

A Statistical Dilemma

New and Emerging Occupations

- Information security analysts
- Robotics engineers
- Genetic counselors
- Ophthalmic medical technicians
- Wind turbine service technicians
- Hearing aid specialists
- Transportation security screeners
- Sustainability specialists
- and more...





Department of
Job and Family Services

A Statistical Dilemma: New and Emerging Occupations

This report was published by the Bureau of Labor Market Information, Keith Ewald, Bureau Chief. For further information, visit <http://OhioLMI.com> or call the Ohio Bureau of Labor Market Information at 1-888-296-7541.

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March 2010

A Statistical Dilemma: New and Emerging Occupations

A Statistical Dilemma. The very phrase “new and emerging occupations” implies that such occupations are not commonplace and that we have little experience or history with them. This newness often makes it difficult to fully define the characteristics of these occupations, much less their potential growth, their prominence in industries, and whether they will be part of the next economic expansion or remain on the periphery of the economy.

Since new and emerging occupations typically arise out of new duties being assigned to existing jobs, it is often difficult to determine when entirely new occupations begin. Job duties are important in evaluating whether an occupation is new, but not all job duties have the same weight. If two jobs share the same core duties, they are considered to be the same occupation even if their peripheral job duties differ.¹ When do the peripheral job duties overtake the core duties and when can they no longer be mapped to the existing Standard Occupational Classification (SOC) taxonomy?² These are empirical questions and turn our discussion from one about conceptual definition to a discussion about methods of measurement.

New and emerging occupations are a statistical dilemma because broad-based employment and occupational information is collected through surveys. It is cost prohibitive to do a census of the entire occupational population or universe. To capture occupational employment and wage levels through survey methodology requires that the occupations be commonplace enough to be readily captured at levels within the statistical reliability of survey samples, as in the Occupational Employment Survey (OES).³ Increasing sample sizes improves statistical reliability, but the rising costs quickly outpace the increases in reliability. The difficulty of achieving reliable estimates is further compounded when we apply geographical, industry or other breakouts, further expanding the number of sample cells to be covered.

New occupations need to grow large enough to be noticed by researchers, which may take years.⁴ An article by the Bureau of Labor Statistics (BLS) notes that there are few people employed in new and emerging occupations, there are few related job opportunities, and that the occupations tend to be found in less-established industries

¹ Crosby, Olivia, “New and Emerging Occupations,” *Occupational Outlook Quarterly*, v. 46, #3, p.21. (2002) <http://www.bls.gov/opub/ooq/2002/fall/art02.pdf>

² “Classification Principles” in the SOC Users Guide. <http://www.bls.gov/soc/socguide.htm>

³ See <http://stats.bls.gov/oes/> for details about the Occupational Employment Survey.

⁴ Crosby, p.20.

and companies.⁵ Researchers do not make employment projections about new occupations because there are no historical data on which to base trend estimates.⁶

Periodically the SOC system goes through a review process to update and reflect the changing patterns of the U.S. occupational structure over time. These changes may reflect:

- elimination of occupations no longer in measurable numbers,
- occupations that have significant change in content, or
- the addition of new occupations.

Attachment A lists the sixty occupations from the 2010 SOC revision with substantial content changes. Twenty-four of these are entirely new. These changes are often related to technology advancements, such as with the occupations of Solar Photovoltaic Installers or Wind Turbine Service Technicians. Also, industry growth may lead to greater specialization and the splitting into several occupational categories from what was classified as a single occupation. Probably the best example is the prior listing of Registered Nurses, which now has additional categories such as Nurse Anesthetists, Nurse Midwives and Nurse Practitioners.

A Workforce Potential. By the time we can conceptually define and systematically measure new and emerging occupations, they are no longer so new. Despite conceptual and methodological difficulties, there are sound reasons for the workforce development community to be interested in new and emerging occupations:

1. The occupations may represent the beginnings of technological and industry breakthroughs and be the keys to competitive advantage for new industries or product developments.
2. Though currently or possibly always few in number, the occupations may provide critical labor inputs for the growth and expansion of an industry.
3. These occupations may offer unique challenges and career opportunities for those with the specialized skills and interests.
4. Such occupations may offer the basis for educational and research specialization and the development of institutions of excellence.
5. The occupations may support worthy social and economic objectives, such as renewable energy and increased energy efficiencies.

The pursuit of these issues has less to do with statistical or labor market information systems and everything to do with pragmatic and programmatic workforce development.

The Pragmatic. The absence of full-fledged statistical accounting does not prevent descriptive and analytical assessment of new and emerging occupations. The evaluation of job titles, job descriptions and industry trends, combined with literature reviews and business expertise, can provide a more descriptive approach to the nature and content of new and emerging occupations. Such information can be analyzed by education and workforce development professionals and vetted through the business community to

⁵ Crosby, pp.22-23.

⁶ Crosby, p.22.

evaluate the potential of emerging occupations and the program or service offerings that can support their development. The question is whether the business demand is large enough to support or justify training or other workforce development services for an emerging occupation. Given the newness of an occupation and localized business demand, this is most often a regional decision.

As a starting place, O*NET developed a methodology for identifying new and emerging occupations. O*NET mines job titles and job descriptions for information. Industry and occupational analysts offer descriptive insights into new or emerging occupations.

To be considered new, an occupation must involve significantly different work compared to existing occupations and not be adequately reflected in the existing occupational taxonomy.⁷ With regard to green jobs, O*NET considers most green job definitions “too molecular” for a taxonomy such as O*NET.⁸ In determining new and emerging green jobs, O*NET looks for green economy activities and technologies with sufficient impact to create the need for unique work and worker requirements.⁹

O*NET’s list shows that many of new and emerging occupations are at a level of detail finer than that used by the Standard Occupational Classification (SOC) taxonomy. At best, full-fledged occupational systems that include employment counts, wages levels and employment projections are made at the SOC 6-digit level of detail. Many O*NET new and emerging occupations are subdivisions of the 6-digit level. For example, for 2009 O*NET added the occupation Green Marketers (11-2011.01), which is a subgroup of Advertising and Promotions Marketers (11-2011).¹⁰

Summary. O*NET has identified seventeen in-demand industry sectors for research in new occupations. In-demand industries are defined by the Department of Labor as being economically critical, projected to add substantial number of new jobs, and being transformed by technology and innovation.¹¹ The in-demand industries are:

- Advanced Manufacturing
- Aerospace
- Automotive
- Biotechnology
- Construction
- Education
- Energy
- Financial Services
- Geospatial Technology
- Green Economy
- Health Care
- Homeland Security
- Hospitality
- Information Technology
- Nanotechnology
- Retail Trade
- Transportation

⁷ New and Emerging (N&E) Occupations: Methodology Development Report, p.3. (2006)

http://www.onetcenter.org/dl_files/NewEmerging.pdf

⁸ Greening of the World of Work: Implications for O*NET@-SOC and New and Emerging Occupations, p.3. (2009)

http://www.onetcenter.org/dl_files/Green.pdf

⁹ Greening of the World of Work, p.31.

¹⁰ New and Emerging Occupations of the 21st Century: Updating the O*NET-SOC Taxonomy,

Appendix A: O*NET-SOC 2009 Taxonomy http://www.onetcenter.org/dl_files/UpdatingTaxonomy2009_AppA.pdf

¹¹ New and Emerging Occupations of the 21st Century: Updating the O*NET-SOC Taxonomy, p.10.

http://www.onetcenter.org/dl_files/UpdatingTaxonomy2009_Summary.pdf

For the combined 2006 and 2009 updates to the O*NET-SOC taxonomy, O*NET identified 159 new and emerging occupations from within the seventeen industries.¹² The vast majority of these new occupations are so new and few that they are not adequately captured in the Occupational Employment Survey for counts of employment and wages. Without such counts, they similarly cannot be incorporated in industry and occupational employment projections. Attachment B lists the 2006 and 2009 new and emerging occupations identified by O*NET.

Conclusion. O*NET provides a considerable list of new and emerging occupations with which to do further study and analysis. This O*NET list can be vetted regionally for its adequacy and offers the beginnings of an evaluation of business need and demand for these occupations. The list can be further defined or modified to meet the business and industry needs of the regional area. Businesses can help articulate the detailed work activities and the corresponding curriculum and skills needed for success. At the same time, most of these O*NET occupations will not be covered in the Occupational Employment Survey until they become prominent enough to be counted through this national/state survey process. In short, the O*NET list provides the foundation for specialized studies and vetting at the local level.

¹² Ibid, p.12.

Attachment A

Standard Occupational Classification – 2010 Revision

There were 60 instances of revisions to definitions that affected occupational coverage. Included are 24 new occupations denoted by asterisks (*).

2010 SOC Code	2010 SOC Title
11-9013	Farmers, Ranchers, and Other Agricultural Managers
11-9061	Funeral Service Managers
13-1041	Compliance Officers
13-1071	Human Resources Specialists
13-1075	Labor Relations Specialists
13-1121	Meeting, Convention, and Event Planners
13-1131	Fundraisers*
13-1161	Market Research Analysts and Marketing Specialists
13-1199	Business Operations Specialists, All Other
15-1121	Computer Systems Analysts
15-1122	Information Security Analysts*
15-1134	Web Developers*
15-1142	Network and Computer Systems Administrators
15-1143	Computer Network Architects*
15-1152	Computer Network Support Specialists*
21-1091	Health Educators
21-1094	Community Health Workers*
21-1099	Community and Social Service Specialists, All Other
23-1012	Judicial Law Clerks
23-2011	Paralegals and Legal Assistants
25-2051	Special Education Teachers, Preschool*
25-2052	Special Education Teachers, Kindergarten and Elementary School
25-2059	Special Education Teachers, All Other*
25-3099	Teachers and Instructors, All Other
29-1128	Exercise Physiologists*
29-1129	Therapists, All Other
29-1141	Registered Nurses
29-1151	Nurse Anesthetists*
29-1161	Nurse Midwives*
29-1171	Nurse Practitioners*

2010 SOC Code	2010 SOC Title
29-2034	Radiologic Technologists
29-2035	Magnetic Resonance Imaging Technologists*
29-2057	Ophthalmic Medical Technicians*
29-2092	Hearing Aid Specialists*
29-2099	Health Technologists and Technicians, All Other
29-9092	Genetic Counselors*
29-9099	Healthcare Practitioners and Technical Workers, All Other
31-1014	Nursing Assistants
31-1015	Orderlies*
31-9097	Phlebotomists*
31-9099	Healthcare Support Workers, All Other
33-9032	Security Guards
33-9093	Transportation Security Screeners*
33-9099	Protective Service Workers, All Other
39-4031	Morticians, Undertakers, and Funeral Directors*
41-9099	Sales and Related Workers, All Other
43-3099	Financial Clerks, All Other*
43-9199	Office and Administrative Support Workers, All Other
47-2111	Electricians
47-2181	Roofers
47-2231	Solar Photovoltaic Installers*
47-4099	Construction and Related Workers, All Other
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
49-9081	Wind Turbine Service Technicians*
49-9099	Installation, Maintenance, and Repair Workers, All Other
51-3099	Food Processing Workers, All Other*
51-5112	Printing Press Operators
51-5113	Print Binding and Finishing Workers
51-9151	Photographic Process Workers and Processing Machine Operators
51-9199	Production Workers, All Other

Attachment B

The O*NET-SOC Taxonomy 2006 and 2009 New & Emerging Occupations

* Denotes new and emerging occupations included in the O*NET-SOC 2006 taxonomy.

** Transportation Security Officers was included in the O*NET-SOC 2006 taxonomy as Transportation Security Screeners.

Code	Title
11-1011.03	Chief Sustainability Officers
11-2011.01	Green Marketers
11-3051.01	Quality Control Systems Managers
11-3051.02	Geothermal Production Managers
11-3051.03	Biofuels Production Managers
11-3051.04	Biomass Production Managers
11-3051.05	Methane/Landfill Gas Collection System Operators
11-3051.06	Hydroelectric Production Managers
11-9039.01	Distance Learning Coordinators
11-9039.02	Fitness and Wellness Coordinators
11-9041.01	Biofuels/Biodiesel Technology and Product Development Managers
11-9111.01	Clinical Nurse Specialists
11-9121.01	Clinical Research Coordinators
11-9121.02	Water Resource Specialists
11-9199.01	Regulatory Affairs Managers
11-9199.02	Compliance Managers
11-9199.03	Investment Fund Managers
11-9199.04	Supply Chain Managers
11-9199.05	Online Merchants
11-9199.06	Logistics Managers
11-9199.07	Security Managers
11-9199.08	Loss Prevention Managers
11-9199.09	Wind Energy Operations Managers
11-9199.10	Wind Energy Project Managers
11-9199.11	Brownfield Redevelopment Specialists and Site Managers
13-1041.07	Regulatory Affairs Specialists
13-1081.01	Logistics Engineers
13-1081.02	Logistics Analysts
13-1199.01	Energy Auditors
13-1199.02	Security Management Specialists
13-1199.03	Customs Brokers
13-1199.04	Business Continuity Planners
13-1199.05	Sustainability Specialists
13-2099.01	Financial Quantitative Analysts
13-2099.02	Risk Management Specialists

Code	Title
13-2099.03	Investment Underwriters
13-2099.04	Fraud Examiners, Investigators and Analysts
15-1051.01	Informatics Nurse Specialists
15-1081.01	Telecommunications Specialists
15-1099.01	Software Quality Assurance Engineers and Testers*
15-1099.02	Computer Systems Engineers/Architects*
15-1099.03	Network Designers*
15-1099.04	Web Developers*
15-1099.05	Web Administrators*
15-1099.06	Geospatial Information Scientists and Technologists
15-1099.07	Geographic Information Systems Technicians
15-1099.08	Database Architects
15-1099.09	Data Warehousing Specialists
15-1099.10	Business Intelligence Analysts
15-1099.11	Information Technology Project Managers
15-1099.12	Electronic Commerce Specialists
15-1099.13	Video Game Designers
15-1099.14	Document Management Specialists
15-2041.01	Biostatisticians
15-2041.02	Clinical Data Managers
17-1022.01	Geodetic Surveyors
17-2051.01	Transportation Engineers
17-2051.02	Water/Wastewater Engineers
17-2072.01	Radio Frequency Identification Device Specialists
17-2112.01	Human Factors Engineers and Ergonomists
17-2141.01	Fuel Cell Engineers
17-2141.02	Automotive Engineers
17-2199.01	Biochemical Engineers
17-2199.02	Validation Engineers
17-2199.03	Energy Engineers
17-2199.04	Manufacturing Engineers
17-2199.05	Mechatronics Engineers
17-2199.06	Microsystems Engineers
17-2199.07	Photonics Engineers
17-2199.08	Robotics Engineers
17-2199.09	Nanosystems Engineers
17-2199.10	Wind Energy Engineers
17-2199.11	Solar Energy Systems Engineers
17-3024.01	Robotics Technicians
17-3027.01	Automotive Engineering Technicians
17-3029.01	Non-Destructive Testing Specialists
17-3029.02	Electrical Engineering Technologists
17-3029.03	Electromechanical Engineering Technologists
17-3029.04	Electronics Engineering Technologists
17-3029.05	Industrial Engineering Technologists
17-3029.06	Manufacturing Engineering Technologists
17-3029.07	Mechanical Engineering Technologists

Code	Title
17-3029.08	Photonics Technicians
17-3029.09	Manufacturing Production Technicians
17-3029.10	Fuel Cell Technicians
17-3029.11	Nanotechnology Engineering Technologists
17-3029.12	Nanotechnology Engineering Technicians
19-1029.01	Bioinformatics Scientists
19-1029.02	Molecular and Cellular Biologists
19-1029.03	Geneticists
19-2041.01	Climate Change Analysts
19-2041.02	Environmental Restoration Planners
19-2041.03	Industrial Ecologists
19-2099.01	Remote Sensing Scientists and Technologists
19-3011.01	Environmental Economists
19-3039.01	Neuropsychologists and Clinical Neuropsychologists
19-3099.01	Transportation Planners
19-4099.01	Quality Control Analysts
19-4099.02	Precision Agriculture Technicians
19-4099.03	Remote Sensing Technicians
25-3099.01	Adaptive Physical Education Specialists
25-3099.02	Tutors
25-9031.01	Instructional Designers and Technologists
29-1069.01	Allergists and Immunologists
29-1069.02	Dermatologists
29-1069.03	Hospitalists
29-1069.04	Neurologists
29-1069.05	Nuclear Medicine Physicians
29-1069.06	Ophthalmologists
29-1069.07	Pathologists
29-1069.08	Physical Medicine and Rehabilitation Physicians
29-1069.09	Preventive Medicine Physicians
29-1069.10	Radiologists
29-1069.11	Sports Medicine Physicians
29-1069.12	Urologists
29-1071.01	Anesthesiologist Assistants
29-1111.01	Acute Care Nurses
29-1111.02	Advanced Practice Psychiatric Nurses
29-1111.03	Critical Care Nurses
29-1122.01	Low Vision Therapists, Orientation and Mobility Specialists, and Vision Rehabilitation Therapists
29-1199.01	Acupuncturists
29-1199.02	Nurse Anesthetists
29-1199.03	Nurse Practitioners
29-1199.04	Naturopathic Physicians
29-1199.05	Orthoptists
29-2011.01	Cytogenetic Technologists
29-2011.02	Cytotechnologists
29-2011.03	Histotechnologists and Histologic Technicians
29-2099.01	Electroneurodiagnostic Technologists

Code	Title
29-2099.02	Hearing Aid Specialists
29-2099.03	Ophthalmic Medical Technologists and Technicians
29-2099.04	Nurse Midwives
29-9099.01	Midwives
29-9099.02	Genetic Counselors
31-9093.01	Endoscopy Technicians
31-9099.01	Speech-Language Pathology Assistants
33-3021.06	Intelligence Analysts
33-9099.01	Transportation Security Officers**
33-9099.02	Loss Prevention Specialists
35-3022.01	Baristas
39-1021.01	Spa Managers
41-3031.03	Securities and Commodities Traders
41-3099.01	Energy Brokers
41-4011.07	Solar Sales Representatives and Assessors
43-4051.03	Patient Representatives
43-5011.01	Freight Forwarders
43-9111.01	Bioinformatics Technicians
47-1011.03	Solar Energy Installation Managers
47-4099.01	Solar Photovoltaic Installers
47-4099.02	Solar Thermal Installers and Technicians
47-4099.03	Weatherization Installers and Technicians
49-9099.01	Geothermal Technicians
49-9099.02	Wind Turbine Service Technicians
51-8099.01	Biofuels Processing Technicians
51-8099.02	Methane/Landfill Gas Generation System Technicians
51-8099.03	Biomass Plant Technicians
51-8099.04	Hydroelectric Plant Technicians
51-9199.01	Recycling and Reclamation Workers
53-1021.01	Recycling Coordinators

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(03/2010)

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