

Research and Technology Occupational Employment

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Occupational Employment Statistics

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Bureau of Labor Statistics

BLS Research and Technology Data

Occupational Employment Statistics

- * 22 Major occupational groups
- * 801 Detail occupations
- * Estimates for 398 Metropolitan areas, 50 states, and 295 industries

Industry Employment Statistics

- * Employment and wage totals for all counties and industries
- * Establishment counts by size class
- * Ownership (private, state, local, federal govt.)

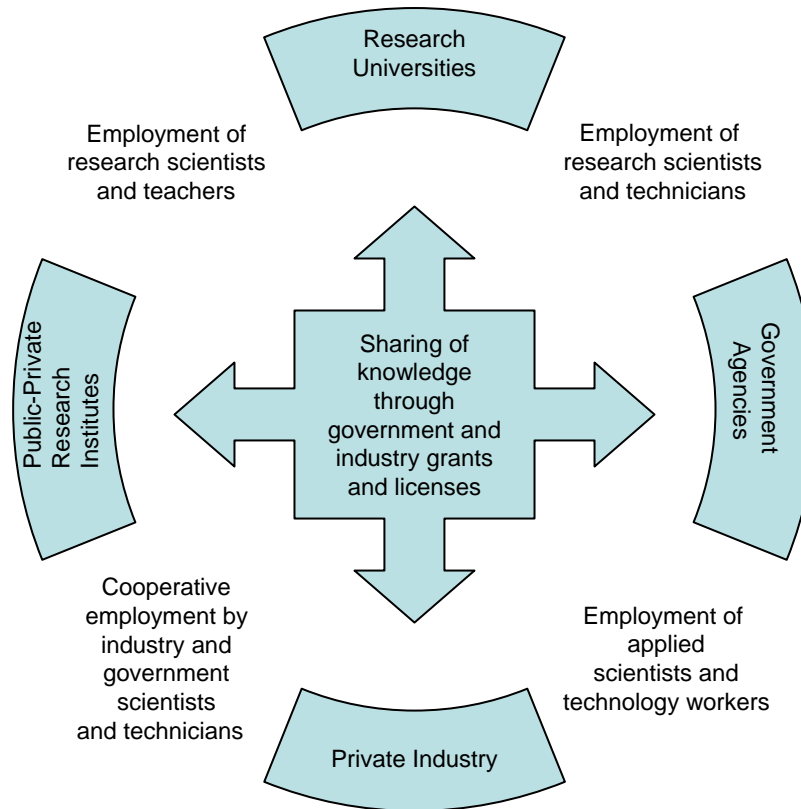
Types of Research & Technology Employment

- Traditionally defined by industry :
 - All workers in NAICS 541710: Research and Development in the Physical, Engineering, and Life Sciences, other technical services and some manufacturing, or universities..
- Additionally defined by occupation (OES)
 - Employees in 36 “High-Tech” occupations
 - Employees in a broader Technical Group (86 detailed occupations)

Information About Research and Technology Workers

- Employment Distribution
 - Description of R&D industry employment.
 - Where high tech and technical group workers are concentrated by geography and industry.
 - How these workers are correlated by area.
- Wage information on Research and Technology workers
 - Wages for these workers generally very high.
 - They are highest in R&D specific industries and metropolitan areas.

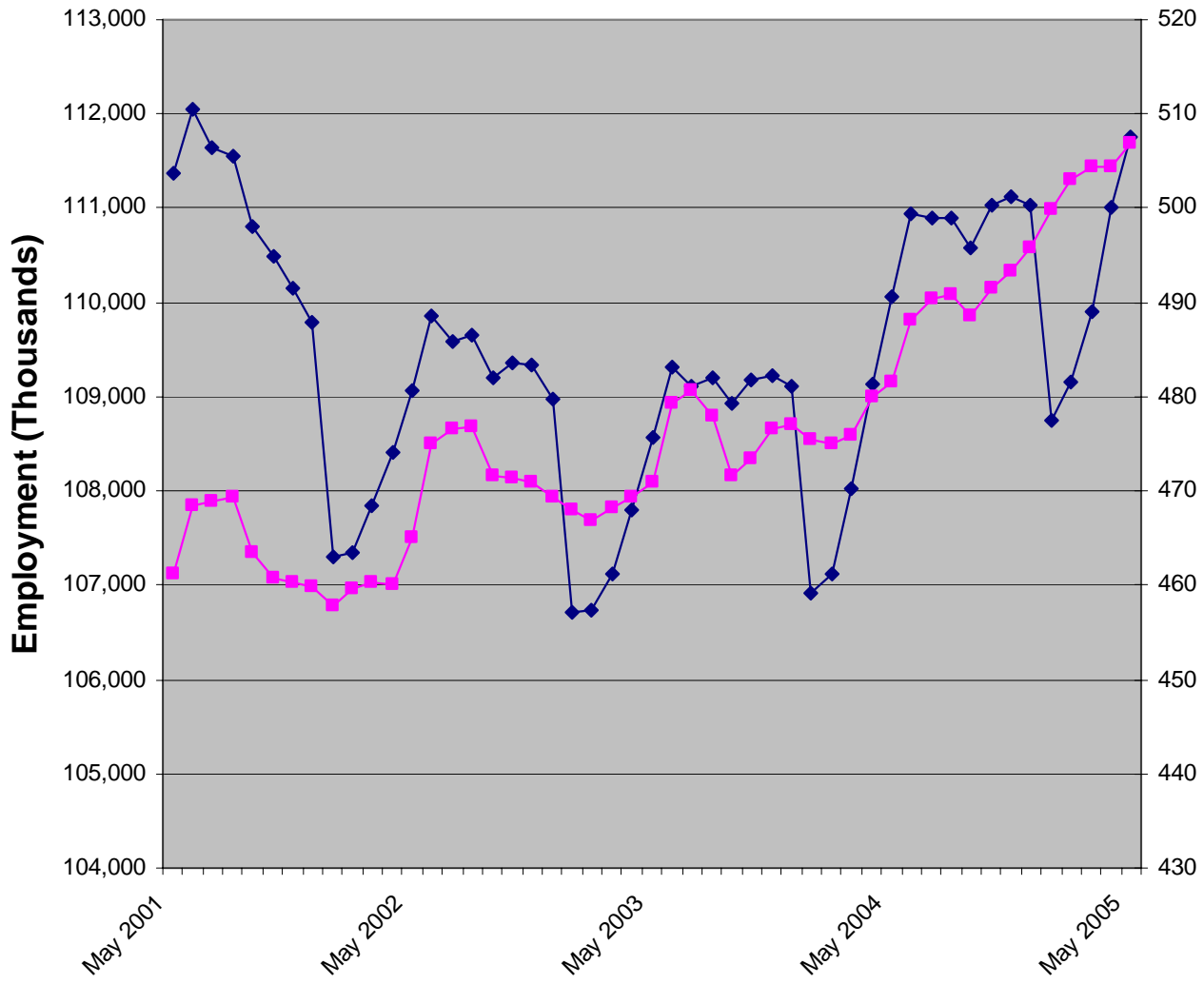
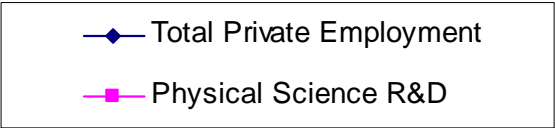
Theoretical Flow of Research & Technology Employment



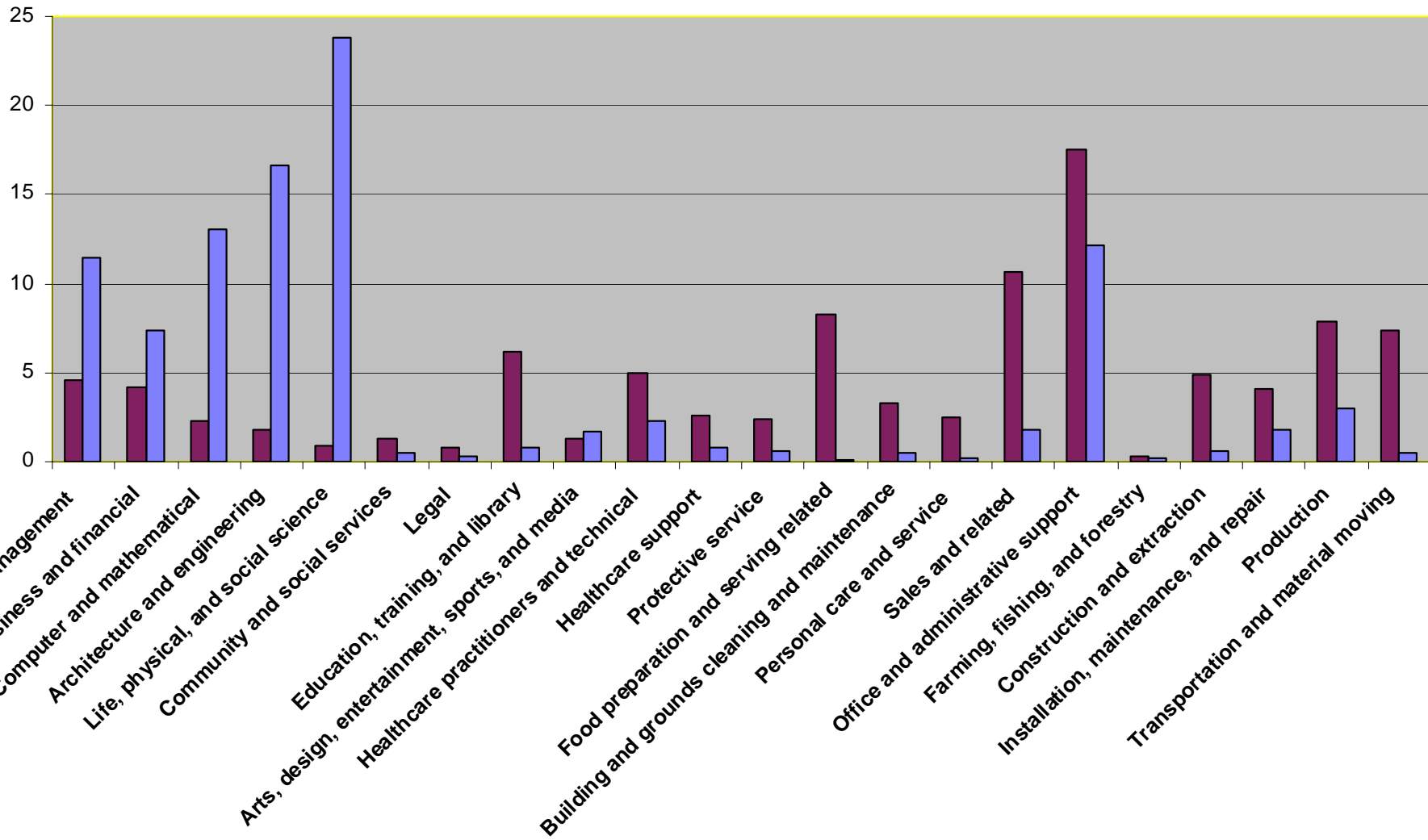
Private Sector Physical Science R&D Industry

- In this presentation, this industry refers to *private-sector* research and development only, not government or university R&D.
- Final product is new knowledge or processes in engineering, physical, or life sciences.
- Employment has increased steadily in the U.S. by 45,000 during the 4 year period from May, 2001 to May, 2005 (CES).
- Private sector employment has fluctuated greatly during the same period.

Private Sector Employment May, 2001 to May, 2005



Employment Percentage by Major Occupational Group (May, 2005)



Wages in the Private Sector Physical Science R&D Industry

- Wages are higher than other industries, for all of the top 20 occupations
- Managers and administrative staff have the largest percentage wage margins between R&D and Non-R&D

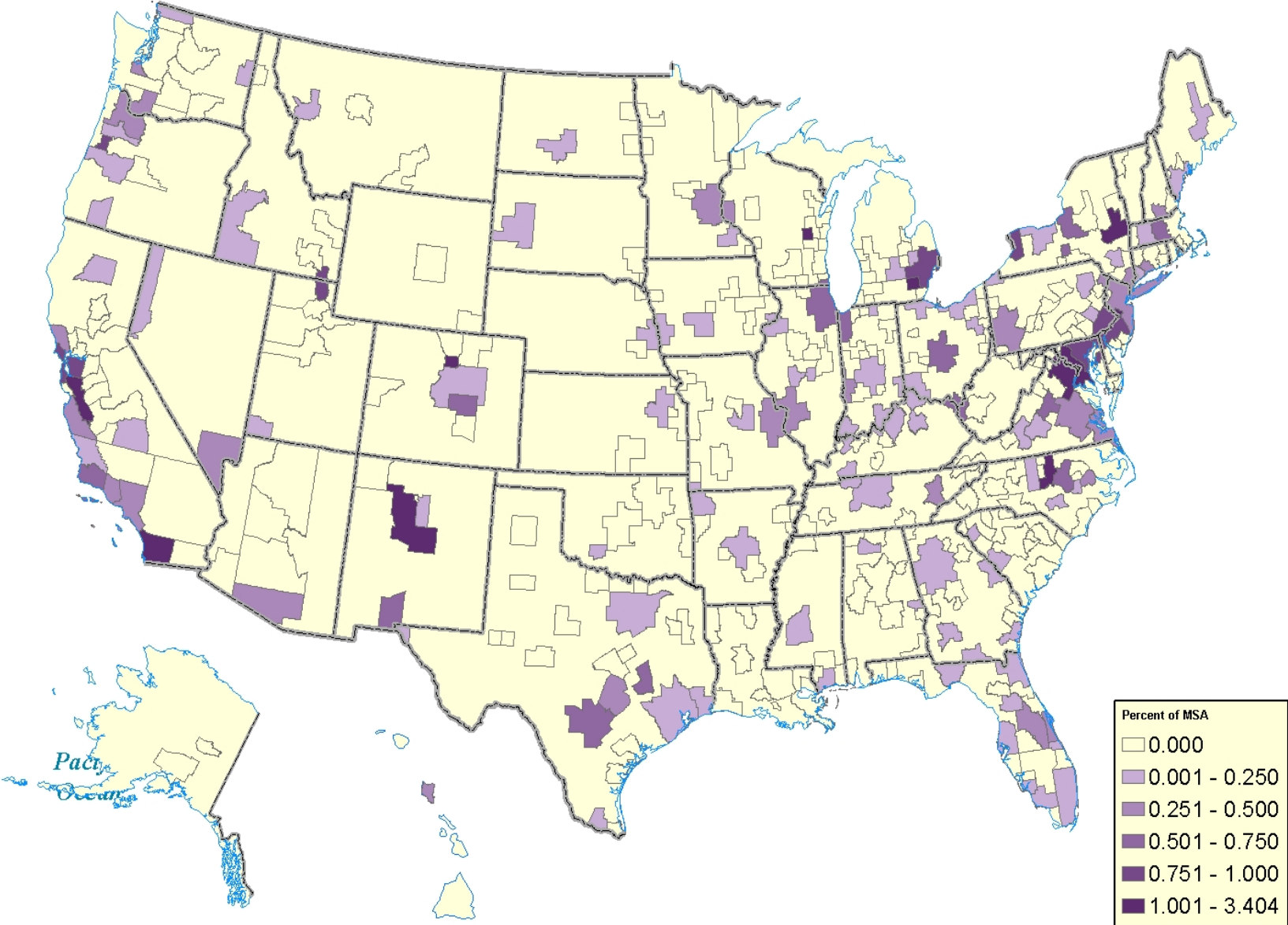
20 Largest Occupations in the R&D Indus

SOC Code	Occupation Title	R&D Average Annual Salary	National Average Annual Salary	Wage Margin of R&D	R&D Employment	R&D Percent of Employment	National Percent of Employment
19-1042	Medical scientists, except epidemiologists	\$75,330	\$69,140	9.0%	21,360	4.2%	0.1%
15-1032	Computer software engineers, systems software	\$97,330	\$84,310	15.4%	18,670	3.7%	0.2%
19-4021	Biological technicians	\$40,740	\$36,480	11.7%	18,260	3.6%	0.1%
43-6011	Executive secretaries and administrative assistants	\$43,580	\$37,810	15.3%	18,240	3.6%	1.1%
19-2031	Chemists	\$71,240	\$63,470	12.2%	12,740	2.5%	0.1%
11-1021	General and operations managers	\$134,770	\$95,470	41.2%	11,170	2.2%	1.3%
17-2141	Mechanical engineers	\$76,170	\$70,000	8.8%	10,650	2.1%	0.2%
13-1199	Business operations specialists, all other	\$71,140	\$59,030	20.5%	9,990	2.0%	0.7%
15-1031	Computer software engineers, applications	\$82,670	\$79,540	3.9%	9,800	1.9%	0.3%
43-9061	Office clerks, general	\$30,640	\$24,580	24.7%	9,620	1.9%	2.3%
11-9121	Natural sciences managers	\$123,260	\$99,140	24.3%	9,030	1.8%	0.0%
43-6014	Secretaries, except legal, medical, and executive	\$34,590	\$27,780	24.5%	8,270	1.6%	1.3%
17-2112	Industrial engineers	\$79,070	\$68,500	15.4%	7,610	1.5%	0.1%
17-2071	Electrical engineers	\$82,670	\$76,060	8.7%	6,950	1.4%	0.1%
11-9041	Engineering managers	\$123,420	\$105,470	17.0%	6,920	1.4%	0.1%
19-4031	Chemical technicians	\$41,200	\$40,120	2.7%	6,770	1.3%	0.0%
11-9199	Managers, all other	\$105,730	\$83,530	26.6%	6,530	1.3%	0.3%
13-2011	Accountants and auditors	\$64,770	\$58,020	11.6%	6,420	1.3%	0.8%
15-1051	Computer systems analysts	\$79,390	\$70,430	12.7%	5,970	1.2%	0.4%
17-3023	Electrical & electronic engineering technicians	\$51,020	\$48,710	4.7%	5,600	1.1%	0.1%

Employment in Physical Science Research and Development (NAICS 541710) by Area

- Employment is concentrated in metropolitan areas with large university, manufacturing, or government research centers.
- Some smaller MSAs have larger concentrations of R&D employment.

Pct. of MSA Employment in NAICS 541710



Research and Technology Occupations

2 Different Groups

High-Tech Occupations

- 36 detailed occupations from OES SOC statistics
- Duties are specifically related to concept and process innovation

Technical Group Occupations

- 7 minor SOC groups
- Technically-oriented occupational groups
- 86 detailed technical occupations

Criteria for High-Tech Occupations

- Occupations in which persons utilize processes or techniques that are innovative and improve the way that people live and work.
- These processes and techniques have yet to be adopted as an industry or societal standard, but are functional and effective.
- Occupations which require technical knowledge.
- Occupations with duties whose methods that, by their nature, are constantly evolving.

“High-Tech” Occupations”

- 15-1011 Computer and information scientists, research
- 15-1021 Computer programmers
- 15-1031 Computer software engineers, applications
- 15-1032 Computer software engineers, systems software
- 15-1051 Computer systems analysts
- 15-1061 Database administrators
- 15-1081 Network systems and data communications analysts
- 17-2011 Aerospace engineers
- 17-2031 Biomedical engineers
- 17-2041 Chemical engineers
- 17-2061 Computer hardware engineers
- 17-2071 Electrical engineers
- 17-2072 Electronics engineers, except computers
- 17-2151 Mining and geological engineers
- 17-2161 Nuclear engineers
- 17-2171 Petroleum engineers
- 17-3021 Aerospace engineering and operations technicians
- 17-3023 Electrical and electronic engineering technicians
- 17-3024 Electro-mechanical technicians
- 19-1021 Biochemists and biophysicists
- 19-1022 Microbiologists
- 19-1041 Epidemiologists
- 19-1042 Medical scientists, except epidemiologists
- 19-2011 Astronomers
- 19-2012 Physicists
- 19-2021 Atmospheric and space scientists
- 19-2031 Chemists
- 19-2042 geoscientists, except hydrologists
- 19-4021 Biological technicians
- 19-4031 Chemical technicians
- 19-4041 Geological and petroleum technicians
- 19-4051 Nuclear technicians
- 27-1014 Multi-media artists and animators
- 29-2011 Medical and clinical laboratory technologists
- 29-2033 Nuclear medicine technologists
- 29-2034 Radiologic technologists and technicians

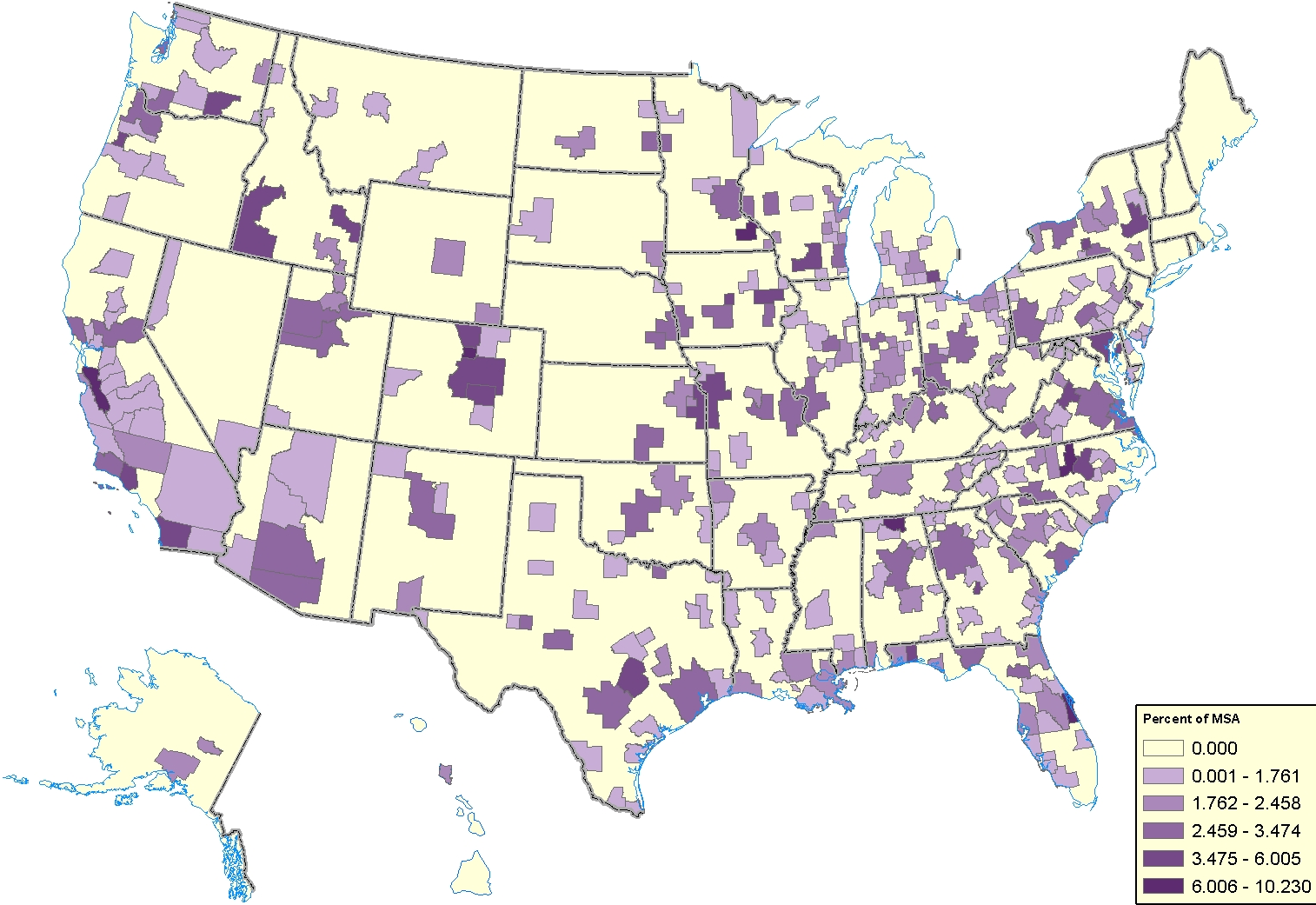
High-Tech occupational employment

- Employment has increased by 20,000 in the past 4 years.
- Wages are statistically higher across industries for these occupations
- Employment is concentrated in certain MSAs with government or university research institutes
- Wages are above the national average for all high-tech occupations in these MSAs

High-Tech Workers by Metropolitan Area (OES May, 2005)

Rank	Metropolitan Area	Percent of Metro employed in High-Tech Occupations	Employment in High-tech Occupations	Average Annual Salary for Metro Area	Average Annual Salary for High-tech	Salary Premium for High-tech Workers
1	San Jose-Sunnyvale-Santa Clara, CA	10.2%	88,620	\$57,980	\$93,790	\$35,810
2	Boulder, CO	10.0%	15,620	\$47,440	\$81,790	\$34,350
3	Huntsville, AL	9.0%	17,110	\$39,540	\$74,080	\$34,540
4	Framingham, MA	8.5%	13,110	\$50,970	\$86,710	\$35,740
5	Durham, NC	7.8%	19,810	\$44,280	\$73,120	\$28,840
6	Lowell-Billerica-Chelmsford, MA-NH	7.5%	8,840	\$47,260	\$79,710	\$32,450
7	Washington-Arlington-Alexandria, DC-VA-MD-WV	6.8%	151,700	\$50,600	\$80,270	\$29,670
8	Bethesda-Gaithersburg-Frederick, MD	6.5%	36,030	\$47,590	\$79,850	\$32,260
9	Rochester, MN	6.5%	6,440	\$41,690	\$72,340	\$30,650
10	Palm Bay-Melbourne-Titusville, FL	6.4%	13,060	\$36,630	\$69,480	\$32,850
11	Corvallis, OR	6.0%	2,110	\$37,460	\$56,240	\$18,780
12	Seattle-Bellevue-Everett, WA	5.9%	77,800	\$46,170	\$78,910	\$32,740
13	Colorado Springs, CO	5.6%	13,540	\$38,330	\$73,830	\$35,500
14	Boston-Cambridge-Quincy, MA-NH	5.5%	89,020	\$50,550	\$77,640	\$27,090
15	Austin-Round Rock, TX	5.4%	36,740	\$38,810	\$72,470	\$33,660
16	Fort Walton Beach-Crestview-Destin, FL	5.0%	4,250	\$32,430	\$65,890	\$33,460
17	Warner Robins, GA	5.0%	2,550	\$36,250	\$67,190	\$30,940
18	San Francisco-San Mateo-Redwood City, CA	5.0%	47,580	\$52,590	\$86,760	\$34,170
19	Portsmouth, NH-ME	4.9%	2,710	\$43,400	\$73,410	\$30,010

Pct. of MSA Employment in Hi-Tech



High-Tech Occupations by Industry

- Mostly concentrated in computer-related industries, as well as Scientific Services
- Wages are highest in manufacturing and extraction industries

Industries with highest concentrations of High-Tech workers

Rank	Naics Code	Industry	Annual Average Salary	Employment	Pct of Industry Employment
1	541500	Computer Systems Design and Related Services	\$76,560	517,830	43.8%
2	511200	Software Publishers	\$81,850	99,780	42.4%
3	334100	Computer and Peripheral Equipment Manufacturing	\$87,290	67,910	33.1%
4	541700	Scientific Research and Development Services	\$74,900	170,510	29.9%
5	518200	Data Processing, Hosting, and Related Services	\$71,940	67,190	25.3%
6	518100	Internet Service Providers and Web Search Portals	\$74,400	26,820	23.1%
7	516100	Internet Publishing and Broadcasting	\$72,890	7,070	23.1%
8	621500	Medical and Diagnostic Laboratories	\$52,070	44,400	22.8%
9	334200	Communications Equipment Manufacturing	\$74,580	33,040	22.4%
10	334500	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	\$75,430	90,460	20.9%
11	325400	Pharmaceutical and Medicine Manufacturing	\$64,450	55,890	19.5%
12	334400	Semiconductor and Other Electronic Component Manufacturing	\$74,940	84,420	18.8%
13	336400	Aerospace Product and Parts Manufacturing	\$77,500	77,450	17.3%
14	211100	Oil and Gas Extraction	\$92,590	21,170	17.3%
15	523200	Securities and Commodity Exchanges	\$74,390	1,340	15.0%
16	517100	Wired Telecommunications Carriers	\$71,820	72,210	14.0%
17	334600	Manufacturing and Reproducing Magnetic and Optical Media	\$79,440	6,070	13.3%
18	517300	Telecommunications Resellers	\$71,630	17,460	12.6%
19	334300	Audio and Video Equipment Manufacturing	\$70,640	4,100	12.6%
20	541300	Architectural, Engineering, and Related Services	\$68,150	160,010	12.4%

Criteria for Technical Occupational Groups

- Occupations requiring technical skills as well scientific knowledge.
- These technical skills are utilized as part of the normal duties of the position.
- Occupations that are grouped together within subsets of the Standard Occupational Classification.

Technical Occupational Groups

- 15-1000 Computer Specialists
- 17-2000 Engineers
- 17-3020 Engineering Technicians
- 19-1000 Life Scientists
- 19-2000 Physical Scientists
- 19-4000 Life, Physical, and Social Science Technicians
- 29-2000 Health Technologists and Technicians

Employment Concentration of Research and Technology Employment

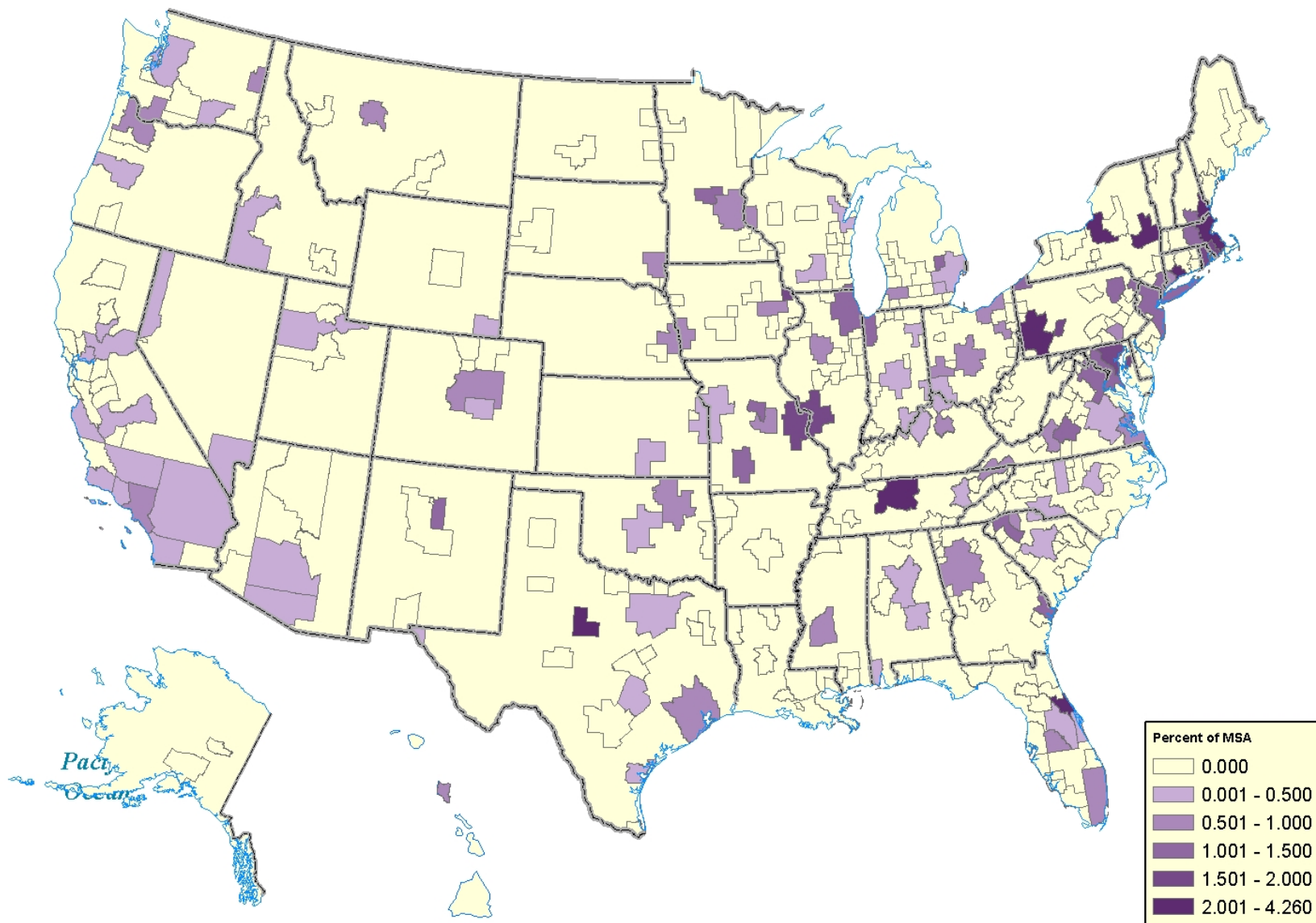
- R&D, university, and high-tech employment is concentrated in certain MSAs
- Some smaller MSAs have larger concentrations of R&D employment
- There are similar occupations in all three groups leading to knowledge transfer

Colleges and Universities

- Employment is more concentrated in areas with large or multiple campuses.
- Technology group and high-tech occupations occur in higher concentration
- Employment of high tech occupations is higher in areas where there is high employment in colleges and universities.
- R&D establishments are frequently located in university areas

College & University Employment

Pct. of MSA Employment in NAICS 611300



Correlations between university, high-tech, and R&D employment

- Correlation coefficient is positive between all employment percentages by MSA.
- All four correlations are positive, with high-tech, technical group and R&D highest.
- There is no double counting of university and R&D employment, only of high-tech and technical group.

R &D, University, High-Tech, and Technical Group MSA employment correlations

	High-Tech Employment	University Employment	R&D Employment
University Employment	.22		
R&D Employment	.61	.36	
Technical Group Employment	.91	.25	.52

Research and Technology Wage Differentials

- The wage of workers in high-tech occupations, technology groups, and research and development are higher than the average wage in every MSA.
- The wage of high-tech workers as a group is much higher in Physical Sciences R &D.
- University technology group workers have higher wages in campus MSAs.

Summary of Points

- High Technology and technical workers are frequently found in the same industries and metropolitan areas.
- The wages paid to workers in the high technology industries and areas are above the average in other industries and areas.