Advanced Media Initiative: Executive Summary

In March 2005 the Advanced Media Initiative (AMI) was commissioned by the UNM Chief Information Officer to develop a campus-wide strategic plan that would guide the development of advanced media technologies to support the University's educational, research, and services missions. In the following months AMI: cataloged existing UNM media services, surveyed media service needs, scanned the advanced media technology plans of similar institutions, and explored emerging media technologies and trends. Because of the diverse stake holder participation in AMI, the findings and recommendations from this effort represent a unique consensus among media service providers about what is required to efficiently provide powerful and relevant media technology services at UNM.

Major Recommendations

Trends in Internet Media and Communications: Current and emerging Internet-based communications technologies and services are collectively the model within which UNM will be able to develop a rich, collaborative and participatory academic environment. This new service model leverages the technology users have in hand as well as their skills using a variety of services and devices. Accepting what people have and use as part of a service development strategy will enable UNM to provide the community with relevant services in a cost effective manner.

Recommendations:

1. Focus on delivering services to devices that leverage users' existing skills and investment.
2. Support user created media and provide the infrastructure that encourages users to share content and collaborate.
3. Support alternative Internet based media and communications services.
4. Support universal and unrestricted broadband access initiatives. Broadband connectivity is a requirement for advanced media and communication services.

Media Services Infrastructure: Internet media/communication technologies' are delivered over Internet Protocol (IP) networks. This implies a fundamental shift in the way media services are developed and delivered. For UNM to efficiently provide such services, a new development and management framework should be established.

Recommendations:

1. Transition existing media technology specific platforms to their information technology (IT) equivalents. Acquire appropriately skilled personnel as appropriate.
2. Create a media and information technology service provider task force that will develop a service coordination, research, and development framework. In parallel this group should develop UNM standards for media technologies and services.
3. Create a media services commons (public facility) that provides easy, facilitated access to current and emerging media technologies. Technology built into the physical classroom space will soon be eclipsed by virtual technologies for reasons of scalability, cost, and flexibility. Thus, creating shared spaces that can be quickly and cost-effectively upgraded to include new technologies is essential.

Resource Centers, Training, and Support for Media Technologies: Focus group participants, no matter their cohort group, all expressed a need for simpler and more cohesive access to media and IT services, training, and support. There are few places where faculty, students, staff or researchers can receive hands-on assistance on how to incorporate media technologies into

their UNM experience. In every session it was clear that the UNM community believes media/IT training and support are fragmented and inadequate. This is a particularly powerful observation since it was clear that many participants were unaware of services that were available to them. It is also important to note that participants made little distinction between media technologies and information technologies when expressing this sentiment. To address this problem, training and support services need to be restructured. External scan participants understood this problem well and in several cases identified addressing it as a top priority.

Recommendations:

1. Create information technologies resource centers (physical and virtual) that will offer training programs and support services. These centers will provide individuals in the community with a facilitated opportunity to learn and use media technologies.
2. Provide reliable media technologies technical support services centered on a single point of contact call center and supported by distributed support desks.
3. Design a comprehensive media technologies curriculum that addresses the general and targeted needs of the University community.

Interactive Media

The emergence of cost effective, real time, interactive Internet voice and video communication technologies creates new opportunities for collaboration. These services represent new dimensions to the educational experience and have the potential to improve administrative efficiency and expand the reach and depth of UNM's partnerships.

Recommendations:

1. Develop UNM standards for room and desktop-integrated voice, video, and data conferencing services.
2. Leverage the efficiencies inherent to Internet media services and web applications (e.g WebEx style web conferencing with integrated voice conferencing).

Post-AMI

The AMI research, analysis, and recommendations should be viewed as the beginning of a discussion about how UNM can provide relevant, efficient and useful advanced media technology services to its community. However, the recommendations on their own will not achieve their intended goal unless specific activities, timelines, and associated costs are expressed within a larger information technology planning framework. In fact, several of the most important recommendations align with UNM IT planning initiatives and priorities (e.g. UNM Initiative #1 'Create a network of learning and support centers and Initiative #4 'Position UNM IT to acquire the funding necessary to grow and sustain strategic IT services'). AMI recognizes that the UNM IT plan will define priorities for distributing limited resources, and thus it will determine how AMI recommendations should be implemented. The individuals who participated in AMI understand the challenges facing the UNM IT planners, and remain ready to participate as needed.

Advanced Media Initiative: Executive Report

Contents **Page**

Executive Summary 1

1.0 Introduction 4
2.0 Tasks and Findings 4
2.1 Current State Survey/Intake Process Design 5
2.2 Needs Assessment 6
2.3 External Scan 7
2.4 Emerging Media Technologies and Trends 9
2.4.1 Internet Media and Communications Trends 9
2.4.2 Media Production and Media Services Infrastructure 11
2.4.3 Shared Space Facilities 11
2.4.4 Interactive Media 12
2.4.5 Unified Communications and Devices 13
2.4.6 Non-Interactive Media 13
3.0 Recommendations 14
3.1 Media Services, Distribution, and Infrastructure 14
3.2 Media Technologies Resource Centers, Training, and Support 15
3.3 Networks and Broadband Access 17
3.4 Interactive Media 17
3.5 Shared Space Facilities 18
3.6 Implementation and Funding 18
4.0 Conclusion 19
5.0 Acknowledgements 19
6.0 Glossary and Acronyms 19

Introduction

Advanced media technologies use is growing rapidly and is broadening the scope of what is possible within an educational and research environment. The goal of the Advanced Media Initiative (AMI) was to assist in the development of a campus-wide strategic plan that will guide the use and future investment in advanced media technologies to meet a University objective to implement state of the art technology in support of the University's educational, research and, services missions.

The Advanced Media Initiative (AMI) was tasked by the UNM Chief Information Officer with cataloging existing UNM media services, surveying current and future media service needs, scanning what other similar institutions are doing and plan to do with media technologies, and exploring emerging media technology trends and institutional impacts of media technologies like including media conferencing and collaboration technologies (audio, video, and/or data conferencing), media production technologies and media infrastructure technologies (e.g. media distribution and media archiving technologies).

AMI is organized into three components: AMI Advisory Group, AMI Steering Committee, and AMI Project Team representing the following UNM administrative, academic, and operational departments:

- Anderson Schools of Management
- Arts Technology Center
- Center for Telehealth
- Computer and Information Resources and Technology
- Health Sciences Library and Informatics Center
- High Performance Computing
- KNME
- Media Technology Services/Extended University
- New Media and Extended Learning/Extended University
- Office of the HSC Associate Vice President for Knowledge Management and Information Technology
- Office of the UNM Associate Vice President for Auxiliary Services
- Office of the UNM Chief Information Officer
- University Libraries
- UNM Gallup Branch/Information Services

2.0 Tasks and Findings

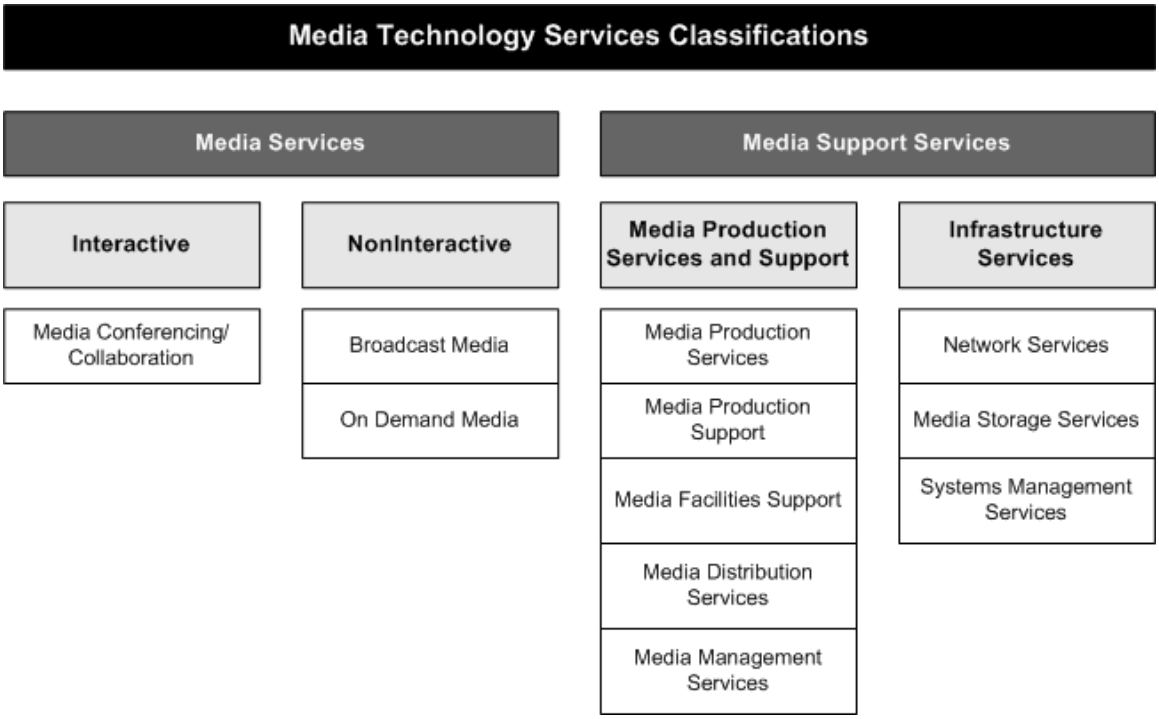
The Advanced Media Initiative undertook the following major tasks:

- **Current State Survey/Intake Process Design:** Survey media technology services currently offered by UNM media service providers. Development of a common media intake process that utilizes the directory of services created in the current state survey.
- **Needs Assessment:** Identify current and anticipated needs for advanced media technologies at UNM.
- **Environmental Scan:** Survey media technology efforts at peer institutions and evaluate the use of advanced media technologies in other environments for applicability at UNM.
- **Emerging Media Technologies and Trends Scan:** Survey emerging media technologies and trends that will be available to and/or impact UNM in the future.

The subsections that follow present our findings from the work on these tasks.

2.1 Current State Survey/Intake Process Design

The Advanced Media Initiative (AMI) project team conducted a current state survey of media technology services and service providers at UNM. The survey cataloged media related services offered by UNM media service providers using the following classification scheme:



The Advanced Media Initiative produced the following documents as part of the current state survey:

1. A comprehensive media services database organized by UNM media service provider. Providers included all known main, north, and branch campus media service providers. This database was used to produce a service directory of service providers. It can also be repurposed to provide the data engine for an online media services and media service provider resource system.
2. Two summary analysis documents that listed media service providers by media service type and a roll up summary of major media services by provider.
3. An additional intake process deliverable designed to guide users through the process of finding appropriate media services for their needs and also direct them to service providers. An integrated online system and offline service provider directory combining this intake process deliverable and the current state services database would present a foundation for providing UNM constituencies with a unified media services and directory system.

Findings: Current State Survey/Intake Process

- The current state survey found the following primary types of media services provided on campus: data conferencing, media collaboration, video conferencing, broadcast media, on-demand media including synchronized media and graphic presentation capabilities, classroom media facilities, and various media management and production systems.
- Media Technology Services (MTS), the primary provider of on-campus media services, is a cable, satellite, and microwave provider of broadcast television services. MTS also

plays a primary role in classroom and facilities audio/visual equipment provisioning and management.

- KNME, whose license is held jointly by Albuquerque Public Schools and the University of New Mexico, is the primary provider of public television programming. KNME provides public television services as public service media using terrestrial analog and digital broadcasts, as well as cable television (TALNET), via COMCAST in Albuquerque.
- Studio media production services are provided by KNME, MTS (on the main UNM campus) and Biomedical Communications (on the UNM Health Sciences Center campus). Media production tools for audio, video, and data are also provided by New Media and Extended Learning (NMEL) and the Health Sciences Library and Informatics Center (HSLIC).
- Production on-demand streaming media services for educational, clinical, and informational use are available from MTS, NMEL, and the HSLIC. HSLIC also provides production live streaming media services.
- Media technologies used for research include virtual reality, data visualization, and advanced collaboration technologies utilizing Internet2 technologies. Internet2 conferencing is also used by UNM High Performance Computing, the Health Sciences Library and Informatics Center and the Center for Telehealth.
- Media services between the UNM main campus and branch campuses primarily use broadcast satellite and microwave television services although there is some availability of videoconferencing equipment for main campus/branch campus use.
- There is some availability and use of videoconferencing on the main UNM campus. Videoconferencing is growing on the Health Sciences Center campus and is used in clinical and educational applications.
- Distance education relies on asynchronous tools and synchronous text messaging tools although there is recent use of integrated voice tools for distance education.
- There are multiple service providers for many of the service categories. These often reflect organizational and program circumstances and requirements.

2.2 Needs Assessment

The Advanced Media Initiative project conducted seven focus group sessions to assess the media technologies needs of the UNM community. The specific goal for this task was to survey current UNM stakeholder (i.e. faculty, research, service, and student) media technology needs within the current state analysis service framework. Faculty, research, and service focus groups were conducted by facilitators from New Media and Extended Learning. Student focus groups and an Advanced Media Initiative steering committee focus group were conducted by the AMI project team.

Findings: Needs Assessment

The needs assessment focus groups elicited a broad range of needs and creative ideas, the strongest themes shared by stakeholders were as follows:

- In all focus groups across all cohort groups the need for a media technologies resource center was raised. Participants characterized the purposes of this resource center as follows:
  - A place for people to find out about available media technologies.
  - A resource center where there is access to media experts.
  - A place for testing media technologies to know better what works and under what circumstances.
  - A place where people could talk to one another about their experience using media technology.

- Faculty wanted to learn more about what staff and faculty around campus are using. They also wanted a place where they could test technologies before deciding on purchasing or using them for their courses.
- There was a sense that better communication and reaching out to students was needed among faculty. Faculty expressed interest in having access to technologies to support synchronous activities for distance education uses. Most expressed interest in synchronous voice capabilities because they felt it had the capability to reach more students. Distance education faculty expressed concern about access and equipment requirements for the use of synchronous communications technologies, particularly video, for distance education.
- All focus groups expressed reservations about the complexity of media technologies and equipment requirements. Participants expressed a desire for access to training (basic instruction and hands-on) on how to use media and information technologies more effectively and the need for improved access to technical support.
- Some students were aware that they had insufficient skills and knowledge of media (and information technologies) and expressed interest in improving their skills to enhance their academic experience and performance. They expressed frustration that they didn't know where to begin or what department to turn to for technology instruction and support.
- Many participants said that they relied on their technically-savvy friends for technology instruction and support.
- Participants were often not aware of the media technology capabilities currently available at UNM and in the market place (i.e. they don't know what they don't know). They often don't know what is possible even with available technologies.
- Inconsistent technology standards created confusion and frustration among all participants. Users are willing to use whatever tools are needed as long as those tools are consistently deployed.
- Students expressed a desire that advanced media technology solutions be 'mobile' and expressed a desire for solutions that can be accessed from a diverse group of devices and platforms.
- Students felt that there was a resistance to technology among many faculty that inhibited the use of media technology in teaching and learning. This resistance reduces opportunities to use the technology for those that are comfortable with it. It also inhibits students' opportunity for a richer learning experience. Students expressed frustration that faculty, in many cases, would not or could not effectively use existing media technologies.
- Faculty felt that it takes too much effort to get involved with media technologies. The use of media capabilities and equipment was viewed as a hassle. The process of checking out equipment, carrying it to the classroom and then setup is difficult and time consuming and they were uncertain that the equipment would work properly.

2.3 External Scan

The Advanced Media Initiative conducted an external scan of both peer and non-peer institutions to determine the current state, future plans, and new approaches in delivering media services to their constituents. Peer institutions included, University of Arizona, University of Arkansas, Iowa State University, University of Louisville University of Nebraska, University of Oregon, and University of New Mexico. The scan was conducted using phone interviews. The questions that were used during each interview focused on the following areas: media services delivery model; media services support; media content storage; managing access to media services including content; media server architecture; media products; and media service offerings.

Findings: External Scan

- **Delivery Model:** A majority of the universities interviewed deliver multimedia services at the departmental level distributed across multiple departments. There are however a few universities that provide centrally managed IT resources such as servers, storage, and bandwidth to the multimedia service providers. In these cases, the university had usually undergone a recent reorganization and consolidation of IT departments

  Collaboration between multimedia service providers varied widely between the universities that were interviewed. One university reported that collaboration and communications between multimedia service providers was good but that integration was poor. One university described a formal learning technology partnership between several of the multimedia service providers including public television, the central data center, their learning technology center and the office of student computing resources. Another university that we contacted uses a business cost-recovery model for core IT production services including storage, bandwidth and servers. These IT assets are both centrally located and centrally managed by the central IT data center.

- **Multimedia Services:** There are a plethora of multimedia services that are offered by the universities that we interviewed. Only one of the campuses that we surveyed had deployed VoIP campus wide and claimed that it would pay for itself after just three years. What we found that was also interesting, were services that had been discontinued such as satellite and microwave ITFS and distance education classes using dial-up connections. The digital learning management systems used by most universities in our survey was either WebCT or Blackboard. Several universities also had integrated the collaboration application Wimba from Horizon into their WebCT systems. Video conferencing products included both Polycom and Tandberg.

- **Support:** Providing a concise description of a support structure for the delivery of multimedia services among the universities interviewed is nearly impossible. But one thing is certain for all those interviewed; establishing a single point of contact (SPOC) is both critical and strategic in supporting any campus-wide IT service. Universities currently deploying multimedia services using a distributed departmental model cited a SPOC as a necessary direction for supporting multimedia applications on their campus.

  Most universities provide some type of smart-classroom support for faculty. A few universities have formal plans to establish “student technology assistance programs”. These efforts which consist of multiple multimedia learning facilities and support staff are funded by a mandatory student technology fee, typically $5/credit hour. In one case, students participate in the decision-making process to determine how money is to be allocated in the upcoming academic year.

- **Data Storage:** Data storage solutions for multimedia applications consisted primarily of multiple departmental servers using direct attached storage. Primary storage capacities for these multimedia hosts varied from a few terabytes up to 10 terabytes. In most cases there were no immediate plans to move to a network storage solution.

  The most interesting storage solution was a university, using a business model for core IT services, that provided both NAS (Network Attached Storage) and SAN (Storage Area Network) storage services to the entire campus including multimedia service providers. Funding for these storage assets was achieved through a chargeback process.

- **Security:** Protecting access to restricted IT services and applications including multimedia applications is primarily done at the hosting application site using a local directory, in most cases Windows Active Directory (AD). A majority of those universities interviewed whose authentication and authorization was being done at the departmental

level had either informal or formal plans to deploy a campus-wide single sign-on for access to restricted services and applications. Two of the universities interviewed reported that they were doing it today.

2.4 Emerging Media Technologies and Trends Scan

The Advanced Media Initiative conducted a survey of emerging media technologies and trends and identified a number of key technologies and trends that are likely to impact media use at UNM in the future. The primary media technologies trend that runs throughout many of the findings and recommendations of this report is that media and information technologies are no longer distinctively separate technologies and the organizations that provide these services will no longer be distinctively separate disciplines, but are two parts of a converging whole. This convergence will fundamentally transform and challenge both disciplines.

We have generally categorized emerging media technologies and trends into the following six categories and the subsections that follow summarize our findings in these areas:

- Internet Media and Communications Trends
- Media Production and Services Infrastructure
- Media Facilities
- Collaborative Interactive Media
- Devices and Unified Communications
- Participatory Non-Interactive Media

2.4.1 Internet Media and Communications Trends

The explosion of media and communications technologies and services on the Internet creates exceptional opportunities for universities to participate as providers of IP broadcast, media on demand and collaborative media in support of academic, research, service, and administrative missions. These opportunities will increase in the future as the potential audience for these services increases with broadband access penetration and as that audience becomes familiar with similar Internet-based entertainment, information, and communications media services.

Internet media is enabled by a number of significant technology trends including the increasing adoption of broadband Internet connectivity. Approximately 67 percent of American households access the Internet through broadband connections as of 2006, which is up from 33 percent three years ago. It is also enabled by the adoption of home networks including home wireless networks that bring multiple devices (personal computers, handheld computers, mobile phones, televisions) into the connected world, and the adoption of IP standards based communications protocols across networks and devices that enable unified communications. Users also now have access to a wide variety of devices capable of communications as well as delivery of media content. Consequently, users have developed varied individual preferences and requirements for devices, media portability, and user experience.

Findings: Internet Media and Communications Trends

- The ecosystem of media and communications devices and services on the Internet is not static and is not within the control of individual institutions. This is particularly true of communications applications and services that will require institutions to support widely popular Internet-based services or at least provide interoperable institutional services if they are to take advantage of the devices and skills that users possess, and the efficiencies that these applications provide. To be successful, institutions must constantly assess, and provide services that leverage, this larger ecosystem.

- Providing communications and content on platforms and devices that users already have will allow providers and institutions to leverage the skills users already possess. The benefits to this strategy include increased learning options for students and multiple modes of delivery that are tailored to individual learning styles and preferences. This is user-driven, rather than provider-driven, media services and communications and has led to a democratization that extends the capability to produce media content to constituent groups themselves (i.e. the people formerly known as the audience).
- IP networks, to their advantage over other existing types of networks, support digital media distribution and communication in all of its forms including interactive, real-time communications applications as well as broadcast, on-demand media, and downloadable media applications. This implies an environment of less reliance on traditional broadcast and communications technologies and networks to support University missions.
- The consequences of the ascendancy of internet media are numerous:

    a) The convergence of media over IP networks results in increasing bandwidth requirements placed on institutional IP networks, consumer broadband requirements, and the public internet. The primary driver of new growth in bandwidth requirements is the increased availability and use of video on demand, downloadable video, and video conferencing applications. Improvements in both networking technology and media applications technology (e.g. distributed content distribution technologies and advances in media compression technologies) will play an important role in increasing the efficiency of and the bandwidth availability for future media technology services, but in the short-term there will be imbalances between bandwidth requirements for media services and network capacity.
    b) The convergence of media to IP networks consolidates all forms of media distribution and communications (including educational, informational, communications, and entertainment) in the hands of a small number of incumbent IP network service providers consisting of the major telecommunications and cable service providers who control much of the broadband access to consumers (including most university constituent groups). Potential consequences of this consolidating power include legislative, regulatory, technical, and contractual attempts to leverage this control to increasingly monetize and/or restrict network use especially for media applications. If these strategies are successful than many of the strategies contemplated by the Advanced Media Initiative to provide IP based interactive and non-interactive media services may not be the free network services we are assuming will be the case.
    c) There are few, if any, alternatives to consumers in the choice of local access “last mile” broadband access providers. Existing alternatives are limited by the fact that the major wireless service providers, some of whom now offer data services, are also in most cases these same telecommunications providers. There is some potential for competition in the form of new technologies like wireless broadband and broadband over power line, but these technologies have so far not proven themselves and in most cases are not fully technically developed yet. Furthermore, alternative wireless broadband options are dependent on access to high quality spectrum if they are to be successful. It is uncertain, at best, whether non-exclusive spectrum will be available for these uses either legislatively or by regulatory means.

- Uneven availability and penetration of broadband access to constituent groups, especially rural and economically disadvantaged constituencies remains a significant problem. Many advanced media initiatives depend on continuing broadband adoption. However, the United States, by some measures, ranks sixteenth in the world in broadband adoption. Rural broadband access, while it has been increasing, still lags urban and suburban broadband adoption. Technologies exist that could help address these issues including rural and community wireless broadband initiatives that would provide competition in urban markets reducing broadband costs and that in many rural areas may provide the only feasible method of providing broadband access. However,

their technical viability and the availability of access to spectrum to support them, remains uncertain.

2.4.2 Media Production and Media Services Infrastructure

The convergence of media distribution to the internet also implies a fundamental shift in the service and delivery platforms used by media service providers. Media services will increasingly be built on information technology infrastructure (e.g. streaming media services) rather than traditional media technology infrastructure (e.g. satellite distribution services).

Findings: Media Production and Media Services Infrastructure

- A benefit of internet media convergence is the opportunity to integrate media technologies into the larger information technologies framework of productivity, collaboration, and line of business applications.
- Shared infrastructure services, like common media storage services, can provide services to all media service providers, which would improve the scalability, efficiency, reliability, and maintainability of these systems for all media service providers and free provider resources for other purposes. Applied to media services, concepts like shared managed storage can provide a useful way to address media service provider redundancies and inefficiencies while maintaining program independence.
- Low cost hardware and software is turning the skill of media production and customization into something that is attainable at a mass scale blurring the distinction between media service provider and media service consumer. For example, high definition video camcorders, which cost upwards of $50,000 only a few years ago, are now available for under $1000. These trends allow anyone to create media as well as to consume it and enable users to participate directly in media production and media customization and enable the participatory (user generated content) media trends described elsewhere in this report.

2.4.3 Shared Space Facilities

Educational facilities are changing to accompany a new generation of student whose learning styles and expectations are changing as technology becomes more prevalent in all aspects of life. Today classes are being designed to support a multitude of audio and video options including streaming media, audio and video conferencing, media simulations, and virtual reality.

Findings: Shared Space Facilities

- Wireless and mobile connectivity (and a variety of end user devices) enable access from any place in the classroom and not limited to the classroom, but also libraries, outdoors or across the state creating unlimited combinations of in-classroom, virtual classroom, and hybrid classroom learning environments. The traditional classroom is no longer bound by desks and a room, instruction can happen in hallways, outdoors, virtually anyplace that has internet connectivity and power.
- Classrooms must be designed for the technology brought into the room. The explosion of devices from personal, notebook, tablet, and ultra compact computers plus the ever increasing power and connectivity of personal devices including mobile smart phones and handheld devices combined with wireless and remote connectivity has important implications for physical classroom and shared space design and functionality. It is probable that the technology brought into the classroom and used to access the classroom virtually will over a short time be far more innovative and capable than any media technology built into the room. Complex provisioning of spaces with set technologies is likely to result in facilities that are obsolete before they are ubiquitous.

2.4.4 Interactive Media

One set of technologies that have benefited most from the transition to internet media are audio, video, and data conferencing and collaboration technologies. Prior to this, video conferencing between two or more parties was provided through metered access through either ISDN networks or audio conferencing service vendors. The ability to transmit real time voice and video communications inexpensively over IP networks has enabled a broad range of solutions for distance education, clinical, research, and business related conferencing. Additionally, the integration of real time audio, video, and data conferencing to extend existing collaboration and productivity tools (i.e. email, instant messaging, learning management systems, workgroup collaboration tools, and office productivity applications) is becoming a realizable goal.

Findings: Interactive Media

- IP network based communications and collaboration technologies enable classrooms to be virtualized, while still facilitating an interactive and interpersonal class relationship experience (previously only available by bringing the class to the classroom). This will enable flexible alternatives for access to educational material for existing students, attract new students, and also expand educational opportunities to those, who for a variety of physical, geographic, and economic reasons, cannot take advantage of them now. These capabilities will increase the effectiveness of distance education and increase the flexibility of on-campus education.
- The availability of low-cost web cameras and microphones, particularly as they become built into desktop, laptop, and handheld computers (and user familiarity with their operation improves) will remove barriers to adoption of internet based media communications and collaboration.
- The availability of low-cost or no-cost consumer voice and video over IP applications will complement or supplant enterprise voice and video applications services particularly in long-distance and international scenarios where the cost advantages over traditional communications technologies are difficult to ignore.
- IP network based communications and collaboration technologies may increasingly support new work models (i.e. telecommuting and satellite work facilities). The availability of these services during short or long-term economic, health, or natural disasters could keep on-campus students enrolled who would no longer be able to do so because of transportation costs or other travel restrictions and keep university employees “at work” in support of the University’s missions. They also provide the university with an opportunity to provide leadership and serve as a model for other private and public institutions and provide competitive advantage in attracting students and workforce.
- Attention will grow around the non-technological issues surrounding effective online collaboration, virtual teamwork, business cooperation and related fields. It is not so much the level of sophistication of the technologies utilized that makes for effective online collaboration, but it is rather the ability to redefine the rules of teaming and cooperation in ways that enable team-members to make best use of these technologies that is critical for the success of collaboration tools.
- Collaboration and virtual reality research activities play an important role in extending the capabilities of existing collaboration technologies. They also drive the computing and networking technologies that will be necessary to support these technologies in the future.
- Session Initiation Protocol (SIP) will largely replace or subsume H.323 based media conferencing. SIP, an IETF proposed standard, is used to establish contact between IP phones and to add special features--such as presence awareness, video or mobility capabilities--onto a voice/video over Internet Protocol (VoIP) network. It also enables integration of media conferencing into instant messaging (SIP/Simple) and provides the

architectural basis for integrated/unified communications. SIP is becoming widely adopted as a standard for IP network based telecommunications platforms as well.

- Alternative forms of media conferencing and collaboration exist including multipoint conferencing over multicast networks including Internet2 (e.g. Access Grid, ConferenceXP). These technologies may impact the future of media conferencing, particularly if the transition to IPv6 is successful. For now, the viability of these technologies for providing enterprise media conferencing services is limited although important research in communications, immersive virtual reality, data visualization continue to utilize these platforms.

2.4.5 Unified Communications and Devices

Closely related to collaborative technologies is the concept of unified communications. Currently, consumer and enterprise media and communications services are provided primarily as stand alone, non-integrated applications (i.e. email, instant messaging, and the telephone). Unified communications extends existing communications systems and also extends live (face to face) environments by providing communications that are accessible anytime, anywhere, and on any device. Unified communications incorporate and integrate all types of synchronous (i.e. voice, video, data) and asynchronous communications (email) into a unified platform.

Findings: Unified Communications and Devices

- Mobile phones provide as much processing power as personal computers did just a few years ago. With nearly 1.8 billion phones in use worldwide, and an estimated 800 million new phones sold last year alone, mobile phones already represent a far larger opportunity than PCs for the delivery of educational, clinical, research, and administrative media content and communications.
- Synchronous and asynchronous communications platforms will be integrated using standard protocols like SIP, and its 3GPP variant IMS, to provide seamless communications across platforms, networks, and devices. This will require institutions and media service providers to provide mobile content and communications in formats and on devices that meet the individual needs and preferences of users, deliver easy synchronization solutions, and provide user-friendly services that don't required extensive setup or modification. Media services must be device agnostic.

2.4.6 Non-Interactive Media

Nobody is as clever as everybody. The web is quickly transforming itself into the participatory web. Participatory media (i.e. user-generated content) relies on the ability of organizations to leverage user created and shared content effectively to the benefit of the user community and to the organization. Participatory media is enabled by the increasing availability of low-cost media production tools and a user community that knows how to use them. Combined with collaborative interactive media, they have the potential to enable a participatory academic environment far richer than an institution is capable of creating or supporting through centrally provided media services and content alone.

An example of this type of participatory media that would benefit an academic institution is to provide tools and platforms that allow students who already record class lectures to share those on a class related collaborative space (e.g. blogs, wikis, audioblogs, videoblogs) so that other students could access, comment on, and collaborate about this material. This would have to be done in coordination with the appropriate faculty and with appropriate access control to prevent undesired dissemination of course materials without faculty permission.

Findings: Non-Interactive Media

- Participatory user-generated media will grow rapidly as new tools provide users with the ability not only to share and download content but also to create, edit, remix, select, and compile content in new valuable formats and styles. Institutions like Stanford and MIT are undertaking notable initiatives to make all courseware and lectures available for not only student use, but also for general public access. Stanford is providing this material through iTunes. All of these are cost effective ways of increasing the creation and availability of educational media materials for students and faculty.
- Tools are becoming available that will allow media recordings to be annotated, referenced and automatically transcribed into text. Also the number of tools that enable search within audio will see growth. Examples include:
    - The Harvard Medical School makes all course lectures available for download onto MP3 players for students, faculty, and staff. Users can download content by subscribing to the classes syndication feed. Additionally, word-recognition software allows users to search archived lectures for a given word or phrase. This allows individuals to search across disciplines and courses for segments of lectures that deal specifically with their area of interest. Results show users exactly what portion of the lecture contains a discussion of their search term, allowing them to link directly to the relevant section of the video on their computer or fast-forward to it on their device.
    - The British Broadcasting Company is experimenting with a system designed to allow users to collectively describe, segment and annotate audio in a Wikipedia-style fashion. This would be of great value to students as a means to reference, share, review, and collaborate on class and research material.
- The role of central IT in a model like this is to facilitate and not provide, but central IT does play a significant role in this model. In addition to providing the connectivity, storage, and media sharing platforms, central IT needs to provide the organizing and management structures to support it.

3.0 Recommendations

The Advanced Media Initiative's scope of work included discrete tasks that would define a future direction for media technology services and provide an accompanying roadmap for how to get there. While tremendous progress has been made within the UNM IT strategic planning process, the framework needed to support a detailed AMI technology road map is still being defined. We believe there is value in publishing the findings and recommendations in this report to initiate a dialog with the campus that will ensure the development of a realistic, detailed strategy that can be efficiently implemented when accepted and supported by UNM administration.

3.1 Media Services, Distribution, and Infrastructure

1. Non-IP based media service providers must begin to transition their existing media distribution infrastructure to information technology platforms and, where necessary, acquire the technically skilled personnel to manage and support these platforms and services. Platforms and services include not only audio and video distribution and interactive services, but also integration with collaboration, productivity, and line of business information services and applications. This transition can be accomplished through a managed program of technology investment and training or in collaboration with existing IP based media service providers. There will be program specific needs for both types of media distribution platforms over the short to mid term horizon.
2. Internet media convergence creates opportunities for collaboration between what have been dissimilar media service providers and information technology service providers. It is also an opportunity to formalize the collaboration between media service providers at

UNM by establishing a group of media and information technology service professionals responsible for the development of a centralized framework for media service planning, research, development, and coordination. This framework would comprise both steering and operational collaboration components. On-going functions of the media technology services framework group include:

a. Define and maintain technology and operational standards for media production, facilities, distribution, and communication services. Industry standards should be adopted where possible. Standards encourage technology adoption and use, reduce media technologies provisioning and maintenance costs, reduce duplication of services and resources to support them, and improve media technology accessibility.
b. Facilitate organizational cooperation that needs to take place between providers of different media services, as well as, between media service providers and information technology service providers.
c. Identify and implement potential shared media service infrastructure efficiencies (e.g. shared storage systems).
d. Provide a campus-wide authoritative source for managing access to restricted media applications and services that was seen as necessary in addressing the protection of intellectual property and the management of digital rights and assets.

3. Develop a strategy for providing competitive advanced media services while accommodating the needs of a diverse constituency and network access landscape. This can be accomplished using scaleable solutions that provide equivalent access rather than equal access. Multiple channels and modes for accessing educational and other services that cover a wide range of access and equipment capabilities (as well as user preferences) should be provided.
4. Utilize participatory, end-user created and customized media concepts as a cost feasible to provide media content and services for faculty and students. This is encouraged by deployment of media technology resource, training, and support centers that provide access to standards-based tools and training. It is also enabled by the deployment of collaboration platforms where user generated content can be hosted.
5. The University should support and encourage use of Internet based media and communications services that leverage the devices and skills that users possess and provide cost effective alternatives to University provided services. Media service providers must provide mobile and repurposed content for users who want communications, messaging, entertainment, and content “on the go” and on devices that users already have. One example is to deploy audio (and at some point video) podcasting services that allow students to access classroom and instructional materials for review at their convenience on MP3 players. Podcasting is a distribution complement of participatory, end-user created media.

3.2 Media Technologies Resource Centers, Training, and Support

1. A dominant theme voiced by needs assessment participants across all cohort groups was the need for a cohesive and comprehensible face to information technology services, training, and support. Participants made little distinction between media technologies and information technologies when they expressed this need. Information technology training and support as it is experienced by the University community is of a fragmented, unorganized, and inadequate information training, and support landscape with evident and negative consequences for meeting the needs of the University community. This theme was also recognized as a high priority by all respondents of the external scan interviews.

There are three component services that were often mentioned as factors in the solution: information technologies resource centers, literacy and training programs, and support services. The key to the solution that addresses the current perception as it is experienced by the UNM community is that the missions of these component services need to be addressed synergistically and focused on customer service if the results from any future needs assessment aren't likely to return results substantially unimproved from the current needs assessment.

Specifically, the component services should address the following media technologies service, training, and support needs:

Resource Centers (Physical and Virtual) Recommendations

- A place for people to find out about available media technologies.
- A place for hands-on testing to know better what works and under what circumstances.
- A place where people can talk to one another about their experience using media technology and learn more about what other staff and faculty around campus are using.
- A place where there is access to media technology experts.
- A unified directory to media service providers and services.
- A unified media services request processing center including a common intake process and integrated cross provider processing.

Literacy Programs Recommendations

- General instruction about how to use media technology effectively and for what uses.
- Targeted instruction to assist users in applying media technology in individual endeavors.
- Training and advocacy to promote technology use.
- Develop a cohesive media technologies curriculum that addresses the general and targeted needs of the University community.
- Develop outreach and collaboration programs to foster and promote technology literacy programs in K-12 education. It is apparent from the needs analysis that many students are not receiving adequate information technology training prior to attending UNM.

Support Services Recommendations

- Provide reliable media technologies technical support services centered on a single point of contact call center and supported by distributed support desks.
- Promote collaboration between technology support services and technology literacy and training programs. Technical support efficiencies can be achieved by proactive literacy and training programs. Likewise, technology literacy programs benefit from feedback about what skills-related issues create the most demand for technology support services.

3.3 Networks and Broadband Access

Advanced media technologies will be enabled within the University by the availability of IP network bandwidth needed to support them and to constituents outside of the University by the availability of broadband access.

1. While it is beyond the scope of the Advanced Media Initiative to make internal University IP network management recommendations, it is clear that the convergence of educational, informational, communications and collaboration, and entertainment media to interactive and device addressable IP networks will create ever increasing demands on institutional network infrastructure. University network service providers must recognize and actively support media and information technology convergence and take the necessary steps to integrate media technology requirements and media service needs into the information technology environment and capacity planning process. Media service providers must participate in IP network capacity planning processes and also actively participate in managing the demands that internet media services will increasingly place on information technology infrastructure and resources.
2. UNM should continue to support and promote universal and unrestricted broadband access principles. UNM should also encourage and participate in developing and deploying alternative broadband access technologies including rural broadband and community broadband initiatives to increase competition in IP broadband access. This would enable a broad range of innovative media technology services (other than least common denominator media services) for UNM and its constituencies. These could take the form of university/community and university/industry joint efforts.
3. UNM should also advocate making available some portion of the broadcast high quality spectrum that will become available from the transition to digital television in 2009, including empty channel spectrum, for nonexclusive use by alternative wireless broadband technologies. Alternatively, UNM could also provision, or participate in the provisioning, of alternative wireless broadband access through spectrum it already controls. Currently, wireless broadband technologies only have access to non-exclusive, low quality spectrum and must compete with hundreds of other wireless consumer devices that use the same spectrum. Without access to more and better spectrum, the promise of wireless broadband as an alternative to existing incumbent broadband services and in some cases the only method of providing broadband access services (i.e. rural broadband) will be frustrated.

3.4 Interactive Media

1. Provision and support media conferencing and collaboration services to all UNM academic, research, service, and administrative programs and constituencies. Room based systems should be available in major facilities to provide convenient access to these services. Additionally, desktop access to these services should be expanded. Media conferencing and collaboration services provide:

    - A competitive advantage to the University to attract students, researchers, and employees to UNM academic and other programs.
    - A means to increase time and distance efficiencies for on-campus meetings and workgroup collaboration and expand off-campus communication and collaboration.
    - Short and long-term emergency preparedness advantages to the university that would serve as a model for other public and private institutions.
2. Media conferencing platforms should adhere to industry standards to enable interoperability with systems in place at other institutions. Adherence to standards and interoperability provide a consistency of experience among devices, applications, and uses; reduces duplication of service; and reduces training and support costs.

3. Data conferencing services need to be provided as a necessary complement to audio and video conferencing services. They provide the document sharing, document collaboration, and shared application capabilities missing from audio or video conferencing alone.
4. University IP communications services exist within a wider context of Internet communications services. The University must be cognizant of media over IP trends in consumer computing and those integrated with web technologies including bundled web application communications services (e.g. voice services bundled into learning management systems and other applications). These may complement or, in some cases, supersede institutional services over time. Consumer communication and collaboration applications are, in many cases free services, and the University should take advantage of the cost saving opportunities and interoperability advantages that these technologies represent especially if one or more of these services become dominant nationally or internationally.
5. Conferencing and collaboration capabilities should be capable of integration with other productivity applications and supported platforms including directory services, learning management systems, and key infrastructure applications (e.g. deployed collaboration, productivity, and line of business applications).

3.5 Shared Space Facilities

The critical technology that must be available in all classrooms and other shared spaces for any advanced media technology future is connectivity. In the future, classrooms and shared spaces are just another node on the network, that is, they are just one option of where and how to access instructional and other events.

1. Shared space design should pay as much attention to technology brought into the room by faculty, students, and staff as it does to the media technology available in the room. Media technologies available in shared spaces must complement, and integrate seamlessly, with device solutions at the application level so that participants have device access to in-room presentations, demonstrations, and materials whether they are physically present in the classroom or not.
2. Determine and deploy a standardized set of shared space technologies that address necessary display, audio, and media playback needs. Doing so will increase use of shared space media technologies, reduce maintenance and support costs, and improve constituent satisfaction. This requires coordinated planning between shared space media technology providers across departments and campuses.
3. Avoid over-equipping shared spaces with similar and/or duplicative devices to reduce complexity for participants. With the fast pace of technology innovation, reducing complexity will also tend to minimize expenditures over time on technologies and devices that rapidly become outmoded.

3.6 Implementation and Funding

Some of the recommendations proposed by AMI involve new investment in facilities and resources; others involve reallocating and using existing resources more efficiently (in some cases reducing costs for existing services), while other recommendations are innovative ways to provide new and enhanced services. Much work remains to be done to determine priorities and specific activities, timelines, and associated costs including:

- An assessment of existing media and media-related information technology resources and expenditures.
- A determination of how AMI recommendations will be structurally and organizationally implemented.

- A determination of preferred strategies and priorities for providing recommended services.

Several of the most important recommendations align with UNM IT planning initiatives and priorities (e.g. UNM Initiative #1 'Create a network of learning and support centers and Initiative #4 'Position UNM IT to acquire the funding necessary to grow and sustain strategic IT services'). AMI recognizes that the UNM IT plan will define priorities for distributing limited resources, and thus it will determine how AMI recommendations should be implemented. The individuals who participated in AMI understand the challenges facing the UNM IT planners, and remain ready to participate as needed.

4.0 Conclusion

The mission of the Advanced Media Initiative was to provide a roadmap for the development and deployment of next-generation media technologies. AMI accomplished the following in support of that mission:

- Understanding of the services provided by the individual media service providers
- Understanding that service providers on campus have areas of duplication as well as specialization
- Realization that we have not fully integrated the use of media into the academic experience to enrich faculty, students, or staff
    - No place for students to get hands-on help to assist the incorporation of media into their studies
    - No place for staff to learn how to incorporate media to make them more productive
    - No place for faculty to go to exchange ideas, methodologies and experiences in integrating media into their curriculum
- Realization that the underlying foundation of processes must be developed campus wide before media can efficiently be distributed as a service on campus
- Realization that organizational changes will need to occur, such as the integration of support centers. "Poorly supported technology is actually worse than no technology at all", (J. Young, The Chronicle of Higher Education).

The work of the Advanced Media Initiative serves as a starting point and the beginning of a discussion about how to enable advanced media services at UNM and what all of us: media service providers, information technology service providers, UNM and IT administration, and the UNM community must do if advanced media services are to be successfully implemented.

5.0 Acknowledgements

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6.0 Glossary and Acronyms

H.320: Video Conference industry standard that refers to video conferencing over ISDN
H.323: Video Conference industry standard that refers to video conferencing over IP
Instant Messaging (IM): Primarily an Internet protocol based application that provides convenient communication between people using a variety of different device types. The most

familiar today is computer-to-computer instant text messaging, but IM also can work with mobile devices, such as digital cellular phones, and can incorporate voice or video.
Integrated Services Digital Network (ISDN): An older type of circuit switched telephone network system, designed to allow digital transmission of voice and data over ordinary telephone copper wires.
Internet Protocol (IP): A data-oriented protocol used by source and destination hosts for communicating data across a packet-switched network.
IP Multimedia Subsystem (IMS): An architecture for telecommunications operators that want to provide mobile and fixed multimedia services. It uses a Voice over IP implementation based on a 3GPP implementation of SIP, and runs over Internet Protocol networks.
Media Conferencing: A term that is used to collectively refer to the various forms of media conferencing (such as audio, video and/or data).
Podcasting: A variation of downloadable media. Podcasting is the distribution of audio or video files, such as audio programs or music videos, over the internet using either RSS or Atom syndication for listening/viewing on mobile devices and personal computers.
Presence: Conveys a participant's availability and willingness to communicate. Instant messaging systems publish presence information to other systems' users to convey the participant's communication state (i.e. online, offline, busy, away, etc.). Presence information has wide application in voice over IP and instant messaging applications.
Session Initiation Protocol (SIP): A protocol developed by the Internet Engineering Task Force and proposed standard for initiating, modifying, and terminating an interactive user session that involves media elements such as video, voice, instant messaging, online games, and virtual reality.
Streaming Media: Streaming media is media that is sent, often in compressed form, over the Internet. Users do not have to wait to download a large file before seeing the video or hearing the sound. Instead, the media is sent in a continuous stream and is played as it arrives. Streaming media can be used to deliver media either live or on-demand.
Video on Demand (VOD): An umbrella term for a set of technologies that enables individuals to select media from a central server for viewing on a television or computer. VOD content is not live but rather pre-encoded content available at any time from a server. On-demand streaming media is a form of video on demand.
Voice over Internet Protocol (VoIP): VoIP is the routing of voice conversations over the Internet or any other IP-based network. The voice data flows over a general purpose packet-switched network, instead of traditional dedicated, circuit-switched voice transmission lines.