

## **Modifying a California DACUM to Assess Industry Needs in Virginia**

John McGee PhD, Virginia Geospatial Extension Specialist, Department of Forestry (0324), Virginia Tech, Blacksburg, VA, 24061

Rodney Clayton, Geophysical Sciences, Tidewater Community College, 1700 College Crescent  
Virginia Beach, VA 23453-1918

David Webb, Engineering Division, Virginia Western Community College, Business Science  
Building 124, P.O. Box 14007, Roanoke, VA 24038

In order to meet the increasing demand in Virginia for a workforce well-trained in geospatial technologies, three Virginia Community Colleges (Virginia Western Community College, John Tyler Community College, and Tidewater Community College), with the support of the Virginia Community College System (VCCS) in partnership with the Virginia Geospatial Extension Program (VGEP) and the Virginia Space Grant Consortium (VSGC), initiated a planning project to enhance the geospatial educational capabilities in Virginia's Community Colleges. This project (Geospatial Technician Education through Virginia's Community Colleges [GTEVCC]) was awarded a National Science Foundation (NSF) planning grant through the Advanced Technology Education (ATE) program. Goals and objectives of the project are driven by the needs of business and industry in the Commonwealth.

Some of the objectives associated with the GTEVCC project are to: (1) Develop a consistent approach and curriculum to train and re-train geospatial technicians at Virginia's community colleges; (2) Provide geospatial technology professional development for community college and precollege faculty. Partners agreed that faculty and technician-level curriculum development should reflect the technician-level skill sets required by Virginia's vibrant geospatial industry.

Initially, an online professional development survey was developed and disseminated to geospatial employees across the Commonwealth. This online survey resulted in approximately 200 responses. (For additional information, reference the ESRI conference 2007 proceedings paper #1585 [[http://gis.esri.com/library/userconf/educ07/educ/papers/pap\\_1585.pdf](http://gis.esri.com/library/userconf/educ07/educ/papers/pap_1585.pdf)]). This particular survey identified potential educational gaps, opportunities, and training needs of Virginia's existing geospatial workforce that could potentially be provided by the VCCS, as well as other institutions of higher education. One outcome of the survey, was a realization that technician-level DACUM's (acronym for developing a curriculum) should be adopted to support the efforts of VCCS faculty to develop model curricula and supporting resources for enrolled students, that would specifically meet the needs of Virginia's geospatial industry.

Several comprehensive DACUM's have been developed to support the development of GIS curricula. Geospatial DACUM's were reviewed, including summary reports from a previous NSF ATE project entitled *Envisioning a National Geospatial Technology Resource Center* (available for download from <http://www.geotechcenter.org>). After reviewing several model DACUM's, recommendations were made to the GTEVCC project advisory committee. The San Diego Mesa DACUM was identified as a potential model that would support the needs of Virginia industry. The question remained: Could a DACUM that was developed for a specific region in California (San Diego) be appropriate in a different geographic context? Could this DACUM be applied to support curriculum development in Virginia?

### **The San Diego Mesa DACUM**

In 2005, San Diego Mesa College, through the support of the NSF ATE program, established a DACUM for entry level GIS technicians, based on regional geospatial industry needs (this DACUM can be downloaded from: [http://ispt.sdccd.edu/TechPrep/ccti/GIS\\_Tech\\_DACUM.pdf](http://ispt.sdccd.edu/TechPrep/ccti/GIS_Tech_DACUM.pdf)). A *workforce needs workgroup* was established through Virginia's GTEVCC project. This workgroup was comprised of both higher education and private industry representatives. The workgroup initiated an assessment of the San Diego DACUM to determine whether the GIS technician level workforce needs in Virginia were similar to industry needs from the San Diego region. This paper will summarize the process involved with the project, and will provide summary findings of this initiative.

### **Virginia's Geospatial Industry Interviews**

As a follow-up to the initial Web-based survey, project participants and advisory board members conducted face to face / telephone / email follow-up interviews with 35 GIS managers and potential employers across the Commonwealth. The objective of these follow-up interviews was to assess whether the San Diego Mesa DACUM, which was developed on the west coast, could be easily transferred and implemented to support the technician-level geospatial skill sets required by Virginia's industry.

Seven interviewers assisted in the design of the interview questions. Draft interview questions were reviewed by members of the project steering committee, and the project advisory committee. The seven interviewers were associated with a variety of institutions, including four-year colleges and universities, community colleges, state government, and the private sector (see Appendix A for a list of interview questions).

<b>Name</b>	<b>Number of Interviews</b>
Lyle Hornbaker	6
John McGee	6
George McLeod	5
Russell Minnich	3
Bob Rike	4
Jim Span	5
James Wilson	6
<b>Total:</b>	<b>35</b>

Table 1: List of interviewers and number of conducted interviews.

Interviewers were encouraged to first contact the potential interviewees by phone, and briefly explain the overarching goals and objectives of this effort, as well as to provide potential respondents with an understanding of a DACUM. If respondents agreed to be interviewed, then the interviewers were encouraged to email the San Diego Mesa DACUM to the interviewee, and to briefly review the DACUM with them over the phone. Interviewers were encouraged to schedule interviews at a later date.

It was anticipated that this process provided interviewees an additional opportunity to review and become familiar with the San Diego Mesa DACUM. Interviewers were then encouraged to meet with interviewees either face to face with interviewees, or to conduct follow-up phone interviews. The majority of interviews were conducted during the summer and fall of 2007. At the conclusion of the interviews, the interviewee typed up the responses, sent the responses to the interviewer for review and further comments / clarification. The final tabulated interviews were collected, tabulated, and summarized by Rodney Clayton, from Tidewater Virginia Community College.

Interviewers were asked to target specific geographic areas (within Virginia) and were asked to target their interviews among a variety of geospatial employers to try and reflect the makeup of the geospatial industry in the Commonwealth (Figure 1). Approximately 54% of interviews were associated with local and state government agencies, while 18% of respondents were associated with the federal government and the private sector, respectively (a total of 36%). Approximately 9% of those interviewed were associated with non-profit groups / research organizations.

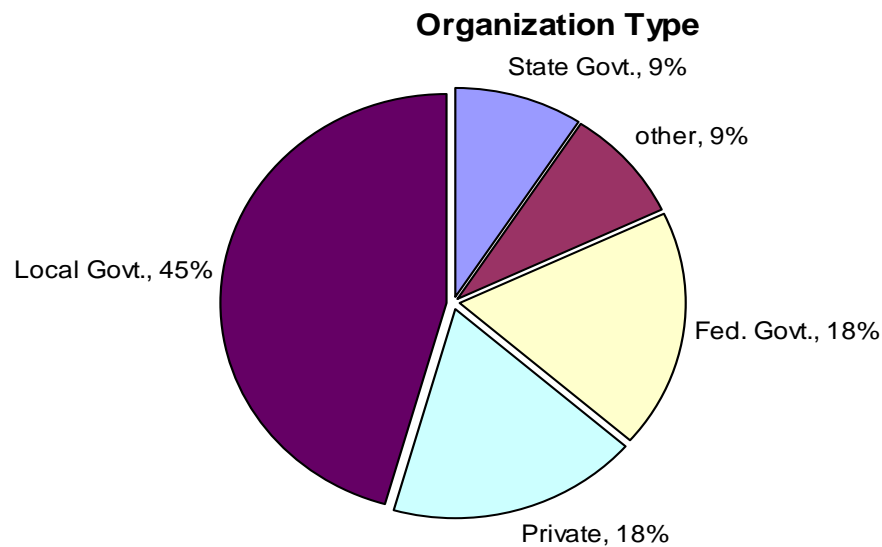
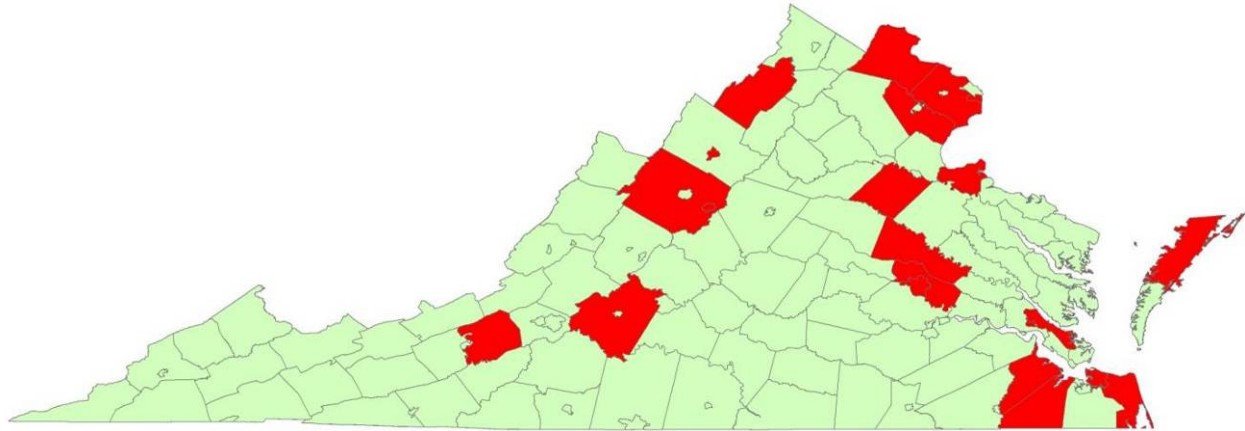


Figure 1: Interviewee by Organization Type

Interviews were conducted across the Commonwealth. Conducting interviews in Northern Virginia, the Richmond region, and the Virginia Beach / Hampton Roads region were emphasized, as these areas maintain relatively large and well established municipal and state government geospatial organizations, and are thus perceived to be some of the best indicators of future geospatial employment trends. In addition, interviews were also conducted in the western and north eastern parts of the state (Figure 2).



Accomack	Chantilly	Isle of Wight	Prince William	Virginia Beach City
Alexandria	Fairfax	King George	Richmond City	Wallops Island
Augusta	Hanover	Loudoun	Shenandoah	Waynesboro
Bedford	Harrisonburg	Montgomery	Spotsylvania	Williamsburg
Blacksburg	Henrico	Norfolk City	Suffolk City	York

Figure 2: Areas in red denote localities where interviews were conducted

### Survey Questions and Responses

Prior to conducting the interview, several background questions were asked in order to gain better insight into the organization. One of the background questions was associated with hiring history. Face to face interviews typically took between 1 and 1½ hours to conduct (see Appendix A)

### A Summary of Challenges and Lessons Learned

Throughout the interview process, we identified several challenges. The major challenge was the geographic scope of the interviews that were conducted. While the San Diego Mesa DACUM was conducted by a relatively small focus group associated with a single (yet extremely diverse) geographic region, the Virginia interviews were conducted statewide. These interviews included GIS managers and employers from large, innovative, and extremely sophisticated GIS enterprise organizations (federal, state, local governments, as well as private sector companies and research / nonprofit institutions), as well as smaller, one or two person “GIS shops”. With this in mind, there was a tremendous difference in opinion in what the duties of a “GIS Technician” actually entailed. An entry level “GIS Technician” might be associated with a particular set of duties to one organization, and may be relegated different tasks to another organization.

In addition, regional employment needs across the Commonwealth need to be taken into consideration during the adoption of a GIS technician DACUM. Employment demands in

Richmond, for example, may or may not mirror geospatial employment needs of the more rural southwest Virginia. A DACUM to support the VCCS needs to be broad and flexible enough to support these various needs, and to potentially allow for a reprioritization of the duties associated with each task.

DACUM's must be flexible, not only to support regional geographic differences and other institutional discrepancies. A GIS DACUM must also be flexible enough to withstand the test of time. Few will argue that the GIS technician of today, will likely look quite different from the GIS technician of tomorrow.

### **Summary**

Given the feedback from a sampling of Virginia's geospatial industry through the interview process, and the issues addressed above in mind, the San Diego Mesa DACUM does provide a strong foundation for the VCCS. This San Diego Mesa DACUM is general and broad enough to allow flexibility to support the individual contexts of VCCS member institutions. The DACUM is further designed to allow re-prioritizations / modifications and updates as the roles and related tasks of GIS Technicians change over space and time.

Virginia has made slight modifications to the San Diego DACUM to support the curriculum development needs of VCCS member institutions. Three of the pilot community colleges associated with the GTEVCC program are already referencing Virginia's modified DACUM to support the development of curricula for their respective programs.

In addition, the VCCS, through the GTEVCC program, is looking for opportunities to leverage curricula resources, once they have been developed, through a Community College Web portal, that will provide necessary infrastructure to support the sharing and leveraging of existing and future educational resources among both faculty and students at community college member institutions. The initial planning and conceptual design of this portal has been completed. We are now in the process of identifying funding resources to support this educational resource.

# Appendix A: Interview Questions

## I. GENERAL INFORMATION

Date of Phone Interview:

Name of Interviewer:

Name of Interviewee:

Name of Organization (i.e. VDOT, etc.):

Position (title) of Interviewee:

General location (city / county / region) of interviewee's agency / organization:

Type of organization associated with interviewee:

Local Govt.

Regional Govt.

State Government

Federal Govt.

Private Sector

Other:

How many entry-level GIS personnel (Technicians) currently work in your shop?

Have you previously hired technicians right out of school?

Yes  No

If "Yes" what level?  High School  Community College  4-yr College/Univ.

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## II. DACUM SPECIFIC QUESTIONS

Please review the attached DACUM and answer these questions.

1. Do the tasks listed match your employment needs / demands?

Yes  No

a. If your answer above was no, what specific additions, deletions, modifications would you make to the tasks?

b. Provide any additional comments:

2. Entry level proficiencies: Do the entry level proficiencies identified in the attached DACUM match your hiring needs for an entry level GIS Technician?

Yes  No

3. Based on your needs as a geospatial employer, are there any tasks that are listed as “entry level” that should not be? Yes No
- a. If so, which tasks?
4. Are there any tasks that are not listed as “entry level” that should be? Yes No
- b. Which tasks should not be listed as “entry level” that currently are listed as “entry level”?
- c. Why?
5. Are there any specific tasks that you think are not associated with GIS technician level duties that should be?
- a. If so, list and add.
6. Do you expect your entry level hires to have any GIS workforce experience (i.e. internships) prior to hiring?
7. Do you require an entry level GIS technician to have basic programming skills? Yes No
- a. If yes: What languages or software?
- b. What would the programming skills likely be used for?
8. What are top three characteristics or competencies you are looking for when evaluating new hires.
- a. At the “entry level”
- i.
- ii.
- iii.
- other comments:

b. At the “mid level”

- i.
- ii.
- iii.

other comments:

9. Are there any specific business functional area experience or education you are looking for from your –

a. “entry level” staff:

b. “mid level” staff

10. In your opinion, does the DACUM provided (and based on the comments included above) support your current hiring needs for a GIS Technician?

Yes No

a. If “no”, why not?

11. In your opinion, and based on demand trends in your industry, do you anticipate that the tasks listed in the attached DACUM will support for your hiring needs 5 – 10 years in the future?

Yes No

Why or why not?

12. Given the 5-10 year time horizon...

a. What tasks that are currently listed on the DACUM will increase in importance?

b. What tasks that are currently listed on the DACUM will likely decrease in importance?

c. What **new** skills do you think that GIS technicians should have when first entering the job market (right out of school)?

13. Do you think, over all, that GIS technicians (people coming right out of a community college) are currently well prepared to enter the job market in Virginia? Yes No

If not, then why?

14. In your opinion, do you think that GIS technicians (people coming right out of a 4-year college or Univ.) are currently well prepared to enter the job market in Virginia? Yes No

If not, then why?

15. Additional Notes: