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EDITORIAL

In this issue of DEOSNEWS, Dirk Spennemann and Anthony Steinke of Australia's Charles Sturt University discuss the use of a computer-based simulation program to provide an alternative to on-site fieldwork for students in a Cultural Resource Management program taught at a distance. These authors discuss the development of the Computerized Interactive Cultural Resource Inventory Tool (CICRIT) and describe how such simulation programs can instruct students in the principles of archeological site survey design in a realistic manner while overcoming many of the drawbacks of a short-term residential experience.

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VIRTUAL ARCHAEOLOGICAL FIELDWORK TRAINING BY DISTANCE EDUCATION

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INTRODUCTION

An Australian National Teaching Development Grant awarded by the Committee for the Advancedment of University Teaching (CAUT) allowed development of a self-contained Computerised Interactive Cultural Resource Inventory Training tool (CICRIT) to teach students in a realistic manner (to the extent possible) (i) site survey design and resource inventory and (ii) resource management techniques on the desk top. This report presents an account of the project and the resulting application, the training program CICRIT. The management of Australia's cultural and natural resources is becoming increasingly important. Sound skills in survey and inventory techniques are the very foundation for responsible management. At present Australian Universities commonly teach students site survey strategies and cultural resource inventory techniques solely by means of face-to-face teaching and during expensive field trips which are dependent on weather conditions at the time of survey. There is a distinct need to develop a training tool which allows teaching of the fundamentals of this field in a distance education mode.

Cultural Resource Management Teaching at Charles Sturt University

At present, Cultural Resources Management (CRM) is taught only at Charles Sturt University (CSU) as an integral part of Parks and Heritage Management. In many other Universities, the term has become a euphemism for mainstream archaeology. The Johnstone

Centre of Parks, Recreation and Heritage and the School of Environmental and Information Sciences aim to promote scholarship, research, consulting and education in the management of natural resources and cultural heritage for conservation, recreation and tourism, with an emphasis on the management of protected areas. The success of the CSU degree programme can be measured by the high percentage of Australian Aborigines and Parks Rangers taking the course in the distance education mode. There are four third-year subjects offered in the Parks Management degree, which have a cultural resource management component focus or subfocus: protected area planning, physical conservation techniques, cultural resources policy and planning and, finally, site survey design. The latter subject examines the type, variety and occurrence of historical and Aboriginal sites in Australia and the basic methods and techniques used to record them. It also examines the different types of site survey methods employed in cultural resource management. The subject takes the student through the initial planning stage of survey design, through to site discovery and recording, and on to the write up of site survey reports. Practical experience is gained in the recording, evaluation and value assessment of both historical and Aboriginal sites. The subject emphasises a practical approach; during residential school students are required to undertake a site survey where practical experience is gained in the discovery, recording and value assessment of both historical and Aboriginal sites.

The Training Needs

The archaeological component of the cultural heritage major of the BAppSci (Parks, Recreation and Heritage) requires students to complete a subject in site survey design. The subject addresses the varied issues of survey design and the implications of student's decisions on the outcomes of the survey. The subject is taught solely in distance education mode and thus the lecturer/student interaction is restricted to preparatory written communications, telephone calls initiated by the student, and a high-intensity 4-day residential school period. The period, however, is not long enough to allow students the opportunity to evaluate the outcomes of the different survey options: Archaeological survey occurs with increasing levels of intensity, depending on the aims of the survey, the time, funds and staff available to execute the survey. A desktop survey or desktop study is conducted by accessing, compiling and evaluating the available information of cultural resources of a given area. It is performed by extracting relevant information from a variety of sources: previous site surveys, regional or thematic studies, excavation reports, anecdotal information and oral history data, as well as predictive models for site presence. There are, in principle, three ways in which students can be taught the skills necessary to conduct surveys: (i) through real-life surveys, (ii) through theoretical instruction in a class-room, or (iii) through computerised interactive instruction.

Real-Life Survey

This is the traditional, and by far the preferred, method of Cultural Resource Management specialists. Withinn a real-life training scenario, the students will conceive a survey design and execute this design in a given time frame. The survey is then written up. Another survey design can be planned, executed and written up, and the outcomes of both designs can be compared. Actual physical surveying cannot be substituted in any mode, as survey training not only comprises the methodology and design, but also the basic training of site recognition. This depends on many parameters, usually the sequential acquisition of clues to the presence of a site and its nature, which relies in many cases on three-dimensional vision and different angles of approach. However, survey training at CSU is conducted in external mode and students come in for a four-day residential school. Thus time is very limited. But even in standard archaeological courses, survey training is often limited to single events. Students gain much of their experience in participating in commercial or research surveys.

One of the major limitations of the standard survey technique is the dependency on weather conditions. While in a standard on-campus taught subject the survey date can be postponed until the weather improves, this is not possible in a residential school environment where all participants have made a substantial investment in time and money. The limited number of survey days available, as well as the limited number of staff facilitating the survey, commonly allows only for a single design to be executed by the group. Thus the residential school group has to agree on a consolidated design which will be executed. This severely limits the choices and, ultimately, the learning experience.

Theoretical Instruction in a Classroom

The other extreme is represented by totally theoretical instruction either by means of classroom lectures and tutorials or by self-study based on manuals, handbooks and review articles. This mode deprives the student of any interaction with the subject matter and creates a situation where little benefit can be gained beyond the mastery of the theory of survey design.

Computerised Interactive Instruction

An intermediate solution is the use of computerised interactive instruction. In such a model a student can learn the theory of survey design from handbooks and print-based media, or through an interactive program approach, and then execute a virtual survey the outcome of which is determined by the choice and combination of parameters defined by the student. A simulation program can be interactive, i.e., prompt the student for decisions during the simulation run, or can be reactive, where the student is presented with the results. The former solution is more realistic than the latter. In both cases the student can assess the variability of outcomes by modifying the input parameters and thus learn the relative importance of the various parameters influencing survey design. However, the computerised training mode has conceptual limitations. Until virtual reality engines can be developed cost-efficiently, the student will experience the 'survey' in a two-dimensional mode and the progression through the surveyed 'area' is abrupt, leading from one site directly to the next, without the tedium of intermediate non-site areas. Likewise, if an area is surveyed which does not contain sites, the student is presented with an immediate result, rather than--as in the real-life scenario--having spent a day's worth of walking. In addition, a computerised model or simulation cannot easily express the nuances of site appearance or the process of site recognition, the gradual piecing together and interpretation of clues.

THE PROGRAM DESIGN

CICRIT was designed to allow a more intensive way of teaching survey design and resource inventory to the student. Further, the package will allow the student to conduct the surveys "ad lib" and at their own schedules (within certain parameters). The objectives were to develop a program which will fulfil the following criteria:

* independence of arbitrary survey times (such as residential schools)
* independence of climatic conditions
* interactive simulation program, not a data/factual information-based knowledge acquisition tool
* variable rate of progress dependent on individual student's pace and interest
* repetitive use of teaching module at student's interest
* efficient use of multi-media
* limited direct supervision needed
* distance education mode and open learning architecture
* open architecture to allow expansion in both space (additional areas) and data sets (such as botanical data)

Conceptual Underpinnings

The key principle of computer-driven interactive multimedia education systems is that the student is enabled to determine his or her own rate of progress through the subject matter and to conduct the self-training at self-determined intervals. With the inclusion of pictorial and audio material and the provision of multiple pathways or links, the student can effectively steer and navigate a route which will favour that particular student's mode of learning. Unlike text-based materials, however, a computer program cannot be taken along on a train or bus or to an outdoor location. Thus, while the mode of study is potentially enhanced, the study environment becomes restricted. In general, the packages can be grouped into four classes (see Table 1). There is a need for all four types of resources, depending on the particular learning outcomes required, and none of these are the 'be-all-and-end-all' of computerised training.

Table 1. Classes of Computer-Assisted Learning Packages

Class	Type	Aim
I	'drill and practice'	mastery of methods/practices
II	'encyclopedia'	information resources for factual knowledge
III	'challenger"	imparting concepts and theory, thus challenging students
IV	'simulation'	application of methods, theory, and factual knowledge

Multimedia per se do not result in increased learning and do not advance students' understanding of the subject matter. Rather, the interactive mode of learning is the critical factor involved, as it allows the student to follow up various pathways influencing the individual learning outcome (Clark & Craig 1992). Further, there is little sense in transforming print-based--and thus linear--teaching resources into linear multimedia packages. While the addition of colour illustrations, live video and sound increases the usefulness of some packages, it does little to aid students individual approaches to learning and, ultimately, mastering a subject. Navigational features in programs enable students to control their movement through a resource, but may disintegrate into an arcade-game style 'click-and-see-what happens' program (see McKenna 1995 for a review of literature). One of the major dangers in a learning web is that students can become lost in the maze (Lynch 1992). This result can be avoided by the provision of predefined pathways of a central core (Gleadow et al. 1993) or by supplying concept maps in printed or electronic form (Clark & James 1993, Mikhelson & Klease 1993).

By contrast, a simulation package requires an input set of parameters which will determine the output. Student interaction is dependent on the setting of the initial parameters--as well as on making decisions along the way--based on program prompts to do so. But beyond this, there is little the student can do to interact with the program. Thus a simulation package is essentially linear, with the possibility of re-running parts of the program after it has been completed without the need to restart it. The CICRIT program was not designed to substitute physical survey training in a field situation, but to complement it. This allows face-to-face student instruction to be more efficient as it removes many conceptual problems before the actual survey takes place. Further, the program needs to be interactive in a fashion that allows the student to influence the outcome of the virtual survey by varying the input parameters. Finally, background information offered to the student needs to be structured in a fashion which allows the student to query information in increasing levels of detail at the students' request. Forcing a student to 'wade through a morass' of data would be akin to actively impeding students' individual learning requirements.

Technical Considerations

Delivery Options. Successful design required consideration of a variety of delivery options : (i) Floppy disk/Syquest based; (ii) CD-ROM based; (iii) Optical and Floptical devices; and (iv) Server/Internet based. Not all of these are equally suitable, however. Standard floppy disks (1.4mb) do not have the capacity to store the information necessary and would require users to download the entire program onto their hard disk. At the moment, CIRCIT requires 68mb of storage space. This is likely to double when all the photo options have been added. Tapes are prone to wear and tear, and in many cases are unable to rapidly access the data. Syquest(TM) cartridges (44mb), which have become the industry standard for prepress bureaus, would permit the delivery of packages this large. However, such systems are prone to magnetic influences and thus to data loss if handled inappropriately, either at the user location or during transfer by post. Updating of the program needs to be conducted in a centralised manner. Experiences with Video packages sent out by CSU have shown that there is little sense in re-using once-posted packages, as the cost of (i) following up on non-returned items and (ii) checking the packages for damage and quality is disproportionate to a new issue. Optical of similar media are less corruptible than magnetic media. Unfortunately, at least at the moment, such media are expensive and thus not common and few people have drives which can read them. In addition, such storage options, like magnetic media options, are systems dependent. CD-ROM disks have become a standard in many multimedia packages. While there is substantial interaction by the

CD-ROM user, all responses draw on predefined criteria with few, if any, temporary files developed. In most cases, such files are written to the memory or a scratch disk on the user's hard disk. The advantages of a server/Internet-based program are that only one active copy needs to exist at any given time, thus ensuring that all students will be using the latest version. This centralised mode allows the maintainence and updating of the program as the need arises without having to upgrade copies held by the 'customer base'. The downside of such a system is the possibility of a slow network response if traffic is high. Recent developments under way at CSU show that it is possible to package all the software necessary to run a virtual network server on a CD-ROM. This would allow packaging of the server and the program material on the CD-ROM and mailing to students who have access to CD-ROM systems but not to the Internet. This option, however, would then result in various generations/versions of the program.

If a server/Internet-based approach is taken, then it is necessary to limit or restrict the outside linkage options. Although such outside links provide additional data sources and options to work with, their efficiency depends on the data loads on the network at the time, the availability of the particular server and the presence of the files.

Platform Options. A variety of platform options exist. In addition, within most of the platform options, a variety of manufacturers and models is used. This situation, combined with the variety in processor models and, thus, overall computer speeds, creates a very diverse systems base: (i) IBM-Compatible DOS, (ii) IBM-Compatible Windows, (iii) Apple Macintosh, (iv) IBM OS/2, (v) Amiga and (vi) UNIX/AUX. While some of these issues can be overcome by specifying certain computer/processor speeds, the issue of different operating systems cannot be overcome easily if the whole program is to run in a stand-alone mode on a user's machine. The greatest customer base exists for IBM compatible machines, followed by Apple Macintosh systems. There seems to be a difference in the markets, however, with Apple Macintoshes being more prevalent in the graphics and arts sphere and as DTP machines. The student population is expected to have a computer spectrum that mirrors that of Australia overall. It would be possible to develop a system based on MS-DOS/Windows only, which would presumably cater to most students, but this could lead to claims of inequity if the use of the program becomes a compulsory and assessable component of the subject. The constraints imposed by this diversity of systems can be overcome by providing platform-independent programs, running on a central server. Students would be furnished with the correct viewer, depending on which system they owned. The project was to be designed based on the Netscape(TM) WWW viewer. However, care was taken not to include structural commands, such as tables, which at the time had not been adopted universally, and which could not be interpreted by some viewers, such as NSCA Mosaic(TM).

Expandability

The program design should be such that the program can be expanded in geographical terms by adding new survey areas adjacent to the currently active areas, and by the addition of other site files and background information files. This expansion then required the establishment of data structures where site files were independent files which could be added to or deleted "ad lib." The latter option was particularly necessary if false or fictitious sites were to be added in order to provide site types which were not really extant in the area, but the presence of which would be conceptually possible given the environmental conditions at Mt.Wills. Likewise, illustrations and photographs needed to be stored separately to allow the easy addition and deletion of files as required. The background data structure needed to be expandable so that further information could be added into the background files if and when the information becomes available. There is a limited set of data files provided. It is intended that, over time, textual material can be added which will form a set of files similar to a book of readings.

THE SIMULATION CRITERIA

Mt Wills offered itself as a suitable location. The area has been the resource inventory 'training ground' of Charles Sturt University since 1991, where students of the BAppSci (Parks, Recreation and Heritage) degree construct flora, fauna and cultural resource surveys and inventory assessments.

Criteria Explained to the Student

The student is given a message screen early in the program, prior to his or her selecting the areas. The student should be well aware from the perusal of the literature that there are a number of parameters which have a bearing on the outcomes of a survey. Of these parameters, those which have been labelled 'primary' parameters have a direct bearing on the outcome of this computer program: these parameters influence the student's survey design, the rate of progress he or she can achieve, and the student's capacity to recognise the sites. The student is presented with a screen providing the following information: From here the primary and secondary parameters can be looked up, and further information can be obtained. Should the student decide that further work on the background data is required, the student can 'backtrack' to the previous screen which will allow access to the background data tree. Once parameters are selected and the 'survey' has commenced, a backtrack button is not offered; however, the student can backtrack using the 'back' buttons provided by the Netscape viewer, even though this function is not advertised. Basically, all parameters influencing the outcomes of the computer simulation are addressed in this section, even though the values of the penalties are not spelled out to the students.

Selecting and Defining the Areas

Partitioning the Survey Areas. The partitioning of the survey areas was conducted manually--and thus arbitrarily--based on the area a single person can effectively survey in a given day, given the conditions of the terrain encountered at Mt.Wills.

Contiguous vs. Non Contiguous Areas. Obviously, the choice of the survey areas should be determined by the goals the survey is meant to achieve. When planning the survey, however, students need to consider the necessity of being able to move from one survey location to another. The terrain at Mt.Wills is such that movement from one area to another may well be very cumbersome and will take some time. Only along the Omeo highway is one able to move reasonably rapidly with out vehicular transport. Most other areas are only accessible on foot and well beaten tracks are rare. The student is told that the program will take this into account, and it will 'penalise' him or her by calculating the time it takes to move from area to another, if non-contiguous areas are chosen. The program calculates the centre points of the individual areas and allocates a travel distance penalty based on a travel rate of 2km/hr.

Selecting the Base Camp Location. The placement of the base camp, from which a team will execute the survey is obviously of great importance. The further it is necessary to walk to get to the survey location, the more time is lost which can be used otherwise productively. In the Mt. Wills area there are four huts to choose from: the Talangatta Ski Club Hut, the Mt. Wills Summit Hut, the CRB Hut, and an insecure hut next to the road side. For purposes of this computer program the student can place the base camp in any of the huts but the last, as this one is not secured and is open to anyone driving along the road. Students cannot set up a permanent camp with all the back-up facilities at such a spot.

The Climatic Parameters

The diligence of the field crew is essential for the recognition of a number of sites. Climatic conditions, such as temperature and rain, as well as the overall duration of a survey project, tends to wear out staff. Unless they are diligent and observant throughout, some sites or site indicators could be missed. Unfortunately, there is no weather station at Mt. Wills (or nearby at Glen Wills) and thus temperature data used for the calculation are based on the daily data collected for Omeo, some 65km to the south (Station NBA 083025) and provided by the Bureau of Meteorology.

The Rainfall Data. The daily rainfall probability was calculated based on the daily rainfall values for the period 1957 to 1994. The probability was calculated as the percentage of events with rainfall greater then 3mm/day. The total number of years contributing to the data set ranges from 33 to 36. Based on the rainfall probability the program simulates (random-based) for each day of the survey the rain probability (chance). If it 'rains', that day of the survey is 'washed-out'. If the program calculates that it rains on day three of a five-day survey, the student will be presented with the displays of the records of the sites for days one and two. The student will be permitted to record these sites as usual. When the program moves on to display the sites for day 3, the user will be told that 'today' (the selected date), i.e., day 3 of the survey, it is raining. The user is asked whether he or she wishes to proceed for the day despite the rain, knowing that some terrain will be rather slippery. If the user chooses 'no', that day will be deducted from the total and the program will proceed to day four, dropping all sites for day 3. If the user chooses 'yes', the program will run a random calculation and drop 40% of the sites in the area surveyed during that particular day. When the student has completed recording/reading all the sites of all days and is about to finish or start over again, a screen will be displayed telling the user, that because of what he/she chose on day 3, x number of sites have been missed by the survey team.

The Probability of Snow. If we interpolate the temperature at Mt.Wills at the medium elevation of 1280m based on a decline of 3.5 degrees C/100m altitude, then the extremes for Omeo for the observation period 1957 to 1994 translate to the historic occurrence of frost on Mt.Wills (at 1280m) at any given day during the year, except four, where the temperature ranged between 0 and +1 degree C. This indicates that morning frosts can occur throughout the year. If the survey period chosen by the student coincides with simulated snowfall (based on probability tables), the program issues a warning to the user. If the user presses on, all two-dimensional sites (n 2000-2999) deemed to be obscured by snow and are removed from the list.

The Temperature Levels. The ambient temperature influences the comfort levels during the survey. Very high as well as very low temperatures are highly likely to limit the attention span of the person(s) conducting the survey. In addition, the steep terrain at Mt. Wills implies increased exertion during these temperatures. To account for this, the simulation has been set such that the total number of sites available to the student is reduced by a certain percentage. The following percentages have been used: greater than or equal to 37 degrees C 15%; 35-37 degrees C 10%; 32-35 degrees C 5%; 10-32 degrees 0%; 8-10 degrees C 5%; 4-8 degrees C 10%; less than or equal to 4 degrees C 15%. As with any simulation, a level of arbitrariness has been introduced. The high temperature was calculated based on the daily maximum, while the low temperatures were calculated based on daily maxima and minima. There is a considerable range of temperatures throughout the area which are generally caused by the differences in altitude. (The adiabatic lapse rate is 1degree C/100m above 600m for unsaturated air and 0.4 degree C for saturated air). Omeo weather station is at 640m. The average elevation of the sites is at 1230m.

Number and Training of Staff

The number of staff taking part in the survey will determine how quickly the students can survey an area, as they represent more 'bodies' able to cover a greater area, and more pairs of eyes to act as spotters. However, the number of trained staff taking part ultimately determines the rate of progress, as one person in each team will be responsible for the documentation of the resources. Students need to consider that the greater the number of staff, the greater the logistical problems will become. The program simulation has been programmed to allocate the value of "1" to a trained archaeologist, and "0.6" to a semi-trained person/staff member. These figures are used to calculate the "worker-days" the program needs to establish the total number of survey areas a student and his or her "team" will be able to survey. Further, the program does not allow for more than 3 untrained staff to accompany one trained archaeologist.

Starting Date and Duration of the Survey

Starting Dates. The starting date of the survey needs to be chosen carefully. The student needs to take into account the climatic conditions he or she is likely to experience, such as average and maximum temperature, the probability of rainfall and the probability of snow. The background data set provides the student with adequate information on the matter.

Duration of the survey. The duration of the survey will affect the results in two ways: the longer the survey, the more survey days are present and hence the more area can be covered. On the other hand, the longer the duration of the survey, the greater the fatigue of the survey crew, since the environment is challenging. The student will need to find a balance between the two. The simulation includes a scaled 'penalty' if students plan to work for too long a period. If the survey period is longer than 5 days, a fixed percentage of sites is deducted, the identity of which is randomly allocated based on the following percentages--Day 1-5: none of the sites; Day 6-7: 5% of the sites; Day 8-9: 10% of the sites; Day 10-12: 15% of the sites; Day 13 and greater: 20% of the sites. In each case, when the student has completed all the sites and is about to finish/start over, a screen will be displayed telling the user, that x number of sites have been missed on day 6, 7, 8, 9 etc. due to the fatigue of the crew.

Final review options. After the last site file has been viewed, the student is given a number of options to review the environmental data etc. Offered are the following options:
* Show me the environmental data again
* Show me the aerial photo again
* Show me the topographic map again
* Show me again the areas I surveyed
* Provide me with details on how to write up the report o
* Show me again the list of sites to be expected.

After the student has accepted or declined the options, he or she can either finish the program or start over again. The final review options, like the background data, is another hierarchy of static files, except for the button which shows the areas surveyed by the user. This requires knowledge of the user i.d. (identification); hence, the final review page is a semi-dynamic document containing a link to the user map file.

Portability. The coding for the program was kept as portable as possible to allow porting of the software to other platforms. All code is written in PERL or C, both of which are widely available on most platforms. The underlying engine controlling the program was designed to be as general as possible. This allows new applications to be developed quickly and easily, using the same engine code and tools, but different subject matter.

FUTURE ACTIONS & OPTIONS

In its current concept the program is designed as a tool to develop skill in designing a meaningful and practically executable survey. Unlike the initial concept proposed in the CAUT/DEET application, the program will not consist of an assignment module, the completion of which is necessary for students to have access to the various options and to 'play' with various scenarios. Instead, the student is tasked with planning and 'undertaking' three different survey designs and to compare the relative merits of the surveys thus conducted. The practical component will comprise a three-day field trip to Mt.Wills to undertake survey's of areas hitherto unsurveyed, thus adding to the simulation database.

Publication of the Program.

The publication strategy comprises a number of actions ranging from posting the program on the world wide web on a test basis to publication in a number of media. For example, the program has been placed on the World Wide Web under the following URL address:
http://life.csu.edu.au/~dspennem/MTWILLS/CICRIT.HTM. Please note that the URL address is case sensitive. It will be included in several relevant homepages, i.e., CSU HomePage, The Virtual

Past, ArchNet and the like. Thus it will be available--at no cost--to anyone interested. Others are encouraged to include pointers to the program on their home pages.

Elaboration and Improvement.

Creation of fictitious sites. Based on the student's experiences at the 1995 residential school, the site list may need to be extended. At the moment, the data set represents the real site distribution. This implies that a number of survey areas are 'blank'. In addition, even though the total area surveyed comprises some 13 sq. kilometers, not all of the area on the topographical map has actually been surveyed. This expansion of the knowledge base is planned for 1996 and 1997. If the 1995 testing of the program shows that this is a problem, then the hitherto non-surveyed areas can be 'stacked' with fictitious sites, which could theoretically exist in the environment. Once the real data become available, these can be deleted, since it poses no problem to uniquely label the fictitious site files for later elimination.

Increase of pictorial options. The initial design proposal gave the student a number of options to assess the sites. It was intended that the student could request various photos showing different angles of the same site. In order to provide a working beta version in time for the acquittal of the CAUT grant, the additional photo options were deferred. These shall be added at a later point in time, if the present configuration seems inappropriate or insufficient.

Expansion to include survey concept training. If the program proves to be suitable for student training and if students accept electronic delivery for this subject as the only means of instruction, then it is intended to expand CICRIT by adding a different front end. This addition will allow extension of the interactive method of instruction to the mainstream of the subject package.

Cross-Cultivation and Proliferation.

The Subject. PKM 360 'Protected Area Planning' draws on the Mt. Wills area as a standard survey area. Successive generations of students have or will use the area as the main fieldwork location. In addition to the cultural resources data information, vegetation plots and faunal trap data exist. The background data set developed for CIRCIT is eminently suitable for inclusion in the teaching of PKM 360. However, as the needs for PKM 360 are slightly different from those for PKM 366, it is not sufficient to merely point to the central node of the CICRIT background data tree. In the first step, the material provided as the background data set shall be duplicated and can become a stand-alone interactive background data unit to support the study package PKM 360. The duplication and interlinking of this section shall be such that once new or updated data are imported into CICRIT, the PKM 360 data tree can be simply replaced with the new data tree, thus ensuring that the data are in step with CICRIT.

Expansion to Include Botanical and Faunal Data. CICRIT can be provided with a different front end, which will allow students to choose between a cultural and a botanical resource inventory. The same area selection engine can be used, this time drawing on individual botanical survey plots rather than archaeological sites. Data for real survey squares exist, and students can interactively conduct a botanical survey to develop a vegetation map for

Mt.Wills. Once an electronic herbarium for Mt.Wills has been created (moves are under way), the plant species in the lists can be linked to the herbarium files. In the second expansion phase, data on fauna traps and survey/spotting transects can be added.

Packaging on a CD-ROM. If it proves necessary, CICRIT can be packaged on a CD-ROM and distributed in this fashion to students.

Monitoring Usage. A monitoring routine shall be written which allows the systems administrator to monitor the usage of CICRIT over the Internet, evaluating the average connect time and the point of origin of the interaction.

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