Multimedia Today for use in UK Higher Education

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Introduction

This paper outlines the current multimedia market, showing how the growing home market for PC applications and embedded applications in consumer electronics (TV, phones etc.) will dominate the growth of multimedia, setting standards for authoring tools, exchange formats and distribution formats.
Because of this it is argued that educational multimedia should follow these standards since they will lead to lower costs of using multimedia, rather than adopting research based, or more intellectually interesting ones.

To define multimedia would be foolhardy. I accept that it covers text and images, also including non-verbal audio, speech, video, and animation on occasions, but not always to any great percentage. This paper does not address multimedia applications which have a communications purpose *per se*. Computer mail can be enhanced by store and forward voice or video systems, telephony can be enhanced with video phones or computer based interactive video conferencing which could lead the way to distributed education replacing the centralised lecture, seminar, tutorial or examination. The introduction of these technologies appears to be dependent on the band width, cost and reliability of the computer networks, and a cost/benefit analysis of the change from conventional to these distributed groupware based methods. Since the purpose of these tools is to support communication nothing more will be said about them. The class of multimedia discussed could be termed hypermedia or even hypertext.

The three major obstacles to general multimedia publishing today are standards of formats, quality of product and copyright issues. These are noted as also applying to the educational market. The major problems in promoting multimedia in the education market are then discussed including the problems in producing and distributing multimedia publications through the educational community.

This paper is written help foster the educational multimedia market in the UK Higher Education Community. The author is an informatics researcher and neither an educationalist nor a marketing specialist. The data and opinions given here are obtained from keeping up with the trade press in the area and not through any special insight - if you read Byte regularly your information is probably as valid, complete and up to date as that to be found here. This paper is intended to raise issues for workshop discussion and not as a seminal text.

The Current Multimedia Market

The multimedia market is currently very fragmented. Most market surveys suggest that training systems are currently the largest market sector, with point of information kiosks and games being the other main sectors (99% between them in 1991). Predictions suggest that the shape of this market will change with these sectors becoming saturated or at least stable in size. Data access and presentation applications are expected to grow to become the majority of the multimedia market by 1997 (Templeton, 1993). Communication companies such as AT&T are buying equity stakes in cable TV companies to ensure control of distribution, and in media production and asset owning companies (such as Holywood studios) to ensure a supply of assets to distribute to domestic consumers. Computer developer companies such as Miscrosoft have made alliances with domestic equipment providers such as General Instrument and computer hardware developers such as Intel to integrate computer operating systems with domestic television systems (Microsoft have announced that Windows for TV will be launched in early 1994). Microsoft have also entered into agreements with fax machine, telephone and photocopier producers in the expectation of adding touch screens supporting multimedia to these domestic devices. Along with these moves to introduce multimedia information technology into domestic devices, market researcher Dataquest has suggested that domestic PC sales

themselves will become 24% of the European market (30% of the UK market) in 1993, reducing the dominance of the business market.

Most published market predictions tend to accelerate the rate of market growth, partly because they are compiled from producers whose interests it is in to promote activity in a sector. In 1992 these suggested that the multimedia technology would be introduced into the market by 1993, with early entrants and technologists starting market growth by 1994, when bulk consumer growth would take off, so the multimedia market would rise to somewhere between $8B and $24B by 1997. These stages are certainly delayed since many producers cannot see a way to initiate large growth in the market. Despite these setbacks there have been several marketing strategies envisaged for both the home and office, driven by games, desktop publishing, or voice mail. Games are moving up in complexity, with consoles moving from 8 bit to 64 bit by the end of 1993. CD-ROM drives are now required for many of the best selling titles, which may support their introduction into the home. CD-ROM versions of photographic libraries and video libraries have become available for desktop publishing systems which may introduce CD-ROM's into the office. Sound cards are acquired bundled with these drives, or explicitly for voice mail or sound annotation. Once the hardware is in place, and the viewing tools are incorporated into operating systems, then offices and homes are provided with multimedia PC's. Photo-CD will allow companies to establish libraries of their own images for incorporation into documents, and for home users to become accustomed to viewing their own images on screens. Once the hardware and software has an installed base then the market for individual multimedia titles can grow more easily.

Current multimedia training, kiosk and games products are Hypermedia artefacts which are discrete published entities. These may be produced as CD-ROM's for PCs, for CDTV players, for Sony Data Discman or any of several other reading platforms. In all of these cases though, they are single published artefacts whose production, marketing and sales follows the conventional paper or video publisher's product life cycle, and not a computer software one. The technology for producing these artefacts moves the control of their production from computer specialists to those accustomed to other forms of publishing. The authoring tools market will be initially large while empowering these creators, but will then diminish in importance as titles are produced (. The estimates on cost of production of a hypermedia CD are in terms similar to the production of a one hour television program, about $100,000 per tittle. The production teams are composed of similar individuals including cameramen, sound recorders, editors, directors, script writers and graphic artists (a recent book by Cotton and Oliver provides an impressively presented collection of images from available hypermedia systems collected by graphic designers and published by an art rather than a computer publisher - Cotton and Oliver, 1993). From the artists, typographers, or video editors perspective they are being provided with a new medium. Hypermedia changes the means of production since a single artist or designer can now sit at a single workstation and on that one machine orchestrate the complete span of media. It is possible to move seamlesly from typography to animation to illustration to image scanning or video editing to sound mixing, and at the same machine produce an entire interactive programme ready to be mastered and stamped on a CD-ROM, or networked to other machines.

As the installed base of multimedia PC's in the home and office is established, the market for this class of hypermedia document will become established. UNIX workstation multimedia systems (E.g. Cats Meow from Tiger Inc.) are expected to be used in more integrated computer environments where information can be accessed over LANs from database servers. These include SQL client programs to that queries can be embedded into applications, for execution at run time. These can be useful for training systems or report generators where information has to be temporally accurate. It is unlikely that such facilities will explicitly be build into PC level products (at about one twentieth of the price) but the use of OLE and DLL technologies in MS Windows allows the interaction of database client programs with hypermedia presentation system to reach the same result for the user at a fraction of the investment. Advances such as this will trickle down from the workstation to the PC market if they are seen to be beneficial and the cost saving on waiting for that rather than investing at the workstation level is substantial.

If hypermedia systems also include queries to databases, those databases could reside locally or remotely. If they reside locally, on the same machine or on a LAN then the machine or LAN must be

capable of supporting transmission of media at a rate the user can bear. Very few systems can support 24 frame per second 24 bit colour video at a reasonable resolution for full screen image on a 12 inch monitor. Indeed, directly reading off a CD-ROM onto a PC or Mackintosh will not provide this performance. For remote access over WANs, the probability of such performance in the near future is unlikely in practical situations. Unless the quality of video is sufficiently high (not as high as medical doctors may require of life critical x-rays or scan results, but approaching the level described) then real users, other than technology fans or researchers, will not use it. Consequently, networks become a means of distributing multimedia documents prior to reading, rather than for live transmission to any but a few specialised locations.

Problems with Multimedia Production

There are still considerable problems associated with this publishing metaphor for hypermedia production, mainly associated with competing distribution formats and copyright. Paper publishers are accustomed to a single form of paper publishing standard with variation in natural language Current Multimedia authoring tools produce their own proprietary formats, and can be distributed in several formats for different presentation tools. This confusing situation is many times worse than the competition between VHS and Betamax video standards which is the closest comparison available to most producers and publishers. A generalisation of Apple's QuickTime which is SGML compatible, HyTime became an ISO standard for hypermedia interchange in April 1992. It is expected that existing authoring tools will provide translators from their own formats into HyTime to facilitate portability, although none are yet available several major manufacturers have expressed support for the standard (Newcombe, 1991; ISO, 1992). At a higher level, Kaleida Labs (a joint venture of Apple and IBM) have demonstrated a device independent multimedia programming language ScriptX on the way to producing a standard authoring system that will work on any computer.

Copyright and IPR issues associated with Multimedia products fall between those of computers and conventional publishing. Publishers, authors, photographers and other producers expect to retain copyright and gain a fee when library texts or images are used . Therefore they need to secure the assets and monitor access. The computer community is more familiar with buying software and then using it as they wish without paying by use. The conflict between these models and the legal resolution of them are addressed elsewhere (Lyons, 1991; Haynes, 1991; McIntosh, 1991) but although the academic community may be in the habit of neglecting contractual copyright issues, they are relevant to them here and should be considered carefully. Reusing an image from a book, or text from a paper in electronic form may be so much more easily distributed (without deterioration of quality) and so much harder to trace than by photocopying a paper copy (which will deteriorate in quality when re-copied) that publishers and asset owners may be stringent in protecting their rights thereby increasing the cost of multimedia production.

The third general problem for multimedia is quality of product. Products such as CDTV, CD-I, and Sony Bookman have all failed in the marketplace because the quality of the images is too low. Even some of the software video tools produced by major manufacturers have not provided sufficient quality of image for a market accustomed to TV or cinema quality (e.g. Microsoft Video for Windows). The major failing of these systems has been the use of the labels such as multimedia along with the failure to deliver high quality full screen video to a quality comparable with TV or cinema which is what the audience is accustomed to. If multimedia products are to become established in the market they must provide the high quality which the public is accustomed to and not small jerky images at 15 frames per second .

The Education Market for Multimedia

The educational market for multimedia does not exist yet. It has to be invented through technological push. A consequence of this is that academics who are trying to produce multimedia courseware can become developers of computer programs. If this happens then the tools have not been sufficiently developed and attempts to develop the market should be postponed. Authoring multimedia courseware should be an authoring task and not a computer programming one. Authors should not have to become computer experts any more than they should be to use a word processor; computer literacy is required, but not software engineering skills. It is believed by their manufacturers that there are

currently authoring packages for multimedia production available on the market which should support this authoring role.

Those more pedagogically aware than me can define the distinction between education and training and the role of training within education. Here I will crudely assume that a training system includes the presentation of a course of material and tests of a students acquisition of that material, whereas and educational publication will present the information and allow the student to explore it and learn without specific tests. Therefore I am considering two classes of multimedia product: i) courses of training material which incorporate student models, tests to elaborate those so that students can be directed through the courses (multimedia CAL/CBT); ii) collections of information with paths of links between them which students can follow to explore the information (multimedia publications).

Multimedia production where video or sound must be created is very expensive, where these exist and the copyright must be obtained they may also be expensive. Therefore the only way that multimedia products could be cost effective is if there is a large market for them. The results of a survey undertaken in 1992 by the ISC courseware development working group (Laurilard et al, 1992) suggested that although academics were interested in using courseware developed elsewhere, it would have to be customisable to their own courses. The closer a piece of software is to multimedia CAL/CBT and less like a multimedia publication then the more effort will be required to customise it. Therefore the softest target would be multimedia publication rather than multimedia CAL/CBT. If this is accepted then four issues must be addressed:

1) What are the benefits to the producer in constructing multimedia courseware ?

If it requires a team of skilled authors in different media to produce a title, they must be motivated by some reward. If they just like playing with the technology it is unlikely that they will be the best subject experts or expositors who should be producing the title. The career development structure of their employers must reward the production of multimedia educational titles; maybe as it has rewarded research publications in the past.

2) Is the courseware actually serving a cost effective purpose compared with alternative, cheaper media?

There must be evaluation criteria available to test whether the courseware improves the time, amount or quality of learning compared to alternative techniques sufficiently to justify the purpose.

3) Does the multimedia publication maximise the potential market?

Have the requirements for the project been collected from a large enough segment of the market to reasonably meet their needs, or is an individual just authoring the system he wants? The investment in each title is sufficiently high to require serious study of potential users. Each title must also support the customisation necessitated by potential users.

4) Is there a distribution mechanism for the multimedia publication ?

Each title must be authored and produced in a portable format. There must be a means of distributing it to the potential market. This could be by downloading from a network server if this does not require computer skills beyond those of potential users. Since this is likely in many cases then a distribution system with its associated costs must be established. This may well involve conventional publishers who have such distribution means already. In which case, should there existing multimedia assets be used in production, or should they subsidise production?

5) Are there IPR and copyright issues outstanding?

Are there any materials used in the title which are not owned by the publisher or author? Secondly, is the copyright on the title itself protected?

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