth than GIF.

Images chosen for the web will be created from the master file (72dpi, 600x600 pixels-fullscreen or 100x100 pixels- thumbnail).

4. New Media

A separate section to define 'new media' is appended here, in order to highlight some of the key distinctions between 'multimedia' and 'new media', and to clarify any confusion arising in regard to their respective associations and usages.

4.1 Definition

Unlike multimedia which encompasses both analogue and digital media, 'new media' is typically associated with digital technologies and electronic multimedia, and by nature of its usages is inherently interactive.

In the broadest sense, *new media* is a term which generally covers the recently created and rapidly evolving new forms of communication that have arisen due to the convergence of computer and telecommunications technology.

New media is also an area of scholarship and research which examines new media and its roles and uses within different interactive and communication built systems, e.g. in relation to social, behavioral, cultural and networked settings, among others.

New art practices have also provoked new interpretations, uses and articulations [q.v. biblio].

[q.v. Handbook of New Media]

Also see sections below

4.2 What is New Media

4.2.1 Characteristics

There are a number of different forms of new media but they are all characterised by some or all of the following features:

- Digital
- Interactive
- Multimedia
- Non-linear
- Hypertextual
- Hybrid (i.e. mixed and recombinant technologies)

4.2.2 Technology

New media can be applied to various forms of communication and technologies, such as the following:

- Browser-based
- E-mail
- Digital Audio and Video (including video conferencing and video-on-demand)
- Interactive Multimedia
- VR and immersive environments
- Digital Television
- Mobile communications
- Electronic publishing
- Personal communication services (PCS)

Not inclusive...

It should be noted that new media products are often an ongoing hybridization of both existing and innovative technologies in interconnected technical and institutional networks: therefore it can include a range of evolved forms of technologies and

media, for example : hypertext literature, cybercafes, and virtual reality systems for work and leisure.

4.3 Roles of New Media

New media can be associated with roles representing different forms of built interactive systems, as well as forms of communication channels within social, cultural and educational contexts and other settings.

In general, three principle roles of new media can be outlined as follows:

- The artifacts or **devices** that enable and extend our abilities to communicate
- The communication activities or **practices** we engage in to develop and use these devices
- The **social arrangements** or organizations that form around the devices and practices

[q.v. Handbook of New Media]

4.4 A New Media Strategy

Similar to the considerations for multimedia development and implementation, the effective deployment of new media within an organization or other setting must be planned and strategised.

For instance, the following should be taken into consideration:

- **Objectives** intended to achieve using new media
- **Audiences** intended to reach
- **Messages** intended to communicate
- **Choice of media** to be used for that communication
- A detailed and timetable **action plan**.
- **Systems and resources** (the infrastructure) needed to carry out the plan.
- **Standards** required for interoperability and longer term sustainability

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