

# Occupational Projections Methods

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Employment Projections Program  
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# Overview

- BLS Projections Background
- Data Sources and Classifications
- Developing Occupational Projections
- Occupational Qualifications
- Estimating Occupational Replacement Needs



# US Projections History

- US Secretary of Labor is charged with developing a national employment statistics system
  - ▶ Bureau of Labor Statistics (BLS) is the statistical agency of the Department of Labor
- First Occupational Outlooks produced in 1940s to aide in postwar readjustments
- Comprehensive numerical projections every 2 years since the 1960s



# US Employment Projections

- 10-year projections of structural labor market changes
- 2014-24 projections cover 819 occupations and 329 industries
- BLS projections prepared at the national level only
  - ▶ National projections serve as an input for state and local employment projections, which are produced by state governments

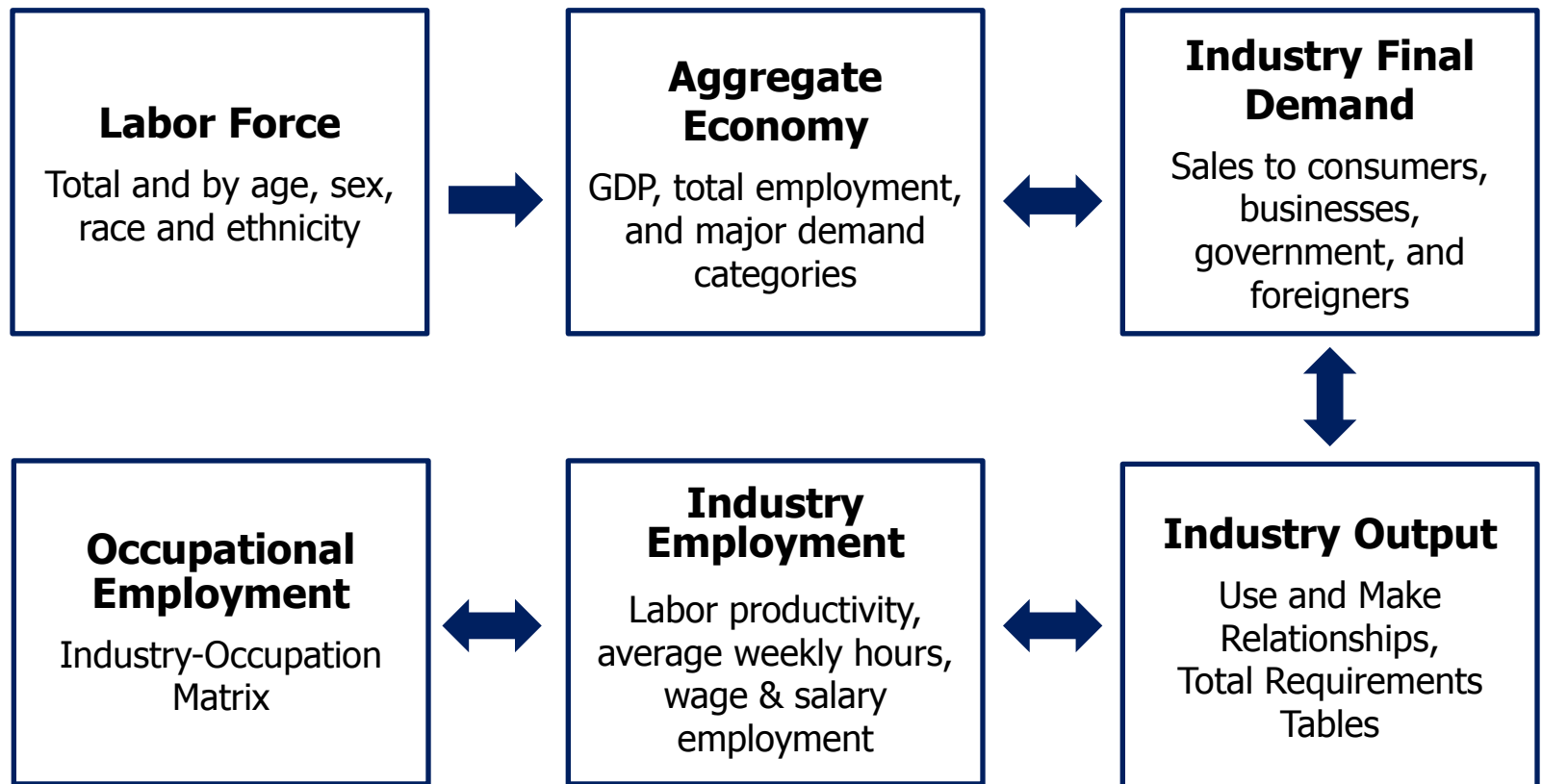


# Projections Uses

- Workforce planning and policy
  - ▶ Federal workforce development funds sub baccalaureate training, but devolves decisions to the state and local level
  - ▶ Baccalaureate training policy is developed primarily at the state level
- Career development
  - ▶ Students, counselors, and jobseekers making career choice decisions
- Labor market research



# Employment Projections Process



# Employment Data Sources

- ▶ Occupational Employment Statistics (OES)
  - Establishment survey for nonagricultural wage-and-salary staffing patterns
- ▶ Current Employment Statistics (CES)
  - Establishment survey for nonagricultural wage-and-salary industry employment
- ▶ Quarterly Census of Employment and Wages (QCEW)
  - Administrative data set for wage-and-salary industry employment
- ▶ Current Population Survey (CPS)
  - Household survey for agricultural industry employment and staffing patterns, self-employed workers

# Classifications

- North American Industry Classification System (NAICS) for industries
  - ▶ Updated every 5 years
  - ▶ 1057 detailed industries
- Standard Occupational Classification (SOC) for occupations
  - ▶ Revised every 8-10 years
  - ▶ 820 detailed occupations
  - ▶ 24 occupations added in 2010, 37 will be added in 2018
  - ▶ 90% of occupations unchanged by revisions





# Projecting Occupational Employment

- Allocate projected industry employment to occupations using a staffing-pattern matrix
- Occupational ratios (share of industry coefficients) change over time
- Could use quantitative methods to project ratios if sufficient historical data available
- BLS does not have comparable historical data, so use qualitative methods



# Researching Occupations

- Research how occupational utilization will change in industries
  - ▶ Data
    - Historical staffing patterns, industry-specific data sources
  - ▶ Interviews and site visits
    - Professional organizations, schools, government agencies, employers
  - ▶ Published research and reports
    - Professional journals, newspapers, trade publications



# Factors Affecting Occupational Utilization

- Automation technology
- Domestic outsourcing
- Offshoring (international outsourcing)
- Occupational substitution
- Change in the mix of industry sector outputs



# Converting Research into Projections

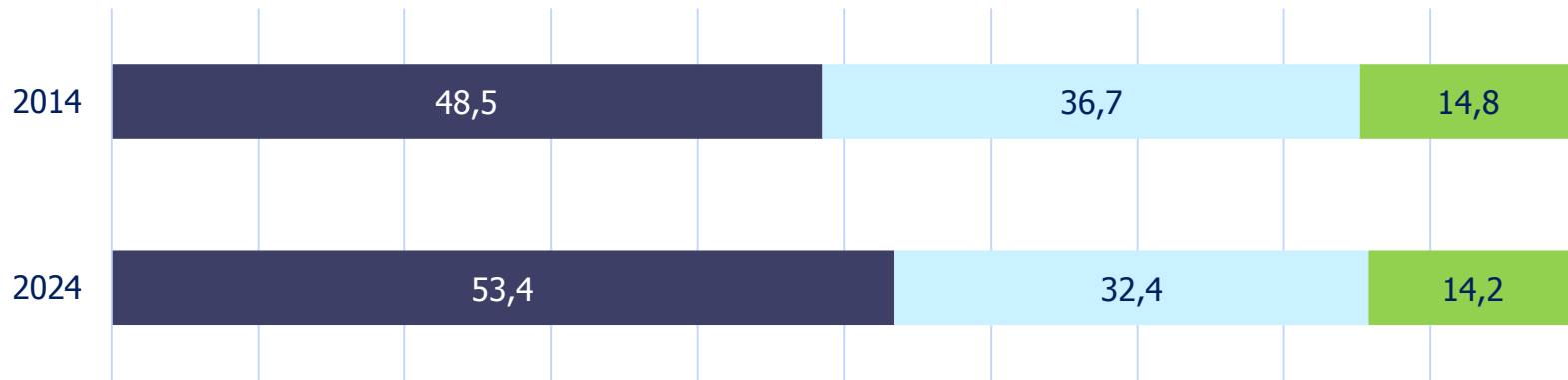
- Develop rationales describing direction and magnitude of ratio change
- Numerical change factors are applied to calculate projected utilization ratios for each occupation by industry cell
- Projected staffing patterns for each industry are balanced to have occupation and industry employment match



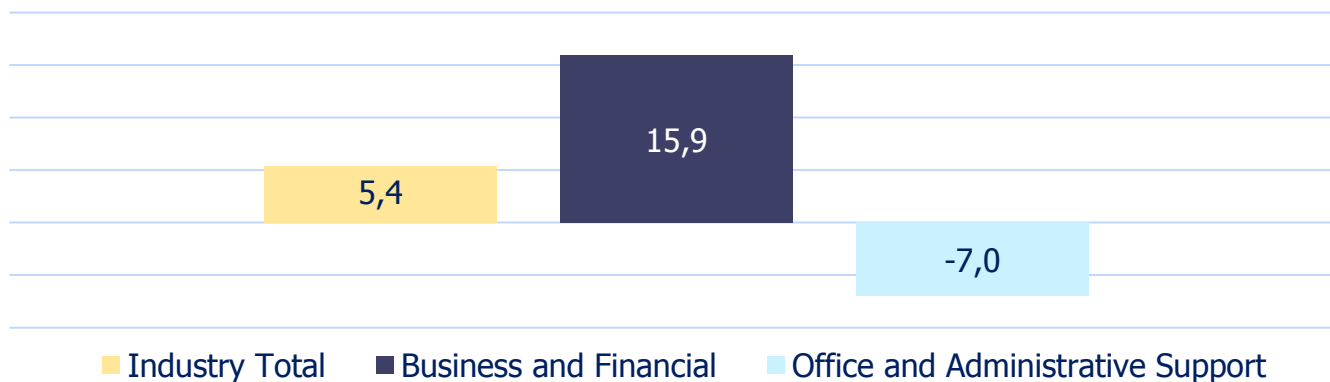
# Example Occupational Shifts

## Occupational Share of Accounting Industry Employment

■ Business and Financial    ■ Office and Administrative Support    ■ Other



## Growth Rates within Accounting Industry, 2014-24



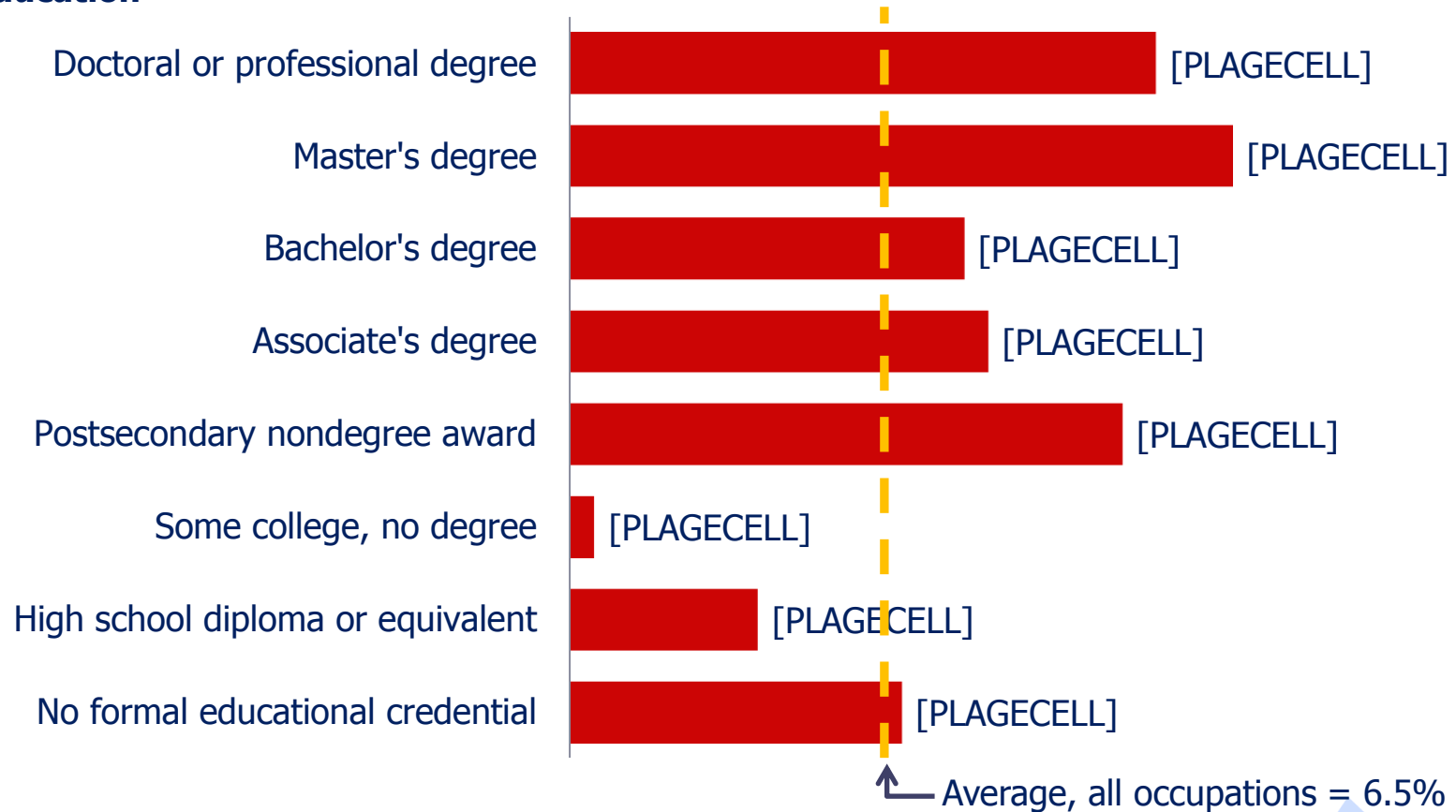
# Occupational Qualifications

- Occupations are assigned to one of 8 education levels based on typical requirements for entry
- Education levels represent current, not projected, requirements
- Education levels are assigned based on research



# Occupations that Need More Education for Entry are Projected to Grow Faster

**Projected 2014-24 growth rate in occupational employment by typical 2014 entry-level education**



# Occupational Replacement Needs

- Projections of growth and decline show structural changes in the labor force
- Workforce demand largely driven by the need to replace existing workers who leave an occupation
  - ▶ Retirements
  - ▶ Other labor force exits
  - ▶ Transfers to different occupations





# Projecting Replacement Needs

- BLS formerly used a cohort-component (indirect) estimation method
  - ▶ Age-based method undercounted opportunities in many occupations
- Starting in 2017, new longitudinal (direct) estimation method will be used
  - ▶ Uses a regression to estimate probability of separating for current workforce demographics

# References

- BLS Projections Methodology: [https://www.bls.gov/emp/ep\\_projections\\_methods.htm](https://www.bls.gov/emp/ep_projections_methods.htm)
- BLS 2014-24 Occupational Projections: <https://www.bls.gov/opub/mlr/2015/article/pdf/occupational-employment-projections-to-2024.pdf>
- BLS Educational Classifications: [https://www.bls.gov/emp/ep\\_table\\_112.htm](https://www.bls.gov/emp/ep_table_112.htm)
- Occupational Outlook Handbook: <https://www.bls.gov/ooh/>



# Occupational Skills Data

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# Overview

- What Are Skills?
- Educational Attainment and Requirements
- O\*NET
- Occupational Requirements Survey



# What Are Skills?

- Abilities: enduring attributes of an individual that affect performance
- Skills: developed capacities that facilitate performance
- Knowledge: organized sets of principles and facts
- How does a worker develop skills and knowledge?
  - ▶ Formal education
  - ▶ On-the-job training
  - ▶ Prior work experience



# Educational Attainment

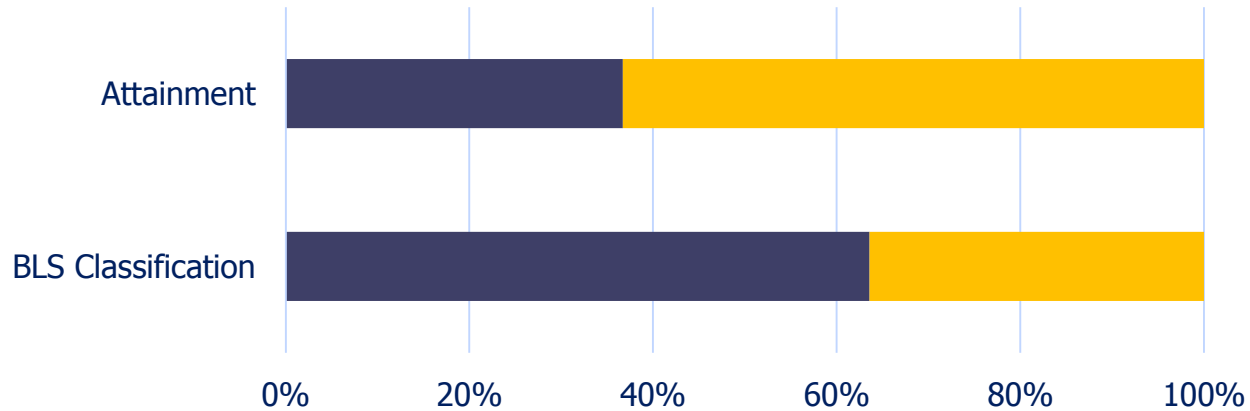
- US labor force surveys measure educational attainment: highest level of education completed
- Attainment measures current workforce for an occupation and may not reflect what new entrants typically need:
  - ▶ Entry level requirement change over time
  - ▶ Workers may continue their education
  - ▶ Personal choice to work in some occupations
  - ▶ Mal-employment

# BLS Education Classification

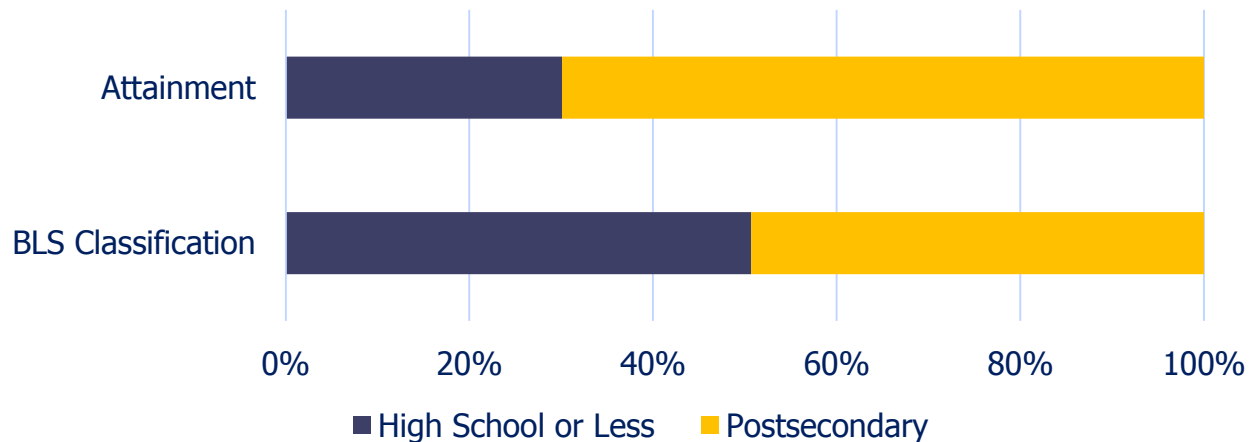
- U.S. Bureau of Labor Statistics (BLS) produces a measure of typical education needed to enter an occupation
  - ▶ 8 categories, from Doctoral/Professional Degree to No Formal Educational Credential
  - ▶ Intended for career guidance purposes
  - ▶ Reflects current, not future, requirements
- Measures employer requirements, not worker attainment

# BLS Classification vs Attainment

## 2014 Employment by Education Level



## 2014-24 Employment Change by Education Level





# Demand for Education

- Wage premium models provide an alternative estimate for the demand for education
- Examine within-occupation wage differentials for workers with different education levels
- Employers may compensate workers with more education even if they do not require it for the job
  - ▶ Expect that results would fall between measures based on attainment and measures based on employer requirements

# Demand for Education

- How many jobs require postsecondary education?

Measure	Share of jobs
Attainment	64.4%
Wage Premium Model	43.3%
BLS Classification	36.4%

- How many jobs require a baccalaureate degree?

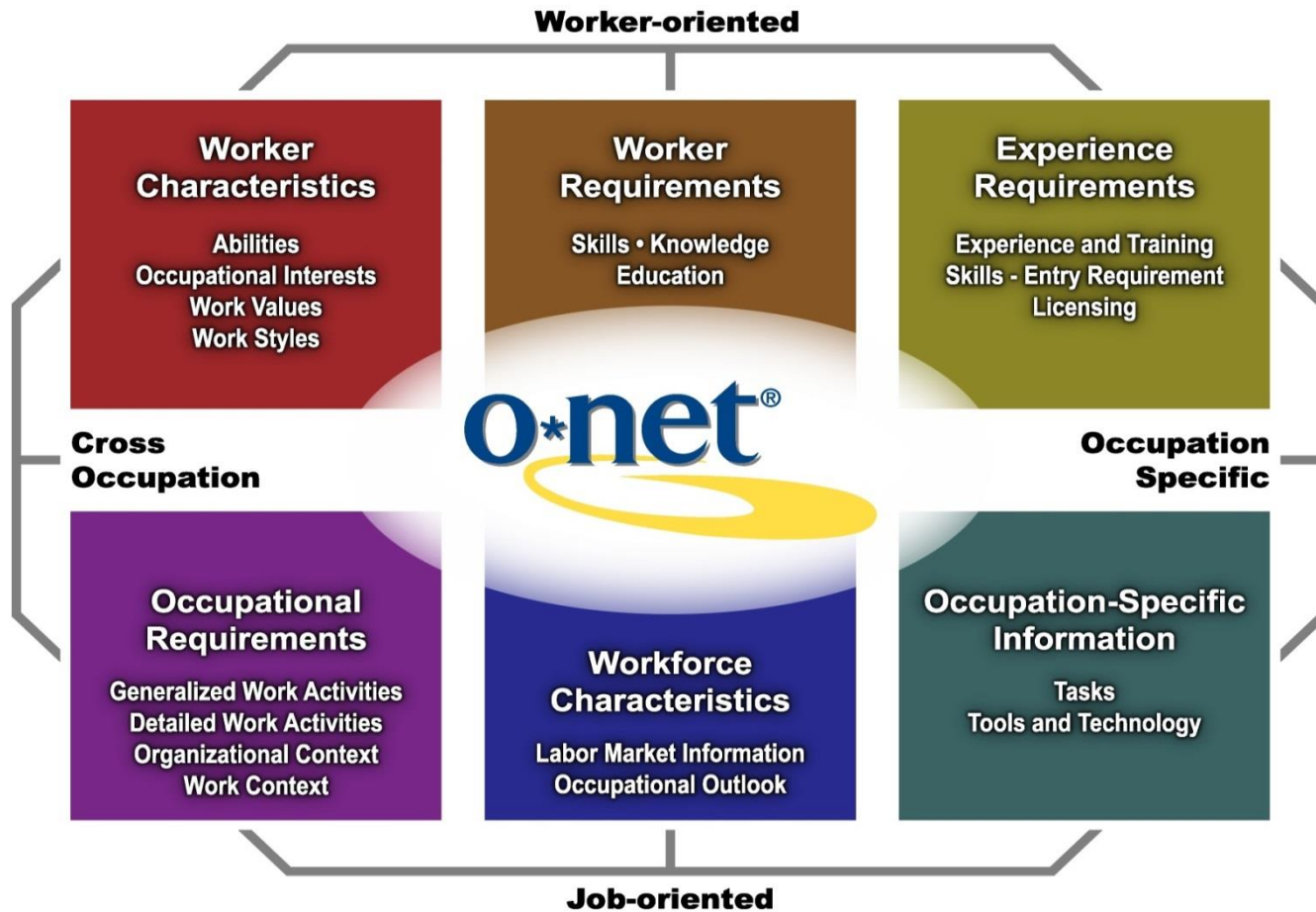
Measure	Share of jobs
Attainment	37.2%
Wage Premium Model	31.8%
BLS Classification	25.6%

# What is O\*NET?

## ■ Occupational Information Network

- ▶ Primary source for characteristics and requirements information on occupations in the US
  - Covers the work conducted in the U.S. economy
    - 900+ occupations
    - Comprehensive description of worker and occupational requirements
  - Common language for describing the world of work
    - Job seekers, students, employers, educators, community developers, workforce professionals

# O\*NET Content Information








# Example O\*NET Data

Updated 2016





## Details Report for:

19-3011.00 - Economists






### Knowledge [Save Table \(XLS/CSV\)](#)

Importance	Knowledge
93 	<b>Economics and Accounting</b> — Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
90 	<b>Mathematics</b> — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
71 	<b>English Language</b> — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
53 	<b>Computers and Electronics</b> — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
52 	<b>Education and Training</b> — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.

### Skills [Save Table \(XLS/CSV\)](#)

Importance	Skill
75 	<b>Active Listening</b> — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
75 	<b>Critical Thinking</b> — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
75 	<b>Mathematics</b> — Using mathematics to solve problems.
75 	<b>Speaking</b> — Talking to others to convey information effectively.

### Abilities [Save Table \(XLS/CSV\)](#)

Importance	Ability
75 	<b>Deductive Reasoning</b> — The ability to apply general rules to specific problems to produce answers that make sense.
75 	<b>Inductive Reasoning</b> — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
75 	<b>Written Comprehension</b> — The ability to read and understand information and ideas presented in writing.
75 	<b>Written Expression</b> — The ability to communicate information and ideas in writing so others will understand.
72 	<b>Mathematical Reasoning</b> — The ability to choose the right mathematical methods or formulas to solve a problem.

# Sources of O\*NET Data

- Job Incumbents
  - ▶ Collected through establishment-based surveys
- Occupational Experts
  - ▶ Used for small, remote, and new/emerging occupations
- Occupational Analysts
  - ▶ I/O Psychologists used for technical data elements not able to be answered by job incumbants

# Data Publication

- Currently covers 974 Occupations
- Approximately 100 occupations are updated each year
  - ▶ Prioritized based on:
    - Fast growing
    - Green/Environment-related
    - Science, technology, engineering, mathematics, and innovation
  - ▶ Not designed for time series analysis of changes in occupational characteristics

# The Occupational Requirements Survey

- The Occupational Requirements Survey (ORS) provides occupational-related data for:
  - ▶ Physical demands
  - ▶ Cognitive demands
  - ▶ Environmental conditions
  - ▶ Vocational preparation
- Data is intended to adjudicate disability claims



# ORS Data Elements

- Vocational preparation
  - ▶ Minimum formal education required
  - ▶ Pre- and post-employment training
  - ▶ Prior work experience
- Cognitive requirements
  - ▶ Decision-making required, supervision
  - ▶ Changes in routine
  - ▶ Pace of work and control over pace

# ORS Data Collection

- New survey collected using the existing National Compensation Survey infrastructure
- Collected at establishments through site visits by field economists
- First data release in December 2016 covered 165 occupations
- Expected to cover up to 1,090 occupations by 2019
- Data on occupations will be updated every 5 years

# References

- BLS Educational Attainment and Classifications: [https://www.bls.gov/emp/ep\\_education\\_training\\_system.htm](https://www.bls.gov/emp/ep_education_training_system.htm)
- O\*NET Data Interface: <https://www.onetonline.org/>
- O\*NET Database: <https://www.onetcenter.org/>
- BLS Occupational Requirements Survey: <https://www.bls.gov/ors/>



# Contact Information

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