# Table of Contents

Introduction.......................................................................................................................................................3

Technology Areas.............................................................................................................................................4
  Web and Videoconferencing...................................................................................................................4
  Video Platform and Classroom Capture.............................................................................................6
  Media Production and User-Generated Content Tools........................................................................7
  Infrastructure-Centric Services: AV, Classroom Technology, and Digital Signage......................9

Conclusion....................................................................................................................................................... 11

Authors............................................................................................................................................................. 13
As video transitions into a pure data network service and becomes more integrated into information technology, it requires a rethinking of how these services are being provided in higher education. The ultimate goal is to stimulate a community conversation and future strategy around leveraging video for teaching, learning, and research, as well as for communications and administrative functions.

Introduction

Video is changing. Services that were formerly few in number and distinct are now converging with other tools and enterprise IT services, including voice, network, desktop, and collaboration services. Many—if not most—applications now support video in some fashion. What were once stand-alone AV or classroom technologies are now network-based, distributed infrastructure. Hardware-based solutions are being consumed by software, a trend that is most pronounced in the areas of videoconferencing, streaming, and capture. All across the video spectrum, previously proprietary or specialized video solutions are moving toward standardized enterprise IT technologies.

This proliferation and convergence of technology is coupled in higher education with strong expectations from students—who are typically digital natives—to use video in their schoolwork; for communicating with peers, faculty, and family; and for a multitude of other applications. Higher education is beginning to respond: The volume of teaching and learning that does not involve video is continually shrinking.

In addition, a number of technology areas within video are contributing to a simplification of the landscape:

- Web and videoconferencing
- Video streaming and lecture capture
- Media production and user-generated content
- Infrastructure-centric services

The way higher education works with each of these areas needs to mature in order to better understand them and what they might mean for the future. This paper, the results of an ECAR working group effort, is intended to begin a conversation in the higher education community on the current state and potential future directions of video in higher education.
Technology Areas

Change is expected in four overarching technology areas for video in higher education (see table 1).

Table 1. Major technology areas

<table>
<thead>
<tr>
<th>Web and Videoconferencing</th>
<th>Video Streaming and Lecture Capture</th>
<th>Media Production and User-Generated Content</th>
<th>Infrastructure-Centric Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Education Functions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Remote lectures
- Distance learning
- Telepresence
  - eMBA
  - Special guest presentations
  - Special courses (languages)
- Lecture capture
- Streaming of produced videos
- User-generated content creation
- Captured-lecture repository
- Library content repository
- Student project production and other lightweight video production
- Equipment loaner for coursework
- School of communications programming
- Classroom and AV technology

Non-Research and Education/Communications and Administrative Functions

- Meeting facilitation
- Employment interviews
- Career services
- Integrations with Skype for Business, chat, and PBX
- Webinars*
- User-generated content creation
- Streaming of produced content
- Live streaming and event webcasting*
- Faculty contribution feeds to news programs
- Sports arena broadcasts
- Recording of lectures, seminars, and special events
- Video-editing applications
- Live streaming, webinars, and event webcasting*
- Conference room and AV technology
- Digital signage
- IPTV entertainment video
- OTT content services (e.g., Netflix)

* Many functions span multiple convergence areas such as live event support. Other examples include distance learning and user-generated content.

Web and Videoconferencing

Early internet videoconferencing solutions tended to be limited by the processing power of the host computers and the performance of the network. Even with these limitations, the technology proved popular since it was able to support both audio and video communication over what appeared—at least from the end user’s perspective—to be the “free” internet. Features were added over time, such that most products came to include shared whiteboards, chat capability, screen sharing, and various other collaboration services. Modern videoconferencing solutions typically support high-definition video with separate content and also provide conference-call capability.
Current Challenges

The chronic challenge posed by modern internet videoconferencing technology is simply that most of the commonly used services available in the marketplace do not interoperate. For example, a Blackboard Collaborate user cannot interact with users on WebEx or FaceTime. Like instant messaging, video collaboration solutions have generally matured as proprietary, noninteroperable solutions. Interconnection of these systems is possible in some cases via gateways, but most users are unaware of this capability and simply install all of the tools they use on campus and with their peers at other institutions. Whoever schedules the meeting effectively selects the technology to be used for that session.

Finally, many challenges revolve around security. Desktop management solutions may make it difficult or even impossible for a user to download and install the video client du jour that is needed to attend a specific meeting. How do users know that all of the video collaboration applications they have installed are adequately patched by the vendor and free from security defects? Can users be easily tricked into installing spyware?

Future Trends

The state of interoperability between common commercial systems is not likely to improve. Business interests for unique features are likely to dominate over user wishes for interoperability. As a result, institutions are likely to pick a single or a small number of videoconferencing solutions to support for internal use that will meet the needs of most users. This approach allows for client software to be preloaded and managed on user workstations. Employees and students who interact via video not supported by their institution will most likely continue to load the application software used by their meeting host.

Integration between specific platforms and common standards will likely accelerate. One example of such an integration is the for-fee add-on services of Zoom and BlueJeans that support interoperation with standards-based room systems (H.323 and SIP), Cisco TelePresence solutions, and other general standards-based endpoints. However, while most VoIP telephony solutions and

Web and Videoconferencing

Research and Education Functions
- Remote lectures
- Distance learning
- Telepresence

Communications and Administrative Functions
- Meeting facilitation
- Employment interviews
- Career services
- Integrations with Skype for Business, chat, and PBX
- Webinars
IP-based telephone instruments are able to support video, actual video usage of these solutions will remain modest for average users.

The ability to participate in meetings from a desktop without installing additional software will continue to improve via technology such as WebRTC, “a free, open project that provides browsers and mobile applications with Real-Time Communications (RTC) capabilities via simple APIs.” However, integrations using WebRTC will likely remain add-on services as opposed to core technology for many commercial products.

**Video Platform and Classroom Capture**

Video platforms are feature-rich digital asset management systems for online media and can automate tasks such as media transcoding and video player delivery. Features may include metadata management, online editing tools, and numerous media ingest and publication methods.

Media ingest can include upload of user-generated content, dropboxes for multimedia professionals, or integration with classroom capture systems or web and videoconferencing applications.

Publishing can be through integrations with an LMS (Blackboard, Canvas, etc.), web content management system (Drupal, WordPress, etc.), or a campus YouTube-like portal.

Classroom solutions provide capturing mechanisms for lectures and screencasts. The solutions can range from in-classroom hardware capture appliances to software for capture on personal computers.

**Current Challenges**

Two significant challenges exist for these systems. First, enterprise-class, cloud-based video platforms and high-end classroom capture systems are expensive, especially if they are integrated and provide a cross-platform capable delivery environment with a secure, scalable architecture and robust media management capabilities. Second, scheduling automation, workflow, and secure media management processes need to be designed to balance a quality user experience with associated costs.
Future Trends

Software-based solutions enable vendors to rapidly add features to address customer needs. Older hardware-based technology had a much longer life cycle. Rapid change provides both opportunity for rapid advancement and the usual liability of user acceptance and additional integration effort.

With the lower barrier to entry provided by modern hosted web services, newer tools, especially feature-rich solutions, will continue to be developed, particularly for niche solutions. Distributed IT and classroom support units will look to these new services to solve problems or create services not yet provided by central solutions.

Costs for content storage and streaming will continue to decline as part of the general trend of decreasing pricing from cloud vendors. We expect to see vendors offer more storage and features for the same price, as opposed to decreasing pricing to campus users.

Media Production and User-Generated Content Tools

Media production is a broad category that encompasses a wide range of expertise and many types of communications to deliver content to an intended audience. Content could include entertainment or information and can range from film and TV programs to promotional, educational, or web-based instructional materials.

A complete production studio can provide everything from the initial concept of the project to completion. Staff can assist with the concept, scripting, scheduling, and casting. Further, they might supervise filming, production, and distribution and might even provide marketing. In some campuses, this entity could be a university public television or radio station or a college- or department-provided training studio.

On the other end of the spectrum, user-generated content tools allow individuals to capture, edit, and post high-quality video right from their portable devices (e.g., cell phones).

### Media Production and User-Generated Content Tools

#### Research and Education Functions
- Student project production and other lightweight video production
- Equipment loaner for coursework
- School of communications programming

#### Communications and Administrative Functions
- Faculty contribution feeds to news programs
- Sports arena broadcasts
- Recording of lectures, seminars, and special events
- Video-editing applications
- Live streaming, webinars, and event webcasting
**Current Challenges**

With so many tools available for video production, the challenge in this area is deciding which approach to use. Dedicated, professional production studios are very expensive, including high costs for equipment and personnel. There might not be enough business to sustain such an endeavor. The goal for successful content is a product that will engage and connect with the audience in the intended manner. Providing excellence in development (creation of the concept) and preproduction (the planning and facilitating of all aspects of a shoot) increases the quality of the content. Some projects do not require professional-quality results, making lower quality acceptable. Time to produce can also be an issue, and that can dictate the level of resources and effort chosen.

**Future Trends**

Several trends are currently influencing this space. One is a move to simplified video production studios (e.g., [One Button Studio](https://www.onobuttonstudio.com)) that allow users to record high-quality video content with little technical expertise required. These provide a self-service space with automated controls and presets for lighting, camera, and microphone settings. The user inserts a flash drive to start the setup for capture and, when ready, pushes a button to begin and end recording. The system saves the video onto the flash drive. Everything then turns off and resets for the next user.

Even in cases that call for professional staff and equipment, a trend is to use these resources only for certain components of the project. For example, professional production staff may provide project development, while the student, staff, or faculty would complete the editing and publishing. Alternatively, the student, staff, or faculty may provide high-quality, raw-source content and submit it to professionals for editing and distribution.

Mobile is starting to replace desktop as the primary venue for watching online videos. As the demand for personalized, mobile viewing grows, the creation of shorter, focused, and targeted content is another future trend. With this shift, the context of the specific audience and their needs should be key considerations in development of on-message videos.
Infrastructure-Centric Services

Audiovisual and classroom technologies enable teaching and learning functions, as well as communication and administrative functions, in classrooms, conference rooms, auditoriums, offices, huddles, and other assembly areas for both in-room and remote participants. The AV infrastructure is a utility service and has a similar topology across all spaces regardless of whether the use is for education or administration. An additional layer of technology, specialized for specific teaching and learning activities, can be added to classrooms.

The AV infrastructure consists of network switching, signal routing and processing, control systems and user interfaces, wireless presentation gateways, and sound and image transducers such as cameras, microphones, speakers, and displays. Examples of classroom technology include student polling systems, classroom capture recorders, digital whiteboards, collaboration platforms, and specialized video sources such as microscopes or document cameras.

Digital signage generally consists of LCD or LED flat panel displays. These displays present marketing content and information for students, faculty, staff, and campus visitors. Content can be interactive, using multitouch displays, or static, using playlists to rotate content. IP television and video streaming can also be incorporated into the displays. Impressive video walls can be created with specialized displays and video-processing equipment.

Digital signage is typically integrated with an emergency mass notification system (EMNS). This integration is usually a major business driver for the deployment of digital signage as a centralized service.

Current Challenges

Given a rapid technology evolution and increase in demand for AV and classroom technologies, challenges revolve around cost-effectively deploying and supporting AV at scale while maintaining consistency and information security and meeting evolving end-user requirements.

These challenges are further complicated in that each installation will have multiple stakeholders, including IT, facilities, faculty, administrators, and external consultants and architects.
Large, new construction and renovation projects face an additional challenge of syncing fast-moving technology cycles with slower construction projects. Deploying yesterday’s technology is risky if the design is not flexible or is finalized too early in the construction process. Decoupling design and procurement of AV and classroom technology from construction contracts is one way to minimize this risk.

There are three significant challenges related to digital signage: cost, content logistics, and support. Although cost per installation is trending downward, a digital signage installation is generally more expensive than a customer expects. The costs of commercial installation—for example, operations, wiring, mounting, networking, and security—are all expenses you don’t encounter when installing a TV in your house. Finding ways to reduce one-time and recurring costs while maintaining enterprise support capabilities is an ongoing challenge. Developing and sharing content can also present logistical issues for departments that deploy these tools, particularly when digital signage isn’t included as part of a larger messaging strategy. Finally, support for signage can be complex, comprising content, application, desktop, and network components. Particularly when digital signage is part of an EMNS infrastructure, developing a robust support model—including testing and coordinating with your EMNS administrators—is recommended.

**Future Trends**

AV continues to migrate away from a proprietary, stand-alone stack to leveraging the network for control, monitoring, and audio and video signal distribution. In addition, there is a related shift from proprietary, room-based control systems to a standards-based, open-source, centralized control system. In the not-too-distant future, standard content management systems (CMS), such as those used for the management of web content (e.g., Drupal, WordPress, etc.), will replace proprietary and expensive digital signage applications. This shift will help lower costs and streamline content development. This change will also enable new opportunities for cost-effective, interactive content.

Integration with your EMNS means that digital signage ought to remain a centrally supported service, but the demarcation point will shift from a proprietary application to the web browser.
Conclusion

What does all this mean? There was a time when video services were specialized and used their own technology. However, as video becomes more integrated into information technology it requires a rethinking of how these services are being provided in higher education.

It is important to develop a strategic approach to video in order to determine where services are offered (including both on-premises and in the cloud) and by whom, as well as to align with institutional needs. Video presents a broadening of the IT discipline. A successful video strategy will do the following:

- Blend video capabilities and support into IT services and organizations
- Consider the complexity of coordination between internal service providers (e.g., facilities, AV, IT, procurement, etc.)
- Include appropriate standardization at an enterprise level to provide a consistent user interface in most classrooms and conference rooms
- Leverage modern software-based solutions over traditional hardware-based technologies
- Provide for economies of scale
- Have thoughtful demarcations between central services and decentralized support
- Enable the use of specialized solutions when required but, in general, will install standardized configurations whenever possible to ease the learning burden on faculty
- Bake-in security, emergency notifications, and other key campus issues in an enterprise-wide, standardized way
- Incorporate BYOD and IT consumerization
- Enable users to install whatever video collaboration software they need to connect with their peers
- Collect data on service and tool usage to guide decision-making

Understanding the impact video might have on the IT organization will be key, as will be working with the multiple areas of campus where video is used. A successful video strategy may require an organizational shift where video and AV blend more fully into the IT organization. An institution might decide instead to work on cross-campus alignment to support distributed services (ranging from
classroom to production, entertainment, sports, and security). Service alignment should be to a level where most faculty are able to teach in most classrooms without noticing technology or support differences. Whatever the decision, application, infrastructure, and support of AV and video will need to be considered.

This paper is meant to initiate a conversation. In addition to asking for feedback on the trends identified above, next steps may include a survey to better understand current and future video solutions and services in higher education. The ultimate goal is to stimulate a community conversation and future strategy around leveraging video for teaching, learning, and research, as well as for communications and administrative functions.
Authors

Special thanks go to the following ECAR Campus Video Strategy (ECAR-CVS)
Working Group authors of this report.

James Jokl
Associate Vice President and Chief Enterprise Architect
University of Virginia

Kenneth T. McCrery
Deputy Executive Director, Technology-enhanced Learning and Online Strategies (TLOS)
Virginia Tech

Andrew M. Page
Manager, Integrated Audio and Video Engineering
Cornell University

Todd W. Plummer
Network Systems Specialist, Enterprise Networking and Communication Services (ENCS)
The Pennsylvania State University

Notes

1. For the purposes of this article, “video” encompasses the use of video for communications and media, including classroom and AV technologies. See table 1 for more details.

2. See WebRTC.

About EDUCAUSE

EDUCAUSE is a higher education technology association and the largest community of IT leaders and professionals committed to advancing higher education. Technology, IT roles and responsibilities, and higher education are dynamically changing. Formed in 1998, EDUCAUSE supports those who lead, manage, and use information technology to anticipate and adapt to these changes, advancing strategic IT decision making at every level within higher education. EDUCAUSE is a global nonprofit organization whose members include U.S. and international higher education institutions, corporations, not-for-profit organizations, and K–12 institutions. With a community of more than 99,000 individuals at member organizations located around the world, EDUCAUSE encourages diversity in perspective, opinion, and representation. For more information please visit educause.edu.

Citation for This Work


© 2018 EDUCAUSE. This work is licensed under a Creative Commons BY-NC-ND 4.0 International License.