Streaming media for higher education: Signs of settling

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This paper updates an ongoing watching brief (Parfenovics & Fletcher, 2003) concerning evaluation of streaming media applications and their potential to be integrated into higher education program delivery. The evaluation criteria for the brief are reviewed and updated. Other considerations meriting report include industry standards progress and industry consolidation, including the packaging of applications to provide broader production and delivery functionality. The brief at this stage finds some rationalisation of the market, with dominant vendors emerging, leaving a clearer picture of risks and costs for higher education institutions who may seek to leverage the technologies for teaching and learning benefits. A classifying continuum for streaming application products, according to functionality, is proposed. Such a tool will assist institutions to determine if an application meets their current needs. Awareness of these factors informs a strategic approach to technology planning and integration in an environment that is still largely hype driven.

Keywords: streaming media, online delivery, technology evaluation.

Introduction

This paper will discuss recent developments that impact institutions making decisions concerning whether and how to integrate streaming media into higher education teaching and learning delivery. The discussion considers industry, higher education, and the local environment at Charles Darwin University, from the perspective of those working to support instructional design and delivery, as well as staff development. Members of Charles Darwin University's Academic Development Unit have maintained a structured watching brief, concerning streaming media technologies and implications for higher education, for the last 2 years (Parfenovics & Fletcher, 2003).

Evaluation framework for watching brief

The original evaluation framework for this watching brief was informed by Roger's (1995) diffusion of innovation theory, and particularly by Hansen & Salter's (2001) elaboration of that framework spelling out categories of concerns, namely, (1) the ability to adapt existing resources (2) the amount of training time needed to learn how to use an application, and lastly (3) the technical parameters of the application/s (p. 289). Evaluating any proposed technology according to these categories remains important, however, to understand the diversity offerings related to streaming media applicable to teaching and learning requires an initial step of needs analysis, in terms of desired functionality.

Streaming media technologies are defined as (Shegda, Bell & Latham, 2004) enabling "the parsing of large video and audio files into a continuous flow that is sent to the browser and received just before the user views them." The applications which support this technical strategy provide various process functions upstream from the creation of the flow to the user and include: (1) content capture (i.e. desktop, audio or video recording, can be synchronous or asynchronous with delivery), (2) content editing/formatting, (3) video/audio editing editing, (4) Content packaging (formatting and compression), and (5) streaming content delivery. While the diversity of functions offered was recognised early in the course of the watching brief, recent reflection on how to categorise applications for evaluation has brought recognition that the first taxonomic level must recognise the process function. The process functions presented in Parfenovics & Fletcher (2003) have been updated. A functional continuum is proposed as in Figure 1. This continuum places the various application products offered by vendors (see Table 1) within the continuum.

Recent streaming media developments

Developments in the past year are summarised at the levels of: industry, higher education, and local institutional environments.
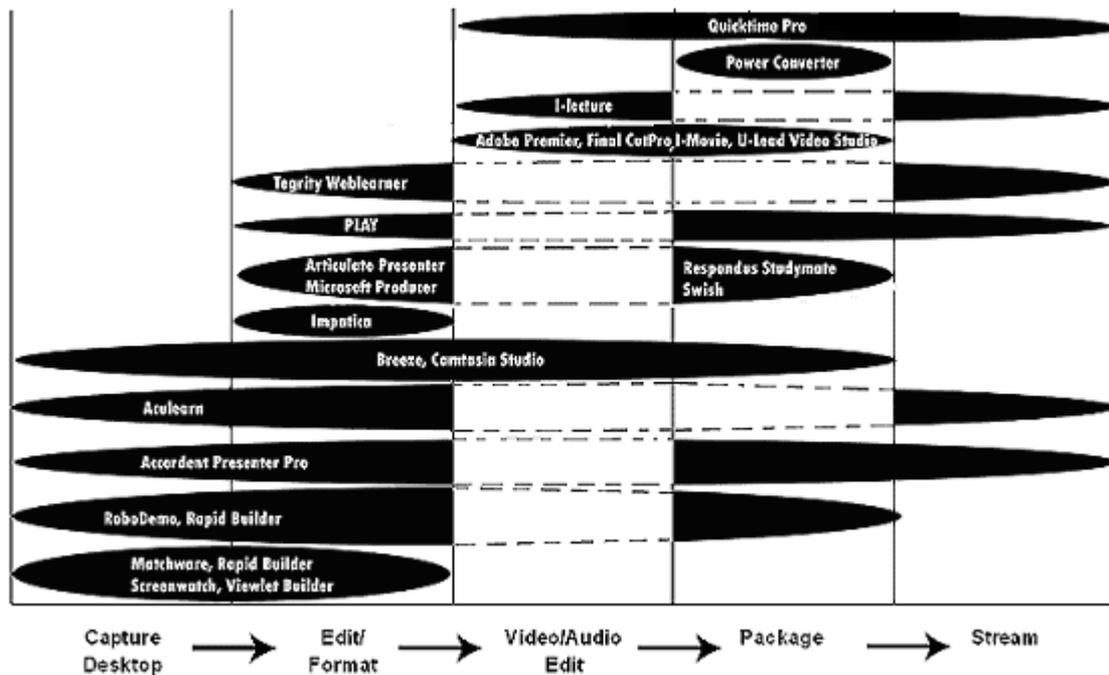
Figure 1 Functional continuum for describing streaming media and related technologies

Industry

In terms of new vendor entrants, or new vendors on the market, there are a small number of additions to the list. The original list (Parfenovics & Fletcher, 2003) is updated in Table 1.

Another indicator of market stability is the membership list of the Internet Streaming Media Alliance (ISMA), which has added some smaller and academic partners, but remains unchanged in terms of major commercial partners, with Apple remaining the most recent addition there. Progress made by ISMA in the past year includes the publication of the ISMA Encryption and Authentication Specification v.1.0 standard (ISMA, 2004) which "works at the core foundation of content delivery systems to allow for seamless integration with different types of rights and key management systems, while adopting parts of published specifications currently in development, or open, standards based specifications already in existence." It is hoped by the ISMA membership that the standard will:

> Facilitate interoperability between all types of devices, increase market adoption of products and services offered by a wide variety of vendors, and promote revenue-generating opportunities for content creation and delivery over public and private Internet networks. (ISMA, 2004)

As mentioned, Apple remains the largest player to cast its lot with open codec standards, while of the other two titans Microsoft and Real, it looks like Microsoft will prevail with its closed codec approach and Real is exploring opportunities to partner and share codecs with other vendors, including Apple (O'Reilly, 2004). These players are driven mainly by the streaming music market's potential and a key focus is on developing standards that allow for protection of intellectual property delivered via the streaming strategy.

However, the content creation market space has also seen consolidations. The biggest established player here is Macromedia. They are investing heavily in developing and marketing for their Breeze application, and have also recently purchased RoboDemo to promote as a subject matter experts' (as opposed to multimedia expertise intensive applications like Flash and Authorware) development tool.

A side plot to the streaming media industries development is the ongoing adventures of Acacia Technologies, a firm claiming ownership and rights to licensing revenues over patents, which it argues,

Table 1: Streaming media and related applications

Application/URL	Notes
Accordent http://www.publichost.com/accordent/presenterpro-presenterplus.html	Creates streaming media and synchronises Powerpoint
Aculearn http://www.aculearn.com/index.htm	A software suite to enhance Powerpoint with rich media and stream content
Adobe Premiere http://www.adobe.com/	Well featured video and audio editing and capture
Articulate Presenter http://www.articulateglobal.com/presenter.html	Enhances Powerpoint with voiceover and creates Flash files
Breeze http://www.macromedia.com	Enhances Powerpoint with audio, quiz, and publishing wizards
Camtasia Studio http://www.realnetworks.com/products/camtasia/index.html	Desktop recorder with audio and text captions
Final Cut Pro http://www.apple.com/finalcutpro/	High end video and audio editing and capture for professionals
Helix Producer http://www.realnetworks.com/industries/resources/technology/helix.html	Professional productions tool to edit and convert video and audio to Real format.
I-lecture http://ilectures.uwa.edu.au/	Automatically records lectures and processed into streaming media formats
I-movie http://www.apple.com/imovie/	Audio and video editor
Impatica http://www.impatica.com/	Compresses Powerpoint files to optimise streaming
Matchware http://www.matchware.net/en/products/screencorder/default.htm	Desktop recorder with audio and text captions
Microsoft Producer http://www.microsoft.com/office/powerpoint/producer/	Enhances Powerpoint with voiceover and rich media features
PLAY http://www.ethworld.ethz.ch/events/showcase/play_EN	Web based application that produces streaming media
PowerCONVERTER http://www.presentationpro.com/Products/PowerCONVERTER.asp	Coverts Powerpoint to Flash
Quicktime Pro http://www.apple.com/quicktime/products/	Video and audio encoding, creates streaming media files
RapidBuilder http://xstreamsoftware.com/rapidbuilder_deluxe_description.htm	Desktop recorder to create customise and deploy simulations
Respondus Studymate http://www.respondus.com/update/studymate-beta.shtml	Creates Flash activities and games without the programming
RoboDemo http://www.ehelp.com/products/robodemo/ [25 Oct 2004 viewed at http://www.macromedia.com/software/robodemo/]	Desktop recorder with audio and text captions
Screenwatch http://www.screenwatch.com/	Desktop recorder with audio and text captions
Swish http://www.swishzone.com/	Creates interactive Flash animations
Tegrity Weblearner http://www.tegrity.com/	Lecturer annotates Powerpoint, video or screen recordings in real time
U Lead http://www.ulead.com/	Video and audio editing and capture for novice users
Viewlet Builder http://www.qarbon.com/products/viewletbuilder/features.html	Desktop recorder with audio and text captions

are central to streaming media technologies. It continues to sign licensing agreements with organisations including higher education providers. Another aspect of this sideshow is that it aligns interests of higher education and the pornography industry, both sectors finding themselves in Acacia's legal sights. The most recent development is that one court has found Acacia's claims 'indefinite,' meaning that they may be too vague as to be enforced (Carlson, 2004).

Comfort zones in cycles

In the initial stages of this watching brief, (Parfenovics & Fletcher, 2003) Rogers' (1995) diffusion of innovation theory was found to be a useful framework for understanding technology adoption within higher education. A derivative (although not readily acknowledged) by of Rogers' diffusion process - awareness (knowledge)=> interest (persuasion) => evaluation (decision) => trial (implementation) =>

adoption (confirmation) - which makes sense in rapidly changing and highly hyped technology markets is the 'Hype Cycle' (Drobik, 1999) used by Gartner Inc. to represent their findings on current status of various segments of the technology market. The Hype Cycle is illustrated below:
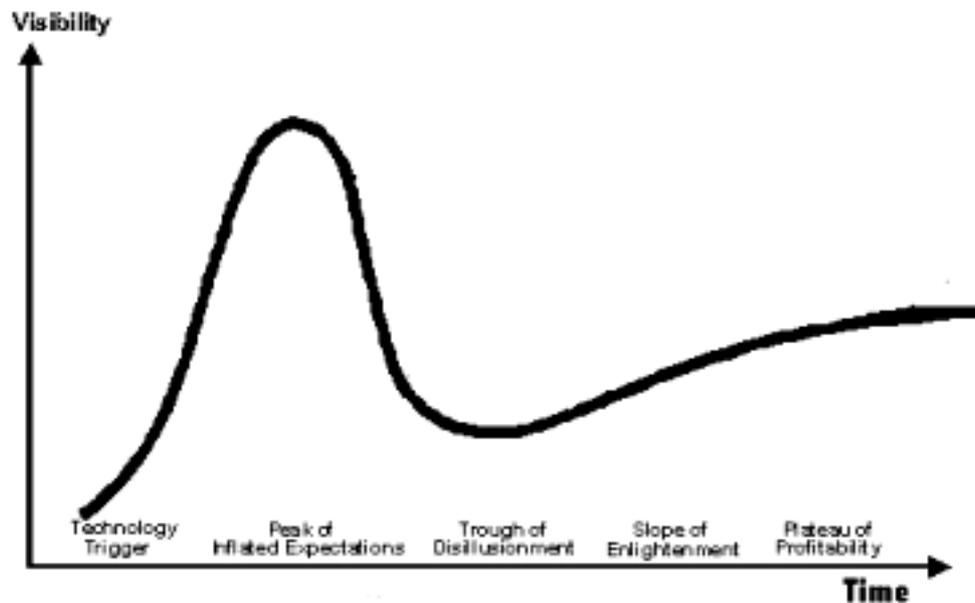
Figure 2: Hype cycle (Drobik, 1999)

The stages of innovation (Rogers, 1995) and the Hype Cycle (Drobik, 1999) both have their comfort zones, arrived at after a time in more erratic zones. According to Gartner, streaming media, in the general technology market, as well as in the higher education market segment, is headed for a more settled and productive future in the next 2-5 years, in effect finally heading into a 'comfort zone.'

Gartner Hype Cycle for e-learning (Arevolo, Lundy, & Phifer, 2004) places 'simulation authoring' and 'soft-skills authoring' (both arguably enabled by streaming audio/video) as approaching the 'peak of inflated expectations', and expected to reach the 'plateau of productivity' in the next 2-5 years. Similarly, within their Hype Cycle for Content Management (Shegda, et. al, 2004) Gartner sees 'streaming media' placed at the bottom of the 'trough of disillusionment,' poised to climb the 'slope of enlightenment' and reaching the plateau of 'productivity' also in 2-5 years.

Higher education

Gartner has also published a Hype Cycle for Higher Education (Yanosky, Harris & Zastrocky, 2004). In this cycle, they have placed 'IP Video for E-learning' at the base of the 'Slope of Enlightenment.' in the Gartner places streaming media as number three on their survey.

After the first year of the watching brief, it was recommended that small scale piloting of the use of streaming media applications would be the best posture for institutions, at least the evaluators' home institution, to take. It seems that appraisal coincided with views taken by numerous other similar institutions. The educational technology literature features a number of conference papers giving overviews of the technology (David, 2003; Yuen, 2004), critiquing advantages of the technology vis-à-vis or in complement with other strategies (Lubberding, van Leijen, & Oomen, 2003; Krithivasan & Iyer, 2004), the transition, including pedagogical opportunities, of transition from traditional video to digital streaming technologies (Shewbridge & Berge, 2004) and trialling the technologies for operational and learner response information (Flower, 2003).

There are a few notable exceptions to the 'go slowly' posture. Leadership in establishing institution-wide initiatives which operationalise all of the functions described in the continuum has been shown in Australia by the University of Western Australia (Neville & Fardon, 2003) and in the United States at Stanford University (Stanford, 2004). In Europe, Jens (2004) recently reported on the development of similar Web based streaming management architectures.

At Charles Darwin University

At Charles Darwin University, IT decision makers chose QuickTime as the default player for all audio and video content, when it became apparent that a streaming solution was required to be used with Blackboard (Version 6 Enterprise). This choice was made after other systems such as Real were investigated. A Mac G4 was purchased for approximately $6,000 and OSX Server for $1,400. The Quicktime Streaming Server 5 comes bundled with Mac OSX. The system integrates seamlessly with Blackboard and has provided a very stable and efficient platform for the delivery of streaming media within online courses.

Staff developing online units can request a Quicktime Streaming account to upload their own streaming media. Also, workshops on how to create and upload streaming media content are being developed by the Academic Development Unit to assist staff in taking the first steps into streaming media. As an adjunct to the workshops Camtasia Studio is being used to produce small vignettes supporting the use of Blackboard and streaming media.

There is no institution wide policy as yet that the university use Blackboard and the Quicktime Streaming server as the de facto standard for online delivery. This has prompted several faculties to experiment with other delivery platforms and adopt other environments for their online delivery. This process has advantages in terms of exploring a more diverse range of options, and disadvantages of delaying resolution of support issues and risking loss of development time and effort.

Summary and recommendations

The applications market for streaming media and the development of rich media content is a crowded one with new offerings coming on stream almost weekly. As offerings increase the selection of the appropriate technologies for Higher Education becomes even more difficult. However, current analysis of the streaming media industry shows signs of settling, and indicates that institutions should begin trialling and considering the various options available for integrating streaming audio and video into their delivery of teaching and learning.. Whichever applications are chosen, significant inputs of development time and money will be needed, although vendor claims tend to understate these factors.

From the experience at Charles Darwin University it is recommended that a needs analysis be conducted as to how and when streaming media is to be used to enhance the delivery of courses. Once this is established, appropriate technologies and applications should be appraised and tested to see which environment best suits the development and delivery of the streaming media content given the institution's specific objectives, bearing in mind *all* of the functions required to develop and deliver content. (The information provided in this paper is intended as a guide to the categories of functionality. As product features may change, and/or interpretations of vendors' claims may vary, readers should themselves refer directly to vendor provided information before decision making).

Given the plethora of products currently available, determining your needs and making selections will be no easy task. It is likely that educators and others who are eager to experiment with the technology will acquire lower cost and incomplete solutions at local levels within institutions. However, a preferable scenario is that strategic attention be given, at the institutional level, to considerations such as initial cost, training, infrastructure and content management procedures, as well as to support and maintenance. Once the applications and platforms are assessed, standards and procedures should be agreed upon and adopted by all players in the design and development of streaming media materials, in order to minimise replication of effort and to simplify support and training issues.

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