

# Using Data and Information to Align Economic and Workforce Development

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## Overview

Economic development is a term that is often used, but not always understood. It is a process where both the public and private sector work together to set up an environment where the economic capacity, quality of life, and overall well-being improves. This involves a number of factors, but central to all of them is improving the wealth of the region, in this case the State of Nevada.

For this discussion, the first step in that process is to think about the flow of money and ways to have more flowing into the state than is flowing out. This is accomplished in a number of ways including:

- Retaining, expanding, and attracting primary companies into the state.
  - Primary companies are defined as those companies where at least 50 percent of the goods or services produced are sold to customers who reside outside of Nevada.
  - This is referred to as export base theory. In Nevada, Tourism/Gaming/Entertainment is our export base industry because it is our largest employment sector that services customers from outside the state. This money takes the form of profits and payroll, which is then re-spent into our local economy.
- Growing the supply chain for our key industries.
  - This helps support import substitution by keeping the money in our state here instead of spending it outside of the region where it grows the wealth of another state or country.
- Attracting companies that pay above the state average wage (currently \$20.62).
- Strategically focusing on regional comparative advantages within the state.
  - Recognizing the distinct differences between southern, northern, and rural Nevada.
  - Regional economies are often geographically constrained to worker commuting time which averages 20 minutes and seldom is longer than one hour.

## Nevada's Targeted Economic Development Sectors

In the wake of the Great Recession a very deliberate and strategic approach to economic development was undertaken to address the economic development principals outlined above. One of the first steps in this process was to identify the key industry sectors that complement the above criteria while diversifying the mix of goods and services that are produced and sold. This diversification strategy is central to ensuring a sustainable economy which mitigates risk during normal business cycle downturns; in essence, we don't want "all of our eggs in one basket."

In 2011, the Brookings Institute and the Stanford Research Institute coauthored the study *"Unify/Regionalize/Diversify, An Economic Development Agenda for Nevada"* which identified seven key industry sectors that Nevada either had, or could have, a comparative advantage. Those original target sectors are essentially the same today as they were when identified in 2011, and are listed in Table 1.

**Table 1: Nevada's Economic Development Sectors**

Sector	Number of Jobs	Percent of All Nevada Jobs	Average Annual Wage*	Location Quotient	Percent above or below National Concentration	Jobs Multiplier
Aerospace & Defense	13,104	1.0%	\$92,803	0.68	-32%	2.04
Business Information Technology Ecosystems	60,300	4.5%	\$53,818	0.69	-31%	2.58
Health & Medical Services	103,245	7.7%	\$63,849	0.66	-34%	1.79
Natural Resources	50,590	3.8%	\$71,759	0.61	-39%	2.79
Manufacturing and Logistics	117,091	8.7%	\$66,449	0.59	-41%	2.98
Mining	14,387	1.1%	\$103,483	1.93	93%	2.39
Tourism, Gaming, & Entertainment	416,421	31.1%	\$35,955	2.50	150%	1.81

\*The average earnings per worker in the region. Includes wages, salaries, supplements (additional employee benefits), and proprietor income.

The information in Table 1 outlines the size and presence of each of the target sectors, as well as measuring the relative concentration each has when compared to the U.S. as a whole by using the location quotient (LQ).

The LQ is a fairly straightforward point statistic that is computed by taking the number of jobs in a sector, dividing it by the total number of jobs, and then taking that percentage and dividing it by the same percentage calculated for the U.S. as a whole. In short, an LQ greater than or equal to 1 indicates Nevada has a comparative advantage for that sector, and an LQ of less than 1 indicates a more focused effort needs to be placed on that sector in order to become nationally competitive. As is readily apparent, only two of the seven targeted sectors, Mining and Tourism, have a concentration of workers that are greater than the national mix while the remaining five are less.

Although all seven sectors are the focus of economic development in the state, it is the five sectors with LQ's less than one that will require specific, intentional, and priority efforts in guiding Nevada's economy into a more diverse and resilient industry mix. This begins by developing a business climate that compliments what is most important to companies that are members of these target sectors.

### **Strategic Location Drivers**

There is a common priority list that companies generally follow when making an expansion or relocation decision. Sometimes the priorities are ranked a bit different from company to company, or industry to industry, but most often human resource concerns top the list. This is the general order:

1. Availability of a Qualified Workforce
2. Competitive Cost Environment
  - a. Labor, Utilities, Real Estate, Transportation, Taxes
3. Favorable Logistics/Accessibility
  - a. Air, Highway, Rail, Port
4. Favorable Business Environment
  - a. Taxes, Incentives, Permitting
5. Quality of place
  - a. Ability to recruit/relocate key workforce

Understanding that if a qualified and available workforce is most often the number one strategic location driver behind company relocation or expansion decisions, then it follows that strategic workforce development needs to be a priority in achieving economic development goals. This requires a clear understanding of the staffing our target sectors require, and how that matches with our current workforce inventory and those in our education and training pipeline. With this information intentional efforts can be made to support our foundational industries, and to diversify our economy by having the right workforce in place to grow the emerging target sectors.

## **The Economic and Workforce Information and Data Pipeline**

Living in the Information Age creates a great opportunity to measure and provide quantifiable direction to economic development plans and priorities. The first step in that process is to know what information is available, what it measures, its reliability, and how it integrates with other complementary information. Fortunately, we have information that meets almost all of those criteria and, with a little “data engineering,” we can provide a quantifiable baseline that not only sets up a great environment for companies, but also great jobs for Nevada’s current and future workforce.

Most of this information is referred to as Labor Market Information (LMI) and is collected on a regular basis by a number of federal, state, and local agencies, including the Bureau of Labor Statistics (BLS), Bureau of the Census, Bureau of Economic Analysis (BEA), Nevada Department of Employment, Training, and Rehabilitation (DETR), and the National Center for Education Statistics (NCES). There are many other economic data providers, but in the analysis described below, these are the primary sources.

Core to any economy and economic development effort are companies, workforce, and education with each being tracked and measured in very specific and prescribed ways. This systematic collection of information yields volumes of information and intelligence not only about companies, workforce, or education, but also creates data driven relationships from one to the other. This provides analytical possibilities to quantify and establish a data pipeline that coincides with Nevada’s economic development priorities.

- Companies belong to industries and industries are classified using a system called the North American Industry Classification System (NAICS). Therefore, every company has an associated NAICS code.
- Workforce is classified most often by the Standard Occupational Classification code (SOC) and/or an Occupational Information Network (O\*NET) code. Both these systems are very similar in nomenclature, but the SOC speaks more to what a workers does, and the O\*NET to specific knowledge, skills, and abilities.
- On the education side, the Classification of Instructional Programs (CIP) codes provide a taxonomic scheme that supports tracking and reporting of fields of study and program completion activity.

The first step in identifying the workforce needed by companies targeted by economic development is to use a process called reverse staffing patterns. Reverse staffing patterns allows us to use existing relationships between industry and workforce to find out what workforce our target sectors require. Then by using Location Quotients we can not only determine which industries require prioritization, but also the workforce required by those industries. Because industry and workforce information is well established and reliable, the patterns established between them tends to be very good as well. From

this analysis we can determine what we do and do not have in the way of a qualified and available workforce for the target sectors we are trying to grow.

The next step in the process is to map identified occupations to the education and workforce development programs that train for them. Unlike the industry to occupation relationships, the occupation to program relationship is not as clear cut. For example, the SOC for a registered nurse maps to 25 individual CIP codes, because in order to become a registered nurse you would have to complete 25 identifiable courses. Likewise, a program course in Nursing Science maps back to four different occupation codes, one of which is a Registered Nurse. That said, the analysis is helpful and can provide important direction in aligning education to workforce demand which is also aligned with economic development priorities.

### **Forming a Complete Picture: High-Demand Occupation Analysis Using Multiple Data Sets and Consensus Rankings**

To this point, the focus has been on what economic development is, our strategic plan going forward, and how data and labor market information can provide direction to education and workforce development. Although this information is critically important in cultivating Nevada's emerging industries, it needs to be balanced with information that supports and strengthens our foundational industries. Fortunately, this too can be accomplished with a little "data engineering" by using other data sources that speak to high-demand occupations based either on existing industry growth patterns or current real-time labor market demand.

In this step of the analysis, I have taken the target sector high priority occupation identified in the analysis described above and combined it with four other information sources that also speak to workforce demand in order to develop a consensus ranking of high-demand occupations.

Using this approach serves to create a systematic and balanced approach which addresses bias inherent to any one data set. For example, just using the target sector approach described above would yield workforce demand patterns that align with economic development priorities, but would downplay non-primary industries such as retail and construction. Alternatively, just using forecasted occupation projections based on existing industry growth patterns would not support initiatives to diversify Nevada's economy.

Currently, this consensus ranking analysis utilizes information from the following five information resources; detailed analytical methodology is outlined in the appendix.

- Target Sector High Priority Occupation Analysis
  - This data details high-demand occupations that compliment economic development priorities as described above.
- Abatement and Incentive Contracts
  - Included in company applications for tax abatement or incentives is a listing of the occupations these companies plan to employ. This data speaks to current demand of companies that align with economic development priorities.
- Sector Council Survey
  - In June 2015, members of the GWIB Sector Council responded to a survey conducted by Nevada's Office of Career Readiness and Adult Learning & Education Options in evaluating their Career and Technical Education (CTE) program to identify those that

align with economic development priorities. Priority programs identified by this survey were mapped back to the occupations they train for which were then included in the consensus analysis.

- Burning Glass Technologies
  - Information provided by Burning Glass Technologies is real-time, on-line job posting data that is collected in a very structured and procedural way by “scraping” roughly 40,000 individual job posting web sites every day. This information tells us what the workforce needs are of existing companies are right now.
- DETR Occupational Employment Projections
  - The Research and Analysis Division of Nevada’s Department of Employment, Training, and Rehabilitation regularly conduct forecasts of all occupations in the state. This is a traditional time-series forecast that looks at past growth patterns of existing occupations in the state and projects them forward.

## Findings

The information in Table 2 outlines the rank order of occupation demand for each data set as well as the consensus rank when all five of them are aggregated together. This information is presented at the 3-digit occupational group level because not all of the data sets provide information at a more detail level. Overall, there are 90 occupation groups included in the analysis. The highlighted cells indicate the single digit ranked occupation groups and those deemed most import by each data set. The table is sorted by the consensus ranking.

**Table 2: Combined High Demand Occupation Analysis at the 3-Digit Level**

SOC 3-digit	Description	GOED Sector Summary	GOED Contracts	Sector Council Survey	Burning Glass	DETR Occupation Projections	Consensus Rank
13-1000	Business Operations Specialists	14	1	7	6	17	1
29-1000	Health Diagnosing and Treating Practitioners	4	22	9	1	19	2
15-1000	Computer Occupations	12	6	8	2	27	2
49-9000	Other Installation, Maintenance, and Repair Occupations	9	8	18	14	12	4
11-9000	Other Management Occupations	35	12	1	4	13	5
43-4000	Information and Record Clerks	31	4	20	8	7	6
51-9000	Other Production Occupations	3	3	15	33	31	7
29-2000	Health Technologists and Technicians	11	18	19	16	25	8
17-2000	Engineers	2	7	3	36	46	9
11-1000	Top Executives	13	15	24	23	20	10
13-2000	Financial Specialists	23	26	22	11	23	11
47-2000	Construction Trades Workers	8	39	29	43	3	12
43-5000	Material Recording, Scheduling, Dispatching, and Distributing Workers	41	2	53	22	10	13
53-7000	Material Moving Workers	20	13	76	20	8	14
17-3000	Drafters, Engineering Technicians, and Mapping Technicians	21	15	6	43	52	14
51-4000	Metal Workers and Plastic Workers	1	17	36	43	43	16

	Other Office and Administrative Support						
43-9000	Workers	39	37	30	31	11	17
51-2000	Assemblers and Fabricators	16	20	32	43	37	17
41-2000	Retail Sales Workers	71	23	55	3	2	19
39-9000	Other Personal Care and Service Workers	50	30	26	28	22	20
41-4000	Sales Representatives, Wholesale and Manufacturing	67	5	49	5	32	21
11-3000	Operations Specialties Managers	72	14	12	24	38	22
19-4000	Life, Physical, and Social Science Technicians	22	19	10	43	68	23
43-6000	Secretaries and Administrative Assistants	59	11	59	13	24	24
21-1000	Counselors, Social Workers, and Other Community and Social Service Specialists	17	38	34	37	40	24
53-3000	Motor Vehicle Operators	61	34	57	7	14	26
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	15	51	42	40	26	27
19-3000	Social Scientists and Related Workers	5	48	4	43	74	27
41-1000	Supervisors of Sales Workers	74	27	31	10	33	29
27-1000	Art and Design Workers	32	45	21	30	50	30
19-2000	Physical Scientists	24	35	11	43	67	31
43-3000	Financial Clerks	49	53	46	19	16	32
31-9000	Other Healthcare Support Occupations	29	59	33	34	28	32
51-8000	Plant and System Operators	27	24	16	43	78	34
25-2000	Preschool, Primary, Secondary, and Special Education School Teachers	10	59	64	41	15	35
19-1000	Life Scientists	6	53	5	43	82	35
11-2000	Advertising, Marketing, Promotions, Public Relations, and Sales Managers	62	25	40	15	49	37
33-9000	Other Protective Service Workers	64	9	78	25	18	38
35-2000	Cooks and Food Preparation Workers	56	51	72	12	6	39
27-3000	Media and Communication Workers	40	43	13	43	59	40
41-3000	Sales Representatives, Services	60	59	25	29	29	41
51-3000	Food Processing Workers	25	21	68	43	51	42
51-6000	Textile, Apparel, and Furnishings Workers	7	32	66	43	62	43
25-9000	Other Education, Training, and Library Occupations	42	59	22	43	47	44
27-2000	Entertainers and Performers, Sports and Related Workers	52	48	27	43	45	45
41-9000	Other Sales and Related Workers	48	43	41	43	42	46
37-2000	Building Cleaning and Pest Control Workers	70	50	82	17	5	47
43-1000	Supervisors of Office and Administrative Support Workers	87	28	47	26	36	47
35-3000	Food and Beverage Serving Workers	75	59	83	9	1	49
15-2000	Mathematical Science Occupations	30	56	14	43	87	50
49-2000	Electrical and Electronic Equipment	26	59	49	42	56	51

	Mechanics, Installers, and Repairers						
25-1000	Postsecondary Teachers	82	59	2	43	48	52
47-5000	Extraction Workers	19	56	48	43	70	53
53-6000	Other Transportation Workers	57	45	53	43	41	54
47-4000	Other Construction and Related Workers	38	59	36	43	65	55
47-3000	Helpers, Construction Trades	36	56	49	43	58	56
	Nursing, Psychiatric, and Home Health						
31-1000	Aides	58	59	63	27	39	57
37-3000	Grounds Maintenance Workers	34	55	88	43	30	58
	Other Healthcare Practitioners and						
29-9000	Technical Occupations	55	45	28	43	81	59
	Media and Communication Equipment						
27-4000	Workers	53	41	52	43	64	60
	Supervisors of Personal Care and Service						
39-1000	Workers	91	41	44	43	35	61
23-1000	Lawyers, Judges, and Related Workers	65	59	39	39	52	61
17-1000	Architects, Surveyors, and Cartographers	44	59	35	43	77	63
21-2000	Religious Workers	51	59	17	43	88	63
	Other Food Preparation and Serving						
35-9000	Related Workers	92	59	83	21	4	65
	Supervisors of Food Preparation and						
35-1000	Serving Workers	89	59	72	18	21	65
25-4000	Librarians, Curators, and Archivists	45	59	36	43	76	65
51-1000	Supervisors of Production Workers	81	10	65	35	71	68
	Supervisors of Construction and						
47-1000	Extraction Workers	88	59	42	43	34	69
33-3000	Law Enforcement Workers	47	59	62	43	55	69
	Forest, Conservation, and Logging						
45-4000	Workers	18	59	55	43	91	69
	Entertainment Attendants and Related						
39-3000	Workers	78	59	89	32	9	72
25-3000	Other Teachers and Instructors	54	59	67	43	44	72
	Supervisors of Installation, Maintenance,						
49-1000	and Repair Workers	86	29	58	38	63	74
	Supervisors of Transportation and Material						
53-1000	Moving Workers	79	40	60	43	61	75
	Supervisors of Building and Grounds						
37-1000	Cleaning and Maintenance Workers	84	59	44	43	54	76
45-2000	Agricultural Workers	33	59	68	43	83	77
23-2000	Legal Support Workers	76	32	76	43	66	78
53-5000	Water Transportation Workers	28	59	83	43	91	79
39-4000	Funeral Service Workers	43	59	71	43	90	80
	Occupational Therapy and Physical						
31-2000	Therapist Assistants and Aides	63	59	70	43	75	81
33-1000	Supervisors of Protective Service Workers	66	59	75	43	69	82
51-7000	Woodworkers	37	59	89	43	84	82

51-5000	Printing Workers	77	31	89	43	73	84
39-5000	Personal Appearance Workers	69	59	89	43	57	85
43-2000	Communications Equipment Operators	93	36	61	43	84	85
53-4000	Rail Transportation Workers	46	59	83	43	91	87
39-2000	Animal Care and Service Workers	83	59	72	43	72	88
33-2000	Fire Fighting and Prevention Workers	73	59	79	43	78	89
53-2000	Air Transportation Workers	68	59	83	43	80	90
	Baggage Porters, Bellhops, and						
39-6000	Concierges	94	59	89	43	59	91
45-3000	Fishing and Hunting Workers	80	59	79	43	91	92
39-7000	Tour and Travel Guides	90	59	81	43	86	93
	Supervisors of Farming, Fishing, and						
45-1000	Forestry Workers	85	59	89	43	89	94

Table 3 provides a listing of the 95 detailed occupations that are members of the top four occupation groups outlined in Table 2. If all the detailed occupations nested under the top 10 occupation groups in Table 2 were listed, there would be 200 of them.

**Table 3: Detailed Occupations in the Four Top 3-digit Occupation Groups**

SOC	Description
13-1011	Agents and Business Managers of Artists, Performers, and Athletes
13-1021	Buyers and Purchasing Agents, Farm Products
13-1022	Wholesale and Retail Buyers, Except Farm Products
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products
13-1031	Claims Adjusters, Examiners, and Investigators
13-1032	Insurance Appraisers, Auto Damage
13-1041	Compliance Officers
13-1051	Cost Estimators
13-1071	Human Resources Specialists
13-1074	Farm Labor Contractors
13-1075	Labor Relations Specialists
13-1081	Logisticians
13-1111	Management Analysts
13-1121	Meeting, Convention, and Event Planners
13-1131	Fundraisers
13-1141	Compensation, Benefits, and Job Analysis Specialists
13-1151	Training and Development Specialists
13-1161	Market Research Analysts and Marketing Specialists
13-1199	Business Operations Specialists, All Other
15-1111	Computer and Information Research Scientists
15-1121	Computer Systems Analysts
15-1122	Information Security Analysts
15-1131	Computer Programmers
15-1132	Software Developers, Applications
15-1133	Software Developers, Systems Software



15-1134	Web Developers
15-1141	Database Administrators
15-1142	Network and Computer Systems Administrators
15-1143	Computer Network Architects
15-1151	Computer User Support Specialists
15-1152	Computer Network Support Specialists
15-1199	Computer Occupations, All Other
29-1011	Chiropractors
29-1021	Dentists, General
29-1022	Oral and Maxillofacial Surgeons
29-1023	Orthodontists
29-1024	Prosthodontists
29-1029	Dentists, All Other Specialists
29-1031	Dietitians and Nutritionists
29-1041	Optometrists
29-1051	Pharmacists
29-1061	Anesthesiologists
29-1062	Family and General Practitioners
29-1063	Internists, General
29-1064	Obstetricians and Gynecologists
29-1065	Pediatricians, General
29-1066	Psychiatrists
29-1067	Surgeons
29-1069	Physicians and Surgeons, All Other
29-1071	Physician Assistants
29-1081	Podiatrists
29-1122	Occupational Therapists
29-1123	Physical Therapists
29-1124	Radiation Therapists
29-1125	Recreational Therapists
29-1126	Respiratory Therapists
29-1127	Speech-Language Pathologists
29-1128	Exercise Physiologists
29-1129	Therapists, All Other
29-1131	Veterinarians
29-1141	Registered Nurses
29-1151	Nurse Anesthetists
29-1161	Nurse Midwives
29-1171	Nurse Practitioners
29-1181	Audiologists
29-1199	Health Diagnosing and Treating Practitioners, All Other
49-9011	Mechanical Door Repairers
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
49-9031	Home Appliance Repairers
49-9041	Industrial Machinery Mechanics

49-9043	Maintenance Workers, Machinery
49-9044	Millwrights
49-9045	Refractory Materials Repairers, Except Brickmasons
49-9051	Electrical Power-Line Installers and Repairers
49-9052	Telecommunications Line Installers and Repairers
49-9061	Camera and Photographic Equipment Repairers
49-9062	Medical Equipment Repairers
49-9063	Musical Instrument Repairers and Tuners
49-9064	Watch Repairers
49-9069	Precision Instrument and Equipment Repairers, All Other
49-9071	Maintenance and Repair Workers, General
49-9081	Wind Turbine Service Technicians
49-9091	Coin, Vending, and Amusement Machine Servicers and Repairers
49-9092	Commercial Divers
49-9093	Fabric Menders, Except Garment
49-9094	Locksmiths and Safe Repairers
49-9095	Manufactured Building and Mobile Home Installers
49-9096	Riggers
49-9097	Signal and Track Switch Repairers
49-9098	Helpers--Installation, Maintenance, and Repair Workers
49-9099	Installation, Maintenance, and Repair Workers, All Other

**Conclusion**

This analysis attempts to provide a systematic and balanced approach using reliable data and labor market information to serve as a tool to help guide education and workforce development. It takes on a somewhat different approach than traditional workforce gap analysis by adding in data elements that pull results toward the economic development priority of diversifying Nevada’s economy. These efforts are critically important to ensure that our economy becomes more resilient to economic downturns, while at the same time, improving the overall well-being of its residents.

Often the questions are asked, “Does a qualified and available workforce attract great companies, or do great companies grow a qualified and available workforce?” The answer to both is yes. We must continue to work together in not only improving the state’s business climate, but also the quality of the workforce. Everyone wins when we get on this path.

**Next Steps**

Developing high-demand occupation analysis using multiple data sets and consensus rankings, especially for the purpose of directing valuable state resources for education and training programs, is a challenging undertaking. The initial results are sufficiently comprehensive to provide a foundation for this work. That said, much work remains to be done and this work will rightfully remain “a work in progress.”

This work also warrants further scrutiny. For example, each data set is equally weighted. Perhaps with future research and input, the data sets will be weighted differently to arrive at even less-biased

consensus rankings. Additionally, one needs to consider the unique regional economic characteristics of the state. Therefore, high-demand occupational analysis for southern, northern, and rural Nevada would be one of the near-term priority next steps for this analysis.

To further strengthen this resource, the Governor's Office of Economic Development will continue to collaborate with key stakeholders that include, but are not limited to Nevada's: Department of Employment, Training, and Rehabilitation; Department of Education; System of Higher Education; and Industry Sector Councils.

## Appendix

Following is a brief explanation of the data sets used in developing a consensus demand ranking of occupations in Nevada. Using multiple data sets is a prudent approach in identifying occupation demand, because each individual data set has strengths and weaknesses. In other words, without considering multiple data sets to determine demand, the results are biased depending on the strengths and weaknesses of that particular data set. For example, real-time data captured by Silver State Solutions (Burning Glass software) only references online job postings. Postings for many occupations often occur through other means and, therefore, this one data set is biased because it does not capture those other job postings. Each data set has at least one weakness, or bias. By combining the data sets and averaging results, most bias is removed.

### GOED Target Sector High Priority Occupation Analysis

This analysis is designed as a way to identify high-demand occupations in Nevada's target sectors. This work includes the use of occupation location quotients (LQ's), STEM (Science, Technology, Engineering, and Math) scores as established in the 2013 Brookings study "The Hidden STEM Economy," and occupation openings over the past 10 years. All analyses were performed using Econometric Modeling Systems International's (EMSI) Analyst software.

The first step was to combine the 699, 6-digit individual North American Industrial Classification System (NAICS) codes that make up the seven GOED target sectors into one GOED "super group." Then, utilizing reverse staffing pattern analysis on that super group, I came up with information on all 786, 5-digit occupations specific to the super industry group including: the number of jobs 2005 and 2015; job change and growth; earnings; and education and experience requirements.

This group of occupations was saved and identified as the "GOED Industry Sectors Reverse Staffing Patterns" occupation group so that occupation tables could be run for all workers in the state and the U.S. This was necessary because the reverse staffing patterns table did not include location quotients or openings information, both of which were critical to identifying workforce demand.

From the statewide and U.S. occupation tables, occupation location quotients and openings for the workforce specific to the GOED industry group were generated. Job openings refer to new jobs due to growth plus replacement jobs due to worker turnover. Occupations with more annual openings indicate they are in higher demand.

Also added to the table, by occupation, were the STEM scores identified by Brookings. The Brookings study utilized a robust analysis of the O\*NET information collected by the U.S. Department of Labor to establish STEM scores for each occupation. O\*NET data is very similar in nomenclature and structure to the Bureau of Labor Statistics' (BLS) Standard Occupational Classification (SOC) so linking them is quite straightforward. Both utilize a 5-digit system where the most detail would be at the 5-digit level and the least detail at the 2-digit level.

Once the table was complete with location quotients, number of openings, and STEM scores, an overall "demand" score could be computed.

Location quotients were the base reference of occupational demand. For those instances where there were more than 200 workers for a specific occupation in the state, the state LQ was used instead of the GOED industry group LQ to account for the larger pool of available workers.

Location quotients are calculated as:

$$\frac{\text{(the number of workers in a specific region/all workers in the region)}}{\text{(the number of workers in the U.S./all workers in the U.S.)}}$$

If the LQ is less than 1, it indicates the relative concentration of workers for that specific occupation is less than that of the U.S. In short, this means that an occupation with an LQ less than 1 would be one with a labor shortage and, therefore, would be a high demand occupation. For this analysis, the reciprocal LQ was needed, hence, the following formula:

$$\frac{\text{(the number of workers in the U.S./all workers in the U.S.)}}{\text{(the number of workers in a specific region/all workers in the region)}}$$

This reciprocal formula yielded a value where if the concentration of workers for a specific occupation in the region was less than the U.S., the quotient would have a value greater than 1.

Weighting multipliers were then developed from the STEM scores by taking the square root of the ranking value of all 786 occupation scores to normalize the data. The same procedure was used on the annual number of openings.

The final formula to calculate “demand scores” for each occupation in the state was:

$$\text{Reciprocal LQ} \times \text{normalized rank value of STEM score} \times \text{normalized rank value of Openings}$$

#### GOED Contracts Summary High Demand Occupation Analysis

In this analysis, all of the occupation information was pulled from the economic development incentive and abatement applications made by companies in FY14 and FY15. Included in the information was the number of jobs by title and wages to be paid. In total, there were 837 job titles gleaned from 80 applications.

The first step in the analysis was to assign Standard Occupation Codes from each of the job titles utilizing the Department of Labor’s O\*NET and the Bureau of Labor Statistics Standard Occupational Classification (SOC) systems. In some cases this was very straightforward, and, in others, we needed to apply reverse staffing pattern procedures back to the industrial classification (NAICS) of the company to more accurately identify the correct SOC code. In many cases the title provided was not specific enough to assign a 5-digit code so a 3-digit code was used.

Once occupational codes were assigned they were aggregated and the job counts summed to the 3-digit SOC level. These groups were then ranked and sorted to find those most in-demand by assisted companies.

### Sector Council High Demand Occupation Survey Analysis

This analysis reviewed the High Demand Survey by GWIB Council Members conducted in June 2015. This survey asked members of the Sector Councils to rank up to ten Career and Technical Education (CTE) programs they felt were most important to the industry sector they represent.

The results of the survey were tabulated with each program given a total score which could then be ranked to identify those viewed as most important in providing industry with a qualified and available workforce.

The next step in the analysis was to visit the CTE Course Catalog to identify each course and the associated 6-digit Classification of Instructional Program (CIP) code taught under each program. These courses were then assigned the same score received for the program they fell under so their relative importance would be reflected when compared across all CTE courses.

From this information, a crosswalk database from the National Center for Education Statistics (NCES) that aligns CIP codes to SOC codes was used to assign SOC codes to each course. Almost all CIP codes crosswalk to more than one occupation code as each course provides training for more than one specific occupation.

The first step in utilizing the NCES crosswalk was to narrow the analysis to the 4-digit CIP level to crosswalk to the 3-digit SOC level. This narrowed the number of CTE courses to 94 4-digit CIP courses that service the education of 917 different 3-digit SOC occupation groups. Each of these 3-digit SOC groups were then assigned the same program score from the sector survey, where they were then summed and ranked to identify the high demand occupations as perceived by Sector Council members. In other words, this was a methodology to indirectly determine what Sector Council members consider to be the CTE programs aligned to high demand occupations.

### Burning Glass High Demand Occupation Analysis

This analysis included real-time, on-line job posting information from Burning Glass Technologies. The Research and Analysis Division of the Department of Employment, Training, and Rehabilitation provided all the on-line postings for Nevada based positions for the year ending June 30, 2014. This information included the de-duplicated number of job postings for 101 occupations at the 5-digit level. The analysis was fairly straight forward and only involved aggregating the 5-digit occupation codes into the 3- and 2-digit levels groups and then ranking them by the number of postings.

### DETR Short-term Occupational Employment Projections

DETR's short-term occupation projections are three year forecasts based on time series projections of 737 occupations at the 5-digit SOC level. The level growth over the three year period is further delineated to determine the number of openings as a result of growth and replacement. It is the total annual openings which are used to determine occupation demand.

The detailed 5-digit occupations were then aggregated into their respective 3- and 2-digit level groups and then ranked based on the total number of openings projected over the period.