GIS in the Rockies Conference 2009
Panel on GIS Career Opportunities, Student Breakfast

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Moderator: Craig Gallagher, *Student, Metro State College, Denver*
Panelists: **Victoria Provenza**, *Principal, proSPATIAL, LLC* — **Esther Worker**, *Youth and Community Mapping Manager, ESRI* — **Joe Berry**, *Principal, BASIS and Keck Scholar in the Geosciences, University of Denver*

*This summary posted at **www.innovativegis.com/basis/Present/GIS_Rockies09/GISTR_panel09.pdf***

*Also, see **http://www.innovativegis.com/basis/present/imagine97/** a plenary address on "Education, Vocation and Enlightenment" and **http://www.innovativegis.com/basis/MapAnalysis/Topic4/Topic4.htm** an online book topic on "Where is GIS Education?"*
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The following QUESTIONS were presented to the panelists for their summary responses to guide and stimulate group discussion. The following are Dr. Berry's initial thoughts:

1) When reviewing job postings the wish lists of hiring companies can be lengthy and intimidating. As we prepare to become professionals what GIS skills should we concentrate on? What non-GIS skills are the most important to acquire while we are still in school?

A good foundation in Geotechnology involves melding of the Triad of Spatial Technologies—Remote Sensing (RS), Geographic Information Systems (GIS) and Global Positioning System (GPS). It is imperative that you develop a working knowledge in each of these areas. In addition, you need to develop a deep keel of advanced skills in at least one of the spatial triad technologies…a demonstrative level of expertise that a prospective employer will readily perceive.

Some very useful "closely related" skills are computer programming (beyond an introductory course required in most GIS curricula; Visual Basic is the most versatile), statistics (particularly multivariate analysis), database management systems and digital media studies emphasizing website design. Less closely related skill sets involve project management (Agile and eGroupWare are the current favorite software) and gaining a good command of an applied field that interests you (e.g., natural resources, public health, real estate, agriculture, etc.). Ideally you should position yourself toward a program emphasis or dual major combining geotechnology with an applied discipline.

A bit of personal advice: This "stretch skills" listing is a menu of possible options to choose, not an inclusive list you are expected to master. The non-GIS skills you acquire should reflect your interests and capabilities, not an external reading of what other folks think might get you the first job.

2) Because geospatial technology is always evolving it is difficult to stand on the edge of the industry as students and determine the best way to set ourselves up for long-term success. So as our window into the industry where do you see the industry, and what skill sets do you see having highest demand for employees in 10 years?

Much of Geotechnology is moving to "commodity status" which means that more and more competition will come from individuals outside geotechnology who can perform basic tasks of data acquisition/collection, geo-query, internet mapping, spatial database management and visualization. However, the analytical capabilities of GIS likely will remain the domain of specialists who can translate complex spatial problems into effective spatial solutions. The most successful among you will be able to contribute "new ways of doing business" to your organization that will likely involve map analysis skills over traditional mapping skills.

Capabilities for spatial inventory, analysis and display likely will revert to those with domain expertise which suggests that you need to develop a thorough understanding of an applied field—if your applied interest is in pipelines you need to be able to "walk the walk and talk the talk" of the pipeline industry and professionals. To do otherwise, will keep you and your geotechnology skills in a closet "down the hall and to the right" away from the real action in the organization.

3) From environmental consulting to software development GIS has a wide range of disciplines. Could you give us an idea of the areas GIS professionals could end up and what to expect in those positions?

| Of the Computer	… ← Continuum of Focus within Geotechnology → ...				Of the Application
Programmer	Developer	Systems Manager	Data Provider	GIS Specialist	General User

At the broadest level, Geotechnology can be thought of as a continuum stretching from those of the computer (systems focus) to those of the application (use focus). It is imperative that you determine where your inherent capabilities and interests place you along this continuum. At the extreme ends— if you love programming, you might consider getting a

Computer Science degree with emphasis in geotechnology; if your passion is for an applied discipline like farming you ought consider a degree in Agriculture with emphasis in geotechnology. Specific geotechnology career paths include—
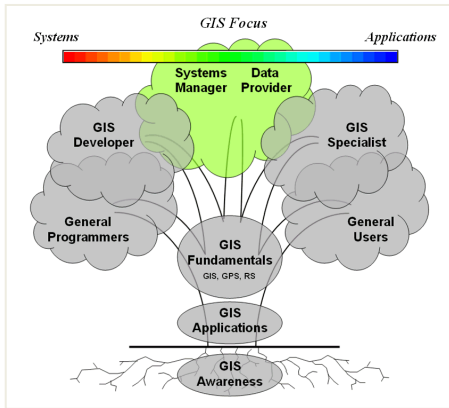
- *Programmer*– develops and enhances fundamental tools in GIS software packages; mostly computer science with some courses in GIS
- *Developer*– develops GIS applications that link GIS to real-world problems; mostly GIS/CS with some disciplinary expertise
- *Systems Manager*– develops and maintains spatial data bases and connections within (LAN) and outside (Internet) the organization; CS and GIS balance
- *Data Provider*– develops base map layers from imagery and collected data; good skills in GPS and remote sensing with strong skills in GIS data formats and geodetic referencing
- *GIS Specialist*– uses discipline expertise and GIS knowledge for basic GIS applications or interacts with GIS professionals to address complex spatial problems

4) With certificates, Bachelor degrees, and Master degrees there are many options in obtaining an education in GIS. Is one any better than the other? For example, is it better to get a degree in something other than GIS to have a specialty then get a certificate or concentrate on GIS, and what benefits if any come with getting a masters degree?

Of the three options mentioned, I believe the Certificate is the least viable unless you have a job and simply need to establish Geotechnology proficiency as a means to advance; it also makes sense in conjunction with a 2-year Associates degree. It is good to get a Bachelor degree in an established field with an elective focus in Geotechnology, or better yet, a program emphasis or joint degree.

A "delayed" Masters degree is the best route to a successful professional career as it provides a technical extension of an established discipline (application area) and then complements your academic and professional experience with technical skills that you can tailor through your independent project or thesis. Keep in mind that with "education inflation" a Masters degree is the equivalent to an undergraduate degree of your parent's generation (which was equivalent to a high school degree of your grandparent's generation). If you anticipate a full-time academic career you will need Doctorate.

5) From your experience what sets applicants that end up getting jobs apart from those that don't, and in what areas do you see the need for improvement from new hires in general?

The biggest initial differentiator is an applicant who clearly communicates an understanding of the organization to which he/she has applied. It is imperative that you tailor not only your cover letter but your resume emphasis to highlight your skill sets, experiences and interests that align with the organization.

The next tier of differentiators involves how you express yourself, exhibit professionalism, creativity, responsibility and interact with peers (hopefully these bases are covered in your letters of reference). However the final filter for next level consideration is how well you know your stuff as established by your academic record and "portfolio" (see below). In the job interview it is how you present yourself, react to questions in a thoughtful manner and appear to think on your feet in a genuinely interested, energetic, professional and creative way. The successful applicant is the individual that appears more interested and able to bring more to the position than the other candidates—about a 50-50 split between direct (geotechnology) skills and indirect (personal) characteristics.

My greatest (and continuing) concern is that many job seekers, while exhibiting technical competence, do not have good written and verbal skills. On the technical front applicant's generally need a better founding in statistics (remember maps are numbers first, pictures later).

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Addendum Thoughts: A comprehensive and continuing understanding of the underlying principles supporting geotechnology is the bedrock of your professional success. However, your initial hire likely hinges on additional considerations with the most critical aspects being able to convey practical experience, initiative, and responsibility. Think of yourself as a "graphic artist" who must prepare a portfolio of examples of their work in addition to their resume listing their academic experience and accomplishment. Consider developing an online portfolio describing and illustrating your mastery of skills and, if at all possible, a comprehensive individual or team project.

Ideally, this extended experience would involve volunteering with a real-world entity, such as an experience for a City or State Park in developing an interactive biking/hiking trail map with embedded photos of the experience (or mapping a local school district's student directory; or generating soil or water chemical concentration maps in conjunction with a school's environmental studies lab; or…). The ability to effectively demonstrate your capacity to define, design, acquire, implement, post, manage and maintain an actual spatial project will capture the attention of prospective employers and help offset that "experience" factor many job offerings reference.