Duke University
Office Of Information Technology

State Of Lecture Capture Technology
2013-2014
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INTRODUCTION

Since 2005 Duke has offered enterprise lecture capture to members of the Duke community through its Office of Information Technology under a service called DukeCapture. This program is available to anyone at Duke through software for Mac, PC & iOS devices and through scheduled recording software installed as part of room AV in approximately 80 classrooms across campus. More information about the current DukeCapture program can be found here: http://oit.duke.edu/voicevideoweb/video/creating/dukecapture/index.php

Each year OIT’s Interactive Technology Services group conducts a survey of leading enterprise capture platforms, evaluating products from the perspective of issues critical to Duke. If we were to determine that advances in a competing platform outweigh the benefits and costs of staying with our current solution, we would be positioned to start the planning of a transition in an efficient way.
At this time, DukeCapture’s subscribers remain generally pleased with our current solution (Panopto Focus), and based on the results of this survey, we do not anticipate transitioning during the coming Academic year. The main reasons for our current satisfaction with Panopto include:

- Product feature set compares favorably with competing solutions
- The company values Duke’s input on product direction. We track feature requests and meet regularly to discuss priorities, timelines, and processes for implementing improvements.
- Highly responsive support for incidents, with detailed tracking of issues via Zendesk ticket system.
- Competitive pricing
- Interest in Unison self-service media publishing engine (requires another licensing component) and potential tie-in with Sakai for media publishing
- New Emerald support option we’ve requested in our budget could help compensate for limited support staff at Duke by allowing end users to contact Panopto directly for support. We envision this feature enabling us to expand the use of DukeCapture to an extent not currently possible with current support options.
DukeCapture (Panopto)

http://www.panopto.com/

Product Overview

Panopto is an enterprise lecture capture system that supports scheduled recording either via Windows machines that customers purchase via the Duke Computer store (Duke has a standard build using Dell PCs and Datapath video capture cards) Recordings are automatically uploaded upon completion to folders on the server and go through an encoding system that produces and automatically publishes rich media output together with audio and video podcasts. The rich media version combines video/ audio of the speaker with slides and slide titles if the speaker uses PowerPoint or Keynote, and screen capture if that option is selected. Multiple video sources can be configured depending on what capture cards are installed on the recording machine, and capture sources from additional machines can be incorporated into a single recording as well. Thumbnail images are created for viewers to click on to navigate through a presentation. These elements are combined in a web player that includes viewer notes and comments as well as captions if generated externally. Slide titles, notes, comments,
and standard recording metadata are all searchable via the rich media viewer, and all this data can be searched at the folder (collection) or site level. In 2010, Panopto developed a web interface for Duke that supports distributed administration--i.e., the ability to break out the web UI into separate nodes reflecting different schools and other organizational units, a requirement that was deemed critical for Duke given our enterprise focus. The Web UI offers extensive monitoring and reporting functionality, and Panopto has made other major improvements over the past several years that show a focus on enterprise capture, such as implementing Shibboleth for authentication/authorization, and a recent overhaul to their scheduled recorder software.

Panopto is attempting to compete with the largest players in the lecture capture space by offering a wide and rapidly evolving feature set (including the ability to upload user-generated video), an ambitious approach to customer service that tracks customer issues via a Zendesk ticketing system and publicly displays customer satisfaction on its website (https://helpdesk.panopto.com/home), and licensing models that compare favorably to its peers.

Core Distinguishing Feature Set

- Appliance-based recording
- Software recording (Mac and PC)
- Product architecture and licensing options lend themselves to campus-wide scale
- Rich media playback (video, content, thumbnails, metadata/search)
- Distributed administration (organize by school/department/group)
- Comprehensive Web UI for configuration, monitoring, and reporting
- Integration with Duke Identity Management
- Search (recording metadata, PPT, Keynote text, notes, captions, comments)
- Web-based editor
- H.264 Podcast export
- Live webcasting
- Combine multiple video sources, even from separate recorders, into a single recording
- Ability to import and publish outside video (Unison)

Key changes since January 2013

- Shibboleth authentication (replacing Active Directory)--allows for greater security, ease of integrating with Duke NetIDs and groups, including SISS-based course groups
- Addition of HD resolution video for both the Software Recorders (Mac and PC) and Remote Recorders (scheduled recordings)
- Nagios monitoring for Panopto appliances in conjunction with Duke OIT Monitoring team
- Improved Remote Recorder configuration and monitoring (for scheduled recordings)
- Panopto recording queue monitoring via Duke OIT Service Ops Center
- Ability to roll over to new NAS shares when existing shares fill up
- Panopto Certified Remote Recorder (Epiphan device)
- Panopto Mobile for the iPad
- Multi-Track Video Switching
- Batch uploading (Unison)
- Improved security (including site-wide SSL and enforcement of password requirements)

**Work in Progress**

- Improving Shibb performance, interface for browsing groups, and search times
- Scoping a site architecture that will allow for cross-site sharing of content and system resources (i.e., recorders), but preserve sense of separate depts/ organizational units
- Developing a feature set within the system to support a content retention policy, including metrics showing utilization (currently in the system but not organized around this
- Researching possibilities for utilizing Unison for on-demand media publishing, including a potential Sakai integration
- Shifting from Silverlight to Smoothstream/ HTML5 playback and delivery architecture
Product Overview

Mediasite is considered by many to be the industry leading lecture capture system, with a compelling feature set and strong track record of support. It scored highest on Duke’s 2009 evaluation but was ruled out because overall service cost of ownership, and because at the time it lacked a software capture option for mobile capture. MediaSite content is created and published with a rich media viewer and H.264-based video podcasts as its chief output. MediaSite’s player used to be Silverlight-based, but have moved to HTML-5, with Silverlight as a backup.

In 2013, hardware (PC)-based appliances continued to be a major focus for MediaSite, with improved HD-capable recording appliances, and 4-input HD recording on the horizon for 2014. However, in 2013 MediaSite began a notable shift into the content management space, moving its new (as of 2012) external media ingest functionality to the forefront of its marketing efforts and building on its with its new indexing functionality for external media (phonetic search and OCR).

MediaSite also added an Air-based desktop recording client (Mac, and PC) in 2013, while continuing to support its integration with Camtasia Relay. Additionally, it launched a new division
called Advanced Integration Services (AIS) that specializes in assisting users of other schools with migrating content into MediaSite. This migration is accomplished via custom toolkits that can either be handed off to the customer for operation in self-service mode, or executed by MediaSite as a professional service (Tegrity was mentioned as an example of content that was successfully transferred to MediaSite). Among notable changes on the horizon for 2014, MediaSite plans to make a major switch to full video capture for content, finally eliminating its problematic .jpeg-based capture architecture.

Core Distinguishing Feature Set

- Appliance-based recording
- Software recording
- Rich media playback (video, content, thumbnails, metadata/search)
- Comprehensive Web UI for configuration, monitoring, and reporting
- HTML5 playback for both Android and iOS devices
- Designed for campus-wide scale
- Live webcasting
- Web-based editor (formerly desktop editor)
- Detailed player customization (turn any feature on/off)
- Ability to import, transcode, index, and catalog outside video content
- Search (Recording metadata, PPT, Keynote text, OCR)
- Search engine optimization for public content
- Speech to text (separate license)
- SEO for public content

Key changes since January 2013

- New AIR-based desktop recorder to go with existing Relay integration for software recording
- New division/toolkit/professional services offering around migrating content from competing lecture capture systems into MediaSite
- Shift to HTML5 playback for all content with Silverlight as backup
- Improvements to web-based editor (formerly desktop editor). Looks easy to use, more fully featured than Panopto, but testing would need to confirm
- Content sunsetting feature allows automated workflows for notifying content owners that content will be deleted (or some other workflow) in (x) amount of time, and allowing them to respond back to alter that process. This includes the ability to target content that has had (x) views or has aged out.
- New phonetic search and OCR licensing option for external media ingest (requires separate licensing)

MediaSite and Duke

Duke Medical Center standardized on Mediasite beginning in 2012, and is currently using it at their School of Medicine (several appliances managed via a central control room), the School of Nursing, and the Duke Physician Assistant Program. In a feature by feature comparison,
Panopto stacks up well against Mediasite, but MediaSite’s implementation of those features in some cases seems to have additional functionality, or at least more refined. For example, both have compelling search capabilities, with MediaSite including the ability to do OCR on video content, including external media ingest, as well as speech-to-text analysis (although the latter involves a separate licensing fee). Despite possible quantity discounts, it’s our opinion that the delta in costs between the current solution and MediaSite would not provide enough value to warrant a change in platform.

Although MediaSite’s broad feature set and implementation of its features is impressive, the fact that Panopto meets the requirements of Duke at a lower cost of ownership indicate that there is no change warranted at this time.
Product Overview

Relay is a software-based lecture recording tool with limited publishing and administrative tools and features. Relay appears to focus on a core workflow designed for simple capture and streamlined external publishing integrations, which means that it doesn't appear to be attempting to compete with full-fledged solutions that offer true enterprise lecture capture. Because of this, and because Relay’s server licenses are more limited and do not seem designed to scale up for campus-wide deployments, Relay may be better suited for deployment by individual schools and departments instead of entire institutions.

Not much appears to have changed for Relay in terms of features or major product roadmap shifts in 2013. One change that seems to weaken Relay as a competitor in this space is what might be perceived as a more tenuous relationship with MediaSite now that MediaSite has developed its own Air-based desktop recorder. However, customers using the Relay integration
with MediaSite do retain an advantage in the ability to integrate more metadata when populating MediaSite via Relay than via MediaSite’s desktop app.

Core Distinguishing Feature Set
- Ease of use/ faculty-friendly recording interface
- Simple publishing workflow
- Mediasite partnership
- The addition of YouTube and Amazon S3 to publishing options
- Records PIP webcam video (2012)
- Automatic captioning via speech to text and a built in captioning editor (captioning is based on user accounts, so should get more accurate over time
- New iOS and Android app (called Fuse) for making recordings, similar to the new Panopto iOS client.
- Subscription-based hosting service added in 2012

Key Changes, 2013
Relay representatives didn’t respond to requests to meet with us to review their updates, but a number of 2013 updates are documented here: http://assets.techsmith.com/Docs/pdf-camtasiaRelay/Camtasia-Relay-430-Release-Notes.pdf. They include:
- Multiple bug fixes and minor improvements (e.g., recorder can automatically check for upgrades)
- Updated administrative dashboard graphs number of recordings being processed by their server at any one time by date range
- Other dashboard features include file size for videos to assist in planning for storage growth and encoding times
- Support for RTMP and MMS protocols in publishing destinations (means Duke could integrate with our Wowza server)
- Better integration with Camtasia Studio

Relay and Duke
The Relay-Mediasite partnership unfortunately still leaves the cost issue for Mediasite on the table for Duke, which means that in the absence of a cost effective hardware-based solution we really couldn’t consider Relay as a replacement for our current Panopto-based service. Additionally, Relay’s lack of enterprise tools for administration and monitoring, it’s primarily self-service publishing options (even though they added important new ones like YouTube and Amazon S3 publishing destinations), and its limitations of scale make it not a solid choice for DukeCapture at this time.
Echo360

http://echo360.com/

Product Overview

Springing from a merger between Apreso, an early U.S-based enterprise lecture capture system and Lectopia, an enterprise tool developed in Australia that allowed dozens of Australian universities (as well as Duke) to implement large-scale class recording programs ahead of the curve, Echo360 continues to position itself as a leader in the enterprise lecture capture space. Echo maintains a strong focus on classroom recording, but bases a significant portion of its current strategy on support for “blended learning,” flipping the classroom, and moving beyond traditional ideas of lecture capture following on the heels of its November, 2012 acquisition of LectureTools. LectureTools encompasses a suite of capabilities that include student note-taking and study tools, tools for assessing student performance on online activities, a student response system, and tools that enable students to ask questions online while a class session is taking place. Echo uses an appliance model for classroom capture, with HD capabilities, and has a software capture option called “Personal Capture.” Yale recently launched a central capture program using this product, and Echo has a long list of high profile universities under its umbrella.

Core Distinguishing Feature Set

- HD capture appliance for scheduled recordings (1080p, 30fps, encoded output from 240Kbps to 3.2Mbps, centrally and automatically managed/upgraded, dual display, v+d, DVI and composite, RCA and balanced audio)
- Software-based recording (“Personal Capture”)
- Live webcasting
- Mobile friendly “dashboard” for viewers
- Google analytics
- Asynchronous discussion feature
- External media ingest
- 11/2012 Acquisition of LectureTools (student engagement and active learning) and subsequent integration of that feature set into the core product
- Heatmaps and statistics
- Integration with Kaltura, summer 2012

Key changes since January 2013

**EchoCenter/EchoPlayer Updates**
- Student Engagement Analytics – learning metrics per student
- Instructors can make presentation content Available/Unavailable
- Branding: add university logo to the Course Portal page
- Copyright: can configure the Player to force copyright acceptance before playing an echo
- EchoCenter + Lecture Tools initial integration
- Add polls and quizzes to the EchoPlayer
- Added support for Android Playback using an HTML5 player
- Downloadable Full Rich Media Player for offline viewing of echo content
- Embeddable Player into 3rd party websites (similar to Youtube)

**ESS (Server) Updates**
- Security: SSO (Shibboleth and CAS)
- Security: LTI integration
- Security: Added SSL Cert updating through the ESS UI
- LMS: Canvas, Moodle, BlackBoard, Sakai and D2L integration support
- Media/file management: auto-deletion of original master media, processed media, and log files on a calendar basis
- Media management: deletion of an entire term, course or section’s content
- iTunes U RSS Extensions
- Ensemble VCMS Plugin Support
- Added Audit Reporting download to the ESS to keep track of who created and deleted objects in the system
- Schedule data csv import/export via ESS UI
- Schedule API enhancements including features and performance
- Large List item handling: perform data management against thousands of echoes at a time
Echo360 and Duke

A finalist along with Panopto in 2009’s DukeCapture Transition project, Echo remains a compelling solution, but costs significantly more than Panopto. Additionally, DukeCapture’s focus on standardized PCs that we programmatically maintain (currently via SCCM) vs appliances offers a degree of flexibility and cost-effectiveness that we wouldn’t get if we relied on standardized, vendor-supplied devices. The acquisition of Lecture Tools and ongoing focus on blended learning is something to watch to see whether this helps facilitate the creation of a more comprehensively interactive framework for class recording. For now, however, Panopto incorporates enough interactive features via its rich media viewer, and when DukeCapture’s current offerings around blended learning fall short, we have been able to deal with that by utilizing separate Duke services and third party products, such as Screenflow for the creation of instructional video modules, or Cisco WebEx for two-way communication.
Tegrity

http://www.tegrity.com/

Product Overview

Tegrity features a range of integrations (many LMS’s and authentication systems, including Shibboleth) and other interesting features, including askii-based indexing of all recorded content (websites, PPT, Excel, etc.) to drive site-wide search. Some features, such as built in remote proctoring, are unique to the Tegrity platform. This function is designed for distance education scenarios to provide an additional level of security beyond authentication for students taking online exams. The software records all activity on the student’s screen, his/her webcam video (which they are required to have turned on), and their microphone. The proctor is then able to review those recorded materials to certify the authenticity of the exam.

Core Distinguishing Feature Set

- Mobile apps (for both playback and recording) for both iOS (full screen for iPad) and Android (incl. Kindle Fire)
- Upload “video as class”—i.e., external media ingest similar to Unison
- Built in remote proctoring.
- Back end improvements to their cloud
- Notetaking capability similar to Panopto

Key Changes, 2013

Company didn’t respond to requests for a call to discuss product changes for 2013, but a number of new features for 2013 were identified here:

http://www.umkc.edu/ia/it/tegrity/documents/Te...
• Viewer interface (UI) improvements
• Users can download captions from UI for recordings containing captions
• Interface optimized for physical printing
• Option to upload recordings to YouTube

Tegrity and Duke
Tegrity scored very well on our 2009 feature survey, and even though it appears Tegrity hasn’t added as many new features as other products (2013 features appear to be fairly lightweight), it seems likely it would do well again on such a survey if conducted today. When we tested Tegrity in 2009, we had difficulties getting many aspects of the tool to work. There doesn’t appear to be a compelling reason to test this solution again. Additionally, in 2012 when we completed our last version of this report, we noted consistent playback issues over a period of three months on the main Tegrity samples page located at http://www.tegrity.com/showcase. As of January, 2014, there still appear to be issues with those sample recordings. These issues were reminiscent of problems we experienced with other components of the Tegrity system during testing in 2009.
Polycom RealPresence Capture Series


Product Overview

Accordent was acquired by Polycom in March, 2011 and the products were rebranded as follows:

- Accordent Capture Station became Polycom® RealPresence® Capture Station
- Accordent Media Management System became Polycom® RealPresence® Media Manager

Like Mediasite, the Capture Station retains an appliance focus, though uses industry standard capture cards similar to those we're currently using for DukeCapture-Panopto. The company offers two versions of its appliances—a mobile version (Polycom® RealPresence® Capture Station Portable Pro) and a rackable version (Polycom® RealPresence® Capture Station Pro). The mobile has a built in monitor, and both models are fully HD-capable. Pricing is in the neighborhood of $14,000 list per unit. Options for enterprise licensing are unclear. It appears in talking with the company that historically these systems have been used mostly for smaller, custom deployments.
Core Distinguishing Feature Set

- Appliance focus (rackable and portable versions)
- Increased focus on collaboration and making capture part of a broader framework for communication, content acquisition, delivery, and media management. Integrations with other Polycom products, including video conferencing systems, and external systems such as Sharepoint are a current focus.
- The company has made efforts to improve mobile delivery primarily through an HTML5 player that offers device-specific resolutions and content configurations.
- The company still has no software capture tool equivalent to what we have with Panopto; however, a Microsoft Lync integration (collaboration software) was recently developed.
- Two-channel HD video capture is a standard offering with both appliance models.

I raised the issue of the impact the Polycom acquisition has had on the product at Streaming Media West in October, 2012, and there hasn’t been a lot of clear information out there. There are some indications that that the product has struggled since the acquisition. Some schools like UCSF (John DeAngelo, formerly Apreso’s flagship user at Fox Business School) switched away from Accorded (to MediaSite) in part because he felt Accordent lacked a solid roadmap. UCLA moved away from the Media Management System because they lost confidence in the product’s longevity. Users at Duke’s Department of Continuing Medical Education discontinued their use of the Media Management System due to similar concerns.

I spoke with a representative who said that since the acquisition Polycom hunkered down and solidified the platform, fixing bugs and ironing out inefficient processes that interfered with the company’s ability to deploy new customers in a timely and efficient way. They have also worked to revamp licensing models to offer a wider range of options—i.e., sub 1000-stream licensing models for the RealPresence® Media Manager.

Polycom and Duke

Though there are signs this year that the company may be on a good path after the Accordent acquisition, it is unclear how we could operate at our current scale for DukeCapture with this platform given that high-priced appliances continue to be the core of the company’s business model. Given costs and lack of compelling feature set as compared to our current solution, no further exploration is warranted at this time. However, we are interested in exploring RealPresence® Media Manager and figuring out if this can be used to satisfy growing needs at Duke around content publishing and asset management. We’ll definitely keep this product on our list to evaluate next year to see what changes.
Opencast Matterhorn

http://opencast.org/matterhorn/

Product Overview

Opencast began as a UC Berkeley-led project to build a global partnership towards the development of an open source lecture capture system. Duke was involved in early discussions in 2007. Opencast received financial backing of the Hewlett and Mellon Foundations, and assembled thirteen partner institutions led by UC Berkeley and ETH Zurich and built Opencast Matterhorn, a suite of open source software to produce, manage and distribute academic audio and video content, especially lecture recordings.

In 2013 Opencast continued developing incremental product releases and is now up to version 1.4.3, released on 1/31/14. They also began work in 2013 to develop strategic alliances, and are involved in discussions with the Apereo foundation. The Apereo foundation was formed in 2012 with the merger of Jasig and the Sakai foundations and is dedicated to open technologies with a non-exclusive focus on academia. The goal is for Opencast to formally come under the Apereo umbrella during spring or early summer, 2014.
Matterhorn provides hardware and software-based specifications for building your own Linux-based “capture agents,” which are the devices that would be installed in rooms and record connected classroom A/V source feeds. Matterhorn is similar to Lectopia and Podcast Producer in that when you set up a recording, you assign it a specific set of processing instructions (what was called a “Delivery Group” in Lectopia.)

Additional features Matterhorn supports:
- Scheduling/ automation (single classes, or groups of classes)
- Hold for administrative review option (i.e., recordings are uploaded, queued, and processed but are not made available to viewers until they are cleared via manual review)
- Captions
- Administrative tools for monitoring and management of recordings
  - Edit/ trim/ delete
  - Administrative tabs show recordings in various stages of processing (All, Capturing, Processing, Finished, On Hold, Failed)
- Media gallery for searching and viewing recordings

Key Changes, 2013

- Work with Apero Foundation

- Support for multiple encoding profiles per compose operation
- Capture agent now uses h264 by default
- Storage enhancements to support re-encoding and publication to new distribution channels
- [JMX based monitoring](https://opencast.jira.com/wiki/display/mh14/Release+Notes)
- Viewing analytics
- Retry strategies for failed operations

Matterhorn and Duke

The main reason Matterhorn isn’t currently a good fit for Duke is the same reason that kept us from moving forward with the project after initial discussions in 2007--it requires an active and ongoing commitment to develop the platform utilizing Duke programmer resources. Unlike Duke, many of the groups pursuing this approach have large teams of coders to draw from for such an initiative.
Crestron Capture-HD


Product Overview

The Crestron Capture-HD is a designed especially for ad-hoc recording in rooms equipped with foundational A/V infrastructure, including cameras, microphones, and Crestron Control panels. The system is rackable (1U) and can be purchased either on its own (list $3,800.00, but Duke A+ pricing would provide a substantial discount) or with a PTZ camera, mic, and basic touchscreen panel. A special touchpanel interface is required for the system to work with existing Crestron systems. There are no annual support costs or licensing fees. The full package is branded as Crestron CaptureLiveHD. In addition to supporting ad hoc recording, the Capture-HD also operates in scheduled mode via integration into several calendaring systems, including Outlook. We spoke with two peer institutions that piloted Crestron units. One was intrigued by the price and the leveraging of existing Crestron infrastructure, but was perplexed that you can capture or stream live but not both at the same time. The other school said one of the major benefits of the Capture-HD was ease of use. There are three simple buttons—record, play and pause, and minimal training was needed for users to become familiar with the process.
However, two issues emerged in testing that our peer described as “showstoppers”:

1. In first mode of operation, you send recordings behind the scenes to an ftp server for transcoding and publishing. In this mode, however, the device can’t simultaneously ftp and record, so it would be unable to produce back-to-back recordings. It was verified that this is still a limitation of the product as of 12/2013.

2. In the second mode of operation, files are written to a thumbdrive, and so can be taken away by the presenter. However, the device records to segmented mpeg-4 TS format, which can’t be played back locally by most media players. Windows Media player can play it but it skips; VLC can play the files, but this program isn’t an easy tool for most users. Crestron indicated, however, that as of 12/2013 the device supports the ability to record files as .mp4, bypassing this previous limitation.

Crestron Capture-HD and Duke

The idea of “one-touch recording” has driven interest in the Crestron Capture-HD among a small subset of the DukeCapture community, particularly the Law School, which have described their ideal use case as having users walk away with recordings on a USB key after an ad hoc session. The Crestron Capture-HD is an interesting option given that most DukeCapture-enabled classrooms and lecture halls are equipped with Crestron control panels. However, the drawbacks pointed out by our peers, particularly #2, would also likely be factors at Duke. The Law School at Duke currently seems satisfied with using the Panopto mobile client for ad-hoc recordings on podium PCs in their classrooms. A new device we are exploring, the Vaddio USB AV Bridge, may make integrating podium PCs a more viable option down the road to serve this particular use case. Also the lack of a rich media interface, searchability and a centralized administration interface would make this difficult to roll out as an enterprise solution at Duke.
Product Overview
Cattura is a relatively new lecture capture system tightly integrated with Kaltura that offers appliance, software, and web-based (i.e., like Tegrity) recording options via a tool called CaptureCast Cloud, which licenses for $499.00 per domain annually and is run via Java. There are four appliance options--two SD, and two HD--in the $5000.00 - $8000.00 range. Their higher ed licensing model is $30.00 per year per install. The company advertises delivery of output to Kaltura, MediaCore, Vimeo, YouTube, and FTP as well as rtmp streaming via your own Wowza or other rtmp server. The company also indicates that rich media playback is possible.

Key Changes through 2012
- Indexing of PPT text and PPT notes
- Notetaking, user generated chapter points, bookmarking and tagging, and inline chat
- OCR
- Automated speech to text option
- Automatic upload to Kaltura SAAS, on prem and CE Edition includes metadata
- Capture scheduler
- KDP content plugin
- Confidence monitoring via ipad app--admin has granular control of captures in rooms
- Android playback
- Watermarking
Integration with Kaltura remix/editing tools

Key changes since January 2013

- Added support for several Blackmagic™ capture cards, including DeckLink Intensity, DeckLink Studio, and DeckLink Quad
- Handy configuration wizard on website for purchasing hardware
- Blog, web site, and Twitter feed seem to have been updated infrequently in 2013

Cattura and Duke

Cattura looks to have a rich feature set. Their appliance pricing puts them roughly in the middle between our current costs for Panopto PC appliances and higher end appliance options such as Mediasite or Polycom. Other open questions to investigate would be enterprise licensing options, support, and what the branding choice suggests about how closely the company and product are aligned with Kaltura. The use of Kaltura would add additional costs to the lecture capture system while limiting the use specifically to Sakai.
Product Overview
Cisco TelePresence Content Server (TCS) adds recording capabilities to pre-existing video conferencing equipment installed in classrooms. Cisco TCS can be used to record lectures in rooms where a video conferencing system is installed; however, it lacks many of the features of more traditional lecture capture interfaces such as an integrated rich media interface or search capabilities. Those features might be added with the addition of additional software such as Show A and Share.

Any standards-based video conferencing equipment in theory is able to connect to Cisco Telepresence Content Server for recording calls. A TCS unit is capable of working either independently or as part of the larger environment encompassed by Cisco TelePresence Management Suite (TMS). List price for the hardware-based recording system is approximately $35,000.00, though Duke discounts would likely apply. The system remains unchanged since 2012 in terms of the functionality described here. This does not take into account the cost to install a hardware-based codec into each room which can as much as $10,000 (Duke Pricing) for systems that can support room audio integration.
The system records video plus content and can output several formats, including stacked, SBS, PIP, and auto-switching between video and content. The system outputs SD with the standard license but up to 720p60 or 1080p30 with the premium resolution option (requires a license upgrade). Delivery options are configured by setting up profiles, and can include progressive download, output to Cisco Show and Share, iTunes U, and playback in the web interface as Silverlight, Flash, or Windows Media.

Each TCS supports up to 5 simultaneous recordings, and can broadcast up to 2 of them at a time as live streams. An upgrade is available that allows up to 10 simultaneous recordings (still only 2 live broadcasts). It’s also possible to string multiple TCS devices together to increase capacity.

Content can be restricted based on Duke NetIDs via the Active Directory integration we’ve implemented for the system.

**Cisco TelePresence Content Server and Duke**

OIT Telecom Engineering has been evaluating Cisco TelePresence Content Server and is considering possibilities for rolling it out as a service. However, at this time there are some roadblocks to our doing so--chief among them the issue of how to support the creation and management of different delivery profiles that would likely be requested by our diverse user base.

We’ve determined not to encourage individual schools and departments at Duke to attempt to deploy TCS on their own. Users attempting to set up a TCS system on their own would likely require support from OIT Telecom Engineering, and, more importantly, their device would need to connect to supporting infrastructure already managed by OIT Telecom Engineering in order to function at Duke and to take advantage of the full range of capabilities.

If deployed as a production service at Duke, we’d need to take storage into account as each device only comes with a 500GB hard drive. Configuring network attached storage and setting a retention policy are two possible approaches to handling this issue.

There are no significant product upgrades on the horizon that we are aware of that could influence our decision to move forward with the adoption of TCS as a central service for the recording of lectures.
ClassX

http://classx.stanford.edu/ClassX/
http://classx.sourceforge.net/

Product Overview

ClassX is an open source lecture streaming system developed by a research group at Stanford University called Image, Video, and Multimedia Systems (IVMS).

ClassX was designed primarily for disciplines such as mathematics where instructors use blackboards instead of projectors and allows multiple blackboards to be captured without having a dedicated camera operator. To do this, ClassX records in high resolution, but employs “region of interest streaming” to avoid having to stream the full video. Instead, it relies on viewers to interact with the stream via pan/tilt/zoom while watching the video. Only the portion they are zoomed into is actually streamed, which lowers the required data rate. ClassX also offers automatic tracking of the lecturer in case users don’t want to use the PTZ tools.

A technical paper describing the ClassX project and a 3 month pilot conducted in Stanford’s Dept. of Electrical Engineering can be found here:
It should be noted that ClassX does not appear to have undergone any major improvements in 2013. The web site does not appear to have been updated in 2013.

ClassX and Duke

ClassX appears to be a niche tool of potential value for a group like mathematics. Interestingly enough, our own Andrew Schretter developed a similar tool especially for Duke’s mathematics department. ClassX doesn’t appear to be equipped with the kind of mature, fully featured administrative framework we would need to operate in enterprise mode at this time, and, like Opencast Matterhorn, would require allocating developer time if we decided to pilot the project. More importantly, given the lack of development of ClassX in 2013 it appears the product may not be viable in the future.