University of Northern Iowa

UNI ScholarWorks

2009

Telos: An Interactive Platform for Broadcast Management

Andrew L. Knight

[Let us know how access to this document benefits you]

TELOS: AN INTERACTIVE PLATFORM

FOR BROADCAST MANAGEMENT

A Thesis Project

Submitted

in Partial Fulfillment

of the Requirements for the Designation

University Honors with Distinction

Andrew L. Knight

University of Northern Iowa

May 2009

This Study by Andrew L. Knight

Entitled *Telos*: An Interactive Platform for Broadcast Management

has been approved as meeting the thesis or project requirement for the Designation

University Honors with Distinction

5/4/09

Date

_____

Ronnie Bankston, Honors Thesis Advisor

5/5/09

Date

_____

Jessica Moon, Director, University Honors Program

Telos: **An Interactive Platform for Broadcast Management**

The following thesis project is an attempt to consolidate a number of media management tools under a single interface, allowing for a streamlined, yet powerful, approach to the organization and distribution of multimedia content. The **T**otal **E**lectronic **L**isting **O**perations **S**uite, or *Telos*, is the main component of the thesis and the result of over a year of research and development. The two adjunct components are this review article (a commentary on the process, design, and implementation of the software), and the product overview, available at http://www.uni.edu/unitv/guide.html

Project Background

Before high-bandwidth Internet services were readily available to consumers, "electronic media" referred almost exclusively to radio and television[1]. The cinema, for instance, was a separate media entity that remained quite isolated until cable television service and home video systems made feature films more readily available. Now, computers, mobile phones, game consoles, and a plethora of personal electronic devices relay a multitude of rich content choices, and the distinguishing characteristics of separate electronic media disciplines have begun to blur. Certainly, it is not difficult for a viewer to distinguish between a TV series and a DVD, an e-mail and a webpage, or a game show and a video game. But what if that DVD is a copy of the TV series? The e-mail displayed in a web browser? The game show an interactive play-at-home activity? In these examples, it becomes difficult to differentiate between home video and television, e-mail and a web page, or passive versus active entertainment. Because current electronic media allows us to view similar content through a variety of mediums, it is here where the "old" industries of television and radio must evolve in order to captivate the next generation of media consumers.

---

[1] (Head, 2000)

Although streaming video was established[2] nearly a decade before online video boomed[3], it was the combination of high-bandwidth Internet service and Flash Video playback that allowed websites like YouTube to bring television to the Web. While YouTube's slogan is "Broadcast Yourself", it quickly became a venue for re-broadcasting television content. Video on the web took the concept of on-demand to a new level; content was not only immediate but also free (and commercial-free). Shortly after its inception, copyright issues surfaced, prompting YouTube and sites like it to reorganize in order to quell fears from networks that viewers were migrating from TV to online video players. If the original online piracy lawsuit of Napster in 2001 and the 2007-2008 Writers Guild of America Strike are any indication, the monetary value of online media (namely, the eyes and ears of its viewers) has been persistently struggled over. While legal clashes will likely not end, other paths to promoting legitimate video downloads have already proven profitable. The website Hulu, for example, has arrived as one of the most promising results: a service which provides high-definition movies and TV shows via the Web with minimal commercial interruption. Considering Disney's planning to buy a 27% stake in Hulu, there would appear to be a bright future for studios that embrace online content distribution[4].

Though television and computing are the first and second most-consumed mediums in the U.S., respectively[5], they cannot coexist independently forever: there is a natural momentum toward a convergence of the two mediums. Examples of this trend are already abundant, as the "digital home" becomes an ever more popular subject. Because many consumers multi-task while viewing, dedicated attention to one medium or another can largely be attributed to the allowances of the medium. Generally speaking, TV, home video, and radio are passive mediums while gaming and web browsing are active. The attention requirement of the medium alone helps explain a large portion of consumer

---

[2] (Audio-Video Transport Working Group, 1996)
[3] (YouTube, 2005)
[4] (Morrison, 2009)
[5] (Ball State University, 2009)

behavior because it allows for assumptions about the purpose of their viewing experience. While TV viewing is primarily split between entertainment and information gathering, computing incorporates work and correspondence as well. For the purpose of *Telos*, the focus will remain within the entertainment and information arenas, as the passive consumer environments are more applicable to the discussion of how TV and the Web enhance one another as the mediums evolve. This certainly does not rule out interactive environs, however, as the ability to stream active television-style content is another important feature of TV's evolutionary process – future versions of *Telos* may call for technologies like on-demand video games and interactive TV. For now, the need remains in the ability to cleanly connect information sources to one another using a benefit-forming, efficiency-driven approach.

Identifying the need

TV, as mentioned before, has matured into a relatively stable and isolated medium. The Web, on the other hand, has only recently reached its proverbial "second version"[6]. With Web 2.0, the Internet has become a highly dynamic information source, drawing in billions of users in a virtually borderless global market. With the threat of losing viewers, it is understandable how the broadcast industry was forced to react to changing consumption patterns. Actions and interests from all sides (consumers, broadcast outlets, Internet pioneers) have prompted the mediums to begin to coincide more harmonically, yet not without an added burden on the media outlet's management team. The purpose of *Telos* is just this: promote harmony between electronic mediums while increasing efficiency in the media workflow.

Many examples of efficiency-increasing tools are already prevalent in the industry. Writers and producers turn to storyboarding software like StoryBoard Artist and scriptwriting software like Celtx to expedite and advance the pre-production process. On live sets, products like EZNews and iNews help

---

[6] (O'Reilly, 2005)

journalists collaborate with the anchors and crew, and systems from NewTeck and GlobeCaster enhance live editing. In the post-production sector, Adobe and Avid provide application suites designed to work in concert with one another, concurrently promoting formats dually compatible with HDTV and browser-based players. While these big names dominate their respective markets, the content delivery segment is considerably more fragmented. On the Web side of things, most operations rely on custom database-driven programs with Flash Video playing in the user's browser. For broadcast and cable providers, content is pushed out through a coordination of sources, from streaming technologies like satellite feeds and playback appliances to more archaic methods like tape and DVD decks. Given the large range of infrastructure possibilities, there are no universal solutions to content management, scheduling, publishing, and distribution – this is the reason *Telos* was created.

One goal behind *Telos* is to not discriminate between media outlet types; it seeks to be a general tool for many types of organizations. There are at least three types of information steams that a video-based outlet may offer: traditional TV, video via the World Wide Web, and digital outside of home (DOOH). The least known of these is DOOH, a term coined by a European technology collective with the initiative of using Internet-based technologies to provide information and advertising in public places[7]. The trend has grown tremendously in Europe and the Americas, and *digital signage* is the main result. Digital signage normally consists of a dedicated monitor, such as a large LCD TV, that displays content related to the organization or venue. These products have become prevalent on college and corporate campuses, train stations and airports, casinos and restaurants, and even department stores. Due to their convenience, relatively low cost, and long lifespan, digital signs are springing up everywhere.

For the generalized media outlet, let us assume the provider uses all three of the aforementioned content delivery systems: a wide-area distribution through cable or broadcast TV, a

---

[7] (Integrated Systems Europe)

localized distribution through digital signage, and a global presence via the World Wide Web. For the staff to distribute their content to all of these systems, it becomes the staff's responsibility to manually copy this information from one source to the next. From this, we see that there is a need for broadcasters to control more than one medium simultaneously. For any media outlet, especially those of the public or educational nature, reducing workload and increasing automation is highly valuable. Given that this model is very pertinent to college campuses, the rest of this article will be focused on the specific benefits associated with this style of media outlet. Keep in mind, however, that the concepts behind *Telos* are not limited to the campus environment; the college campus is simply the most useful environment for which to describe the program's features. As a feasibility study, the University of Northern Iowa multimedia distribution system will be the focus of *Telos*'s application.

Design of the Software

For the general model described, each component of the campus media outlet is independent of one another, yet they need the ability to communicate with one another in order to achieve autonomy. For this reason, the master application should reside on a dedicated web server that can control and gather information from the other devices. By doing so, the user only needs to interact with the master application as opposed to the individual components. Here is a list of required components, as well as their current implementation at UNI:

Appliance	UNI-Specific
• Database-enabled Web server	• Apache Web Cluster with PHP/MySQL
• Video playback appliance	• 360 Systems ImageServer
• Video Switcher/Distributor	• Leightronix WinTCD/IP
• Modulators and/or feed to cable provider	• 5 Analog, 1 Digital
• Messaging/Bulletin Board System	• KeyWest MediaExtreme MX5
• Digital Signs	• Various 50" Plasma screens around campus

From this list, we can create a software stack for effective use of the hardware:

- A parsing engine for reading & writing video switcher files

- A web calendar for displaying schedules

- A media player for looping information streams

- An ingestion system for receiving and administrating user submissions

The parsing engine allows the program to read and write schedule files that are compatible with the video switcher. This means that the user can either choose to write schedules as they normally would (with the video switcher's own software), or use the parser to build the schedules. The user is most likely to choose whichever interface he/she is most comfortable with, taking speed and reliability into consideration. In our example, WinTCD and the Leightronix TCD/IP switcher are used. The schedule file is encoded as hexadecimal byte blocks; these were reverse-engineered so that a suitable parser could be created for them. The parsing engine is written in PHP, so the centralized server model improves performance while allowing the manager to schedule from any Internet-enabled computer.

The content manager allows information tags to be associated with media files. Through this mechanism, the information can be searched, sorted, and provided to other services within the program.

The next component, a web calendar, is highly flexible because it uses an object-oriented process to display information provided by the parsing engine in a visually pleasing format. It can fit into many styling schemes, from a full-page weekly schedule to mobile phones. For websites, the user needs only to modify the style schema (by way of a Cascading Style Sheet) in order to make the schedule fit the look and feel of their

CSS allows schedule information to take on a variety of visual styles, including a weekly calendar view

web page. For UNI's purposes, a web sidebar was created for the UNI-TV website as well as an experimental Apple iPhone version. The object model allows the interface to be extended to other applications like Google Calendar or even a spreadsheet program like Microsoft Excel. In Web terminology, this is known as the "mash-up" effect – the ability to pull in seemingly unrelated information sources into a new product or service. The option to "mash-up" *Telos*' information streams should prove an important option for media outlets wanting to extend the program's capabilities.

While interfacing with a web page is straightforward, integrating into digital signage solutions is slightly more obscure due to the lack of a standardized framework. In order to provide a generalized solution, *Telos* includes a basic media player that automatically accesses an announcement feed from the *Telos* server. The application, written in Adobe Air, prompts the server to reveal a list of files for

Telos supports several digital signage systems, including its own lightweight player

download and playback. The major advantage to this approach compared to a slideshow system like Microsoft PowerPoint is that the advertisements are updated automatically with a scheduling backend that allows the slides to expire. Currently, this feed goes out to the Maucker Union monitors as well as UNI-TV.

For UNI-TV, the feed has been adapted to work with the Media Extreme software package, with plans to support the Visix system when UNI makes the upgrade in June 2009.

The final component is likely the most important component for an organization like UNI-TV because it makes *Telos* extremely useful to students and the community. This is the ingestion component, which allows user submissions to be played back on cable and through the digital signs. UNI organizations can already use the first version of this software at http://www.uni.edu/studentorgs/nisg/monitors.php. Right now, only still (bulletin-board style) advertisements can be submitted, but support will soon be added on UNI-TV's website for audio and video. By opening a public forum for organizations to spread their word, UNI's cable channels can be more effectively utilized. To further this utopian-style community access system, user requests will be added to allow users to help managers determine content popularity and playback times.

Impact of the Software

The first versions of *Telos* are already making an impact at UNI, and after a final release it could easily be used by organizations around the world. One of the most attractive features would be the price: there are currently no software packages like this available for free, and this product would be an excellent candidate to be released open-source. By releasing the product open-source, it could be augmented and improved by the community, allowing it to penetrate even further. Even if it was not released in an open manner, it could still be offered at a reasonable price with a fair number of potential buyers.

At UNI, *Telos* could really make an impact within the campus community as students, faculty, and residents actively submitted announcements to the open system. With this feature, of course, comes responsibility. There would need to be a curator (or group of curators – likely student volunteers and faculty advisors) willing to screen the submissions to make sure they fall within acceptable guidelines. Besides basic indecency restrictions, the submissions would also have to be non-commercial

in nature and within the limits of "educational content." For the public access channels, though, these submission guidelines could be less restrictive. For the closed-campus channels, the guidelines could be nearly non-existent, allowing students a venue to "push the envelope" where they might otherwise experience opposition.

Perhaps one of the most important features the product could provide is a way for public safety to address the campus through TV: because all systems would be under the same framework, a message could be delivered to the campus and community immediately as part of the Emergency Notification System (ENS). Efforts are already underway to connect the ENS to UNI-TV, and *Telos* could provide this missing link, given that *Telos* has already asserted its ability to control these devices.

Final Comments

The creation of *Telos* has been a very enriching experience because had prompted me to address a wide range of problems associated with software development, media formats, and social research. It has allowed me to combine much of my classroom experience to my own endeavors in content creation, marking it as the culmination of my experience as an electronic media student. With a working implementation of the software now in place, the *Telos* project has already made a lot of progress in simplifying the media workflows for UNI-TV and ITS. It also is already serving the campus as an outlet for broadcasting oneself, and those capabilities will soon be increased. As the creator of *Telos*, I envision it as a gateway to making public access more accessible, as well as making another step towards the convergence of the Web and television. A system like *Telos* can truly improve the media awareness and interactivity of a college campus, as well as improving safety in the event of an emergency. With a bit of luck, *Telos* will become a recognized gateway to greater media accessibility.

Works Cited

Audio-Video Transport Working Group. (1996, January). *RFC 1889: RTP: A Transport Protocol for Real-Time Applications.* Retrieved from Internet Engineering Task Force (IETF): http://www.ietf.org/rfc/rfc1889.txt

Ball State University. (2009, March 26). *Video Consumer Mapping Study.* Retrieved from Council for Research Excellence: http://www.researchexcellence.com/vcmstudy.php

Head, S. (2000). *Broadcasting in America: A Survey of Electronic Media.* Houghton Mifflin Company.

Integrated Systems Europe. (n.d.). *Digital Outside of Home.* Retrieved from IntegratedSystemsEurope.org: http://www.iseurope.org/kcms/home.php?site=DOOH

Morrison, S. (2009, April 30). *Disney's Hulu Deal Raises Questions About YouTube Model.* Retrieved from SmartMoney: http://www.smartmoney.com/news/ON/?story=ON-20090430-001097-1959

O'Reilly, T. (2005, September 30). *What is Web 2.0.* Retrieved from O'Reilly Media, Inc.: http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

YouTube. (2005, February). *Company History.* Retrieved from YouTube.com: http://www.youtube.com/t/about?hl=en_US