An Analysis of
Information Technology
Middle Skill Job Openings 2011

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BATEC Broadening Advanced Technological Education Connections

TechAmerica

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EXECUTIVE SUMMARY

This Information Technology (IT) Middle Skill Job Openings study outlines the number of middle skill **jobs openings** in IT Technician Occupational Classifications as reported by the Department of Labor (DOL) Workforce System under the Workforce Investment Act (WIA) reporting mechanism in the calendar year 2011.

As IT Technicians are pervasive in multiple industries, the study captures IT middle skill job openings across all Industry Sectors, including Information Systems, Computer Science, Information, Computing Technology, Health, Manufacturing, Business Systems, GeoScience and Law Enforcement.

While the Internet, telecommunications, computer processing speeds, social media, analytics and informatics have greatly changed how work is done in many industries, this report focuses on the job openings in all industry sectors that require Information and Computing Technology as the **primary job function.**

The U.S. Bureau of Labor Statistics (BLS) and the WIA funded workforce providers annually collect job openings projections and job openings in each region by using the U.S. Department of Labor, Employment and Training Administration O*NET-SOC taxonomy.

This job openings report focuses on private sector full-time middle skill IT jobs. Forty-one occupational classifications are defined to 21 job function descriptors. As job titles vary within primary job functions, sample titles are included for each occupational classification. Job Function Descriptors are grouped by 10 Job Types to reflect similar task focus:

Job Type	2011 Job Openings
Data and Information Management	20,093
Information and Content Delivery /Development	2,734
Web / Internet / Digital Media	21,541
IT and User Support	24,732
Sales	11,694
Software Development	12,721
Computer, Network and Database Systems Administration	32,610
Computer Programmers and Operators	12,856
Health Informatics	8,257
Geographic Information Systems	6,322
Total Middle Skill Full-time IT Job Openings (CY11)	**153,560**

These job openings were then placed side by side to unique job ads over the last 120 days as reported by Monster®. While job ads do not correlate to unique job openings, they are useful in predicting trends and employer demand.

Job Type	2012 (120 day) Job Ads
Data and Information Management	20,910
Information and Content Delivery /Development	4,534
Web / Internet / Digital Media	206,990
IT and User Support	138,030
Sales	10,691
Software Development	96,929
Computer, Network and Database Systems Administration	292,016
Computer Programmers and Operators	66,634
Health Informatics	31,980
Geographic Information Systems	942
Total Middle Skill IT Job Ads over 120 days	**869,656**

In 2010, the latest year available jobs by industry, the Bureau of Labor and Statistics' reported 130,435,600 non-agricultural jobs in the United States. The Industry Sectors primarily hiring IT Technicians account for 14.8% of jobs (Information and Professional and Technical Services). However, IT technicians are employed all major industry sectors. *(BLS "Employment by Major Industry Sector" January 2012 Monthly Labor Review).* BLS estimates that jobs with an IT primary job function numbered 9,739,204 in 2010, indicating approximately half of those two sectors' jobs being primary function IT jobs.

In 2010, there were 5,128,945 full and part time job openings in the United States. Job Openings in the Information Sector were 673,500, and Professional and Technical Services Sector were 449,000, accounting for 22% of job openings. Of those, BLS projected that 504,100 were IT primary jobs.

While part-time job openings have exceeded full-time openings in all industry sectors, this report focuses on capturing full-time private sector and self-employed positions that garner a livable wage. This report transcends industry classifications and captures all IT middle skill full-time job openings.

KEY FINDINGS

Computer and Information Technology occupations are projected to grow by 22% over the next 10 years, adding close to 75,000 new jobs each year. Middle skill jobs are projected to comprise 38% of those new jobs. *(Bureau of Labor Statistics, Occupational Handbook, 2010-11, Overview 2010-20 Projections).*

While no IT Middle Skill Occupations are listed amongst BLS's 2010 "Fastest Growing Occupations" or "Occupations with the Largest Growth", there are two occupations that are considered "High-Demand" by the US Department of Labor, Employment and Training Administration. Ranked #2, **Network and Computer Systems Administrator (15-1142.00)** projects almost 50% of its jobs will be filled by middle skill professionals. In 2011 there were 11,257 jobs filled by persons with a high school diploma and specialized training, indicating an that at least half of the jobs are being filled by middle skill workers. Ranked #6, **Computer Systems Analysts (15-1121.00)** essential job duties can be met with trained middle skills workers. In 2011, there were 17,857 jobs filled by middle skill workers.

Three occupational classifications **Computer Programmer (15-1131.00) and Software Developer (15-1133.00 & 15.1132.00)** have demonstrated the fastest growing wage rates. While computer programmers have increasingly been filled by middle skill workers, their wage gains were ranked #2 in 2010. Ranked #8 on the fastest growing wages, Software Developer jobs are filled by middle skill workers about 20% of the time. *(BLS, Employment Projections, Industries with the Fastest Growing and Most Rapidly Declining Wage and Salary Employment, January 2012)*

The fastest growing industry sector employing IT middle skill workers is the Financial Activities sector *(BLS 2010 Fastest Growing and Declining Employment by Industry).* Business and Financial Analysis job functions require IT primary skills in two distinct occupational classifications: In 2011, 71% of **Business Operations Specialists (13.1199.00)** identified information systems as their primary job function; 7,040 job openings were available to middle skill workers. **Financial Quantitative Analysts (13-2099.01)** were comprised of 88% IT middle skill workers; 4,825 job openings were recorded in 2011.

Changing technologies and solutions are impacting the roles and demand for data storage and access, security of information as well as how information is positioned and processed across multiple platforms.

Data Warehousing Specialists (15-1199.07) are developing and implementing common and uncommon data storage mechanisms to efficiently preserve and access information and digital product; 2,358 middle skill jobs were open in 2011. Cloud-based computing and virtual memory solutions are emerging technologies these specialists will need to apply to keep pace with this emerging occupation**.**

Information Security Analysts (15-1122.00) are charged with "cybersecurity" of information, data, networks and systems; 4,710 jobs were open in 2011. This ever evolving field across all industry sectors will continue to provide a steady annual job openings rate.

As internet commerce expands, **Search Market Specialists (15-1199.10)** work to optimize a product or company's on-line presence to increase revenue; 1,110 job openings were recorded in 2011. This emerging occupation has a high turnover rate and unfilled positions indicating a need for training *(US Department of Labor February 2012 Monthly Newsletter).*

As Information, Computing Services and Information Technology continues to impact and transform the way Americans work, more and more jobs are crossing over to reflect required primary skills that are traditionally associated with the Information Sector. This report identified two occupational classifications that were transformed to distinctly IT jobs. **Medical Records Medical Records & Health Information Technicians (29-2071.00)** transformed a primarily paper-based clerk job to Electronic Records Systems. Medical Clinics, Hospitals, Emergency Care Facilities, Nursing Homes, Hospices and Pharmacy rely on the mobile and integrated electronic records systems, generating 4,710 job openings in 2011 **Geographical Information Systems Technicians (15-1199.05)** has transformed from analog tools and mechanical calculations to merging cartography, statistical analysis and database technology; 3,124 job openings occurred in 2011 .

Over 56% of **job ads** were in three of the forty-one surveyed occupational classifications: Computer Systems Analysts (186,652) Web Developer (164,594) and Computer User Support Specialist (138,030). Computer Programmer (64,592), Software Quality Assurance Engineer and Tester (53,014) complete the top five most advertised jobs, representing almost 70% of the job ads counted.

METHODOLOGY

Definitions:

Computer and Information Technology Occupations were defined by Bureau of Labor Statistics Occupational Outlook Handbook, Computer and Information Technology Occupations 2010 and supplemented with the information uncovered by the Center for Excellence for Information and Computing Technology report titled "Emerging Workforce Trends in Information and Computing Technology".

Full-time Job: Job requiring 35 hours or more of work per week.

Industry Sector: The North American Industry Classification System (NAICS) groups similar industries into sectors. This report collects job opening data across all sectors.

Job Opening: A specific position of employment to be filled at an establishment; conditions include the following: there is work available for that position, the job could start within 30 days, and the employer is actively recruiting for the position. For the Department of Labor, Employment and Training Administration, Job Openings is the indicator used to determine training needs, including skills gap analysis in devising workforce training to meet employment demands. Job Openings is the primary indicator used in the analysis of industry retention rates, business cycles, economic development investment impact.

Middle Skill Jobs: "Jobs in the middle of the labor market – those that require more than high-school, but less than a four year degree" definition put forth by the Urban Institute's "America's Forgotten Middle-skill Jobs", November 2007

Occupational Classification: Method of classifying workers into one of 461 classifications reflecting similar job duties. The O*Net Resource Center's occupational classification codes were used rather than the SOC codes as O*Net-SOC includes new and emerging occupations that have yet to be incorporated into BLS data, but are tracked by the Department of Labor Employment and Training Administration in counting job openings.

Primary Job Function: describe the essential job duties required by the employee.

Definitions provided by Bureau of Labor Statistics Glossary unless otherwise noted.

Primary job function must be the use, implementation, or creation of information systems, data analysis or informatics, utilization of software, networks, computer hardware, on-line and digital information creation, development, or management. While the impact of Information Technology on occupations is unquestionable, this report addresses those job openings whose skills are primarily IT.

Middle Skill jobs are those that require a high school diploma and some post-secondary training. This job count excluded jobs that require supervisory skills, management experience, complex multi-disciplinary analysis, or engineering. General Educational achievement was removed as a search criterion. Instead, skill, knowledge and experience descriptors were employed whereby "analyst, manager, director, lead, supervisor, scientist, engineer" were excluded.

Using the O*Net-SOC taxonomy, DOL Labor Market Reports, BLS Employment Projections, IT middle skill occupations were selected for report inclusion. Using the BLS JOLTS national reports from 2011, Workforce Investment Act (WIA) employment and wage reports, each O*Net code was attached to 12 month job opening counts. These counts were refined to exclude public sector job openings and jobs containing management, complex analysis, or engineering skills. NAICS codes were applied to Sales descriptors only. All other descriptors include all private industries.

Job Ads counted by Monster® utilized the same criteria. The data pull was completed on May 22, 2012 reflecting the dates of January 21 – May 20, 2012. Every job ad is assigned an O*net-SOC code by Monster®. Less than 60% of job ads are classified using North American Industry Classification System (NAICS) codes. Therefore, the job ads are a mix of private and public sector jobs. In general, about 8-12% of job ads that have been NAICS coded are non-private sector jobs (government or education).

Primary Data Sources:

- Bureau of Labor Statistics Economic and Employment Projections
- Bureau of Labor Statistics Business Employment Dynamics
- Bureau of Labor Statistics Job Openings and Labor Turnover Surveys (JOLTS)
- U.S. Department of Labor, Employment and Training Administration, Labor Market Reports
- Monster® Real Time Labor Analysis

Data is presented by 1) Job Type: grouping on similar roles; 2) Job Function Descriptor: relating job skills and knowledge requirements; and 3) Occupational Classification: categorizing by job duties. _All Occupational Classifications are defined using Department of Labor Employment and Training Administration associated descriptions._

Job Type: Data and Information Management

Job Function Descriptor: Online/Electronic Information Security

Occupational Classification Definition: **Information Security Analyst** plans, implements, upgrades, or monitors protection of computer networks and information. Focuses on safeguarding digital and responds to computer security breaches and viruses.
Estimated Composition of Middle Skill Jobs: 60% of jobs do not require managerial or complex analysis skills.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Information Security Analysts	15-1122.00	4,710	19,523	• Information Security Specialist (CISSP) • Support Technician (Security+) • Data Security Specialist • Computer Forensics Technician

Job Function Descriptor: Financial Analysis

Occupational Classification Definition: **Financial Quantitative Analyst** conducts quantitative analyses of information affecting investment programs of public or private institutions.
Estimated Job Openings Requiring Middle Skills: 37% of jobs do not require managerial or complex analysis skills.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Financial Quantitative Analysts	13-2099.01	4,825	357	• Financial Analyst • Financial Systems Data Specialist • Operation Risk Data Specialist

Job Function Descriptor: Business Analysis

Occupational Classification Definition: **Business Intelligence Analyst** produces financial and market intelligence by querying data repositories and generating periodic reports and identifies data patterns and trends.
Estimated Composition of Middle Skill Jobs: 26% of jobs do not require managerial or complex analysis skills.

Occupational Classification Definition: **Business Operations Specialists** collects and reports on operational data indicators as related to expense and income.
Estimated Job Openings Requiring Middle Skills: Approximately 71% of job openings are primarily concerned with designing decision support analytics; these jobs were counted as "IT middle skill". All other job openings are business process primary skill and are not counted in this report.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Business Intelligence Analyst	15-1199.08	1,160	804	• Database Reporter • ETL Specialist • Business • Relational Database Specialist
Business Operations Specialist	13-1199.00	7,040	N/A	• Operations Specialist • MIS Coordinator

Job Function Descriptor: Data / Information Storage

Occupational Classification Definition: **Data Warehousing Specialist d**esigns, models, or implements corporate data warehousing activities. Programs and configures warehouses of database information and provides support to warehouse users.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Data Warehousing Specialist	15-1199.07	2,358	226	• Cloud Computing Specialist • Storage Administrator • Data Storage Technician

Job Type: Information and Content Delivery / Development

Job Function Descriptor: Distance Learning

Occupational Classification Definition: **Distance Learning Coordinators:** Converts classroom based courses to on-line format. Provides technical support to students engaged in distance learning.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Distance Learning Coordinators	11-9039.01	272	84	• On-line Learning Technicians • Distance Learning Coordinators • Distance Learning Support Specialists

Job Function Descriptor: Television & Radio

Occupational Classification Definition: **Broadcast Technician** sets up, operates, and maintains the electronic equipment used to transmit radio and television programs; controls audio equipment to regulate volume level and quality of sound during radio and television broadcasts; operates transmitter to broadcast radio or television programs.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Broadcast Technicians	27-4012.00	980	3,054	• Master Control Operator • Production Assistant

Job Function Descriptor: Print

Occupational Classification Definitions:
Desktop Publishers: Uses computer software to produce publication-ready material.

Document Management Specialists: Implements and administers enterprise-wide document management systems and related procedures that allow organizations to capture, store, retrieve, share, and destroy electronic records and documents.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Desktop Publishers	43-9031.00	256	658	• Desktop Publishing Specialist • Publishing Coordinator
Document Management Specialists	15-119.12	1,226	738	• Document Management Coordinator • Document Control Coordinator

Job Type: Web / Internet / Digital Media

Job Function Descriptor: Web Development

Occupational Classification Definition: **Web Developer d**esigns, creates and modifies web sites using software designed to facilitate web page creation; analyzes user needs to implement content, graphic, performance, and capacity.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Web Developers	15-1134.00	1,784	164,594	• On-line Learning Technicians • Distance Learning Coordinators • Distance Learning Support Specialists

Job Function Descriptor: Web Administration

Occupational Classification Definition: **Web Administrator** manages web environment design, deployment, and maintenance activities; performs testing and quality assurance of web sites and web applications.
Estimated Job Openings Requiring Middle Skills: 73% of jobs do not require engineering or complex analysis skills. It was observed that many jobs are emerging as hybrids of web development and administration.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Web Administrators	15-1199.03	1,135	711	• Information Security Specialist (CISSP) • Support Technician (Security+) • Data Security Specialist • Computer Forensics Technician

Job Function Descriptor: Web Content Developer

Occupational Classification Definitions:

Multimedia Artists and Animator creates special effects, animation, or other visual images using film, video, computers, or other electronic tools and media for use in products or creations.

Film and Video Editor edits moving images on film, video, or other media.

(Web) **Graphic Designer** designs or creates graphics to meet specific commercial or promotional needs for use on websites.

Sound Engineer Technician operates machines and equipment to record, synchronize, mix, or reproduce music, voices, or sound effects for web content. Estimated Job Openings Requiring Middle Skills: 100% It was observed that many specialists in content are being phased out and web developers are required to have skills in all facets of content creation.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Multi-media Artists & Animators	27-1014.00	1,681	4,032	• Website Content Manger • Interactive Designer
Film & Video Editors	27-4032.00	649	3,347	• Web Content Developer
Graphic Designers	27-1024.00	9,568	32,795	• Web Graphic Designer
Sound Engineering Technicians	27.4014.00	317	1,284	• Sound Engineer • Sound Technician

Job Function Descriptor: Online Market Strategist

Occupational Classification Definitions:
Search Market Strategist works to increase web presence/visibility; examines search query behaviors, search engines and internet-based content; analyzes research, data, and technology to understand user intent and measure outcomes for optimization.

On-line Merchants conducts retail activities of businesses operating exclusively online, including managing inventory, marketing activities, and balancing financial records
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Search Market Strategists	15-1199.10	1,110	N/A	• Digital Marketing Specialist • Search Engine Optimization Specialist • Social Media Marketing Specialist
On-line Merchants	13-1199.06	5,297	227	• Electronic Transaction Analyst • Online Marketing Coordinator

Job Type: IT Technical & User Support

Job Function Descriptor: Computer / IT Support

Occupational Classification Definitions:

Computer User Support Specialist provides technical assistance to computer users; answers questions or resolves computer problems for clients in person, via telephone, or electronically; provides assistance with computer hardware and software printing, word processing, electronic mail, and operating systems.

Computer Network Support Specialist analyzes tests, troubleshoots, and evaluates existing network systems, including, such as local area network (LAN), wide area network (WAN), and Internet systems; performs network maintenance to ensure networks operate correctly with minimal interruption.

Estimated Job Openings Requiring Middle Skills: 100% It was observed that the distinction between these two occupational classifications has diminished and most IT support jobs require a broad understanding applications, hardware and networks.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Computer and User Support Specialists	15-1151.00	19,256	138,030	• Technical Support Specialist • Help Desk
Computer Network Support Specialists	15-1134.00	5,476	N/A	• Network Support Specialist • Network Technician

Job Type: Sales

Job Function Descriptor: Software Sales

Occupational Classification Definitions:

Sales – Direct/Outside Representative markets and sells software products direct to consumers away from a fixed retail location using presentation and demonstration.

Sales – Indirect/Inside Representative sells, services, and grows the customer base as defined by management; analyzes customer needs, identifies services to maintain and grow accounts; increases a revenue generating sales pipeline, which consists of active accounts.
Estimated Job Openings Requiring Middle Skills: 100% Sales jobs were filtered to NAICS 51 and 54 (Information and Professional and Technical Services) to capture the highest likelihood of software/hardware/network/security solutions sales.

Sales Engineers: Supports direct sales by providing complex technical information; works directly with customers to design customizable solutions
Estimated Job Openings Requiring Middle Skills: 33%; requires a technical background equivalent to a baccalaureate degree in engineering.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Sales – Direct/Outside	41.3099.00	2,489	4,060	• Direct Sales Representative • Software Sales Consultant
Sales – Indirect/Inside	41.4011.00	5,879	3,347	• Account Manger • CRM Specialist
Sales Engineer	41.9031.00	3,326	3,284	• Technical Sales Specialist • Customer Support Engineer

Job Type: Software Development

Job Function Descriptor: Software Development

Occupational Classification Definitions:
Software Developer, Systems researches, designs, develops, and tests operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computing applications.
Estimated Job Openings Requiring Middle Skills: Approximately 13% of job openings in this occupational are considered "middle skill". Engineer, Analyst, Manager, and Project Lead jobs are excluded from these job counts.

Software Developer, Application develops, creates, and modifies general computer applications software or specialized utility programs; analyzes user needs and develop software solutions; designs software or customize software for client use with the aim of optimizing operational efficiency.
Estimated Job Openings Requiring Middle Skills: Approximately 22% of job openings in this occupational are considered "middle skill". Engineer, Analyst, Manager and Project Lead jobs are excluded from these job counts.

Software Quality Assurance Engineers & Tester develops and executes software test plans in order to identify software problems and their causes.
Estimated Job Openings Requiring Middle Skills: 100%

Video Game Designer designs core features of video games. Creates and maintains design documentation.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Software Developers, Systems	15-1133.00	4,353	39,876	• Software Developer • Software Designer
Software Developers, Applications	15-1132.00	2,149	3,688	• Network Designer • Applications Developer
Software QA / Testers	15-1199.01	4,956	53,014	• QA Analyst • Software Test Engineer
Video Game Designer	15-1199.11	1,263	351	• Game Designer

Job Type: Computer, Network and Database Systems

Job Function Descriptor: Computer Systems Administration

Occupational Classification Definitions:

Network and Computer Systems Administrators installs, configures, and support an organization's local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system; monitors network to ensure network availability to all system users and may perform necessary maintenance to support network availability.
Estimated Job Openings Requiring Middle Skills An estimated 48% of jobs are middle skill; engineer, director, and manager are excluded in the job opening counts.

Database Administrator administers, tests, and implements computer databases, applying knowledge of database management systems; coordinates changes to computer databases.
Estimated Job Openings Requiring Middle Skills: 87% of positions are non-managerial. It was observed that many database analysts were classified with this O*net code. The merging of management systems and data use is evident.

Computer Systems Analyst analyzes science, engineering, business, and other data processing problems to implement and improve computer systems; analyzes user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations.
Estimated Job Openings Requiring Middle Skills: 82% of positions do not require complex analytical skills nor require computer engineering skills.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Network and Computer Systems Administrators	15-1142.00	11,257	68,083	• LAN Administrator • Systems Specialist • Network Manager
Database Administrators	15-1141.00	3,496	37,281	• Database Administrator • Data Analyst
Computer Systems Analysts	15-1121.00	17,857	186,652	• Technical Sales Specialist • Customer Support Engineer

Job Type: Computer Operators and Programmers

Job Function Descriptor: Computer Operation

Occupational Classification Definitions:

Computer Operator monitors and controls electronic computer and peripheral electronic data processing equipment to process business, scientific, engineering, and other data according to operating instructions; monitors and responds to operating and error messages. May enter commands at a computer terminal and set controls on computer and peripheral devices.

Computer-Controlled Machine Tool Operator operates computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.

Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Computer Operators	43.9011.00	763	2,042	• Computer Technician • Computer Operator
Computer Controlled Machine Tool Operators, Metal and Plastic	51.4011.00	2,156	N/A	• CNC Operator • Machine Set-up Technician

Job Function Descriptor: Computer Programming

Occupational Classification Definitions:

Computer Programmer creates, modifies, and tests the code, forms, and script that allow computer applications to run; works from specifications drawn up by software developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.
Estimated Job Openings Requiring Middle Skills: 54%; about half of the jobs require computer science and engineering competencies.

Computer Numerically Controlled Machine Tool Programmer develops programs to control machining or processing of metal or plastic parts by automatic machine tools, equipment, or systems. May develop computerized maintenance management systems as part of over enterprise asset management system.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Computer Programmers	15-1131.00	9,565	64,592	• Programmer • JAVA Developer • Applications Programmer
Computer Controlled Machine Tool Programmers, Metal and Plastic	51-4012.00	368	N/A	• CNC Programmer • Process Engineer • CAD CAM Programmer

Job Type: Health Informatics

Job Function Descriptor: Health Records

Occupational Classification Definitions:
Medical Records & Health Information Technician compiles, processes, and maintains medical records of hospital and clinic patients in a manner consistent with medical, administrative, ethical, legal, and regulatory requirements of the health care system; processes, maintains, compiles, and reports patient information for health requirements and standards in a manner consistent with the healthcare industry's numerical coding system.
Estimated Job Openings Requiring Middle Skills: 100%

Informatics Nurse Specialist applies knowledge of nursing and informatics to assist in the design, development, and ongoing modification of computerized health care systems. May educate staff and assist in problem solving to promote the implementation of the health care system.
Estimated Job Openings Requiring Middle Skills: 78% Bachelor's in nursing is not required.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Computer Operators	43.9011.00	763	2,042	• Computer Technician • Computer Operator
Computer Controlled Machine Tool Operators, Metal and Plastic	51.4011.00	2,156	N/A	• CNC Operator • Machine Set-up Technician

Job Function Descriptor: Medical and Bio Information Technologies

Occupational Classification Definition:
Bioinformatics Technicians applies principles and methods of bioinformatics to assist scientists in areas such as pharmaceuticals, medical technology, biotechnology, computational biology, proteomics, computer information science, biology, and medical informatics. May build and maintain databases for processing and analyzing genomic or other biological information.
Estimated Job Openings Requiring Middle Skills: 63% do not require scientific methodology understanding.

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Bioinformatics Technicians	43-911.01	189	82	• Research Associate • Bioinformatics Technician

Job Type: Geographic Information Systems

Job Function Descriptor: Geographical Information Data Capture

Occupational Classification Definitions:
Cartographers & Photogrammertrist collects, analyzes, and interprets geographic information provided by geodetic surveys, aerial photographs, and satellite data. May work with Geographic Information Systems (GIS). May design and evaluate algorithms, data structures, and user interfaces for GIS and mapping systems.

Surveying Technician adjusts and operates surveying instruments, such as the theodolite and electronic distance-measuring equipment, and compiles notes, makes sketches, and enters data into computers.

Mapping Technicians calculates mapmaking information from field notes, and draws and verifies accuracy of topographical maps.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Cartographers & Photogrammertrists	17-1021.00	502	49	• GIS Analyst • Digital Cartographer
Surveying Technicians	17-3031.01	657	N/A	• Survey Technician
Mapping Technicians	17-3031.02	1,879	N/A	• Map Technician • CAD Technician • GPS Mapper

Job Function Descriptor: Geographical Information Systems & Data Analysis

Occupational Classification Definitions:
Geographic Information Systems Technician assists scientists, technologists, or related professionals in building, maintaining, modifying, or using geographic information systems (GIS) databases. May also perform some custom application development or provide user support.

Geospatial Information Specialists & Technologist researches or develops geospatial technologies. May produce databases, perform applications programming, or coordinate projects; may work in agriculture, mining, health care, retail trade, urban planning, or military intelligence industries.
Estimated Job Openings Requiring Middle Skills: 100%

Occupational Classification	O*Net-SOC Code	2011 Job Openings	2012 Job Ads (120 days)	Common Middle Skill Job Titles
Geographical Information Systems Technicians	15-1199.05	3,124	858	• GIS Technician • GIS Technical Support Specialist • GIS Developer
Surveying Technicians	15-1199.04	160	35	• Geospatial Applications Developer • Geospatial Modeler

DISCUSSION

1) What occupational classifications can be eliminated from "IT Middle Skill Jobs"? What are the criteria for eliminating?

2) What occupational classifications need to be added? What is the rationale for inclusion?

3) What is the biggest obstacle in filling IT Middle Skill job openings? Is it unskilled job candidates? Is the slowly recovering economy allowing jobs to go unfilled longer?

4) What education level is traditionally required for each occupational classification? How do employees with a bachelor's degree perform in comparison to non-baccalaureate employees? What is the perceived role of a bachelor's degree having on job performance?

5) What skills are required for each occupational classification? What credentials or industry certifications are now required to successfully work within each occupational classification?

6) How is the education sector meeting the skill demands for each job function? Which educational delivery mechanisms are most effective? How can education meet the needs of IT middle skill workforce?

AREAS FOR FURTHER RESEARCH

1) Are there specific jobs within the occupational classification that are lacking skilled workers?

2) What jobs can be isolated from each occupational classification and defined as middle skill?

3) Does the current occupational classification system adequately describe the hybridization of jobs requiring IT as a secondary function?

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