

NMSU Geomatics - View From the Sidelines

Earl F. Burkholder, PS, PE, F.ASCE
Global COGO, Inc., Las Cruces, NM 88003
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This article provides background information on ABET accreditation activities as related to surveying and geomatics. A version of this paper was prepared for the Education Committee, ASCE Utility Engineering & Surveying Institute (UESI) - Geomatics Division. Not in the ASCE version, this item also highlights renovations being made to the NMSU Surveying Engineering Program. I was a member of the ABET Applied and Natural Science Accreditation Commission (ANSAC) from 1993 to 2002 (Commission Chair 2000/2001) and I taught in the NMSU Surveying Engineering Program from 1998 to 2010. Since I am retired and no longer involved in either organization, the title of this item is "View from the Sidelines."

Although ABET also serves other disciplines, these comments apply primarily to Surveying, Surveying Engineering, Land Surveying, Surveying Engineering Technology, and Geomatics as accredited by ABET. Links to two important ABET web pages are:

<http://www.abet.org> and <http://www.abet.org/about-ABET>

The Accreditation Board for Engineering & Technology (ABET) was formed in 1980 as the successor of the Engineers Council for Professional Development (ECPD) which concentrated on accrediting programs in professional engineering (EAC) and engineering technology (TAC). One way to describe the difference between those EAC and TAC accredited programs is that one required calculus and the other did not. Of course, that leads to a different occupational focus and activities. But, both EAC and TAC programs are important and each can lead to satisfying a career. In the more recent past, ABET has branched out and accredits programs in disciplines such as computing and applied & natural sciences. The math level of a program is still important but is not really a reliable discriminator between commissions. More recently, ABET focuses on outcomes of an educational program as evidenced by the performance of its graduates as measured against stated program objectives. ABET consists of representatives from 35 different member societies. Surveying in ABET is represented by the National Society of Professional Surveyors (NSPS) and the American Society of Civil Engineers (ASCE). There are no individual members of ABET.

Depending on one's perspective, surveying enjoys significant professional stature in both surveying and mapping as evidenced by development and use of the U.S. Public Land Survey System (USPLSS), by the generation topographic maps for the entire nation, and by establishment and use of horizontal and vertical geodetic control networks covering the United States. More recently, the surveying profession also participates in development and use of geographic information systems (GIS) that support the use of spatial data in many sectors of the economy. Accomplishments and success stories are legendary.

Another perspective is that, through state licensure, the surveying profession is charged with the responsibility of establishing and re-tracing boundaries (cadastral) for both private ownership and lands held by government agencies (the BLM is an exception). Many principles are the same for both perspectives, but a difference of opinion often exists as to which perspective is more important, or which perspective deserves more respect. Given that those two perspectives are not mutually exclusive, much of the dialog between the two is constructive. But it is also true that adherents to one perspective become defensive (and arguments become heated) if and when they do not get the respect and/or

recognition they deserve from adherents of a different perspective. The challenge, especially with regard to ABET accreditation, is to build on common ground for the benefit of the public.

Other issues (such as construction staking, machine control, FEMA elevation certifications, and spatial data standards) contribute to the discussions but the impact of the digital revolution (disruptive innovation) is viewed as a common denominator to many challenges. It appears that surveying is unique in that both soft and hard sciences (law and physics) are an integral part of professional practice. Although it can become expensive, courts are the ultimate arbiter to legal issues and boundary disputes. On the other hand, peer-reviewed publications and the authority to develop/enforce standards are viewed as the ultimate authority on technical issues. In a pragmatic manner, the various state boards of licensure must accommodate both perspectives as their mandate is to protect the health, safety, and welfare of the public against incompetent practice. It is not fair to suggest that licensing boards are not interested in accreditation issues but, sometimes, the dialog has educators emphasizing the importance of rigorous educational programs while licensing boards and state societies (practicing surveyors) insist that legal issues and the responsibility for protecting the rights of land owners are what really define the surveying profession. Of course, many persons understand and are well-versed in both perspectives.

In 1955 ASEE published the Grinter Report which laid out a plan for the future of engineering education. That report emphasizes theory and rigor while downplaying the “hands-on” component of engineering education. The Grinter Report did not include surveying as a significant part of engineering education or practice. The impact of the Grinter Report as it affected the surveying profession is summarized in a paper presented at the 2012 ASCE International Conference on Computing in Civil Engineering, in Clearwater, Florida. A link to the Grinter Report is included in that paper.

<http://www.globalcogo.com/ASCE3D2012.pdf>

As a result of the Grinter Report, many civil engineering programs began to reduce surveying content with, some would say, devastating consequences. During the 1960s and 1970s, several educational programs were established that focused on surveying. EAC accreditation for surveying was a problem because surveyors need courses in boundary location, legal issues, and land development rather than courses in, say thermodynamics, structures, or concrete design. Engineers (and licensing boards) typically suggested that the TAC criteria should be used for surveying accreditation. Thankfully, visionary leaders insisted that surveying involves more than technical issues and that the professional stature of surveying warranted accreditation on par with engineering. John McEntyre at Purdue University was a vocal advocate for surveying and was instrumental in the formation of a third accrediting commission within ABET, the Engineering Related Accreditation Commission (RAC). The surveying program at the Oregon Institute of Technology was re-designed in the early 1980s and became one of the first two programs accredited by the RAC in 1984. Information on the OIT program and their accreditation experience is included in the following links:

BS RAC at OIT 1984 - <http://www.globalcogo.com/BSOIT1984.pdf>

RAC at OIT 1987 - <http://www.globalcogo.com/RACatOIT.pdf>

Although surveying was the first discipline included in the RAC, other disciplines have been added and the name of the commission has evolved from the Related Accreditation Commission (RAC) to the Applied Science Accreditation Commission (ASAC) to the Applied and Natural Science Accreditation

Commission ANSAC. Since 2005 ABET operates under the ABET acronym and presently includes the following commissions:

- Engineering Accreditation Commission (EAC)
- Computing Accreditation Commission (CAC)
- Applied and Natural Science Accreditation Commission (ANSAC)
- Engineering Technology Accreditation Commission (ETAC)

Each commission within ABET operates according to its own General Accreditation Criteria. Those criteria have been “harmonized” to the extent possible to exploit similarities between commissions while preserving the uniqueness of each commission. Furthermore, there are Program Criteria developed for each program category accredited by ABET. The program criteria are developed in concert with the member society having curricular responsibility in the discipline.

Two points to be made here are:

1. Surveying has programs accredited in three different commissions, EAC, ETAC, and ANSAC. (A 2015 list of programs and commissions is posted at www.globalcogo.com/ABET-sur.pdf)
2. Two separate member societies having curricular responsibility in surveying include:
 - a. National Society of Professional Surveying (NSPS)
 - b. American Society of Civil Engineers (ASCE)

NSPS is the Lead Society for surveying program criteria while ASCE is a Cooperating Society.

With exception of subjective points made in the links cited above, the information to this point is intended to be “factual.” The following represents the views and aspirations of the author and is intended to promote discussion of various viewpoints. Many differences in perspective as described earlier are deep-seated and long-standing – often with good reason. Somehow, efforts to develop a more robust surveying profession must transcend those differences. That requires discussion, listening, cooperation, and a commitment to mutually beneficial goals in the context of modern practice and the use of 3-D digital spatial data. **The caveat is that, rather than protecting existing “turf,” discussions and subsequent actions should enhance competent professional practice in our collective service to society!** I am reminded of a quote by Edward Markham, Oregon Poet Laureate 1923 to 1931.

*He drew a circle that shut me out,
Heretic, rebel, a thing to flout.
But, love and I had the wit to win,
We drew a circle that took him in.*

Of course, an intended (secondary) consequence is that the surveying and engineering professions will both be recognized for visionary leadership and be viewed with greater stature and reputation within society. Absent appropriate action by professional leaders, the gap between what society deserves and what society gets will continue to grow. That gap (vacuum) is already being filled by others from the broader geospatial community – examples include ‘drones’ and the 2017 Geospatial Data Act.

Challenges:

The following articles contain information intended to foster discussions on the future of surveying.

- This article provides an abstract view of our (surveying) use of geospatial data.
<http://www.globalcogo.com/setepaper.pdf>
- This article gives specific suggestions to West Fed for the future of the surveying profession.
<http://www.globalcogo.com/WestFed.pdf>
- This article reaches out to the larger geospatial data user community.
<http://www.globalcogo.com/GIS-GSDM-Bridge.pdf>

The Rejuvenated Surveying Program at NMSU:

The 4-year NMSU Surveying Program was started in the early 1990s with Dr. James P. Reilly as Department Head. When I joined the faculty in 1998, the program was accredited by the Related Accreditation Commission of ABET. With previous accreditation experience, holding both PS and PE licenses, and being familiar with geodetic surveying practice on large projects (nuclear power plant sites and high voltage transmission lines both domestically and internationally), I was delighted that NMSU faculty and administration opted to request ABET accreditation under the EAC for the Surveying Engineering Program. The visit was conducted in the fall of 2000 and, being successful, the program was accredited retroactively effective for the 1999 graduates.

Several comments about ABET accreditation policies:

1. ABET accredits only programs – not institutions.
2. The nominal (maximum) accreditation cycle is 6 years. The NMSU Surveying Engineering Program was first evaluated in 2000, again in 2006 and again in 2012. The next “normal” visitation cycle is for the NMSU Surveying Engineering Program to be evaluated again in fall of 2018.
3. All EAC accredited programs must have the word “engineering” in the degree title.
4. The “new” NMSU Geomatics degree is called Bachelor of Science in Geomatics.
5. Presumably, the next ABET visit will evaluate the NMSU Geomatics program according to the ANSAC criteria. The goal of that commission is to provide professional level accreditation for surveying programs. That is an appropriate ABET accreditation for NMSU Geomatics program.
6. ABET’s policy is to work with institutions in a collaborative manner to handle transitions without denying students the opportunity to earn a degree in an “ABET accredited program.”

Of the many persons who deserve recognition for their efforts to rejuvenate the NMSU Surveying (Geomatics) Program, make sure you offer support and congratulations to:

- Dr. Kurt Wurm – he is carrying a big load and has responsibility for making it work.
- Dr. Jenkins and Dr. Cooper, NMSU Department Head and Associate Dean for tirelessly working to garner the support of many persons and for orchestrating design of the Geomatics Program.
- Geomatics and spatial data educators at all levels in the broader professional community.
- NMSU Officers and members who “dug deep” to put their money where their mouth is.
- The NMPS lobbyist who arranged for a \$200,000 gift from the PNM Resources Foundation to enhance educational opportunities for persons choosing a career in surveying.
- Current and future students who are the real future of our profession.