



President's Angle

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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. Δ