Institute for Advanced Education in Geospatial Sciences Educating the Next Generation of Scientists

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THE INSTITUTE FOR ADVANCED EDUCATION IN GEOSPATIAL SCIENCES

The Institute for Advanced Education in Geospatial Science (AEGS) is a project funded by NASA at the University of Mississippi. It seeks to support the NASA Earth Sciences Enterprise efforts to optimize NASA's Earth Science investments for the benefit of the Nation. This presentation describes the basic work of the project, its goals, history and progress to date. The project is in year two funding of a potential five year funding.

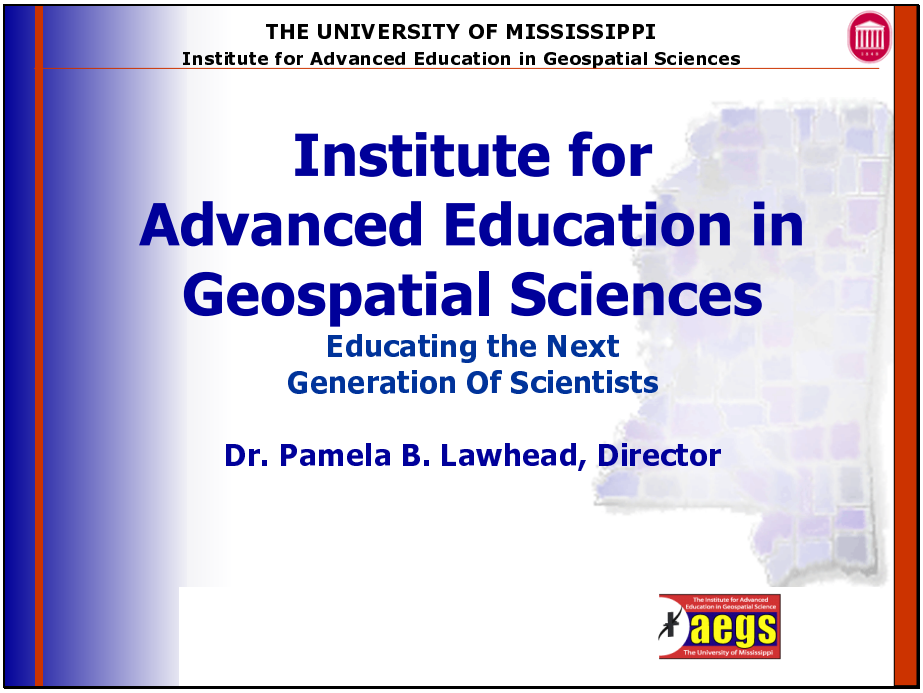

Figure 1

THE PROJECT

The project, as stated earlier is sponsored by NASA and is located at the University of Mississippi in Oxford, MS. It has two principal investigators with one of them, Pam Lawhead, serving as the Director of the Institute.

The goal of the project is to create fifty online courses in Remote Sensing over the five year life of the project. Each year ten courses are put out for bid and the best ten submissions are accepted. This request for proposals insures that the course creators are content experts. "Equivalence of product" drives the online hosting of the courses. That is, we want the online presentation and delivery of each course to be as multi-media intensive as is effective. The goal is not to replace existing courses but, to provide courses created by content experts to as many colleges and universities as possible. This effort to create and host online courses has as its final goal the creation of a very large college educated workforce prepared to use the vast stores of information gathers by NASA and other remote sensing industries to enhance life on this planet.

Figure 2

PROJECT GOALS

Historically, little has been done to provide a consistent curriculum in Remote Sensing. This project has as its goal to do that first and then to move forward with its other efforts. To that end, we entered into a partnership with the American Society of Photogrammetry and Remote Sensing (ASPRS) to help us identify Academic and Industrial leaders. Once these individuals were identified, they were brought together to develop a robust, integrated curriculum.

Once the curriculum was identified, courses were prioritized and sets of courses were designated for each year. By following the outline of the committee ten courses were created for each of the first two years of the program. The committee will meet again in October, 2003 to work on year three courses. Following this process either fifty courses or its equivalent will be written and enhanced for online delivery by the end of the funding period.

In order to insure the widest range of acceptance and to provide a true equivalence of product a state-of-the-art course delivery system and creation process has been developed. This process is being tested as this presentation is being written.

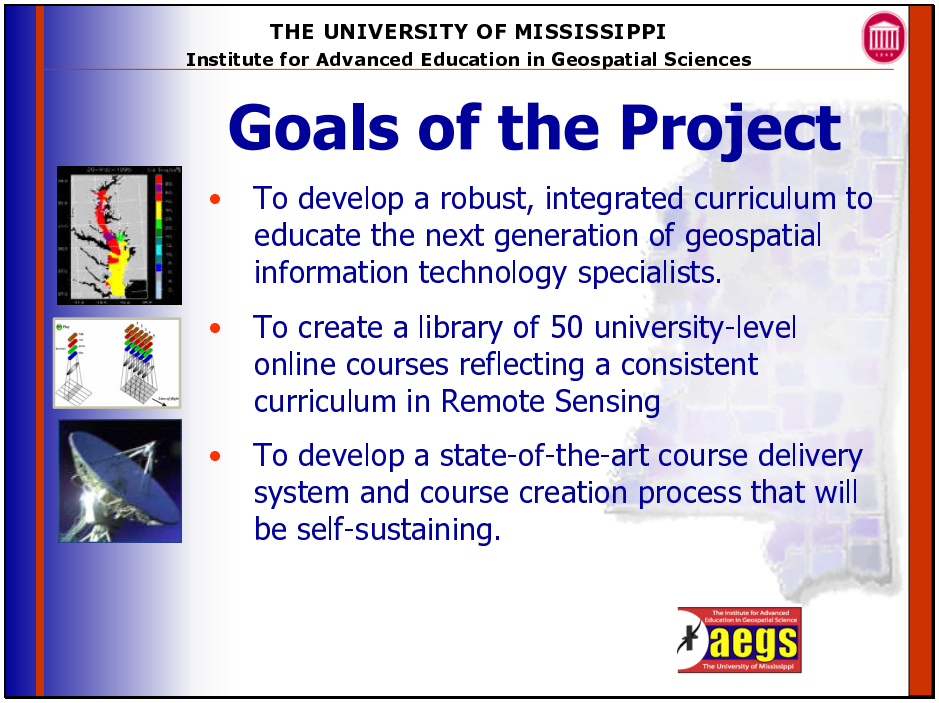

Figure 3

ALIGNMENT WITH NASA EARTH SCENCE SYSTEM'S NATIONAL APPLICATION AREAS

NASA's Earth Science Enterprise, Applications Program and Applications Directorate have identified three missions:

"To develop a scientific understanding of the Earth system and its response to natural and human-induced changes to enable improved prediction of climate, weather and natural hazards for present and future generations."

"Expand and accelerate the realization of societal and economic benefits from Earth science, information and technology."

And finally: "To optimize benefits from NASA's Earth Science investments through systems engineering to advance decision support tools that serve the nation."

To be consistent with that enormous effort we have made very attempt to be sure that our courses are in alignment with these missions. The following figures demonstrate that alignment by listing the current and future courses that alignment with each of the identified application areas.

The figure below shows the first of these areas and the courses consistent with Agricultural Competitiveness.

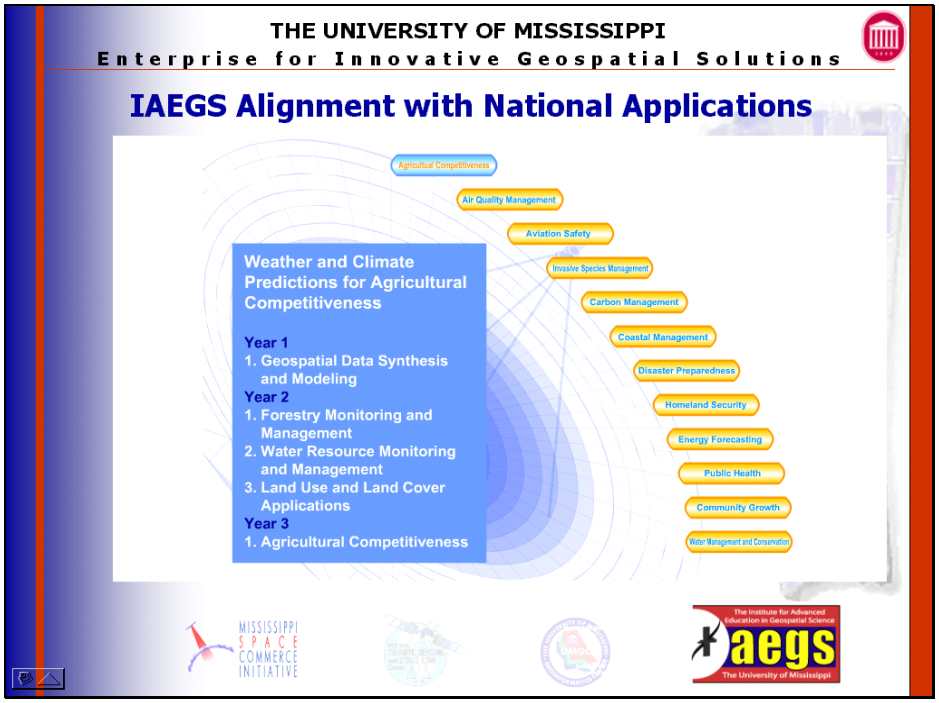

Figure 4

ALIGNMENT WITH NATIONAL APPLICATIONS
AIR QUALITY MANAGEMENT

In year one we have one course that meets this application area, Geospatial Data Synthesis and Modeling/

Year two will have two courses in this area. The authors of the courses Land Use and Land Cover applications and Community Growth will be selected at the June 9th-10th meeting to be held in Oxford.

Year three will have a course in Air Quality Management. The full description of that course will be written by the members of our National Advisory board in October.

Figure 5

WEATHER, CLIMATE AND NATURAL HAZARDS PREDICTIONS FOR AVIATION SAFETY

The course that addresses this issue, Aviation Safety will be written in the October meeting and then put out for bids in the spring of next year.

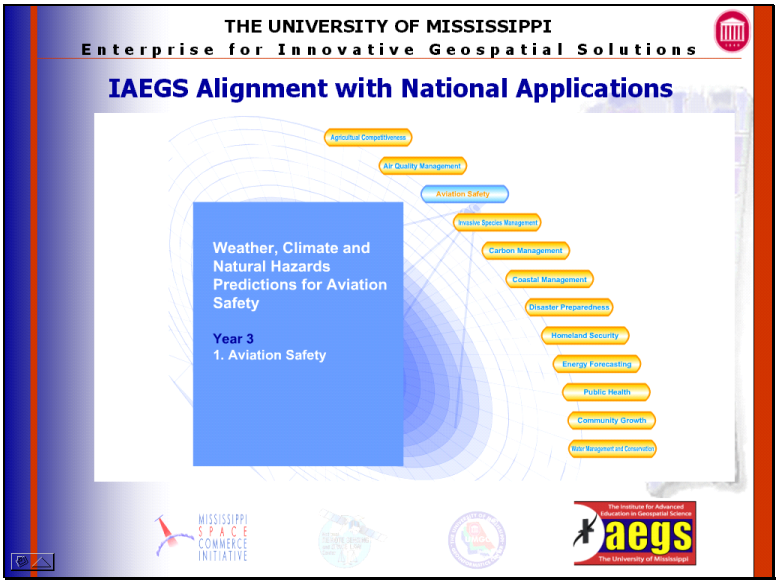

Figure 6

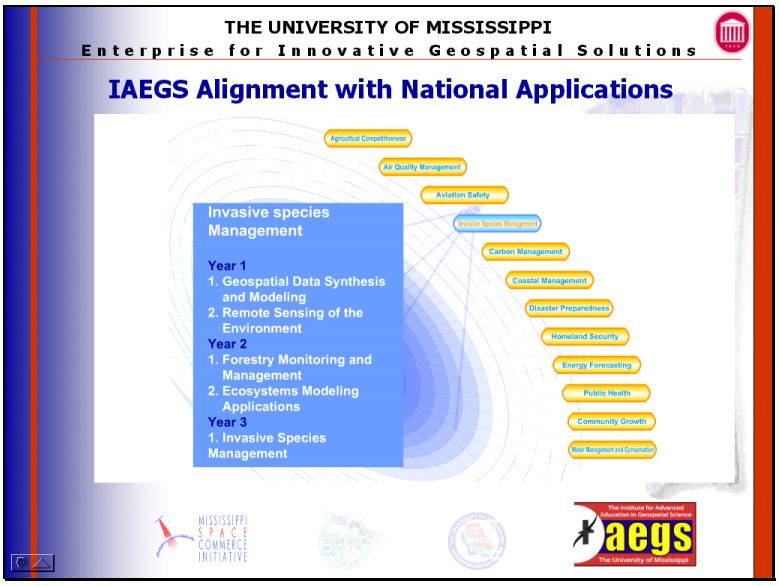

Figure 7

PROPOSALS

Once the course descriptions were completed a request from proposals was created and published. It was sent to the several professional organizations membership lists; it also appeared on our web site. Thirty proposals were accepted and the authors were invited to participate in a forum where the proposals were formally reviewed. Nine proposals were accepted and their authors were awarded sub-contracts of $80,000 each.

The authors were then invited to a workshop in August where they were introduced to the course creation process and to their course liaisons.

Figure 8

THE COURSE FELLOWS

The course fellows and their affiliations are listed below. The Lidar course was not awarded because there was not a strong proposal for it.

Figure 9

THE COURSE CREATION PROCESS

In order to build a course on line the Institute provides graduate students in a technology lab for each course fellow. The fellow is responsible for the course content only. That content may be delivered to the center in any way that the fellow feels comfortable. We have set up an online delivery process but some fellows found it difficult to use or preferred to give us the material in other ways. Once the material is presented to the student liaisons, it is enhanced, broken up into acceptable sizes and hosted online. The student liaisons work very closely with the fellows. We also provide an educational consultant for the fellows. This person is responsible for guiding the fellows in the development of very detailed course concept hierarchy maps.

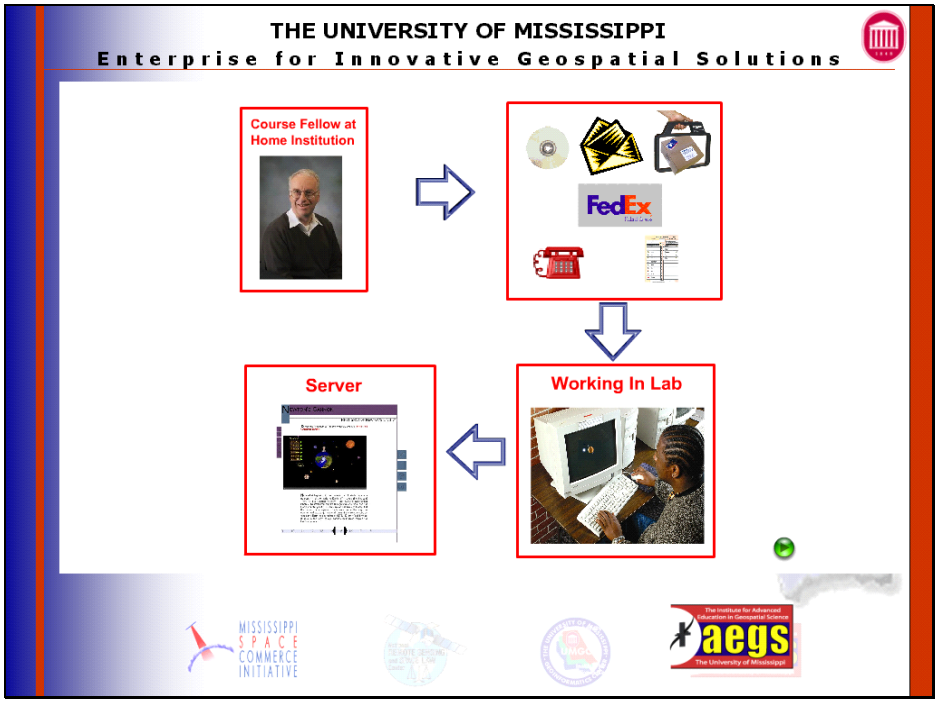

Figure 10

THE PROGRAM DELIVERY SYSTEM

On the programming side the course delivery system is divided into four parts, the user interface, XML/XSLT templates, publishing framework and the backend database. These are used to produce each course page.

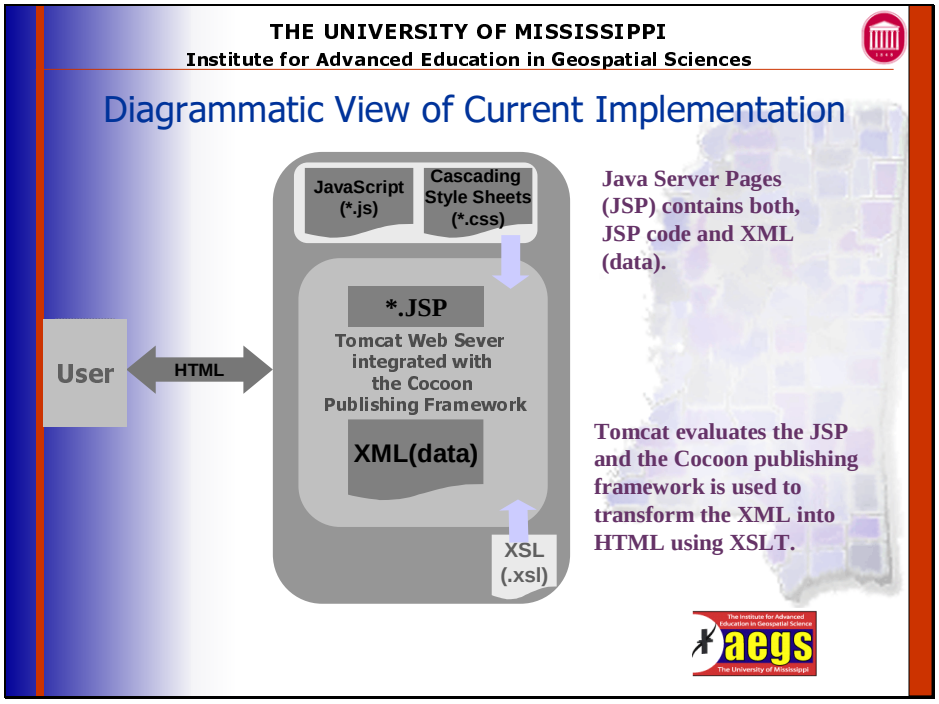

Figure 11

THE COURSE DELIVERY SYSTEM

The delivery options for each course are varied. A student may enroll at any college our University, anywhere and access the courses. The home institution licenses the courses from the Institute. The home institution awards the credit to the student, gives grades and basically oversees the administration of the course locally.

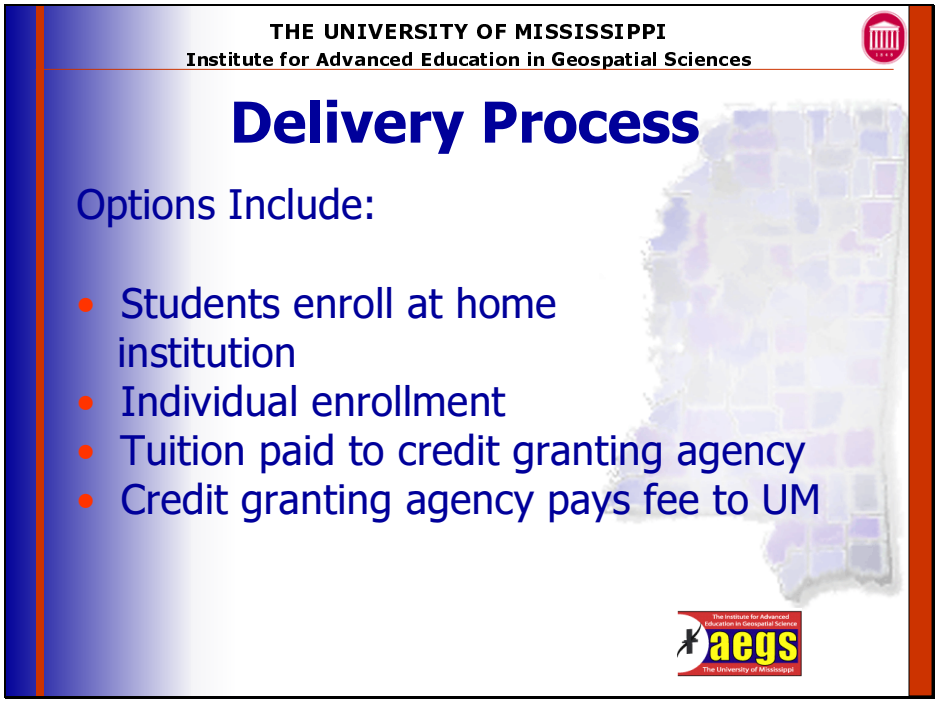

Figure 12

CURRENT STATUS

We have currently hired a staff of four, a director, an associate director, a project coordinator and a network administrator. We have thirty graduate students at work. These students are divided into five teams and within those teams have multiple responsibilities. Some students are members of multiple teams. Student liaisons are responsible for identifying work to be done for each course and then parsing the work out to others. All students are members of the research team and expected to be actively involved in some research topic related to the course creation/ delivery process.

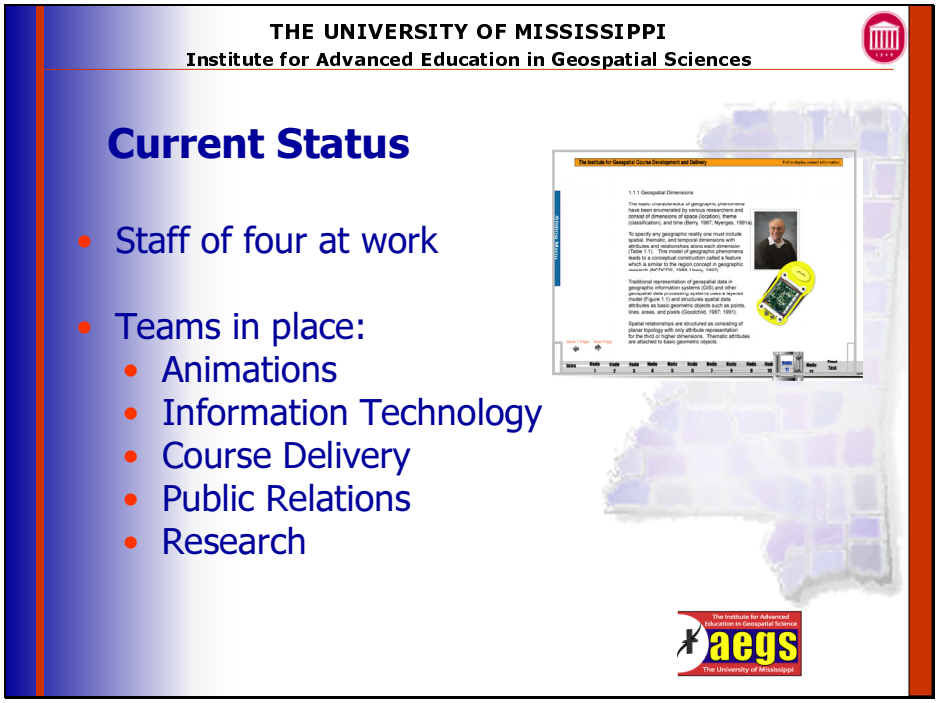

Figure 13

CURRENT STATUS

As discussed earlier, the Advisory Board is an active part of the Institute's work. The technology lab is established with students working actively each day. Two prototype courses are complete. Two other courses are 90 % complete and all others are approximately 60% complete. One short course is in process on Decision Support Systems.

We work very closely with our educational expert in directing the overall design of each course. We have a very large group of graduate students at work and are, for the summer, using some undergraduates.

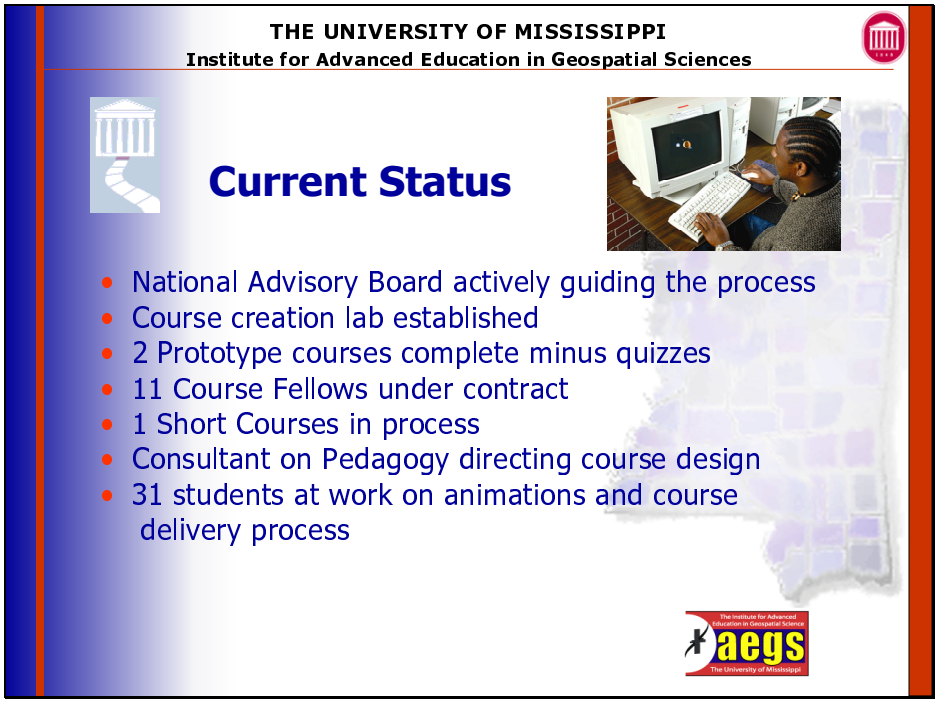

Figure 14

STATUS

The Knowledge Engine, described earlier is complete and undergoing testing at this time. The Virtual Portal is being completed, including the Virtual Campus and the browser application.

The course fellows are all under contract, the second round of RFPs will culminate in a conference on June 9th of this year. The goal is to have six courses out for testing by the end of this summer.

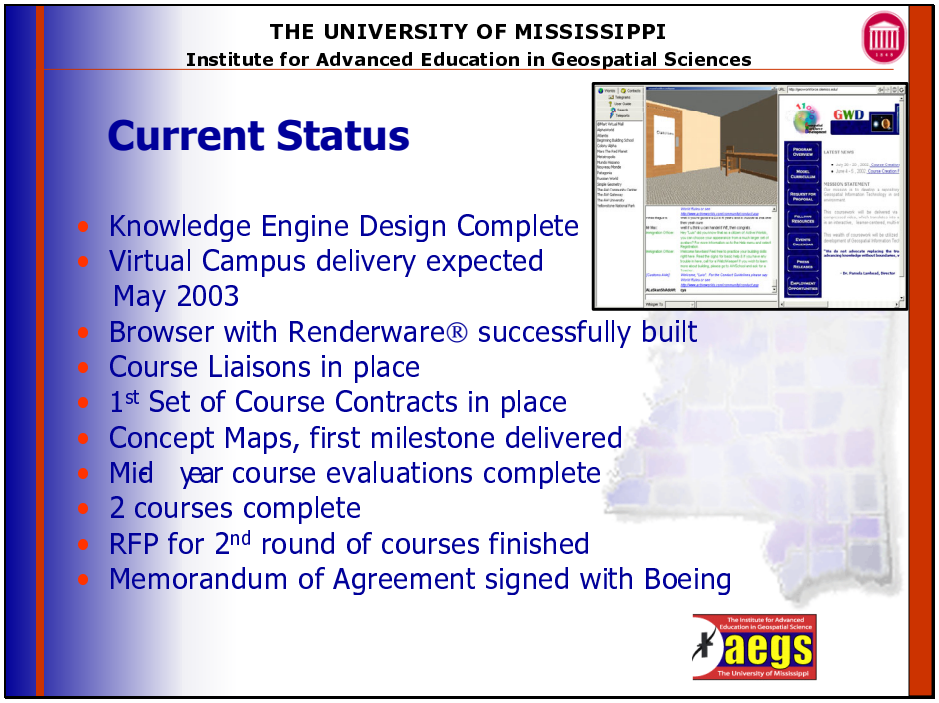

Figure 15

RESEARCH RESULTS

The articles listed below are evidence of the effectiveness of the work of the research team. This is the status as of April, 2003. There are many more papers under construction at this time. It should be noted here that, because of our successful International work we have had a name change. In the research papers our name appears and the Center for Geospatial Workforce Development (GWD) we are now the Institute for Advanced Education in Geospatial Sciences.

Figure 16

MORE RESEARCH PAPERS

These paper topics indicate the scope of the work being done. The paper by Bhatt explores the work of using Virtual Reality to provide online laboratories in GeoSpatial Sciences. The others all have to do with technical issues regarding the delivery of the online courses or the creation process itself.

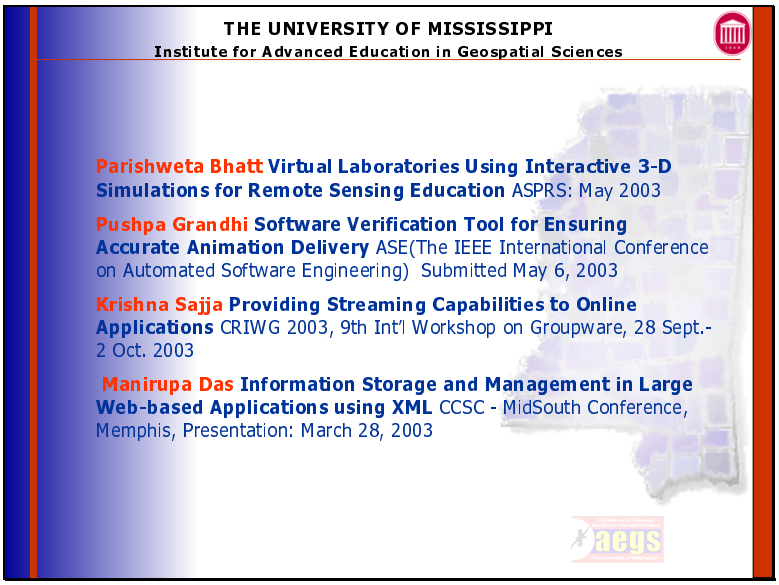

Figure 17

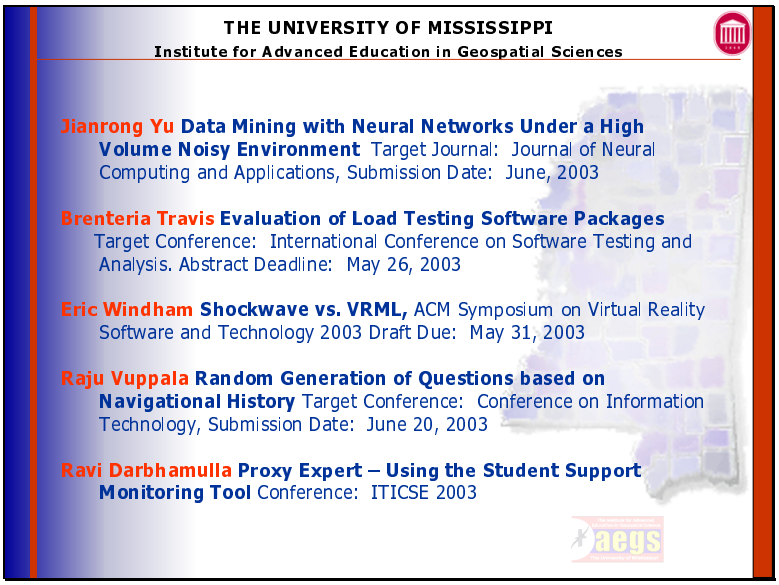

Figure 18

PUBLICATIONS CONTINUED

This list continues the papers written by members of the research team. The list goes from policy issues to Adaptive Learning. Again, it is important to note that these papers are a reflection of the issues that we work on at the Institute and are critical to the success of the projects.

Figure 19

RESEARCH CONTINUED

Mr. Paris is the team lead on the Virtual Portal, he also is doing significant work on data compression both for course image delivery but for compression used in other areas as well.

Figure 20

COURSE LIST

The list below is the set of courses that are currently under construction. We expect to have courses, 3, 4, 5, 7 and 10 ready for delivery by the beginning of the Fall semester.

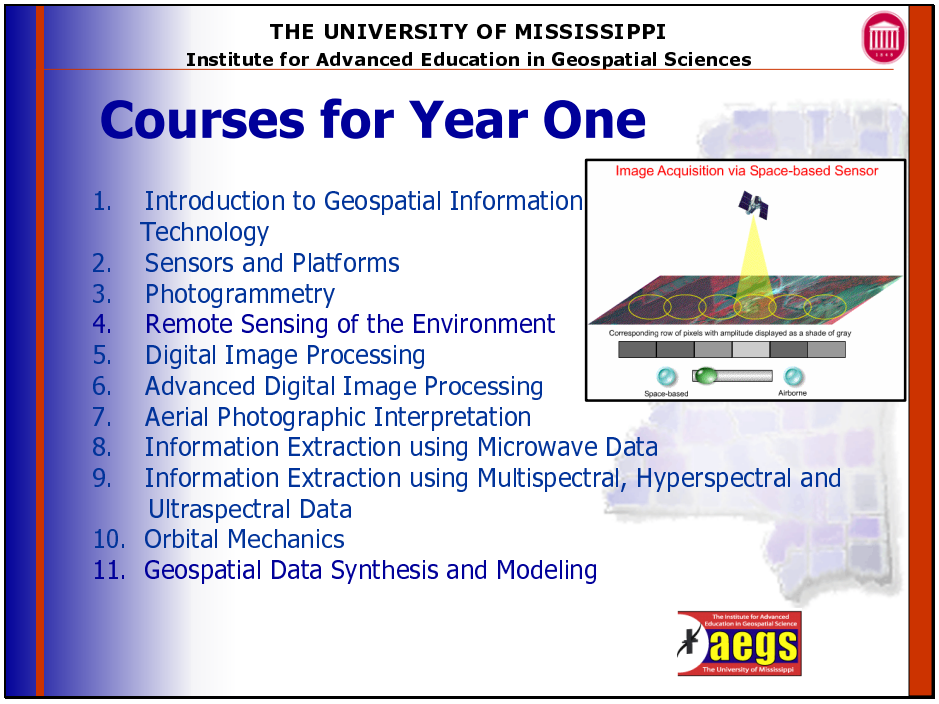

Figure 21

YEAR TWO COURSES

The descriptions and the RFP for the courses listed here can be found at the Institute's web site: http://geoworkforce.olemiss.edu.

The meeting to determine the authors for each of these courses will be held on June 9, 2003. The fellows will then return to the campus for a workshop in August to begin the course creation process.

Figure 22

INTERNATIONAL EFFORTS

Round one of the course selection process had applications from Greece and Canada. This was only the beginning of our International effort. We spoke to the ISPRS Council and Commission heads in December where we received their endorsement. We are in the earliest stages of working with CEOS in an effort to achieve a global market.

Year three will be very involved in "internationalizing" the curriculum to insure that it has as large an audience as possible.

Figure 23

OUTSTANDING CHALLENGES

The Institute still faces many challenges, none insurmountable but all are there before us. We are in the process of completing the licensing process. This requires a formal document which must be acceptable to our own institution as well as the subscriber institutions. It is being reviewed as this is being written.

Web deliverable 3-D has a significant overhead that must be dealt with if the speed is to be acceptable. We are working on this on many fronts. We are working to reduce the files size, to compress and decompress the files, to use streaming and caching techniques.

We are testing the delivery process on many levels, not just the speed but also the understandability of the interface as well.

It is our hope that the second version will be filled with existing learning style technology.

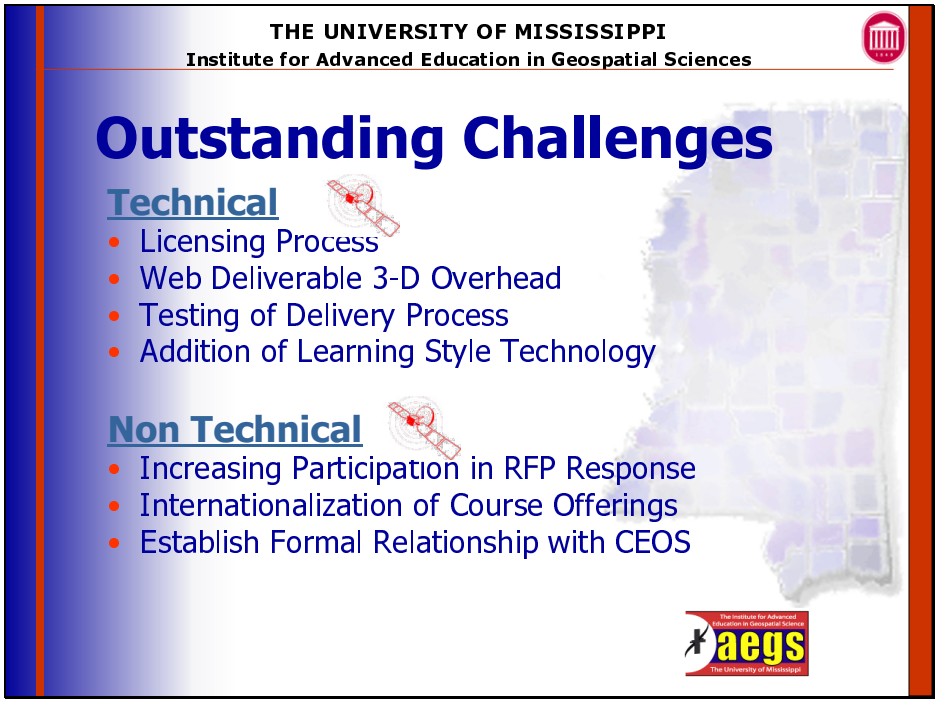

Figure 24

THE VIRTUAL PORTAL

The virtual portal is nearing completion. We have the Portal sending information to the Browser but we must complete the loop and have the information flow in both directions. This is simply a programming issue and it is being solved.

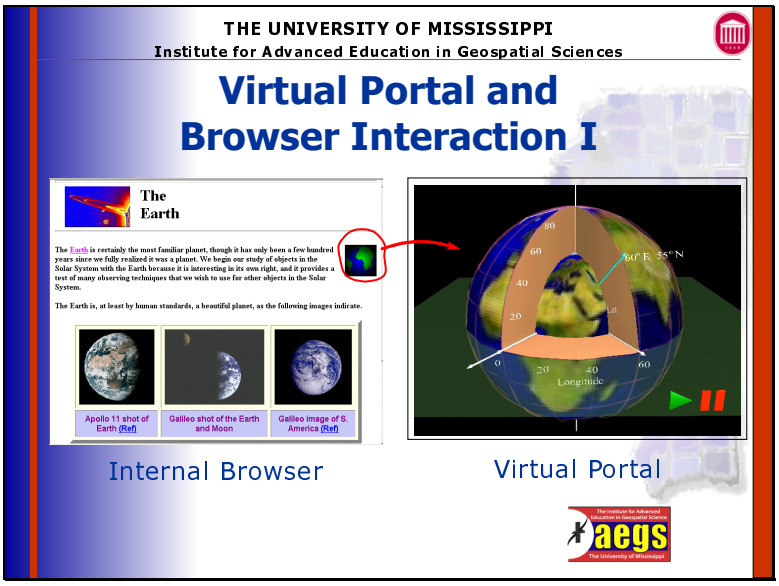

Figure 25

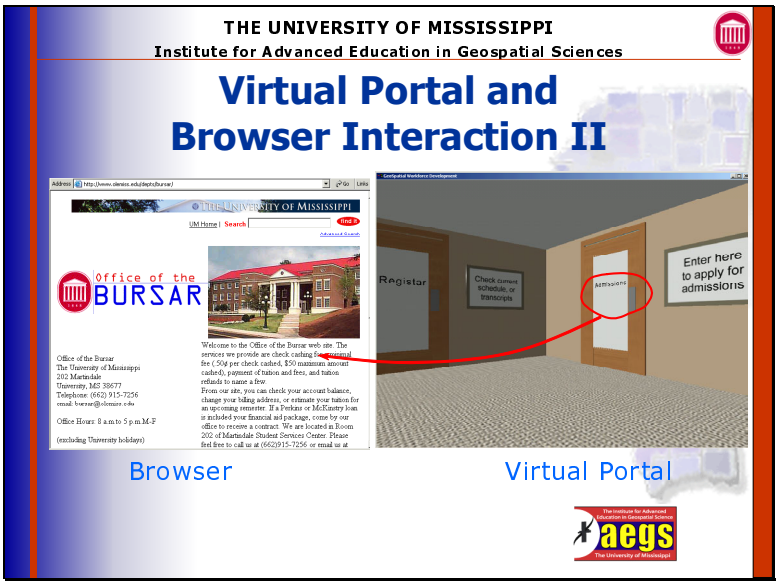

Figure 26

THE FINAL PRODUCT

The image below reflects the final project. In it there is a standard browser, a video chat space, a white board, the 3-D virtual portal, a note pad and a list of who is online as the student is logged on. This will be the space used by the students.

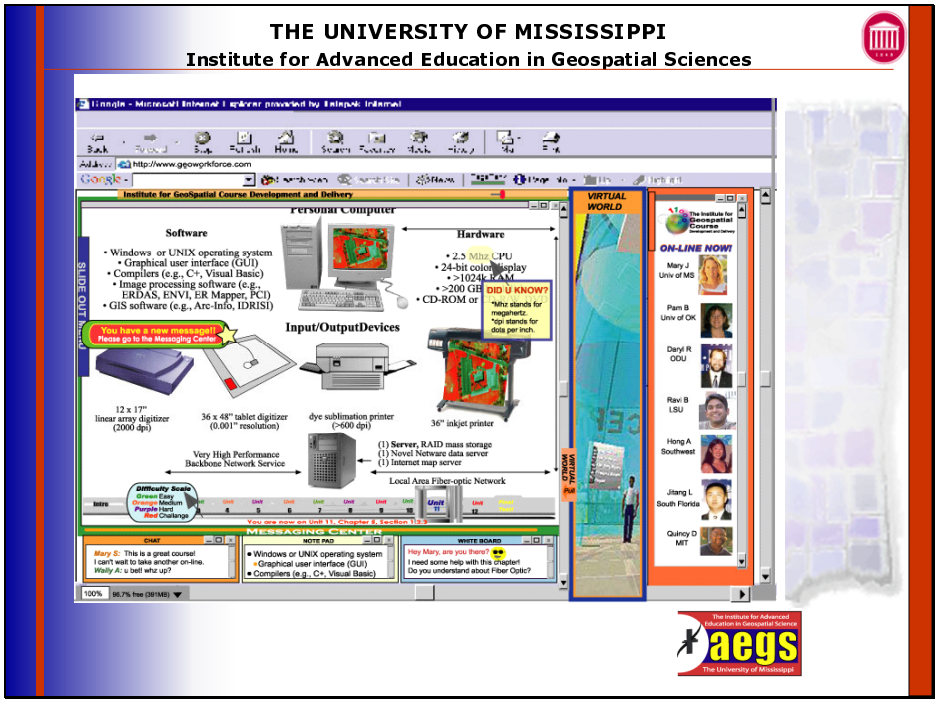

Figure 27

THE WEB PAGE

This is a snapshot of our web page which can be viewed at
http://geoworkforce.olemiss.edu

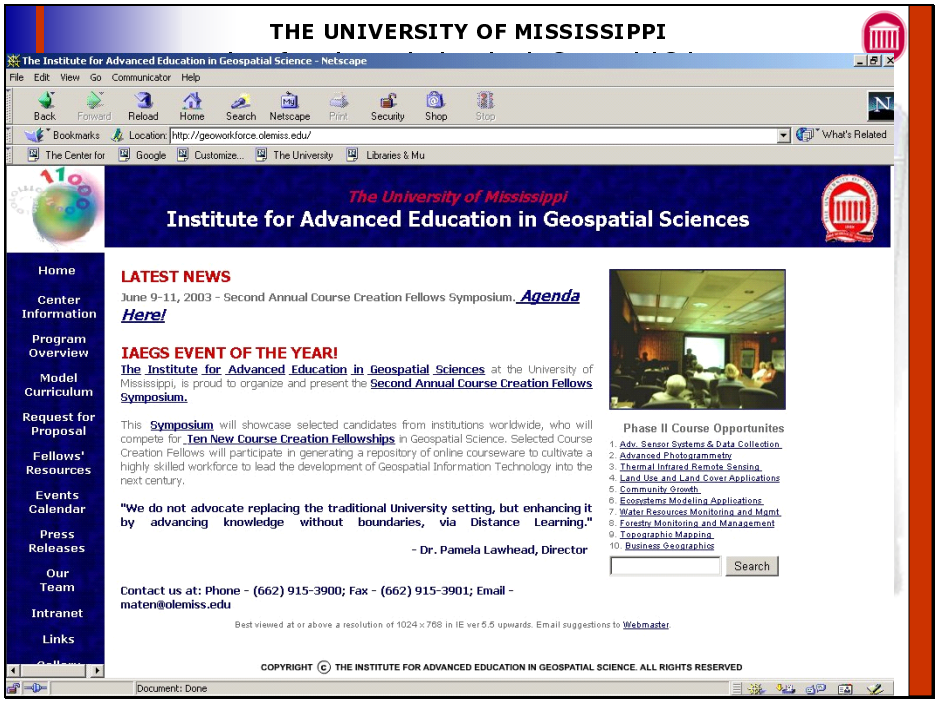

Figure 28