IT Employment – Identifying Skills and Opportunities
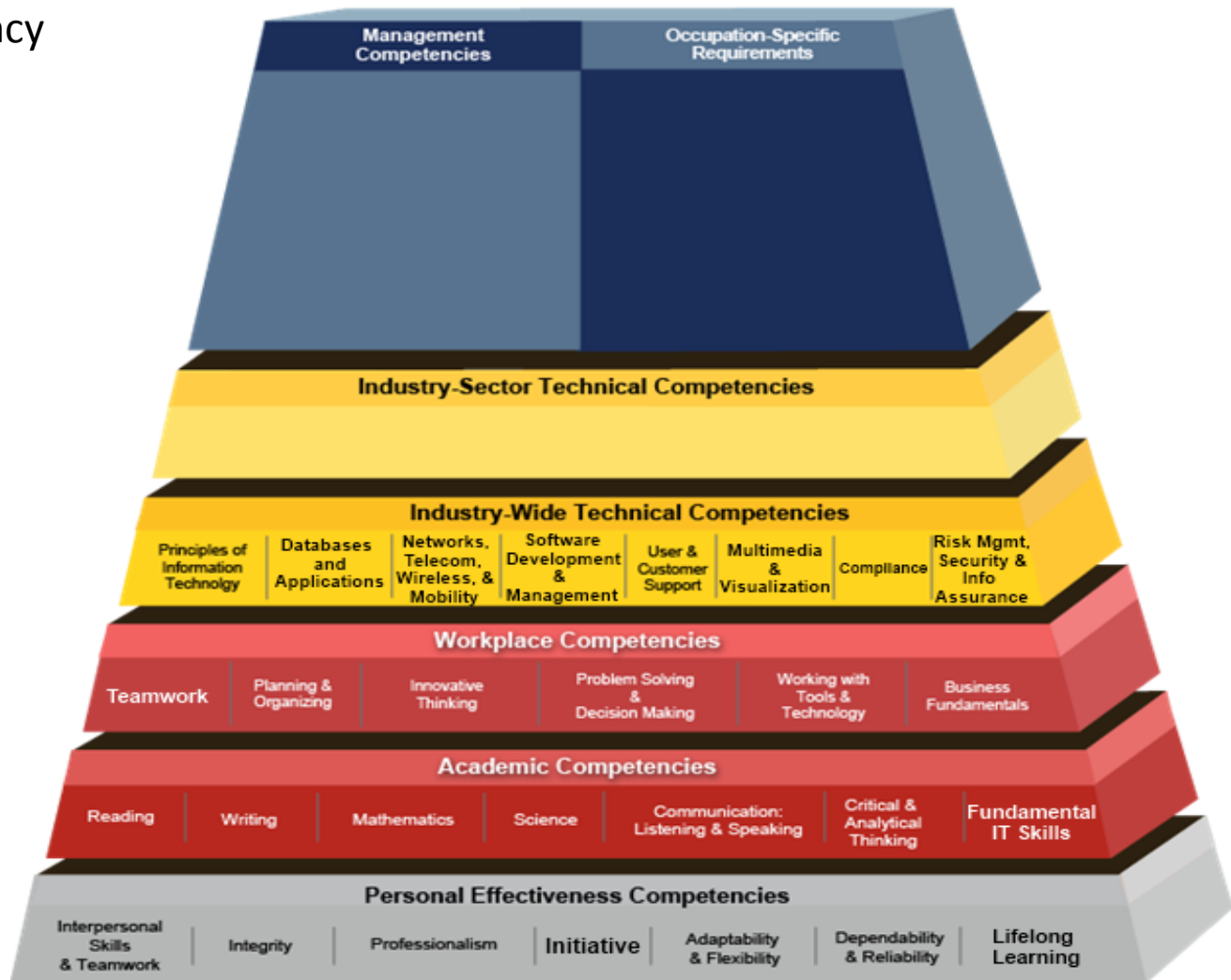
Presentation to MCCWDTA IT Sub-Group

September 17, 2012
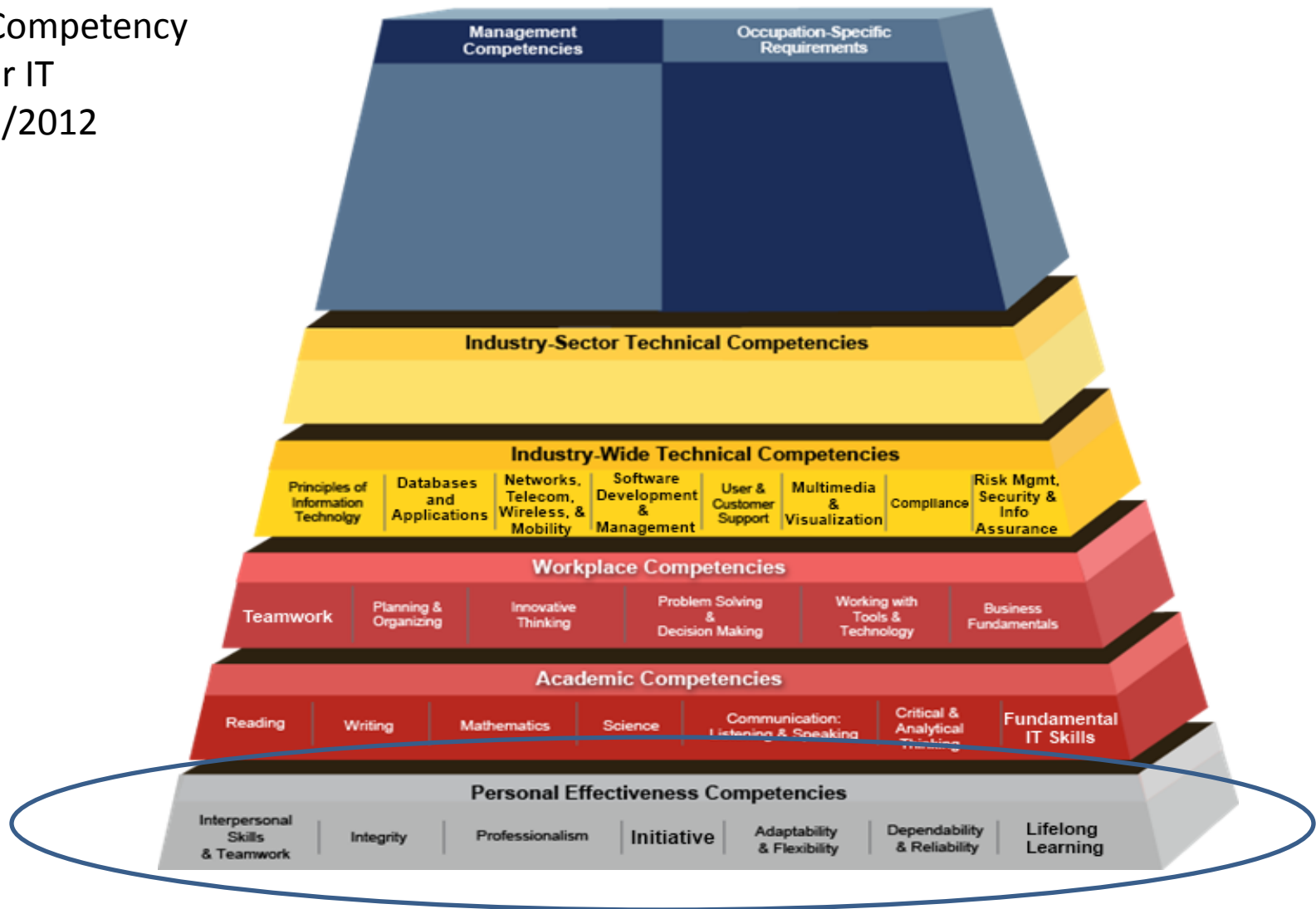
US DOL Competency
Model for IT
Draft 9/7/2012

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Tier 1 – Personal Effectiveness Competencies are personal attributes essential for all life roles.

1. **<u>Interpersonal Skills & Teamwork</u>**: Displaying skills to work with others from diverse backgrounds.

2. **<u>Integrity</u>**: Displaying accepted social and work behaviors.

3. **<u>Professionalism</u>**: Maintaining a professional demeanor at work.

4. **<u>Initiative</u>**: Demonstrating a willingness to work.

5. **<u>Adaptability & Flexibility</u>**: Displaying the capability to adapt to new, different, or changing requirements.

6. **<u>Dependability & Reliability</u>**: Displaying responsible behaviors at work.

7. **<u>Lifelong Learning</u>**: Displaying a willingness to learn and apply new knowledge and skills.
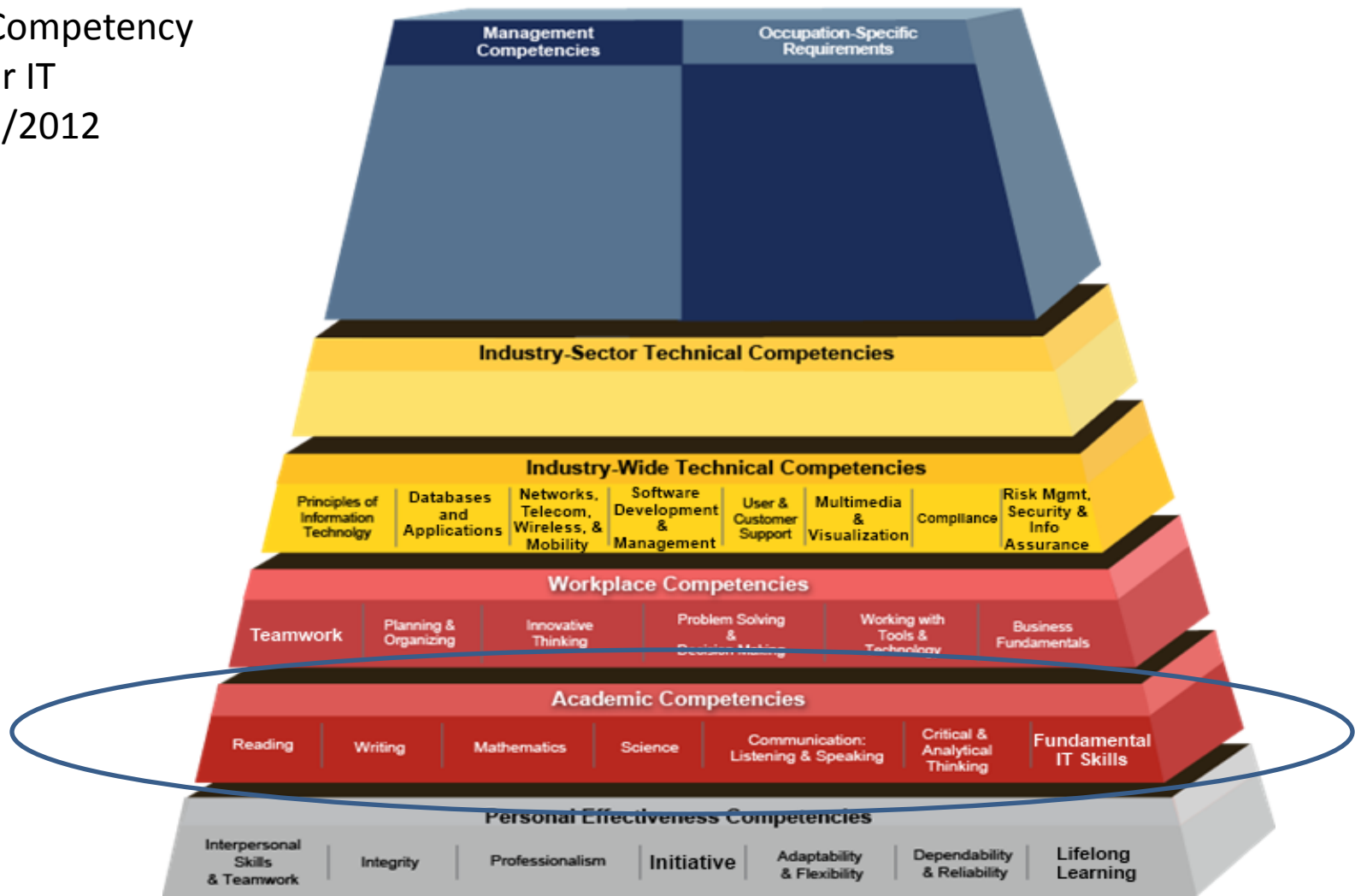
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Model for IT
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Tier 2 – Academic Competencies are critical competencies primarily learned in a school setting. They include cognitive functions and thinking styles.

1. <u>**Reading**</u>: Understanding written sentences and paragraphs in work-related documents.

2. <u>**Writing**</u>: Using standard English to compile information and prepare written reports.

3. <u>**Mathematics**</u>: Using mathematics to express ideas and solve problems.

4. <u>**Science**</u>: Using scientific rules and methods to solve problems.

5. <u>**Communication—Listening & Speaking**</u>: Giving full attention to what others are saying and speaking in English well enough to be understood by others.

6. <u>**Critical & Analytical Thinking**</u>: Using logic, reasoning, and analysis to address problems.

7. <u>**Fundamental IT User Skills**</u>: Using a computer, communication devices, and related applications to input, retrieve, and communicate information.

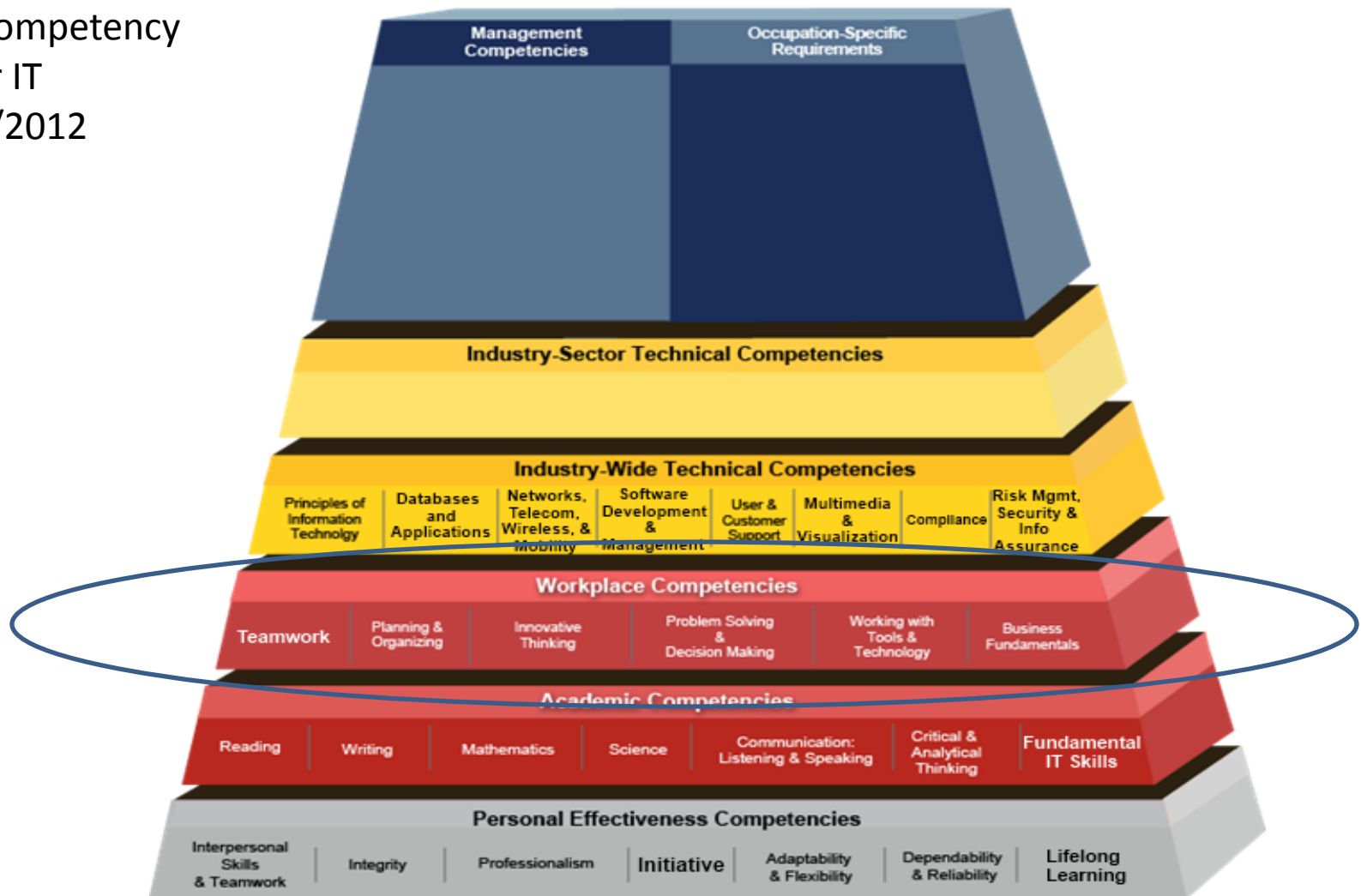*US DOL Competency Model for IT*
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Management Competencies	Occupation-Specific Requirements

Industry-Sector Technical Competencies

Industry-Wide Technical Competencies

Principles of Information Technolgy	Databases and Applications	Networks, Telecom, Wireless, & Mobility	Software Development & Management	User & Customer Support	Multimedia & Visualization	Compliance	Risk Mgmt, Security & Info Assurance

Workplace Competencies

Teamwork	Planning & Organizing	Innovative Thinking	Problem Solving & Decision Making	Working with Tools & Technology	Business Fundamentals

Academic Competencies

Reading	Writing	Mathematics	Science	Communication: Listening & Speaking	Critical & Analytical Thinking	Fundamental IT Skills

Personal Effectiveness Competencies

Interpersonal Skills & Teamwork	Integrity	Professionalism	Initiative	Adaptability & Flexibility	Dependability & Reliability	Lifelong Learning

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Tier 3 – Workplace Competencies represent motives and traits, as well as interpersonal and self-management styles.

1. **<u>Teamwork</u>**: Working cooperatively with others to complete work assignments.

2. **<u>Planning & Organizing</u>**: Planning and prioritizing work to manage time effectively and accomplish assigned tasks.

3. **<u>Innovative Thinking</u>**: Generating innovative and creative solutions.

4. **<u>Problem Solving & Decision Making</u>**: Applying critical-thinking skills to solve problems by generating, evaluating, and implementing solutions.

5. **<u>Working with Tools & Technology</u>**: Selecting, using, and maintaining tools and technology to facilitate work activity.

6. **<u>Business Fundamentals</u>**: Knowledge of basic business principles, trends, and economics.
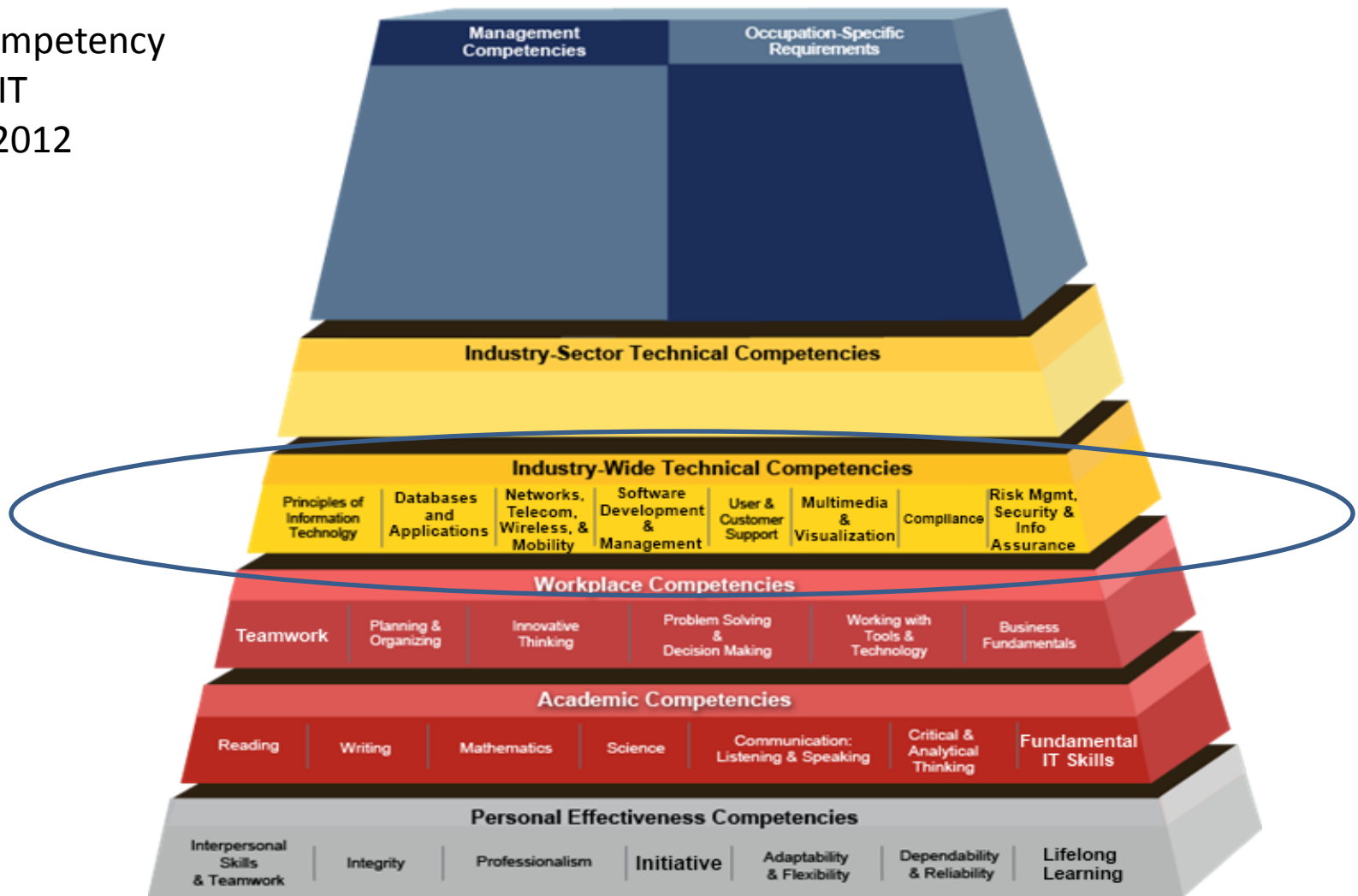
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Tier 4 – Industry-Wide Technical Competencies represent the knowledge and skills that are common across all of the sectors within a broader industry.

1. **Principles of Information Technology**: Knowledge of Information Technologies (fundamental concepts, systems, platforms, tools, and technologies), IT industries (hardware, software and services), the widespread application of IT in other industries, and common roles of IT professionals.

2. **Databases and Applications**: The use of technology to control and safeguard the collection, organization, structure, processing and delivery of data.

3. **Networks, Telecommunication, Wireless, and Mobility**: The processes, hardware, and software employed to facilitate communication between people, computer systems and devices.

4. **Software Development and Management**: The process of designing, writing, testing, debugging/troubleshooting, and maintaining the source code of computer programs and of managing and maintaining software in an organization.

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5. **User & Customer Support**: The range of services providing assistance and technical support to help users implement and solve problems related to information technology.

6. **Digital Media and Visualization**: Conveyance of ideas and information in forms such audio, text, pictures, diagrams, video, photos, maps, 3d models, et cetera.

7. **Compliance**: The standards, processes, and procedures in place to ensure products, services and practices comply with legal and regulatory requirements. This might logically be combined with the following Security section

8. **Risk Management, Security & Information Assurance**: The standards, issues, and applications used to protect the confidentiality, integrity and availability of information and information systems. Encompasses risk identification and mitigation, business continuity, disaster recovery, protection from unauthorized access, use, disclosure, disruption, modification, loss/theft or destruction, and compliance with appropriate laws, and regulations.

US DOL Competency Model for IT
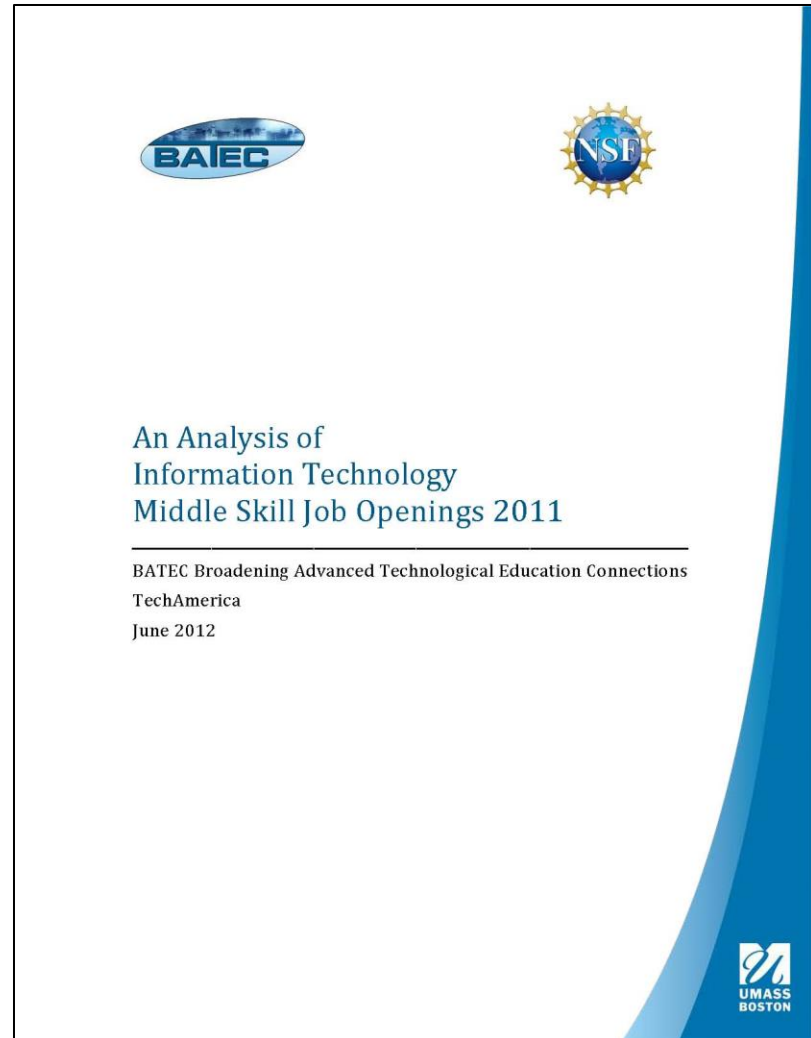*Draft 9/7/2012*

BATEC Interim Report on

Middle Skill Job Openings

released June 2012

An Analysis of
Information Technology
Middle Skill Job Openings 2011
_____
BATEC Broadening Advanced Technological Education Connections
TechAmerica
June 2012

WHY THIS STUDY…

- Record Unemployment;

    Yet…

- Significant Numbers of Unfilled Jobs;

    Heightened…

- Attention at all levels to this Issue;

    Resulting in a need for…

- Better Understanding about the Problem

CLARIFICATIONS

- The data is sourced from Wanted Technologies via Wanted Analytics 3.0 and they (not Monster) are responsible, for example, for the SOC coding on the job ads/postings. Wanted collects data from the entire spectrum of online job sources and because of their proven level of data quality.

- Ads coded to "public administration" and "educational services" were backed out to reduce the count to reflect as much as possible just "public sector" job postings

- The following postings were also excluded: (1) Bulk Employers (includes work at home opportunities, training opportunities, and companies that re-post ads from other employers on their own site, obscuring the name of the employer and (2) Third Party Postings (job boards that simply re-post opportunities from other sites already collected by Wanted Technologies).

- Data was pulled for "new ads without duplicates"

KEY FINDINGS

- Computer and Information Technology occupations to grow by 22% next 10 years

- Equates to approximately 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)

KEY FINDINGS

Two "High Demand" Occupations

- **#2, Network and Computer Systems Administrator (15-1142.00)**
  50% of its jobs will be filled by middle skill professionals

- **#6, Computer Systems Analysts (15-1121.00)**
  2011 had17,857 jobs filled by middle skill workers

(US Department of Labor, Employment and Training Administration)

KEY FINDINGS

Fastest Occupational Classification Wage Growth Rates

- **Computer Programmer (15-1131.00) ranked #2 in 2010**

- **Software Developer (15-1133.00 & 15.1132.00)** ranked #8 in 2010

These jobs are increasing being filled by middle skill workers

(BLS, Employment Projections, Industries with the Fastest Growing and Most Rapidly Declining Wage and Salary Employment, January 2012)

KEY FINDINGS

Financial Activities Sector Fastest Growth for IT Middle Skill Workers

Business and Financial Analysis Job Functions Requiring IT as Primary Skills

- **71% Business Operations Specialists (13.1199.00)**
  7,040 job openings were available to middle skill workers in 2011

- **88% Financial Quantitative Analysts (13-2099.01)**
  4,825 job openings were available to middle skill workers in 2011

(BLS 2010 Fastest Growing and Declining Employment by Industry)

KEY FINDINGS

Changing Technologies and Solutions Create Demand

Data storage and access, security of information as well as how
information is positioned and processed across
multiple platforms are creating new opportunities.

- **Data Warehousing Specialists (15-1199.07)** 2,358 jobs in 2011
- **Information Security Analysts (15-1122.00)** 4,710 jobs were open in 2011
- **Search Market Specialists (15-1199.10)** 1,110 jobs openings in 2011

National Center of Excellence for Computing and Information Technologies

KEY FINDINGS

Two Occupational Classifications Transformed by IT

- **Medical Records Medical Records & Health Information Technicians (29-2071.00)** 4,710 job openings in 2011

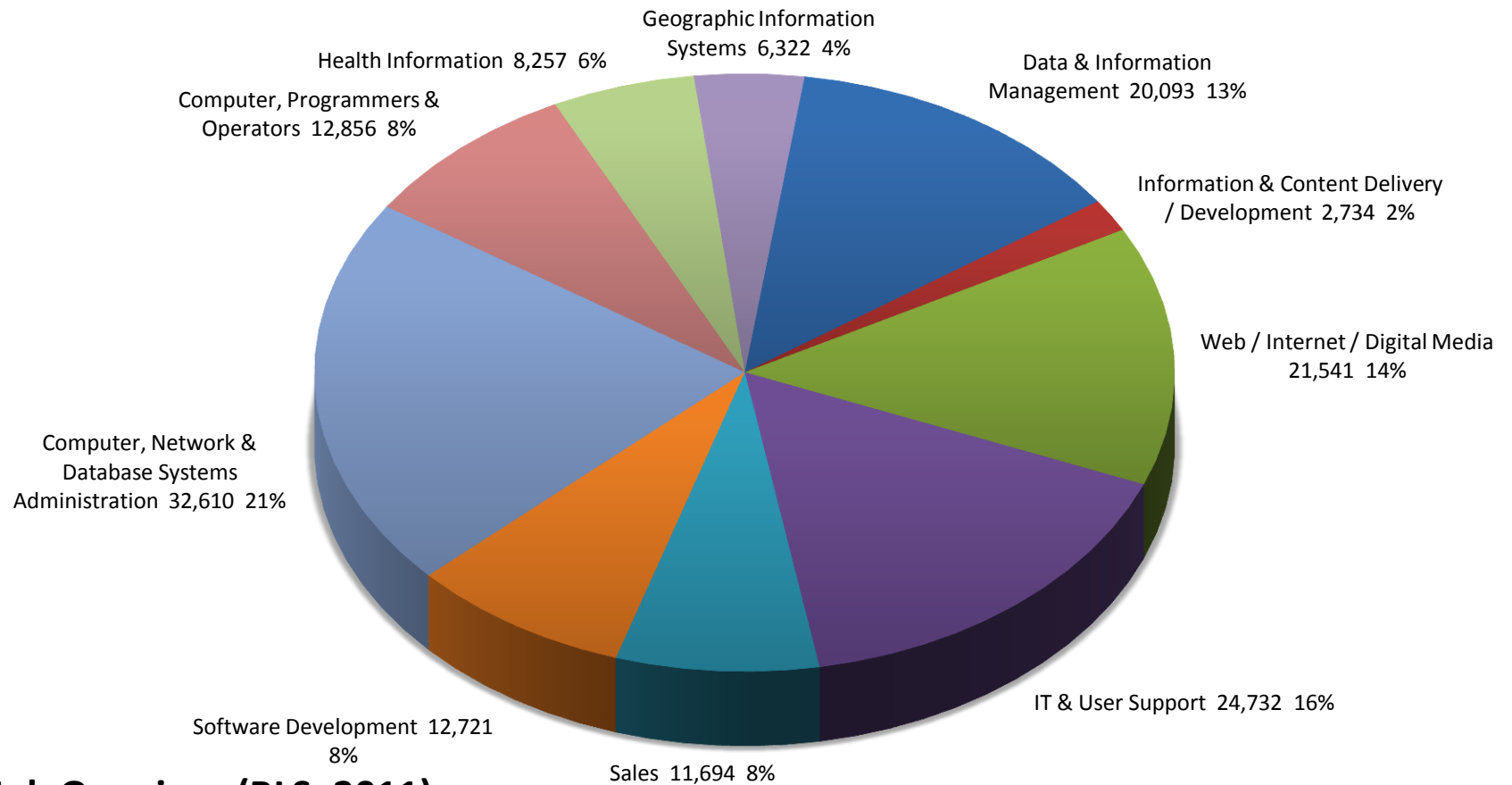- **Geographical Information Systems Technicians (15-1199.05)** 3,124 job openings in 2011

KEY FINDINGS

Top 5 Job Ads by Occupational Classification

Represent Nearly 70% of Count with Over 56% in Top 3

- Computer Systems Analysts (186,652)
- Web Developer (164,594)
- Computer User Support Specialist (138,030)
- Computer Programmer (64,592)
- Software Quality Assurance Engineer and Tester (53,014)

Job Openings (BLS, 2011)

Geographic Information Systems 6,322 4%

Health Information 8,257 6%

Computer, Programmers & Operators 12,856 8%

Data & Information Management 20,093 13%

Information & Content Delivery / Development 2,734 2%

Web / Internet / Digital Media 21,541 14%

Computer, Network & Database Systems Administration 32,610 21%

IT & User Support 24,732 16%

Software Development 12,721 8%

Sales 11,694 8%

Job Ads (Monster, 2012)

Pie chart segments:
- Data & Information Management 20,910 2%
- Geographic Information Systems 942 0%
- Health Information 31,980 4%
- Computer, Programmers & Operators 66,634 8%
- Information & Content Delivery / Development 4,534 0%
- Web / Internet / Digital Media 206,990 24%
- Computer, Network & Database Systems Administration 292,016 34%
- IT & User Support 138,030 16%
- Software Development 96,929 11%
- Sales 10,691 1%

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Job Openings / Job Ads Ratio

DATA AND INFORMATION MANAGEMENT

Information Security Analysts: Plans, implements, upgrades, or monitors protection of computer networks and information. Focuses on safeguarding digital and responds to computer security breaches and viruses.

Business Intelligence Analysts: Produces financial and market intelligence by querying data repositories and generating periodic reports and identifies data patterns and trends.

Business Operations Specialists: Collects and reports on operational data indicators as related to expense and income. *Approximately 18% 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.*

Financial Quantitative Analysts: Conducts quantitative analyses of information affecting investment programs of public or private institutions.

Data Warehousing Specialists: Designs, models, or implements corporate data warehousing activities. Programs and configures warehouses of database information and provides support to warehouse users.

Job Function Descriptor	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Online/Data/Information	Information Security Analysts (15-1122.00)	4,710	19,523	Information Security Specialist (CISSP, Security+) Data Security Specialist Computer Forensics Technician
Business Analysis	Business Intelligence Analysts (15-1199.08)	1,160	804	Database Reporter / ETL Specialist Relational Database Specialist Business Operations Specialist MIS Specialist
	Business Operations Specialist (13-1199.00)	7,040	5234	
Financial Analysis	Financial Quantitative Analysts (13-2099.01)	4,825	357	Financial Analyst Financial Systems Data Specialist Operation Risk Data Specialist
Data/Information Storage	Data Warehousing Specialists (15-1199.07)	2,358	226	Cloud Computing Specialist Storage Administrator Data Storage Technician

Information and Content Delivery/Development

Distance Learning Coordinators: Converts classroom based courses to on-line format. Provides technical support to students engaged in distance learning. (W)

Broadcast Technicians: 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.

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.

Job Function	Occupational Classification	2011 Job Openings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Distance Learning	Distance Learning Coordinators (11-9039.01)	272	84	On-line Learning Technicians Distance Learning Coordinators Distance Learning Support Specialists
Television & Radio	Broadcast Technicians (27-4012.00)	980	3,054	Master Control Operator Production Assistant
Print	Desktop Publishers (43-9031.00)	256	658	Desktop Publishing Specialist Publishing Coordinator Document Management Coordinator Document Control Coordinator
	Document Management Specialists (15.1199.12)	1,226	738	

Web/Internet/Digital Media

Web Developer: Designs, creates and modifies web sites using software designed to facilitate web page creation. Analyzes user needs to implement content, graphic, performance, and capacity.

Web Administrator: Manages web environment design, deployment, and maintenance activities. Performs testing and quality assurance of web sites and web applications.

Web Content Developers: Creates visual, sound, and copy for use in web products

Search Market Strategists: 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.

Job Function	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Most Common Job Titles
Web Developer	Web Developer (15-1134.00)	1,784	164,594	Web Developer/Designer User Experience Specialist Front End Developer
Web Administrator	Web Administrator (15-1199.03)	1,135	711	Webmaster Web Systems Administrator Web Programmer
Web Content Developer	Multi-media Artists & Animators (27-1014.00)	1,681	4,032	Website Developer/Content Manager Interactive Designer Web Graphic Designer
	Film and video Editors (27-4032.00)	649	3,347	
	Graphic Designers (27-1024.00)	9,568	32,795	
	Sound Engineering Technicians (27-4014.00)	317	1,284	
Search Market Strategist	Search Market Strategist (15-1199.10)	1,110	N/A	Digital Marketing Specialist Electronic Transactions Analyst
	On-line Merchant (13-1199.06)	5,297	227	Search Engine Optimization (SEO) Specialist Internet/Online Marketing Coordinator Social Media/Website Marketing Specialist

IT Technical and User Support

Computer User Support Specialists: 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 Specialists: 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.

Job Function	Occupational Classification	2011 Job Openings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Technical and User Support	Computer and User Support Specialists (15-1151.00)	19,256	138,030	Technical Support Specialist / Help Desk Computer Specialist
	Computer Network Support Specialists (15-1152.00)	5,476	6,997	Network Support Specialist Network Technician

Sales

Software Sales – Direct/Outside: Markets and sells software products direct to consumers away from a fixed retail location using presentation and demonstration. (W)

Software Sales – Indirect/Inside: 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. (W)

Sales Engineers: Sell business goods or services, the selling of which requires a technical background equivalent to a baccalaureate degree in engineering

Job Function	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Sales	Software Sales Direct/Outside (41.3099.00)	2,489	4,060	Direct Sales Representative Software Sales Consultant Specialty Software Sales Representative
	Software Sales Indirect/Inside (41-4011.00)	5,879	3,347	Inside Sales Representative Account Manager CRM Specialist
	Sales Engineers	3,326	3,284	Technical Sales Specialist Product Engineer Customer Support Engineer

Software Development

Software Developers, Systems Software: 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. *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 Developers, Applications: 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. *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 & Testers: Develops and executes software test plans in order to identify software problems and their causes.

Video Game Designers: Designs core features of video games. Creates and maintains design documentation.

Job Function	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Software Development	Software Developers, Systems Software (15-1133.00)	4,353	39,876	Software Developer Software Designer
	Software Developers, Applications (15-1132.00)	2,149	3,688	Network Designer Software Architect Programmer Analyst Applications Developer
	Software Quality Assurance Engineers & Testers (15-1199.01)	4,956	53,014	Software Quality Assurance Engineer Product Assurance Engineer QA Analyst Software Test Engineer
	Video Game Designers (15-1199.11)	1,263	351	Mobile Apps Producer Game Designer iOS Programmer

Computer, Network and Database Systems

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. *An estimated 48% of jobs are middle skill; engineer, director, and manager are excluded in the job opening counts.*

Database Administrators: Administers, tests, and implements computer databases, applying knowledge of database management systems. Coordinates changes to computer databases.

Computer Systems Analysts: 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.

Job Function	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Computer Systems	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	IT Specialist Database Administrator Database Analyst SQL Developer / Oracle Developer
	Computer Systems Analysts (15-1121.00)	17,857	186,652	Computer Systems Analyst Applications Analyst Information Systems Analyst

Computer Programmers and Operators

Computer Operators: 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 Operators, Metal and Plastic: Operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.

Computer Programmers: 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.

Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic: 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.

Job Function	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Computer Operators	Computer Operators (43-9011.00)	763	2,042	Computer Technician Computer Operator Operations and Maintenance Technician
	Computer Controlled Machine Tool Operators, Metal and Plastic (51-4011.00)	2,156	7,811	CNC Operator Machine Set-up Technician CNC Machinist
Computer Programmers	Computer Programmer (15-1131.00)	9,565	64,592	Programmer JAVA Developer Applications Programmer
	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic (51-4012.00)	368	939	CNC Programmer Process Engineer CAD CAM Programmer

Health Informatics

Medical Records & Health Information Technicians: 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.

Informatics Nurse Specialists: Apply 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.

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.

Occupational Classification	2011 Job Openings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Medical Records & Health Information Technicians (29-2071.00)	6,753	30,003	Medical Records Coordinator Health Information Clerk Coder
Informatics Nurse Specialists (15-1121.01)	1,315	1,895	Clinical Applications Specialist Clinical Information Coordinator Nursing Information Coordinator
Bioinformatics Technicians (43-9111.01)	189	106	Research Associate Bioinformatics Technician

Geographic Information Systems

Cartographers & Photogrammertrists: 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 Technicians: 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.

Geographic Information Systems Technicians: 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 specialize in areas such as agriculture, mining, health care, retail trade, urban planning, or military intelligence.

Job Function	Occupational Classification	2011 Job Open-ings	2012 Unique Job Ads (120 days)	Common Middle Skill Job Titles
Geographical Information Data Capture	Cartographers & Photogrammertrists (17-1021.00)	502	49	GIS Analyst Digital Cartographer
	Surveying Technicians (17-3031.01)	657	245	Survey Technician
	Mapping Technicians (17-3031.02)	1,879	188	Map Technician CAD Technician GPS Mapper
Geographical Information Systems & Data Analysis	Geographic Information Systems Technicians (15-1199.05)	3,124	858	GIS Technician GIS Technical Support Specialist GIS Developer
	Geospatial Information Specialists & Technologist (15-1199.04)	160	35	Geospatial Applications Developer Geospatial Modeler

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.

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

Definitions

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.

Definitions

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.

Discussion

Does this accurately reflect the IT Landscape?

    What occupational classifications can be eliminated from "IT Middle Skill Jobs"?
    What are the criteria for eliminating?
    What occupational classifications need to be added? What is the rationale for inclusion?
    Does the current occupational classification system adequately describe the hybridization of jobs requiring IT as a secondary function?

How do we reconcile multiple data sources in order to fully understand the breadth and depth of the problem? What do we consider "the problem" to be?

What is the biggest obstacle in filling IT Middle Skill job openings? Is it unskilled job candidates? Is it a mismatch of job "specs"? Is it something else?

What are the next steps?

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National Center of Excellence for Computing and Information Technologies