Collaboratory for GIS and Mediterranean Archaeology (CGMA) Project Report
July 2005 – June 2006
DePauw University
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DePauw University received the Mellon Foundation grant for the CGMA (Collaboratory for GIS and Mediterranean Archaeology) Project at the end of March 2002. In the first three full years of the grant, we developed and refined MAGIS (Mediterranean Archaeology GIS), the CGMA database and the web delivery system. We held annual board meetings, we developed and taught the CGMA undergraduate seminar twice, and supervised six summer interns. Also, Drs. Foss and Schindler contributed a book chapter on CGMA to a forthcoming ESRI publication[1], and presented the CGMA project to colleagues at conferences and universities in Ankara (Turkey); Boston, San Francisco, Philadelphia, Colorado Springs, and Birmingham (England).

In AY 2005-06, we arrived at a functional beta version of the database and web delivery system, worked on faultless delivery of the system over three major web-browsers, and built a Help file for those consulting and entering metadata. We also conducted the undergraduate seminar for the third time and held the fourth board meeting, we are supervising four summer research interns in summer 2006, we developed a plan to transition the undergraduate seminar to a more national constituency through NITLE, and presented papers on CGMA at the 3rd International Conference on Ancient History in Shanghai, China as well as the 2006 CUR (Council on Undergraduate Research) National Conference at DePauw University.

The Undergraduate Seminar, Fall 2005

Dr. Nick Kardulias at the College of Wooster taught the third iteration of the CGMA undergraduate seminar in fall 2005. Eleven students enrolled in the course: four from DePauw University, four from Rhodes College and three from the College of Wooster.[2] The class met twice a week for two hours and was taught using the Course Delivery System (CDS) developed by the ACS (Associated Colleges of the South) Technology Center. Dr. Kardulias' syllabus [Appendix 1] continued to develop the formats used by Dr. Foss in 2003 and Dr. Morrell in 2004, with updates on readings and organization. The course retains its three original components: introductory lectures and exercises on survey archaeology and GIS, a group practicum carried out at each institution, and individual projects whose nature could vary from year to year based on the expertise of the instructor. This year, the individual project consisted of detailed annotated bibliographies on survey work done in various assigned regions of the Mediterranean. As always, we held the CGMA Board Meeting at the instructor's college.

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[1] Schindler, R., and P. Foss, "Classical Archaeology: Building a GIS of the Ancient Mediterranean," in Diana Stuart Sinton and Jenni Lund (eds), *Mapping and GIS Across the College Curriculum*, ESRI Press, Redlands, CA, forthcoming 2006.

[2] Millsaps College did not participate in the seminar this year because Dr. Mike Galaty was on sabbatical and was not able to supervise the students on his home campus.

In feedback for the course, students found the practical elements of instruction (reading maps, learning basics of laser transit, GPS and GIS) particularly useful, and in fact, called for more of that. Activities in class or for the practicum tended to circle around the various campus groups; there was in fact interest in more working with / learning from students from other campuses. Students did find themselves learning from each other (which can happen in the 'bubble space' formed by each campus while participating in the synchronous streaming during class time), and sometimes across those spaces through the on-line chat and conference calls. The individual agency required for the practicum allowed students to develop skills required to approach their research problems, but finding help outside of class when working on those projects was a challenge for most students. Clearly, building up GIS support infrastructure on the member campuses would assist students in advancing further with their projects.

The primary experiential learning component of the course was the practicum. Students on each campus worked together to design a survey project on their campus or in their town. They had to develop a database, collect GPS (Global Positioning Systems) data and other data from the field, and enter their data into a GIS (using ArcGIS software from ESRI). This year, students built three new GIS projects. One traced the historical development of the DePauw University campus: carrying out GPS survey on campus, using remotely sensed imagery, and sorting through university archives to determine the nature and location of previously-existing university structures, and chart the development of the institution with regard to the parallel development of the town of Greencastle. The group at Rhodes College investigated retention rates for students by mapping the hometowns of those students who stayed, and those who left (and wither they transferred if they did). Students at Wooster searched out a possible local cemetery on private land (attending to issues of landowner permission) using on-site survey and magnetometry.

In 2003, Dr. Foss initiated the CGMA Cup competition, in which the professor posed questions and the students at each school worked together to earn points towards the 'Cup'. This friendly competition encouraged students to engage with the course material and to work together as colleagues at their institutions. This year DePauw and the College of Wooster shared the Cup, breaking the two-year tenure of Rhodes College.

Fourth Board Meeting, Fall 2005

The Board Meeting was held at the College of Wooster in Wooster, OH. Participants in the fall meeting included three of the five CGMA faculty members (R. Schindler, N. Kardulias and K. Morrell), the students enrolled in the course, and board members H. Haskell from Southwestern University and Aaron Fuleki of Denison College. Board member P. Foss joined the meeting remotely by conference call.

At the mid-term workshop, students took crash-course instruction in the operation of GPS equipment, the collection of data using laser transits, and how to use ESRI's ArcGIS 9. We have found that the earlier students are exposed to using this hardware and software, the better they are able to use it in the practicum. The business meeting, meanwhile, primarily revolved around the present progress of CGMA, immediate needs, plans for its future continuance, and the appropriate use of remaining funds after 30 June 2005.

In the area of database administration, the suggestion was made that a technology audit of the MAGIS code would be beneficial. Such an audit would seek to assess the clarity of the code that underlies the system, particularly for outside users who might wish to adapt MAGIS code for other on-line GIS delivery efforts. From the start, CGMA has been committed to an open-source stance, and to making available its code; such an audit would ensure that the code would be clean, uncluttered, and clearly understandable. Finally, a tech-audit might spark ideas for how to improve or further develop MAGIS. The board agreed that this was important; Aaron Fuleki of Denison and Scott Simmons of Wooster volunteered to undertake such an audit at such time as the CGMA programmer Beth Wilkerson had reached a 'steady-state' of the code (the beta-release version). The fact that Ms. Wilkerson would continue to maintain CGMA and MAGIS from a hardware and software standpoint was noted, since her position as GIS specialist at DePauw would now include MAGIS as one of her several duties. This will help ensure long-term sustainability for MAGIS.

Progress in metadata entry was reported; at the time, approximately 200 projects had been placed into the database with full or partial entries. The idea was raised that in order to help push entry of their own projects by survey archaeologists themselves, we should propose an AIA (Archaeological Institute of America) workshop that helps explain how the system works and how researchers can contribute. This was thought to be an excellent idea, and we plan to propose such a workshop for the January 2008 AIA meeting, after the beta-version of CGMA has been publicly released and promoted, and as many bugs as possible worked out of its system. As part of this effort, it was agreed that Schindler and Foss should take advantage of their planned AY 2006-07 sabbatical in Europe to travel and make contact with European schools and archaeological authorities, both to learn about surveys that have been or are being carried out, and to spread the word about CGMA (and persuade researchers to contribute metadata for their projects). Some of the remaining funds could be used to make these visits possible. Part of helping colleagues to understand the system and enter and/or search for metadata must include a clear and detailed Help File for MAGIS; such a file was developed in Spring 2006, and is currently in the final stages of vetting by the CGMA Board [Appendix 2].

Discussions also took place about making the summer internships more effective. It was clear that students scattered among different campuses did not develop the kind of synergy, and did not have the kind of supervision, necessary for efficient and productive work. It was suggested that the summer interns all work out of CGMA headquarters at DePauw, and that transport and summer housing costs be provided for non-DePauw students in order to make this possible. This in fact was done for one 2006 summer intern, Tulisha Jackman, from Rhodes College.

We also discussed our long-term plans for CGMA and the undergraduate seminar after the Mellon grant runs out. All agreed that the CGMA seminar has been effective, and suggestions were made to open up the course to all NITLE schools using the parallel of Sunoikisis, the virtual classics department of the ACS, which has come under NITLE's direct administration. After the meeting, discussions ensued with Rebecca Davis, who now administers Sunoikisis for NITLE, at the AIA meetings in Montreal, and this transition has been approved. We are now in the process of developing a new format (both instructional and technological) for a CGMA NITLE course that would consider the needs of multiple schools across the country.

As worked out in the spring of 2006, the NITLE CGMA course will operate as follows.
      NITLE Inter-Campus Collaborative Course
      CGMA Seminar: GIS in Mediterranean Archaeology
      start date: Fall 2007

      <u>organization</u>
      • Dr. K. Morrell will teach the Fall 2007 course; Dr. P. Foss of DePauw will teach the Fall
      2008 course.
      • Five students will be allowed to take the course at the home institution.
      • There will be a cap of 20 students for the course across all participating campuses.
      • For the participating schools (out of the 93 NITLE schools):
            - Each should have institutionalized GIS support on campus (student access to
      ArcView and IT training / support).
            - Up to 3 students from any one additional campus can register.
            - A faculty member (preferably an archaeologist, classicist, or GIS specialist)
      should be available to help students on their home campus during the first week get
      acclimated to the set-up and technical specifics of accessing the course.

      <u>course</u>
      • Synchronous lectures/discussion over the Course Delivery System and/or
      VideoConferencing; 2 days/wk.: 2-4 pm ET, Tues/Thurs.
      • Students get GIS training in ArcGIS 9 early in the term through their home institution.
      • Students complete a GIS practicum at their home campus; they may use GPS equipment
      at their home campus or borrow a handheld unit from one of the four core institutions
      (DePauw, Millsaps, Rhodes or Wooster).
      • A symposium is held at the home institution at the *end* of the term where students can
      meet and present the results of their practica.
P. Foss will work out the details of the new syllabus for the course with the other PIs during
summer 2006 and AY 2006-07.

The use of any remaining CGMA funds was discussed. Suggestions included: funds for a tech
audit, funds for Schindler and Foss to discuss CGMA with colleagues in Europe, and the
acquisition of four mid-range handheld GPS units that could be based at the four core CGMA
schools (DePauw, Millsaps, Rhodes and Wooster), would be used for training students and for
student use in the course practicum, and for loan to other schools participating in any NITLE-run
countrywide version of CGMA in the future. Differing equipment at the member schools in the
past has made instruction and coordination difficult; this would make student instruction and
research much smoother and more effective.

The Meta-database and Programming

We are continuing to run the CGMA system on an Apple Xserve (named Hecataeus). Beth
Wilkerson continues to serve as the CGMA programmer; after two years of being assisted by an
excellent student intern, Alex Iliev, the student intern for 2005-06 did not prove satisfactory.
Still, this was not an impediment, as the bulk of programming was already complete, and so
efforts turned to finishing the construction of MapServer (the GIS engine) on a Macintosh server,

developing user functionality, releasing a working beta version for the search and data entry pages, making minor database structure refinements, and testing usability on three major web-browsers: Internet Explorer, Firefox, and Safari.

Students continue to help test both the data entry page (reserved for CGMA staff to enter data directly into the database), and the data submission page, which allows outside researchers to enter data about their own projects. Data entered through the data submission page is saved on the server but we have the opportunity to check it before it is uploaded to the primary database. Both entry options ask users to sign on so that we have a record of who entered the data. To date, information has been entered on 273 projects, with information on scores more expected to be entered by the end of this summer. Coverage is particularly strong in the western Mediterranean and Greece because surveys in those zones are easier for students to find, access and read; zones needing further attention this summer and in the future by CGMA faculty include North Africa, the Near East, the Black Sea, and Central Europe.

Essentially, the spatial search, data search, and data entry pages are complete, but for small re-organizations, re-orderings, and a few additions. For instance, we are working with Tom Elliot of the Ancient World Mapping Center at UNC-Chapel Hill to add a layer of major ancient cities to the spatial search map.

The beta version can be accessed now at this address: http://cgma.depauw.edu/MAGIS_beta/ . Clicking on the Spatial or Database Search buttons calls up the appropriate interfaces [Appendices 5-7]. In the Spatial Search particularly, the geographic boundaries of survey projects now appear as red-lined boxes, quickly providing an impression of MAGIS' coverage and also of where research has been carried out. The various geographic layers that can be turned on and off (with or without labels) shows the flexibility of presentation that will be available to the user (some may in fact use MAGIS simply for generating clear and quick maps of the ancient Mediterranean world). In this sense, MAGIS is now a functioning on-line GIS, though not all bugs have been worked out of the system for all of the three major browsers listed above.

One hurdle of the project has been to determine the spatial boundaries of the survey projects. Surprisingly few survey projects clearly state, using absolute coordinates, the limits of their research areas. More often, descriptions or generalized maps are provided. The emergence of GoogleEarth (http://earth.google.com/), with its decimal-degree presentation of the earth's surface, has permitted a breakthrough in this regard. Students now can match the printed maps in survey publications with satellite views in GoogleEarth. This process gives good, though not perfect, results; we do plan to encourage survey archaeologists to provide us with more exact coordinates directly once they see their project in MAGIS. Also, we have decided to include GoogleEarth locational code (a .kmz file) in the database entry for each project, so that users can go directly to GoogleEarth 'placemarks' from the MAGIS database. Such leverage of GoogleEarth is permitted in GoogleEarth's Terms of Use; in the manner of a hyperlink, we will simply be pointing the user to additional functionality (a satellite view of each survey's coverage area) present in a free and freely-distributed third-party resource. As an added feature, we are also providing pointers to FlashEarth's (http://www.flashearth.com/) browser-based version of GoogleEarth, since not all users will have GoogleEarth running on their own system.

Student Work

We originally established three ways in which undergraduate students could contribute to building CGMA: research projects as part of the CGMA seminar, work-study positions in the spring semester, and internships during the summer. In AY 2005-06, we had one student take a work-study position, and four students are currently holding summer internships. We have been able to gather all this summer's interns at DePauw; already it is clear that the synergy created by this critical mass (and our ability to supervise them on a daily basis) is realizing more productive results.

Students are busy working in three main areas: they are continuing to seek out surveys from which they can mine metadata and are collecting publications of those projects; they are double-checking metadata collected by previous students, using the more detailed instructions now provided in the master Help File [Appendix 2]. They are also busy determining the geographic coordinates for the boundaries of the surveys. They are particularly working in the areas of North Africa, the Near East, and the Black Sea, where we do not have as many projects included as we would like at this stage.

Conference Presentations and Publications

In August 2005 Dr. Schindler presented a paper on CGMA at the 3rd International Conference on Ancient History in Shanghai, China. She also featured CGMA at two interactive sessions at the June 2006 CUR National Conference. The publication of our chapter in *Mapping and GIS Across the College Curriculum* is due later in 2006. Dr. Foss successfully made application to DePauw University to spend his 2006-07 sabbatical working on CGMA [Appendix 3].

Budget

In the past year our primary expenses have been the salary for Ms. Wilkerson, the student internships in the summer of 2005, the salary for Dr. Kardulias to teach the CGMA seminar in Fall 2005, and the board meeting in fall 2005. When necessary, we upgraded some of our system software; we purchased only a basic scanner in AY 2005-2006 to assist with the georegistration of published survey maps in order to ascertain the geographic coordinates of their boundaries. A summary of the expenditures under the grant budget is presented in Appendix 4a, and a detailed budget and expenditure spreadsheet is provided in Appendix 4b.

Plans for 2006-07

We have requested in separate correspondence to the Foundation a no-cost extension to the use of the funds granted to DePauw University for the CGMA project. We have tried to be conservative with the use of the funds, anticipating that our needs towards the end of the four-year initial grant period might be different from those envisioned when the grant was originally proposed. The activities we wish to pursue during AY 2006-07 have been hinted at in the text above, and are discussed at some length in Appendix 3, but allow us to summarize them here, as well as provide a budget for the use of the remaining funds.

When we originally submitted our grant proposal, we planned four calendar years for the grant: 2003, 2004, 2005, and 2006. When the grant was approved for the fiscal year starting July 2002, we had a six-month difference. We used it to begin planning, course development, and infra-structural setup. Key to our proposal was the initiation of a fall-semester seminar for undergraduates on GIS and survey archaeology, which we first offered in Fall 2003, and every year since. The last year for that class scheduled in the original grant was Fall 2006, which according to the present timetable, would fall outside the grant's boundaries.

A primary reason, then, to request the extension, is to be able to finance and teach that seminar this fall, for which a professor (Mike Galaty of our partner school Millsaps College) is committed, and students are already signed up. Another reason for this request is because the two PIs will be on sabbatical leave in 2006-07. Dr. Foss has dedicated his leave to furthering the development of CGMA, for which the basic programming has been completed, and four summer research interns are at this moment busily culling metadata to enter into the database. During our sabbatical, we will be based at the School of Archaeological Sciences in Bradford, U.K. This is one of the leading schools for GIS and scientific archaeology in Britain, and it will provide an excellent place for discussing how we will take the CGMA project to the next level, and eventually how to integrate the massive British database of survey fieldwork into CGMA. We also would like to use that opportunity to travel to several countries in Europe, particularly Italy, Spain, France, Germany, and Slovenia (as a base for the Balkans), as well as within England, to learn about more survey projects that are being carried out, especially by local archaeological authorities (which do not always get published in journals accessible in the U.S.). We mention those countries because so much work there is carried out by local authorities as opposed to international teams, and that information is much more difficult to access, since it is less likely to be published in major journals or monographs. We would also especially like to encourage those colleagues to join CGMA by entering metadata about their own projects directly into the CGMA holding database. By distributing the work and asking researchers to be responsible for the metadata representing their own projects, we will expand the resource, keep it better up-to-date, and more accurate. In other words, this would be an important opportunity to 'spread the word' directly to our colleagues, and have them see for themselves how CGMA works, since the programming will be done, and they will be able to pull it up on their own web-browsers. Also, we would like to have a tech audit done on the CGMA programming (to make sure our code is clear and comprehensible to other users, since we plan to release our code for other researchers to use or build upon), and this would be appropriate to do after this July, when the CGMA beta-version (http://cgma.depauw.edu/MAGIS_beta/) will be finished. Finally, we have put in for a final student summer (2007) internship, both to give the Fall 2006 students an opportunity to work on the project more in-depth, and because we anticipate additional entries can be made after a year of seeking them out.

We can add several updates. First, that the Pleiades Project (http://www.unc.edu/awmc/pleiades.html), recently funded by the NEH, has asked us to partner with them; they will be responsible for putting the Barrington Atlas of the Ancient World on-line in digital form. Second, NITLE has agreed to continue the CGMA undergraduate seminar as a national offering in Fall 2007, taught that year by Dr. Morrell of Rhodes College. Dr. Foss then will teach the course in Fall 2008, and we will meanwhile be looking to add colleagues and students from other NITLE schools to continue this unique offering of archaeology, geographic

technology, teaching and a major research project. Third, the CGMA programmer, Beth
Wilkerson, is now on-staff as the GIS expert at DePauw University, and can continue to maintain
and update the CGMA programming as part of her regular duties serving the GIS needs of the
DePauw community. We mention these things to show how we are working to sustain CGMA,
and how CGMA continues to contribute in important ways to the progress of other
interdisciplinary and inter-institutional initiatives.

For these reasons, we would like to request an extension for the use of the remaining funds
(which currently total $40,891.55) through June of 2007. Our budget for those funds is outlined
below.

$7500	Reassigned time/course replacement for Mike Galaty at Millsaps College to teach the Fall 2006 CGMA undergrad seminar.
$3000	Fall 2006 Annual Meeting/Fall Workshop at Millsaps for travel, room, and board of participants from Wooster, DePauw and Rhodes.
$2500	Technology audit of CGMA/MAGIS code by Aaron Fuleki of Denison and Scott Simmons.
$900	Two external 600 GB hard-drives ($800) and DVD-Rs ($100) for secure archival back-up of code, GIS/database structures and data from the CGMA server.
$6000	Travel costs for PIs Foss and/or Schindler (based at the University of Bradford, U.K.) to meet with colleagues, collect metadata about unpublished surveys, and evangelize CGMA in Italy, Spain, France, Slovenia (for the Balkans), Germany and England during their sabbatical year 2006-07.
$17,500	(Four) handheld Trimble GeoXT GPS units ($4360 each with ArcPad 7.0 software) for student training, CGMA course use and CGMA on-location metadata collection; one to be stationed at each of the four core campuses, and available for loan to other campuses participating in the new NITLE-Sunoikisis CGMA seminar to begin in Fall 2007.
$3500	One student summer internship for 2007.
$40,900	TOTAL (amount currently remaining in grant, incl. interest gained = $40,891.55)

Respectfully submitted,

Pedar Foss and Rebecca Schindler

Annotated List of Appendices

1. Fall 2005 syllabus for the CGMA undergraduate seminar, taught by Nick Kardulias of the College of Wooster.
2. CGMA master Help File. This file is currently undergoing a final inspection by the members of the CGMA Board. These are outside experts whose advice about how we characterize what we mean by our metadata fields is critical to ensuring that scholars and students in archaeology, ancient history, geography, anthropology and sociology will understand our categories and definitions, and know how to use them properly and profitably. This help file will be put into a pop-up window, with anchors that are referenced when the user requests help for a particular section of the spatial or data search.
3. P. Foss' application to spend this 2006-07 sabbatical working on CGMA. It should be noted that while both he and R. Schindler received offers of Tytus Fellowships at the University of Cincinnati for their sabbatical year, they declined those offers in favor of visiting status at the University of Bradford, U.K., in part because of its proximity to Europe and the Mediterranean, where we can travel and demonstrate CGMA to colleagues in both academic and governmental positions.
4a. CGMA summary budget for 2002-2006.
4b. CGMA detailed budget spreadsheets for 2002-2006.
5. MAGIS compiled and expanded data-entry page. This is the plan for its final organization once adjustments to the database have been completed (ref. master Help File, Appendix 2).
6. MAGIS data search page. Users can search for individual projects by project ID (if known), by keyword (a 'Google'-type search), by fields with logical operands (see the expanded lists). Users can also browse the database by zone, country, chronological period, etc. We do plan to add an option that returns all records, so that all projects currently in the database can be displayed.
7. MAGIS spatial search page. Users can: pick one of several different map sizes to display on their monitor, they can navigate by zooming or re-centering, they can turn layers on or off in the display and show legends for those layers, and can select individual survey boxes by turning on that function and clicking on a desired box. The map data currently shown is the 1-km. GTOPO 30 data; we are close to having the 90-m. SRTM data ready to display in the map window once the user reaches the resolution limit of the GTOPO30 data.