GIS Certification and Accreditation:  
An idea whose time has come  
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Abstract: This paper makes the case that the time is right for certification and/or accreditation in GIS. The paper begins with a brief history of the debate, and details current trends in the field of GIS that are driving current initiatives in GIS certification and accreditation. The two major driving factors are major growth of the GIS profession, and initiatives coming from the Surveying community. In the next section, the paper describes two alternatives, which the GIS community may employ either separately or in tandem, certification of GIS professionals and accreditation of GIS programs. While noting that the relatively recent creation of the University Consortium for Geographic Information Science provides an institutional framework for implementing GIS certification or accreditation that did not exist in the early 90s, the paper concludes by suggesting a strategy to develop certification guidelines.

Introduction

As Yogi Berra has been quoted, “It’s deja vu all over again.” As the nineties began, members of the GIS community began to ask one another whether there was a need for accreditation or certification for GIS professionals, and URISA provided a key forum for raising this question (Goodchild & Kemp 1992; Obermeyer 1992, 1993; Burley 1993; Craig 1993). At the time, a concerted effort among the surveying community to require certification of GIS professionals provided the primary stimulus to a consideration of the necessity of such an action for the GIS community as a whole. At the time, the impediments to implementation of either certification or accreditation seemed impossible to overcome, and the GIS community seemed still small and cohesive enough to allow peer pressure to keep the relatively small number of potentially incompetent or dishonest practitioners in line. Moreover, the surveying profession eventually backed away from the idea, and, consequently it fell by the wayside.

Today, at decade’s end, the issue arises again, this time motivated by several factors. Among these factors are the continued exponential growth in the number of GIS practitioners and a vast increase in the size of the GIS “community;” the coalescence of a GIS “profession” (Obermeyer 1994; Wikle 1994, 1997); and the official admission of “GIS Specialist” into the United States Department of Labor’s Dictionary of Occupational Titles. In addition, several institutions of higher learning, including the University of Minnesota, San Diego State University, Rutgers University and the University of Wisconsin at Milwaukee have introduced programs that enable their students to earn certification in GIS (Minnesota has an actual MA program in GIS). In addition the International Standards Organization (ISO) has also expressed an interest in GIS certification.

This paper revisits the ideas of certification and accreditation within the GIS community, this time coming out in favor of the idea of developing guidelines for GIS
certification programs. The paper begins with a brief history of the debate, then discusses why the time is right for taking these steps. Finally, the paper suggests a process for developing certification guidelines within the field.

A Brief History of the Certification/Accreditation Debate in GIS

GIS have proliferated exponentially in the 1990s as public and private organizations alike have adopted the technology. Along with the well-entrenched general purpose GIS, such as those developed by ESRI and Intergraph, there has been a rapid growth in the development and marketing of special-purpose GIS, designed for business applications, crime mapping and analysis, and a whole host of other market niches. This proliferation has created many related opportunities, including the development of new GIS publications targeted to specific interests, such as Business Geographics. The GIS explosion has also created numerous career opportunities for individuals, as GIS vendors and implementers alike search for qualified employees to assume the many duties associated with the implementation of GIS in their own organizations. Entrenched GIS vendors run advertisements continuously in GIS publications and on their own websites in an effort to meet their staffing needs. Public and private organizations must also find qualified GIS staffers. Finding qualified staff is not always an easy task. If the constant advertising by GIS vendors is any measure, demand for qualified GIS practitioners outstrips supply.

Researchers on GIS implementation have been raising the issue of certification and accreditation in GIS since the early Nineties (for example, see Craig 1993). One of the first groups in the GIS community to try to take action to address the issue of professional competence, which underlies the debate about certification and accreditation, was the professional organization of land surveyors, which proposed instituting a licensing program for GIS professionals in the early nineties. This initiative failed to gain the support needed to institute a licensing program throughout the U.S., but the issue of ensuring the qualifications of GIS practitioners has remained on the radar screen of GIS topics ever since (Goodchild & Kemp 1992; Craig 1993; Obermeyer 1992, 1993; Wikle 1997).

As is often the case, talk has not quickly been translated into action. While individuals and organizations have periodically urged that the GIS community “do something” about these issues, the broad-based nature of the field has made action elusive. Initial discussions of this issue identified several impediments to the establishment of either a generally accepted GIS certificate or accreditation of GIS programs. A major impediment seemed to be the broad based nature of the GIS community. The general usefulness of geographic information systems has meant that over the years, it has been adopted and adapted by all manner of organizations: public, private, and non-profit whose missions span the range of human activities, from engineering, transportation and environment to economic analysis, crime, and health and human services. There was a perception when this issue arose several years ago, that it would be impossible to find common ground among these many and varied uses.

A second impediment to establishment of certification and accreditation in the early 90s is closely related to the breadth of the GIS community described above.
Because the community was -- even in 1992 -- so large and diverse, scholars considering the ideas of certification and accreditation observed that there existed no single umbrella GIS organization that could coordinate so sensitive and potentially volatile an issue. The recent creation of the University Consortium of Geographic Information Science, a multidisciplinary group instituted to foster the responsible implementation of GIS, has addressed this issue in a way that builds in the disciplinary diversity so characteristic of GIS users. And of course, URISA also has a history of disciplinary diversity.

Finally, the lack of models for certification of GIS practitioners was another impediment to the development of certification and accreditation. In recent years, a variety of options for certification have appeared. Vendors themselves have developed certification programs for their own software. More significantly (certainly for the academic community), several institutions of higher learning have also established GIS certification programs, thus establishing credible models for the GIS community at large. Significantly, these programs are in a variety of disciplines, including planning, geography, and surveying, social sciences and at the graduate, undergraduate, and community college levels.

**Why the Time is Right for Certification/Accreditation**

As we approach the next millennium, the surveying group is once again pushing licensing as a means to address the issue of responsibility in GIS, and the ISO has also joined the certification bandwagon. As before, these initiatives threaten to inaugurate a turf war over this valuable technology. At the same time, both URISA and the University Consortium on Geographic Information Science (UCGIS) have established subcommittees to explore the potential for GIS certification at the individual level, and program accreditation at the institutional level. It is not necessarily a foregone conclusion that any of these efforts will bear fruit; still, it is important to address the issue head-on. The fact that this issue has arisen before suggests that it will continue to arise until the GIS community brings it to resolution. URISA and the UCGIS represents perhaps the best hope yet for facilitating consensus on these issues, and defusing potential turf wars. GIS --- and its profits -- are big enough to go around.

Another important external stimulus for developing GIS certification and accreditation programs is the rise of the GIS profession itself, and the growth in the market for qualified GIS practitioners. The problem of identifying qualified GIS practitioners affects different organizations differently. Established GIS vendors know the field extremely well, know specifically what capabilities they need in their employees, and know where to find qualified candidates. They have favorable institutional reputations, the contacts, and the financial capacity to hire the best and the brightest GIS practitioners. On the other hand, an organization implementing its first GIS is less likely to have great familiarity with the technology, a clear idea of the qualifications that will best meet its needs, or the expertise and experience to evaluate the candidates who apply. Furthermore, novice GIS implementors may in some cases lack either the reputation or the financial resources (or both) to land the candidate of their choice. Implementation of uniform programs of certification and accreditation would help address these personnel issues.
The GIS community continues to grow and expand. When this issue arose several years ago, there was a perception that a combination of peer pressure and market forces would keep GIS practitioners largely honest. Today, however, we must as a community come to grips with our growing size as well as the growth in the profit potential from GIS. There is a lot of money to be made in this field. Most GIS practitioners insist on making their profit honestly; still there are others who are less concerned with ethical issues, or those who may be less competent than they believe. As long ago as 1991, Linden acknowledged the growth in ethical lapses among a small proportion of GIS practitioners. These lapses have included exaggeration of system or hardware performance, spreading rumors about the products and services of competitors, and intentionally underbidding contracts, with the idea of claiming “misunderstandings” later in order to squeeze more money out of the client. Establishing a certification and accreditation program in GIS would have the benefit of also establishing a system of sanctions against unethical behavior.

In short, the current certification initiatives, along with the growth in the market for GIS practitioners suggests that there is momentum for the activities proposed in this paper. Concurrently, the existence of the multi- and inter-disciplinary University Consortium for Geographic Information Science means that there is an organization that has the breadth and respect to undertake this sensitive activity.

Two Tactics

This paper suggests that the development of guidelines for both certification and accreditation are valid initiatives for the GIS community to undertake at this time, but that the development of certification guidelines is the more prudent approach. In the past -- and now as well -- certification has gained greater attention than accreditation. Perhaps this is because of the perception that it might be easier to identify common ground at the level of the individual than it would be to find commonalties between academic specialties as diverse as, say, facilities management and human resources. In some respects, this perception was a result of the models to which we looked. Specifically, the long historical relationship between GIS and the disciplines of planning and surveying, and our familiarity with those fields meant that the GIS community more or less stopped looking for other models aside from these two. This paper suggests that there is another relevant model for both certification and particularly for accreditation: public administration.

Perhaps the small number of GIS practitioners and/or scholars with a background in public administration explains our overlooking this field as a model for an accrediting body. In any case, the field of public administration has a great deal in common with the evolving GIS profession. Both GIS and public administration cover an extraordinarily wide variety of tasks and activities -- in fact, many of the very same activities, from transportation, public works and facilities management to environmental policy to human resources to general public management. Practitioners in both fields work at all levels, from local to national and even international. Both GIS and public administration include a range of responsibility levels, from analyst to manager. In addition, both GIS and public administration have grown as professions (and eventually disciplines) in the second half of this century. The National Association of Schools of Public Affairs and Administration
(NASPAA) developed its accreditation program in 1977, barely over 20 years ago. For these reasons, this paper proposes including the public administration model in any development of a model for GIS, particularly for accreditation.

Certification

Certification is a method to ensure that only qualified individuals may enter into a profession. Ordinarily, a person achieves certification through a combination of matriculating through an approved course of study, and/or passing a certain prescribed exam, or set of examinations. The American Institute of Certified Planners is an example of such a program. Some professions take this idea further, gaining the cooperation of governmental agencies to establish state and federal licensing boards to enforce certification requirements: this is licensure. We commonly understand the value of licensing doctors by the American Medical Association and lawyers by the American Bar Association, but most states also license beauticians and cosmetologists as well.

As previously noted, several institutions of higher learning who are also leaders in the field of GIS have already established certification programs. In this section, we identify the common ground among several of these, with the idea of presenting a general model of certification. Several schools have developed certificate programs in GIS: the most well-known are Rutgers University, the University of Minnesota, the University of Wisconsin at Milwaukee, San Diego State University and Leicester University in England. In this paper, the focus is on programs in the U.S.

In researching this issue, a key step was to do an internet search to identify “GIS Certificate” programs. Typing in the key words “GIS Certificate” turned up over one million websites! Obviously, we have not reviewed every website; in fact, we examined only the first 30 websites generated from Alta Vista’s search engine. It turned out that several of the website listings from this group of 30 were listed multiple times, even within this limited search. In addition, many of the websites turned out to be personal home-pages and resumes, in which individuals identified themselves as having earned certificates in GIS. It is clear that the daunting million-plus GIS certification websites is a fallacy.

As already noted, existing programs in GIS certification run the gamut from vendor training programs to at least one MA program in GIS (U of Minnesota’s). The names vary, too: Master of Geographic Information Science (Minnesota); Certificate in Urban GIS (UWisconsin-Milwaukee); Geomatics Certificate (Rutgers). The number of courses required to earn certification also varies widely, from a low of 4 courses (Cal State - San Bernardino); to a high of 44 quarter hours (UMinnesota’s MA program). The types of courses that each program requires to earn its certificate are also relatively broad. For example, some require coursework in remote sensing (San Diego State) or aerial photography (University of Georgia), while others allow it as an elective option (Rutgers, Northern Virginia Community College). Still others build in applications or GIS management expertise (University of Wisconsin - Milwaukee; University of Texas-Dallas Social Science Division). Some, but not all, require a project or internship. In short, it is clear that GIS certification means many things to many people.

As one would expect, the programs at institutions with a strong history of GIS expertise have developed certification programs that are fairly similar, in spite disciplinary
differences. We are all aware, however, that in spite of the disciplinary differences, the individual GIS faculty know one another and interact professionally on a regular basis. Thus, there is no surprise in the similarities, and the programs are consistently rigorous. For example, among the examples outlined in the appendix to this paper, certification programs at the U of Wisconsin at Milwaukee, Rutgers and San Diego State all require seven or eight courses that cover GIS theory and concepts, technical skills and applications. San Diego State’s program (like Minnesota’s MA program) explicitly includes these three elements. The program at Northern Virginia Community College requires very similar coursework.

On the other hand, the program at California State University in San Bernardino requires just four courses. The undergraduate program at Cleveland State requires only five. The University of Georgia’s program also requires just five courses, but has a stiff list of prerequisites that includes calculus, computer programming, statistics and cartography, along with at least a 3.0 GPA in the program.

It is this lack of consistency among programs that points up the need for (at the very least) guidelines for GIS certification. The whole point of certification is to provide some certainty to potential employers of a certified professional that he or she is qualified to perform a specific job or hold a range of positions within an organization. In order for certification to have any real meaning, it must prepare its holder with a specific range of skills and knowledge. In this way, the certified professional knows that his or her certificate has value, just as the potential employer knows that the certificate means that the professional is, indeed, qualified.

The fact that a number of different institutions of higher learning have designed certification programs that are in the same ballpark strongly suggests that there is a consensus on the core range of skills and knowledge required of a GIS practitioner. Moreover, we can no longer argue that there is no umbrella organization to provide such guidelines. In fact, there are several organizations that could -- and should -- participate in the development of specific guidelines for GIS certification. URISA, UCGIS, ACSM, APA and the other sponsors of GIS/LIS, all have a role to play.

The question remains, how far should we go? Guidelines for the certification of GIS professionals at various levels of practice (entry level GIS operator, analyst, and manager, for example) would seem to be the minimum. From the perspective of employers, guidelines would assure that GIS certification would mean that a prospective employee has gained a specific, predictable level of competency (more or less). From the perspective of aspiring GIS practitioners, certification guidelines would assure that the seal of approval from their particular institution would be comparable to the seal from other institutions who also follow the guidelines. For institutions offering certification programs, a set of specific guidelines would let them know if they’re out in left field, or even in the ballpark at all! Guidelines would meet several critical needs at this time.

**Accreditation**

Accreditation would take this idea of guidelines much further, establishing a group of experts to assess the capacity of individual institutions to offer GIS certification programs. Accreditation standards address each component of the educational process,
including faculty, facilities, program requirements, and student body. There are many benefits to approaching the issue of GIS program quality at the institutional level through accreditation. To begin with, there are a relatively small number of institutions offering an education in GIS (although that number is growing). Second, the individuals at these institutions have already built networks (including URISA, UCGIS, the ACSM, etc.) that can serve as a foundation as an accrediting body.

The major impediments to developing an accreditation program in the past have been the lack of an umbrella organization to serve as an accreditation body, and the lack of acceptable models for accreditation. The close link between URISA and GIS, the rise of the UCGIS, and the institutionalization of GIS/LIS all point to the presence of enough concerned experts to consider accreditation. Moreover, the discovery of the similarities between the GIS profession and public administration, as well as the relevance of existing planning and surveying accreditation processes provides the GIS community with several models for accreditation.

Other issues in accreditation are thornier, however. For example, it is one thing to identify organizations with an interest in GIS who might provide either models or interested experts to develop an accreditation process. It is quite another to gain enough support for accreditation and find enough people who have the time to develop accreditation standards and agree to participate in accreditation studies to make accreditation an reality. In addition, the faculty, equipment, and resource requirements that accreditation standards are designed to enforce could limit too severely the number of institutions able to meet such standards.

**Toward Certification Guidelines**

GIS certification is a reality. While many members of the GIS community have either forgotten about the topic or relegated it to infrequent casual conversation, a number of institutions have identified a need and responded to it by developing their own programs. Some of these programs are outstanding, and deserving of imitation. Others, however, may be of limited value to both prospective employers and to aspiring GIS professionals, producing practitioners with a limited range of skills and knowledge which may or may not be relevant to the situation at hand.

We should not overlook the fact that the word “certification” itself holds value. When someone -- either prospective GIS employer or aspiring GIS practitioner -- sees the word “certified,” he or she often makes assumptions about what this means. It’s as though the person had earned the “Good Housekeeping Seal of Approval,” it’s a good thing. Institutions providing certification know this. And while we may want to assume that each and every GIS certification program was designed with the best of intentions, we should leave open the possibility that not all institutions offering GIS programs possess the knowledge to design a sound program. Let us, for now, only mention that the occasional institution of higher learning may well understand the marketing potential of a GIS certificate and care less about the institution’s ability to provide a sound certification program.

The time has come for the GIS community to develop a set of guidelines for GIS certification. Development of these guidelines should begin with a more systematic review
and analysis of existing GIS certification programs than this short paper provides. The review and analysis should identify commonalities among both the programs, laying the requirements out in a spread-sheet format. At the next step of the exercise, members of the GIS community should be asked to comment on the quality and efficacy of existing programs, as well as on what a certification program should include. A combination of surveys and focus groups, perhaps held in conjunction with various GIS gatherings, will help provide this important input. This input, along with the information on existing GIS certification programs, should enable a committee representing various components of the GIS community to reach consensus on certification guidelines, which would then be published through the adopting parties (URISA, UCGIS, ACSM, etc.), both in hard copy and on a web site.

It should be stressed that these guidelines would be just that: guidelines, not licensing. The guidelines would provide institutions that wish to develop a GIS certification program with a model for such programs. It would provide both prospective GIS employers and aspiring GIS practitioners with an objective means to assess the value of a certification program (“This program follows the voluntary guidelines established by URISA, UCGIS, ACSM etc. To verify this, check the URISA, UCGIS, ACSM, etc. home page for specific requirements.”).

The fact that institutions of higher learning are developing GIS certification programs, and that students are enrolling in them and employers are hiring the graduates of these programs is proof positive that GIS certification is an idea whose time has come. The issue now, is how can the GIS community assure that it will mean that its recipient is a competent and qualified GIS professional. Guidelines are a way to accomplish this goal.

References