Summary of Three Panel Discussions
Regarding Employer Expectations of New GIS Hires
Employer thoughts on how colleges and universities should be preparing students for employment in geospatial sciences

Panel discussions:
- GIS in Higher Education Summit, CSU, April 2009
- GIS Day, CSU, November 2009
- GIS in Higher Education, Pikes Peak Community College, April 2010

GIS in Higher Education 2009 (CSU)

Panelists, made up of GIS professionals from a variety of organizations, were asked to address the following:
- Your position and organization
- How your organization/industry uses geospatial technologies (briefly!)
- What positions you have in your office/organization for GIS professionals. What are they expected to do?
- What skills and knowledge you expect from new hires.
- Your thoughts on how best to prepare these students.
- How you view institutes of higher education with respect to their contributions to the GIS profession.

a. Steve Holmes, City of Loveland:
- Some programming is key
- FUNDAMENTAL skills: reading, writing, math, basic communication, problem solving, etc.

b. Scott Steigerwald, Idea Integration:
- Exclusively IT consultants.
- ALL staff are programmers: Python, object oriented; C#; SQL server.
- Consultants must be EXPERTS and the only way to become that is through experience.
- SQL server spatial and Virtual Earth; they prefer VE over Google.

c. Jeffrey Evans, The Nature Conservancy (TNC):
- Science-based organization. Scientific rigor; publishing.
- Levels of GIS staff:
  - Interns - narrow to specific projects
  - Technicians - compile data/support staff; question the data – GIS skills
  - Analysts – know more about data analysis and be able to process and handle complex ecological models
  - Modeling/spatial statistics (integrative; “R” (an open source version of S+); massive spatial library)
- Domain knowledge is key, not all GIS skills

d. Heather Stanton, NPS:
- Soil, vegetation, geology inventories; produce data for all parks.
- Data models already developed.
- They employ interns to specialists: some need programming skills, others project management skills.
- Specialists in a discipline are needed—WITH GIS skills.
- More support needed for GIS integration into other subjects.
- NPS has in-house GIS support group.
- Service wide consistency; all data via one portal.

e. Important Job Skills - SUMMARY
- Programming
Project Management
Knowledge of the scientific method (scientific rigor)
Ability to interpret results from an analysis
Modeling, geostatistical analysis
Experience with remotely-sensed data
File Management ("What did I name it and where did I put it??")
Problem solving
Self-thinkers, self-starters, equipped with collaboration skills
More real-world experience (i.e. internships, collaboration between university/corps-orgs).
Quantitative skills: Rigor, discipline, deal with numbers (without fear!); problem solving. Avoid “5 minute error”—that is, someone will notice your errors within five minutes of looking at your work.

f. Discussion
Most don’t understand the underlying geography with GIS to begin with. (e.g., terrible campus map of CSU)
Importance of communicating data; graphic display of spatial and other data
There should be a fundamental return to cartography
One needs to identify the product and customer base.
Mass misunderstanding of GoogleEarth/Map type stuff; they are tools for VISUALIZATION, not data analysis.
Virtual Earth (VE) is grounded in photogrammetry NOT visualization.
Legal implications of data. Is this discussed? It’s in Body of Knowledge document.
We need to move away from the idea that maps are discrete objects, because in GIS we do not need to define concrete boundaries.
Note to instructors:
Let go! Let students solve problems - ‘teach’ problem solving. (“Guide on the side; not sage on the stage”—same discussion in K-12 GIS)
Teach a critical approach to the nature of information
How can Community Colleges prepare students?
Basic skills: math, algebra, vector/raster, concepts/buttons, cartography, map use
Not necessarily specialty in one field or another.
Basics like “what’s a loop” or “conditional statements”.
Basic scripting. How to define consistent domains; basic database design principles. True critical thinking about information.
Spectrum: DEEP specialists → lay public

GIS in Higher Education 2010 (Pikes Peak Community College)

PANEL: Are GIS graduates prepared for the workforce? Are they ready to hit the ground running?

- Llana Hines, Sanborn Mapping
- Roger Clarke, Peterson AFB
- Jerry Cordova, City of Fountain
- Phil Friesen, City of Colorado Springs
- Joel Hanson, Douglas County
- Ben Sloboda, El Paso and Teller County E-911 Authority
- Jessica Touchard, GeoSearch, Inc.

List of qualities employers are looking for:
- Ability to use software
- Understand and organize database files and structures; database manipulation; attribute management
- Teamwork & attitude
- Cartography skills
- Editing and advanced editing
- Topology
• Raster vs. vector
• Visualization
• Basic IT literacy; Communication
• Python/ Model builder; VB, .NET, Java, Flex
• Programming
• Critical thinking; attention to detail; humility and curiosity
• Experience; knowing how to problem solve and work independently
• Theory and spatial literacy
• Project management (advanced level)
• Spatial SQL and/or Oracle
• Version editing
• Scripting; ability to automate repeatable processes
• ArcGIS Server and web mapping
• Industry doesn’t necessarily expect academia to keep up—just TRY, and have good solid foundation, problem solving skills, curiosity. Direct students towards their preferences and their talents—so many options for employment at different levels.
• Keep learning
• Data standards
• Know what your data represents: Go outside!
• Make resumes ‘living’—links to projects, updates
• Expose students to different data types
• Issue of SCALE—use appropriate scale data for projects
• Software: ESRI products, Google, CAD, digital globes, ERDAS,
• Train students for the LOCAL needs; ensure communication between industry and education
• Put data to good use; SOLVE problems, don’t just deliver data
• Domain/discipline expertise
• Unrealistic for students to come out completely “trained and prepared”
• We need to use local knowledge, problem solving, cartography, teamwork and a combo of physical and human geography to be effective.
• Action item thought from Sophia (post-Summit): We’ve had three panels like this over the past year. It may be time to consolidate and organize these ‘laundry lists’ to look for commonalities, consensus, etc., and then distribute more widely.

GIS Day 2009 - CSU

Panel Discussion--GIS in the Workplace: What Are Employers Looking For?: A panel discussion after lunch enabled representatives from a number of regional employers to present their thoughts on how students should best prepare themselves to be marketable in the GIS workforce. Panelists included Jason Rowe, TechniGraphics, Inc.; Ryan Smith, ESC Engineering; Lisa Kennaway, USDA, APHIS; Laura O’Gan, City of Fort Collins; and Gary Senseman, Center for Environmental Management of Military Lands (CEMML). A few key themes that surfaced from this discussion are included below.

- Familiarity and experience with: geodatabases, metadata, topology, cartography, projections, data management, ArcServer, web apps, quality control, modeling
- In addition, programming and geography
- Expertise in a discipline; skills in GIS
- Programming: .NET, Python, ArcObjects
- Multiple software platforms, not only ESRI products; open source
- Other skills: critical thinking, commitment (stick with it, even if starting from the bottom), dedication, respect, enthusiasm.