Higher Education and Digital Learning Assets
June 2006

I. Issue

This paper summarizes creative dialog regarding public television's role in meeting the digital needs of higher education and adult education services. Higher education's inquiry-based nature relies on academic discourse supported by a variety of content sources. Public television stands uniquely poised to provide content to higher education through a convergence of resources, delivery systems, and people creating valuable learning experiences. Partnering with content professionals and related national organizations, public television recognizes a window of opportunity and recommends increased focus and momentum to this important work.

II. Background

In January 2006, The National Educational Telecommunications Association (NETA) convened a meeting of Public Television and Content Providers to discuss service for higher education. The meeting stemmed from NETA licensee inquiries about NETA's role as PBS' Adult Learning Services was dissolved in September 2005. Rather than focusing on a service that was ending, the group saw an opportunity to congregate like minds around specific issues and future needs. While the focus in higher education has shifted away from semester-long video courses delivered over television, the overall consensus is there are new opportunities to collectively create a forward-thinking vision to make video and other multimedia assets available for faculty and students.

As higher education institutions are moving away from broadcast television courses and transitioning to multimedia delivery, public television must repackage their assets, remarket its value, and change its image. The group believes it is important to become known as *creators and distributors* of educational content rather than a broadcast entity. The five action items generated from the Higher Education group at the NETA conference are:
1. Define what we mean by Higher Education.
2. Develop new partnership opportunities.
3. Create a national clearinghouse of public television assets via repositories.
4. Repurpose public television marketing – more than just broadcasters.
5. Develop a new business model that incorporates digital assets and/or learning objects.

A June follow-up meeting was held in Salt Lake City at the University of Utah. Attendees included representatives from public television stations that have developed their own learning object services, public television stations with strong ties to higher education, content providers, and national leaders. The purpose of the meeting was to have a creative and open dialog regarding the future digital needs of higher education and adult education services. The outcome of the meeting is this white paper outlining the technical and content requirements for interactive learning objects, particularly those that address higher education. Public television station leaders provided direction to help inform and work with content providers on developing a learning objects service for higher education. The ultimate goal was to develop strategies to equip and position local licensees with the tools for developing and strengthening relationships with institutes of higher learning along with relevant community-based educational entities.

III. SWOT Analysis

The meeting participants conducted a SWOT analysis. Background research for the SWOT analysis is included in Appendix 1. The strengths include public television's reputation and experience specifically quality content, its ability to "tell a story" and its mission orientation. Partnerships and community connections present opportunities to raise the bar for the industry by converging content, technology and delivery system infrastructures.

Most importantly, the SWOT analysis enabled the group to identify areas for improvement and actionable opportunities which are outlined in detail within the Recommendations section.

IV. Delivery Systems

Presentations by Michele Korf of Teachers' Domain [teachersdomain.org], Cory Stokes of Utah Education Network's eMedia [uen.org/emedia], Gail Long and Mike Aubin of ThinkPort [thinkport.org], and Gens Johnson of Open Media Network [omn.org] highlighted delivery system best practices.

Both Teachers' Domain and ThinkPort have professional development components which are utilized by higher education. Teachers' Domain is looking into how professors could use their resource folder tool and collection assets, and assumes growth spanning both K-12 and higher education. ThinkPort's newest initiative may have beneficial implications for digital learning objects. It is extracting interactive tools from its online field trips so they can be used independently. One example is providing a timeline builder that can be used in a variety of different ways. ThinkPort is also exploring tools that can pull content within resources to build a learning object. As part of this process, metadata descriptions are being included to enable a teacher to quickly identify resources and determine if it fits his or her needs. Utah Education Network (UEN) wants to integrate learning objects into a WebCT environment as modular choices for instructors. In addition, it hopes to work with the academic libraries and their collections to build bridges. Open Media Network (OMN) offers large screen video projection capabilities for universities. In the future, the uploading feature may enable faculty to ingest learning objects within the OMN library.

The following are delivery system opportunities and possible issues identified by the group:

Opportunities
- The public television delivery system may be a vehicle to get content to educators via university/college libraries and WebCT. But alternative distribution technologies, besides broadcast and cable TV, may be better suited for delivering public TV content for use in higher education and needs to be explored.
- There are a large range of post-secondary needs. PTV should focus on thematic national needs that tie to mission-compatible goals (ie. Science, Technology, Engineering, Math – STEM, Nursing, ESL). The group felt that learning objects and metadata will have more of an applications orientation within a community college context; this will be confirmed in a needs assessment along with further distinctions between two and four year institutions.
- Professional development for Faculty, IT & Library Staff on instructional design for digital assets & tied to outcomes is a possible opportunity.

Potential Issues
- There are interoperability questions: local programs & content is not currently interoperable. Metadata needs to be added to content to provide for universal searches and sharing.
- Accessibility issues need to be addressed (CC, ESL, SAP).
- Users desire to 'own' or be able to manipulate content as they would like; the fewer restrictions on usage the better, specifically with Internet delivery and downloading.
- The digital rights management system must be seamless.

Panel transcripts are located on the project web site at www.uen.org/highered/learning_objects.shtml.

V. Metadata

Paul Burrows, of the University of Utah's Media Solutions and significant contributor to the CPB Public Broadcasting Metadata Dictionary Project (PBCore), presented on the topic of best practices for metadata. It is important for public television to develop frameworks for interoperability and encourage their use across the system. The use of metadata dictionaries such as PBCore helps build the paths for connectivity amongst public television stations.

Metadata descriptors provide a structured, organized and standardized way to describe digital objects while striving for data accuracy and timely search retrievals and sharing of assets. A vital aspect of successfully deployed metadata is a mandate to conform to metadata standards. The long term application of a metadata schema demands that a "registration authority" assume the responsibility to maintain and sustain the integrity, meaning, and use of individual metadata elements in their current form and their future revisions.

PBCore was funded by the Corporation for Public Broadcasting and provides a dictionary of metadata descriptors (elements) that enable access to both the descriptions and the actual content used within public radio and television. The PBCore provides a way for public broadcasting producers and distributors to organize, re-use and re-purpose their valued assets. It can be inserted into many different applications and to fit various organizational infrastructures, capabilities, and needs. Helping instructors and students find the public TV content is another huge issue and is further reason for PBCore and metadata that is searchable by library catalog systems. The web site that explains the project and itemizes the PBCore metadata elements is found at http://www.pbcore.org.

Crosswalks, or the mappings of one metadata element in one schema to another element or elements in a second schema, are vital to facilitate the exchange of content descriptions and assets among organizations and consumers. Metadata element crosswalks will allow stations to share metadata descriptions, while leaving the content where it resides. Paul concluded his presentation by describing the various "disconnects" that can compromise find-ability, way-finding, and sharing of content. Disconnects can occur as a result of low quality metadata schemas and entries; interoperability among media asset management, digital asset management and content management systems; as well as differing expectations for the quality of metadata and ease of finding digital assets.

VI. Content

The Salt Lake City meeting attendees assessed the need and availability of various types of content. Details are included in Appendix 2. Many content opportunities were identified but a more thorough investigation of the marketplace is needed before moving forward. Public Television has strong

connections with communities and institutions of higher education and should utilize these ties to conduct local needs assessments. The communalities will help generate the low hanging fruit. Action items include:

- Look at how public television serves K-12 and adult education and apply to Higher Education.

- Examine DOE statistics, specifically the number of students enrolled in certain classes. Also look at statistics from the Department of Labor and Census for workforce and changing demographics of the country to help figure out national areas of need. Work with Ron Crouch, demographer, Data Center at the University of Louisville.

- Assess content gaps or opportunities in the marketplace after conducting needs assessments.

- Seek a national entity to provide leadership and to help facilitate more sharing, indexing, and partnering. A national consortium must buy, barter, produce, and share content.

- Develop Central Repository - PTV could create an Internal Marketplace that would contain an index of existing assets as well as facilitating an avenue to exchange content. PTV would also be able to determine what content and/or multimedia elements are missing.

- Production - What should PTV produce to fill the gaps? Given PTV's connections with higher education, a student production model via assignments or internships is possible.

- Partnering – PTV has viable multimedia elements & objects that can be incorporated into partner vendor courses. Also consider what resources can be acquired via partnerships.

VII. Licensing

Andrea Downing of PBS provided an overview regarding PBS' licensing strategies. To date, PBS has negotiated full program broadcast rights which makes it difficult to "chunk" programs into segments. While digital rights are difficult to negotiate with renewables, PBS plans to negotiate digital rights moving forward with new negotiations and is in the process of developing a digital licensing strategy. As part of the strategic process, local stations need to define what digital licensing they need and how to best exploit those rights. In addition, there needs to be a happy mix of revenue generated at the national and local levels. Revenue share back to stations might be a way to create parallel synergies and economies.

The group outlined the following items to investigate further:

- Outline what rights public television stations need in the digital arena and involving producers in this discussion with regards to chunking material.
- Describe windows of rights and modes of distribution.
- Outline what is for free and what is for a fee.
- Consider pilot opportunities.

VIII. Recommendations and Next Steps

The June 2006 meeting participants recognized a changing role for PTV stations and service to higher education constituents. The SWOT analysis revealed eight weaknesses and threats, with

recommendations for action items. The opportunities for action build on PTV's strengths and are outlined below:

Weaknesses & Threats	Opportunities for Action
Lack of Interoperability among Digital Asset Services Good digital asset models exist, but they aren't readily shared, since many projects are very focused on meeting the needs of funders and local constituents.	Incent sharing of best practices - The Digital Services Fund grant with Teachers' Domain, KQED and WPSU from CPB is a good example. Develop frameworks for interoperability and encourage their use across the system, *e.g.* PBCore Metadata Project. Crosswalk case studies may include: Teachers' Domain, Maryland's efforts with Library of Congress and Marco Polo, Maryland's efforts with PBS TeacherSource.
Lack of Rights-Available Content A lack of rights-available content provides a barrier to meeting faculty needs.	Develop a clearinghouse of content that can be shared among PTV stations. Set up UEN's eMedia framework to allow stations to upload their content metadata and match providers with acquirers in a web-based "marketplace." The database would include bartered and fee-based content. Contract negotiations would be between the two parties (*i.e.* a system-wide "Craig's List" for educational content).
Unclear Marketplace to Identify or Acquire Content Unlike K-12, there is no existing marketplace for reviewing and acquiring higher education content.	Encourage NETA to set up a group buy process for higher education content, based on successful K-12 models. Tie in with other national buying conferences where feasible. Need more extensive exploration of business model/underwriting including funding for the initial R&D phase.
Varying Digital Asset Needs Higher education is rapidly changing to more asynchronous digital instruction. With Blackboard's acquisition of WebCT, and the increased prevalence of web-based conferencing for courses, knowing our constituents and their digital needs is increasingly critical. Faculty and students vary greatly in their knowledge and use of digital assets.	Conduct a needs assessment with higher education faculty, students, academic librarians, etc. to make sure our new models match their priorities and needs. What is the urgent need? Who is the audience and what does PTV bring to the market? The needs assessment should draw on the needs of not only four year and two year institutions but also adult and continuing education in order to determine the target audience. Working with CPB, build on national higher education relationships and needs so our efforts work in tandem.

Weaknesses & Threats	Opportunities for Action
Unclear Terminology for Content Understanding the difference between digital learning objects that include the full educational context and raw digital assets has resulted in confusion over licensing, rights, and stakeholder use of content.	PTV should work on delivering both digital assets (raw content) and framing those assets in a learning object context – confirm with needs assessment. One opportunity is to create learning object templates around common higher education pedagogical models, such as the case study method. As rights become available, digital assets could be "plugged in" to these templates by faculty. *Frontline* is an example of content well suited to case study method and highly in demand by faculty. Pilots with PTV stations, higher ed, and other key partners are critical.
Higher Education Does Not Realize Public Television's Digital Asset Role There is a rapidly closing window. Many constituents don't realize that PTV could play an important content role for digital assets and are looking to textbook or commercial providers.	Maintaining momentum for this effort will require leadership at the national level and coordination between CPB, PBS, PTV stations and NETA. University Licensees are particularly poised to continue this effort. Regular conference calls, listserv, meeting times, and leadership are key. PTV needs to use its storytelling skills to better market its digital assets. Likewise, it needs to establish joint marketing and co-branding efforts among stations and partners.
Ongoing Rights Issues Rights issues continue to present barriers. The digital rights working group, convened by CPB, is developing a tiered approach for rights. Willingness to allow experimentation with delivery models and licensing options in the future will be increasingly important. Focus on digital rights at the outset, rather than repurposing older content will be important for growth.	Participants at the Salt Lake City meeting were encouraged by the preliminary work done by the digital rights working group. In particular, recognizing the need for delivery over multiple platforms will be critical for higher education.
Prioritization of Educational Needs Lack of focus has caused confusion across the PTV system and our national organizations. Now, more than ever, we need to identify the critical educational needs facing our nation and demonstrate the unique role that PTV plays in addressing that need.	Encourage APTS and CPB to identify and communicate pressing educational needs that PTV stations are uniquely poised to address. By convening our efforts around common, targeted issues, our impact will be demonstrated more effectively.

The initial key steps resulting from the opportunities for action include:
1) **Generate a list of sharable PTV content.**

2) **Generate a list of available vendor content.**

3) Conduct a needs assessment and assess the gaps or opportunities in the marketplace. Determine which educational needs PTV is uniquely qualified to fulfill, and which ones we can reasonably shoulder.

Partnering with content professionals and related national organizations will enable public television to take advantage of the digital learning opportunities within higher education. It could also potentially strengthen the ability of local stations to provide meaningful services to their communities, while exploring future applications of new technologies and platforms. To maintain momentum, NETA will lead a planning team that will work with various constituent groups, including CPB, PBS, PTV Stations and the University Licensee Association, the National Media Market, The National Association of Media & Technology Centers, and the Consortium of College and University Media Centers to implement the recommendations.

Working committees will be identified and monthly conference calls along with a list serve will help facilitate progress. The next onsite meeting will take place in January 2007 at the NETA Marketplace in Norfolk,Virginia.

Salt Lake City June 2006 Meeting Attendees

First Name	Last Name	Organization
Kyle	Anderson	Utah Education Network
Michael	Aubin	Maryland Public Television
Frank	Batavick	Films Media Group
Marta	Bechtol	Wisconsin Educational Communications Board
Paul	Burrows	Media Solutions/Univ of Utah (KUED, Utah Education Network)
Mark	Caldwell	LearnKey
John	Chambers	NETA
Lynn	Dahnke	Coast Learning Systems/Coastline College
Andrea	Downing	PBS
Richard	Goodrow	Gallaudet University
Nancy	Hill	Alabama Public Television
Ryan	Hines	KUED
Rachelle	Howell	Dallas TeleLearning
Laura	Hunter	Utah Education Network
Gens	Johnson	Open Media Network
Dan	Jones	Coastline Community College
Susan	Knoble	WHYY
Michele	Korf	WGBH Educational Foundation
Gail	Long	Maryland Public Television
Kathy	Manwaring	LearnKey, Inc.
Laura	Orsetti	KET
Mike	Petersen	Utah Education Network
Allan	Pizzato	Alabama Public Television
Ronald	Plummer	Univ. of NC-Television UNC-TV
Terry	Rinehart	Iowa Public Television
Chris	Seifert	Montana PBS
Amy	Shaw	KETC
Larry	Smith	KUED
Nate	Southerland	Utah Education Network
Cory	Stokes	Utah Education Network
Carolyn	Wapnick	CPB
Bill	Weber	WHYY
Detmer (DJ)	Wells	Governors State University
Alison	White	Corporation for Public Broadcasting
Renee	Willemsen	Utah Education Network

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Appendix 1 – Background Research for SWOT

A. Strengths

Public Broadcasting's Reputation, Initiatives & Experience
Institutions of higher education respect and trust Public Television as a valuable educational resource. Public Television is distinguished in the market by its mission orientation and ability to secure grant funding. Public Television is strategically positioned to build on this trust as it explores and develops materials for the learning object market. In addition, Public Television has captivating storytelling skills; viewers are emotionally connected to the educational programs. It needs to transfer its storytelling skills to help better market itself to higher education as it moves into the digital marketplace.

There are a few leading stations that have developed their own delivery system for K-12 objects and have expertise in this area: Thinkport, Teachers' Domain, Digital Library and eMedia are just a few. Additional information about each system is included in the Delivery Systems section.
CPB has funded the PB Core Metadata Project. The PB Core establishes a consistent national process for tagging and indexing digital collections. UEN's eMedia is one of the first educational applications of the PB Core used by public broadcasters.

Many of the June meeting invitees were original partners with the onCourse project and bring four plus years of experience and history to this effort. onCourse was an attempt to create a system wide portal and collection of digital learning objects. While the initiative ended due to funding and sustainability concerns, it served as an impetus to partners and raised the level of dialog about digital assets from local station efforts to system-wide. Alison White from CPB remarks that one lesson learned from onCourse was that it might be better to create new digital assets than to struggle to re-use and negotiate rights on old assets.

Partnerships & Community Ties
Public Television has strong connections to educational communities as well as local and national organizations. The organization is often the convening group for many local community organizations. In addition, half of the system consists of "university licensees." These partnerships provide viable opportunities for the organization.

Content & Resources
Public Television has a plethora of high quality content that can be extended into the digital learning objects arena. Video content can be incorporated and used as a teaching tool as well as body of research. The attitude and commitment of its staff is an invaluable strength as well.

B. Weaknesses and Challenges

Lack of Single Definition
The definition of learning objects continues to create confusion.   The literature draws a distinction between digital assets (raw multimedia content) and learning objects that include the learning objective, activity, and assessment in context (ECAR, 2004). Public TV and content providers are well positioned to provide raw digital assets, while institutions of learning are well positioned to create learning objects out of those assets.

Needs Assessment & Planning Required
The Salt Lake City meeting attendees identified a need to better understand how higher education faculty and students would use digital assets and learning objects, and recommended a broader needs assessment with those stakeholders. It is critical to determine how the content will be used and to be certain that we are fulfilling what they identify as needs.

Marketing & Sales
The group also recognized that despite being good educational storytellers, public television needs to do more marketing and promotion of *its* story. In some regards public television is arrogant in that it assumes the public should know what it is doing. In the same light, public television is competing with text book publishers who have an established relationship with higher education and more financial resources.

It is also important to underline the extensive time, staff energy and effort required to get the information out about the service especially if it's fee-based. Stations must have a realistic understanding of this, and whatever system is created must accept this as well.

Organizational Culture
The organizational culture within higher education hinders implementation of new pedagogical models. Traditionally, discipline silos and protection of intellectual knowledge have been quite prevalent in higher education. Likewise, textbook publishers divide disciplines into different "vertical markets." All of these factors impede a swift integration of adaptable, cross-discipline learning objects and will most likely require gradual change.

Academic libraries play a key role as content aggregators for faculty. Yet, librarians and educators may be slow to assess and identify the needs of their academic stakeholders as compared to industry. (ECAR, 2004).

Lack of Faculty Time, Pedagogical and Technical Skills
Best practices are still being developed as much debate and research continues on how to best apply the "chunks" of learning content in instructional processes. (ADL, 2003) How to manage the multitude of available resources and integrate them into teaching practice is a major hurdle. While learning outcomes are familiar to educational designers and technologists, most instructors of higher education are not comfortable with the concept. As a result, many faculty mistake a digital asset — a movie clip, a simulation, images— with that of a learning object and do not include the added support of pedagogical framework. Tools like Designers Edge (Allen Communications) and ID Expert (Utah State University) help designers create instructionally valid activities but they require the designer to bring significant instructional design skills to organizing the learning content with the tool.

Training is needed to teach strategies for using repositories effectively as well as designing learning objects for deeper learning and reuse but there is little structure or incentive for a faculty member to engage in this kind of methodology training. Likewise, most faculty are not receptive or lack the time (ECAR 2004; FIPSE project at University of Wisconsin, 2005).

In addition, while many instructional technologists assumed that faculty would welcome an opportunity to actively participate in the creation of learning objects, to date this has not been the case. While they are experts in their fields, most do not have the time, technical or the previously mentioned pedagogical skills to create learning objects. Given all of these factors, *additional models include 1) partnering professors with instructional technicians, programmers and visual designers 2) developing faculty-staff-student*

partnerships that is integrated into coursework 3) outside entities with PhD staff or consultants creating the learning objects.

General Lack of Knowledge about the Level & Quality of Digital Resource Use
Research regarding the use of digital resources is still in its infancy. A recent study conducted at the UC Berkeley investigated the use and users of digital assets. One finding is that the different kinds of developers, owners and users impact the lack of common vocabulary. When creating a typology faculty described resource types (e.g., curriculum, video, maps, electronic journals) while users often define a resource based on whether they can find a format, a photo, a picture or passage on the web. Furthermore, users bring diverse perceptions, needs and ways of finding and utilizing digital resources making categorization even more challenging (Harley, 2006). While digital providers would like to measure how and for what purpose materials are being used, there are limited plans for measuring this in a systematic way (Harley, 2006).

Cataloging and Management Issues
Consistent meta-tagging is critical in order to ensure easy discovery and access of resources. It is unclear who will catalog and tags objects, as well as maintain the repositories. Faculty members point to librarians who in turn point to instructional technologists who circle back to faculty. *The Online Computer Library Center (OCLC), a consortia of libraries, is exploring business models and assessing whether it can provide these type of services along with assisting users with a process for navigating through vast collections of information.* (ECAR, 2004)

The management of digital rights becomes complex as content and context are combined. While the rights to an image may be relatively straight forward, managing the entire learning object becomes challenging. There are not only rights connected with the content objects but also authorship rights of the assemblers and aggregators of the learning object components. *National and international policies are needed to solve copyright, digital rights and intellectual property challenges inhibiting commercial exchanges of learning objects, especially as it relates to the potential deconstruction and repurposing of materials.*

Technical Hurdles
There is not an easy or automatic way to tag objects. Interoperability is not yet a reality as collections are still transitioning to SCORM compliancy. In the 2003, ADL survey, 50% of the respondents reported that integrating SCORM learning objects into CMS systems was difficult and hindered their use in instruction. (ADL, 2003) There are only a few off–the–shelf repository solutions, although the commercial market is investigating (See Threats Section). File storage for repositories can amount to two and three-figure terabytes, which is technically feasible but the issue of cost often arises. (ECAR, 2004)

The Macromedia White Paper cites other technical needs:

Tools that facilitate the authoring of standards-based, interoperable learning objects. However, there is not agreement on what metadata should be used and what file formats should be standardized.

Tools to capture, document, and manage digital rights. To prevent unlawful copying, Digital Rights Management (DRM) are embedded into media files. Currently there are several competing DRM schemes but only very large media distributors (Apple's iTunes, Microsoft) have the financial and legal resources to apply DRM across a large scale. Most DRM systems also tend to be cracked and defeated within a few weeks of their release.

Tools to effectively search across several repositories at once. Programmers are researching ways to harvest and share metadata. The biggest barriers are the lack of standardized ratings vocabulary and poorly implemented metadata schemas that do not effectively map to standards.

C. Opportunities

Many of the weaknesses/challenges listed above present opportunities if approached appropriately. These opportunities are highlighted in italics within Section B.

Public Broadcasting's Role

PBS could serve a role in the development of learning objects. A repository of learning objects and licensing model for higher education that supports distance instruction, online instruction, in person and "blended" models would be a valuable service from public television. Thinkport, Teachers' Domain, Open Media Network and eMedia are all successful steps towards this type of model. However, higher education does not currently look to public television for this type of service. Furthermore, PBS Stations are working independent of other stations. A more unified, comprehensive approach outlining what public television can offer higher education with regard to learning objects would help build PBS brand awareness in this market. Converging components of the independent projects and publicizing the success stories would increase higher education's knowledge and interest in these public broadcasting endeavors.

The following are the top opportunities as identified by the Salt Lake City working group:

Orientation
- Curate quality content
- Build for the future-leadership
- Raise the bar for the industry
- Meet a mission objective to underserved individual learning through customization and asynchronous delivery
- Rally around national issues

Interoperability & Convergence
- Develop frameworks for interoperability—connecting lots of dots so content will work on multiple systems
- Work with national organizations to bolster, buy and trade; one resource via a group buy
- Develop an "Interdatabase loan"- middle-tier application; marketplace for content & tools
- Establish joint marketing efforts

Education
- Education is in a crisis- funding opportunities in high-need areas
- Push/Pull - students and faculty to find what they need
- Case studies provide current immediate content – Frontline format

Stakeholders
- Add educator voices to the conversation
- Develop partnerships with faculty and students

Information about the PB Core can also be better disseminated to higher education content providers. This will guide vendors as they index and market their content. Likewise, it will steer PTV stations as they deliver content and increase their interoperability.

With the purchase of Blackboard, WebCT now owns 80% of the higher education course management system market. Whatever is developed for public television must also work with WebCT in order to be attractive to faculty. UEN-TV has experience in this area.

Greater Familiarity with Learning Objects
Educators are beginning to better understand the value that learner-centered, nonlinear, reusable, customizable, media-rich educational resources can provide. Likewise, more faculty and students are able to access content via broadband services at both school and at home. In a 2003 survey with 40 partner institutions of the Academic ADL Co-Lab, over 65% responded that learning objects is used in at least one discipline on their campuses with the most often used disciplines being the natural and physical sciences, computer science and medical science. Likewise, different disciplines require different types of resources and use them in different ways. (ADL, 2003) In a UC Berkeley study, images and visual materials were the most frequently used resource.   Faculty used digital objects to improve student learning, integrate primary source materials, or to include materials or teaching methods what would otherwise be unavailable (Harley, 2006). *However, more data on the costs, monetary and otherwise, for adopting a learning-object-based strategy needs to be outlined. The opportunity costs for not doing so must also be addressed. Effective business models need to be identified and described in clear-cut terms* (Macromedia, 2003).

There is a Need to Manage Information within Tight Budgets
Universities are trying to manage an abundance of information across decentralized organizations within tight educational budgets. As a result, the concept of sharing high-quality digital content is appealing (ECAR, 2004).

Collaboration
The opportunity to collaborate within and outside departments, across disciplines, as well as institutions is resulting in "communities of practice" (COP). These communities will provide valuable sources of digital learning materials, while developing new pedagogies and providing supportive and collaborative networks for the creation and development of learning objects. (ADL, 2003) The UC Berkeley research indicates that community collaborations are one of the keys to digital asset sustainability challenges.

Creative Commons licenses provide a flexible range of protections and freedoms for authors, artists, and educators. The nonprofit organization (http://creativecommons.org/)
offers flexible copyright licenses for creative works through a "some rights reserved" approach.

Open-Source Trend
Faculty have been reluctant to post and share teaching materials but that is changing slightly with time. Successful open-source projects are somewhat driving the change. The resources within MERLOT and MIT's OpenCourseWare (OCW) Initiative have been increasing in size. DSpace, an initiative between MIT Libraries and HP, is a cross-institutional, open-source digital library system that can be customized and extended to store, index, preserve and redistribute faculty research and intellectual output. The University of Virginia and Cornell University have jointly developed Fedora, a repository that can also be used in whole or in part to support digital libraries, content management, digital asset management, scholarly publishing and digital preservation. LON-CAPA and the Sakai Project are other consortium projects that create modular, open-source learning content management and assessment systems. The Open Archives Initiative with partners from the Library of Congress, Harvard, Virginia Tech, Los Alamos, Cornell, CNI, NSF, and the Mellon Foundation, is developing and promoting interoperability standards. Their Metadata Harvesting Protocol provides mechanisms for multiple disciplines to contribute to an institutional repository using common metadata
(McCord, 2003).

Repositories
Advancements are being made in the ability to manage inventories of digital assets via repositories.

Intuitional Repositories consist of collections of digital intellectual content generated by faculty, staff and students. Many of the open source initiatives mentioned above are examples of Institutional Repositories: The Open Archives Initiative, DSpace, and Fedora. Repositories can include many different technologies to support the storage and distribution of digital content, including:

- Collection-based digital repositories managed by library professionals, either stand alone or aggregated
- Course management systems and associated file stores
- Collections of research data and reports managed by academic departments
- Student academic portfolio systems
- Institutional file storage systems

Multistate or Multiorganizational Repositories are organized and managed across multiple entities. One example is SCORE (Sharable Content Objects Repository for Education) which is a cooperative composed of 37 higher education and K-12 coordinating and governing boards in the 16 Southern Region Educational Board (SREB) member states. SCORE is a repository of modular learning objects initiative to share digital learning course content among colleges, universities and schools in SREB states. The initiative:

- establishes school and college relationships to create, license and provide high-quality content;
- provides cost-effective learning resources for K-20 by sharing development costs among states and commercial companies;
- reduces duplication of effort;
- increases faculty and student productivity; and
- adheres to e-learning standards: SCORM, W3C HTML protocols, IEE LOM standards (http://www.sreb.org/programs/EdTech/SCORE/index.asp)

Increase in Digital Audio & Video Use within Higher Education
Projects such as Apple iTunes University and Apresio Classroom enable universities to manage audio or video content that can be downloaded to computers or iPods. The most common current uses include taped lectures and interviews which can be reviewed after class sessions. Some early adopters are using the recorded lectures as pre-class material freeing up time for class discussion, others are integrating primary source materials. Public television has an opportunity to build on these inroads.

Metadata & Standards (SCORM) Coordination
The IMS Global Learning Consortium, Inc. is coordinating efforts with other standards groups to form working alliances and coordinate metadata efforts to ensure that objects can be readily or appropriately accessed (ECAR, 2004). The Sharable Content Object Reference Model (SCORM) integrates the various organizational specifications into a cohesive, usable model and defines key interrelationships between the standards. This allows content, technology and systems using SCORM to "talk" to each other ensuring interoperability, reusability and manageability (MASIE, 2002).

The following standard recommendations were made in the 2003 Macromedia White Paper and serve as opportunities to expand the demand for learning object solutions:

- Practical information about the object-based approach and its benefits for users must be developed and made available.
- Clear information about the potential types of learning objects and how each would work from a user's perspective must be developed and made available. (One model is described in David Wiley's paper: *Connecting Learning Object to Instructional Design Theory: A definition, a metaphor and a taxonomy*)
- The broad adoption of standards by learning management, knowledge base and content management system providers must be encouraged by articulating a strong business case for such enhancements.

Universal Search Capabilities Would Expand Repository Use

Faculty are most comfortable with their fields of expertise and not used to searching all-inclusive repositories. However, a universal search capability across the various collections would provide sharing power and would provide leverage to overcome this hurdle. Programmers are also researching ways to harvest and share metadata, as well as subscribing to selected repositories using "rich site summary or really simple syndication (RSS), a lightweight XML format originally designed for syndicating news" on web sites. MERLOT is experimenting with federated searches and the RSS Web content syndication format.

D. Threats

Commercial Offerings

Industry funded initiatives are more likely to result in proprietary systems that have little need for interoperability. In addition, academic circles are hesitant to endorse the concepts of business models, market research and sustainability. The only other viable options are a combination of foundation and institutional funding.

Given the limited funds within education to build non-proprietary, open-source learning object collections, the commercial sector is investigating ways to fill the gap. Publishers are offering items a la carte instead of bundled with textbooks. CMS vendors are partnering with publishers and making content available via course web sites. In addition, with the release of the newest enterprise-level software, CMS vendors are in the process of developing internal or add-on learning content repositories. CMS vendors also partner with publishers to produce content in format for the CMS platform called ePacks. Similarly, a company called XanEdu (www.xanedu.com) is repacking database collections into online coursepacks for faculty and students; interestingly most of the material is already purchased by university libraries and freely available for professor and student use (ECAR, 2004). Faculty are partnering with textbook, CMS and other vendors rather than Public Television. PTV's video role is shifting as these materials become available elsewhere.

PTV's Role Within the Market Currently Undefined

It is important as the group moves forward that it keeps public television's keys strengths in play. Everything should be tied to PTV's mission oriented values to avoid irrelevance and not adding obvious value for the organization.

Faculty Issues

There are several issues relating to faculty that the group identified as threats. Many faculty believe they can do it themselves and/or better than vendors. Likewise, there are no incentives within the higher education model to learn best practices relating to digital learning object pedagogy. There is also a lot of misinformation amongst faculty relating to digital rights.

Appendix 2 – Content Assessment

The Salt Lake City meeting attendees assessed the need and availability of various types of content. Individuals were asked to place dots on a grid with need on the X axis and availability, existing resources within the market, on the Y axis. The results are as follows:

Adult Basic Education Programs

High Need & Mixed Feelings regarding Availability
INTELECOM leaving the market. KET – 65% of the market, DVD-like delivery. Adult Education, Department Workforces, and Public Libraries are all avenues for Adult Basic Education. There is some resistance from organizations to partner because their revenue is based on contact hours rather than independent studies.

Content for Adult Career, Technical & Professional Certification

High Need & Low Availability
Technical colleges are creating their own content because they do not know where to go for resources. There is a lot of funding available in IT fields since there is a trend in this area, but there are also lots of competitors. There is a critical need for nurses; the National Nursing Association is willing to provide money for offering distance education courses in the areas of Microbiology, Anatomy and Math for individuals who already have bachelor's degrees and are entering the field of nursing.

Content for general education or entry level college courses

High Need & High Availability
General education is the biggest pond to fish in. General online classes free up the professors for more advanced courses. Producers & Publishers have been in the business a long time and are partnering.

Content for K-12 Teacher Professional Development

High Need/High Availability. There is a lot of content already available in this market.

Content for Faculty Professional Development

High Need but Mixed Availability. There are minimal incentives for faculty to participate in professional development; PTV would have to target the early adopters.

Lifelong Learning

High Need/Medium Availability
Topics: History of Religion, Languages, Current Affairs, Cultural Areas of Study, Scrapbooking/Crafts both for personal enrichment and credit

Content for Upper Division or Graduate Level Courses

Need & Availability all over the board
There is not a lot of material out there and universities are also creating their own. A possible opportunity would be to curate, aggregate, and distribute the material. PBS brand combined with faculty created material. For example, UNT is looking to sell their courses; PTV could distribute. PBS also has access to experts which provides creditability; faculty are willing to go on FRONTLINE and case studies could be wrapped around the episode. Instructional designers could create templates for case studies and then the content could be added to fit the FRONTLINE format. Given that FRONTLINE is one of the top video sellers in higher education; this may be a niche to explore further (see table below).

PBS Top 6 Sellers in Higher Education[1] June 2005 through June 2006
Declining By Degrees: Higher Education at Risk
FRONTLINE: A Class Divided
FRONTLINE: Is Wal-Mart Good for America?
Bill Moyers: Children In America's Schools
Art 21: Art in the Twenty-First Century: Season III
Art 21: Art in the Twenty-First Century: Seasons I & II

Course Format

The group strongly believes that there is a need for both linear and interactive courses via the Internet, CD Rom, television, DVD and HD-DVD. Likewise, both timely small interactive objects and tools that enrich the learning experience and semester long courses are relevant. Media elements that integrate with courses are in high need and are available across the board. However, implementing the objects can present challenges. If PTV could find a way to generate faculty interest in pedagogical training a gap would be filled.

Types of Objects

Flash objects: High Need & Low Availability

Video Segments/Chunks: High Need & Low Availability

Java Simulations/Virtual Manipulatives: put in X and take out Y, different experiences every time. Higher education wants and needs. Coast reported it recently released 200 simulations and they are selling very well due to demand.

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[1] The full list is available at: http://www.uen.org/highered/downloads/PBSSellers.pdf