

## **President's Angle**

### **New Mexico Professional Surveyors Benchmarks**

Earl F. Burkholder, PS, PE  
2009 NMPS President  
March 1, 2009

By way of introduction, I have been teaching in the Surveying Engineering Program at New Mexico State University since 1998 and am honored to serve as the 2009 President of the New Mexico Professional Surveyors (NMPS). I welcome this opportunity to share thoughts with the hope that we may all be inspired to take more pride in our profession. Or, even better, I believe that this column will have an even greater impact if the reader is motivated to react or to write a letter to the Editor. Such letters can reinforce a point made by others, take issue with a stated assumption, develop a counter argument, call an author to task for possible mis-statements, or otherwise lay "cards on the table." If done respectfully (my intent), I believe that honest discussion of differing viewpoints can be very beneficial in promoting the stature and reputation of the surveying profession.

I've had numerous mentors in my career and owe much to those who have provided words of encouragement, to those who have been patient with my pace of learning, and to those who have challenged me to uphold the integrity of our profession. I wish I could say I have "arrived." But, I am still a work-in-progress and, like many, I still wrestle with finding the appropriate balance between "going along to get along" and "sticking to my principles." I continue to look for guidance from those with more experience than I and I keep learning from many who have a better understanding of various issues.

After being in the surveying profession for over 40 years, I also realize that I have become a mentor to a new generation of professionals and that I have an enormous responsibility to those who look to me for guidance. I like teaching because the work is steady, because I like the schedule, and because I enjoy sharing in the learning process. Those are selfish reasons and not sufficient to justify my privileged position as a surveying professor at New Mexico State University. I believe that there are larger issues to be considered and one goal in writing this column is to invite others (you) to look at the larger issues with me.

If, as often stated, we expect surveying to be counted as one of the learned professions, then the responsibility of those of us who teach is awesome indeed. I count myself as very fortunate to be able to work with talented persons who, like me, are dedicated to the surveying profession. The combined talent of the surveying instructors at NMSU has both breadth and depth and anyone enrolling in the NMSU surveying engineering program has an opportunity to gain an excellent education. But, becoming a successful graduate and, subsequently, a profitable practicing professional also depends upon the individual. The opportunity is there for all who enroll and it is no secret that earning a BS degree requires dedication and a lot of work. Each reader should also understand that

not all surveying instructors in NM teach at NMSU and that surveying education also occurs outside the classroom. Furthermore, please understand that I speak for myself. Others are free to support, challenge, clarify, or add to these comments. I see that too as part of the diversity and strength of the surveying profession.

Now, back to those larger issues. I will identify some as I see them. Undoubtedly there are others and the ones I discuss are from my perspective. You, the reader, also have unique insights and certainly have valid opinions about the issues. In order to get the discussion started, I offer the following:

***The evolution of technology during the past 50 years has had an enormous impact on many professions and, in fact, our whole way of life. Not only does it affect what we do and how we earn a living, the evolution of technology also impacts development of our value system, how we interact in our communities, how we raise our children, and a host of other issues - both local and global.***

No, I don't have answers for those huge issues, but I want to make the following points with regard to the surveying profession:

1. Responsibility for the health and continuing development of the surveying profession is a collective responsibility of all surveying professionals not just the educators. Yes, we educators like to think we have answers (and sometimes we do). But every practicing professional has a contribution to make and we should all take pride in participating in this exciting profession.
2. Technology is challenging. The manufacturers and vendors bring us a wide range of tools, gadgets, and equipment. All we need to do is purchase those items we need to make our efforts productive and profitable. Such purchase decisions vary as we search for that combination of hardware and software tools that we need and can afford. The irony for me is that there is a lot more "talent" built into the hardware and software that I buy than I know how to use. True, the tools enable me to do more and to do it better, but I get impatient with myself when I realize I am using only a portion of the capability of the tools (this word processor being an example). And I find myself wondering sometimes if maybe I should spend less time trying to do things right and focus more on trying to do the right thing. Hopefully, those two are not mutually exclusive.
3. Education and training are both essential. The arguments in favor of one over the other are probably older than any of us, but I do not believe that either can be justified to the exclusion of the other. The vendors are not serving their customers well if they focus on education to detriment of training and we educators are not serving our students well if we focus on education to the detriment of training. Finding the proper balance remains a challenge for everyone. However, putting on my educator's hat, I will continue to insist that students and professionals are ultimately responsible for the "why" as much as the "how." My suggestion is that education without training is time wasted and that training without education is also

time wasted. In looking for the right balance between education and training we should recognize the importance of life-long learning (education beyond the classroom) and the value of hands-on experiences (training while still in school).

4. My final point is that, for the reasons just given, I believe that the 21<sup>st</sup> century can be the best of times for the surveying profession. With the digital revolution well advanced and with so many gadgets available, more and more persons in various disciplines are using spatial data. The gadgets and tools are available and are being used. But, do the novice users (or even seasoned professionals) always get the right answers? What happens if the technology is misused? Do we really understand the consequences of getting it wrong? What does it take to establish and prove the accuracy of spatial (oftentimes survey) data? How are spatial data related to property boundaries? To what extent can we rely on digital maps (such as elevations on Google Earth)? What about the reliable location of the constructed facilities? Is machine control really a cost saver for contractors? Surveyors have a reputation of being the measurement professionals and society looks to us for competent surveying services. We are trained to collect evidence, to evaluate evidence, and to address the needs of our client. I'll suggest that is true whether we are doing a site plan, a new subdivision, a retracement survey, a flood plain certification, or a host of other digital products being generated by the new technology. Oh my... we've just gotten started. I believe it promises to be an exciting journey. We need your help.

My goal as President of NMPS is to begin and continue discussion of many issues with the idea of finding ways that we, the existing surveying profession, can join (and on occasions lead) the parade of spatial data users and professionals in an ever expanding scope of services to modern society.

## **President's Angle**

### **New Mexico Professional Surveyors Benchmarks**

Earl F. Burkholder, PS, PE  
2009 NMPS President  
April 11, 2009

The 2009 NMPS Annual Conference was March 13 & 14, 2009 and a follow-up NMPS Board of Directors (BOD) meeting was held in Farmington, New Mexico, April 4, 2009. For those who might not know, most of the work associated with being an elected officer of NMPS occurs during the year one serves as President Elect. The President Elect is responsible for planning the NMPS Annual Conference held during the following year. That way the NMPS President can be intimately familiar with all aspects of the conference. Although not perfect, that system works quite well and, once the Annual Conference is over, the President is free to devote more time to NMPS Board and committee activities. By comparison, the remaining months of the President's term and the following year as Past President are not so intense. I look forward to that.

I am happy to report that, although overall 2009 conference attendance was off about 6% from 2008, the conference was quite successful. Given the bleak economy facing many, we are grateful to all who attended and supported NMPS, to the vendors (we had 2 more than last year), to the speakers who presented interesting and thought provoking material, to the moderators who facilitated smooth operation of the workshops, and to the students from NMSU who generously donated their time and assisted in many ways.

A huge benefit for me in serving as an officer of NMPS is learning to know more of you - NMPS members. I have become more aware of many wonderful persons who are active in NMPS. There really is a huge well of talent within NMPS and I, as NMPS President, have been encouraged to draw freely from that well for the benefit of the organization. At the risk of not recognizing some that I should, I want everyone to know that; for starters, we are all deeply indebted to the following persons.

Our Executive Director, Patty Floyd, is the one who really deserves credit for a successful Annual Conference. Patty and her assistants do an excellent job of coordinating the logistics, arranging the facilities, soliciting and assisting the vendors, making travel arrangements for the speakers, securing door prizes, making sure coffee and rolls are readily available, preparing handout materials, and many other details. Patty, thank you! We all appreciate your efforts on our behalf.

There are several other examples I'd like to cite. First, Gary Eidson is the 2009 President Elect and will serve as NMPS President in 2010. After serving approximately 10 years as Treasurer of NMPS, Gary stepped forward to fill a vacancy in the rotation of NMPS officers. As NMPS President Elect, Gary has already begun planning the 2010 Annual Conference and, barring widespread economic catastrophe, the 2010 conference should be even better and more fun than the one just ended.

Kery Greiner is another person who is making a huge contribution to NMPS. Last fall, Gary Eidson asked me to find someone else to serve as NMPS Treasurer starting in January 2009. Responsibility for that Presidential appointment first appeared quite daunting, but I asked for help from the NMPS Board and ended up with the delightful dilemma of choosing between two well qualified persons willing to serve as NMPS Treasurer. Thank you Kery for your willingness to serve NMPS members as Treasurer. Your leadership is already being realized in beneficial ways. Thanks to Gary Eidson's frugal diligence, NMPS finances are in good shape and Kery, we look to you to keep NMPS solvent.

The NMPS newsletter, Benchmarks, is one of the most visible benefits of NMPS membership. Karen Bennett served as Editor of the Benchmarks for 9 years and, in spite of routine problems, she consistently delivered a high-quality publication that served NMPS members very well. Due to health and related care-giving issues, Karen asked NMPS to find another Editor. We all owe Karen a huge debt of gratitude for the excellent service she provided. Oh my. . . how do we go about replacing her talent? Here again, the challenge was presented to the NMPS Board of Directors and Barry Phillips stepped forward to embrace the opportunity of serving as Benchmarks Editor. Barry published his inaugural March 2009 issue, just after the Annual Conference. This is the second issue for which Barry is Editor. Thank you Barry for accepting the challenge of publishing the Benchmarks and for maintaining the high standards of your predecessor. NMPS is committed to assisting you in any way possible and I know you will not be bashful in asking NMPS members for materials. We all want Benchmarks to reflect the vitality of the surveying profession in New Mexico.

Other persons deserving recognition are the NMPS Committee Chairs and Liaisons to various organizations. Discussions at the NMPS Board meetings are quite interesting because the committee chairs do an excellent job of organizing their materials and reporting on committee activities. Some of the committee chairs are there as a result of office they hold and other positions are filled by direct presidential appointment. Persons serving NMPS during 2009 are:

<u>NMPS Office/Appointed</u>	<u>Person</u>	<u>Committee Chair/Representative to</u>
President	Earl F. Burkholder	NMPS Executive Committee
Past President	Tom Patrick	Web Committee
President Elect	Gary Eidson	2010 Conference Committee
Vice President	Allen Grace	Nominating Committee
Treasurer	Kery Greiner	Finance Committee
Editor	Barry Phillips	Benchmarks Committee
Appointed	Allen Grace	Legislative Committee
Appointed	Tom Patrick	Surveyor-of-the-Year Committee
Appointed	Allen Grave	Ethical Practices Committee
Appointed	Kery Greiner	Western Federation of Professional Land Surveyors
Appointed	David Cooper	Western Federation of Professional Land Surveyors

Appointed  
Appointed

Glen Thurow  
David King

ACSM M.O. - NSPS Governor  
Representative to the New Mexico  
Geospatial Advisory Committee

The NMPS Chapter Officers and Directors – listed elsewhere in this issue – also deserve recognition for their service to NMPS. Second only to (or, if information flows freely in both directions, more important than) the impact of the Benchmarks, the Chapter Officers and Directors provide direct communication between the NMPS Board of Directors and the NMPS membership. The role of Chapter Officers and Directors is vital because that personal contact with local NMPS members fosters greater ownership in NMPS policies and practices. All NMPS members are encouraged to attend local chapter meetings and to make sure your chapter officers know your feelings on various issues. It is the Officers' and Directors' responsibility to convey collective Chapter sentiments to the NMPS Board of Directors. Officer/Director participation on the NMPS Board is also critical because it facilitates the continuity of discussions from one year to the next.

There are other organizational issues I'd like to discuss but those will need to wait until a subsequent issue of Benchmarks. In the meantime, I'd like NMPS members to be thinking about, discussing, and providing input on the following two items. In my opinion, the surveying profession has a huge stake in and is making valuable contributions in both cases.

1. What is the best or most appropriate way for New Mexico surveyors to enhance our interaction with the GIS community? Other reasons may be more important but, one reason I chose to hold the 2009 NMPS Annual Conference in Albuquerque, instead of Las Cruces or some other place, was to preserve the continuity of bringing local high school students in to visit the conference so they can see first-hand what it is that surveying is all about. Some of those students may end up in the surveying profession (that is great) but a greater number (not all) of them will probably find themselves working with spatial data in one form or another (and using GIS tools). Regardless of who does it, I believe that the persons and organizations responsible for planning and hosting those high school student visits deserve our appreciation and continued support. I've described only one of many examples that can be listed. For example, see the article on GIS Coordination in the March 2009 issue of Benchmarks.
2. What is the best or most appropriate way for New Mexico surveyors to enhance our interaction with the engineering and photogrammetry disciplines? This item may be somewhat more controversial than the first because there is a longer history of professional interaction. In the past, dedicated persons in various disciplines have articulated their positions well and, in some cases, remain resolute in them. That in itself is not bad. A well-thought-out position is personal and very valuable. This next comment goes both ways and applies to all of us. We all need to listen to each other with respectful attention. As new evidence becomes available, sometimes it is difficult to modify what we believe. The philosopher, Bertrand Russell once stated, "It is one of the rarest gifts to be able to hold a view with conviction and detachment at the same time."

In my opinion, the digital revolution is forcing many of us in traditional practices to acknowledge that an expanded skill set is required to handle 3-D digital spatial data competently, e.g., GPS, photogrammetry, Lidar, 3-D laser scanning and other remote sensing products. Yes, we can and do adopt new technology into our practice. That is good and many (but not all) of us do it routinely. However, it may be unsettling to realize that we surveyors are not the only persons capable of buying and using the multitude of measuring technologies, positioning gadgets, and databases so readily available. And it may be even more unsettling to discover that talented “technicians” (or related professionals) are better than we at collecting, processing, and using spatial data in a host of applications that may even include some of those activities traditionally coming under the “surveying” umbrella – geodetic surveying, 3-D laser scanning, photogrammetric mapping, deformation monitoring, and others. I believe the surveying profession is capable of making huge contributions to the spatial data user community and that there are many opportunities for us to pursue.

But boundary and cadastral surveying remain enormously important – especially in the licensure arena - and those are unique to surveying. But really, isn't it naïve of us to suggest that having a surveying license somehow qualifies us to offer/perform high-tech services or that one must be licensed as a surveyor to offer those services to the public? Yes, yes, a surveying license is certainly required of those offering services that include determination of land boundaries. But, this whole line of reasoning leads to a narrow definition of surveying with which I am not comfortable. What do you think?

In a subsequent column I plan to focus on the importance of education in meeting some of the challenges of successful interaction with a variety of spatial data professionals. As a way of starting that discussion, I'll ask a rhetorical question - which do you feel is more important, learning specific curriculum content or learning how to learn? Is there a difference?

## President's Angle

### New Mexico Professional Surveyors Benchmarks

Earl F. Burkholder, PS, PE  
2009 NMPS President  
June 13, 2009

One of the reasons I enjoy teaching is this thing called “summers off.” I turned my grades in several weeks ago and now I have nothing to do for the entire summer – **not**. As stated in a previous column, my motivation for work and professional participation must extend well beyond a paycheck and my selfish preferences. FYI, I am deeply committed to development of our collective professional capacity and see that as a journey, not as a destination. Yes, my summers are also quite busy, but enjoyable.

I hope to keep this column short, but in keeping with previous rhetorical questions about “learning how to learn,” I will also encourage the reader to ponder issues that may extend beyond the obvious. In the May 2009 President's Angle, I recognized a number of persons who keep NMPS running smoothly. Yes, that was a good start, but I have also come to realize that there are many others who are making valuable contributions. Many talented dedicated persons are members of NMPS and I am humbled to serve as your President. To everyone doing a good job day after day – thank you! Keep it up. The collective finesse with which we do our work contributes to the integrity and reputation of our profession. Using the Biblical phrase (Matt 5:15); let's not hide our light under a bushel. And, oh yes, my previous comment about the NMPS President having less to do after the Annual Conference – I must have been dreaming. That simply is not the case.

Elsewhere in this issue you will find a report on Height Modernization and the Precise Digital Leveling Workshop held in Albuquerque in May, 2009. Be sure to read it and talk with persons who attended. I see that workshop as a step in the right direction and evidence we are “doing it for ourselves.” I will do what I can to build on the enthusiasm exhibited by those participants. Our professional journey can be an enjoyable one if we continue to share our successes and join forces to meet the challenges ahead.

Education: What is the difference in learning and learning how to learn? I do not have the answer but I invite each reader to give it some thought. One event that made a difference for me was a fluid mechanics class at the University of Michigan in which the professor was also the author of the text. Now fluid mechanics had a reputation of not being an easy class and Victor Streeter was a no-nonsense professor. Upon returning an assignment in which the class performance was less than stellar he commented, “Look - as engineers, people's lives will depend upon your understanding and correct use of the concepts, not just your ability to use an equation or piece of equipment.” I think many will agree that rote learning can be beneficial. We all do it. But as an educator I will push concepts and as surveyors (boundary, measurement, and development professionals) we are judged, in part, by how well we apply and use surveying concepts correctly.

Without carrying that logic very far, I am a victim of my own scenario. I am not an electrical engineer and I struggle to understand what happens with all those bits and bytes chasing around in my computer or GPS receiver. In modern practice, most of what we do involves or relies on electronic signal processing. We need to rely on others for competent application of concepts in their domain and our clients need to rely on our competent application of surveying concepts. I see the spectrum between extremes of rote applications and “writing the book” as continuous and including many concepts. The point is not where we are on the continuum but in what direction we are moving. In my case, I am grateful for the opportunity I had to write a book on spatial data models but in other areas I am closer to the rote end of the spectrum. Nevertheless, I am committed to progress and enjoy learning in other areas. Incidentally, just because I wrote a book does not mean I’ve arrived there either. Watch the professional literature for evidence that I did not go far enough.

More to the point of learning and learning how to learn, I offer two imperfect analogies - walking versus learning how to walk and production versus building tools of production. You, the reader, will certainly think of others. Learning how to walk is fundamental to many life experiences. How do we learn to walk? Some, but not all of the learning elements include desire, example, encouragement, practice, failure, and more practice. Where does understanding fit in? Maybe that comes later. To learn how to walk, you must do it. But, knowing how to walk does not make one an athlete. To be a successful athlete one must practice, practice, practice. But the successful athlete will also devote time and effort to understanding concepts such as diet, development of muscles, lung capacity, endurance, attitude, and steroids (?).

The production example may be out of date. The Industrial Age is past and many of us have come to grips with living in the Information Age. Even so, the standard of living we enjoy owes much to those who “make things.” The question I wish to raise is who makes the tools used in production, e.g., generators, welders, lathes, grinders, trucks and robots? And how do they make the tools used to make those tools? I don’t have the answer but enjoyed reading the book, “A Whole New Mind: Moving from the Information Age to the Conceptual Age” by Daniel Pink. He has much to say about how we marshal brain power in supporting activities of modern society – on a global scale. I find it fascinating to read about the endless potential and opportunities that are available to those persons who take the time to understand and apply fundamental concepts. I submit that even though we know how to learn, we should also pay more attention to how and what we learn. It is an on-going effort and can be enormously satisfying.

In each column, I try to provide a clue as to what will be in the next column. It occurs to me that success in many endeavors involves two separate issues – content and process. Both are required and should be used in concert. Is one more important than the other? Or, what happens if one is promoted at the expense of the other? Oh my . . . that is a huge can of worms – stay tuned.

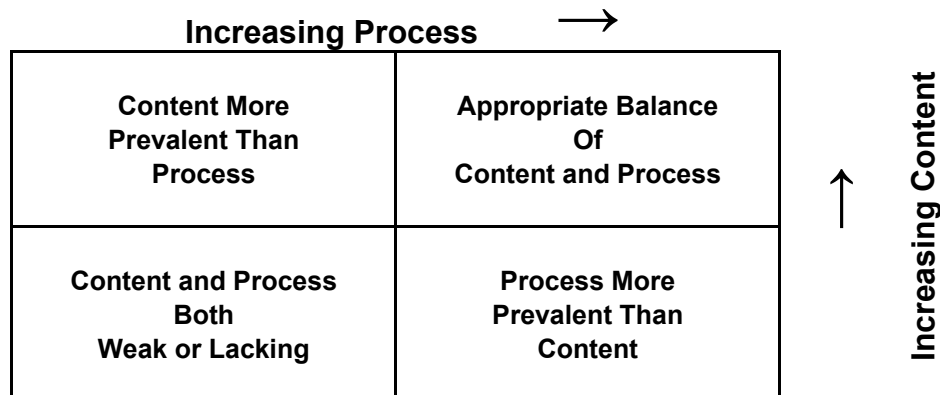
## President's Angle

### New Mexico Professional Surveyors Benchmarks

Earl F. Burkholder, PS, PE  
2009 NMPS President  
August 14, 2009

In the July 2009 column, I promised to discuss process and content. In the big picture I see “process” as related to doing things right while “content” is more related to doing the right thing. A successful manager is one who excels in doing things right while a good leader has the vision and ability to do the right thing. It is not a matter of doing one to the exclusion of the other but many people have more talent/aptitude for one or the other. Very talented individuals sometimes excel at both. If we can agree that process and content are not mutually exclusive then we may benefit from this inquiry that looks for an appropriate balance in whatever endeavor we find ourselves.

At the risk of oversimplifying the issue, I offer the following two-dimensional matrix of characteristics. Of course, the best result is one in which process and content are both present in proper proportions. The consequence to be avoided is where process and content are both absent or defective (that is why most bank robbers end up in jail - they do the wrong thing badly).



Most successful endeavors involve an appropriate mix of both process and content. A successful vision must be built upon reliable content. But, vision without supporting process often makes little progress. On the other hand, process without the foundation of content is often weak or shallow. Let's consider several rhetorical questions and examples – especially as related to education, surveying, and professional practice.

1. What is more important, learning (training) or learning how to learn (education)?
2. What is more important, measuring the right line or measuring a line correctly?

3. What is more important in the process of becoming licensed, being able to pass the exam or acquiring the requisite education, experience, and references?

I submit that none of the questions has a simple either/or answer. But my intent is that we read the questions, mull them over in our minds, and discuss our insights with others. As you do that, please be open to differing perspectives and be willing to share your ideas with fellow professionals (write a letter to the Editor or submit an article to the Benchmarks). That, I believe, will ultimately move us all up and to the right on the content/process diagram and will help enhance the stature of the surveying profession.

I'll start with the education question first. The surveying profession includes an enormous amount of content, i.e., concepts we should know, understand, and be able to use. On the other hand, I am one of those who feels intimidated at times by the onslaught of tools, gadgets, and processes inherent in this thing called the digital revolution. Oversimplifying again, education (learning and understanding the concepts) is the foundation of our professional activities while training is required for us to learn how to use the equipment/gadgets properly and productively. Do I know the right balance? No, but I can see where finding the right balance becomes a dilemma for educators, vendors, practicing professionals, and licensing boards. Each of us brings a different perspective to the question and we will not arrive at the same conclusion. But, I am optimistic that working together, asking good questions, and sharing experiences does make a difference in the quality of service the surveying profession provides the public. Re-statement - open discussion benefits everyone.

Question 2 has been around for nearly 100 years. In the Preface of "Boundaries and Landmarks," A.C. Mulford writes in 1912 (see link at end of column) - "It is far more important to have faulty measurements on the place where the line truly exists (content), than an accurate measurement (process) where the line does not exist at all." Note that I have taken the liberty of inserting two words. I am not aware of anyone really arguing with Mr. Mulford but I have heard "content" people use that quote as an excuse for making sloppy measurements – such as not calibrating their EDM, ignoring prism offset, or other "process" issues. In an article, "Cadastral Survey Accuracy Standards," Belle A. Craig and Jerry Wahl write in the ACSM SaLIS, Vol. 63, No. 2, 2003, pp 87-106, about the Mulford quote and include several paragraphs of analysis by Ben Buckner writing in the September 1997 issue of Professional Surveyor. Those too are worth reading and re-reading. I think everyone would agree that it is best to include both process and content and to measure the true line correctly. Craig and Wahl offer a corollary to Mulford's quote as, "An *inaccurate* measurement, even if on the correct line, is a source of unending mischief."

Lastly, it is not fair to single out the licensing board in the third question because the issues are fundamental to the entire surveying profession. Should entry into the profession be based primarily on content criteria or process criteria? Again, what is the right balance? Undoubtedly, the New Mexico Board of Licensure (BOL) has an enormous responsibility in protecting the health, safety, and welfare of the public and I do not wish to fault any of our BOL members. But, the content/process issue needs to be raised in that context as well. Many non-surveying experts have become quite proficient

with gadgets and new technology (process) and there are persons who also possess the background (content) to competently handle issues such as spatial data accuracy, machine control, LiDAR, laser scanning, and photogrammetric mapping. I agree that surveying practice (and licensure) should legitimately include those activities but I need help understanding the following in terms of process and content.

1. Although many surveyors do a good job of keeping up with new technology, having a surveying license does not insure that a person has the level of knowledge/skill society can legitimately expect from our profession. Is the public sufficiently protected by our professional ethics which stipulate that we will not offer services outside our area of expertise? Overall, I would say “the system” works but many of us also devote a lot of energy and effort to staying current. My question – how do we allocate our efforts between process and content? How does that tie in with mandatory continuing education or planning for Annual Meeting programs? Does it matter?
2. The converse of the previous statement also needs to be addressed. Not having a surveying license does not necessarily mean a person is not qualified to perform various surveying related services (machine control, LiDAR, laser scanning, photogrammetric mapping, etc). What is surveying? If the broad definition of surveying is used by the BOL (NM Engineering and Surveying Practice Act, Section 61-23-3), then what about those engaged in unlicensed practice? Is the public not being protected or maybe, more importantly, is the public being harmed? Question – what should be the balance of process/content in the BOL’s licensing and enforcement efforts?
3. I think everyone agrees that boundary surveying is an activity for which proven competence is absolutely essential. But boundary surveying is only a part of those activities routinely encountered in the broad practice of surveying. Should competent persons be barred from offering services to the public in related areas because they lack the requisite boundary experience to be eligible to take the licensing exam? For some, boundary surveying never will be part of their service to the public. In part 1, I noted that we invoke professional ethics as a protection to the public against licensed (boundary qualified) persons operating beyond their area of expertise. Should it also work the other way? If the surveying BOL backs off on the boundary experience requirement to the point other spatial data professionals can become licensed, can professional ethics be relied upon to provide sufficient protection to the public? Conceivably a person could/should first obtain a “generic” surveying license, but additional qualifications would be required to qualify as a “boundary surveyor.” That plays to a two-tiered system that does not enjoy wide support. But, as we (the profession) also look at process/content issues, is it possible the two-tiered system offers an acceptable alternative. What do you think?

I try to look at both sides of an issue, but I readily admit that I often focus more on content than process. On the other hand, administrators and efficient business operations often tend to focus on process to the detriment of content. I after writing this column, I read a compelling article on page 68 in the August 17, 2009 issue of Business Week by

Henry Mintzberg, Cleghorn Professor of Management Studies at McGill University. He makes the point that “We’ve been Overled and Undermanaged.” He raises excellent points and brings a balance to the process/content discussion. I recommend it for your reading. See his 1-page article at the following link.

[www.globalcogo.com/process.pdf](http://www.globalcogo.com/process.pdf)

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Question to be discussed in the President’s Column in the next issue of Benchmarks –

What can or should surveying professionals do to ensure continued viability of our profession? Should we hunker down and focus primarily on the boundary issues or should we open up the profession and embrace others who, although they may do extensive work with spatial data, might not have the background, insight, or motivation to understand real surveying. Is it possible or desirable to have it both ways? Feel free to share your thoughts – the deadline for the November 2009 issue of Benchmarks is October 20, 2009.

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The following is a link from which a free pdf file (2.93 mb) of Mulford’s book can be downloaded.

[www.archive.org/details/cu31924004602615](http://www.archive.org/details/cu31924004602615)

## President's Angle

### New Mexico Professional Surveyors Benchmarks

Earl F. Burkholder, PS, PE  
2009 NMPS President  
October 23, 2009

In the September 2009 column, I promised to speculate on what surveying professionals might do to ensure the continued viability of the surveying profession. In a word, "participate." I have no crystal ball, but I fully anticipate that the future of surveying lies between two extremes – as a profession, surveying will not go away but neither will surveying ever arrive at that state of perfection we all dream about. If we can agree that our individual participation is more important than some nebulous state of perfection, then I am optimistic that our professional journey can be more satisfying for us as individuals than if we assume the role of a critical cross-country spectator who chides the runners for not trying hard enough. I believe the profession will ultimately benefit the most from that collection of persons who participate and give it their best effort.

Maybe I should practice what I preach. The following is a story but it contains some truth. I'm sure you'll get the point. I and my family have moved a number of times in which we were new to the community. With each such move, the issue comes up as to what church we should attend. It is interesting to visit various congregations and to get a feel of community/dedication/service and other attributes. We've made the observation that it really is difficult to find the perfect church. But, guess what, one day we found it. What a joy. Then, following up on several visits and discussions we decided to join "the perfect church." My, my, can you imagine our disappointment when we then came to realize that this perfect church was not so perfect after all – like us, people there also had foibles. Humm. . . No organization or group of humans is perfect!

Once aware of the imperfections, it becomes easy to just quite attending and/or to become uninvolved. Is that the attitude we take with our profession? If the group or organization does not do what we want or does not embrace the values we hold important, then we feel justified in taking our "business" elsewhere. Wait! Stop right there! Now ask, "In such a case, who loses?" In terms of what does not happen, both sides tend to lose and ultimately status quo degenerates into mediocrity.

That may be overstating the case. After all, the churches of which I never became a member seem to get along just fine without me. But, the point of this column is to focus on what can happen when we do get involved. I really do not know the answer, but let's speculate a bit. Any organization thrives on the attitudes and actions of its members. A supportive attitude and active participation are essential for vitality and growth. The organization and the individual are both invigorated by active participation. Joining any organization and just paying the dues and/or getting ones name on a membership roster may be justified but, without active participation, mediocrity will flourish like weeds in an untended garden. The organization and the individual member both benefit to the

extent one becomes actively involved. The saying goes, “What is in it for me?” The answer is “nothing” unless you become involved.

Such parallels could be taken too far. But, if there is benefit or inspiration to be drawn from the analogy, then I’ve achieved my objective. Quite simply, the surveying profession needs you. We all have a contribution to make, if it none other than offering a sympathetic ear or a word of encouragement to others. Too often, it is easy to be judgmental as we compare our own circumstance with that of others. What good does that accomplish? The temptation is to build a self-image or a reputation on the foibles of others. I submit that is short-sighted and self-defeating. We need to develop a vision and decide what it is we really want (that is an entire separate column but, for now I would ask each reader to visit the NMPS web site and read our mission). Once that vision is in place, many creative individuals will do those things that contribute to the good of the group without being told to do so or without expecting accolades for services rendered. We do it because it is the right thing to do and our contribution, even though it may be small, contributes to the well being of the organization.

Following is a restatement of the question posed in the September issue. What can or should surveying professionals do to ensure continued viability of our profession? Should we hunker down and focus primarily on the boundary issues or should we open up the profession and embrace others who, although they may do extensive work with spatial data, might not have the background, insight, or motivation to understand real surveying. Is it possible or desirable to have it both ways?

OK, I did not answer my own question but I attempted to lay the ground-work for additional discussion. A sharper vision and renewed professional identity will emerge as we trade ideas, share experiences, and offer encouragement to each other. In so doing, each voice deserves to be heard – if offered as a sincere contribution to the profession. But, it is also true that naysayers, even if there point is valid, tend to be ignored.

In the next President’s column I hope to comment on the surveying body of knowledge, cause and effect, and “connecting the dots” with regard to promoting a broader view of what it is surveying is and does. But, it probably comes as no surprise that I see surveying a part of a larger collection of spatial data professionals. I also believe the surveying profession can make a huge contribution in that arena and that we can prosper, both financially and on the satisfaction scale. The opportunities are endless and exciting.

## **President's Angle**

### **New Mexico Professional Surveyors Benchmarks**

Earl F. Burkholder, PS, PE  
2009 NMPS President  
December 2009

By the time the January Benchmarks is published I will no longer be NMPS President. It has been quite a year for me and, the economy notwithstanding, I believe a good one for NMPS. From my perspective, we got a lot done and many persons deserve credit for making things happen. It is also true that much remains yet to be done. What are you willing to do for the profession and ultimately, for yourself? Never underestimate the value and impact of your contributions. Collectively, we all benefit from the contributions of many individuals, often made without well-deserved recognition. Thank you. Keep up the good work.

In a previous column I promised to focus on “connecting the dots” in this my last President’s Column. Taken the wrong way, “connecting the dots” involves reading the minds of others and jumping to (maybe unwarranted) conclusions. Rest assured, I do not have ESP and I will try to avoid making unjustified inferences. I will, however, be happy to share my opinion and make comments on issues as I see them. Your feedback is welcome.

First dot: Some twenty years ago while serving as Editor of the ASCE Journal of Surveying Engineering, I received a book, “Argumentation – Reasoning in Communication.” Being more comfortable with math and equations than with language skills, I’ll admit to being intrigued by the stated goal of the book – “thinking logically.” But I was not prepared for the qualifier “– the heart of a liberal arts education.” Before that, I had never been an advocate of a liberal arts education. Without apology, I have enjoyed and devoted a lot of time to geometry, equations, computations, and computers. No, I was never smart enough to qualify as a “geek,” but the surveying profession has provided me a variety of geometry related opportunities – not the least of which was writing a book on the 3-D Global Spatial Data Model (GSDM). I’ve also come to appreciate the value of a solid liberal arts education. Maybe I’ll have an opportunity to get a BA degree in my next life.

Second dot: You can’t study geometry or do much surveying without using the Cartesian coordinate system – named after Rene Descartes. Born in 1596 and independently wealthy, Descartes devoted his life to the study of philosophy and mathematics and made contributions in several disciplines. Although he became famous for other reasons, I identified with and came to embrace Descartes’ 4 rules of logic:

1. Never accept anything but clear distinct ideas.
2. Divide any problem into as many parts as are needed to solve it.

3. Thoughts must follow an order from the simple to the complex and where there is no order we must assume one.
4. Always check thoroughly to make sure that no detail has been overlooked.

In 25 years of teaching college level surveying courses – especially programming computers and solving survey problems - I have attempted to convey the importance of logic, i.e., critical thinking, as a key element in surveying education. The challenge of getting students to embrace such values remains and sometimes I wonder if it is too much of a stretch to connect those two first two dots.

Next dot: I was in grade school when the Russians launched Sputnik I in 1957 and I was still dating in 1969 when Neil Armstrong first set foot on the surface of the moon. The evolution of technology that I have witnessed in my lifetime is incredible. But, for surveyors, the transition from analog to digital may be the most pervasive part of what is commonly referred to as the digital revolution. Surveying concepts involving boundaries, maps, and layout are still valid but the manner in which we handle measurements and spatial data are now profoundly different. Spatial data are now characterized as digital and 3-D. The tools we use to collect spatial data are almost exclusively electronic and many of the products we deliver are in an electronic format. Oh my, this dot appears rather large. So, following Descartes' advice, let's break it into three parts (of course, additional subdivisions can be justified).

I'm putting the following on the table and asking for your help to connect the dots. The collective wisdom of those who discuss the issues constructively will enable the surveying profession to accommodate change better, both now and in the future. I see dots 3A, 3B, and 3C as:

- A. The models we use for spatial data manipulation.
- B. The impact of the digital revolution on education – in the United States.
- C. The future of this profession we call surveying.

Dot 3A is based upon an explicit assumption of a single origin for three dimensional data. In the past, surveyors and others have handled horizontal and vertical data separately (for reasons having to do with the earth not being flat). But the fact is spatial data can be handled much more efficiently using rules of solid geometry if we use a geometric model that has a single origin for all three dimensions. The 3-D model is called the earth-centered earth-fixed (ECEF) geocentric coordinate system and is used by the global navigation satellite system (GNSS) industry as the basis for geometrical computations. For many spatial data users, the transition to a single-origin reference system is well under way but wholesale implementation will take awhile. I want to believe that the surveying profession - with appropriate vision, leadership, and dedication - can participate as an equal player with other disciplines in finding a way through that maze. The eventual benefits appear to be enormous.

I hope I will be proved wrong, but my view of Dot 3B is not good. I will describe my pessimism but I will also attempt to look at the bright side. That will carry over into Dot 3C. I have no quarrel with those who insist that we need to learn how to use the new

technology. Successful modern practice demands it. But, if we stop there or if we focus too heavily on learning the technology at the expense of gaining an understanding of the underlying concepts, an extrapolation of that trend has modern surveying practice reduced to sub-professional levels. Don't get me wrong. I spent several years as a draftsman and even more time as a computer person performing calculations for photogrammetric mapping control, section breakdowns, and other engineering related surveys. There are many satisfying and rewarding activities within the surveying profession not requiring a license. I believe it is a mistake to belittle those in our profession who do not earn a four-year degree or obtain a license. Percentage wise, the surveying profession probably needs more well qualified technicians than licensed professionals. But, at the professional level, we need to interact responsibly with our clients and with other disciplines as intellectual peers. I believe a focus on learning the concepts connects with dots 1 and 2.

I do not take exception to our capitalistic system or to the profit motive that drives development of technology. However, two observations are that 1) manufacturers and vendors hire talented graduates (both domestic and foreign) who become very successful in bringing new technology to the practicing professional and that 2) a larger and larger portion of daily surveying practice consists of following the manufacturer's instructions for using the equipment or software that we purchased. I hope I have over-stated the case but my point is that, with regard to prudent use of 3-D spatial data, the surveying profession has the opportunity to make a huge contribution in formulating and implementing policy in addition to simply collecting and presenting data. For more information, see the President's Column in the September 2009 issue of Benchmarks on doing the right thing versus doing things right.

On the bright side – Dot 3C. I believe learning will never go out of style and a very important goal of a college education is learning how to learn. Yes, I am all for earning a degree, but getting a degree is really not the issue. In my opinion, the issue is working with each student as appropriate to develop both their technical and their critical thinking skills. For example, I learned very little about GPS in my formal education. But, I learned how to learn and that has served me well. Admittedly, the career goal of some students is targeted toward technician activities. Although I would like to see each NMSU surveying engineering graduate go on to be a successful dynamic professional leader, not everyone has or will ever develop those talents. That's OK. But, from this surveying educator's perspective, it is very gratifying to witness the professional development of former students who grow into responsible professional roles and to share in the pride of their accomplishments. From that perspective, I am very heartened at the prospects for the surveying profession and take great satisfaction in sharing in the learning experience with them while they were in college. I am also quite aware that many successful professional leaders have never sat in my classroom and they still make huge contributions to the surveying profession. And it is also true that some former students are successful in spite of what I taught them rather than because of what I taught them.

The last dot has to do with the surveying body of knowledge (SBOK). What is it that one needs to know to be a successful member of the surveying profession? In a way, that is

not a fair question because the answer may vary from person to person. Rightly or wrongly, I have the opportunity to serve on a committee Chaired by Josh Greenfeld, New Jersey Institute of Technology, that is developing a presentation on the SBOK for the ACSM Annual Meeting in Phoenix in April 2010. In broad terms the committee has identified 5 general categories as:

1. Legal aspects.
2. GIS.
3. Photogrammetry/remote sensing.
4. 3-D positioning.
5. Land development.

How should the SBOK dot be connected with the others? I don't know. But, it has been interesting to participate in the committee discussions. Although we do not have the answers, we continue working on the issues and will be presenting some carefully vetted ideas. We look forward to additional discussion from the audience and remain confident that a better picture will emerge of what surveying is and what it is that surveyors do.

In the meantime, I look forward to having a related discussion at the NMPS Annual Meeting in Albuquerque on March 12 & 13, 2010. I will be leading a discussion on Saturday afternoon to discuss "Height Modernization and Possible Impacts on Surveying Practice in New Mexico." My goal at the 2010 NMPS Annual Meeting is become more familiar with what it is that New Mexico Professional Surveyors want and what we might do together. Please think about connecting the dots (or not) and come prepared to discuss the future of surveying in New Mexico with fellow professionals.

Lastly, thank you for the opportunity to serve as NMPS President during 2009. It was a lot of work, but many of you shared unselfishly in everything we accomplished. For me it was an honor and it was fun. Thank you.