High Growth INDUSTRY PROFILE

Industry Snapshot

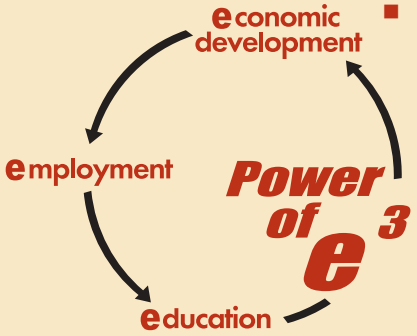
Growth Pattern

- The geospatial technology industry is defined as "an information technology field of practice that acquires, manages, interprets, integrates, displays, analyzes, or otherwise uses data focusing on the geographic, temporal, and spatial context." It also includes development and life-cycle management of information technology tools to support the above. *(Geospatial Workforce Development Center, University of Southern Mississippi)*

- The progressively complex and accelerating pace of change in the geospatial technology industry offers dramatic possibilities for meeting the increasingly sophisticated geospatial information demands of government, private industry, scientists, and the public. *(U.S. Geological Survey)*

- The worldwide market for geospatial technologies has enormous potential. Estimated at $5 billion in 2001, the market is projected to have annual revenues of $30 billion by 2005. *(Geospatial Workforce Development Center, University of Southern Mississippi)*

- The architecture and engineering occupations group, which includes surveyors, cartographers, photogrammetrists, and surveying technicians, is 1 of the top 10 occupational groups projected to have the fastest growth in employment between 2002 and 2012. Employment in architecture and engineering occupations is expected to grow by 220,000, led by a 22% increase in landscape architects. *(U.S. Bureau of Labor Statistics)*



- Increasing demand for readily available, consistent, accurate, complete, and current geographic information and the widespread availability and use of advanced technologies offer great job opportunities for people with many different talents and educational backgrounds. *(U.S. Geological Survey and U.S. Bureau of Labor Statistics)*

Occupational Outlook

Careers in geospatial technology disciplines are available in many segments of commercial, public, government, and academic communities. O*NET, the Occupational Information Network, has identified several occupations that may require geospatial competencies, including: cartographers, photogrammetrists, surveyors, civil drafters, electrical drafters, mechanical drafters, and technicians in aerospace engineering, civil engineering, electrical engineering, environmental engineering, industrial engineering, mechanical engineering, surveying, mapping, soil conservationists, range managers, foresters, geological data technicians, and geological sample test technicians. Other occupations listed by the American Society for Photogrammetry and Remote Sensing include geographers, physical scientists, computer scientists, geographical information systems (GIS), analysts, database administrators, and remote sensing scientists.

Geospatial Technology-Related Occupations	Number Employed 2002 (000's)	Number Employed 2012 (000's)	Numeric Change (000's)	Change %	2002 Median Annual Earnings	Postsecondary Education & Training
Environmental engineers	47	65	18	38.2%	$61,410	Bachelor's degree
Environmental engineering technicians	19	24	5	28.4%	$36,850	Associate degree
Surveying and mapping technicians	60	74	14	23.1%	$29,230	On-the-job training
Cartographers and photogrammetrists	9	10	1	15.1%	$42,870	Bachelor's degree
Geoscientists, except hydrologists and geographers	28	31	3	11.5%	$67,470	Masters degree
All other drafters, engineering, and mapping technicians	150	167	17	11.3%	$44,450	Associate degree
Engineering managers	212	231	19	9.2%	$90,930	Bachelor's or higher degree plus work experience
Industrial engineering technicians	62	67	5	8.7%	$41,910	Associate degree
Surveyors	56	58	2	4.2%	$39,970	Bachelor's degree
Architectural and civil drafters	106	110	4	4.2%	$37,330	Postsecondary vocational award
Mechanical drafters	72	74	2	1.9%	$40,730	Postsecondary vocational award

Employment of Wage and Salary Workers in Search, Detection, Guidance, Aeronautical, and Nautical Systems, Instruments, and Equipment by Occupation, 2001
(employment in thousands)

Occupation Title	Total Employment	% of Total
All occupations	153,710	100.0%
Electrical engineers	8,360	5.44%
Electrical and electronic equipment assemblers	8,270	5.38%
Computer software engineers, systems software	6,310	4.11%
Electrical and electronic engineering technicians	5,750	3.74%
Engineering managers	4,620	3.01%
Mechanical engineers	4,260	2.77%
Aerospace engineers	4,050	2.63%
Computer software engineers, applications	3,870	2.52%
Industrial engineers	3,510	2.28%

Note: These occupations are far broader in employment scope than just for the geospatial technology industry, i.e., geospatial technology-related positions are subsets of these occupational categories.

Guide Missiles, Space Vehicles, and Parts Manufacturing Industry Selected Occupations, 2001

Occupation Title	Total Employment	% of Total
Total geospatial technology industry	78,990	100.0%
Aerospace engineers	13,290	16.82%
Engineering managers	2,110	2.67%
Computer software engineers, systems software	2,030	2.57%
Management analysts	2,010	2.54%
Inspectors, testers, sorters, samplers, and weighers	1,870	2.37%
Production, planning, and expediting clerks	1,590	2.01%

This is not a comprehensive list of occupations. Please refer to the U.S. Bureau of Labor Statistics Occupational Employment Statistics at www.bls.gov/oes/home.htm for more geospatial technology occupational information.

Types of Jobs Created

Skill Sets:

(Source: The Imaging and Geospatial Information Society)

- College preparatory courses that emphasize the sciences are suggested for individuals interested in pursuing careers in photogrammetry, remote sensing, and GIS.

- Many 2-year academic and technical institutions offer education and training in photogrammetry, remote sensing and GIS, and related fields. Associate degree and certificate programs in GIS, surveying, photogrammetry, and similar curricula provide a sound foundation for work experience or for transfer to other academic institutions for further education. For individuals who do not wish to pursue an advanced degree, there is a substantial demand for technicians in geospatial information technology.

- It is highly recommended that any individual wishing to pursue a career in photogrammetry, remote sensing, and GIS participate in an internship program to obtain hands-on experience as part of their preparation for employment.

- Like many rapidly advancing high-tech fields, continuing education in photogrammetry, remote sensing, and GIS is necessary to keep current as a professional.

Workforce Issues

The overarching geospatial technology industry workforce issues are: skills, competencies and training, image and outreach, and recruitment and retention. The following workforce issues have been gathered directly from industry stakeholders:

- The industry remains focused on 4-year and advanced degrees. However, to meet industry growth requirements, and requirements within the applications arena in particular, employers need to examine alternatives to the traditional pipeline. These alternatives include training provided by technical and community colleges. The fastest emerging occupations within the geospatial technology industry require technical skills; however, the industry does not have enough training models or curricula to develop the necessary pipeline of skilled workers.

- The industry needs to define the occupational characteristics outside of the 4-year and advanced degree levels for individuals interested in entering the field, especially within the applications arena. Those interested in entering the field must also recognize that employers seek employees who possess soft skills as well as technical skills. There is a need to create flexible training programs with different deployment approaches and to map skills and competencies to various applications and user needs.

- The public is not aware of the necessary skill sets and competencies needed to prepare for the diverse career opportunities available within the geospatial technology industry. There is a need for better industry promotion and improved image that could be addressed by developing an industry definition, using the work already performed by The University of Southern Mississippi as a starting point.

What is the High Growth Job Training Initiative?

The President's High Growth Job Training Initiative, as implemented by the U.S. Department of Labor's Employment and Training Administration, is designed to provide national leadership for a demand-driven workforce system that ensures no worker is left behind. It is a strategic effort to prepare workers to take advantage of new and increasing job opportunities in high growth/high demand and economically vital industries and sectors of the American economy. The initiative is designed to ensure that worker training and career development resources in the public workforce system are targeted to helping workers gain the skills and competencies they need to obtain jobs and build successful careers in these industries.

The foundation of this initiative is partnerships that include the public workforce system, business and industry, education and training providers, and economic development working together to develop solutions to the workforce challenges facing these industries and to develop maximum access for American workers to gain the competencies they need to get good jobs in these industries.

High Growth Job Training Initiative

In its efforts to meet the workforce demands of the 21st century economy, the U.S. Department of Labor's Employment and Training Administration (ETA) is conducting forums with various targeted high growth industries.

The Executive Forums are opportunities for senior industry executives to communicate the critical workforce issues facing their industry.

The Workforce Solutions Forums are opportunities for industry leaders, employers, educators, public and private workforce professionals, and economic development organizations to work together to identify a range of actual and potential solutions that, if implemented, could address their industry's workforce needs.

Geospatial Technology Industry Executive Forum

ETA conducted the Geospatial Technology Industry Executive Forum in Colorado Springs, Colorado, on April 10, 2003. Executives from the following organizations attended the Executive Forum:

- Aerospace Industries Assn.
- Analytical Graphics, Inc.
- Ball Aerospace & Technologies Corporation
- Boeing Autometric
- California Space Authority, Inc.
- DigitalGlobe
- Eastman Kodak
- Harris Corporation
- Lockheed Martin
- National Aeronautics and Space Administration (NASA)
- Raytheon Company
- Resource 21, LLC
- RSI
- Sensor Systems, Inc.
- Space Foundation
- Spatial Technologies Industry Association
- U.S. Department of Commerce

Geospatial Technology Industry Workforce Solutions Forum

To follow up, the ETA and public workforce system representatives met with 30 executives, human resources professionals, community college directors, and industry organization officials representing more than 18 companies, organizations, colleges, workforce professionals, and government agency colleagues on July 24 and 25, 2003, in Washington, D.C. The purpose of the forum was to discuss the geospatial technology industry's workforce needs and opportunities for the industry to partner with ETA. The following are the geospatial technology companies and organizations represented at this Workforce Solutions Forum:

- 3001, Inc.
- EarthData
- Fulton Montgomery Community College
- Jones County Junior College
- NASA Center for Distance Learning
- NASA Earth Science Applications
- Navigation Technologies
- ORBIMAGE
- Questerra, LLC
- Raytheon Company
- Research Systems, Inc.
- Resource 21, LLC
- Sensor Systems, Inc.
- The Aerospace Industries Assn.
- The California Space Authority
- The Harris Corporation
- The Institute for the Application of Geospatial Technology
- The National Imagery and Mapping Agency
- The National Oceanic & Atmospheric Administration
- The Space Foundation
- The Spatial Technologies Industry Association
- The U. S. Department of Commerce
- The Univ. of Southern Mississippi
- Workplace Inc.

Geospatial Technology Industry Workforce Solutions Forum *(continued)*

On March 9, 2004, the ETA conducted a Geospatial Technology Industry Workforce Solutions Forum in Washington, D.C., with more than 90 participants representing industry, education, economic development, and the workforce system. The purpose of the forum was to develop innovative model solutions that address the critical workforce issues already identified and validated by the stakeholders at previous forums. (For a complete list of forum attendees, please contact the BRG.)

Background & Next Steps

ETA has addressed the workforce issues of the geospatial technology industry from a national perspective by conducting an Executive Forum with the geospatial technology industry to gather relevant information from key industry leaders.

This forum provided ETA and the public workforce system with the opportunity to gain further understanding of the overall critical workforce needs of the industry. After meeting with industry leaders, ETA developed and solidified strategic alliances with business, education, and workforce leaders who are focused on the workforce issues confronting the industry through a Workforce Solutions Forum. ETA engaged leaders in industry, education, and the workforce system in developing innovative approaches to address their needs.

ETA will partner with employers and education providers to develop and model skills training solutions nationally that can be replicated and sustained throughout the state and local public workforce system. These approaches will help ensure that workers have the right skills for the right jobs at the right time.

The ETA In Action

University of Southern Mississippi (USM) Geospatial Technician Apprenticeship Project (GTAP)

Challenge

The geospatial technology industry is an emerging high growth sector of the U.S. economy that is expected to reach more than $21 billion in revenue over the next few years. Geospatial technologies include remote sensing, GIS, and global positioning systems (GPS) technologies. There is an immediate and anticipated need to fill tens of thousands of positions in geospatial technology and related fields.

Addressing the Challenge

ETA's $1.5 million grant to USM will support the establishment of apprenticeship standards for geospatial technicians. USM and its industry partners will develop state-of-the-art training models and materials to engage the potential geospatial technology workforce, implement innovative on-the-job and classroom training delivery methodologies, and develop detailed exploration and mapping of career ladders and lattices in the industry. USM will also develop a geospatial technology training, technical assistance, and capacity-building component for federal, state, and local workforce system partners to ensure that the critical demand for technicians is met throughout the country.

Sustainable Impact

USM's GTAP pilot represents a timely, demand-driven response to the workforce needs of an emerging and rapidly evolving industry. USM's partnerships with NASA, Lockheed Martin, and regional economic development and technology organizations ensure that the project will continue to be driven by the industry and guided by the industry's developing workforce needs. USM's focus on capacity-building and technical assistance for the public workforce system will ensure that the successful models developed in the GTAP pilot will be widely disseminated, replicated, and sustained through the One Stop Career Center infrastructure.

For the most up-to-date information on ETA investments in workforce solutions for the geospatial technology industry, go to www.doleta.gov.

Additional Resources

Online Tools

CareerOneStop
(www.CareerOneStop.org)

The CareerOneStop is a resource for businesses and job seekers. It contains links to America's Job Bank, America's Service Locator, and America's Career InfoNet.

www.careervoyages.gov
www.doleta.gov
www.doleta.gov/atels_bat
www.onetcenter.org

Other Tools

Toll-Free Help Line
1-877-US2-JOBS (1-877-872-5627)
1-877-889-5627 (TTY)

The Toll-Free Help Line provides up-to-date information about the full range of workforce services for workers and businesses as well as answers to employment and training questions.

National Programs

Apprenticeship

Apprenticeship is currently working with the geospatial technology industry to design an apprenticeship program with academic curriculum for the occupation of geospatial technician. This program will encompass skill development in the fields of remote sensing, GIS, and GPS technologies.

Contact the BRG

For more information on the activities and services of the ETA's Business Relations Group (BRG), please contact:

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