Toward the Virtual University
The Utah State University Model

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Utah State University has an international reputation for research and teaching. Classified as a Carnegie Research I institution, USU benefits annually from over $80 million in contract/grant dollars generated from outside sources. The University provides a comprehensive academic program for undergraduates and graduates through eight academic colleges. Over 170 undergraduate and 135 graduate degree programs are offered. The on-campus enrollment is well over 18,000, with an additional 1500 off campus.

In the tumult of the technology explosion lies the concept of delivery of degrees by accredited institutions of higher education, both those with “walls” and those “without walls,” to an unnamed multitude of people across state boundaries and economic circumstances. To many in academia this multitude implies greater access to their institution, greater numbers of students on their books, and huge influxes of additional revenue to run existing and “emerging” programs. Land-grant universities have been in the business of delivering education to outlying regions of their own states for over 100 years. Only now are they beginning to band together, pool that expertise and deliver technology based instruction to their own states and beyond.

At Utah State University the Learning Resources Program and Continuing Education have partnered with the state of Utah to implement a state of the art digital satellite system. This is one phase of the hope that is the Western Governor’s University. Now we have the technology in place, and, at least for the moment it remains current. Now we have to begin dealing with the real issues: cost, access, the role of the teacher in the distance environment and student services. In a discussion based presentation, and attempt will be made to discuss the history, present the problems and propose some solutions. Personalities aside, the world it is changing. We are ready to open the doors of this new room, but are we ready to walk into it and enjoy all it has to offer?
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Looking Back

When the doors to Utah Agricultural College opened in the fall of 1888, the mission of the school was clear. It was to be the Land Grant College for the state of Utah, and with that umbrella came various responsibilities. It was to be the Agricultural Experiment Station for the state of Utah, a state only a few years old itself. It was to teach teachers how to teach. Eventually, we, the sum of those who began and those who have carried on, also taught business people how to organize themselves and their businesses for success, we taught soldiers how to operate in a combat situation, we have sent experiments into space, and a myriad of other things beyond and including the original mission. The state of Utah has always been a large and geographically diverse region and therein lies the ultimate challenge. Given the responsibility to serve these people, to excel in the joint mission of teaching, research and extension, the faculty and staff at the new AC had to find ways to extend their expertise throughout the state. In the very beginning, that involved moving the classroom right out to the field--literally, into the wheat, alfalfa, and barley that comprised the early agricultural economy. The expert was the teacher, the man (generally) with all of the schooling from the AC. Small groups would be formed in agricultural regions and education was dispersed person to person, with the professor coming to the classroom of the rural area. It also became clear that bringing those farmers to the fledgling campus provided a welcome break for them in their daily routine, and an opportunity for the professor to use the laboratory that was the campus to extend knowledge to this geographically diverse audience in one location. These early attempts at “distance education” were called Farmer’s Encampments, and early photographs prove the name to be appropriate.

Even the combination of campus and field was not enough. These farmers brought with them families who were a willing audience for additional education. Women were encouraged to participate in special class sessions on the latest techniques of homemaking, and children were encouraged to investigate future careers that would, of course, involve an advanced degree from the AC. As counties became more cohesive, agents were sent into the field to be the resident experts for their neighbors--a tradition which has continued throughout the country to the present day. These resident experts were limited however, to their own area of expertise, be it irrigation, dry farming, dairy or vegetables. Other experts were needed to fill the gaps, and the gaps themselves changed. As the state became more settled, there was a growing need for business expertise, teacher training and on-going life-long learning in many areas.

Many years, and two world wars later the face of Utah State University has changed. No longer could we expect everyone who wanted to learn to come to our door. It was time to figure out how to extend the knowledge of the professors into the far reaches of the state for subjects beyond, but including, those associated with agriculture. In 1968, Utah State University began its program of Life Long Learning, establishing the first “outreach” center in the Uintah Basin, followed shortly thereafter by a center in Tooele. These centers functioned almost as mini-universities. Courses were offered toward a degree, or specialized certification in a certain subject in a centralized location. This helped. Professors flew to the centers, taught classes and flew home. The course work was limited, but available for the first time in these locations.

As is always true, a bit of knowledge is a powerful tool. It was a very short time before the system of flying knowledge to the recipient was a cumbersome option. That challenge brought forth the birth of the telecourse. The early attempts involved land telephone lines and microphones--hardly an adequate medium for the exchange of knowledge, but it allowed a greater variety of course work to be brought to the “far-reaching corners” of the state. Soon Utah State was able to deliver entire degree programs using this medium, and the student was exposed to a variety of professors and their knowledge because the professor could stay on campus and still reach these students. Professors found that they had to organize their material differently for the “new” medium--gesture
and facial expression were not effective, graphics and blackboard illustrations could not be seen. Still, the students were thrilled. Now they could satisfy their thirst for knowledge and their need for training without having to interrupt careers and home to travel to campus.

The “new” telephone learning was just a beginning. The university worked toward a system where the professor could actually be seen at the remote site. That spawned the birth of Com-Net, a combination of video presentation and electronic black boarding which allowed the professor to interact with the student, sort of. No longer were the gestures and graphic materials useless. But the slow scan method of the early Com-Net made some of these gestures comical and some of the graphic material meaningless. Once again the University professor had to change, to adapt to this new learning environment. Students had to travel some--to centers located strategically throughout the state, but they did not have to leave jobs and families to “better” themselves. Slow scan became its own teaching method. Professors would fondly refer to their Com-Net experiences as something where anything could happen. They could only hope that there were actually students at the other end of their lectures and that something was actually being learned. Studies have shown (Beth Walden, PhD. Dissertation, USU, 1997) that more learning was taking place than was originally expected, and in different ways than was anticipated. Students were learning as much from the interaction with one another at times as they were learning from the professors “on line” with them. As equipment failures became both more predictable and less fearful, the interaction among students at the sites accelerated.

The prominence of computer services on university campuses accelerated during the late 1960s and early 1970s. Universities were facing the faculty’s need to simplify much of the research, especially the mathematically intensive research. Utilization spread beyond just numbers quite rapidly. The early computers organized, digitized, categorized and manipulated tremendous amounts of data that heretofore had been handled by an individual or teams of individuals with great effort and much time. Soon the computer was able to handle routine computations with unbelievable accuracy and skill. The computer operator who made it all happen gained tremendous status.

It was at the same time that transmitting actual words across campuses from one building to another became a reality. It was not long before campuses were able to integrate entire functions from certain buildings to the computer center, utilizing nothing more than a series of bits and bytes. Again the computer center operator’s status grew.

In the early 1980s people began to consider the role of the computer in education beyond the mere computational capabilities already demonstrated. The idea of integrating what was happening on the slow-scan of Com-Net with the speed and accuracy of the data stream available on parts of campus began to take shape. People beyond the computer center personnel began to dream; dream of an integrated system where voice, data and video would be able to be transmitted at will to multiple locations.

The first attempt at such a transmission in Utah was the Intermountain Community Learning and Information Services (ICLIS) project. This project was initiated in late 1985 as a multi-faceted partnership between public and private enterprises. It was funded by a major $2.7 million grant from the WK Kellogg Foundation. The focus of the project was to transform rural community libraries into dynamic education and information centers by providing technology assessment and network development leadership to promote resource sharing. ICLIS was created to extend and enhance information and education resources to rural America.

Western Governor’s University

ICLIS ran concurrently with the Com-Net system on campus. Neither one accomplished the dream, but each had elements which would eventually become the virtual university concept. The governor was approached with this concept in the early 1990s and it would eventually become the nucleus for the Western Governor’s University project which has now included 6 western states, 3 foreign countries and the very active participation of at least two western governors. At the core of their enthusiasm is the concept of delivering education--life-long
education--to anyone, anywhere through the medium of their home computer. No longer would anyone have to
venture to a university campus to acquire the advanced degree or the advanced training that would help them in their
lives or in their work. At the virtual touch of a button, they could have access to any number of courses, in any
number fields, just for pleasure or for serious pursuit of an advanced degree.

The vision of the Western Governor’s University recognized that higher education is a prerequisite for
economic and cultural development of the Western United States. Higher education serves as a gateway to help
people to acquire skills, knowledge and abilities to compete in the workforce. The governors set forth a vision with
several parameters, including access to high-quality educational and training opportunities at a variety of locations
and utilizing a variety of delivery modes. It must be cost-effective and affordable from a combination of public and
private sources. Accessibility must be made available throughout a multi-state region and last, but not least, the
curriculum must be relevant. (Concept Paper, 1995)

The component that is to set this vision apart is that the curriculum, over time, will be governed by
assessment and evaluation of acquired learning, knowledge and skill development. Patterned after the British Open
University, WGU will implement intensive performance and outcomes-based assessment of learning and the
certification of acquired skill sets will be required. (Concept Paper, 1995) The governors recognized that some time
would be required to develop such testing mechanisms. The western land grant schools were chosen as the first
link, utilizing their state and regional network of extension field offices already in place.

Linking the established extension offices to the extended learning proposed through the Western
Governor’s University offered several advantages. The personnel were already in place to provide local
administrative services, and linkages with main campuses were achievable to provide additional resources in
guidance, counseling, textbook ordering and distribution, faculty access and library and information services. The
Learning Center concept of the British Open University would be thereby extended to the existing resource of the
local extension office. From this base and the base already established through the Com-Net centers, students
would be able to participate in independent study classes, distance delivered courses, and, soon, computer-assisted
on-demand instruction.

It is felt that the Western Governor’s University (WGU) will make its greatest contribution if it remains
clearly focused on those few functions which can add the greatest value by removing the barriers to the free flow of
high-quality educational materials and recognized learning across institutional and state boundaries, by creating a
competency-based approach to assessing and certifying learning at the postsecondary level, and, finally, by
brokering the distribution of existing high quality services and fostering the development of new services. (Western
Governor’s University Proposed Implementation Plan, 1997.) The mission of this new university as proposed is:

1. To remove the obstacles of both time and place to postsecondary education opportunities for
    individual and corporate citizens of the West by developing and demonstrating innovative, cost
    effective approaches to delivering education through the use of rapidly evolving advanced
    technology.
2. To provide a means for learners to obtain formal recognition of the skills and knowledge
    obtained outside a traditional higher education (campus) contest and/or from multiple providers
    through the assessment and certification of competency.
3. To encourage joint development of new learning and assessment materials among states and
    with private entities, and technology standards that ensure connectivity.
   (Western Governor’s University Proposed Implementation Plan, 1997, page 5)

WGU will, in concept, be both a broker of course work and a franchiser of delivery sites. It will, through
its administrative structure, establish and maintain access to quality course materials which will originate from any
number of original locations. The franchised delivery sites will enable students to have a centralized location for
access to all that the WGU has to offer. One of the key elements provided by WGU will be the accreditation of all
courses and degree programs offered through the system. Another is the ongoing identification of heretofore unmet
education and training needs in the local and regional markets, and the ability to contract with institutions or private enterprise to fill those needs.

The New Role for Utah State University

In the state of Utah, the governor has been a tireless advocate for the implementation of technology in the classroom, both in the higher education areas as well as down to the grade school level. Between 1993 and 1995 the initial funding came into the computer center at Utah State University to upgrade overall system, create a campus fiber network, which, when completed, connected each and every campus building to one another and to the computer center. T-1 service extended this connectivity into the community and into the world. Professors were able to transmit knowledge without any walls to confine them. They were able to share with their colleagues in far-flung areas all that was new in their laboratory. Problem solving acquired new dimensions as experts converged in virtual meetings of the minds across the airwaves. It soon became evident that there was a need to incorporate this information with their on-campus students. No longer were these researcher/teachers confined to showing a few students their work in a laboratory, or forest, or agricultural plat. Now they captured the vision of being able to show, manipulate and maneuver through their research in front of a class of students. The Learning Resources Program created UWIN, the University Wide Information Network in 1994. We fondly spoke to faculty saying that they could either buy into the concept and U-WIN or U-lose, because, although ubiquitous today--a mere 4 years later, the concept was initially regarded skeptically by faculty and administrators alike. This network concept came at a time when the telephone switch and network had to be upgraded, and combining the two projects provided a strategic opportunity to address the growing data and video needs on campus. Totally converted, Utah State University’s UWIN supports over 10,000 TCP/IP addresses on the campus network and well over 100 LANs, with demand increasing daily.

As the first rumblings for “real” education at a distance were being heard, the installation of the first “electronic” classroom at Utah State University took place. Meetings were held with selected professors who were teaching large section classes and were also willing to take the plunge with technology and “throw away” their old methods. They were given the opportunity to work with the curriculum designers to make their lectures more “technology friendly.” The first installation, in the engineering auditorium, took three months to complete and cost over $250,000. Twenty six classrooms and 4 years later, we are able to equip a classroom to an almost identical level for under $20,000 with higher clarity and ease of use.

The retrofit for educating utilizing advanced technology requires the careful melding of the computer center expert, the knowledge expert (IE, the professor) and the curriculum expert. Dancing the dance that unites these three talents requires motivation--on everyone’s part. On many campuses that motivation comes in the form of additional compensation--a sort of hazard pay for technological advancement if you will. At Utah State University that motivation came some in the form of compensation, some partly because of the pressure of converting classes to semester based, and in great measure from internal motivation on the part of the professors themselves. The next phase of development was the Faculty Assistance Center for Teaching (FACT.) This center offers, at little or no cost to the professor, high end computer equipment and output devices for the enhancement of course materials. Core to this organization is the graphic/curriculum design team.

Graphic designers have been a part of good educational design for many years, and as technology has evolved, these individuals help incorporate their excellent visual sense into the structure and components of what becomes the “enhanced” lecture. Professors willing to change their methods of delivery and incorporate new content into their lecture formats often did so with the enticement of the new enhanced classroom. The first projector installed on campus cost well over $100,000. With the additional equipment and remodeling required, the first installation of a large classroom enhancement topped $250,000. At that figure, the university administration realized that there would be only a few enhancements that could be installed, and only in large classroom settings. The one thing that no one counted on was the fact that many of the professors willing to use this type of equipment in their face to face teaching were also the professors teaching classes much smaller than the 250 seat auditorium we
were outfitting. At the same time, these professors were still teaching utilizing an increasingly antiquated Com-Net system, now broadcasting over 40 classes to an average of 2000 enrollments per year throughout the state.

Clearly the time had come to look at enhancing smaller classrooms on campus, and to upgrading the Com-Net system. The decreasing costs of technology have enabled the university to create media enhanced classrooms for on campus use for under $20,000 each. Necessary in each installation was the connection to the campus backbone, with the hope of connection to a video server. The functionality of each classroom increased, the professors became more proficient, and the training required decreased. Two things became more and more apparent, however. Technology created an increasing need for curriculum design, and an increasing need for bandwidth from the backbone. Once again, the computer center and the graphic designers were thrown together to create a functional, friendly and interactive product to teach students. The one advantage to this mix is that the university had made a determination in the early 1990s that they would create an expanded program called the Learning Resources Program which would include the University Libraries, the Computer Center, Multi-media Distance Learning Services (MDLS,) Telecommunications Services, Publication Design and Production (PDP) and University Photography Services. The creation of this seemingly unlikely team put data experts (the computer center), curriculum experts (MDLS), delivery experts (Telecommunications Services), graphic experts (PDP and Photo) with knowledge experts (the University Libraries), together creating a synergy toward providing service to facilitate learning not usually available on campuses. The down side in the eyes of the computer expert was the increasing role of academic computing. Administrative computing had taken the front row in the minds of the computer center professionals for many years, and they were now having to deal with professors who wanted to do more on the system than keep track of data.

Still, in this mix, the Learning Resources Program lacked one important component: continuing education. The Dean of Learning Resources found himself in the awkward position of being in charge of all of the technology, but none of the academic content. As the push for the virtual university grew, this disparity became more apparent. The Learning Resources Program became very good at enhanced delivery on campus, and in some limited experiments, to the surrounding community. In order to push the enhanced teaching “out the door” and into the surrounding region, close cooperation had to be established with the continuing education division, and, as it turned out with the entire cooperative extension system in the state.

The Digital Satellite Network

The Utah Legislature, in 1997, appropriated one time costs of $1.5 million and on-going costs of an additional $1 million to implement a digital satellite network. Utah State University provided a logical home as an uplink facility because of the work already done on campus and throughout the state. It was decided that the network of sites would expand, from the 24 already in place to 53. These sites would include all the Continuing Education Centers, all county extension offices, six higher education institutions, three high schools and three correctional centers. A partnership between the Continuing Education division and the Learning Resources Program was established to facilitate this implementation. Continuing Education provided the destination sites and the core of the curriculum to be delivered. The Learning Resources Program enhanced six classrooms on campus to provide both on-site and distance delivery of instruction. The computer center entered into discussions to become an Internet II site, which will eventually allow for reciprocating images to be transmitted from the centers to the origination sites. They had already made the considerable investment in upgrading to ATM in some areas with more scheduled as funding permits. MDLS became the home for the uplink facility, and the FACT Center became a core resource to faculty utilizing the system. It is hoped that this partnership will eventually facilitate the home computer user’s access to courses that are being delivered on campus and interaction with the classes as if he or she were in the room.

At the conclusion of the legislative session in spring of 1997, the funding for the first phase of construction was in place. The Request for Proposal was issued in April of 1997 for implementation and testing by September 1, 1997 and start-up at the beginning of fall quarter 1997 (October 1.) The list of proposed downlink sites and a flow
A detailed list of project tasks and requirements was created (Appendix 2.) Careful forethought and experience gave Utah State an advantage. All deadlines were met and classes were delivered over the new system October 1, 1997. With very few problems, we are entering our third quarter of delivery. Additional institutions in the state system are coming on-line with programming, but the bulk of the transmissions are originating at Utah State. The transition of the state university system from quarters into semesters is creating a heavy demand for technology enhancements. Professors once unwilling to make changes in tried and true curricula are finding themselves with new challenges in the changeover and technology enhancements are becoming more attractive alternatives. As the infrastructure in place at Utah State to design, enhance and deliver courses at a distance grows, the utilization of this technology also grows. After two quarters of use, one channel on the system is entirely filled to capacity, and the second is almost there. We are planning to utilize the remaining two channels to capacity within the next two years. Planning and executing a $1.5 million project is no small undertaking. The partnership between the Learning Resources Program and Continuing Education at Utah State University purchased, installed, tested and made the system operational throughout the state in less than 10 weeks. [LIST OF EQUIPMENT MUST GO HERE.]

The Future

Utah State University recognized the need to expand its then current Com-Net system. Through cooperation with the Utah Education Network, legislators were lobbied and eventually funded the implementation of the statewide satellite distribution system, supporting the transport of compressed video via a leased DS-3 circuit to a commercial uplink provider. Transponder time is leased from a commercial provider, delivered by Utah State University and up linked by UEN. A collaborative effort was initiated which capitalized on the strengths inherent in the land grant system, namely an established set of site locations in the county extension offices; the strength of the Utah State distance education program; and the ability of the state organization to lobby and coordinate among and between the varying institutions in the state.

The most challenging aspect of the implementation has not been content, or even delivery. The challenging aspects are quality and cost. The actual costs of delivering one credit electronically versus face to face have yet to be calculated, yet the assumption persists that it must be less expensive. We are creating virtual buildings--concrete and mortar without either--to allow these courses to be sent from campus. We have to establish a life cycle for the technology, an issue that each of the partners must deal with. Do we approach the legislature with the concept that this equipment must be maintained and replaced in much the same way that maintenance budgets come with each new construction on campus and each year the campus is allowed a certain amount in remodeling money? We have to create quality courseware and on-line live courses that meet the needs of an increasingly diverse and intellectually responsive population. Are we going to add this additional responsibility to an already overburdened faculty, or do we let those with interest pull to the front? How do we create a rounded curriculum without rounded faculty participation? And how do we determine which courses come up to the quality standard we have come to expect?

Following the installation of the digital satellite network, work began on improvements and upgrades. It is the desire of the governor and Utah State to be able to offer to individuals university based courses at locations and times of the individual’s choosing--true asynchronous transmission. We have lobbied the Utah Education Network to include both upgrades in the present system and an amount for research and development in the future budget plans. It is already within the realm of possibility to link a variety of users from different locations into one computer at the professor’s location. It is the goal of distance education to offer both the advantages of the classroom based approach to learning and the convenience of time and space. The legislature is being presented an aggressive plan for expansion at the 1998 session, which at the time of writing is still in the planning stages.

It is the goal of the Learning Resources Program to remain the service provider for the campus community in technology and in delivery. But the burden also rests on our shoulders to envision the future, to be continually pushing the envelope so to speak. The implementation of the digital satellite network was an incredible accomplishment--one we should all be proud of--but it is by no means the end of the line. As a matter of fact, it is
almost a new beginning to an ever faster line toward true real time remote interaction. The Learning Resources Program is writing a grant now to extend some of the current technology to the Native American land grant schools, incorporating what has already changed since the digital satellite went operational merely 5 months ago. The struggle over funding is always a reality. We are beginning the process of creating a business plan for the delivery of course works over distance, because it is a real business, not an altruistic set of desires. The struggle for turf is also real. Copyright and ownership of course materials created by professors is a huge issue. Does the university own the material, does the professor own the material, or does WGU eventually own the material?

Utah State is concurrently striving to excel in on campus delivery. It is my dream to incorporate the two. I would like to see the large auditoria on campus outfitted with multi-screens on either side of the room which will have the live images of students participating in the class from all different locations. The off-site student will be able to see the students and professor in the auditorium and everyone on campus will be able to see and interact with the student at a distance. This is not the solution of anytime, anywhere instruction, but it would be a tremendous stride in access.

At Utah State University we are attempting to grapple with all of these issues. State legislators deal the most efficiently with concepts that are, shall we say, concrete to them. It is our responsibility to show to them the real costs of implementing a virtual university. The original opening date for the Western Governor’s University was fall of 1997. Until some of these issues, especially funding issues and issues dealing with student services, accountability and library resource sharing can be worked through, the WGU remains in the planning stages. Utah State University continues to move forward, however, with the NII proposal, the installation of more media enhanced classrooms, the further integration of curriculum design--especially through our Faculty Assistance Center for Teaching (FACT), initiatives with IBM and other vendors to facilitate an on-line reserve program along with other beneficial partnerships, and continued excellence in distance delivered instruction.

“It was the line spoken by Emperor Joseph II after the premiere of ‘The Abduction From the Seraglio’: ‘Too many notes, my dear Mozart.’ He was expressing the feeling common among the day’s elite that Mozart’s complex music was too fast-paced and stimulating for the average listener.

Like new music, new technology is always disturbing, especially to the establishment, and it always causes unforeseen problems. The agricultural and industrial revolutions were accompanied by new plagues, pollutants and weapons of destruction. Today’s revolution will bring troubles and tradeoffs, but we can cope with them. Transmitting information from one willing individual to another is hardly a new menace.

Like Mozart’s music, this is something our brains are equipped to handle. This is what we’re good at, and what makes us better.” (New York Times Magazine, September 28, 1998, p. 102)
Attachment A
Description of USU Uplink Facilities

LOCATION: Multimedia and Distance Learning Services
745 North 1200 East; Logan, UT 84322-8500

COORDS: 4144 49 North Latitude, 11148 24 West Longitude

CALL SIGN: E900323

ANTENNA: RS1 50OKS, 5.0 Meter Prime Focus

FEED ASSEMBLY: Three port, Ku Band, one transmit, two receive

HPA: Varian VZU-6993F3,300 Watt Ku Band

EXCITER: LNR LVE-14, Wegener 1680 ATIS

WAVEGUIDE SWITCH: Mitec M2543

POSITIONER: Microdyne MAPS-4

DE-ICER: Walton Enterprises

RF Redundancy: The USU Uplink has been equipped and configured such that RF redundancy could be added at a future date. Thus, the RF chain has been fitted with a Waveguide Switch, Dummy Load and all the necessary waveguide sections to add an additional HPA and Exciter or Up converters.

Digital Conversion Considerations: It will be necessary to locate the Digital Encoder Rack in the MDLS Distribution Room roughly 50 Feet from the uplink RF equipment because of limited floor space next to the uplink racks. However, space is available in the existing racks for additional RF components. Duct runs are already in place that can be used to connect the digital equipment to the uplink. Power is also available for the digital rack. A 5 Ton AC Unit was added Fall of 1996 to the distribution area to handle the growth in heat load.

Refer to Figure A. 1 for existing analog uplink functional block diagram.
The digital satellite equipment vendor will be responsible for integrating the satellite portion of the project. This includes converting the USU uplink to digital and installing all the downlink dishes and testing the space segment. Other requirements include the following:

**ADMINISTRATIVE ITEMS**
1. Evaluate the Digital Satellite Proposals and make an award based on the evaluation [award to be made May 27, 1997 to COMSAT/RSI].
2. Do the necessary accounting so that funds can be transferred to USU and requisitions can be written. Since the Board of Trustees may need to approve requisitions and they meet infrequently, delays could be experienced in authorizing PO's, thus, stalling work on the project [Larry Smith of UEN has requested that all funds be channeled through his office]. A final decision will need to be made with regard to the number of required satellite channel hours [this cannot be less than 15000 total per year] If there is a need for continuous use, such will have to be specified when the satellite contract is signed [with the additional cost].

**MDLS UPLINK SITE**
1. Relocate existing racks in the MDLS Distribution area to make way for the Digital Encoder and Access and Control System. It may be necessary for the Physical Plant Electricians to reconnect power to the new racks. Note: The contracted digital satellite integrator will install the encoding racks and system, however, the MDLS Engineering Staff along with UEN will oversee the installation and provide the cabling and interfacing to the network.
2. UEN has requested the construction of three TOC's (Technical Operation Centers) for management of EDNET and satellite events at MDLS. UEN has specified that the new TOC Facilities are to be an acoustically isolated and will house four equipment racks. LTEN will fully equip two of the TOC's. USU is responsible for equipping the third TOC and any architectural redesign of the building that is necessary. The preferred solution for the location of these TOC's is the East end of Distribution (Room 130) where the Engineering Shop is now located. The engineering shop, parts inventory and tech manuals would be relocated in the annex.
3. UEN will fund and install all the necessary upgrades to the existing BTS Venus Router to accommodate the additional audio and video circuits. The upgrades must be in place prior to operation of the digital satellite system.

There is sufficient rack space in the satellite room to accommodate the digital Up converters if the current layout is shuffled around, however, there will be NO room for growth and NO room for future RF Redundancy nor space for individual monitoring of satellite channels. The existing satellite room inside the studio will have to be expanded sooner or later in order to make room for at least one additional equipment rack. It is strongly recommended that the necessary expansion to the satellite room be completed before the September 1, 1997 deadline.
ORIGINATING CLASSROOMS, QN-C"PUS
All on-campus classrooms are to be capable of EDNET delivery with two-way audio and video as well as satellite delivery. Four on-campus classrooms have currently been identified in the Merrill Library. The following modifications will be required:

L-218 MODIFICATIONS
1. Construct new permanent kiosk and remount camera (This room would be ideally suited to the Annex 108 style)
2. Install Paracube style lenses on exiting lighting fixtures. Install track lighting to fill instruction area.
3. Install amplifier and speaker to monitor return student audio via telephones.

L-204 MODIFICATIONS
1. Install new video monitors at the front of the room for both program and return video (video projection will not be practical for EDNET and Satellite delivery)
2. Install new track lighting to fill instruction area.
3. Install video cameras and Audio Visual Equipment as needed for instructional support.

L-206 MODIFICATIONS
1. Relocate and add monitors and cameras for best view angles (video projection will not be practical for EDNET and Satellite delivery)
2. Install new track lighting to fill instruction area.

L-204/206 PROJECTION ROOM MODIFICATIONS
1. Remove all equipment belonging to Audio Visual Services.
2. Remove all or sections of shelving below projection windows.
3. Install two full size equipment racks to house fiber, distribution, control and audio equipment needed to support the four classrooms.
4. Install telephone circuits to support fax machines, cross-campus communications.

L-380 MODIFICATIONS
1. Install new video monitors at the front of the room for both program and return video (video projection will not be practical for EDNET and Satellite delivery)
2. Modify track lighting to fill instruction area.
3. Install video cameras and Audio Visual Equipment as needed for instructional support.
5. Install amplifier and speaker to monitor return student audio via telephones.

ORIGINATING CLASSROOMS, OFF-CAMPUS
UEN will provide connectivity to all the identified back-haul origination sites including Vernal,
Salt Lake City (Atherton Drive) and Brigham City. It is assumed that these origination sites will be capable of EDNET delivery with two-way audio and video as well as satellite delivery. Each ComNet off-campus origination site will require at least the following:

1. Install appropriate lighting to fill instruction area.
2. Install video cameras, monitors and Audio Visual Equipment as needed for instructional support. Adapt LiveWorks system in required locations.
3. Modify existing audio and microphone arrangement for EDNET and satellite delivery.
4. Reconfigure telephone audio using Digital Hybrid Couplers to interface existing ComNet dedicated telephone network with satellite audio.
5. USU / UEN will be responsible for connecting the satellite equipment to the video monitor and audio system. No provision has been made for conversion of the old ComNet Darome Audio System to support satellite transmission.

CAMPUS INFRASTRUCTURE
The current video capacity to the Merrill Library is two duplex video channels. Four channels will be required to service the four classrooms. The following will be necessary to provide connectivity to MDLS:

1. Install new 12 strand [24 strand is being considered based on availability and cost] multimode fiber optic cable between the second floor of the Merrill Library (terminated in the equipment racks in L-204/206 projection room) and SER 022 Communications Room. The 96 strand trunk to MDLS can be accessed from SER 022. It is suggested that, for the sake of both economy and simplicity of design, this be done using "Freedom Cable" in one continuous length (no splices) from the second floor of Merrill to the SER 022 [routing of the fiber next to the Science and Technology Library and the Old Computer Center is being considered for future ease of access and splicing].
2. Purchase and install the necessary electronics to interface the two additional fiber channels.

TELEPHONE RETURN AUDIO
A large "Meet Me" Conference Bridge will be required to support all the remote classrooms [It is proposed that USU Telephone Services be approached concerning partnering with the conference bridge. They could maintain the system and sell off excess time and capacity]. The Legislature did not appropriate enough funds to totally cover the projected "800" Line costs nor purchase the bridge. Some interim solution will be required such as reuse of the existing Com-Net dedicated network.
The Western Governor's University represents one of the most innovative concepts to deliver education and training to urban and rural citizens in the 21st Century as the land grant university achieved in educating the common citizens in the 19th and 20th centuries. Utah has been on the forefront to provide the conceptual leadership for this bold educational venture. To move the Western Governor's University from concept to implementation by Fall 1997 will require additional leadership to build the collaboration to begin the delivery of degree and certification programs. Utah State University is a recognized leader in the delivery of bachelor's and master's degrees to off-campus students using telecommunications and can provide a jump-start for the delivery of degree programs for the Western Governor's University. Specifically, Utah State University can provide expertise to support three stages of implementation:

(1) **Phase I Implementation:** Regional delivery of existing degree and certification programs from accredited institutions of higher education using multi-channel digital satellite delivery to receive sites throughout the western states. Degree programs can be delivered by Fall 1997.

(2) **Phase II Implementation:** Regional delivery of computer-based programs as degree and certification programs become available and network bandwidth permits. Implement programs as courses/programs become available and as networks provide capacity.

(3) **Phase III Implementation:** Implement performance-based assessment as tests and evaluation tools are validated.

UEN / Utah State University has proposed a multi-channel digital satellite system to begin the delivery of existing degree programs from accredited institutions by Fall 1997.

Upgrading UEN / USU uplink and other western universities to accommodate the concurrent delivery of multiple courses and degree programs *(See attached table).*

Utah institutions can deliver programs via the UEN / USU uplink through UEN's EDNET microwave and fiber systems.
Twenty-six (26) degree programs, were initially identified from a limited web search, that are being delivered electronically by accredited universities in the western states *(See attached table).*

WGU will broker degree programs to the participating western states.

There is demonstrated faculty willingness to deliver distance education degree programs.

Local site coordination and multi-level marketing are keys to building enrollments.

Extension offices, libraries, public schools or private facilities can be used as a delivery site for satellite-delivered programs.

Local learning centers will provide access to computer technologies, E-Mail and library services/learning resources.

- Universities will collaborate on providing student support services, including preadvisement counseling, career services, financial aid, admissions and registration, and library/learning resources.

- Career advisement can be assisted through the use of computer-based programs such as SIGI-Plus and online counseling.

Funding for WGU will be based on the WICHE model. Students participating in WGU degree programs will pay full instate tuition when their home state institution delivers the degree program and 1.5 times instate home institution tuition for students participating in programs originating from out of state institutions. Home state institutions receiving programs from other Western States will pay WGU 1.5 times instate tuition. WGU will pay 1 times the instate tuition to the originating institution and share .5 times instate tuition for student services and program administration with home state institutions. Reciprocity agreements will minimize transfer of funds between states.