

Southwestern Pennsylvania Industry Cluster Snapshot

INFORMATION TECHNOLOGY

Three Rivers Workforce Investment Board
August 2003

ABOUT THIS BRIEF

Southwestern Pennsylvania Industry Cluster Snapshot: Information Technology is part of a series of publications intended to inform discussions about workforce development efforts in the region¹. It is a product of the Community Audit project, a collaborative effort by the Three Rivers Workforce Investment Board (TRWIB) and its partners² to improve the quality of local workforce information. The target audience includes local elected officials, cluster coordinators and members, education and training providers, employers, job seekers and other stakeholders. Other cluster briefs deal with financial services, healthcare, manufacturing and hospitality and tourism. The briefs serve as companion pieces to a more comprehensive report entitled "A Regional Audit of Workforce Supply and Demand." To obtain additional copies of this brief, contact the TRWIB at 412-552-7090. The complete series is also available online at www.trwib.org/reports.htm.

The Community Audit project is supported by a demonstration grant from the U.S. Department of Labor.

¹ In this series, the Southwestern Pennsylvania region is defined by four contiguous workforce areas: Southwest Corner (Washington, Greene and Beaver counties); Three Rivers (Allegheny County, including the City of Pittsburgh); Tri-County (Indiana, Armstrong and Butler counties); and Westmoreland-Fayette (Fayette and Westmoreland counties).

² Partners include Workforce Connections (a project of the Pennsylvania Economy League), the Pittsburgh Technology Council, the Steel Valley Authority, the Westmoreland-Fayette Workforce Investment Board, the Tri-County Workforce Investment Board, and the Southwest Corner Workforce Investment Board.

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WHAT ARE INDUSTRY CLUSTERS?

According to the National Governors Association, most experts define an industry cluster as a "geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats."³

Businesses typically benefit from clustering through better access to suppliers, skilled labor pools, and transfers of knowledge. Collectively, cluster companies can enhance a region's economy by increasing productivity and fostering entrepreneurship.

The Five "Priority" Clusters

In 2001, the Three Rivers Workforce Investment Board, Workforce Connections (a project of the Pennsylvania Economy League) and other major players in regional workforce development selected five industry clusters on which to concentrate their collective efforts. The five clusters, chosen because of their importance to the regional economy, are:

- financial services;
- healthcare;
- hospitality and tourism;
- information technology; and
- manufacturing.

Collective efforts to date have included convening four industry-focused workforce summits, hiring "cluster coordinators" to work with employers to develop and implement targeted strategies to address critical labor shortages, and undertaking action-oriented research.

³ *A Governor's Guide to Cluster-Based Economic Development*, National Governors Association (2002).

SUMMARY OF MAJOR FINDINGS

- Information technology has the lowest employment of the five priority clusters, with only 1.3% of total SWPA employment.
- Information technology has the highest average annual wage of the five priority clusters in SWPA. However, the average annual wage is lower in the region than it is in Pennsylvania or the U.S. The region's rates of growth of firms and wages also trail behind the rates for the state and the nation.
- In terms of employment, the leading industry is "custom computer programming services" with 7,291 jobs, followed by "telephone communications except radio" (5,825 jobs). "Custom computer programming services" also has the most business establishments (486), followed by "other computer related services" (407).
- Computer systems analysts have the most employment among all occupations in the cluster, with 4,540 jobs across the region.
- On average, the information technology cluster requires more education and training than other priority clusters, with all twelve of the top jobs requiring at least a post-secondary vocational award. Furthermore, annual wages are high, with many workers making more than \$60,000 per year.
- Career clusters within the industry cluster include database development and administration, digital media, enterprise systems analysis and integration, network design and administration, programming and software engineering, technical support, and technical writing.
- Key skills separate occupations along a career mobility track. Computer systems analysts, for example, have higher levels of skills in reading comprehension and equipment selection than do computer support specialists. In addition, the former occupation requires more education (a bachelor degree versus an associate degree).

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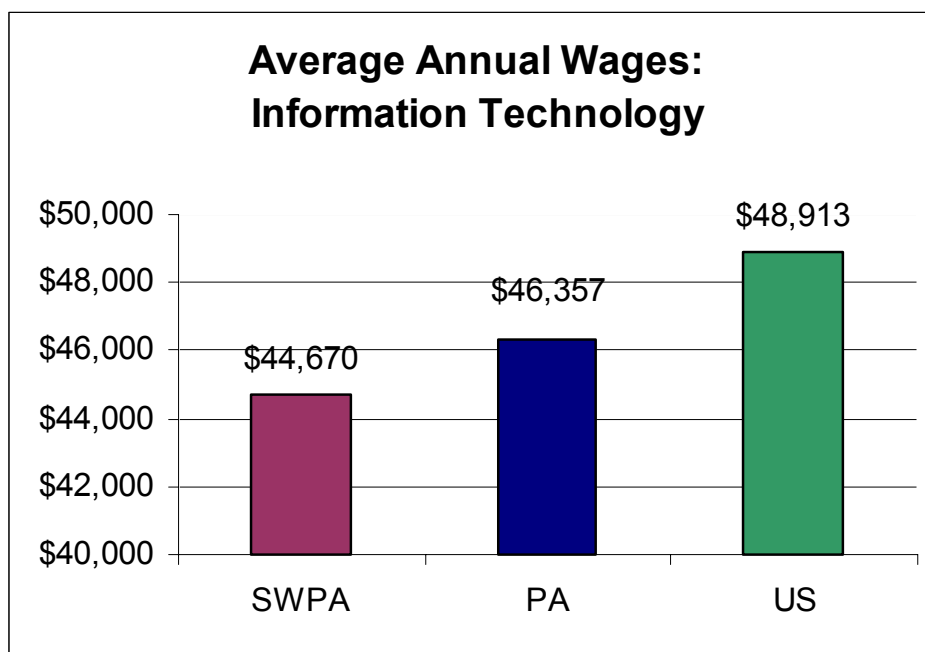
CLUSTER TRENDS

This section details the employment, wages and labor market trends for the information technology cluster in Southwestern Pennsylvania (“SWPA”), the state, and the nation. Data come from multiple sources so there may be some discrepancies.

Employment

The information technology cluster employed a total of 18,341 workers in 2000, the lowest level among the five priority clusters.⁴

Wages



Source: Center for Workforce Information and Analysis, PA Department of Labor & Industry (2000)

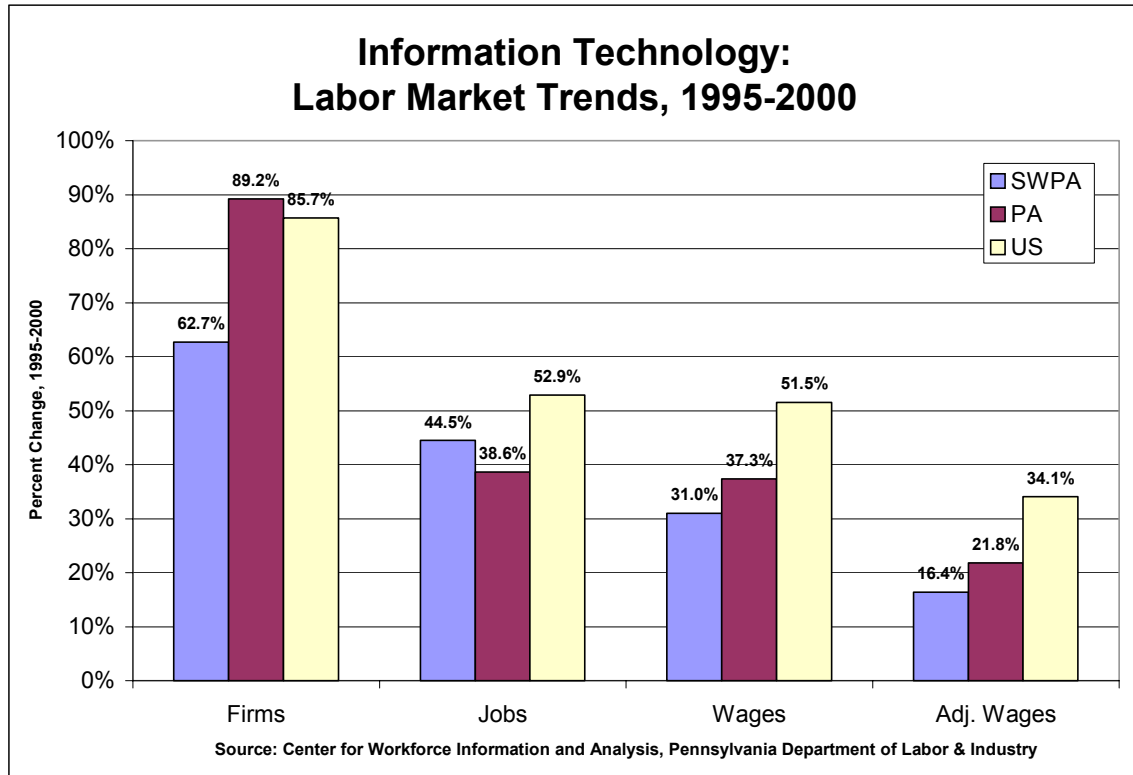
The average annual wage within the information technology cluster was lower in the SWPA region (\$44,670) in 2000 than it was in the state (\$46,357) or nation (\$48,913) but it was significantly higher than in any of the other priority clusters.

Job Growth

The rate of job growth in the region's information technology cluster was 44.5% from 1995-2000, considerably higher than in the other clusters but below the nation's rate of 52.9% for the same period.⁵

⁴ Center for Workforce Information and Analysis, PA Department of Labor & Industry

⁵ Ibid.

CLUSTER TRENDS (CONT.)*Labor Market Trends*

The rate of growth in new business locations ("firms") in the region (62.7%) was impressive compared to other priority clusters but lagged behind the rate for the state (89.2%) and the nation (85.7%), as did the rate of growth in wages (31.0%, 37.3%, and 51.5%, respectively) and adjusted wages⁶ (16.4%, 21.8%, and 34.1%, respectively). The region's rate of job growth (44.5%), meanwhile, exceeded the state's (38.6%) but was lower than the nation's rate (52.9%).

According to a report released by the Pittsburgh Technology Council, information technology companies experienced employment growth of 69.9% and total wage growth of 160.4% between 1990 and 2000.⁷ Among hardware companies, employment growth averaged 88.6% and wage growth averaged 152.6%; among software companies, the respective rates were 132.0% and 316.3% and among telecommunications companies, 24.5% and 72.5%.

⁶ i.e., adjusted for inflation

⁷ *An Action Plan for the Information Technology Cluster in Southwestern Pennsylvania*, Carnegie Mellon Center for Economic Development, prepared for the Pittsburgh Technology Council, December 2001.

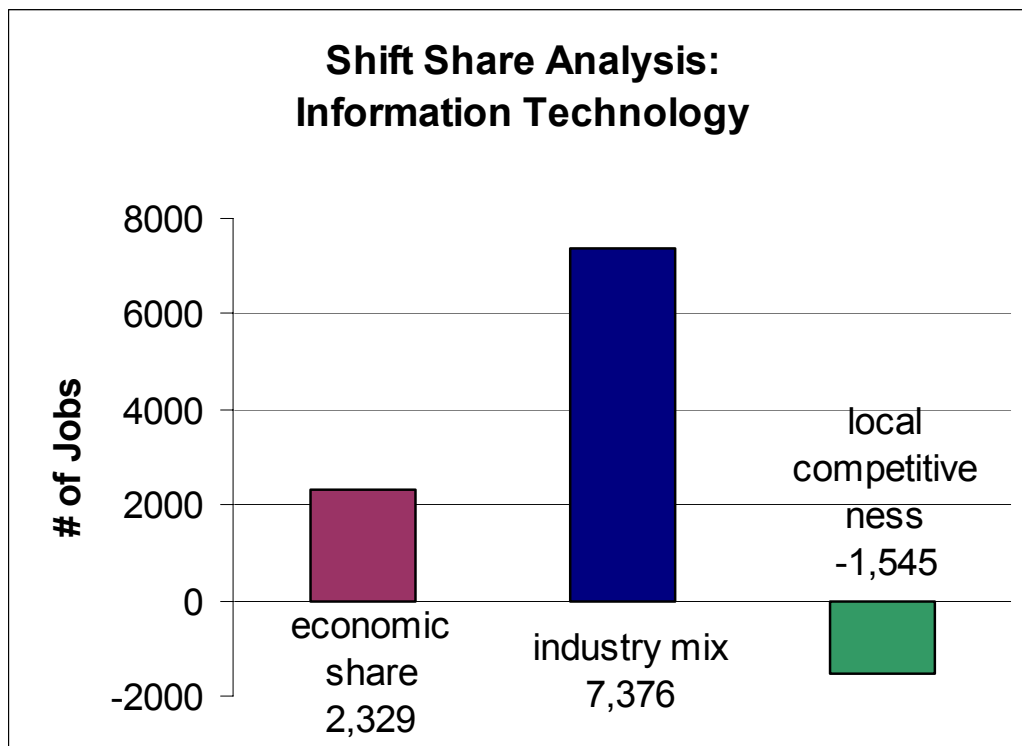
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CLUSTER TRENDS (CONT.)

Location Quotient⁸

The region's concentration of employment in the information technology cluster was slightly above average compared to Pennsylvania (1.04) but below average compared to the nation (0.77) in 2000.⁹

Shift Share Analysis¹⁰



Source: Center for Workforce Information and Analysis, PA Department of Labor & Industry (1995-2000)

⁸ A location quotient indicates the extent to which a single industry's concentration of employment in one region compares to the concentration in another region. A value greater than one signifies an above-average concentration of employment in the first region relative to the second; a value of less than one signifies a below-average concentration of employment in the first region relative to the second.

⁹ Center for Workforce Information and Analysis, PA Department of Labor & Industry

¹⁰ Shift Share Analysis breaks regional job growth or decline down by three factors: "economic share" (the increase or decrease in employment that can be attributed to growth or decline in the national or state economy); "industry mix" (the increase or decrease in employment that can be attributed to faster-than-average or slower-than-average growth in the industry cluster, compared with the average for all industries in the state or nation); and "local competitiveness" (the increase or decrease in employment that can be attributed to advantageous or disadvantageous conditions in the local area that make the industries in the cluster either more competitive or less competitive than their counterparts nationally or statewide).

CLUSTER TRENDS (CONT.)

According to shift-share analysis for the region's information technology cluster, the region's employment growth from 1995 to 2000 can be attributed to both expansion of the state and national economies ("economic share") and especially to faster-than-average growth in the information technology industries nationwide ("industry mix"). The negative "local competitiveness" factor, however, suggests that information technology companies in SWPA are somewhat at a competitive disadvantage compared with their counterparts in other parts of the U.S.

INFORMATION TECHNOLOGY**DETAILED CLUSTER PROFILE**

This section provides a more up-to-date and more detailed picture of the cluster by looking at standard industrial classification (“SIC”) codes. (Note: the data come from a private third party – Dun and Bradstreet – so they may not correlate with other data that appear in this report.)

Industry Employment in SWPA Information Technology Cluster (March 2003)

SIC Number	SIC Name	Employment	Businesses	Average Employment per Business
7371	Custom computer programming services	7,291	486	15
4813	Telephone communication, except radio	5,825	322	27
7373	Computer integrated systems design	5,361	213	26
7374	Data processing and preparation	4,607	279	17
7379	Computer related services, other	3,293	407	8
3577	Computer peripheral equipment, other (Manufacturing)	2,043	33	66
7372	Prepackaged software	1,883	176	11
3823	Process control instruments (Manufacturing)	1,779	32	59
3824	Fluid meters and counting devices (Manufacturing)	1,674	7	239
4832	Radio broadcasting stations	1,660	77	31
4841	Cable and other pay television services	1,646	70	39
3679	Electronics Components, other	1,485	34	48
Total/ Average ¹¹ for all 4-Digit Industries		49,949	2,729	20

Source: MarketPlace (Dun and Bradstreet)

Almost 50,000 jobs existed in information technology-related industries in the nine-county region in March 2003. (Note: there is some overlap between the information technology cluster and the manufacturing cluster.)

The cluster's average employment per firm is relatively high, with 20 employees per business location. This is probably attributable, however, to the inclusion of manufacturing-related technology industries that tend to employ larger numbers of workers.

¹¹ These aggregate figures reflect the entire cluster (all 4-digit industries), not just the top twelve 4-digit industries listed in the table.

STAFFING PATTERNS

This section looks at occupations for which there is high demand from employers in the industry and provides information about the number of jobs available, the average salary, the type of work schedule offered, the stability of the job, and the education level required.

Dynamite Dozen: Top 12 Information Technology-Related Occupations by Employment, Pittsburgh Metropolitan Statistical Area¹² (2001)

Occupation	2001 Employment	Mean Annual Wage	Likelihood of Part-Time Employment	Susceptibility to Unemployment	Education and Training
1. Computer Systems Analysts	4,540	\$62,100	Very Low	Very Low	Bachelor Degree
2. Computer Support Specialists	3,410	\$36,950	Very Low	Very Low	Associate Degree
3. Computer Programmers	3,280	\$56,530	Low	Very Low	Bachelor Degree
4. Computer and Information Systems Managers	2,580	\$76,120	Very Low	Very Low	Degree plus work experience
5. Network and Computer Systems Administrators	2,230	\$45,220	Very Low	Very Low	Bachelor Degree
6. Computer Software Engineers, Applications	2,220	\$59,220	Very Low	Very Low	Bachelor Degree
7. Computer Software Engineers, Systems Software	1,130	\$69,410	Very Low	Very Low	Bachelor Degree
8. Network Systems and Data Communications Analysts	1,000	\$48,800	Very Low	Very Low	Bachelor Degree
9. Database Administrators	970	\$52,710	Very Low	Very Low	Bachelor Degree
10. Operations Research Analysts	860	\$49,510	Very Low	Very Low	Master Degree
11. Actuaries	110	\$70,800	Very Low	Very Low	Postsecondary Vocational Award
12. Computer and Information Scientists, Research	100	\$72,280	Very High	Very Low	Doctorate Degree

Source: U.S. Bureau of Labor Statistics

The industry is education-intensive, with every occupation among the top dozen requiring at least some postsecondary schooling, and ten of the dozen requiring a

¹² The Pittsburgh MSA includes the counties of Allegheny, Beaver, Butler, Fayette, Washington, and Westmoreland.

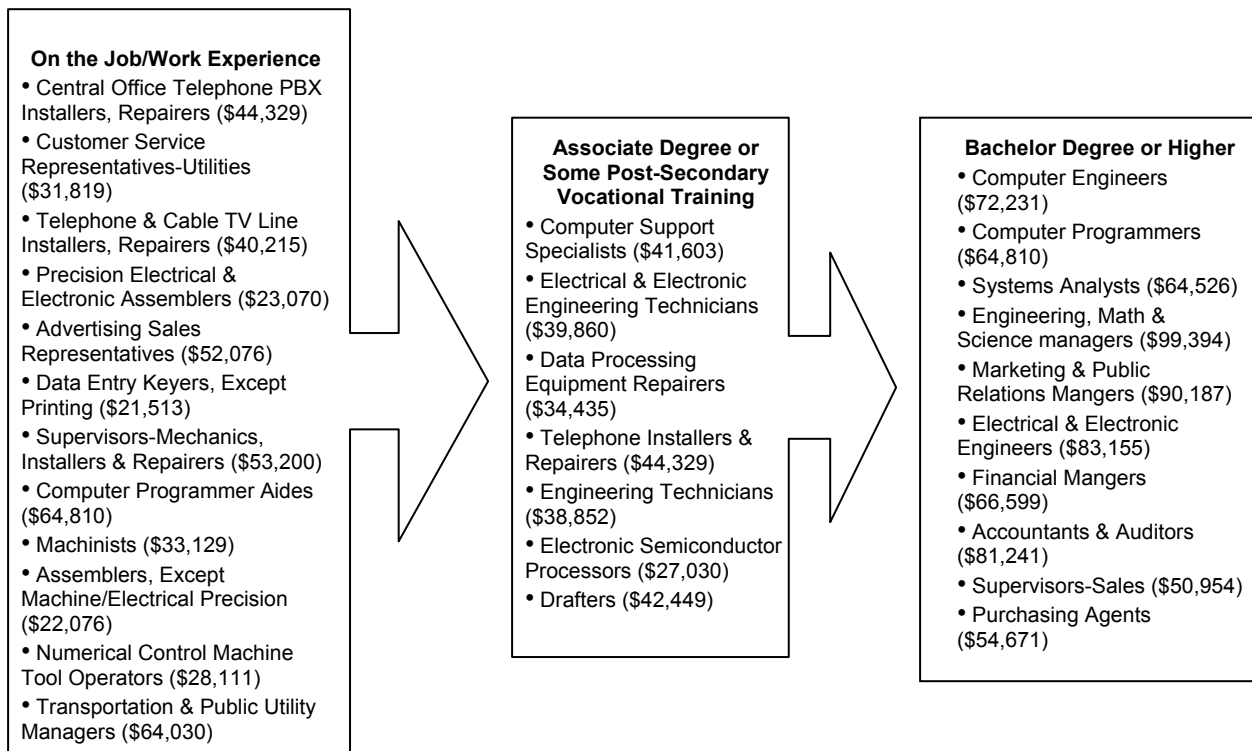
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STAFFING PATTERNS (CONT.)

bachelor degree or higher. Furthermore, the annual wages are high – five of the top dozen occupations offer average salaries of more than \$60,000 per year and 11 pay more than \$40,000 per year. Meanwhile, the occupations have low or very low likelihood of being part-time and tend not to be susceptible to unemployment.

Top Occupations in the SWPA Information Technology Cluster by Education and Training

In addition to identifying occupations in demand, it is useful to look at career mobility – how workers move from one job to another. In the chart below, occupations are ranked according to current employment, projected rate of growth and annual wage, and then categorized according to education and training levels required.



Source: O*NET, U.S. Department of Labor, and Corporation for a Skilled Workforce

STAFFING PATTERNS (CONT.)

According to this model¹³, "central office telephone PBX installer" is the "top" job, requiring no post-secondary education or training and paying more than \$26,000 per year. Customer service representatives and telephone and cable installers and repairers also rank high with average yearly salaries of \$31,819 and \$40,215, respectively. Note that the schematic includes many occupations that are not cluster-specific (e.g., advertising sales representatives, marketing and public relations managers).

¹³ Current employment, projected growth rates, and average annual wages were ranked, weighted equally, and aggregated.

CAREER CLUSTERS

The U.S. Department of Education's Office of Vocational and Adult Education (OVAE) has developed 16 career clusters¹⁴ to help educators organize curricula around employment readiness. For each cluster, OVAE has identified sample career specialties/occupations and a set of common knowledge and skills. Career clusters related to the information technology cluster include:

Database Development and Administration

Sample career specialties/occupations: systems administrator, systems architect, systems analyst.

Digital Media

Sample career specialties/occupations: 3D artist, audio and video engineer, media specialist.

Enterprise Systems Analysis and Integration

Sample career specialties/occupations: application integrator, e-business specialist, systems designer, systems integrator.

Network Design and Administration

Sample career specialties/occupations: communications analyst, information systems administrator, PC support specialist, security analyst, user support specialist.

Programming and Software Engineering

Sample career specialties/occupations: business analyst, computer engineer, programmer, program analyst, design engineer, tester or test engineer.

Technical Support

Sample career specialties/occupations: customer service representative, call center support representative, customer liaison, support technician.

Technical Writing

Sample career specialties/occupations: desktop publisher, document specialist, editor, instructional designer, electronics publication specialist.

Web Development and Administration

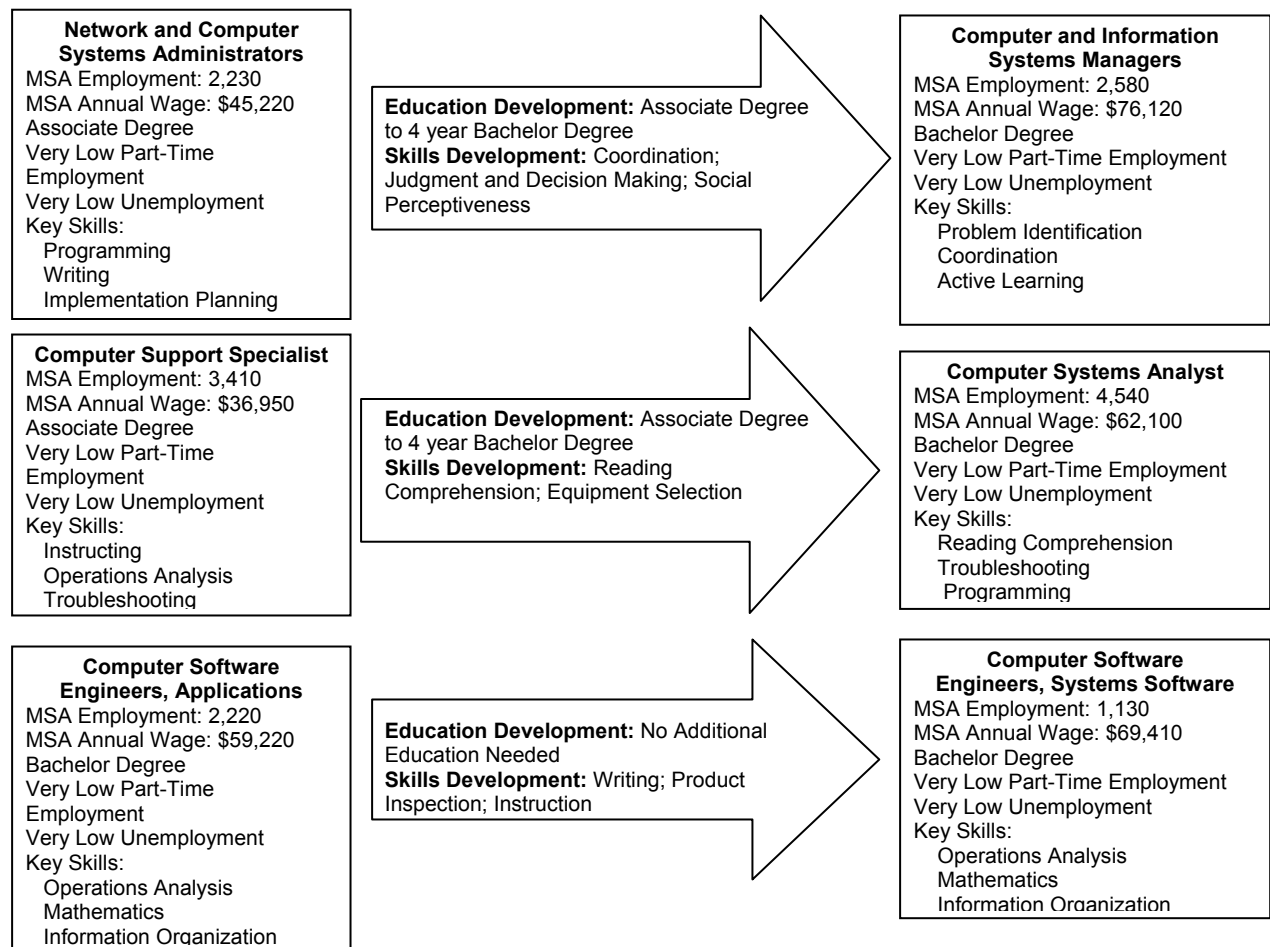
Sample career specialties/occupations: web master, site developer, site designer.

¹⁴ For more information, visit www.careerclusters.org.

CAREER MOBILITY

The chart below illustrates how workers might progress from one occupation to another within the information technology cluster. Based on 2001 data from O*NET (a project of the U.S. Department of Labor), pairs of occupations were analyzed in terms of employment and wages for the Pittsburgh Metropolitan Statistical Area, the education and training requirements (as identified by the U.S. Bureau of Labor Statistics), the likelihood of part-time employment, the susceptibility to unemployment, and key skills (as defined by O*NET and the U.S. Department of Labor).

Included in the arrow between occupations are the necessary education and training development required, and the three critical skills that must either be developed or enhanced in order to make a successful transition from one job to the next.



Source: O*NET, Department of Labor

SPOTLIGHT: #1 DEMAND-OCCUPATION FOR INFORMATION TECHNOLOGY CLUSTER

There are more than 4,500 jobs for computer systems analysts in the Pittsburgh Metropolitan Statistical Area. Compiling a list of the most often performed tasks for the occupations in highest demand is one approach to ensuring that the region's educational and training curricula are adequate for creating and maintaining a pool of qualified workers.

The tasks most often performed by computer systems analysts include:

- Analyzes and tests computer programs or systems to identify errors and ensure conformance to standard.
- Consults with staff and users to identify operating procedure problems.
- Formulates and reviews plans outlining steps required to develop programs to meet staff and user requirements.
- Devises flow charts and diagrams to illustrate steps and to describe logical operational steps of program.
- Writes documentation to describe and develop installation and operating procedures of programs.
- Coordinates installation of computer programs and operating systems, and tests, maintains, and monitors computer systems.
- Reads manuals, periodicals, and technical reports to learn how to develop programs to meet staff and user requirements.
- Writes and revises program and system design procedures, test procedures, and quality standards.
- Reviews and analyzes computer printouts and performance indications to locate code problems.
- Modifies program to correct errors by correcting computer codes.
- Assists staff and users to solve computer related problems, such as malfunctions and program problems.
- Trains staff and users to use computer system and its programs.

Source: O*NET, U.S. Department of Labor

EMPLOYER SURVEY RESULTS¹⁵

- Positive recruitment factors include: the quality and rewards of the work itself; presence of good universities; quality schools and good areas for families; company culture; quality, affordable housing; and low cost of living.
- Negative recruitment factors include: workforce availability; competition from other firms in industry; location relative to other regions; travel time; and competition from firms in other industries.
- Effective recruitment techniques include: employee referrals; networking; internet ads; local newspaper ads; and temporary-to-hire contractors.
- Top retention factors include the quality and rewards of the work itself; organization of work; fit between company philosophy and workforce; company philosophy; company culture.
- Negative retention factors include: compensation and benefits; general growth of information technology in the area; opportunities for advancement; available opportunities for spouse; and company image.
- Effective retention techniques include: favorable work environment; challenging work assignments; flex-time; emphasis on teamwork; and everyday casual atmosphere.

¹⁵ *An Action Plan for the Information Technology Cluster in Southwestern Pennsylvania*, Carnegie Mellon Center for Economic Development, prepared for the Pittsburgh Technology Council, December 2001.

NEXT STEPS

This brief provides a range of cluster-specific information to orient stakeholders and to foster discussion about opportunities and challenges facing the region. It is intended to be used in conjunction with other products developed within the scope of the Community Audit project – such as the educational index – to identify cluster-specific concerns related to the regional labor market.

Possible next steps include the following:

- Consider focusing efforts more strategically on high performance sub-clusters of the industry cluster rather than the cluster as a whole, recognizing that this approach could be much more challenging from a coordination standpoint.
- Work with education and training providers and other workforce professionals to integrate career clusters, career mobility concepts, and work task information into programs and curriculum.
- Develop and/or validate skill standards within the cluster so that education and training providers as well as job seekers better understand the occupations and job duties associated with them from employers' perspectives.

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