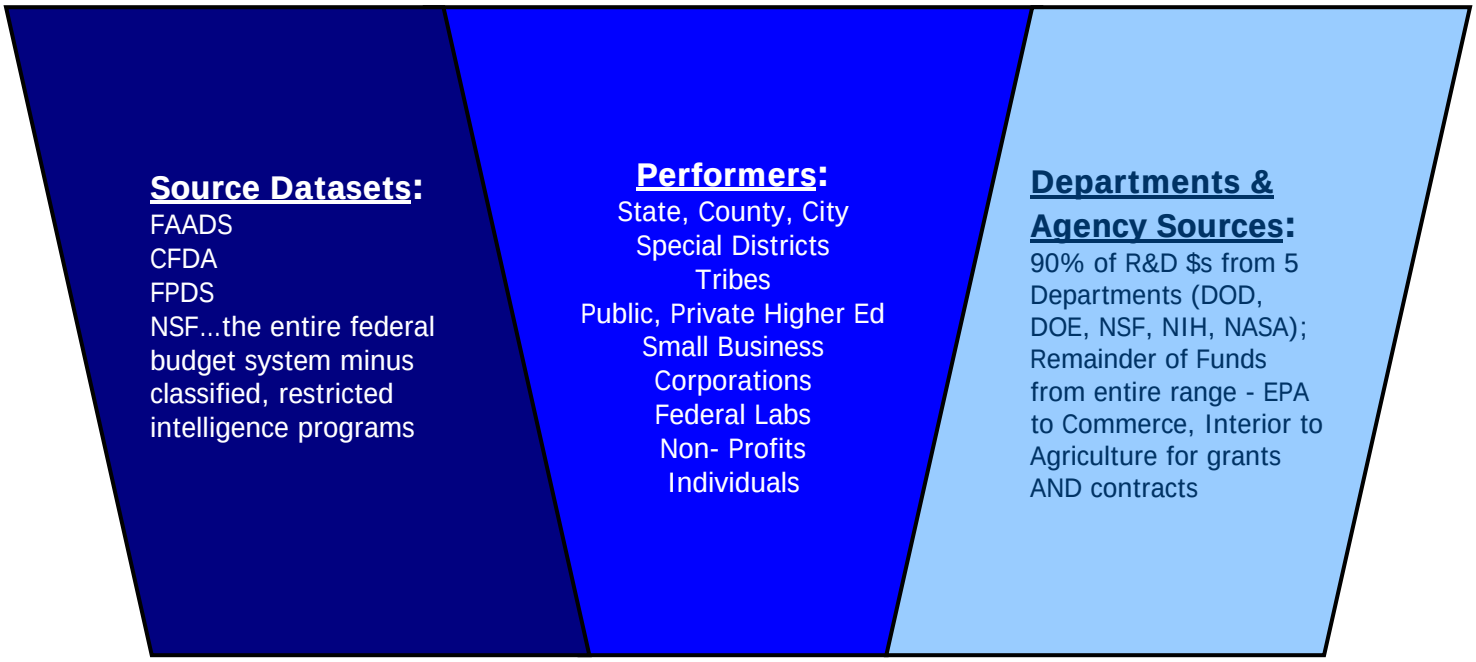
Innovation Data Methodology

Federal Funding of Innovation

For the past ten years, NES has partnered with the University of California San Diego and the RAND Corporation's Washington D.C. office in the use of RAND's RADIUS dataset ("Research and Development in the United States"). A year ago, after identifying specific limitations and flaws in the original RADIUS composition, NES elected to start the analysis and development of an alternative approach to capturing federal investments in the innovation capacity of States and their regions. Of note is that RADIUS was limited to R&D only rather than the larger context of innovation capacity building! With the assistance and guidance of Dr. John Voehler, Chief Technology Officer of Black and Veetch Engineering, and a former ASME Fellow to the White House Science Advisor's Office as well as the U.S. Department of Homeland Security, NES began the laborious process of constructing an integrated solution on federal funding.

First, NES identified over 900 specific budget categories out of 18,000 from the Catalogue of Federal Direct Assistance (CFDA) that represent federal investments in state innovation in four areas: research and development, economic development, workforce-skills-talent development, and enterprise-entrepreneurial programs. Using the designated budget categories, NES pulled all related grants using the FAADS (Federal Assistance Award Data System), a source of all federal departments and agencies from the past ten years, which amounted to over 12 million records. These 900 budget codes, 12 million records, and the profile of the transaction between federal accounting systems and the recipients was compared against the past twenty years of National Science Foundation data as well as individual tracking systems for the top 20 federal agencies involved in research or similar grants and contracts. To capture the most current and relevant data on contracts with public AND private sector recipients, NES also sorted the FPDS (Federal Procurement Data System) to capture the past ten years worth of transactions.



Several important understandings and limitations linked to this process must be clarified to ensure the transparency of the data and its impact on end-users. With hundreds of accounting and financial managements systems throughout the federal government, at no one time can there be an accurate snapshot of each and every transaction. Such transactions have multiple characteristics –for example a university or private sector entity might be the prime principal investigative team or contractor on a $30 million project, but only $10 million of that amount may go to work conducted in that entity's particular state or locality.

In many instances an institution will suggest publicly that the appropriate accounting for all federal dollars into the entity should include the entire $30 million rather than the 1/3 which they retain; we can only capture and reasonably suggest the accuracy of the records provided by the departments and agencies. Some transactions are multiple years – and the draw-down of dollars occurs at different scale and pace from one grant or contract to the next. Where appropriate, we normalized the multi-year programs by simply dividing the total number by the length of the grant or contract. We recognize that many institutions and organizations might have additional descriptions and operating procedures for accounting and grants management, however we provide this information to assist in aligning many avenues to the same result: the most accurate picture feasible of all the resources driving innovative output in a state or region.

Once the data capture, analysis, and assessment is complete, the 12+ million grants and contracts were sorted into the four areas of funding (research and development, economic development, workforce-skills-talent development, and enterprise-entrepreneurial programs) and classified according to their relevant technology sector. All values are again in yearly nominal terms.

Information in this first-ever Federal Funding of State and Regional Innovation database includes:

- the funding agency/program/office;
- the amount of funding;
- performer name;
- performer type; and
- performer location (city, state, county and zip code).

Additionally, information is categorized by tech sector or specific activity and fiscal year of the award. Our categorization and descriptions of the sub-elements within a tech sector are illustrative and not exhaustive – therefore the phrase "included but limited to..." should be assumed throughout this document; funding focus and agency interests change from year to year in certain instances, and thus we imply by our descriptions that this is a starting point for examination and data analysis.

Federal Research & Development
Advanced Computing, Advanced Manufacturing, Advanced Materials, Aerospace, Agricultural Sciences,
Defense, Environmental Technologies, Energy, Electronics, Life Sciences-Biotech, Telecommunications,
Other S&T, Other Research, Support of R&D Activities including infrastructure
[note: R&D section inclusive of both grants and contracts, especially in the defense, energy and space related sections]

Advanced Computing
Advanced Computing includes funding for VLSI design, multiprocessor system design, high-performance networks, digital libraries, parallelizing tools, high availability and fault-tolerant systems, web technologies, software development, algorithms, computer based modeling, simulation and data analysis among others.

Advanced Manufacturing
Manufacturing includes funding for mass customization, distributed manufacturing, quality control, product standardization, distribution, designs, data and process controls, computer-aided manufacturing, robotic technology, system integration.

Advanced Materials
Advanced materials research involves discoveries of fundamental principles of chemistry, mathematics and physics that can be applied to control the molecular-level properties of new materials. Engineered polymers and resins, advanced fibers, such as carbon, Kevlar and sapphire, metal matrix composites, structural ceramics, ceramic composites, other types of composites, high temperature alloys, specialty adhesive, specialty chemicals, powder metals, thin films, surface engineering and nanotechnology.

Aerospace
Aerospace includes funding for the design, analysis, and testing of aerospace vehicles - including satellites, space stations, and launch vehicles, as well as propeller-driven, and jet-powered airplanes, helicopters and even gliders. Aerospace centric technologies include sensors, gyroscopes, software tools and specialized electronics used in aerial vehicles.

Agricultural Science
Agricultural Science includes plant genome research, future agriculture and food systems, marine fisheries, research on soil and water, plant sciences, human nutrition, etc.

Defense
Defense includes defense related research, weapons systems, and scientific applications with military applications.

Electronics
Electronics includes sensors, electronics, advanced electronics not specifically related to computers, telecommunications, and aerospace.

Energy
Energy includes fuel cells, nuclear power including fusion, advanced batteries, solar power, coal liquefaction and other energy related technologies.

Environmental Technologies
Environmental Technologies include water resources research, atmospheric sciences, superfund research, and environmental biology.

Life Sciences and Biotech

Life Sciences and Biotech include cell biology, disease and oncology research, biomedical engineering, developmental mechanisms, medical rehabilitation research, toxicological research, biomedical research, biochemical, biomass engineering, biotechnology, cancer research, comparative medicine, biological models, etc.

Telecommunication

Telecommunication includes funding for communications research, wireless technologies, satellite communication systems, etc.

Transportation

Transportation includes funding for automotive, ship and rail technologies, new materials as well as electronics related to transit management/operations/evaluation of transportation product design and application, etc.

Other Research/ Other S&T

Other Research includes funding for political science, sociology, economics, education, law, social science, cultural anthropology, etc. Other S&T includes funding for algebra and number theory, analysis, petrology and geochemistry, infrastructure, applied mathematics, topology and foundations, statistics and probability, dynamic systems, etc.

Addition of these "other" categories beyond what may be considered the hard-research areas suggest that integrated, multidisciplinary science leading to new solutions and translational benefits comes from the link between and among various discoveries of knowledge and applied thinking. For instance, DNA mapping now includes not only the biological sciences but information technologies, geography, mathematics and theories, and statistics. These alignments of science and technical "know-how" are critical to competitiveness and innovation.

Economic Development
Brownfields, Community Development Block Grants, Economic Development Support, Infrastructure and Public Works, Military Base-Reuse, Native American Support, Poverty Amelioration, Rural Development, Telecommunications-Broadband Deployment

Brownfields
Assessments, environmental impact studies, research on applied solutions and best practices, leverage funds with state and local partners, clean-up and related remediation (traditionally funded by EPA, Department of Energy, and in some cases Department of Defense).

Community Development Block Grants
A major investment by the U.S. Department of Housing and Urban Development, offers large-scale grants, loans, and guarantees to cities and counties for housing, livable communities, expanded economic opportunities, small-city community development, industrial authority funding, disaster recovery, U.S border colonias, Empowerment Zones and other public-private partnerships.

Economic Development Support
Wide range of programs and initiatives to spark economic development – increasingly around clusters, technology-specific products or services, and distressed communities facing competition from globalization, outsourcing, and/or declining industries. There are some 60+ different agencies and program offices engaged in economic investments including the U.S. Department of Commerce (Economic Development Administration) and U.S. Department of Treasury (New Market Credits)

Infrastructure and Public Works
Long-standing, more traditional economic development resources for a variety of street and road improvements aligned with an economic activity such as a research park or related site for related economic expansion. Also includes waste water treatment, incubator facilities, enhancements such as broadband access, and increasingly investments in technology-based improvements to facilities and infrastructure in communities lacking appropriate resources.

Military Base Reuse
Economic development assessment, impact analysis, facilitation and design of mixed use development, environmental impact, infrastructure improvement – often in partnership with other federal agency dollars. Post the designation of a loss or even a gain on a U.S. Department of Defense site, communities apply for grants to engage stakeholders, other governments and consultants in developing localized strategies for reuse of all or pieces of the military's original mission bases, depots, air/maritime/reservation locations. Primarily a function of the Department of Defense, but may include Commerce, Energy, and other co-development funding.

Native American Support
Specific legislative requirements for increasing the economic opportunities among Tribal Nations, communities in or adjacent to a native population, and the potential for economic-creation/ market-making scenarios through both entrepreneurial activities as well as inward investments. Through the Department of Interior, Commerce, Small Business and other related programs.

Poverty Amelioration
A mixed portfolio of long-standing programs and immediate interventions that seek to reduce poverty caused by any number of internal and external effects from changes in the local economy to standing issues such as lack of access to economic development related tools and knowledge.

Rural Development
Through specifically programs and investments from the U.S. Department of Agriculture's Rural Development state directors and headquarters operations, as well as various agencies focused on non-urban, smaller communities either transitioning their commodities-based economies and/or the emergence of new opportunities including automotive and other heavy manufacturing, conversion of commodities to alternative fuels and materials, and the potential entrepreneurial scenarios through broad-band investments. Though USDA is the largest, several other federal departments invest in rural community assets and infrastructure.

Telecommunications, Broad-band Deployment
While USDA is a vital invest in rural communities, U.S. Departments of Commerce, Energy, Interior, and others single out telecommunications and broad-band access as critical part of long-term economic development for individuals, small businesses, public-private partnerships.

Community Development
Arts & Humanity, Housing, Indian and Minority Programs, Transportation (Aviation, Highway, Maritime, Rail, Ports, Security), Creative Community, Climate-Environmental Impact

Subset to the Economic Development, additional elements around Community Development that are drill-downs into specific categories of federal funding beyond those outlined:

Arts & Humanity/Creative Community
Because both the Arts and Humanities have become acknowledged drivers for 'Quality of Life' designations as an economic development contributor AND the attraction for young workers and empty-nesters, funding from the National Endowments and programs from various agencies supporting the arts and humanities research are captured. In turn, as the benefits from cultural amenities as well as the investments in graphics and virtual reality for instance become vital to fostering economic output from creative assets, additional funding sources are identified from the National Science Foundation among other resources.

Transportation
Transportation is placed in the Economic Development category due to its critical investment in infrastructure around airports, highway systems, rail including light rail, water and maritime ports, homeland security-related initiatives, and alternative resources such as rails-to-trails, improvement of traditional infrastructure to meet more current and future demands. Therefore, the U.S. Department of Transportation including Federal Aviation Administration, Federal Highway Trust Fund, and similar sub-agencies are included as well as entities such the Environmental Protection Agency, U.S. Departments of Commerce and Energy.

Climate-Environmental Impact
As more state, regional, and local stakeholders seek solutions around issues such as climate and environmental impact, the need to identify federal resources is becoming vital to achieve several tasks. Therefore, data on funding from the Environmental Protection Agency, the U.S. Departments of Energy/Interior, and Agriculture coupled with specialized program funding from unique efforts such as Housing & Urban Development, the National Institute of Standards and Technology (NIST), Transportation and the National Institutes of Health.

Workforce, Skills and STEM

Adult Education, Continuing Education, General Employment and Training, K-12/Primary, Post Secondary, Senior Employment, Student Aid, Veterans-Military, Vocational

Overall funding for Workforce: Start with U.S. Department of Labor…but do not end there!

The lead investor for federal funding of workforce and skills development is of course the U.S Department of Labor including its sub-agency the Employment and Training Administration. Many elements of the federal investment are mandated through DOL, and yet there are several departments and agencies that provide upstream and downstream impact on the competitive workforce in the U.S.: the Departments of Education, Defense, Agriculture, the National Science Foundation and a good number of lesser-known programs in agencies for specific vocational and/or technician funds. With nearly 700+ STEM initiatives within and among federal agencies, 400 alone divided up among the military branches of DoD, further drill-down into STEM related resources is required. Depending on the industry sector, the age and demographic population, and even the transition of a potential employee from one sector to the next, analysis of federal funding for workforce, skills and STEM can suggest a bit of creativity to determine where to hunt for existing grants, loans, and contracts historically and going forward into the future.

Enterprise and Entrepreneurial Development

Advanced Technology Program, Cooperative Agreements, Direct Loans, Direct Payments, Formula Grants, Guarantees, Project Grants, Small Business Innovation Research Grants, Technical Assistance, Minority & Underserved Population Programs

There are well over 68 different enterprise and entrepreneurial programs and initiatives across departments and agencies that seek to stimulate the next generation of companies, employers, and growth firms with potential to drive the future of the U.S. economy. Differentiated in our overall datasets from Economic and/or Community Development, Enterprise and Entrepreneurial funding is typically targeted to individual companies and those that are mandated or assigned the tasks of providing technical assistance at the local and regional levels for specific enterprise endeavors. Hundreds of new initiatives emerge monthly and annually to address specific scenarios and new opportunities; for instance the current focus of attention is around alternative energy and fuels. In the past specific emphasis has gone towards nanotechnology, new market access, and distressed communities with potential for commercialization and startup activities.

Small Business Innovation Research Grants/Advanced Technology Programs/Cooperative Research and Development Agreements

Over the past ten plus years, federal agencies have sought to catalyze enterprise and entrepreneurial initiatives among small and emerging companies seeking to do research, development testing, evaluation and ultimately product sales to federal procurement demands and needs. For instance, the Small Business Innovation Research grant program is based on a 10% set-aside of specific procurement among small enterprises and the range of federal laboratories, agencies, program offices and systems. With over $2 billion awarded annually, SBIRand its ancillary STTR program have sparked thousands of new products and technologies as well as millions in early stage and venture funding from the private sector.

The recent conversion of the Advanced Technology Program into the TIP (Technology Innovation Program) furthers the U.S. Department of Commerce's National Institute of Standards and Technology investment in programs related but not limited to the Manufacturing Extension Program and similar small enterprise outreach for expanding research and development to emerging companies and talent .

Loans, Guarantees, and Related Financial Instruments

Using its powerful lending and capital access capabilities, federal departments and agencies on the whole have provided a number of financial instruments to individual businesses an d/or sectors of industry with common interests (copper, steel, manufacturing, etc.) Of late the increased scrutiny of federal investments through loans, guarantees and other financial programs – such as the U.S. Small Business Administration – have increased the leverage of resources brought to the table by the private sector and/or the borrower. In some cases, these financial instruments are marketed and accessed through third parties such as local and regional banks, Small Business Development Centers, and regional offices of federal agencies . Other intermediaries include the U.S. Economic Development Administration's coordinated funding programs.

Themed Funding Initiatives

Programs that range from competitive direct payments to technical assistance for marketing and promotion cut across a number of federal interests including globalization and trade, clean technologies, and downsizing/laid-off workers. These funding initiatives can and have included specialized training programs on business plan and funding/grant writing lessons as well as leveraged resources with regional and national corporate and philanthropic resources. Examples include the offices of Trade Promotion, U.S. Department of State, U.S. Import-Export Bank.

Of Special Note about the Updating and Refreshing of Federal Funding Data
As noted in earlier background, the Federal Government operates hundreds of tracking systems on the appropriations, budgeting, acquisitions, and maintenance of data on its own operations and those in which it serves as a spark to fulfilling the services AND consensus around the direction and goals of the nation. Because the tracking systems are fiduciary in nature rather than designed to analyze the innovation capacity of the facilitation of regional innovation, we have sought to integrate several pieces of data that provide the most accurate and time-sensitive information to citizens and taxpayers. Therefore while we pull-down monthly updates among the accounting, budgeting and tracking systems, our intent is to issue updates of formal annual awards of grants and contracts, and then measure trends from the past ten years worth of investments and federal contracts to determine if there are any noted or remarkable new trend-lines. We then harmonize the data through the exact process we used to create the initial database and our own tracking. *Our preference is to be as accurate as possible and therefore not rush unaudited data into the marketplace.*

We will also seek out any background or insights from the federal agencies themselves to determine if sudden shifts are indicators of simple report failures or worse, as well as unique changes to the funding process at the legislative or departmental levels. Based on our previous and current work, it would appear that statutes, interpretations, rulings and case law can and do affect the funding levels as well as the deployment of resources on any given day or month. For these reasons and other unforeseen in the future, we encourage end-users to collaborate with local recipients and funding partners to keep track of changes and shifts that are often noticed at the grassroots first before any particular impacts are recorded in Washington, D.C.

Our promise and intent is to remain as current as the data is released through the agency pipeline to the larger management systems – raw or polished format – and to get the updated data in the hands of our end-users. If and when delays occur, alerts will be provided to our clients and end-users to keep them apprised of near-term and long-term negative impacts on the innovation information sets.

Private R&D

Private research and development was obtained from Schonfeld & Associates' *R&D Ratios & Budgets and Research & Development Growth Trends*, which reports on annual R&D expenditures from listed companies. Schonfeld & Associates obtains raw data on publicly traded companies through Standard and Poor's Compustat data. S&P's Compustat compiles data from sources such as statistical services, government reports, newspapers, registrations statements, and company documents to provide the best records, estimates, and trends in private R&D funding. Private R&D includes all costs incurred that relate to the development of new products or services as reported in government filings.

Information included by this database is the company performing the R&D, location (city, state, county and zip code), total R&D expenditure and year, and the technology sector (listed by NAICS code and the corresponding Standard Industrial Code description). Private R&D spending for each year is expressed in constant (real) 1990 dollars. Using constant dollars accounts for inflation over time and therefore allows for better comparison of private R&D expenditures over time. The US Department of Labor Consumer Price Index was used to deflate nominal values of R&D spending to 1990 dollars.

Important Considerations

R&D spending by privately owned companies is not reported by Schonfeld & Associates. While such companies may make significant R&D expenditures in certain industries, they are not required to publish information regarding R&D spending. Therefore, a company may not publish or release R&D spending as part of its financial reports, or it may simply report that its R&D expenditures were an insignificant amount and give no figure for the amount. Companies that spent less than $1,000 on R&D a year are not reported. In addition, some companies within certain industries, such as the financial services industry, do not report their R&D to the same extent as companies within other industries.

Conglomerates and multi-industry companies may not conform to any specific industry; yet, they will be classified in the industry associated with their largest line of business. For example, Eastman Kodak makes cameras and film for consumers and was associated with this activity. It also makes computer and records storage equipment for businesses and other organizations. Although some businesses are quite multi-faceted, they are classified into only one industry.

Finally, publicly traded companies often have multiple locations, but only one headquarters. Because companies do not normally release information on the geography of their R&D spending, all private R&D spending is generally assigned to the location of the company headquarters. As a result, some regions may be over-represented in terms of R&D activity while other regions may be under-represented. However, given data availability constraints, this is currently the most effective method to geographically map private R&D.

Patents

The patent data were obtained by NES from 1790 Analytics, which uses raw data from the U.S. Patent & Trademark Office and uses its unique methodology to further classify the patents in two ways.

First, 1790 Analytics provides a more detailed analysis of the specific location of the patent. The USPTO office provides the inventor city and state on the patent documents, but in most cases does not provide the zip code. To determine a zip code for the patent, the city and state for each inventor on the patent is matched to a database (provided by CD Light LLC) containing zip codes and counties for every city and state combination. Likewise, the county match is performed by matching the patents to a database of city-state and county combinations. This is an inexact process because some cities are comprised of more than one zip code. In these cases one standard zip code was chosen arbitrarily. In this process, patents are assigned to the counties where workers live rather than where they work. For patents assigned to multiple inventors in different locations, a patent is assigned to each.

In this methodology the sum of the patent counts by counties that make up the region will sometimes be more than the total regional patent count. The same is true for zip code counts versus county counts. This discrepancy occurs when there are patents with multiple inventors located within the region, and patent has been assigned to each of its inventors. For example, a patent may have three inventors, each located in a different county within the region. When all of the counties are summed, the patent will be counted three times instead of just once. Therefore, regional patent counts will remove the duplicates to ensure accurate representation of patent totals.

Second, 1790 Analytics uses the descriptions listed on patent applications to group the patents into relevant technology sectors, which can then be used to examine research and technology transfer patterns within a region. Subcategories are additional categories within the general technology sectors. A region strong in optics may have several subcategories related to optics and possibly only one related to other categories such as biotechnology and pharmaceuticals, whereas another region may have several subcategories related to biotechnology, but none related to optics.

Occasionally a patent will correspond to more than one subcategory. To avoid duplication, the patents are typically assigned to only the more relevant subcategory so that the counts in the general technology sectors will be accurate without any double counting. For example, in Upstate NY there are a number of patents assigned to Kodak related to the manufacture of ink-jet print heads. These print heads are made using semiconductor manufacturing methods, so that they have classifications related to both computer printers and semiconductor manufacturing. In this case we put the patent in the computer printer category and remove it from semiconductor manufacturing so that there is no double counting when the subcategory counts are summed into the general technology sector of information technology.

Venture Capital

Venture Capital data is provided by Thomson Financial's VentureXpert database within the SDC Platinum database. Data are collected from a variety of sources including press releases, regulation D offerings, Quarterly surveys in conjunction with PricewaterhouseCoopers and the National Venture Capital Association, *Private Equity Week*, *Venture Capital Journal*, buyouts newsletters, and firm websites. The data are categorized by the following:

- **Firm Name:** The name of the investing organization
- **Company Name:** The name of the company receiving the capital
- **$:** The dollar amount invested in 1,000's of dollars in nominal terms
- **Industry:** The names of aggregate-level Venture Economics Industry Codes (VEIC codes). These codes developed by Thomson Venture Economics to represent the new technologies that private equity companies invest in. They were developed to be a more specific than SIC codes.
- **Stage of funding:** The maturity of a company when an investment is made: whether it is early (e.g. seed and early stage) or late (e.g. expansion and later stage).

VentureXpert is the only database application officially endorsed by the National Venture Capital Association and the PricewaterhouseCoopers MoneyTree Survey.

Industry Cluster Data

Regional economic data and growth projections are based on Moody's Economy.com regional modeling system. This firm is a leading independent provider of economic, financial, country, and industry research and data that specialize in national and metropolitan economic growth forecasts. Moody's Economy.com county-level output, employment, and payroll historical data are estimated from several publicly available sources. Projections are derived using a large-scale econometric model system developed by Moody's Economy.com. Historical data and projections are updated on a regular basis incorporating the most accurate information available. Sub-state or county projections employ accepted economic principles, but are limited to historical data that, in general, are less complete and less accurate than data at state and national levels. Regional income, output and employment estimates, whether at the county level or the regional level (consisting of combined counties), are intended to provide reasonable and accurate long-term projections.

Moody's Economy.com methodological approach to the analysis of the U.S. economy is quite standard. The firm utilizes large-scale, simultaneous-equation econometric models, conducts simulations, and adjusts them accordingly. However, their approach to sub-national modeling is unique. In the Moody's Economy.com model, the variables that are national in nature are modeled nationally while those that are regional in nature are modeled regionally, subject to data availability. Therefore, interest rates, prices, and business investment are modeled as national variables while key sectors such as labor markets (e.g. employment, labor force), demographics (e.g. population, households, and migration), and construction activity (e.g. housing starts and sales) are modeled regionally and then aggregated to national totals. An important methodological capability in Moody's Economy.com regional modeling system is that each state's economy is explicitly linked to other states through migration flows and unemployment rates. Workers and families are mobile and tend to move from states where the economy is weak to states where the economy is strong, and Moody's Economy.com model structure explicitly accounts for this trend.

Defining the Industry Cluster/Groups

To analyze an industry's scope, size, and contribution to the regional economy, it is necessary to first define the industry groups or clusters. However, clusters are cross sectional links that are often dictated by place specific concerns and resources and, by nature, difficult define. There are numerous methods for identifying clusters, comparing their relative scales and concentrations, mapping value chain and other systematic relationships, and assessing performance. Thus, there is not a universally accepted definition for each industry cluster.

In order to allow for maximum flexibility, users are able create their own clusters by selecting desired industries, designated by the North American Industry Classification System (NAICS) codes currently in use for reporting by U.S. Statistical Agencies. The NAICS numbering convention uses between 2 and 6 digits, with each additional digit defining an additional level of detail. For example NAICS code 339 defines miscellaneous manufacturing. NAICS 3391 provides addition definition to the industry by specifically targeting medical equipment and supplies manufacturing. Finally NAICS 339112 is more specific than 3391 with the definition being surgical and medical instrument manufacturing. Each of the industry groups is identified at the NAICS 4-digit level, which is the most detailed level for which satisfactory amounts of county data are available.

Two important measures will be used when examining the industry clusters: Location Quotient and Forecasted Output.

Location Quotient can be used as a surrogate measure for exports. It can be assumed that an industry with an LQ of 1 is producing enough output to satisfy regional demand, and that there is very little importing or exporting of that industry's products. If an industry has an LQ less than 1,

it is assumed that local demand is not met by regional employment, which leads to importing. If the LQ is greater than 1, it is assumed that not all the product is consumed locally and that some of the industry's employees are producing goods or services for export. Export industries are important as they create new money flows in a regional economy and have higher employment multipliers.

Forecasted Output is the projected value-added produced in a region, which is defined as final sales minus the value of intermediate goods and services purchased to facilitate their production.

Occupational Data

The occupational data analysis is based on the Bureau of Labor Statistics (BLS) Occupational Employment Statistics programs. IE360 provides occupational and payroll data at the metropolitan level and state level and is organized by specific occupation and occupation major groups, which aggregate occupations into groups according to function such as "Life, Physical, and Social Sciences occupations" and "Sales and related occupations." "Employees" are all part-time and full-time workers who are paid a wage or salary. The survey does not cover the self-employed, owners and partners in unincorporated firms, household workers, or unpaid family workers.

NES has assembled significant regional and national data from the U.S. Bureau of Labor Statistics on over 800 occupations. Occupational definitions are based on Standard Occupation Classification (SOC) system, in which employees that perform essentially the same tasks are grouped in the same occupation, whether or not they are in the same industry The data provided include both current employment totals and average wages in each occupation code at the metro and state level for 2006, the most recently updated figures from BLS.