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**Building And Supporting a
Large-Institution Digital Media Service**

Chris Millet | The Pennsylvania State University

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In early Spring 2007 Penn State launched an ambitious project to build, within 2 years, 20 centrally supported multimedia production facilities designed for students and faculty across the statewide system. This was a unique venture in many ways, with unique challenges related to the size and geographic distribution of this institution. But surveys we conducted were indicating a significant rise in the need for such a service. As of 2008, 17% of incoming freshmen had created digital videos and 42% of instructors were assigning multimedia projects (Sonak, 2008). Demand at our two existing facilities reflected this change and underscored the urgency to act quickly.

The first phase of the project started in Fall 2007 with 5 facilities, and by Fall 2008 (halfway in) we were at 15 locations. The service, called Digital Commons, has been extraordinarily well received. This paper will discuss the design of this new service and provide practical information for other institutions evaluating a similar program.

The Digital Commons Service

The goal of the Digital Commons service is to provide both facilities and support for digital media production and educationally sound integration of digital media into instruction. This service is provided to both students and faculty at all Penn State campuses, and is managed by Penn State's Teaching and Learning with Technology (TLT) group, a division of Information Technology Services (ITS). ITS is the central IT organization at Penn State.

There are several challenges to offering the type of service we will describe at an institution on the scale of Penn State. They include ensuring the service:

- is equally available to every campus population
- addresses the needs of a very diverse audience
- is centrally managed but respects local expertise and relationships

Additionally, some of the factors guiding how the service was designed are:

- integration with existing infrastructure
- consistency of facilities across location
- scalable support

Integration with Existing Infrastructure

In order for a service like Digital Commons to remain streamlined and agile, we needed to design it around existing services and IT infrastructure. Many of the critical components already were in place within ITS, such as classroom and computer lab management, and distributed file storage and backup capabilities. Other components existed in other units across the University. It was important to identify these integration points early on so we were not duplicating efforts, but rather leveraging them.



Examples of this integration include:

- Classroom and Lab Computing (CLC) group for management of workstation configuration and software and management of shared storage and backup
- University Libraries for equipment lending and physical space for facilities
- ITS Help Desk for support request triage
- Local departmental instructional design staff to provide pedagogical support
- Campus IT staff to provide frontline IT support

Consistency of Facilities Across Locations

In order for a relatively small staff to support 20 locations, every installation needed to be almost exactly the same. This enabled us to prepare standardized support materials, and specialize in the operation and potential issues surrounding a known and limited set of equipment and software. Standardization also ensured that students and faculty would have the same opportunities at each location, with the ability to move between locations without having to adapt their skill sets.

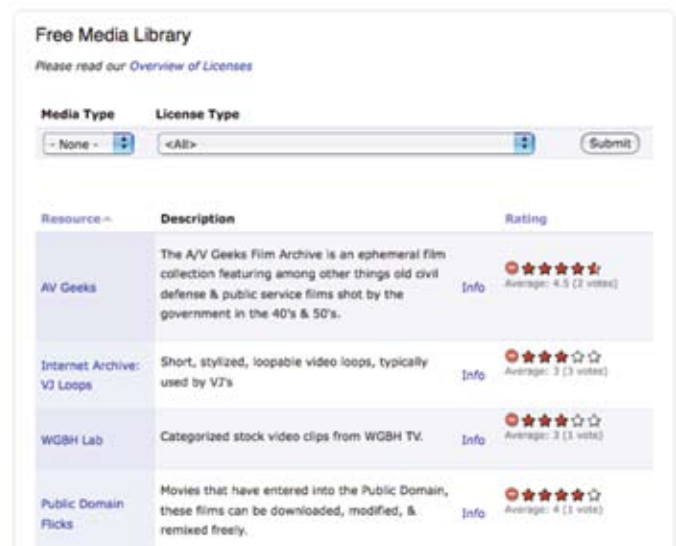
Scalable support

Scaling support is a theme that will be reiterated many times in this paper. Nothing we do moves forward unless we can ensure that it will scale. We define “scalable” as any aspect of Digital Commons that can operate under the upper boundary of predicted demand without sacrificing other aspects of the service. Scalability also assumes a fixed staff size and budget. Buying more equipment and constantly expanding the size of our staff is not sustainable. For example, when we add a new training format, we will project the staffing requirements for providing that format to several large-enrollment (300+ student) classes. If that will not work without significantly cutting back on another critical component such as availability of individual consultations, it will not scale. This is not a problem we have solved across-the-board, but it is behind everything you will read here.

Some Guiding Themes

Addressing Trends in Teen Media Use

The number of freshmen arriving at Penn State having some experience producing digital media is increasing every semester. Additionally, “39% of online teens share their own artistic creations online, such as artwork, photos, stories, or videos, up from 33% in 2004” (Lenhart, 2007). While students who have never authored this type of content still constitute the majority, one can project the trends and imagine a not-too-distant future where students are just as comfortable using technology to communicate visually and audibly as they are writing. As research continues to show the value of using this technology in the classroom, learning early how to effectively support its use as a tool for student content creation will prepare us for this future.



Media Literacy

In her paper “Student Content Creators: Convergence of Literacies,” Joan Lippincot states that students from all academic disciplines should be prepared to be digital media authors. And university staff and faculty should promote media, technology, and information literacy in their curriculum “to assist graduates in becoming sophisticated digital-content producers in their professional lives” (Lippincot, 2007). Henry Jenkins, in a report from the MacArthur Foundation, suggests media literacy should not be treated as an “add-on subject” but rather as a shift in “how [educators] teach every existing subject” (Jenkins, 2006). At Digital Commons we hope to serve as a platform for this shift by ensuring instructors of all disciplines are confident about incorporating digital media into their course activities.

One example of our own efforts in this area is promoting the responsible and ethical use of media. Easy access to a global source of creative works via the Internet, much of which is copyrighted or whose use is restricted in some way, combined with the fact that “about one in five internet-using teens (19%) say they are content remixers” (Lenhart, 2007), reinforces the need to educate students on this subject. We do this by providing information about copyright law, Fair Use, the TEACH Act, and Creative Commons during consultations and other training. We also educate students on alternatives to illegally using copyrighted material in their projects, such as the many repositories of Creative Commons-licensed media.

Educationally Sound Use of Digital Media

It is important that sound teaching and learning practices be integrated into everything we do. Providing resources that are not just technical in nature but that inform instructors on subjects like how to engage students, how to design an effective video project, or how to design rubrics to help assess those projects is essential. There are some cases where learning the technology (or digital literacy) in and of itself is the goal. In most cases though, digital media is used merely as a means to help students learn concepts not directly related to digital media. Beyond anything else, for us to consider ourselves successful, the technology must be facilitating pedagogy.

Service Design

In this section I will explore some of the major elements of the Digital Commons service.

Facilities

Each installation consists of a studio, an editing suite, and networked storage. The studio space is designed for audio and video capture (equipment can also be lent out for field work). The editing suite is designed for post-production, editing, and publishing. Ideally a studio will be in a permanent dedicated space, although all equipment was selected to be portable and store-able for cases where dedicated space cannot be secured. Editing capabilities can also be incorporated into existing computer labs as it is primarily specially-equipped desktop computers.

Installations consist of the following equipment:

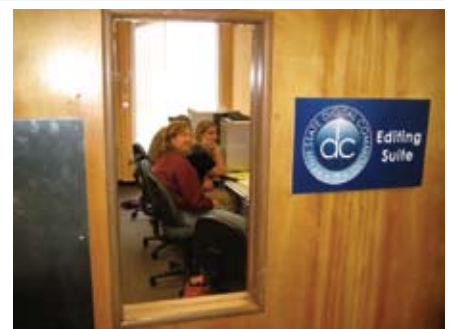
Studio

- (1) Large and (1) small collapsible green/blue screen (two-sided)
- (2) High-definition camcorders with integrated hard drive and SD-card slots
- (1) Studio lighting kit
- (1) Podcasting bundle (2 high-quality condenser microphones and pre-amp)
- (1) Digital still camera



Editing Suite

- (2) 24" iMacs, 750MB HD, 4GB RAM
- (1) Podcasting bundle (2 high-Studio)
- (1) DVD/VHS Deck



Networked Storage

- (1) 2TB RAID5 networked storage server

Note: Additional equipment such as cables and adapters is not listed here.

Each installation is on a 2-year refresh cycle. At the end of a cycle new technologies are added to either augment existing or replace outdated equipment. Installations that see especially high usage will receive some additional equipment.

In addition to the equipment Digital Commons itself provides, studios are typically installed near existing computer labs. As most of the labs have standard software builds including multimedia-authoring software, they can serve as an extension of or primary studio and editing suite.

Personnel

Digital Commons personnel includes a dedicated core team as well as staff from other units who dedicate a portion of their time to the program. The core team consists of a small group of consultants, one instructional designer, and a program manager. Consultants train on A/V hardware and software and production processes, as well as provide best practices for applying this technology in an educational setting. The primary function of instructional design staff is to ensure that the work consultants do is instructionally sound and meeting the needs of students and faculty.

Additional supporting staff include those who maintain our IT infrastructure including workstation builds and our networked storage solution, campus IT staff to provide frontline IT support, and campus instructional design staff to provide both technical and pedagogical support locally.

Overview of Support Model

Consultations and training are conducted from our facilities at University Park and at individual campuses, and can be face-to-face or remote. Consultants responsible for supporting campuses regularly travel to those locations, and continue to provide remote support when they are not able to be physically present. It is a considerable commitment to travel this often, and get to each location frequently, but by training local staff and providing high-quality virtual support this issue is largely balanced out.

In order to address a wide range of learning styles, skill levels, course sizes, depth of training needs, and time and geographical constraints, we have attempted to diversify our support options as much as possible. We offer face-to-face consultations, train-the-trainer sessions, remote technical support, web-based tutorials, and small-group workshops.



Face-to-Face Consultations

One basic guideline of face-to-face consultations is that we try not to ever touch the user's keyboard or mouse. The interface and workflow of most multimedia authoring software can be daunting for first-time users, and it can be easy to get lost observing a very experienced consultant work through a long sequence of actions.

Training the Trainer

Local IT and instructional design staff at each installation site receive training on the operation of equipment and software. This training is continually updated as consultants travel to a location, and local support staff takes extensive advantage of remote support. They are also equipped with much of the same standardized training materials as our core team of consultants. So after receiving sufficient training from our consultants, they are soon able to provide their own local training.



Remote Technical Support

Remote support, done right, can approach the utility of face-to-face support. Typically this involves consultants sitting down with a user and walking through a software package with them to explain some aspect of its usage. These consultations are equal part software training and techniques for effectively applying features of that software to a problem. In these cases, online tutorials might not be sufficient. On the other hand, workshops or other intensive training might be overkill. The basic requirements of delivering effective technical assistance are that the consultant and user can both see the user's screen, and that they can verbally work through the problem together. Since many of the Digital Commons facilities are geographically dispersed, we achieve this level of support by using remote screen sharing via VNC (Virtual Network Computing).

When students or faculty call our phone support line, they are asked to enable screen sharing by clicking on an icon on their desktop. Digital Commons consultants can then connect to that computer, see the user's screen, and control the mouse pointer.

Web-Based Tutorials

The Digital Commons website hosts over 120 tutorials, both in text and video formats. These tutorials cover basic to advanced usage of every piece of audiovisual equipment and software we support. Each tutorial is highly focused and modular. Some examples would be: "Importing video from the Sony HD camcorder onto an iMac" or "Exporting for Powerpoint from iMovie."



Workshops

Digital Commons began offering small-group workshops in Spring 2008. This coincided with a period of increased usage and was as much a reaction to being saturated by one-on-one consultations as it was foresight into the long-term demands on the service. Group workshops were a straightforward solution to the need to increase the impact of limited resources.

One can look at our typical workshop as an exercise in bootstrapping, or getting a lot done with minimal resources. In terms of the support services Digital Commons offers, bootstrapping refers to the short (1 hour), intensive workshops we provide with the objective of motivating a student and providing them with enough instruction that they're confident to take the first real steps on their own. It's "just good enough," not in the sense of being low-quality – indeed our goal is to have exceedingly high-quality training – but of looking at the problem holistically, prioritizing how we'll spend our resources, being honest about practical limitations, and making certain concessions so we can focus on catalyzing a self-sustaining process: a student with the tools, skills, and motivation to be bold and creative.

This process will not result in a student with any depth of skill, which is of course not the intent. Our assumption is that without the initial interest and motivation, we cannot expect the sustained attention required to complete the rote process of working through steps sequentially to learn how to operate a new video editing software or high-definition video camera. In our observations, this isn't even the next step students take after leaving a workshop. They're not hungry to go home and watch a video tutorial online. They want to begin creating, and they now know enough to get started. And just as significant, they know enough to know what they don't know. They can form at least a rudimentary mental model of what they want to accomplish and self-reflect about what skills they lack to get there. This self-reflection might not yield any self-improvement behavior until they've initiated a project and worked right up to a roadblock, when the problems (and their limitations) are a little more defined. What we provide in this context via our web-based video and text tutorials is focused instruction that answers a specific need at a certain moment. Their skill-set can be further deepened by additional workshops or one-on-one consultations. Since our objective is quality that scales, this "a la carte" approach ensures that we can provide targeted support with little wasted effort.

Faculty may request a consultant to come to their classroom and train their students on a specific topic. Once again, this training is based on our standardized set of training materials. However, most classrooms are not equipped for hands-on workshops. In-class training sessions are instead preceded by an introductory overview of the target software packages. This overview is available online in self-paced tutorials, as well as modules which can be imported into ANGEL, our course management system, and can be included as assignments in a course. When consultants enter a classroom they can assume some prerequisite knowledge is in place. The in-class session then concentrates on higher-level skills such as media production workflow, time management, and teamwork strategies. Consultants will also answer questions, inform students on how to schedule individual or group consultations, and introduce them to other resources to further self-paced learning.

All workshops can also be presented online with Adobe Connect. Sometimes the remote location will use a projector in a computer lab so that large groups can work along with remote training like this. Most often, however, online training cannot be as hands-on as our typical training sessions and is geared more towards a higher-level overview of technology and best practices.

Strategies for Scaling Support

In order to streamline our operation, we implement strategies for ensuring the support we provide matches the needs of our students and faculty. For example, all Digital Commons consultants are trained on our standard set of software and are equipped with a standardized set of training materials geared toward a variety of presentation formats. When support requests are made, either via phone, email, or walk-in request, they can be responded to in the most effective way for a particular situation. For example, if a student comes to us for help with a class project, we first try to determine the course and instructor. This information allows us to contact the instructor and work with them to decide if an in-class workshop might work or if they can help us facilitate consultations in groups. This effectively reduces the amount of consultation time required, sometimes by orders of magnitude. It also removes a burden from the instructor knowing that all her students have the same baseline skills going into a project. In this case, we address the needs of the instructor and the class as a whole, and we continue to be available for more individualized help if that is still needed.

Reproducing The Digital Commons Model

We propose that it is possible to implement a program like Digital Commons with a modest budget at institutions with a wide range of population sizes and geographical makeup. In this section I will present a set of guidelines distilled from our experiences at Penn State. I will also provide a sample configuration for a low-cost studio that is designed to meet most faculty and student needs.

Best Practices

I have attempted to generalize our experience at Penn State and provide a series of guidelines that should be useful for any educational institution wishing to implement a service similar to Digital Commons, or to revamp an existing service to take advantage of some of the lessons we have learned. These guidelines are largely a summary of what I have expanded on in this paper.

1 Standardize on *what* you support

Decide on a standard set of AV hardware and software that meets most of your audience's needs, and build your support offerings around that. Do not get into the habit of bringing every esoteric piece of software a small handful of users might want to use into the mix. Standardization brings sanity to your operation and enables you to create and significantly reuse training materials.

2 Diversify *how* you provide support

Standardization on what you support also frees you up to be creative about how you provide support. Adapting your training materials to different audiences and environments (even if they're virtual) is much easier than creating it from scratch.

3 Learn about your audience

Conduct focus groups and run surveys. But consider more informal means of gathering feedback as well. Leave 5 minutes at the end of a workshop to allow users to fill out a 5 or 6 question evaluation. Keep detailed consultation logs in a content management system that will allow you to search, sort, and generate reports. Adapt to this information incrementally and continuously. The skill-sets, interests, and habits of incoming students change with every new class.

4 Broaden staff skill sets to include pedagogy

Instructional designers usually have technical skills in addition to an understanding of educational theories and instructional processes. However, the opposite may not always be true for technical specialists, even those that are hired into positions in educational institutions. Since these people may provide most of the frontline support, make sure to provide professional development opportunities and time for interaction with instructional designers. Even if the service is highly technical, sound pedagogy should be part of everything you do.

5 Build a high-quality, low-budget studio

Good media production hardware and editing software doesn't have to be expensive. Cameras and microphones are constantly dropping in price, and most consumer-level software can be acquired at academic prices or for free if you choose one of the many open source options.

Shoestring Studio Configuration

The objective of this studio design is to meet the needs of a large majority of potential users. The equipment in our shoestring studio was selected to balance several factors, including cost, ease-of-use, quality, and portability. Our overall goal was to create a single facility that offered a range of capabilities from “quick and dirty” multimedia production to something capable of nearly professional results, and to offer this to as many simultaneous users as possible. In our experience, this equipment and software is the same or equivalent to what is utilized in about 90% of the observed usage at Penn State.

Our shoestring studio setup consists of the following equipment:

Item	Purpose	Cost*
Studio		
Collapsible Blue/Green Screen	Chroma keying, digital background compositing	\$99-\$129
HD Camcorder	High-end video capture	\$850
Mini-Camcorder	Low-cost camera for lending/field work	\$139
Makeshift Studio Lighting Kit	Lighting studio and green screen	\$200
Editing Suite		
Refurbished 20-24" iMac	Post-production, editing, publishing	\$1000
Podcasting Mic	High-end audio recording, multiple sources (group podcasts)	\$150
Headset	Low-cost podcast recording, individual	\$17
Software		
iLife Suite (iMovie, iDVD, Garageband)	Basic video and audio production, DVD authoring	\$0 (included with iMac)
Final Cut Express	Pro video editing, required for chroma keying	\$69
Visual HUB	File format conversion	\$23
Perian	Quicktime plugin for reading a variety of video formats	\$0 (open source)
Photoshop Elements	Basic photo editing	\$61
Adobe After Effects	Video compositing and effects	\$128
Adobe Flash	Interactive media	\$119
Audacity	Audio editing	\$0 (open source)
Support Tools		
Chicken of the VNC	Remote screen sharing	\$0
Drupal	Content management system for publishing support materials, community development, etc.	\$0
Adium (Mac)	Multi-protocol IM for remote support	\$0

*Prices as of September 2008

Conclusion

There are many different models for student and faculty digital media services other than the one I have presented in this paper. The model for Penn State's Digital Commons addresses the need to serve a very large and geographically dispersed audience in as scalable a manner as possible. However it is my hope this overview of our service may serve as a guide to other educational institutions.

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Additional Information

Details on studio configurations, as well as a recording of the original presentation and other resources can be found at: <http://digitalcommons.psu.edu/nmc>

About the Author



Chris Millet has worked in the field of eLearning and Educational Technology for 9 years. He is the Manager of Advanced Learning Projects at Education Technology Services (ETS), a division of Teaching and Learning with Technology (TLT) and Information Technology Services (ITS). His responsibilities include managing Penn State's Digital Commons and Podcasting services and exploring new technologies and their potential impact on teaching and learning. He is currently conducting research into the educational impact of student-generated multimedia.

About Penn State

The Pennsylvania State University is a statewide system of campuses, enrolling approximately 85,000 students and employing over 5,600 faculty members. The institution consists of 20 geographically disbursed campuses: 19 Commonwealth Campuses and an administrative hub at the largest campus, University Park. A chancellor provides oversight at each campus. Many aspects of campus operations function semi-autonomously from University Park.