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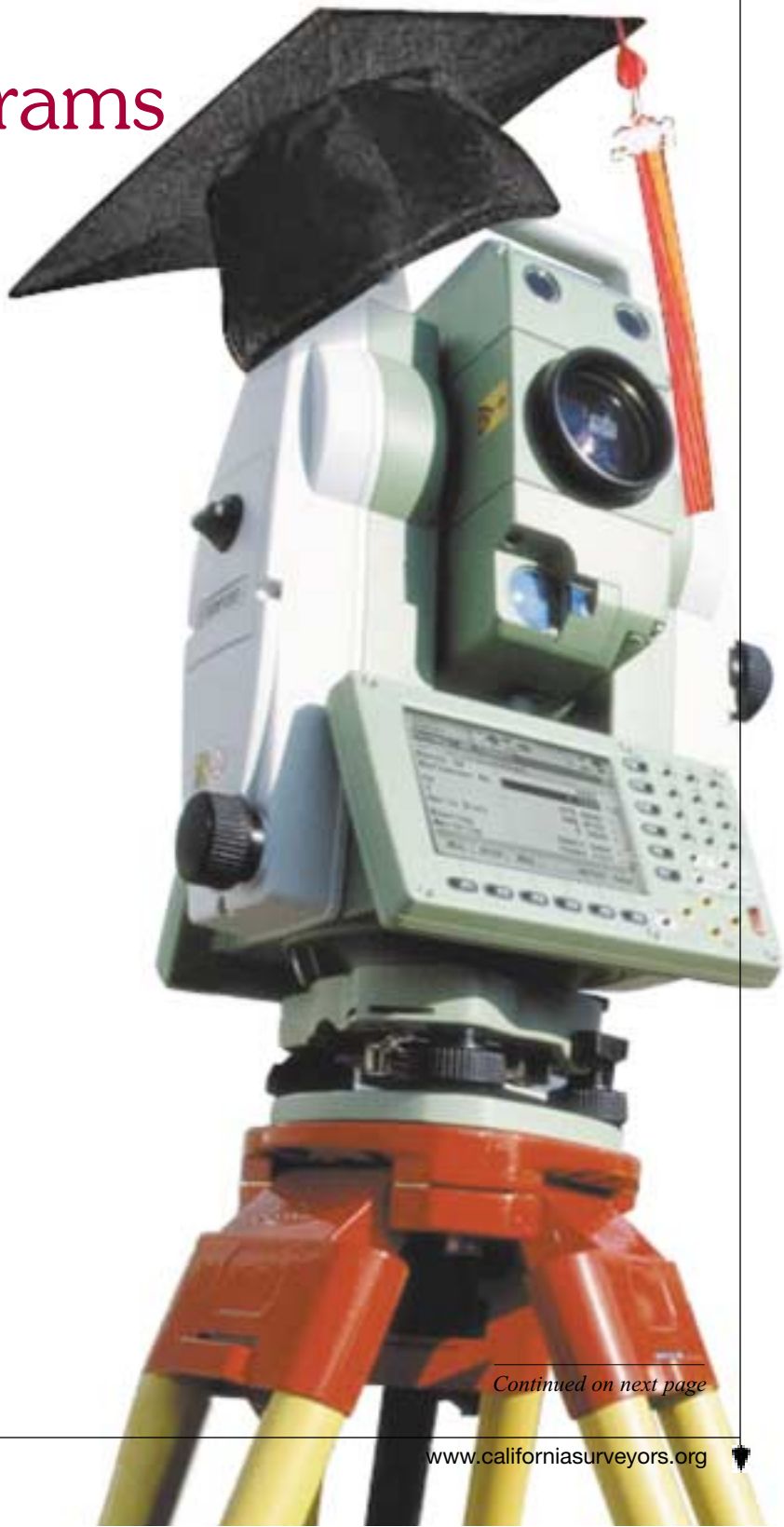
How Geomatics Professional Employment Characteristics Impact Four-Year Educational Programs



ABSTRACT

Geomatics/Surveying 4-year academic programs have now been active for 35 years. Now twenty-five such programs generate about 250 graduates each year. Owners, managers and party chiefs (in a 1-2-6 ratio) comprise the approximately 50,000 currently active professionals in the nation. New technology continues to reduce field crew size, eliminating technician slots, reducing up from the ranks professional opportunities and decreasing the pool of potential students.. Geomatics 4-year programs tend to be small and higher education is scrutinizing small programs for cutbacks. Program enrollments need to increase five-fold. The profession (one professional at a time) must mobilize significant recruitment efforts into 4-year programs across the nation. This effort will save the programs and preserve the profession.

INTRODUCTION

The first persons to complete a 4-year surveying program in the nation were Robert Parsons and Steven Thumlert who completed their studies in June of 1971 at California State University, Fresno. Nationally, since then, a continuous stream of new programs have been implemented and approximately five thousand graduates have moved into professional geomatics careers. This influx of trained measuring and mapping professionals has indeed changed the face of a profession. Yet, was 5000 enough? Each year about 250 students graduate from approximately 25 total 4-year degree programs. Are 250 graduates each year enough to keep pace with the employee needs of the greater geomatics profession that contains 50,000 individuals?

If each geomatics professional has a 40 year career and they were evenly distributed by age, then on average at least 1250 new professionals are needed each year to replace them. We have a serious shortfall. Where do the extra professionals come from?

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Many are trained on the job. Starting out as low paid technicians some of these people move up to professional positions. Others get educated in a related subject area like Forestry, Computer Science, Civil Engineering, Math, Physics, Geography or Geology. They may find jobs in their area of interest unsuitable or unavailable. Then they may get geomatics jobs and eventually move into the professional ranks as well. But what is the most effective way to generate a licensed professional? Licensure is composed of education and or experience and passing the appropriate licensing exam.

Careful analysis of the educational backgrounds of LS exam takers several years ago in one Western state revealed the following information. Examinees with a 4-year B.S. degree in surveying (or similarly named programs) were three times more likely to pass than those with a B.S. in Civil Engineering, nine times more likely to pass than someone holding an associate degree in surveying, and 20-100 times more likely to pass than any other educational category of examinee which included those with no formal education. This suggests that obtaining a 4-year degree greatly facilitates passing a state licensing exam.

CURRENT EMPLOYMENT CHARACTERISTICS

Various estimates suggest that approximately 50,000 professionals are actively engaged in the greater geomatics profession in the United States. Thousands of small, medium and large scale agencies, utilities and private companies employ the geomatics professionals who measure and map the earth. The major subgroups under the greater geomatics umbrella include (but are not limited to): land surveying, geodetic surveying, geodesy, photogrammetry, mapping, GIS, remote sensing and construction surveying.

Current approaches to geomatics personnel utilization vary across a wide spectrum. An effort to simplify this for purposes of this discussion might be justified. The typical organization might be staffed with an owner who manages the office staff and two field managers, each of whom monitors three field parties. Each field party has a party chief and an average of one additional crewman. While it is realized that many private firms already have one-person field parties (due to the use of RTK-GPS and robotic total stations) many situations still require two or more persons as a minimum for safety and/or to comply with various work rule requirements that may apply. The typical office staff then is comprised of approximately three additional CAD drafters or report writers or data processor technicians. This organizational scheme has any number of variations. Yet the ratios of geomatics professionals identified here are representative of those found across the nation. The makeup then is one owner, two managers, six party chiefs, six crewpersons and three office technicians or 1-2-6-3. It is assumed that on average the owner, managers and party chiefs are licensed and the office technicians are not. The number of licensed office workers probably very nearly is balanced by the number of party chiefs who are not.

The current 50,000 licensed geomatics professionals are broken into job types as defined by the 1-2-6 owner - manager - party chief ratio, or approximately 5500 owners, 11,000 managers and 33,500 party chiefs.

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EMPLOYMENT TRENDS

The Owner - Manager - Party Chief employment ratio is likely to remain virtually the same for the foreseeable future. Technology continues to drive this profession however. Whereas thirty years ago a three person crew was typical, now the goal seems to be to get a crew size of one person if possible, using RTK-GPS or a robotic total station. That one person typically is the party chief. The noticeable decline recently has been the number of crew members. These persons have historically been the huge pool of raw talent from which future professionals have generated, coming up through the ranks and eventually developing themselves into a licensed professional. These crew persons have also often been the typical 4-year student, often unhappy with their immediate career prospects, and thereby deciding to use an education to catapult them into the career faster than would have normally been the case.

The number of (not yet professional) crew persons is declining. This has serious implications for the supply of future geomatics professionals regardless of the methodology chosen for obtaining the necessary credentials for licensure.

DISTURBING EDUCATIONAL TRENDS

Colleges and Universities are under great pressure across the nation to economize. State support for higher education continues to dwindle almost everywhere. Since geomatics degree programs typically have chronic low enrollment (compared to other disciplines) they are often singled out for cuts or elimination. These geomatics/surveying program difficulties have manifested themselves in numerous ways over the last few years. A few examples include:

1) A forced department merger into another department
2) A publicly announced plan to close one program
3) A publicly announced plan to merge one programs department into another College
4) The fragmentation of an entire department and drastic change in accreditation status
5) One programs department forcing the program to absorb the entire budget cut assigned to the department

These situations are bad enough, but there may be more trouble ahead. Several programs are almost totally dependent upon one individual faculty person. When that person retires or collapses from fatigue, the campus administration (especially when enrollment is low) sees a great opportunity to close the program.

Unfortunately, community colleges are less likely now to produce potential geomatics transfer students, since many have dropped surveying coursework. Only three community colleges out of 107 in California currently offer more than two surveying courses on a regular basis. It could be argued then, that a larger share of new prospective professionals will have to be recruited directly from high schools into 4-year geomatics type programs.

MAKING UP THE SHORTFALL

We need 1250 new professionals every year. Colleges are producing about 250. The number of technicians on survey crews is dwindling, thereby decreasing the number of professionals who come up through the ranks. Community colleges are cutting back on geomatics related coursework, thereby reducing the number of potential transfer students. Clearly, there is a need for up to 1000 more Geomatics (and related named degrees) graduates each year from the nations institutions of higher learning. That will require a five fold increase in students. Simply stated, 1000-2000 new geomatics students must enroll each year. This correlates to approximately 40-100 for each of the 25 or so 4-year degree programs in the nation. These programs need help recruiting students.

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FUTURE PROFESSIONAL COMMITMENT

Many professionals have historically gone all out to promote 4-year education. NSPS and ACSM routinely endorse the concept. A few reluctant holdouts might still not agree with this idea. A few select quotes from William Brown, a Minnesota licensed surveyor are appropriate here.

> ***"If land surveyors ignore the need for college education we are going to find ourselves waking up in a new world and wondering what happened to our profession."***

> ***"Will a high school education and on-the-job training really prepare us to fill the expanding role of the land surveyor?"***

The 4-year programs are doing everything they can to encourage enrollment. But professionals must help. Every current geomatics professional (on average) must recruit at least two geomatics students (during their lifetime) to enroll in a 4-year program. Some professionals probably won t do anything, so to make up for their inaction try to refer five or ten. An average of two are required per professional because the typical dropout rate is 50%. Two new students should equal one graduate. One graduate will replace you.

Some professionals have already done their part. Recent success stories at Fresno State include fathers sending three sons and one daughter; one woman sent her younger sister and a Junior College surveying instructor who sent four transfer students. The referring professional in each of these instances has done his or her part to preserve the profession. Similar success stories abound across the nation.

But what about everyone else? Who have you sent? Remember, there are no excuses now. Complete 4-year degree programs are available on the Internet. Current Fresno State distance learners for example reside in the states of New Jersey, North Carolina, Illinois, Washington, Ohio, Utah, Michigan and throughout distant parts of California (San Diego, Pasadena, San Francisco and Bishop).

So what can you do to help? Simply send students. Send your son or daughter, nephew, niece, step-child, friend of the family or someone who works for you. Maybe someone wants to work for you but is unqualified. Tell them to go to a 4-year program and get a degree first. Send yourself. Go to local high schools or community colleges to promote the program that best serves your area, state or region. Try not to mention the S word (surveying) however, as this turns off most high school students. It s OK to

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talk to prospective students one-on-one about surveying if they bring it up first. Call your favorite 4-year program and they will be glad to send you suitable recruitment materials. If schedules allows it, a faculty member or student may be able to come to the recruitment event with you.

Helping to motivate a student already enrolled will reduce dropout rates, thereby increasing the number of graduates. Provide a good summer job. Sponsor a scholarship. Participate on Advisory Committees if asked, go to annual banquets or conferences that the 4-year program organizes. Contribute to endowments and other forms of program support. Send unused equipment for possible use in labs. It may take a little extra effort, but in the end you will be able to say, I did my part. Send students to 4-year geomatics and surveying programs. The faculty at those programs will educate them, the profession will nurture the graduates and thus we will all have managed to keep a profession alive.

CONCLUSION

Geomatics 4-year programs tend to be small and higher education is scrutinizing small programs for cutbacks. Not enough prospective geomatics professionals are entering the pipeline. Ultimately, 4-year geomatics and surveying degree program enrollments need to increase five-fold just to keep our professional ranks stable. The profession must help the academic institutions mobilize significant recruitment efforts to increase 4-year program enrollment across the nation. This effort will simultaneously save the programs and preserve the profession.

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About the Author

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received his Ph.D. from the University of Wisconsin, Madison in 1984. Since then he has taught at CSU, Fresno. He has been an ACSM member for over thirty years, serving on several committees and presenting numerous papers at national meetings. He was AAGS President in 1996. He served as the ACSM member of the Engineering Accreditation Commission of ABET from 1995-2001. Dr. Crossfield currently serves as chair of the Department of Civil and Geomatics Engineering and Construction and Mechanical Engineering at CSU, Fresno.

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