



Automating Production of Cross Media Content for Multi-channel Distribution

DE8.2.1 Content Selection Guidelines

Version: 3.2

Date: 19/05/2005

Responsible: ILABS

Project Number: IST-2001-37168

Project Title: Automating Production of Cross Media Content for Multichannel Distribution

Deliverable Type: Report

Visible to User Groups: Yes

Visible to Affiliated: Yes

Visible to the Public: Yes

Deliverable Number: DE8.2.1

Contractual Date of Delivery: 01/04/2005

Actual Date of Delivery: 19/05/2005

Title of Deliverable: AXMEDIS Content Selection Guidelines

Work-Package contributing to the Deliverable: WP8

Task contributing to the Deliverable: WP8.2

Nature of the Deliverable: Report

Author(s): ILABS,UNIVLEEDS,ACIT,AFI,XIM,ANSC,FUPF,SEJER,DSI,COMVERSE,TISCALI

Abstract:

This document provides extensive guidelines for object selection taking into account the twofold nature of AXMEDIS content delivery that is B2B and B2C. Each of them requires a different approach, management and support activities in order to be successful.

Keyword List:

Content, Selection, Guidelines, Metadata, Formats, Layouts, Templates, Processes

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1 Executive Summary and Report Scope (ILABS)

As already stated in several documents (starting from the technical annex) AXMEDIS content partners have a relevant amount of digital content to be used in the project. Nevertheless such content, and the one eventually acquired or produced specifically for the project, should be selected for demonstrator development so to ensure the best suitability for high quality assessment of derived infrastructure, application and tools. Partially such an activity can be based on the analysis of *DE2.2.1a* related to test cases, partially on *DE3.1.3* related to content aspect specification. The present document will also tackle issues related to interaction between content selection and usage, especially focusing on metadata and technical issues, on one side, and user needs on the other. What follows is a reminder of the Technical annex:

WP8.2 Content Identification for Validation – responsible ILABS – This WP consists in the production of specific content for the validation test cases, a process of content identification is needed. Partners such as OD2, ILABS, SEJER, ANSC... have a substantial amount of content that they intend to reverse in the AXMEDIS network supported by the AXEPTTool when the project will be in the exploitation phases. In this task, they intend to make a selection of the content in order to identify the most significant content and content components to cope with two fundamental aspects that the content for validation has to satisfy: (i) The technical needs (to cover a large set of possible technical combinations), (ii) The promotional needs (be attractive for the content producers and for the content distributors to give them the evidence of the innovative functionalities of AXMEDIS solutions). **The amount of content that will be identified for validation will be in the order of: 300 to 400 content pieces for technical validation; about 30.000 of pieces for the demonstrators, a large part of the same pieces will be available for the several distribution channels identified in the project.** Other details: A first version of the guidelines for content identification will be produced as well as a refined version of these guidelines. An analysis of the whole content of the partners will be performed; the first selection of the content for validation considering the technical aspects will be provided.

1.1 Responsibilities

Main responsibility of the document is in charge to ILABS that with the contribution of XIM will collect and combine contributions coming from all partners mentioned either at chapter or section level. When a section is not reporting specifically a responsible it is intended to be a general one where all partners involved in the process shall contribute.

2 An introduction to content usage (ILABS, XIM, TISCALI, COMVERSE, EUTELSAT)

In *DE3.1.3* we discussed about content aspect design, we now would like to focus on the selection process, pointing out criteria for achieving the best possible result, so to maximise content reusability in post-processing (comprising aggregation, adaptation...) and to enable further distribution, or publishing either in simple or aggregated format. Please note that achieved results will strongly depend on the suitability and quality of selected content. For example, a publisher would need not only make own content valuable, but also to make it attractive; in a similar manner, a video has to capture the audience, an audio has to be appealing and easy to remember... all those are success factors related to communication processes, therefore they imply a combination of content, attraction, engagement, fascination and psychology. Moreover, intellectual property rights (IPR) and copyrights, play an essential role, as the complexity of the legal landscape can be a limiting factor in achieving the original idea of the author.

3 Content classification & formats in brief (ILABS, XIM)

Foreseen basic types of content are summarized in the following table, for a more detailed description, please refer to *DE3.1.1 Guidelines and Specification of research enabling technologies* and *DE3.1.3 Content As-*

pects Specification. From now on, explanations and suggestions provided will only apply to those kind of basic objects.

Simple objects	Complex objects	Compound objects
Text / Images / Audio ¹	Video / Animations	Multimedia

A compound object accounts for all constraints coming from its components; it is given for granted that it has to be selected evaluating the most restrictive combination so to ensure that all constraints are properly met. It could also happen that the same content has to be available both for B2B and B2C. This implies that it has to be manipulated in a different manner according to its final usage. Therefore different sets of digital rights management (DRM) rules may apply to the same object, resulting in different licenses. Thus, maximum care should be placed in evaluating licenses and potential available rights (PAR) at selection time, as this will have great impact on subsequent processing steps. The issue of licensing is, in any case, out of scope of the present document, nevertheless it is given for granted that a careful exam of rights management has to be performed at both selection and acquisition time in accordance with “user” needs and expectations.

4 Ensuring Effective & Efficient Communication (XIM, ILABS, ALL)

While in *DE31.3* we addressed the design issue, now we focus on content selection. The starting point is that archives usually hold “sets” of potentially useful contents for each topic. Individual contents have usually been developed for different purposes/targets; therefore selection should identify the most suitable ones in respect to expected usage. It will also be necessary to grant an effective and attractive usage, and minimal production and distribution costs. Despite it may seem obvious; a message has to be clear to be properly received. Creativity and innovation are highly valuable, yet balance between effectiveness and efficiency should be achieved. In the late 19th century “Cubism” and “Abstractivism” brought artists to represent own “emotions” rather than a “subject”. This change was difficult to be accepted by the public, and for quite a while artists experienced difficulties in placing their work. Nowadays a “Piacasso”, a “Kandinsky”, a “Van Gogh” or a “Miró”, are the dream of any art collector. Publishers and distributors are looking for content that may turn out to be a success, this implies creativity and innovation, but also user acceptance. A content that is too “unfamiliar” or too “innovative” may lack users’ acceptance. This is exactly what happened with “Blow up²” by Michelangelo Antonioni; the movie became a success only much later than its launch. The reason for the initial difficult distribution was the feeling of instability, incompleteness, and uneasiness to communicate and understand³, conveyed by the author. Therefore unless authors specifically expect certain result, a set of solutions has to be avoided, as content distribution success is strictly dependant on successful communication processes.

5 Readability and Understandability principles (ILABS, XIM, ALL)

Both factors are extremely important, as already mentioned in *DE3.1.3*, therefore one should select those objects that for each of them present the highest level. Basically this means that the content should be “easy to read” (in case of textual content) or in any case easily understandable and accessible. This implies more than to be accessible to “impaired users”, this implies that content should be suitable for clear and effective communication. To a certain extent, it may seem that there is a high superposition between these two concepts; actually “understandability” means more than “readability”: a text could be perfectly readable (in terms of font, layout...) but totally unintelligible as the language may be unknown, or the topic too specific, just as a written text may be useless for a blind person unless it is made properly accessible. As we have to deal with various kinds of objects and formats, we will primarily focus on basic aspects to take into account while performing content selection; more specific issues (related either to accessibility or multi-language issues) will

¹ Up to a certain extent, also database records (like UNIMARC record as defined according to the provisions of ISO 2709), or a JPEG2000 image (<http://public.migrator2000.org/pandorademo/>) could consider basic objects.

² <http://www.scaruffi.com/director/antonion.html>

³ <http://www.geocities.com/Hollywood/3781/modernism.html>

be covered elsewhere (*DE8.3.1* and *DE8.1.1*). Please note that even though what reported hereafter holds true for many “content objects”, however, there may be different rules (or no rules in same case) for art, entertainment, games etc. To summarize we can say that to create, or select, truly “*attractive*” and “*user friendly*” content the author has to strive for **legibility** and **readability** applying the following basic principles of design:

- **Contrast** deals with physical (or physically perceived) polarities (opposites). It is usually referred to size, shape, textures, tone, and direction and it is used to attract and to emphasize.
- **Balance** means dividing space into equal or understandable parts. Our constant exposure to the balanced patterns of nature allows us to accept this principle as part of the cognitive process.
- **Proportion** is the relationship of visual elements, one to another and to the whole. We consider this particularly in relations of size, shape, colour and quantity. It can cause contrast.
- **Rhythm** is the use of shape, colour and other visual elements in regular and repetitive patterns.
- **Harmony**, the opposite of contrast, implies simplicity of design. Harmony does not interrupt, but allows for a smooth and even flow.
- **Movement** directs the eye (the mind) through logical, coherent and acceptable arrangement.
- **Unity** is a condition or quality of design that is achieved when individual elements are in agreement. Unlike harmony unity is active.
- **Attraction** is that visual reference which draws the eye to it immediately. Attraction does not indicate an assignment of meaning, but simply nervous energy stimulation.
- **Attention**, however does imply an assignment of meaning. Attention requires long-term memory, while attraction requires only short term or immediate memory.

5.1.1 Text

For textual content it is necessary to ensure that:

- Font size should be adequate (not too small to be read in a normal situation);
- Font size should be resizable (for people with low visual capabilities);
- Font should be “*san-serif*” (this applies especially to small font and on screen usage);
- Text lines should be properly spaced (not too packed, that is at least “single line” spacing);
- Text should be properly balanced in respect to the page space (use proper margins and remember that too crowded pages are difficult to read, and give a perception of disorder); for example centered display type contrasts with the asymmetry of the ragged right margin of left-justified body text and produces an unbalanced page.



Moreover the relatively primitive text justification that is often provided today for many contents (and primarily for web-based ones) creates word-spaces problems that result in the so-called “rivers” of white spaces that seem to run across the page.

- Text-based content should present a proper balance between text and images: the most relevant object should take the majority of space and be located in the most attractive position;
- For text-based content (but non text only) text / image mutual placement should respect rules like the ones related to areas of interest (AOI) and visualization focus; Patchy, heterogeneous typog-

raphy and text headers make it hard for the user to see repeating patterns and almost impossible to predict where information is likely to be located in unfamiliar documents:



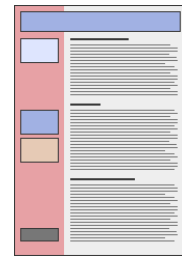
Badly balanced



Correctly balanced



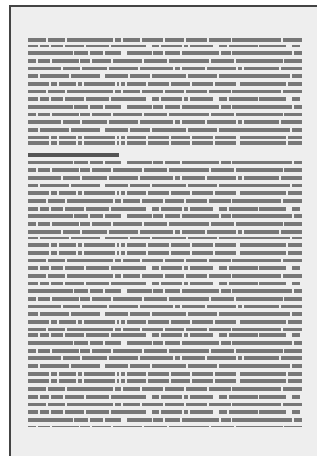
Too patchy, inconsistent



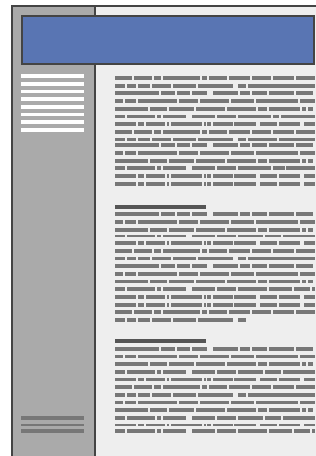
Predictable modular structure

- Text title, summary and description should be available;
- Text should possess enough clarity in terms of expression; language used should be plain (aulic expressions should be avoided unless specifically needed like in poetry...);
- Explanation of technical/specific terms should be available via glossary or notes;
- Translation of foreign terms should be available (at least as a note if they are not commonly used and understood by the intended target audience);
- Green and red have to be used with attention due to the existence of colour-blind people;
- Text and background colour, even the case of sufficient contrast, should not create readability difficulties and weaken sight;
- Text should be clearly distinguishable from background, or characterised by sufficient contrast (contrast is not only the ratio between foreground and background colour, it also means the visual structure contrast as counterposition of elements – please see the following image);

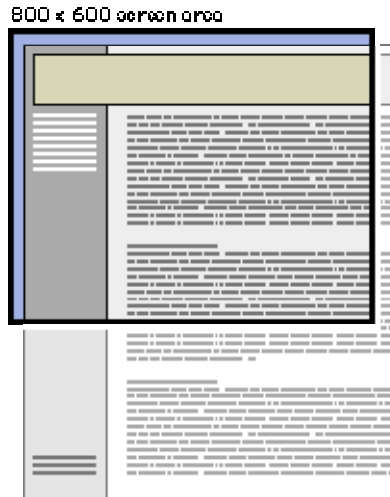
**Dull; no focal points,
no graphic structure**



**Stronger visual structure;
better contrast, visual entry points**

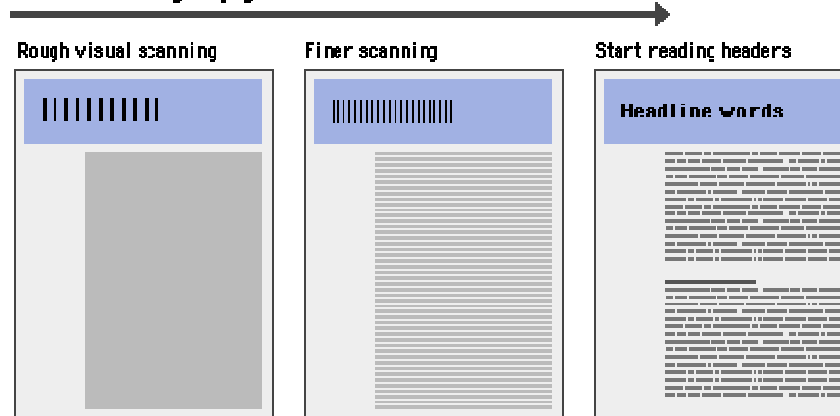


- Whenever text (or in general content) may be resized, it is necessary to ensure that scrolling / panning facilities are available to prevent that access is affected by resizing (e.g. resizing text in a text window without scrolling/panning may cause content to be presented incomplete);



- For web-based text, studies⁴ indicate that around 79% of users scan a page to find a keyword or a phrase while only 16% actually read through the whole text. Therefore:
 - Paragraph should be 5 to 6 lines long at most;
 - Sentences should be limited to 12 to 15 words;
 - Titles and sub-titles should be explicit.

Visual scanning of page structure over time



What just mentioned is also due to the fact that we read primarily by recognizing the overall shape of words, not by parsing each letter and then assembling a recognizable word:

Tree Boy Dog

Therefore words formed only with capital letters are monotonous rectangles that offer few distinctive shapes to catch the eye:

MONOTONOUS
RECTANGLES

Monotonous
rectangles

⁴ <http://www.useit.com/papers/webwriting/writing.html>
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We recommend selecting text that presents downstyle typing (only the first word and any proper noun are capitalized) for headlines, subheads, and text. Downstyle is more legible because as we read we primarily scan the tops of words as evident from the following example:

Legibility depends on the tops of

while is easy to notice how harder it is to read the bottom half of the same sentence:

Legibility depends on the tops of

Using initial capital letters in headlines, reader's scanning of the word forms is disrupted causing less efficient reading:

Initial Caps Cause Pointless Bumps

What just mentioned has also further consequences as choosing typefaces will further influence the efficiency and efficacy of selected content. The most conventional scheme for using typefaces is to use a serif face such as Times New Roman or Georgia for body text and a sans serif face such as Verdana or Arial as a contrast for headlines. Generally text-body is prepared in Times New Roman because it produces a reasonable balance between density of information and overall legibility. Most readers expect a serif font for long blocks of text and find Times New Roman comfortable to read off-screen from paper printouts. Various studies infer that serif type is more legible than sans serif and vice versa, we feel that one can truly judge type legibility only within the context of the situation. Our experience and reference text would suggest that one might use either a variation of the serif font or a contrasting sans serif face for the text body type. Nevertheless it is safest to use a single typographic family and vary its weight and size for display type and emphasis. If one chooses to combine serif and sans serif faces, is recommendable to select fonts that are compatible and don't use more than two typefaces (one serif, one sans serif) on a page. The basic fonts that come with Windows and Macintosh operating system are listed below.

Windows	Macintosh
Arial	Charcoal
Courier	Chicago
Courier New	Courier
MS Sans Serif	Geneva
MS Serif	Helvetica
Times New Roman	Monaco
Verdana	New York
	Palatino
	Times

If content should be used on cross platforms then one should base selection on the typefaces listed, and always check that at least one typeface from each operating system (for example: "Arial, Geneva") is available (e.g. to avoid having the browser render pages in the default font rather than in the specified one). The most useful fonts that ship with the Apple Macintosh and Microsoft Windows operating systems are reproduced here (we have omitted bitmap fonts and decorative or novelty typefaces):

Windows

Times New Roman

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Georgia

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Verdana

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Arial

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Trebuchet

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Macintosh

Times New Roman

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Georgia

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Verdana

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

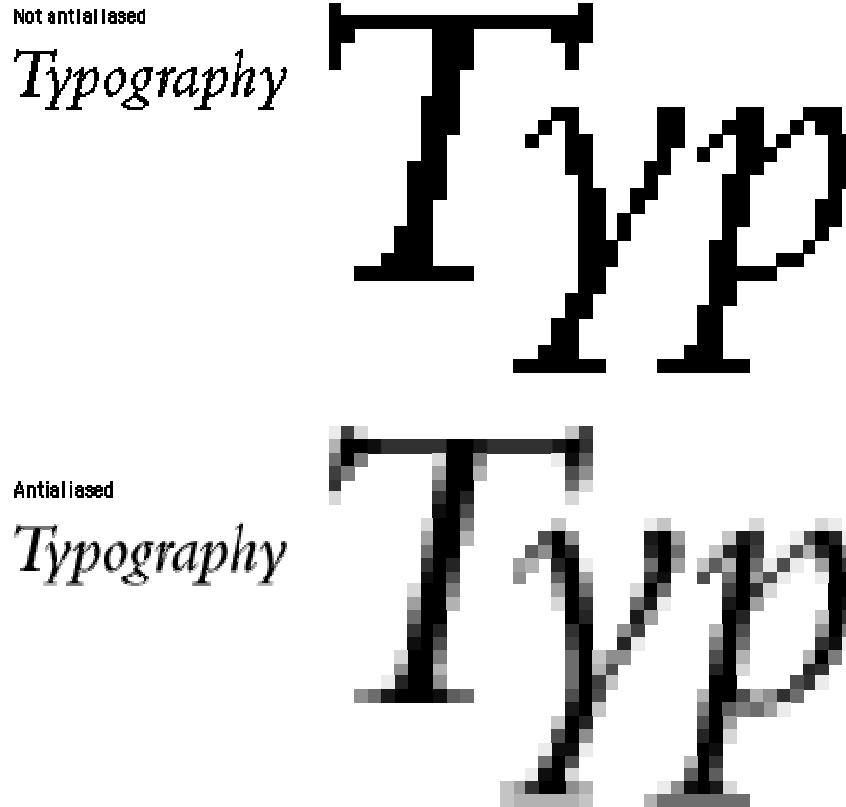
Arial

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Trebuchet

Each typeface has a unique tone that should produce a harmonious fit between the verbal and visual flow of your content.

Another extremely important aspect to be taken into account in the selection phase, as far as text is concerned, is antialiasing. What just stated has both aesthetical and accessibility related aspects. In the following examples are initially reported samples of non/antialiasied fonts. The first image explains the meaning and reason for adopting antialiasing whenever there is a screen-based fruition of content.



The second image presents some examples of different base fonts. The original set has been prepared with a tool and then imported in another. Note that sometimes this may introduce distortions (as evident in the sample) and also how original font format and size affect the overall result.

Geneva	Search	Home	Comments	Index	Type not antialiased Set in Microsoft Word and captured as a screen grab
Arial	Search	Home	Comments	Index	
Times New Roman	Search	Home	Comments	Index	
Georgia	Search	Home	Comments	Index	
Geneva	Search	Home	Comments	Index	Type set in Adobe Illustrator and imported into Adobe Photoshop with antialiasing on (Results are poor for small type sizes; avoid doing this)
Arial	Search	Home	Comments	Index	
Times New Roman	Search	Home	Comments	Index	
Georgia	Search	Home	Comments	Index	
Geneva	Search	Home	Comments	Index	Type set in Adobe Photoshop with antialiasing on Best results for small antialiased type sizes
Arial	Search	Home	Comments	Index	
Times New Roman	Search	Home	Comments	Index	
Georgia	Search	Home	Comments	Index	

After all this it should be clear that text based content can be a quite complex object to deal with “per se”, but there is also an other relevant aspect to take into account and that relates directly with content (more than to its graphical format, and that is the relation between content and its readability and legibility. While Readability is a measure of ability to understand written messages and deals with grammar, structure, and usage (normally associated with *plain language*); **Legibility**, which is the dominant consideration in use of type and

line art, is how the type is presented, and how easily we can recognize and identify a symbol (*letter*) or a group of symbols (*words*). Legibility can also extend to how easily we can recognize and identify the intended use of a graphic (as shown before). Without becoming too technical, these abilities to recognize and identify are a product of the cognitive process. In essence it is possible to consider that the human mind works best on a “*familiarity breeds content*” basis. The familiar is accepted readily while the unfamiliar is excepted. What follows is a set of examples of good and bad kind of text-based contents; each of them is related to some of previously mentioned issues [1-9]. It is worth taking into account that readability formulas and indices⁵ have been in use for a long time to measure the readability of educational texts, and are today also used to assess the readability of web pages; they are based on assumptions such as:

- longer sentences and longer words lead to reading difficulty;
- “*unfamiliar*” words make a text more difficult to read;
- documents with few pronouns generally lack cohesiveness and fluidity;
- too many pronouns may indicate ambiguity;
- too much nominalization (verbs that are changed to nouns) in a document can sound abstract and be difficult to understand, etc.

Nevertheless researchers found that readability formulas work well for English language text, however, they are not directly applicable to text in other languages, e.g. German text is often 15% to 20% more comprehensive compared to the English equivalent. The formulas may also underestimate the reading difficulty for math texts, poetry and other “*terse and condensed prose*”, and “*materials that contain subtle variations in meaning*”. Nevertheless, the comparison of text from different sources allows the calculation of the relative readability, which can be used for the selection of high quality texts [12], [13].

Sample	Characteristics
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (12 points, proportional, non condensed, single line spacing, double justification, no special features used.); text is easy to read and print.
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (12 points, non proportional, non condensed, single line spacing, double justification, no special features used.); text is easy to read and print
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>San serif</i> font (12 points, proportional, non condensed, single line spacing, double justification, no special features used.); text is easy to read and print
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (12 points, proportional, condensed, single line spacing, double justification, no special features used.); text is not easy to read and print.

Sample	Characteristics
This is a sample of text showing line and font spacing, line distance, font size and fea-	<i>Serif</i> font (12 points, non proportional, condensed, single line spacing, double justification, no special features used.); text is still easy to

⁵ e.g. Kincaid formula, Automated Readability Index, Coleman-Liau formula, Flesh reading easy formula, Fog index, Lix formula, SMOG
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tures. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	read and print
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>San serif</i> font (12 points, proportional, condensed, single line spacing, double justification, no special features used.); text is still quite easy to read and print even if not looking nice
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (8 points, proportional, non condensed, double line spacing, double justification, no special features used.); text is not so easy to read and print.
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (8 points, non proportional, non condensed, double line spacing, double justification, no special features used.); text is not so easy to read and print
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>San serif</i> font (8 points, proportional, non condensed, double line spacing, double justification, no special features used.); text is not so easy to read and print
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (6 points, proportional, non condensed, double line spacing, double justification, no special features used.); text is not easy to read and print.
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>Serif</i> font (6 points, non proportional, non condensed, double line spacing, double justification, no special features used.); text is not easy to read and print
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	<i>San serif</i> font (6 points, proportional, non condensed, double line spacing, double justification, no special features used.); text is not so easy to read

We have already mentioned that font/window resize may greatly affect content display aspect and accessibility, hereafter we would like to present the visual result in same case as to make clearer what happens in such cases. For simplicity we have chosen original samples that are in 11 points and present them as they are and how they look once they have been, subsequently, rescaled by 25% or by 50%.

Original	Rescaled to 75%	Rescaled to 50%
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.
Original	Rescaled to 75%	Rescaled to 50%
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph	This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other	This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

spacing and settings. Alignment and other typical text features applied either to font or text lines.	typical text features applied either to font or text lines.	
This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.	This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

bution, colour combination, contrast, font/paragraph special features usage... hereafter a further set of examples is provided focusing on those aspects. One should always select the combination that ensures the best possible result in terms of quality, as the better the content has been designed; the better it will result even when some adaptation is performed. For each example is provided a brief explanation and some remarks. Primarily these are aesthetics and technical remarks, but this is definitely just a very coarse set, as we are not supposed to deliver a “*Visual Communication*” course nor an e-publishing manual, more information can be found in reference sources reported at the end of the document.

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Notes & remarks

This sample comprises: **title**, **sub-title** and **body text**. The **Title** is in San Serif format to make reading easier and attract attention, as the format is different from the rest of the text, which is in Serif format. Font size ratio among title, sub-title and text-body is the usual one; spacing between chars and line are regular, indentation is used moderately, the results is in the overall acceptable and even in case of rescaling will retain a decent quality as can be seen in the 50% reduction example (even though better results could have been achieved if body text would have been a San Serif).

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Notes & remarks

This sample comprises: *title*, *sub-title* and *body text*. In this case all text except the *sub-title* is in San Serif format. Here to attract attention other characteristics are exploited. Italics applied to the first paragraph could be used to put in evidence a summary or some other text that should be read as first. Font size ratio among *title*, *sub-title* and *body* is the usual one; spacing between chars and line are regular, indentation is used moderately, the results is in the overall acceptable and even in case of rescaling will retain a decent quality as can be seen in the 50% reduction example. In respect to the previous example the reduced text is slightly less readable simply because the original font is a 10 points rather than a 12 points, usually, for typographic reasons, San Serif font are 1-2 points smaller than the corresponding Serif one.

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Notes & remarks

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Also this sample has the same content of the previous ones, but in respect to them the most relevant problem is the “*font mix*”. The co-existence of several fonts should be avoided; it causes a lowering in reader’s attention, and results in a lack of harmony and user appreciation. If the specified font is not installed, the operating system will automatically replace it with one of the same “*family*”, nevertheless this may have different characteristics, therefore the rendered result could be somehow different from the one expected by the author. Even content distribution through pages (pagination layout) may vary as each printing device may re-map fonts on own ones that may slightly vary in terms of size and spacing, therefore a carefully studied paging may be spoiled by a little variation in font pitch or spacing. Apart from this, the sample above presents another problem, when resized (as in the 50% example) the non-proportional characters present poor aspect and are hard to read (just as the subtitle).

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Sample title

Sample sub-title

Sample body text - This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

This is a sample of text showing line and font spacing, line distance, font size and features. Paragraph spacing and settings. Alignment and other typical text features applied either to font or text lines.

Notes & remarks

Also this sample has the same content of the previous ones. In respect to the sample just presented, this has an advantage: nominally there are fewer fonts in use and therefore the result is slightly better. If the first paragraph should be in *Italic* as the subtitle result would be better as this would give a clear message: *title*, *sub-title* and *first paragraph* are the part to look at to know what we have at hand. The *body* could be examined only if info acquired after a first level exams result in a sufficient level of interest for the reader. In this case the resized sample is still quite readable. If the first paragraph would have been in *Italic* it will be evident even in the resized format and therefore attention would still be attracted as pointed out before.

Other critical quality factors are colour and contrast combinations. W3C Guidelines⁶ recommend: “*Don’t rely on colour alone. Ensure that text and graphics are understandable when viewed without colour. If colour alone is used to convey information, people who cannot differentiate between certain colours and users with devices that have non-colour or non-visual displays will not receive the information. When foreground and background colours are too close to the same hue, they may not provide sufficient contrast when viewed using monochrome displays or by people with different types of colour deficits*”.

Acceptable	Un-acceptable
Sample Text...	Sample Text...

⁶ <http://www.w3.org/TR/WAI-WEBCONTENT/#gl-color>
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Sample Text...	Sample Text...
Sample Text...	Sample Text...
Sample Text...	Sample Text...
Sample Text...	Sample Text...

More references can be found in [30-40].

5.1.2 Images

For image-based content it is necessary to ensure that:

- Image dimension has to be balanced with respect to space assigned to text;
- Image format should be selected according to usage (web, CD, DVD, print...);
- Image compression format should be selected according to usage (*lossless* for print, CD, DVD... *lossy* for thumbnails, previews, web...);
- Selected resolution should allow both *zoom-in* and *-out* with a quality level that can be considered generically accepted (depending on the context);
- Image default display dimension has to be chosen depending on usage (print, web, CD...),
- Panning should be avoided for the default appearance while is fully acceptable for a detailed vision like during zoom-in;
- Image colour space should be selected according to usage (CMYK for print, RGB for monitor);
- Colour depth (8/16/24-bits 256 colours...) has to be selected according to application context;
- Image title/caption/description should be available;
- Image additional description/information should be available to ensure accessibility;
- Image readability depends also from framing type, therefore it is better to choose dimension and resolution in relation to image content (i.e. a square packed of people, a portrait, a music manuscript⁷, etc...).

The first thing to take into account when selecting content is the effect of vision problem/deficiencies. This is very important as usually people designing or selecting content are perfectly able to see and may lack the knowledge of visual deficits. Just for reference we report hereafter a brief summary of colour vision defects:

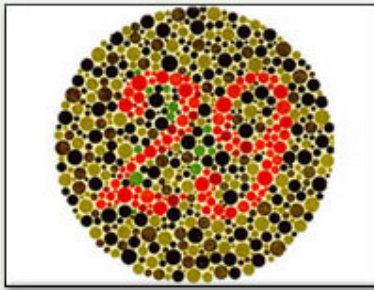
Blue-Yellow Defects		
Type	Form	Cause
tritanopia	dichromatic	missing S cones

Red-Green Defects		
Type	Form	Cause
protanomaly	trichromatic	dysfunctional L cones
protanopia	dichromatic	missing L cones
deutanomaly	trichromatic	dysfunctional M cones
deutanopia	dichromatic	missing M cones

Having said so, let's take into account what happens to a set of sample images when the abovementioned defects occur. The images are taken from [31] and are useful to explain the issue.

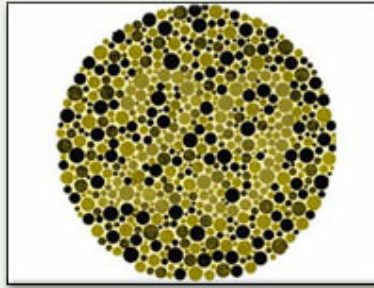
⁷ To have proper readability of a music sheet (especially if handwritten), is needed a high-resolution image, otherwise the 5-lines musical staff (e.g. in a raster image) tend to appear mixed among each other (at least at certain zooming rate). Moreover the set of phenomena involved in music reading need a wide range of notes.

On the other side understanding music implies always being reading one-step-forward playing (or singing); for these reasons vector or XML representation of music has to be preferred when dealing with PC-based music editing; this accounts for the need of a proper combination of the two solutions to provide an efficient and effective solution.



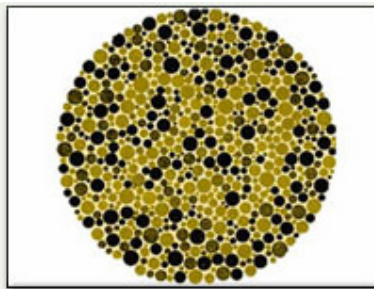
Normal – the reference image is reported on the left, a test image based on the related set of colour on the right.

For a person with normal sight is easy to read the number 29 in the test image and to distinguish also a number of different colour spots defining the shape.



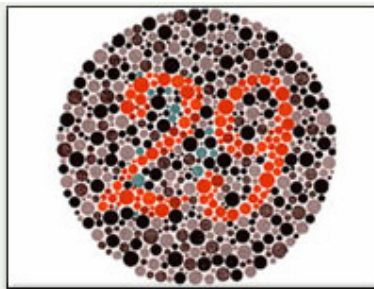
Protan (L-Cone) – the reference image is reported on the left, a test image based on the related set of colour on the right.

In this case is much more difficult to distinguish the number 29 and the range of spots colour is quite limited with a quite high contrast.



Deutan (M-Cone) – the reference image is reported on the left, a test image based on the related set of colour on the right.

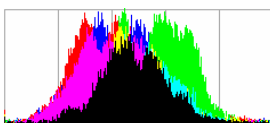
Also in this case is difficult to distinguish the number 29 and the range of spots colour is quite limited and with a lower contrast than in the previous case.



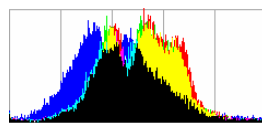
Tritan (S-Cone) – the reference image is reported on the left, a test image based on the related set of colour on the right.

In this case is much not so difficult to distinguish the number 29 but the background set of spots seems to be biased towards grey and blue.

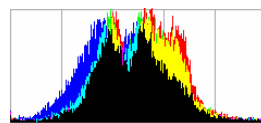
Hereafter are reported the RGB spectrums of the reference images for the reported cases:



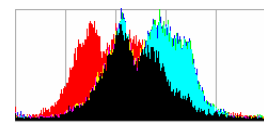
Normal



Protan (L-Cone)



Deutan (M-Cone)



Tritan (S-Cone)

What just presented has some direct consequences in the content selection process, at least as far as metadata or supplementary information is concerned just as pointed out in the following examples.



Example 1

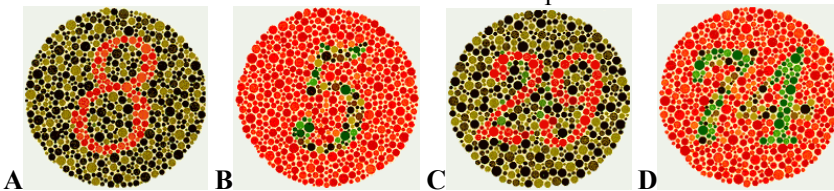
For *protanomalous* individuals a picture like the one aside presents some challenging aspects, as it will be easy to fail to distinguish a “green traffic light” from the various “white” lights. This will definitely have an effect in a driving manual or training course. It is true nevertheless that this could be considered a minor problem as the percentage of affected people is not too high and potentially most of them will have to take special training for acquiring a driving license or may be imposed some restrictions in the circulation.



Example 2

Using the side image of **tomatoes, limes** and **oranges** as a part of an advertisement conveying some message related to colour may prove inefficient for *dichromat* individuals who will see no perceptible difference between red, orange, yellow, and green. All these colours that seem so different to the normal viewer appear to be the same colour for this two percent of the population. Again the percentage may seem minimal but in Europe this means over 6 millions individuals.

Just to give a further example of how subtle the issue could be we report hereafter some samples of test patterns used to assess vision related issues and the procedure to achieve them (at least one of them).

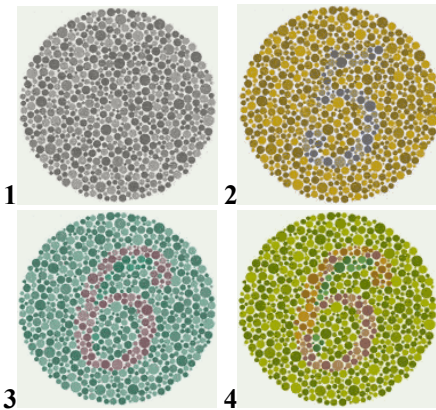


Vision test examples.

Normal people should see A=8, B=5, C=29, D=74.

Colour deficient people may see A=3, B=2, C=70, D=21.

Designing a test pattern in 4 steps



Step 1 – Select a random pattern of grey level dots.

Step 2 – Select a digit pattern that is defined by yellow/blue variation only. Observers able to do yellow/blue discrimination can detect it. Most people with red/green deficiency will still be able to do yellow/blue discrimination and so will see the digit 5 pattern.

Step 3 – Add another digit pattern defined by red/green variation and easier to see than the pattern defined by yellow/blue variation.

Step 4 – Add all three components: the random brightness pattern, the yellow/blue pattern, and the red/green pattern. Observers with red/green deficiency will not be able to see the red/green pattern; their response will be based on the yellow/blue pattern only.

Normal observers will see both patterns and since the red/green pattern is stronger they will base their judgment on the red/green pattern and see the digit 6.

It is important to take into account that what just reported does not only apply to visually impaired as there are other phenomena that will bring to the same result even for normal people, just like images revealed by ultraviolet or grazing light. For example *invisible patterns* are revealed on this Cleopatra butterfly when the ultraviolet light is seen.



As already mentioned content selection is primarily guided by the expected target audience and usage of the content. Therefore what presented here should be used as a complementary set of info to be taken into account whenever accessibility has to be taken into account for any reason (content is devoted to institutional training in school or public administration...). Moreover the provided information can also be profitably

used to design advertisement or promotional content with the highest potential audience. Having stated this it is worth recalling that if digital images are properly prepared according to professional standards, it will not be necessary to require a glossy print for quality evaluation. All publishers that accept digital images have specific guidelines for archival and usage. Although different entity will have different guidelines, here are some general requirements that will help in the selection and management process. In terms of **formats** it is worth remembering that usually digital files embedded within a “document” do not fit for publication. Usually those are low-res while in the editorial process are used the high-res ones. In other words, usually, they don’t have the required resolution and characteristics for printout, therefore native TIFF or EPS files will be required while JPG files may only fit for web publishing. In term of **resolution** it is worth remembering that images must be scanned at the proper resolution in order to ensure print quality:

Object	Resolution	Unit
Continuous tone (greyscale) / colour figures with no text	300	DPI/PPI
Continuous tone (greyscale) / colour figures with text	600	DPI/PPI
Black-and-white line art	1200	DPI/PPI

Whenever scanned images have to be used it will be better to select those black-and-white images scanned and save in greyscale mode (not black and white). While for continuous tone (greyscale) and colour images should be preferred those scanned in RGB colour mode, but saved in CMYK colour mode. All these info should be recovered in the image annotation or metadata. Often archives hold two versions of the same digital files: one with annotations and one without. In the event that the annotation needs to be edited, the clean copy can be used to re-label the image and obtain a new annotated one. If possible, it will be better to obtain the original image rather than graphics downloaded from Web pages because the resolution is too low for publication. Usage of scanned images/photographs from published materials should be avoided unless necessary as usually these images have been screened with a halftone pattern that will create an unpleasant moire effect. The **Image Size** used should be at 100% of the final print dimensions, so that scaling is not necessary. For **Graphs and Charts** it would be better not use greyscale (black and white solids or patterns are preferred), or 3-dimensional charts.

5.1.3 Audio

For audio content it is necessary to ensure that:

- Quality and compression have to be selected depending on usage (web, CD, DVD, mobiles, provisioning...)
- Sampling frequency should ensure adequate quality for the most likely rendering media or device (so that even if some degradation occurs no major defect will be perceived);
- Bit-rate should be adaptable in accordance with user needs;
- Original recording volume level has to be selected depending on usage, it should be neither too high nor too low as in the first case it would be digitally distorted and in the second case noise level would be unacceptably high;
- “readability” may be affected by graphical background/interface (some combinations may result in a loss of attention to audio content); moreover it depends also from proper synchronization with text or notation (if present).
- Any sound effects, when coexisting with some speech, should be kept at a suitable level to not degrade the clarity of speech itself. Basically background audio level has to be adjusted so to ensure proper voice understandability; if necessary, an appropriate amount of audio compression should be used to maximise the audibility of the voice
- Spoken language should be common one (possibly slang should be avoided, unless specifically needed for training / learning purposes);
- Audio should be mono-compatible if intended to be played also through mono devices (i.e. any stereo effects used should cause phase cancellation when played back in mono)
- Audio title and description should be available;
- Audio transcription should be available, more specifically:
 - For audio in foreign languages text based transcription or subtitling should be available;

- Text version should be available to ensure proper accessibility by hard of hearing people.
- o If possible, audio content should be properly indexed (this could be crucial for classical music in order to easily reach the point of his interest). Even if this problem does not appear in CDs, it is very important for sound archives where often the audio content is not indexed.

5.1.4 Video

For video content it is necessary to ensure that:

- o Quality and compression have to be selected depending on usage (web, CD, DVD, mobiles...);
- o Frame rate (30 fps...) should be selected in accordance to rendering media, or device, and adaptable according to user needs;
- o Video standard (PAL, NTSC...) should be selectable so fit customers needs (references are NTSC in US, and PAL in EU, only rarely SECAM, mostly in France);
- o Window size should be user configurable (at least among a pre-defined set of values like: VGA, QVGA, SVGA, XGA...);
- o Video title and description should be available;
- o Video additional description information should be available to ensure accessibility;
- o Video image should be clear and sharp, focus should be good and colour combination balanced;
- o Contrast level must be acceptable when played on target devices (i.e. dark areas not still visible, light areas not bleached out, yet adequate distinction between brightness levels);
- o Playback artefacts should be avoided;
- o Any accompanying audio tracks should be correctly synchronised with video content
- o Subtitling should be available (at least to manage when audio dubbing is not available).
- o If possible, video content should be properly indexed (just as already mentioned for audio)

5.1.5 Animations

For animation-based content it is necessary to ensure that:

- o Format and compression have to be selected depending on usage (web, CD, DVD, mobiles...);
- o Frame rate (30 fps...) should be selected in accordance to rendering media, or device, and adaptable according to user needs;
- o Window size should be user configurable (at least among a pre-defined set of values like: VGA, QVGA, SVGA, XGA...);
- o Colour depth has to be selected according to application context (8/16/24bits, 256 colours...);
- o Animation title and description should be available;
- o Animation additional description information should be available to ensure proper accessibility;
- o Where possible, a suitable vector-based format (such as Macromedia Flash “.swf”) should be used to allow smooth scalability for different playback devices.

5.1.6 Multimedia

For multimedia content it is necessary to ensure that:

- o All previously mentioned rules have to be applied to each production element;
- o Players needed for fruition should be available for installation along with content (in case user has not the needed SW);
- o The user should be able to select GUI effects (whether to have a 3D looking or flat interface...);
- o Support info for content management and players needed for fruition should be available;
- o Each element of the content must be consistent in quality, use of colours, styling, frame rate, compression level, audio level, etc. in order to give the feeling of an integrated production;
- o Interactive content (buttons, game functionality, algorithms and other scripted elements) must be:
 - easy to use;
 - fully reliable and resilient;
 - compatible with target platforms;
 - compatible with distribution network servers if responses are required.
- o Detailed audio and text description should be available to ensure proper accessibility by people with vision or hearing impairment.

In order to clarify and sum up all what exposed do far, we can examine slides, as typical form of multimedia content. Later on we will examine some example of more complex multimedia content. As far as presentations and slides are concerned, the most usual distribution format is PPT, PDF or PS. In some cases they are packed including the player. Slides are merely a visual tool aimed to support a presentation, help the audience follow during it and remember afterwards. Therefore the selection should be based on the effectiveness in keeping the attention of the audience and to achieve this can is necessary to:

5.1.6.1 General issues

- Present only **one** thought per slide. So the audience will spend more time listening and less time reading if slides
- Let slides be a brief representation of what is being said.
- Do not overwhelm the audience with information.
- Use footnotes to eliminate distracting data.
- Do not read slides.
- Use audio/video excerpt only when really needed. Limit their length to keep presentation size under control. Remember that if a print-out is given info related to audio/visual content will be lost unless supplementary info are provided.
- Use already resized images to save storage. If possible use also formats that allow compression as if slides will be available for download it is advisable to keep file size into reasonable values. Eventually produce PDF format for download.
- Include an index of covered topics.
- Include a legend for acronyms.
- Include a reference section if needed or relevant.
- Include a contact page at the end.

5.1.6.2 Text related issues

- Limit titles to **seven** words at most. Longer titles should be broken into title and subtitle.
- Limit subtitles to **five** words at most.
- Use bulleted text because they are easier to read than full sentences.
- Each bulleted item should have no more than **ten** words per line.
- Each slide should have a maximum of **seven** lines of bulleted text per slide. If you have more, break the information into two or more slides.
- Capitalize only the first letter of words that begin sentences or that are proper nouns.
- Do not capitalize the first letter of every word in a sentence.
- Use upper- and lower-case text, not all capital. All caps take up more room, take longer to read, and make it difficult to identify acronyms.
- Make **title** font size at least **40**-points.
- Make **subtitle** font size at least **30**-points.
- Make the **body text** font size at least **26**-points. Do not use a font size smaller than 22-points. If it is needed to use 22-points or smaller font to fit text on the slide, break the information into two slides.
- For **footnotes** use a **12**- or **14**-points font size.

5.1.6.3 Colour related issues

- Use blue, either solid or gradated shades, for backgrounds.
- Use yellow and/or white for text because both show up well against a blue background.
- Do not use pre-designed templates with unnecessary graphics.
- Do not use textured backgrounds. It makes it difficult to read the text.
- Do not use red and green colours for text because colour-blind members of the audience cannot differentiate between the colours red and green. Also, red and green text bleeds and is difficult to read. Limit these colours to bullets and clip art.

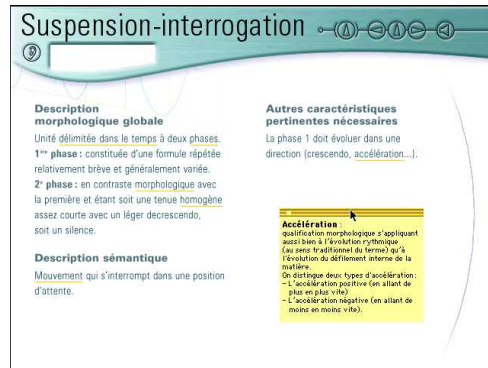
5.1.6.4 Images, Clip art, Charts and Graphs related issues

- Use images or clip art to strengthen the message (e.g. if the point is: “*smoking kills*”, show a skeleton holding a cigarette).
- Do not add images or clip art if it does not enhance the meaning.
- Do not sacrifice content for images or clip art. If text is too small because a graphic takes up too much space, delete the graphic or place it by itself on another slide.
- Use the correct type of graph to illustrate data:
 - **line** graphs show **trends** over time,
 - **bar** graphs **compare** values,
 - **pie** charts **show** values relevance against a whole.
- Compare similar elements in one chart.
- Use **two** y-axes when elements are measured by different values (e.g. if one measurement is in percentage and the other is in centimetres, each element should have its own y-axis).
- Use symbols to distinguish between lines when creating black-and-white line charts.
- Avoid dashed, dotted or grey lines.
- Use two-dimensional graphs instead of three-dimensional graphs. The values in three-dimensional graphs are misleading and difficult to discern on a two-dimensional surface.
- Do not use a table if the same information can be presented as a short sentence, a piece of art, or as a graph or chart.
- Keep tables simple by including only the data needed for discussion.
- Compare similar elements. For example, compare demographics (gender, age, race, etc.) in one table, but compare operative findings in another.
- Limit tables to **four** columns and **seven** rows. Break larger tables into multiple slides.
- Compare numbers in columns, not rows. It is easier to compare stacked numbers.
- Round numbers if necessary (e.g. 0 and 100 do not need decimals).
- Use footnotes to eliminate distracting data from your table.
- Include a legend for acronyms.

5.1.6.5 Multimedia product samples

As already stated it is worth also to take into account more complex examples of multimedia content to better understand how compound objects have to be selected. Here we give for granted that the selection is for distribution and not for content fragmentation and re-assembly, as in the latter case most of the issues tackled here may be solved (given the licensed grant for re-styling and adaptation of content). As this is a guideline presented examples of multimedia products are described via screen shots accompanied by the source and a tiny set of notes of remarks. Selected products do not present a too strongly “*branded*” style and are therefore best suited to point out selection criteria. It is worth to take into account that in AXMEDIS it will be possible to have access also to some already aggregated content or to content presenting a structured navigation and involving several media formats.

Example 1 – Nouvelles clés pur l’écoute,

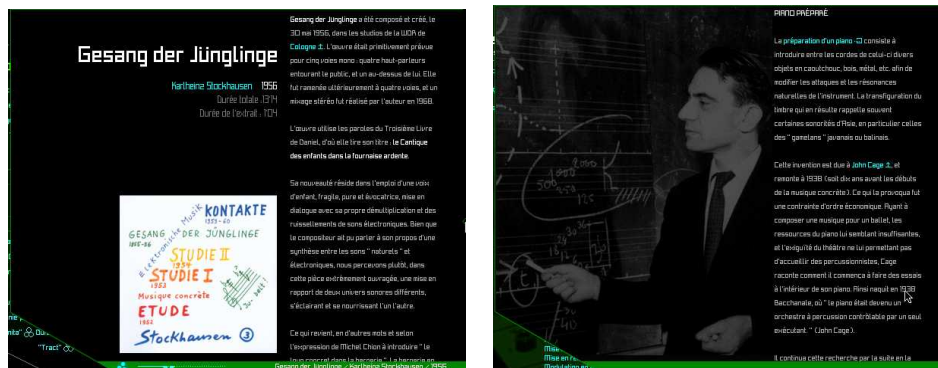


Source MIM / IRCAM,

Notes & remarks

In the overall it presents a good, clear layout, font sans serif, easy criteria of navigation between content. The disk image at the centre of the image attracts the attention and makes it easy for the user to identify available functionalities. The screen partition in four areas with different backgrounds makes easy to remark the presented content. Images used as background are directly and clearly related to the presented content. This second screen refers to another portion of the product, providing more technical and specific information. It is remarkable the clear readability of very technical content, with good proportion between text size, leading and background. Hyper textual links are easy to locate and understand (colour link = popup window). The interface has been cured under all aspect as is apparent from the navigation buttons in the top part of the screen that is clearly devoted to host navigation and control area.

Example 2 – La musique electroacoustique

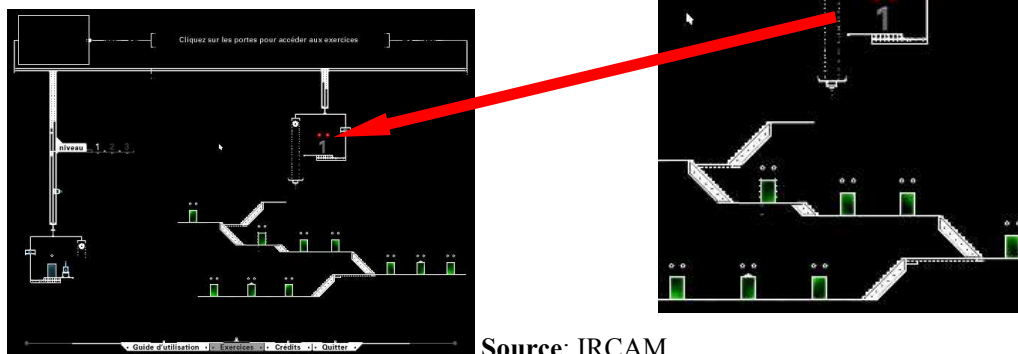


Source: IRCAM

Notes & remarks

In this product the interface appears to be over-simplified and text (despite being sans serif) has been given a “techy” approach (squared stile) that given the selected font size is a bit too small. Following some specific design purpose, pop up windows take up the entire screen but the font is perhaps too narrow, yet it is compensated by the high contrast. Links are clearly marked by a bold font with a different colour and (in some cases) also special characters.

Example 3 – 10 jeux d’écoute



Source: IRCAM

Notes & remarks

Example of purely graphic interface (text appears as tagged attribute to items). The overall interface is over-simplified and aims to recall an “arcade like” game (just like Donkey Kong, Mario Bross, Pokemon, Resident Evil...) probably in relation to the product title that actually means “10 listening games”. Also the solution adopted to represent access to the different level is in line with the overall approach and this gives the user a sensation of consistency and denotes high cure in the overall design.

Example 4 – Conoscere e capire Giuseppe Verdi

Source: De Agostini, 1996

Notes & remarks

Despite the high quality of contents some choices in terms of interface and graphic layout badly affect overall product acceptability. Among most remarkable problems there is the adoption of a serif font that turns to be not easily readable on the chosen background. Musical symbols are used as control/navigation buttons but there is no relation with their usual meaning in music; therefore their interpretation result difficult and can be very upsetting for customers, which very likely are music amateurs, professionals or students. The choice of music symbols as interface elements for navigation has another basic problem: they are not intuitive once turned into the main navigation bar and not accompanied by an explanatory text (as in the second screen example). Several buttons are located around the page, each with a specific function, yet all basically related to overall navigation in the content. This choice leads to not-clear interface functioning; who could guess that “crowns” are used like “arrows”? Moreover crowns usually stand for an “*ad libitum*” prolongation of sound or pause, and not for a dynamic direction like arrows.

6 Content management process (ILABS, ANSC, AFI, XIM, SEJER...)

The first step in designing any content is to define the goals. Without clearly stated mission and objectives the design and production phases will drift, bog down, or continue endlessly. Careful planning and a clear purpose are the keys to success, particularly when working as part of a development team. Therefore first is necessary to analyze needs, expected target audience and goals, then gather information and finally start creating a development specification document that details what to do and why, what technology and content will be needed, how long the process will take, what will be spent to do it, and how results will be assessed. The specification document is crucial, as it is both the blueprint for the process and the touchstone used to keep the project focused on agreed goals and deliverables. Depending on the kind of content the development process may slightly vary, but in the overall the structure will remain basically the same with the following steps:

- | | | |
|------------------------------|--------------------------|-----------------|
| 1. Definition and planning, | 4. Content construction, | 7. Evaluation, |
| 2. Information architecture, | 5. Content marketing, | 8. Maintenance. |
| 3. Content design, | 6. Tracking, | |

The abovementioned steps can be further divided into sub steps that better clarify the process. Please note that in this sub classification are located the major differences in the various content production cycles. Taking as a reference the production of content in a multimedia environment we have the following decomposition of the abovementioned steps. So we have that “*Definition and planning*” is usually divided into:

- | | | |
|--------------------------------------|--------------------------|----------------------------|
| 1. Production checklist development, | 2. Technology selection, | 4. Budgeting, |
| | 3. Support definition, | 5. Appoint a chief editor. |

While “*Information architecture*” is usually divided into:

1. Detailed design specification,
2. Detailed description of content,
3. Navigation structure⁸,
4. Detailed technical support specification,
5. Supported technology identification,
6. Technology resources identification,
7. A schedule for implementing the design and construction,
8. One or more prototypes of sample contents,
9. Multiple graphic design sketches or roughs.

The last step that presents a number of sub-step worth to be explicitly mentioned here is “Content design” that is usually structured as follows:

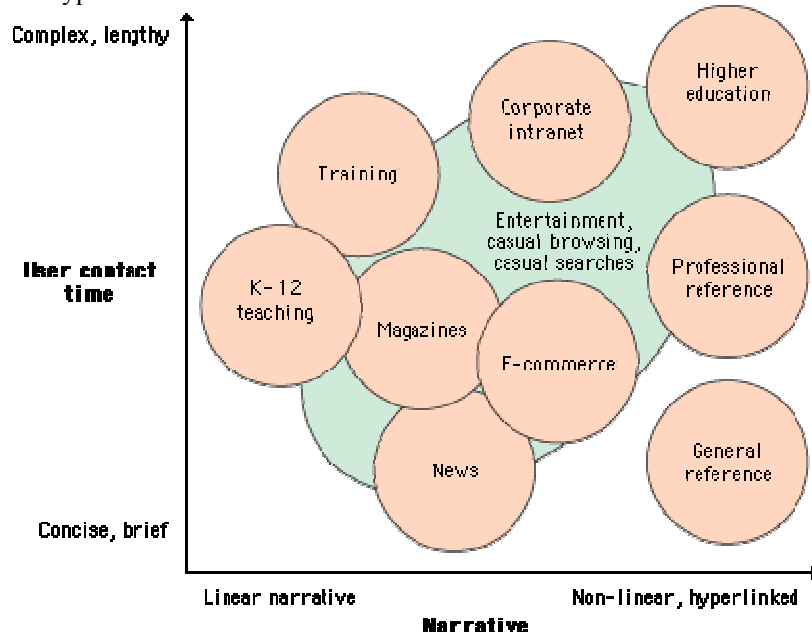
1. Content components detailed organization and assembly,
2. Functional and logic components,
3. Templates,
4. Accessibility.

Usually the content components, detailed organization and assembly is further subdivided into:

- Text editing and proofreading
- Graphic design specs for all object types
- Detailed composition or finished example
- Content templates design
- Illustrations
- Photography

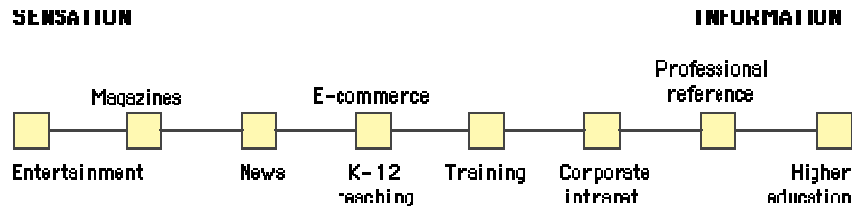
As otherwise it will turn out into a too complex activity and its schedule will result too cumbersome. In this manner most of the activities can be planned in parallel with some overlap. The need for planning and structuring prior to pass to content design and production phase emerges clearly from the following picture that plots major themes for information delivery against two fundamental variables:

- linearity of the structure of content presentation and
- length of the typical user's contact time.



The diagram just presented is usefully complemented by the following image, where the various kinds of audiences are presented on a linear axis giving a clear perception of the balance among sensation vs. rigorousness of information.

⁸ Including thumbnails, outlines, table of contents...
AXMEDIS Project



As already stated, even if the content production process is more or less the same regardless the kind of content, terms adopted to describe each step are quite different, moreover concepts about structuring information are at present still mainly largely based on the organization of printed books, periodicals, library indexing and cataloguing systems that developed around printed information. Quoting the “Web Style Guide – 2nd Edition” we could say that the “*interface standards*” of books in the English-speaking world are well established and widely agreed-upon. As a matter of fact detailed instructions for creating books may be found in such guides as *The Chicago Manual of Style* or *Xerox Publishing Standards: A Manual of Style and Design*. Therefore although contents differ in terms of development process following their own nature, most of the guidance needed to design, create, assemble, edit, and organize multiple forms of media do not differ radically from current practice in print media. For example most Web documents can be made to conform to *The Chicago Manual of Style* conventions for editorial style. Text organization and much of what an organization needs to know about creating clear, comprehensive, and consistent internal publishing standards is already available in the *Xerox Publishing Standards: A Manual of Style and Design*. Following what just mentioned, we could say that each content could be regarded as a document and therefore its basic elements can be determined checking the following set of rules:

Who – the source should be always available

What – all documents need clear titles to capture the reader's attention

When – temporal reference is extremely relevant to determine relevance

Where – content location (URL) should always be present whenever available

For example every Web page needs:

- An informative title (which also becomes the text of any bookmark to the page)
- The creator's identity (author or institution)
- A creation or revision date
- At least one link to a local home page or menu page
- The “home page” URL on the major menu pages in your site

Just as an example, we report now the process of book production in the professional environment (in this case specifically the one of composers and musicians thanks to kindly provision of insight by one of the partners: ANSC). As in this case audience is essentially composed of musicians and scholars (not a broad public) the production expenses are concentrated in a quite short time while revenues are usually split over 10 or more years; content quality has to cover the first place in development, while communication format has to fit for at least a 5-years selling time; the process can be synthesized as follows:

- An author proposes own book (*manuscript*), the work is read by a committee (*go / no go* step); in alternative an author is asked to produce a book. In this latter case the “*go / no go*” step is dropped. If there are any problems with the content... the author is asked to revise and correct.
- The author is asked to provide the iconographic section content in low resolution, plus info for requesting the images to the owners or proof of proper clearance.
- The author has to provide the musical examples or the score in camera ready format (with all redaction rules that would applied) as a file of Finale. If this is not the case the author would be asked to correct his printout and musical examples / score.
- The publisher eventually check the music and produce the graphical files of the examples / score.
- The publisher assembles the book on a previously approved layout template, or prepares it with standard desktop publishing tools and procedures.

- 1st proofreading to the author.
- Texts and images for the cover are selected and prepared.
- 2nd proofreading (internal only).
- The book is prepared for printout, and it is given to an external typography.
- The typography change the low resolution images (acquired in the meantime while the process is running) with the corresponding hi resolution images taken from transparencies, photos, etc...
- The specimen of the book is prepared for the last "*go for print*" decision.

The overall process lasts at least 6-8 months (even 1 year). The readability of books produced following such process is usually not under discussion because all related issues have been taken into account when selecting the graphic layout, nevertheless some readability issues may still be found, especially when books are converted into PDF files. As already stated, similar description could be provided as far as music, video, animations or multimedia productions are concerned, but this is somehow out of scope of the present document as focus should be on the content selection. Nevertheless is important to recall that content undergoes a real life cycle that goes well beyond production. So far we have always been providing info on content design or production even if when describing the general process we mentioned that there are also marketing and maintenance steps. Basically this means that once content has been produced it has to be classified, tagged and archived. This latter step opens up to parallel processes: one dealing with content maintenance (updating, renewing/restyling or even restoring), and the other dealing with promotion, marketing and sale of the content itself (this also implies IPR management...). These passages may seem obvious but they are not at all so simple as they seem. Especially content maintenance and IPR management.

7 Selection criteria (ILABS, XIM, OD2, TISCALI, CONVERSE ...)

This section covers selection criteria form an overview of the overall process to cover then aspects related to constraints and suitability.

7.1 Overview of content selection process

Due to the large quantity of content available to AXMEDIS, it is necessary to plan a structured selection process based on clear criteria. The criteria for selecting content can be conveniently divided into objective, factual *constraints* (such as technical, legal and commercial) and the subjective, qualitative issues concerning the *suitability* and attractiveness of content. The objective constraints are simpler to evaluate, and could possibly be automated as most of the required metadata should already be available. It is therefore recommended that the selection process should start by “funnelling” candidate content through a set of objective tests based on the measurable constraints of the AXMEDIS distribution channels. If the candidate content meets these objective criteria, it must next be evaluated against its suitability for the purposes required in AXMEDIS:

- Test case performance analysis;
- Dissemination support - supporting project promotion;
- Demonstrator operation - requiring content to be competitively priced & attractive to target market.

This second stage clearly requires more manual intervention and evaluation, and could be achieved by an evaluation team applying a scoring process. The three areas of use in AXMEDIS are not mutually exclusive, nor should content be required to suit all three uses. For example, some content may be appropriate to all three uses, while some content may be ideally suited for test case evaluation but not sufficiently commercial to be used by the demonstrators.

7.2 Constraints

The following section examines the constraints affecting content selection for AXMEDIS. As described above in the approach, these constraints are more objective and easier to determine than the more subjective “*suitability criteria*” described later. The constraints can therefore form the first stage of “*funneling*” of content in AXMEDIS, effectively filtering out candidate content that does not comply with the constraints set by

the project. The subset of compliant content can then be evaluated against the suitability criteria, saving the need to subjectively assess the full range of candidate content.

7.2.1 Potential Available Rights (PAR) and other Legal Constraints

A crucial constraint for object selection is the rights issue; the rationale is simple: selection criteria are mainly imposed by expected usage, target market and available rights (both at authoring and distribution level). In order to analyse these constraints, it is useful to separate the B2C and B2B scenarios:

7.2.1.1 Business to Consumer (B2C)

The table below describes the known legal or rights-related constraints for each of the distribution channels in AXMEDIS.

Channel	Known legal/rights constraints
PC online music	- Each object has to be IPR & copyright cleared prior usage for all desired target market, both in terms of location & language (e.g. English = worldwide). - Rights infringement, due to user fruition, should be avoided by adopting all possible security and protection means. - In case of infringement it should be evident that the breach is due only to user “<i>malicious will</i>” and cannot be accounted against distributor. - Usage case licenses have to be also specified per each object. Licenses should specify whether content can be streamed, downloaded, saved on disk, copied, played on multi-devices, CD burned or DVD burned.
iTV satellite	- Rights infringement, due to user fruition, should be avoided by adopting all possible security and protection means. - In case of infringement it should be evident that the breach is due only to user “<i>malicious will</i>” and cannot be accounted against distributor.
Channel	Known legal/rights constraints
Mobile	<u>Legal constrains for all Adaptation Configurations:</u> - As adaptation implies content extraction from the AXMEDIS object, format conversion (e.g. WAV to MP3), performing relevant transformations (e.g. reduce quality, clip), and packing resulting content as a new object; PAR should comprise this, and proper licenses should be available; - As adaptation may imply creation of intermediate transcoding files (if required for the content adaptation - e.g. CD-audio to intermediate WAV to MP3); PAR should comprise this, and proper licenses should be available; <u>Legal constrains for Off-Line Adaptation Configurations:</u> - The adaptation system must respect ‘licensing instructions and materials’ to grant proper re-licensing of adapted-content. This implies a re-licensing agreement and the issuing of all related licenses for the entity performing the off-line operation (adaptation and re-licensing).
PDAs kiosk	- Each object has to be IPR & copyright cleared prior usage for all desired target market, both in terms of location & language (e.g. English = worldwide). - Rights infringement, due to user fruition, should be avoided by adopting all possible security and protection means. - In case of infringement it should be evident that the breach is due only to user “<i>malicious will</i>” and cannot be accounted against distributor.

7.2.1.2 Business to Business (B2B)

For B2B use, the key legal implications concern PAR and licensing – the PAR of the content in terms of its ability to be used in the required format and distribution channel, and the licensing terms relating to the pricing model of the license in relation to the anticipated revenues and volumes of the end product. Another legal

factor for B2B use of content is clearance where required, in terms of obtaining appropriate authorization from the content owner for a specific instance of content use within a specific project. Even if the issues of licensing and IPR clearance are out of the main scope of the present document it has to be underlined that one of the major constraint affecting the content selection and acquisition criteria is the hurdles associated with obtaining the rights necessary to bring together text, images, music, video and other content for their aggregation, fruition and distribution. Critical elements of the content acquisition process include evaluating the product carefully and thoroughly to identify and classify all elements of content, deciding systematically which of those elements may require third party licenses or releases, tracking down the persons or entities with authority to grant the rights needed, and, finally, negotiating the necessary licenses and other agreements. Music is, in particular, an important part of most digital content. It is important to know to what end that music content is going to be utilized, which music-related rights are implicated, who owns or controls the necessary rights, and whether the anticipated value of including the content in the product justifies the cost and/or difficulty of acquisition. Because of the great storage capacity of the new digital media, the same new media product can incorporate hundreds of works for a planet wide distribution and exploitation. This leads to a number of concerns related to new media producers in clearing rights including the following:

- No one knows what its worth is and the asking price is the same as for the traditional media, which turns out to be exorbitant in the new media context.
- Provisions of applicable laws are unknown.
- There are no licensing standards in this domain.
- The difficulties could increase the transaction costs independent of the cost of the license itself.
- Current licensing framework requires that rights for the marketing of music and related multimedia copyrights be acquired at each of the national collecting societies for the different territories

Payment system issue. The current inadequacies of the options available have to be highlighted. With such a limited number of options, their impact on a host of commercial and consumer issues is of major significance. These include the choice of business models; the definition of markets, both demographically and territorially; the flow of consumer data; and the service/consumer relationship generally. The whole area of payment and billing systems is highly complex. As their use becomes more pervasive they could bring profound changes to the established economic order within which participants in digital content value chains have traditionally operated. The lack of ubiquitous e-payment systems remains a significant barrier to the enabling of digital content commerce. The current solutions do not cater adequately for micro-payments necessary for many new business models, in certain consumer sectors and for the interoperability demanded by consumers across platforms. Before incorporating an existing work or an extract from it into a new media product, the various rights have to be cleared, which involves the many stages:

- Identify work category/categories. A single product can incorporate works from several categories.
- In case of reproduction of a work extract determine whether the extract constitutes a substantial part of the reproduced work (within the meaning of the law), if so, continue the procedure.
- Depending on the type of work and the intended use, the user need to check the appended list of collecting societies who are likely to represent the rights owners and contact them.
- In many cases, the commercial value of exploiting an existing work in a new content is not established in advance and will depend on circumstances. Therefore interested parties must negotiate conditions on a “case-by-case” basis.
- Rights clearance depends on the relationship between the work or the extract to be used and the product as a whole (for example, two photos out of 500, a 30-second extract of a film in a 60-hour game, one paragraph from a book out of 100 pages of text, etc.), its position within the work as well as the types of exploitation planned (internet distribution, mobile distribution etc.);
- To use a piece of audio content not in the public domain is necessary to obtain, synchronization rights (audio on images), composition rights (for public performance of the composition itself); recording rights (for the recorded work) and reproduction and distribution rights (for both the composition and the recorded)

More complex actions might include those that deal with multiple digital objects such as those that access content to transform one object into another; or those that merely aggregate multiple digital objects into

composite structures, but that do not actually access their contents. Among constraints related to complex or compound objects is to identify the multiple aspects of a work that must be preserved as a simple object. Preservation measures must ensure that as many of these aspects as possible persist over time.

- **Fix the object as a discrete whole.** A book is a book, or it exists in a set, but what are the boundaries of a digital object? The boundaries of digital objects are less clear, especially if they are compound objects created by assembling different media or by linking to resources from around a net.
- **Preserve content.** This refers to maintaining the ability to access the content at its original level.
- **Preserve the presentation.** Content is typically rendered in some presentation, format or layout, which includes different font faces and sizes, footers, pagination, and so on. In many types of digital documents the layout specifications are separate from the content.
- **Preserve functionality.** Complex or compound objects can contain many components (text, graphics, audio, and video), in various formats, or have navigation functions, such as toolbars, keyword search, or interactive tables of contents. Special efforts must be made to preserve the functionality.
- **Preserve authenticity.** An individual accessing the object must be able to verify that it is the desired one, and that the transformations to keep it accessible have preserved its original form. Thus, activities to guard authenticity include securing digital objects against unauthorized changes and monitoring digital objects through multiple "copying" cycles to ensure that each copy is an acceptable rendition of the original.
- **Preserve provenance.** Provenance is an archival concept that asserts the origin and chain of custody of an object and contributes to defining it as a whole. Establishing an object's origin and history help confirm that the work is authentic and its contents are intact.

Only recently Copyright, DRM and IPR management systems have entered every day's work of librarians, archivists, and museums managers. This implies also that DRM knowledge has become essential just now in such environments because many European cultural institutions started a massive digitization process of their heritage. Probably due to the difference in data needed for traditional and DRM based management of content the author (or owner) of a certain archival object is not always known. The photographic archive of ANSC has for instance this kind of problem. It should be possible to have a disclaimer for those cases. If not this could be a serious constraint in using these items into any new object. Luckily this problem is generally avoided in case of scholars or student study purposes. Another actual serious constrain related to rights is the potential unavailability of concerts due to the complexity of rights involved in each single concert. Most institutions like ANSC are working to solve this problem at least in a B2B perspective.

7.2.2 Media-type constraints

As widely explained in AXMEDIS *DE3.1.1 Guidelines and Specification of research enabling technologies* and *DE3.1.3 Content Aspects Specification* each foreseen type of content (either simple or aggregated) has specific characteristics and may therefore impose limitations in usage especially when combined with other objects. Therefore in the following table we present the most relevant constraints to be taken into account when selecting objects.

Type	Content format	Selection constraints
Simple	Text/Image/Audio	PAR, IPR clearance, readability
Complex	Video/Animation	PAR, IPR clearance, format availability, adaptability, readability
Compound	Multimedia	PAR, IPR clearance, availability, adaptability, readability, accessibility

Note that suitability factors such as quality-price relationship and target suitability are excluded from this stage of assessment, as these require more qualitative evaluation.

7.2.2.1 PC – online, music (All, TISCALI/OD2)

Unless clear malicious intention of the end user to breach the law and rules of this market is in place there are no special constraints to be taken into account. Usually the user has subscribed a service contract and has received or downloaded proper software tools to access the data being adequately authenticated via ID and password. All other constraints may come either from access connection or device performance capabilities

(memory, hard disk, audio board and related equipment, monitor resolution...). Primary constraints are, by order of importance:

1. **Usage licenses:** rights holders may limit usage of content available over the Internet to multiple licensed modes streaming, downloading, saving on disk, copying, play on multi-devices, CD or DVD burning.
2. **Bandwidth:** currently average bandwidth available per user in Europe is growing at exponential rates due to high competition among TLC operator. By 2006 most Western European users will have enough bandwidth to receive a DVD quality 2Mb/s MPEG4 or Windows Media stream. Nevertheless bandwidth is still the first technical constraint that has to be taken into consideration. No use to stream a certain content at a bit rate, which is not supported by target audience. Moreover Quality of Service (QoS) requirements may impose extra requirements limiting therefore the effective bandwidth to lower than TV broadcast quality. Target user bandwidth should always be addressed as a first requirement in content design. All of these issues can be addressed by providing multi bit rate options to the consumers from low end (dial-up connection) to full broadcast (DSL, fibre etc.)
3. **PC performance:** Currently average PC hardware performance is capable of rendering the most common streaming formats at DVD quality. Nevertheless the PC is a very unstable environment for entertainment, especially video due to the number of applications (some conflicting) which operate on a standard home PC. As in the case of bandwidth limitations, these problems can be addressed by providing multi bit rate options to the consumers from low end (dial-up connection) to full broadcast (DSL, fibre etc.)

7.2.2.2 iTV/satellite (All, EUTELSAT)

Unless clear malicious intention of the end user to breach the law and rules of this market is in place there are no special constraints to be taken into account. Usually the user has subscribed a service contract and has received proper tools to access the data being adequately authenticated. The only possible limitation to quality of service provided to end-users may derive from location coverage, equipment or infrastructure availability and environmental conditions (bad weather may affect transmission quality...).

7.2.2.3 Mobile (All, COMVERSE)

Telephony industry standards require high performance and constant on-line availability of all systems and infrastructure. The reason being the QoS that has to be provided to a high number of consumers at any given time, especially during peak use hours. Time-consuming tasks are either performed offline, or shifted from the distribution service to the end-device. This implies that either DRM related operations have to be performed off-line or that other mechanisms have to be put in action for content access protection. Basically users have to subscribe a contract with telecom operators that in turn have a contract with content owners. The latter contract entitles telecom operators to deliver content to the end-user based on the user identification (usually via IMEI + SIM unique ID). Therefore the following situation may occur and to respect legal/rights constraints proper contracts have to be signed in advance and formalized consequently in the service subscription the user will sign.

- Distribution system caches objects (half way distribution to consumer)
- Distribution system delivers the user cached objects content.
- Distribution system unpacks and caches content (half way distribution to consumer)
- Distribution system delivers the unprotected content to mobile devices (so far content usage cannot be controlled or reported by the system or the mobile device).
- Distribution system unpacks and caches catalogue material (narrations, samples, etc)
- Distribution system allows the user to play cached catalogue material (browsing menus, listening to free samples).

7.2.2.4 PDAs/kiosk (All, ILABS)

When taking into account both PDA and kiosk terminals it is necessary to distinguish among the specific characteristics of the individual devices in order to define media related constraints. In more detail is neces-

sary do distinguish among lightweight content (usually designed for PDA based fruition), regular content (usually designed for fruition on both) and high quality content that will be available only on terminals. Having stated that is now necessary to specify what this implies. Basically the first media constraint is directly related to object dimensions. Essentially in a kiosk environment where PDA are connected via wireless LAN the maximum available bandwidth is 56 Mbs in case of a 802.11g wireless connection that has to be shared among connected devices. This grants a typical response that will be more limited than a regular cabled LAN (usually 100 Mbs). Yet 802.11g devices are less diffused than 802.11b whose maximum bandwidth is just 11 Mbs, a tenth of a cabled LAN. For a terminal the situation is different as the connection can be either a regular 10/100Mb or a 1Gb one. The second is still rare but is more and more frequent. In any case in case of cabled connections adopting fibre connections can further reduce the bandwidth problem. The second issue is the kind of media to be rendered, as devices potentialities (terminals and PDA) are quite similar for certain objects and quite different for other. For example, both devices can render properly a MP3 file (in stereo mode and CD quality); at the same time a video file encoded in AVI may be rendered on both (assuming there is enough storage for hosting it locally) but with quite different results as in one case it can be seen at full screen with a result fully comparable to the one available on a home TV screen or even better) while on the other the rendering dimension is so limited that the rendering quality can be considered too poor. For other kind of contents like multimedia all depends on the availability of a proper viewer for the PDA. In case this viewer (or the correspondent plug-in for the PDA based browser) is not available the content will result useless. This, at present, is one of the most relevant limiting aspects to be taken into account at content selection level as this will be the key-point for real success.

7.2.2.5 Cross-channel (ALL)

In our view cross channel distribution foresees the combination of constraints that apply to all involved channels. Therefore in the selection process it will be necessary to:

- have multiple instances of the same content (one per distribution channel) or
- select the one that would allow adaptation (whenever possible) or else
- select the one that presents the minimum common set of characteristics.

This latter solution may save storage and troubles in content administration, but at the same time penalises the end user that may end up with content whose quality is greatly limited.

7.2.2.6 B2B (ALL)

What stated so far applies mainly at B2C level, but also at B2B, at least up to a certain point, as in many occasions the purchaser may either be offered content already compliant with distribution channel (and in this case the acquisition contract may foresee just distribution) or to be adapted and customised. In this latter case the selection process is mainly to be focused on the set of rights that the re-selling party will have in order to determine if the combination of content and possibility of operation on it are suitable for one purposes or if this is not the case. In the former case the second selection criteria will be cantered on content quality combined with target market expectations, receptivity and economical potential.

7.2.3 Client device constraints

Some of the key constraints for content selection concern the matching of content to the physical and logical characteristics of the client device (kiosk, PDA, mobile, PC, etc.). The general principle is that the content must be of a greater or equal resolution than the target device and must be able to be conformed to the device's characteristics (audio quality, file size, image resolution, etc.) whilst maintaining usability and quality. For example, video that contains text must still be readable if output is required on a mobile phone, audio must be intelligible if played back through small PDA speakers, etc. For multi-channel content, the content must be able to be successfully conformed to all required channels.

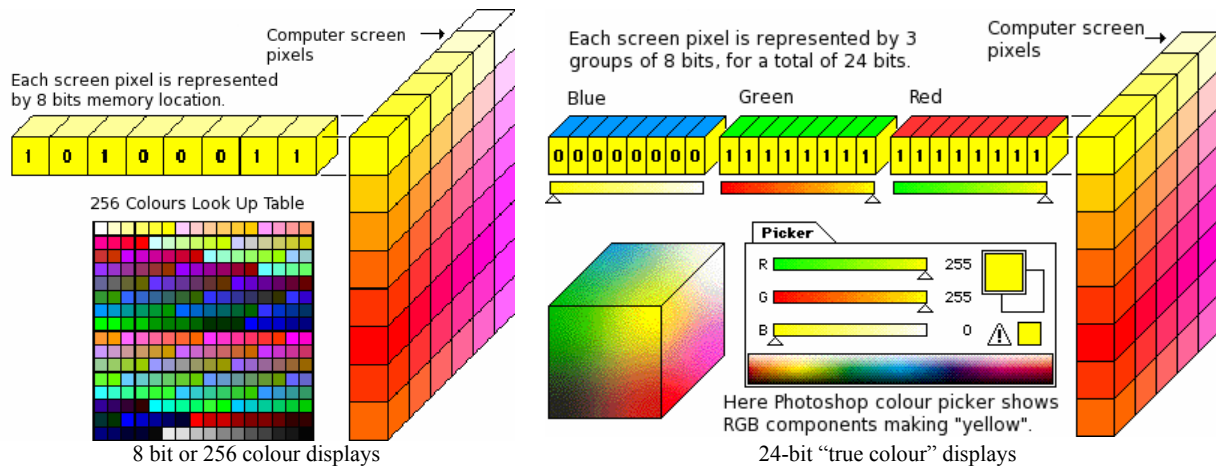
7.2.3.1 Device display size and format

Whenever taking into account fruition on a specific terminal content format will be heavily affected. Just as a reference is enough to notice that most screens of TV and computers have a 16/9 while most PDA and mo-

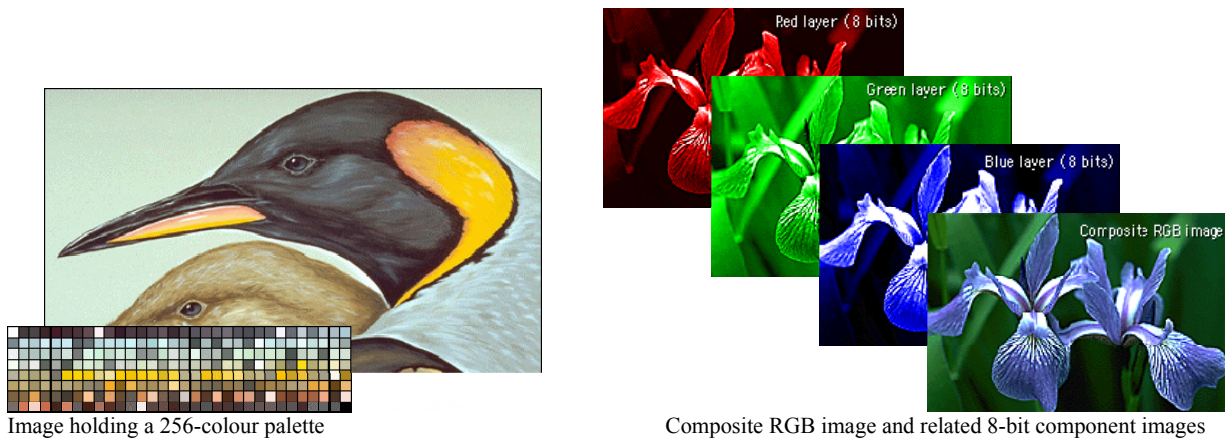
bile phones have a 9/16 ratio. This implies either a specific possibility of flipping screen usage (content is presented rotated by 90 degrees counter clockwise) or else content need to be adapted in a way similar to what was the Cinemascope presentation on a regular TV screen (black filling of unused screen areas). This latter solution presents further disadvantages as, depending on screen width; the content could become far less readable and appealing. It is therefore necessary during the content selection process to verify if the content and related rendering device, are suitable for the desired usage and if the user acceptance of eventual degradation will be sustainable in terms of business model and revenues. The available colour-space is also important, as some devices (e.g. a PDA or mobile phone) may have a limited colour-space whereas others such as high quality PC monitors can display a wide range of colours and contrast. This factor in conjunction with the colour bit depth (8 bit, 16 bit, 24 bit, etc.) will greatly impact the viewing potential of detailed video.

Channel	Optimum display size	Display aspect ratio	Colours	Colour space/gamut
PC online, music	For desktops the average monitor now is 15-17" with availability of 21-28" while for laptops it is comprised among 10-12-14-15 or 17"	Typically rectangular with a landscape orientation including but not limited to 16:9	8 to 32 bit, 16 being the average.	Usually it is the RGB one with the variations imposed by screen manufacturers
ITV satellite	The usual display is comprised among 14-21" but are available also 28, 32, 36 and 42"	Typically rectangular with a landscape orientation including but not limited to 16:9	Being analogue it is comparable to a 32 bit	Usually it is the RGB one with the variations imposed by screen manufacturers
Channel	Optimum display size	Display aspect ratio	Colours	Colour space/gamut
Mobile	Varies, small. Typical display size ranges from 90 to 200 pixels width and height. Typical Screen size ranges from 1 to 2 inches.	Varies. Typically square, not including menu display area.	8 to 16 bit, 16 being the maximum.	Quite narrow
PDA's kiosk	For terminals we fall under the regular PC ones, while for PDAs it varies but is still usually quite small.	Typically landscape for terminals and portrait for PDA even if some of them allow rotation of content.	8 to 32 bit, 16 being the average.	For terminals it is the regular one of a PC screen, while for PDA is usually quite narrow.
B2B	Depends much on the content. For example nowadays for web based content is expected a minimum 800x600 display format	Typically the aspect is rectangular landscape oriented	8 to 32 bit, 16 being the average.	Depends strictly on fruition device, even if generally a computer like one is adopted.

Just for reference is worth to recall here the difference that is implied by the various kinds of colours representation formats:



The difference among these representation formats is crucial in content selection as it implies quite relevant limitations in the first case and even problems when objects with different characteristics are combined.



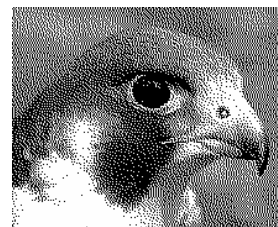
For example to achieve a good colour rendering with a 8 bit format is often adopted the “*palette*” approach that leads to images with a different set of colours indexed and that when presented together may originate strange effects like colour inversion... on non “*true-colour*” devices. The same may apply in case of true colour images rendered on 65K or 256 colour capable devices, they will render the images in incorrect mode giving the end user a poor result.



Original full-colour photograph

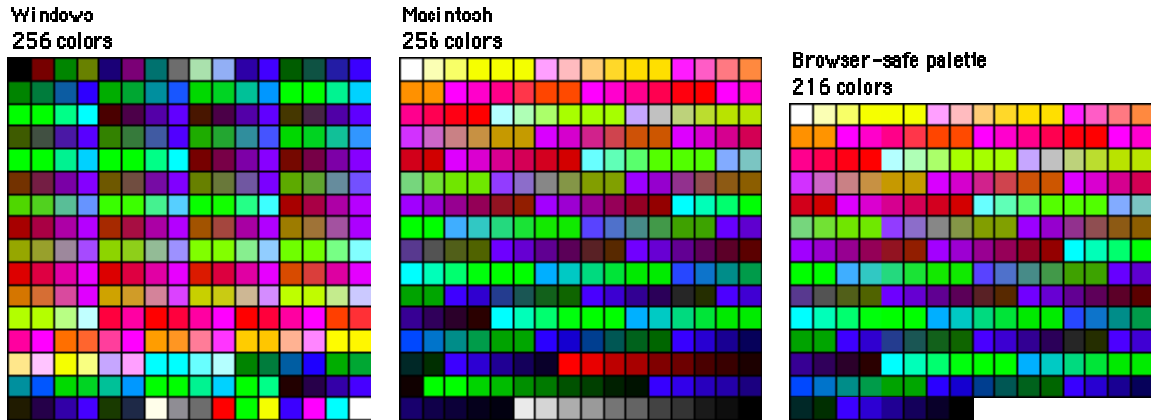


Dithered to 256 colours



Dithered to 1 colour

It is also necessary to take into account that different OS have usually also different default settings in terms of basic palette (at least as far as web content is concerned) as reported hereafter:



The adoption of a browser safe palette allows retaining image quality avoiding rendering issue as can be clearly seen in the following images taken from following site www.dartmouth.edu/~hist12:

Full color image dithered to 256 colors



Full color Image dithered to 64 colors



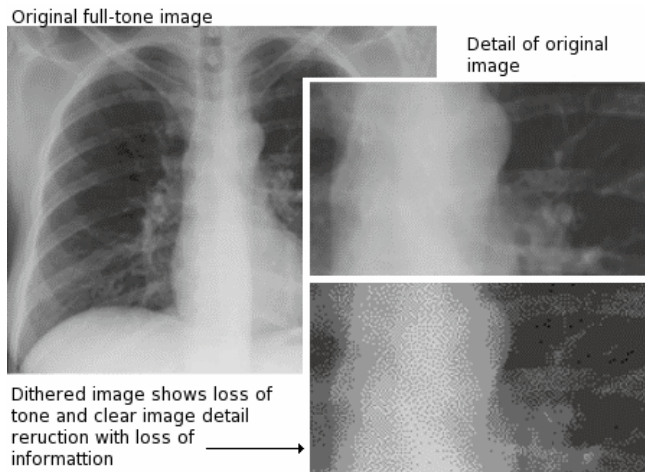
Forcing a GIF made from custom palette colours to display within the limited system palette colours can result in image distortions. For example a Web browser running on an 8-bit display may not optimize a custom GIF colours and could force display original colours in the nearest equivalent in the browser palette distorting the original colours, as in the example below:

GIF file with custom color palette (256 colors)



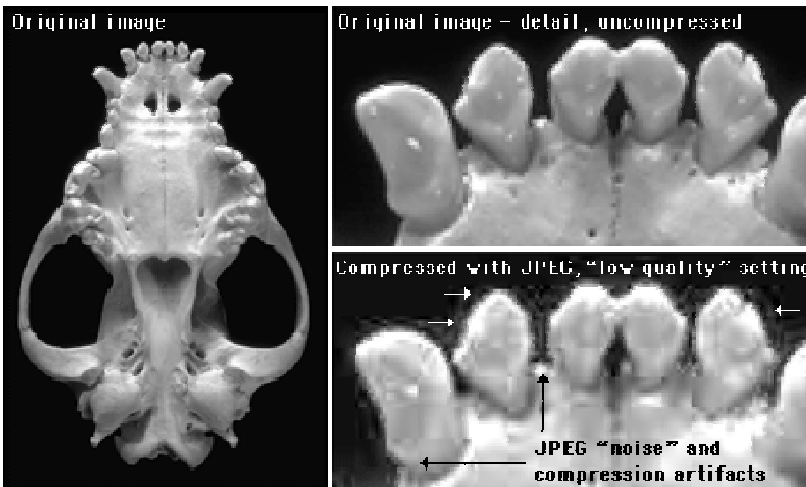
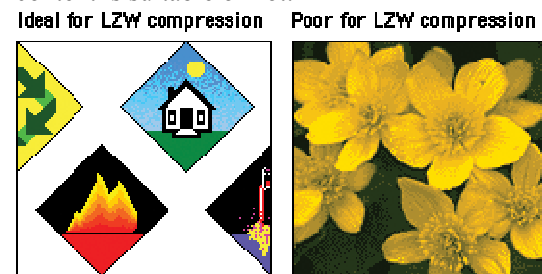
GIF file with Web-safe color palette (216 colors)





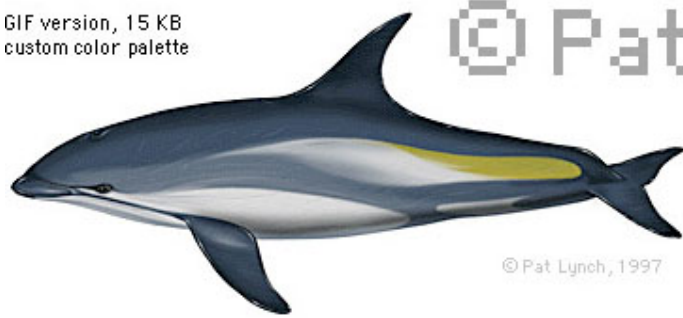
The concept of suitable, in this case, has to be specified as it could refer to the technical aspect (a synthetic image is more suitable for a LZW compression than a natural scene, just as presented in the example aside), or to the usage/content purpose one (a medical image is not suitable for being stored into a JPEG format as the inherent loss of information may alter the possibility for a proper use, as apparent in the following second example).

While the adoption of dithering and palettes may help much in having lighter graphics for certain purposes it may also have some very disappointing results especially as far as certain content are concerned (as apparent from the medical images reported for reference aside) therefore the utmost care should be placed when checking image handling performed on some specific content. Another relevant point to be considered while performing content selection is the eventual need for compression of the acquired image based content. If content has to be compressible for transmission needs, or for any other, it is crucial to know whether the acquired content is suitable or not.

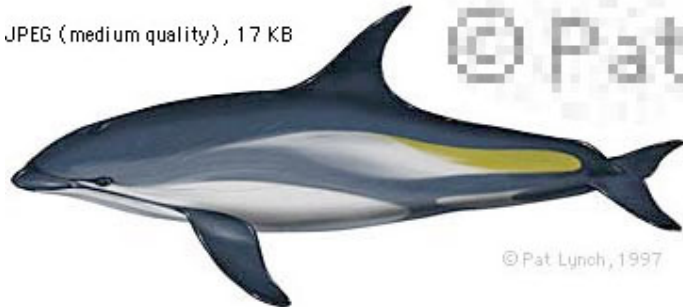


Another example of JPEG compression is shown below, note compression noise and distortion of the bottom dolphin; the image is lower quality than the original GIF, yet it could be acceptable on a small screen with a limited number of colours; what really makes this JPEG image unacceptable is the text loss in quality (the save in downloading time is not worth the degrading).

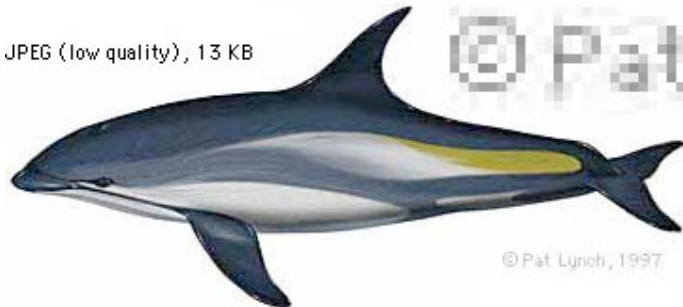
GIF version, 15 KB
custom color palette



JPEG (medium quality), 17 KB



JPEG (low quality), 13 KB



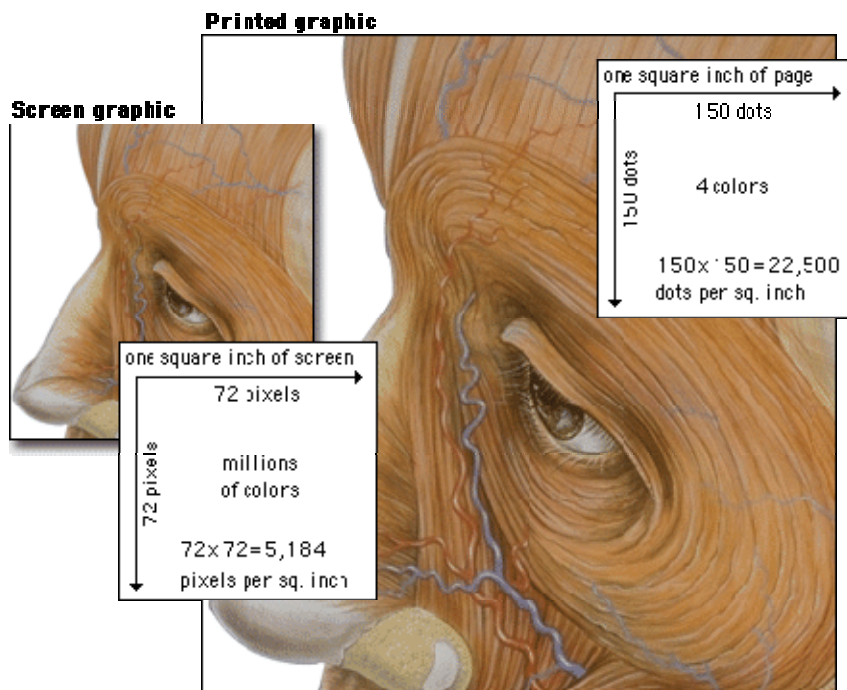
Vector graphic illustrations have the advantage to be automatically antialiased when imported into raster imaging programs and converted

Illustrator artwork, imported
but not antialiased



Same graphic, antialiased on
import into Photoshop

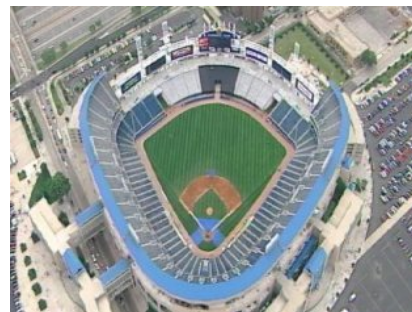




A last point to be taken into account when selecting image-based content is the different aspect ratio for an image and the different colour space between screen and paper based fruition. For a screen based fruition there are 72x72 pixels for a square inch with a colour resolution of millions of colours while for a text based one in the same square inch there are 150x150 dots but only four colours are available. This may turn out in different appearance in the same image once printed out in respect to the one originally viewed on the screen. Moreover, due to the different dimensions of a *pixel* in respect to a *dot*, the same image turns

out to have different proportions when seen on paper or on screen at the same resolution. Hereafter are reported some examples of the issues that screen differences in aspect ratio and dimensions will imply at user fruition time. Reference is made to standard TV broadcast level. Images are taken from “Camera Systems” website portion related to widescreen by flyingpictureslive⁹. The most relevant points to be taken into account are that digital widescreen technology uses all lines available on a television screen giving a sharper picture particularly when viewed on a 16:9 screen, while on a conventional 4:3 set get squashed making the picture look taller and slimmer. Usually the widescreen signal is converted in a 4:3 either by:

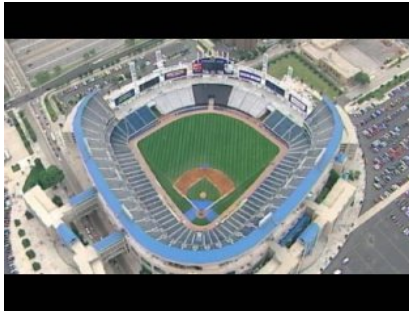
- **Letterbox:** Viewing the whole picture as a "letterbox" - but leaving black bands above and below the screen. For example, this may be the preferred option when viewing films on a 4:3 monitor.
- **Centre cutout:** this cuts off the extra information to the sides of the picture. Viewing the centre portion only of the original widescreen picture. This fills the 4:3 television screen but cuts off the sides of the original picture.

Original picture¹⁰

Without adaptation

⁹ <http://www.flyingpictureslive.com/cameras/widescreen.html>

¹⁰ The off screen captures are from the same camera switched from 4:3 to 16:9 mode. Chicago's Comiskey Park Stadium shot in both 4:3 and 16:9 wide screen formats from the air the extra coverage is clearly appreciated



With *Letterbox* adaptation



With *Centre cutout* adaptation

What just stated is usually reflected also in Test card F/G, as apparent from the following pictures reporting it in wide screen 16:9 and 4:3 formats (the F format is from BBC).



Test card G in wide screen 16:9 formats



Test card G in 4:3 formats



BBC Wide screen 16:9 Test card F



BBC 4:3 Test card F

It is worth taking into account that adaptation may also occur when content prepared for display over a 4:3 screen is displayed onto a 16:9. As evident in the following images wide-screen TVs have ways to stretch, crop, or zoom the regular 4:3 image so that it fills the screen. These methods distort the image somewhat, but many wide-screen TV owners prefer looking at slightly stretched people rather than window box bars.



Normal or 4:3

Places window box bars on either side of the 4:3 screen. This solution provides a good image quality but present the side black stripes that are often disliked by the end user. Therefore the following solutions have been identified. Each of them has advantages and disadvantages that are quite evident from the picture.



Panorama, Theatre Wide, or Natural

TV makers have many names for modes that compromise between stretching and zooming to fill the screen. Some stretch the sides of the image more than the middle, so people in the centre of the screen look correct. Some crop a little so that they don't have to stretch as much.



Zoom or Enlarge

Magnifies the entire image, eliminating the window box bars but cropping the top and bottom of the image. Often, more than one level of zoom is provided. Depending on content image the superimposed distortion may be acceptable or not. In this case the results is comparable to original and the user may be satisfied.



Wide or Full

Used for native 16:9 content such as that found on DVDs. With 4:3 content, such as regular TV, it stretches the image horizontally, making people look shorter and fatter. Obviously the user may be quite annoyed with such a distortion, which may be quite evident in most of the cases.

Source: CNET (http://cnet.nytimes.com/4520-7608_7-1016109-4.html)

The following table reports a further set of examples of image adaptation

Before adaptation		After adaptation	
	Letterbox bars are visible at the top and bottom. You can see how the director intended the shot to look.		The image fills the screen, but it is less sharp, and it cuts off the left and right sides. Who knows what's in left hand?
	Output intended for 16:9 on a 4:3 stretches everything to look artificially tall and thin. Note that the spherical bowling ball is now oval-shaped.		Adapting image to match the 4:3 screen displays the image in its correct proportions. The bowling ball correctly shows its circular form.
	Black bars are visible on the left and right of the screen.		The image fills the screen, but it is less sharp, top and bottom parts are cut-off (the clock is no longer visible in upper left corner).
	Black bars are visible on the left and right of the screen.		The image fills the screen, but it's distorted, making everything appear wider and fatter.
	Black bars are visible on the left and right of the screen.		The image fills the screen, keeping proper proportions toward the centre, stretching only extreme left/right edges.
Before adaptation		After adaptation	

	Black bars are visible on all four sides of the screen of this letterboxed documentary on the Discovery Channel.		The image fills the screen. It's not as sharp, but nothing is cut off.
	Black bars are visible on the top and bottom of the screen of this scene from The Return of the King's climactic battle scene.		The image fills the screen, but it's not as sharp and it cuts off the left and right making the scene somewhat more claustrophobic.

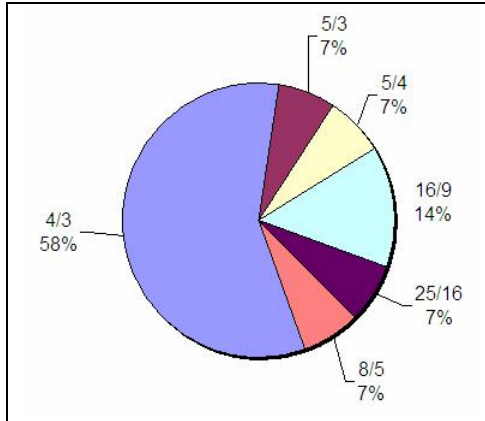
7.2.3.2 User entry methods

In the following table are summarised the main user entry methods available for each distribution channel depending on used device. It is given for granted that other

Channel	Mouse/pointer available?	Keyboard format?
PC online, music	Typically yes. It may also be possible to have touch-screen, pen based or other pointing devices.	Typically enhanced 101, 102 or 106 keys for desktops, while typically standard block layout for laptops. (Text can also be inputted via handwriting recognition on pen-tablet or via voice recognition).
iTV/satellite	Usually yes even if in a quite simplified form (navigation control arrows plus Ok button) located on the remote control jointly with some functional keys.	Typically no for set-top-box devices even if some are provided with an infrared keyboard (PC like standard). Most satellite receiver and set-top-box only have an enhanced remote control with functional keys and navigation arrows.
Mobile	Typically – no. PDAs and some Smart Phones have a touch-stick for the touch screen.	Numeric, limited alphanumeric. (Text and some commands can also be inputted via handwriting or voice recognition).
PDAs/kiosk	Typically – yes for kiosk terminal but no for PDAs. PDAs and some Smart Phones have a pen for the touch screen.	Regular for a terminal and device dependent for PDAs that usually have on screen one. Some PDA like the TREO, Blackberry and others have a 34 key alphanumeric one. (Text and some commands can also be inputted via handwriting or voice recognition).

In the past years, the minimal resolution, mostly on laptop, was 800x600. But now it is more often 1024x768. The standard resolutions available on a desktop computer with a 21" screen are:

Resolution	Ratio	Resolution	Ratio	Resolution	Ratio	Resolution	Ratio
640x480	4/3	1280x768	5/3	1600x1024	25/16	1920x1440	4/3
600x600	4/3	1280x960	4/3	1600x1200	4/3	2048x1536	4/3
1024x768	4/3	1280x1024	5/4	1920x1080	16/9		
1152x864	4/3	1600x900	16/9	1920x1200	8/5		



The graphic shows the distribution of the several resolutions over their ratio. Given what just stated these are the available resolutions that could be expected so far to be the average and therefore our targets for the initial testing phase:

- For a PC the resolution is mostly 1024x1280, 864x1152, 768x1024 or 600x800.
- For a laptop or a Tablet PC the resolution is mostly 768x1024 or 600x800 (for the latter the screen can be rotated by 90°).
- For PDA, Pocket PCs have mostly 240x320 and 480x640 capabilities, while Palm OS have 160x160, 320x320 and 320x480.

7.2.4 Connection bandwidth

When selecting content (raw assets to be used for aggregated content production) is extremely important to verify the implications in terms of required delivery bandwidth (either for download or streaming). This is mainly due to the fact that user acceptance (and consequently economic revenues) may be deeply affected. While it is not feasible to grant a 30 frame per sec at 640x480 16bit video data stream on a 56k GPRS connection it is feasible with present implementation of UMTS connections; therefore video streaming would not be considered via GPRS but may be considered via UMTS. It is also important to consider the Quality of Service (QoS) characteristics of the channel. For example, a kiosk connected to a private intranet should experience a highly predictable network performance level, whereas a PC attached to a service via the public internet will experience an unpredictable QoS, with possible high traffic, service outages, etc. These factors are relevant for certain types of interactive or streamed content.

Channel	Maximum Bandwidth	Average user 'real' bandwidth	QoS level (highly predictable/unpredictable)
PC online, music	10Gb	56Kb for modem 128Kb for ISDN 384Kb for 3G 128-8Mb/s for DSL, satellite or fibre	Rather predictable in case of modem, ISDN, ADSL or similar connections.
iTV/satellite	10Gb	380-680Kb	Highly predictable
Mobile	380K	56Kb for GPRS 384Kb for 3G	Often unpredictable
PDA's/kiosk	1Gb	11-56Mb for 802.11b/g wireless 10-100Mb for LAN connection 100Mb-1Gb for LAN or fibre connection	Highly predictable for terminals. Somehow unpredictable for PDA as it strongly depends on number of connected devices and activities performed.

7.2.5 Readability of images & text

As already mentioned it is extremely important to verify the readability of the content itself when selecting raw assets to be used for aggregated content production. This is particularly true when dealing with PDA and mobiles. Present screen sizes and resolutions of these devices are far from being comparable with those of high-end devices (PC or similar) so that the same content may result quite degraded once presented on such device. Quality implication may also be a limiting factor for content owners in respect to selling or renting the content itself (certain authors or publisher do not grant permission of usage of their content unless a specific quality level is granted and require in any case to be presented an actual sample of final result prior to grant usage authorization).

7.2.6 Subtitling and synchronization

This issue is particularly relevant when selecting content that has potentially an extremely wide audience, as language dependency may constraint its usage. In many European countries it is common to dub audio-visual material, while in others it is preferred to have the original audio and subtitling. Apart from this aspect that implies that object selection can be influenced (under this respect) by target market, it is also important to notice that whenever the same content is also used for educational purposes subtitling is highly desirable plus (feature to be de/activated on request) for better content comprehension. Subtitling is also useful for users with hearing disabilities and of course also for client platforms that do not support audio. There is finally another issue to be taken into account when selecting a subtitled content, namely: subtitling has to be easy to read (right font size, colour contrast level...). The key issues here are whether the content is already subtitled, or it may be subtitled, and secondly whether the target use requires subtitles. As a selection criteria, it is therefore not necessarily a 'showstopper' for video content to not be subtitled, but the availability of subtitles needs to be flagged somewhere in metadata to ensure that content is suitable for uses requiring subtitles. With the wide range of media related to the AXMEDIS, it is important to note that there are various technologies and approaches to combine different medias in order to achieve content accessibility for the end user. In this respect subtitling and synchronisation issues are particularly important. In terms of subtitling, there is a company involved with C4 and Broadcast Text called Softel Online. Relevant companies in terms of subtitling include:

- Channel 4 (TV, UK)
- Broadcast text called Softel Online ¹¹

For captions, there are various different formats including:

- Synchronized Multimedia Integration Language (SMIL, pronounced "smile")¹²
- MAC DVD Studio Pro (*.txt)
- QuickTime Text (*.txt)
- RealTime (*.rt)

From Cable Television Standards:

- ANSI/SCTE 27 (DVS/026): SCTE Methods Subtitling Methods for Broadcast Cable. This standard defines a transmission protocol supporting multilingual subtitling services to augment video and audio within MPEG-2 multiplexes [41].

7.2.7 Audio / video compression & quality constraints (UNIVLEEDS, All)

With the multi-channel distributions required in AXMEDIS, it is important to survey and collect the bandwidth capabilities and transmission speeds for each channel used. Each channel has specific characteristics, relevant usage and more importantly users' expectation. For example a 128Kbs MP3 will be more than acceptable on a PDA or mobile, but may not be satisfactory on a PC or a set-top-box for a home theatre. A comparison of Internet audio compression formats for audio not speech can be found at Serious Cybernetics¹³ where the following formats are surveyed and compared:

- 16-bit PCM (.wav or .aiff);
- G.711 mu-law (.au);
- 32Kbps MPEG-1 (.mpa or .mp2);
- IMA/DVI ADPCM (.wav);
- GSM 06.10 (.gsm);
- InterWave VSC112 (.vmf); TrueSpeech 8.5 (.wav);
- RealAudio v1.0 (.ra);
- RealAudio is used by BBC2 (UK) for live internet radio
- ToolVox for the Web (.vox)

¹¹ <http://www.softel.co.uk/>

¹² <http://www.w3.org/TR/REC-smil/>

¹³ <http://www.sericyb.com.au/audio.html>

Channel	Supported compression format(s)	Maximum bit rate	Minimum acceptable bit rate
PC	WM9, MPEG...	640KBps	128KBps
iTV/satellite	MPEG1/2	340KBps	128KBps
Mobile	MP3	386KBps	56KBps
PDA's/kiosk	MPEG1/2	Limited by network connection type	128KBps
B2B	All	Unlimited (prefer to be uncompressed)	As high as possible

7.2.8 Metadata & Common issues

At this stage we are mainly referring to object related metadata as other relevant aspects have already been tackled. Metadata are crucial for content usage, fruition and search. Through them it is possible to know practically all that is necessary to know about an object. Moreover DRM related metadata are essential to ensure proper content usage in full respect of laws, property and fruition restriction that may apply. Therefore, users should exploit to the maximum available metadata when selecting an object. Dealing with both B2B and B2C environment, metadata have to be extremely variegated and structured. For example in B2B it is necessary to cover needs of publishers (acquiring content for editing or aggregating), distributors (acquiring content for rental) and other professionals (acquiring content for different purposes like education, training, advertisement...) is necessary that object metadata combines the simplicity of Dublin Core (small number of fields for an easy search) with the complexity of LOM and other metadata sets to ensure proper professional usage at all levels from editing to fruition.

7.2.8.1 IPR & DRM Metadata (FUPF, ILABS, XIM, OD2, AFI...)

Regarding IPR & DRM metadata it is important to take into account that content provided to AXMEDIS needs associated licenses and rights. This will allow AXMEDIS tools to check that licenses terms are accomplished during content lifecycle, from creation to distribution and fruition from final user. According to the structure of the most popular rights expression languages (MPEG 21 and ODRL), the licenses related to AXMEDIS content need to define the following four elements:

1. **Subject** – actor who performs some operation. In ODRL, it is the party and in MPEG-21 REL it is the principal.
2. **Right** – what a subject can do to an object. In ODRL it is the permission (right) and in MPEG-21 REL is represented by the right.
3. **Object** – content acted upon by a subject. In ODRL it is the asset and in MPEG-21 REL it is the resource.
4. **Condition** – describes when a right can be performed. In ODRL it is the constraint and is included in the permission (right), and in MPEG-21 REL it is the condition.

Not all of them have to be present in the license, but this is the main information needed from the DRM point of view. One may include other kinds of rights among the ones that can be associated to content, apart from those related to content consumption and distribution. These are rights more related to intellectual property issues like moral or exploitation rights, including derived ones (like adaptation or communication rights). These rights are defined by international organizations. It is often used to have in objects metadata some link to copyright (or IPR) information. In some cases some of information is even stored inside the file format (like in JPEG or other images). The real issue in this case is to ensure that such info is preserved at authoring level. Usually people editing content is not so keen in filling also metadata, therefore it would be better to select those contents that foresee proper filling of all copyright / IPR related metadata (we refer here to those information that are explicitly mentioned in metadata like LOM rights section) in respect to those that only have the DRM data portion filled. AXMEDIS framework may be of great help in this facilitating and simplifying the process.

7.2.8.2 Classification keywords

This is an extremely important aspect to be taken into account at selection time. The set of classification keywords associated to an object is the main source of information that will be exploited during the search process, therefore the richer and more appropriated it is, the easier and efficient it will be the retrieval process. If possible it would be better if this set of metadata could be organized according to a well-defined classification schema. There are several standards [10-11] that can be followed for this, but we believe that the best could be a combination of them. For example the Dewey Decimal System and Library of Congress have been used for indexing and retrieving documents for over a century and therefore they represent a well-consolidated approach yet not always fit for some kind of media or content. For the classification keywords a hierarchical structure could be implemented, like is presently adopted in the standard archival authority files, that is: one (1) accepted form and 'n' variant forms, e.g. of accepted form: "Marriage" (1 for each language: *Ehe*, *Matrimonio*, *Mariage*, etc...), variant form (n for each language *wedding*, *matrimony*... , *nozze*, *sponsali* ... , *noces*... , *Hochzeit*, *Trauung*, etc...). Nevertheless it is extremely important to take into account that classification keywords are also extremely tricky as already pointed out in DE3.1.3, as their insertion is highly dependent by the "human" performing it. Several automatic solutions have been developed and may more are presently under study (see the ontology and semantic based classification approach), yet a widely and commonly agreed on solution as not been found.

7.2.8.3 Supported languages

Also language is a very relevant issue to be taken into account while selecting objects for further processing. Basically we have to distinguish among two different kind of language support, nominally: content and metadata. The first is often the more evident one, yet it could be not the most relevant. What stated is based on a simple assumption: *"if content has to be used into a multi-lingual environment then metadata used to manage it should be compliant with the overall environment"*. It could be possible to have non-multi-lingual content and multi-lingual metadata, for example a training course for a specific language at advanced level may hold only content in the target language, yet all the metadata should be available at least in the target and source language (preferably also in English).

7.2.8.4 Accessibility

Despite what is often thought, accessibility is a much broader issue than it is perceived. In essence true accessibility covers every aspect of content, from its format to its fruition and acquisition. It is an underlying constant in the whole production and fruition value chain. This takes its origin from a basic finding: *"all that is designed to be accessible is also more usable at all levels and form a broader set of users than the one for whom it has been designed"*. This has a very relevant impact as it implies that accessibility starts at the design phase. If something is not design for being accessible it will be very hard to make it accessible afterwards. As this document deals with the selection process for content we would like to point out that to build accessible contents is required to take into account a set of basic criteria, starting from very simple ones (like adopting simple exposition, plain words, easy linguistic forms, clear fonts...) up to more complex ones(like those expose in the 508 article [43] or the W3C recommendations for accessibility [36]). In more detail we can profitably benefit from W3C guidelines adoption as (more and more often) content is available also in web format. The W3C has a specific initiative related to accessibility [44] and also provides guidelines [45] and checklists [46] related to web content accessibility; such checklist is prioritized in three levels as apparent from the following abstract. Each checkpoint has a priority level assigned by the Working Group based on the checkpoint's impact on accessibility.

- Priority 1 A Web content developer **must** satisfy this checkpoint. Otherwise, one or more groups will find it impossible to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents.
- Priority 2 A Web content developer **should** satisfy this checkpoint. Otherwise, one or more groups will find it difficult to access information in the document. Satisfying this checkpoint will remove significant barriers to accessing Web documents.

- Priority 3 A Web content developer **may** address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. Satisfying this checkpoint will improve access to Web documents.

Some checkpoints specify a priority level that may change under certain (indicated) conditions.

Priority 1 checkpoints

- | | |
|---|--|
| <i>In General</i> | <ul style="list-style-type: none"> - Provide a text equivalent for every non-text element (e.g., via "alt", "long-desc", or in element content). <i>This includes:</i> images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ASCII art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video. - Ensure that all information conveyed with colour is also available without colour, for example from context or mark-up. - Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions). - Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document. - Ensure that equivalents for dynamic content are updated when the dynamic content changes. - Until user agents allow users to control flickering, avoid causing the screen to flicker. |
| <i>And if you use images and image maps</i> | <ul style="list-style-type: none"> - Use the clearest and simplest language appropriate for a site's content. - Provide redundant text links for each active region of a server-side image map. - Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape. |
| <i>And if you use tables</i> | <ul style="list-style-type: none"> - For data tables, identify row and column headers. - For data tables that have two or more logical levels of row or column headers, use mark-up to associate data cells and header cells. |
| <i>And if you use frames</i> | <ul style="list-style-type: none"> - Title each frame to facilitate frame identification and navigation. |
| <i>And if you use applets and scripts</i> | <ul style="list-style-type: none"> - Ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page. |
| <i>And if you use multimedia</i> | <ul style="list-style-type: none"> - Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation. - For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation. |
| <i>And if all else fails</i> | <ul style="list-style-type: none"> - If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page. |

Priority 2 checkpoints

In General

- Ensure that foreground and background colour combinations provide sufficient contrast when viewed by someone having colour deficits or when viewed on a black and white screen. (Priority 2 for images, Priority 3 for text).
- When an appropriate mark-up language exists, use mark-up rather than images to convey information.
- Create documents that validate to published formal grammars.
- Use style sheets to control layout and presentation.
- Use relative rather than absolute units in mark-up language attribute values and style sheet property values.
- Use header elements to convey document structure and use them according to specification.
- Mark up lists and list items properly.
- Mark up quotations. Do not use quotation mark-up for formatting effects such as indentation.
- Ensure that dynamic content is accessible or provide an alternative presentation or page.
- Until user agents allow users to control blinking, avoid causing content to blink (i.e., change presentation at a regular rate, such as turning on and off).
- Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages.
- Until user agents provide the ability to stop auto-redirect, do not use mark-up to redirect pages automatically. Instead, configure the server to perform redirects.
- Until user agents allow users to turn off spawned windows, do not cause pop-ups or other windows to appear and do not change the current window without informing the user.
- Until user agents allow users to turn off spawned windows, do not cause pop-ups or other windows to appear and do not change the current window without informing the user.
- Use W3C technologies when they are available and appropriate for a task and use the latest versions when supported.
- Avoid deprecated features of W3C technologies.
- Divide large blocks of information into more manageable groups where natural and appropriate.
- Clearly identify the target of each link.
- Provide metadata to add semantic information to pages and sites.
- Provide information about the general layout of a site (e.g., a site map or table of contents).
- Use navigation mechanisms in a consistent manner.

And if you use tables

- Do not use tables for layout unless the table makes sense when linearized. Otherwise, if the table does not make sense, provide an alternative equivalent (which may be a linearized version).
- If a table is used for layout, do not use any structural mark-up for the purpose of visual formatting.

And if you use frames

- Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone.

And if you use forms *AXMEDIS Project*

- Until user agents support explicit associations between labels and form con-

- And if you use applets and scripts*
- trols, for all form controls with implicitly associated labels, ensure that the label is properly positioned.
 - Associate labels explicitly with their controls.
 - For scripts and applets, ensure that event handlers are input device-independent.
 - Until user agents allow users to freeze moving content, avoid movement in pages.
 - Make programmatic elements such as scripts and applets directly accessible or compatible with assistive technologies (Priority 1 if functionality is important and not presented elsewhere, otherwise Priority 2.)
 - Ensure that any element that has its own interface can be operated in a device-independent manner.
 - For scripts, specify logical event handlers rather than device-dependent event handlers.

Priority 3 checkpoints

- In General*
- Specify the expansion of each abbreviation or acronym in a document where it first occurs.
 - Identify the primary natural language of a document.
 - Create a logical tab order through links, form controls, and objects.
 - Provide keyboard shortcuts to important links (including those in client-side image maps), form controls, and groups of form controls.
 - Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links.
 - Provide information so that users may receive documents according to their preferences (e.g., language, content type, etc.)
 - Provide navigation bars to highlight and give access to the navigation mechanism.
 - Group related links, identify the group (for user agents), and, until user agents do so, provide a way to bypass the group.
 - If search functions are provided, enable different types of searches for different skill levels and preferences.
 - Place distinguishing information at the beginning of headings, paragraphs, lists, etc.
 - Provide information about document collections (i.e., documents comprising multiple pages.).
 - Provide a means to skip over multi-line ASCII art.
 - Supplement text with graphic or auditory presentations where they will facilitate comprehension of the page.
 - Create a style of presentation that is consistent across pages.
- And if you use images and image maps*
- Until user agents render text equivalents for client-side image map links, provide redundant text links for each active region of a client-side image map.
- And if you use tables*
- Provide summaries for tables.
 - Provide abbreviations for header labels.
 - Until user agents (including assistive technologies) render side-by-side text correctly, provide a linear text alternative (on the current page or some other) for *all* tables that lay out text in parallel, word-wrapped columns.
- And if you use forms*
- Until user agents handle empty controls correctly, include default, placeholder characters in edit boxes and text areas.

Following these guidelines can be quite overwhelming, so we suggest that we should follow at least **Priority 1** but that we must state in the metadata the level of compliance, none being acceptable.

7.2.8.5 Traceability

This aspect of content is very much dependent from the kind of object and has definitely different meaning and relevance for different contexts and contents. Basically objects for which this aspect is relevant are learning objects when used inside a monitored course granting self and remote evaluation of learner's results. In this case (according to IMS, AICC and SCORM standard) the most relevant aspect to be kept under control is the combination of content the learner has accessed in respect to the results achieved both in pre- and post-evaluation phases. In this case an object embeds some API directly related to the tracking system; therefore, at selection time, it will be necessary to carefully evaluate if this specific feature will be supported and related constraints respected prior of content re-use. In other environments (like the digital imaging one) the concept of traceability is somehow different as usually it is intended as the possibility to trace back the source of a specific content in order to verify if IPR and copyright have been respected.

7.2.8.6 Commercial, billing and payment models

Just like the previous aspect also this one is very much dependent on content type and usage. It is necessary to take into account that not every object will require to bear directly data for handling billing info, as usually content will be purchased, rent or acquired passing through a proper selection and acquisition phase managed by a backend system. Nevertheless in some cases it will be necessary to perform on the flight transactions to properly handle a sort of “*pay per use*”. This often applies to learning content. As a matter of fact is often possible to find “*pay per use*” content among other free ones on e-learning infrastructures. In this case the object has to carry along also prices and acquisition conditions that may be used by the e-learning platform for handling the correct access to content without the real need for an e-commerce back-end in place. In AXMEDIS the need for this side information is very much probably reduced as each object will be provided with proper DRM management, something presently missing in most other environments, nevertheless it is worth, during the selection phase, to verify if a selected object has or not additional metadata used for billing (like the one foreseen in LOM rights section: cost and other restrictions) in order to ensure that the resulting object (maybe the selected one will be aggregated with others...) will retain certain characteristics or not. It is also important to ensure that the payment model for the channel is compatible with the licensing rules of the content. Further considerations to be taken into account in respect to this aspect are:

- Are there any payment models specific to a channel that might restrict selection of content?
- Are there any other commercial issues related to a specific channel? (For example, Sky requires that content providers for interactive TV must carry insurance to indemnify their content against the risk of crashing set top boxes.)

7.2.9 Delivery packaging features

On the market there are plenty of solutions currently available for content management and fruition. Each is, usually, aimed to cover a specific set of needs or communities of users. Especially in the e-learning environment many different platforms have been developed in time following technology and needs evolution. In the very beginning CBT like approaches were adopted and proved to be un-interoperable. This brought to standardization initiatives like AICC, IEEE-LO/LOM, IMS, SCORM... and made possible to achieve interoperability of content specifying rules and methods for production, packaging and delivery. At present, there are several platforms, which can mutually exchange content thanks to commonly adopted packaging standards, and that have acquired a relevant market share (Blackboard, WebCt, learn eXact...). In selecting content it is therefore necessary to select the one that fits the specific packaging and delivery needs of the target user (this should be at least the perspective of publishers, aggregators and distributors operating at B2B level).

7.3 Suitability (ALL)

Having established that content meets the constraints imposed by the distribution channels the selection process next needs to evaluate the suitability of the candidate content for the key uses in AXMEDIS. These are described below.

7.3.1 Common suitability criteria

Some general criteria can be applied to evaluate content suitability for all applications within AXMEDIS. These are more subjective than the constraints described previously. For example, when selecting audio or video content, user will start with some general criteria, then other specific criteria should be considered.

Overall user selection criteria

- **Potential audience.** Who will use the resource? Will a narrow or broad audience use the resource? Will audience use justify the purchase?
- **Life.** How long will the resource last in terms of durability, technology, and interest?
- **Price.** Is the resource worth the price?
- **Quality.** Is the resource accurate, current, appropriate?
- **Balance.** Are other materials already available in other formats?
- **Value.** Has the resource received favourable reviews?
- **Known.** Does the public know the resource?
- **Unique.** Does the resource contribute in a unique way?

Need and Usage selection criteria

- **Interests.** Does the resource meet the interests and needs of the audience?
- **Purpose.** Will it educate, entertain, or both?
- **Depth.** Is the depth and length appropriate for the intended audience?

Content Quality selection criteria

- **Format.** Is the resource suitable for the format (i.e., audio, video)?
- **Authority.** Is the content creator known and knowledgeable?
- **Authenticity.** Is the content accurate and correct?
- **Timeliness.** Is the content current and up-to-date? Is the topic timely?
- **Relevance.** Does the content match the purpose of the work?
- **Efficient.** Is the content worth the effort and time in reading, viewing, or listening?
- **Appeal.** Is the content stimulating and interesting?
- **Originality.** Is the content interesting and imaginative (i.e., style, creativity, originality)?
- **Vocabulary.** Is the vocabulary appropriate for the intended audience?
- **Aims.** Is the resource appropriate for the subject (i.e., animation, documentary)?
- **Organization.** Is the content well organized, easily followed, presented in effective manner?
- **Editing.** Is the content well edited?
- **Features.** Are special features effective (i.e., background information, supplemental materials)?
- **Special Needs.** Are options provided for special needs (i.e., captioning, language choices)?

Technical Quality selection criteria

- **Visual Elements.** Are the visual elements effective (i.e., viewpoint, composition, focus, exposure, colour, clarity, special effects)?
- **Sound Elements.** Are the sound elements effective (i.e., sound quality, voice and music quality, clarity)?
- **Editing.** Is the editing effective (i.e., smooth, rhythm, continuity, pacing)?

- **Technology.** Does the technology work effectively (i.e., skipping, missing elements, poor navigation)

In addition to these general suitability criteria, which apply to all uses, each of the uses of content within AXMEDIS have specific requirements for content which need to be matched with candidate content objects.

7.3.2 Test case performance analysis

Technical testing within the project will need a wide mix of content types and formats in order to test the extremes of format, file size, bit rate... For each item of test content, it will be necessary to define the expected results (e.g. expected processing time for a large file or complex format, etc.). These issues will be detailed in the deliverable *DE8.1.1*.

7.3.3 Dissemination support

This set of criteria cover the suitability of content to properly support AXMEDIS promotion. Some content will be able to promote the project, either by directly covering project related issues (e.g. a promotional video or material produced for dissemination) or indirectly by being used live in demos at exhibitions and conferences, or perhaps on a promotional DVD, etc. Additionally, dissemination aspects can also be considered for the activities on demonstration and training. Content created for the dissemination of AXMEDIS such as the flyers and poster in a digital format (jpeg, gif, etc), clips of the promotional videos (mpeg, avi, etc.), training material and user manuals (text, pdf, doc) can also be used as Content in this context. Moreover demonstrating and training with some content of a promotional nature can enhance the dissemination for AXMEDIS. Content providers that have the capabilities to create AXMEDIS content specified in *DE3.1.3 Content Aspect Specification for dissemination* would be encouraged to do so. It is important to setup a small collection of digital media objects to be used for demonstration and training, particularly in all AXMEDIS related events, such as the AXMEDIS International Conference series. For this purpose, the following content selection guidelines are suggested:

- File size has to be rather small to minimise waiting time due to content processing (the purpose is to show the working of the or the overall framework); content should be relatively small, but at the same time sufficient to demonstrate framework capabilities and functionalities, therefore in general:
 - audio: <= 1MB
 - video <= 8MB
 - text: <= 1MB
 - images <= 1MB (e.g. JPEG, GIF, PNG etc)
 - animation <= 5MB
- Content related to or with reference to AXMEDIS would be preferred, e.g. flyer with logo, etc
- Content providers partners are encouraged to ensure correct and completed metadata, i.e.:
 - AXINFO Metadata is to be completed appropriately
 - Dublin Core Metadata description field states “*Subject to the terms and conditions of the license, this sample video/audio/etc. was created for AXMEDIS demonstration and training*”
- The following materials are proposed since they could be used as content as well as serving to enhance dissemination activities:
 - Project flyers (M5 – available now) – in image and document formats;
 - posters (planned for M13) – in image and document formats;
 - a few minute of the promotional videos (planned for M18) – in video sequences;
 - part of or the complete promotional video (planned for M36) – in video sequences;
 - various training manuals – in text or other doc format;
 - various user manuals – in text or other doc format;
 - various installation guides – in text or other doc format.

7.3.3.1 Can the content be used to support dissemination?

All contributed content should be submitted with reference to the allowable usage. Ideally all content collected here should be usable for public demonstration and training purposes. All the content suggested in the above section on “*Dissemination Support*” should be usable to support dissemination, e.g. conference, work-

shops and all other AXMEDIS related events, and also training, tutorial and training course. Reference to AXMEDIS within the actual content or the metadata such as the AXMEDIS logo and reference in the appropriate metadata fields are encouraged.

7.3.3.2 Does the content reflect the desired image of AXMEDIS?

Usage of promotional material can guarantee that the content reflects the professionalism and innovation of AXMEDIS. Content providers for demonstration and tutorial digital content are expected to provide content of a level expected for the AXMEDIS project. To ensure the level of professionalism, all content submitted for demonstration and tutorials will be monitored by all relevant partners, particularly by DSI and UNIV-LEEDS, to ensure that the appropriate level is represented not only by the demonstrators and the tools by the digital media being used.

7.3.3.3 Is the content suitable for the distribution channels to be demonstrated?

The content should be adapted and ready for the demonstration of distribution on all the different channels as supported by the AXMEDIS demonstrators. This is to make sure that we are ready to provide demonstration at all time, with or without running all the necessary modules.

7.3.4 Demonstrator Business Model Support

This set of criteria covers the attractiveness and suitability to the target markets, both B2B and B2C, of the AXMEDIS demonstrators. This will build on outputs from the business plan questionnaire from Tiscali and will become better defined as the project's exploitation planning evolves.

7.3.4.1 Is the content attractive to the target market?

“Who are the target market for the demonstrator and does the content address their needs?” This should be kept in mind among selection criteria and, ideally, tested *“a posteriori”* with samples from the target market. Preliminary checks in terms of acceptance can be carried out by consulting target market samples of users, either by survey, focus groups or other methodology.

7.3.4.2 Can the content have the required price point for the target market?

Once again as a basic selection criteria is worth taking into account the following questions: “What is the target market’s preferred price?” “Can the content be delivered, satisfying all licensing costs within this price?” if during content selection the reply to such questions is positive, then the content being examined is worth of more attention and represents a possible asset. If the reply is negative, the content should be discarded unless it represents part of the promotional activities or is a “best-of-breed” test case for the developed technology.

7.3.4.3 Will the content meet the required quality-price relationship in order to offer value for money?

Quality is clearly a vital criterion, but must be measured in context with the target price. For example, a game could cost anywhere from €10k up to €10m to produce, so the important issue is to match the quality of the content to the target market. If for demonstration purpose it will be possible to use content that may not be targetable to the end-user-market, for the exploitation phase it will be necessary to keep in mind the economical aspect of content production and distribution, therefore the abovementioned criterion is crucial.

7.3.4.4 Will the content be suitable for the preferred channel(s) to the target market?

Due to AXMEDIS nature and purposes there are several channels to be addressed and, as already mentioned, the same content may suit one or several of them. Therefore while selecting content it will be better to have in mind the following questions: *“Which are the preferred channels?”* *“Can the content be delivered through them with sufficient quality and usability?”*

8 References, Standards & Bibliography (ALL)

In this sections are reported the more relevant reference and standards that have to be taken into account when selecting content either for re-editing/publishing or distribution purposes. The content reported hereafter is intended to complement the equivalent section of *DE3.1.3* and other specification deliverables. It is worth recalling that an AXMEDIS object could contain data coming from any cataloguing procedure used in the world. Even though these kinds of data are generally intended as pure text, they have to be interpreted, since they usually are UNIMARC files. That is a standardised file type for exchanging cataloguing records of books, audio supports, manuscripts, periodicals, electronic resources, etc... and that differs from the ISBD standard, which describes the different kind of cataloguing procedures depending on the individual item to be catalogued (see Glossary). To achieve the desired results it is necessary to have a tool converting UNIMARC files into XML ones. Digital resources of musical manuscripts for instance should be always connected with their own records. They represent the digital attachment of the bibliographic record. Note that some main fields (i.e. the main UNIMARC labels) can already hold information that will necessarily be replicated in AXInfo part of the AXMEDIS object derived by the raw source (e.g. title, author, etc...). It is commonly accepted that during import procedures of previous archives into new ones some data replication may occur. This is particularly expected between cataloguing information and metadata because the purpose is different (in this case metadata describe the digital resource, UNIMARC describe the real manuscript). More metadata standards used are described in *DE 3.1.3 Appendix 1*.

- [1] Fiorenzo Fallani, SSIS Veneto - *Fondamenti e didattica della grafica* - <http://www.101010.it/corso-a7-04/documenti/fallani.rtf>
- [2] V.A., State of Ohio, State Forms Management, Forms Management, Paper No. 3 - *Visual Communication for Forms Design* - <http://www.gsd.das.state.oh.us/forms/visual.pdf>
- [3] V.A., State of Ohio, State Forms Management, Forms Management, Paper No. 2 - *Selecting Information Elements for a Form* - <http://www.gsd.das.state.oh.us/forms/elements.pdf>
- [4] Russell N. Baird, Duncan McDonald, Ronald H. Pittman, and Arthur Turnbull - *The Graphics of Communication: Methods, Media, and Technology*. 6th ed. - Harcourt Brace Jovanovich, 1993.
- [5] Erik Spiekermann, E. M. Ginger - *Stop Stealing Sheep (& find out how type works)* - Adobe Press, 1993.
- [6] Ray Kristof, Amy Satran - *Interactivity by Design: Creating and Communicating with New Media* - Adobe Press, 1995.
- [7] Carolyn Knight, Jessica Glaser - *Effective Visual Communication for Graphic Designers (Creating Hierarchies with Type, Image and Colour)* - RotoVision SA 2003
- [8] UniSA Library - *Internet resources for Visual Communication* - <http://www.library.unisa.edu.au/resources/subject/viscomm.asp>
- [9] Patrick J. Lynch, Sarah Horton (Yale University Centre for Advanced Instructional Media's) - *WEB STYLE GUIDE, 2nd edition* - <http://www.webstyleguide.com/index.html>
- [10] OCLC - OCLC Bibliographic Formats and Standards - <http://www.oclc.org/bibformats/en/0xx/098.shtm>
- [11] Knowledge Management Connection - *Faceted Classification of Information* - <http://www.kmconnection.com/DOC100100.htm>
- [12] V.A. - *Readability Scores for Web pages and MS Word files in a flash!* - <http://www.readability.info/info.shtml>
- [13] Abu Dhabi Men's College in the Higher Colleges of Technology (ADMC) - *Readability: Measuring Readability* - <http://www.admc.hct.ac.ae/hd1/english/readability.htm>
- [14] EdNA Online, Education Network Australia - *Metadata* - <http://www.edna.edu.au/edna/go/pid/1>
- [15] BBC - *BBC Web Development Guidelines* - <http://www.bbc.co.uk/guidelines/webdev/>
- [16] Deakin University - *SCC100 Multimedia Design* - <http://www.deakin.edu.au/~agoodman/scc110/>
- [17] V.A. PBS 45 & 49 Staff - *Television production Tips* - <http://wneo.org/video/Default.htm>
- [18] V.A. PBS 45 & 49 Staff - *Video Production Guidelines* - <http://wneo.org/LessonActivities/integratingtechnology/Videoproductionguidelines.htm>

- [19] National University of Singapore (NUS) - *Video production: Production guidelines (Video recording and microphone tips)* - http://www.cit.nus.edu.sg/website/vp_guidelines.htm
- [20] The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) - *Video Production Guidelines* - http://www.sages.org/sg_vidguide.html
- [21] CDG Solutions Inc. - *Template Production Guidelines* - http://comps.cdgsolutions.com/cdgsolutions/usability/guide_template_prod.htm
- [22] V.A. Digital Media at College of the Redwoods - *DM30 Multimedia Authoring (Production Team and Cycle)* - <http://isweb.redwoods.edu/instruct/johnsonc/dm30/production.htm>
- [23] University of Delaware - *Multimedia Production Guidelines* - <http://www.udel.edu/present/multimedia/guidelines/video.htm>
- [24] Marika Pehkonen, Hanne Turunen (Hypermedia Laboratory, University of Tampere) - *Preliminary guidelines for the design of the mobile learning activities and materials* - http://www.mindtrek.org/liitetiedostot/materiaalit_editori/75.doc
- [25] IASA - *Guidelines On The Production And Preservation Of Digital Audio Objects* - <http://www.iasa-web.org/tc04/tc04.htm>
- [26] Springer Verlag - *Author Guidelines* - <http://et2.springer-ny.com/authors/>
- [27] Texas Heart Institute, Visual Communication Services (VCS) - *Guidelines for Poster Production* - http://www.texasheartinstitute.org/Guidelines_for_Poster_Production.doc
- [28] Texas Heart Institute, (VCS) – *How to Prepare Digital Images for Publication* - http://www.texasheartinstitute.org/How_to_Prepere_Digital_Images_for_Publication.doc
- [29] Texas Heart Institute, Visual Communication Services (VCS) – *Tips for Creating Effective Slide Presentations* - http://www.texasheartinstitute.org/Tips_for_Creating_Effective_Slide_Presentations.doc
- [30] Aries Ardit, PhD, Lighthouse International - *Effective Color Contrast* - http://www.lighthouse.org/color_contrast.htm
- [31] Michael Douma, Institute for Dynamic Educational Advancement (IDEA) - *How Do Things Look To Colorblind People?* - <http://webexhibits.org/causesofcolor/2.html>
- [32] Thomas G. Wolfmaier - *Designing for the Color-Challenged: A Challenge* - http://www.internettg.org/newsletter/mar99/accessibility_color_challenged.html
- [33] Diane Wilson - *Color Vision, Color Deficiency* - <http://www.firelily.com/opinions/color.html>
- [34] V.A. - *Color Blindness* - <http://www.geocities.com/Heartland/8833/coloreye.html>
- [35] V.A. - *Color and Accessibility* - http://www.evolt.org/article/Understanding_Color_and_Accessibility/4090/60472/
- [36] W3C - *Guidelines of the Web Accessibility Initiative* - <http://www.w3.org/WAI/>
- [37] Christine Rigden - *Now You See It, Now You Don't* - IEEE Computer2002 (Vol. 35, No. 7), pp. 104-5.
- [38] Cal Henderson - *About color blindness* - <http://www.iamcal.com/toys/colors/>
- [39] V.A. IDEAL Group Inc - *Accessible Design Guidelines* - <http://ideal-group.org/guidelines.htm>
- [40] LiddyNeville - *Accessibility Issue 2005* - http://standards.edna.edu.au/idea/summer2005/ppt/OTF20050209_LiddyNeville.ppt
- [41] http://www.tvhandbook.com/support/pdf_files/Chapter2_7.pdf
- [42] Tanaka, Sugaya - *Universal Service to Universal Access and Web Accessibility* - http://userpage.fu-berlin.de/~jmueller/its/conf/berlin04/Papers/Tanaka_Sugaya.pdf
- [43] U.S. General Services Administration's Office of Governmentwide Policy - *Section 508* - <http://www.section508.gov/index.cfm>
- [44] W3C - *Web Accessibility Initiative (WAI)* - <http://www.w3.org/WAI/>
- [45] W3C - *Web Content Accessibility Guidelines 1.0* - <http://www.w3c.org/TR/WCAG10/>
- [46] W3C - *Checklist of Checkpoints for Web Content Accessibility Guidelines 1.0* - <http://www.w3c.org/TR/WCAG10/full-checklist.html>
- [47] TeX Resources on the Web - <http://www.tug.org/interest.html#free>

9 Terminology (ALL)

Term	Explanation (including source if available)
QoS	Quality of Service – relates to telecommunications and the reliability and predictability of services. For example, a private line telephone link can have a guaranteed QoS whereas a voice-over-IP telephone connection relying on the internet will have no guaranteed QoS.
Colour space	Effectively, the dynamic range of colour and contrast. A wide colour space includes brighter whites, darker blacks and richer colours.