There's bipartisan consensus:

“Keeping America Great” means protecting America’s World Leadership in Science, Engineering & Technology. And that requires maintaining federal funding for science and engineering R&D as a top budget priority.

Expanding the innovation capacity of the U.S. is the only way to address an increasingly difficult struggle to maintain our U.S. standard of living, national security and global economic competitiveness.

Through sustained federal, state and private funding, we must also invest more in research programs and science & engineering infrastructure. The U.S. must significantly improve the capabilities of our science, technology, engineering, and math (STEM) workforce.

A National Science Foundation (NSF) study found that 73% of the scientific papers cited in commercial patents were funded by taxpayers through the federal government, especially through university research operations. 1

For More Information: STEM in Your State

- The Science-Engineering-Technology Working Group (SETWG) has sponsored the annual STEM on the Hill™ Congressional Visits Day Program since 1995. See www.setcvd.org

- Science & Engineering Indicators 2018, published by the National Science Board, provides a broad base of quantitative information on the U.S. and global science and engineering enterprise. It is created biennially by the National Science Foundation’s Division of Science Resources Statistics (SRS). See www.nsf.gov/statistics/2018/nsb20181/

- The Congressional Research Service has produced extensive and authoritative analyses of many Science & Technology Policy Issues. See www.everycrsreport.com for free access to this important data base.

- ASTRA’s Web Sites include www.usinnovation.org. See also store.usinnovation.org for free downloads of all ASTRA State STEM Report Cards 2019 and the ASTRA EdTech Revolution in Education. Get a daily, free download of US Innovation Today, our daily innovation newsletter at https://vr2.verticalresponse.com/s/usinnovationsundaynewsletter

1. NSF-sponsored study, March 1997; 2 and 3. Sources: The sources of this data include a variety of federal government agencies, including the U.S. Office of Management & Budget and the National Science Foundation.

2 - 3. Source: CRS Analysis of Organization for Economic Development & Cooperation, OECD Stat database, https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB Notes: Global R&D includes the expenditures of the OECD countries, Argentina, China, Romania, Russia, Singapore, South Africa, and Taiwan. Share computed in PPP terms. PPP = Purchasing Power Parity. PPP is used to determine the relative value of different currencies and to adjust data from different countries to a common currency allowing direct comparisions among them.

4. Source: CRS Analysis of Organization for Economic Development & Cooperation, OECD https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB Notes: Global R&D includes the expenditures of the OECD countries, Argentina, China, Romania, Russia, Singapore, South Africa, and Taiwan. Share computed in PPP terms. PPP = Purchasing Power Parity. PPP is used to determine the relative value of different currencies and to adjust data from different countries to a common currency allowing direct comparisions among them.
As of 2018 the region’s population increased by 6.0% since 2013, growing by 43,205. Population is expected to increase by 3.0% between 2018 and 2023, adding 22,706.

From 2013 to 2018, jobs declined by 3.0% in North Dakota from 493,741 to 479,029. This change fell short of the national growth rate of 7.8% by 10.8%. As the number of jobs declined, the labor force participation rate decreased from 69.1% to 65.5% between 2013 and 2018.

Concerning educational attainment, 20.6% of North Dakota residents possess a Bachelor's Degree (2.0% above the national average), and 12.9% hold an Associate's Degree (4.9% above the national average).

The top three industries in 2018 are Restaurants and Other Eating Places, Education and Hospitals (Local Government), and Local Government, Excluding Education and Hospitals.
**Location quotient (LQ)** is a valuable way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region “unique” in comparison to the national average, which is defined as 1.0. In more exact terms, location quotient is a ratio that compares a region to a larger reference region according to some characteristic or asset. Industry LQ is a way of quantifying how “concentrated” an industry is in a region compared to a larger geographic area, such as the state or nation. The basic uses of industry LQs (and, by extension, for clusters and occupations as well) include these:

- To determine which industries make the regional economy unique.
- To identify the “export orientation” of an industry and identify the most export-oriented industries in the region.
- To identify emerging export industries beginning to bring money into the region.
- To identify endangered export industries that could erode the region’s economic base.  

*Source: EMSI*

### Rank How North Dakota Ranks Nationally in Key Innovation Metrics (latest) & North Dakota & Total U.S.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Metric</th>
<th>North Dakota</th>
<th>Total U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>High-Tech Manufacturing Exports ($Millions)</td>
<td>$351</td>
<td>$389 Billion</td>
</tr>
<tr>
<td>43</td>
<td>High-Tech Share of All Manufacturing Exports (%)</td>
<td>15.6%</td>
<td>28.6%</td>
</tr>
<tr>
<td>50</td>
<td>IT Services Exports ($Millions)</td>
<td>$5</td>
<td>$36 Billion</td>
</tr>
<tr>
<td>48</td>
<td>IT Share of All Services Exports (%)</td>
<td>0.5%</td>
<td>5.2%</td>
</tr>
<tr>
<td>41</td>
<td>Royalty and License Services Exports ($Millions)</td>
<td>$190</td>
<td>$131 Billion</td>
</tr>
<tr>
<td>15</td>
<td>Royalty and License Share of All Exports (%)</td>
<td>20.0%</td>
<td>19.1%</td>
</tr>
<tr>
<td>43</td>
<td>Patent Filers Per 1,000 Workers</td>
<td>2.3</td>
<td>10.0</td>
</tr>
<tr>
<td>43</td>
<td>Patents Filed Per 1,000 Workers</td>
<td>1.1</td>
<td>3.7</td>
</tr>
<tr>
<td>41</td>
<td>Public R&amp;D Funding Per Worker ($)</td>
<td>$360</td>
<td>$1,059</td>
</tr>
</tbody>
</table>

*Sources: 5. EMSI; 6. U.S. Patent & Trademark Office, USASpending.gov U.S. Census Bureau*
# North Dakota’s Innovation X-RAY:

## North Dakota’s Future Workforce:
**Top 40 STEM Jobs 2018 - 2028**

<table>
<thead>
<tr>
<th>2028 Rank</th>
<th>SOC*</th>
<th>Description</th>
<th>Jobs 2018</th>
<th>Jobs 2028</th>
<th>Change 2018 - 2028</th>
<th>% Change 2018 - 2028</th>
<th>+ / - National Average (LQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29-1141</td>
<td>Registered Nurses</td>
<td>8,882</td>
<td>9,833</td>
<td>951</td>
<td>11%</td>
<td>0.97</td>
</tr>
<tr>
<td>2</td>
<td>29-2061</td>
<td>Licensed Practical and Licensed Vocational Nurses</td>
<td>2,554</td>
<td>2,843</td>
<td>289</td>
<td>11%</td>
<td>1.15</td>
</tr>
<tr>
<td>3</td>
<td>15-1151</td>
<td>Computer User Support Specialists</td>
<td>1,827</td>
<td>2,007</td>
<td>180</td>
<td>10%</td>
<td>0.84</td>
</tr>
<tr>
<td>4</td>
<td>17-2051</td>
<td>Civil Engineers</td>
<td>1,306</td>
<td>1,456</td>
<td>150</td>
<td>11%</td>
<td>1.36</td>
</tr>
<tr>
<td>5</td>
<td>15-1132</td>
<td>Software Developers, Applications</td>
<td>1,188</td>
<td>1,494</td>
<td>306</td>
<td>26%</td>
<td>0.43</td>
</tr>
<tr>
<td>6</td>
<td>41-4011</td>
<td>Sales Reps., Whtl. &amp; Mfg, Technical &amp; Scientific Products</td>
<td>1,099</td>
<td>1,168</td>
<td>69</td>
<td>6%</td>
<td>1.04</td>
</tr>
<tr>
<td>7</td>
<td>29-2041</td>
<td>Emergency Medical Technicians and Paramedics</td>
<td>1,005</td>
<td>1,257</td>
<td>252</td>
<td>25%</td>
<td>1.39</td>
</tr>
<tr>
<td>8</td>
<td>11-9111</td>
<td>Medical and Health Services Managers</td>
<td>993</td>
<td>1,167</td>
<td>174</td>
<td>18%</td>
<td>0.88</td>
</tr>
<tr>
<td>9</td>
<td>29-2018</td>
<td>Clinical Laboratory Technologists and Technicians</td>
<td>974</td>
<td>1,041</td>
<td>67</td>
<td>7%</td>
<td>0.92</td>
</tr>
<tr>
<td>10</td>
<td>15-1199</td>
<td>Computer Occupations, All Other</td>
<td>906</td>
<td>992</td>
<td>86</td>
<td>9%</td>
<td>0.84</td>
</tr>
<tr>
<td>11</td>
<td>15-1121</td>
<td>Computer Systems Analysts</td>
<td>809</td>
<td>944</td>
<td>135</td>
<td>17%</td>
<td>0.46</td>
</tr>
<tr>
<td>12</td>
<td>29-1051</td>
<td>Pharmacists</td>
<td>802</td>
<td>855</td>
<td>53</td>
<td>7%</td>
<td>0.86</td>
</tr>
<tr>
<td>13</td>
<td>29-2052</td>
<td>Pharmacy Technicians</td>
<td>796</td>
<td>899</td>
<td>103</td>
<td>13%</td>
<td>0.64</td>
</tr>
<tr>
<td>14</td>
<td>29-2071</td>
<td>Medical Records and Health Information Technicians</td>
<td>787</td>
<td>878</td>
<td>91</td>
<td>12%</td>
<td>1.19</td>
</tr>
<tr>
<td>15</td>
<td>15-1142</td>
<td>Network and Computer Systems Administrators</td>
<td>768</td>
<td>858</td>
<td>90</td>
<td>12%</td>
<td>0.67</td>
</tr>
<tr>
<td>16</td>
<td>29-1069</td>
<td>Physicians and Surgeons, All Other</td>
<td>683</td>
<td>875</td>
<td>192</td>
<td>28%</td>
<td>0.66</td>
</tr>
<tr>
<td>17</td>
<td>15-1152</td>
<td>Computer Network Support Specialists</td>
<td>682</td>
<td>735</td>
<td>53</td>
<td>8%</td>
<td>1.06</td>
</tr>
<tr>
<td>18</td>
<td>29-1123</td>
<td>Physical Therapists</td>
<td>671</td>
<td>858</td>
<td>187</td>
<td>28%</td>
<td>0.96</td>
</tr>
<tr>
<td>19</td>
<td>15-1131</td>
<td>Computer Programmers</td>
<td>665</td>
<td>626</td>
<td>(39)</td>
<td>(6%)</td>
<td>0.79</td>
</tr>
<tr>
<td>20</td>
<td>15-1133</td>
<td>Software Developers, Systems Software</td>
<td>644</td>
<td>728</td>
<td>84</td>
<td>13%</td>
<td>0.52</td>
</tr>
<tr>
<td>21</td>
<td>11-3021</td>
<td>Computer and Information Systems Managers</td>
<td>641</td>
<td>732</td>
<td>91</td>
<td>14%</td>
<td>0.55</td>
</tr>
<tr>
<td>22</td>
<td>29-2021</td>
<td>Dental Hygienists</td>
<td>636</td>
<td>799</td>
<td>163</td>
<td>26%</td>
<td>1.03</td>
</tr>
<tr>
<td>23</td>
<td>29-2034</td>
<td>Radiologic Technologists</td>
<td>604</td>
<td>673</td>
<td>69</td>
<td>11%</td>
<td>0.97</td>
</tr>
<tr>
<td>24</td>
<td>17-2141</td>
<td>Mechanical Engineers</td>
<td>588</td>
<td>720</td>
<td>132</td>
<td>22%</td>
<td>0.73</td>
</tr>
<tr>
<td>25</td>
<td>17-2071</td>
<td>Electrical Engineers</td>
<td>554</td>
<td>627</td>
<td>73</td>
<td>13%</td>
<td>1.00</td>
</tr>
<tr>
<td>26</td>
<td>29-1127</td>
<td>Speech-Language Pathologists</td>
<td>505</td>
<td>609</td>
<td>104</td>
<td>21%</td>
<td>1.14</td>
</tr>
<tr>
<td>27</td>
<td>17-2112</td>
<td>Industrial Engineers</td>
<td>487</td>
<td>610</td>
<td>123</td>
<td>25%</td>
<td>0.67</td>
</tr>
<tr>
<td>28</td>
<td>29-9011</td>
<td>Occupational Health and Safety Specialists</td>
<td>458</td>
<td>536</td>
<td>78</td>
<td>17%</td>
<td>1.79</td>
</tr>
<tr>
<td>29</td>
<td>29-2051</td>
<td>Dietetic Technicians</td>
<td>448</td>
<td>474</td>
<td>26</td>
<td>6%</td>
<td>3.80</td>
</tr>
<tr>
<td>30</td>
<td>29-1122</td>
<td>Occupational Therapists</td>
<td>445</td>
<td>539</td>
<td>94</td>
<td>21%</td>
<td>1.11</td>
</tr>
<tr>
<td>31</td>
<td>11-9041</td>
<td>Architectural and Engineering Managers</td>
<td>442</td>
<td>523</td>
<td>81</td>
<td>18%</td>
<td>0.86</td>
</tr>
<tr>
<td>32</td>
<td>29-1171</td>
<td>Nurse Practitioners</td>
<td>441</td>
<td>611</td>
<td>170</td>
<td>39%</td>
<td>0.89</td>
</tr>
<tr>
<td>33</td>
<td>17-3022</td>
<td>Civil Engineering Technicians</td>
<td>437</td>
<td>485</td>
<td>48</td>
<td>11%</td>
<td>1.98</td>
</tr>
<tr>
<td>34</td>
<td>29-1021</td>
<td>Dentists, General</td>
<td>410</td>
<td>532</td>
<td>122</td>
<td>30%</td>
<td>1.13</td>
</tr>
<tr>
<td>35</td>
<td>17-3029</td>
<td>Engineering Technicians, Except Drafters, All Other</td>
<td>392</td>
<td>452</td>
<td>60</td>
<td>15%</td>
<td>1.70</td>
</tr>
<tr>
<td>36</td>
<td>29-2081</td>
<td>Opticians, Dispensing</td>
<td>381</td>
<td>440</td>
<td>59</td>
<td>15%</td>
<td>1.66</td>
</tr>
<tr>
<td>37</td>
<td>17-2199</td>
<td>Engineers, All Other</td>
<td>376</td>
<td>439</td>
<td>63</td>
<td>17%</td>
<td>0.87</td>
</tr>
<tr>
<td>38</td>
<td>29-1062</td>
<td>Family and General Practitioners</td>
<td>358</td>
<td>451</td>
<td>93</td>
<td>26%</td>
<td>0.93</td>
</tr>
<tr>
<td>39</td>
<td>17-3023</td>
<td>Electrical and Electronics Engineering Technicians</td>
<td>341</td>
<td>397</td>
<td>56</td>
<td>16%</td>
<td>0.92</td>
</tr>
<tr>
<td>40</td>
<td>19-2041</td>
<td>Environmental Scientists and Specialists, Including Health</td>
<td>325</td>
<td>371</td>
<td>46</td>
<td>14%</td>
<td>1.27</td>
</tr>
</tbody>
</table>

7. Source: ASTRA’s Global STEM & Innovation Data Project and EMSI occupation employment data are based on final EMSI industry data and final EMSI staffing patterns 2/15/19.

© 2019 Dr. Robert S. Boege for ASTRA. The Alliance for Science & Technology Research in America www.usinnovation.org and store.usinnovation.org for free downloads of ASTRA’s State STEM & Innovation Report Cards™. STEM on the Hill™ is powered by ASTRA and EMSI data.
North Dakota’s Key Economic Characteristics 2019

Population Characteristics

- **Millennials**
  - North Carolina has 2,067,240 millennials, compared to 2,127,777 in an area this size.
  - The national average for an area this size is 2,152,717.

- **Retiring Soon**
  - Retirement risk is about average in North Carolina. The national average for an area this size is 3,509,491 people 65 or older, while there are 2,952,122 here.

- **Racial Diversity**
  - Racial diversity is about average in North Carolina. The national average for an area this size is 4,034,663 racially diverse people, while there are 3,707,319 here.

- **Veterans**
  - North Carolina has 670,326 veterans. The national average for an area this size is 977,356.

- **Violent Crime**
  - North Carolina has 3.02 violent crimes per 1,000 people. The national rate is 3.75 per 1,000 people.

- **Property Crime**
  - North Carolina has 24.21 property crimes per 1,000 people. The national rate is 24.21 per 1,000 people.

Business Characteristics

36,200 Companies Employ Your Workers

Online profiles for your workers mention 36,200 companies as employers, with the top 10 appearing below. In the last 12 months, 10,108 companies in North Dakota posted job postings, with the top 10 appearing below.

- **Trinity Health Corporation**
  - North Dakota State University
  - University of North Dakota
  - Sanford Health
  - North Dakota State College of Science
  - Minot State University
  - University of Mary
  - Dickinson State University
  - Valley City State University
  - Co-Alliance, LLP
  - Heartland Express, Inc.

Educational Pipeline

In 2017, there were 12,678 graduates in North Dakota. This pipeline has grown by 4% over the last 5 years. The highest share of these graduates come from Liberal Arts and Sciences/Liberal Studies, Registered Nursing/Registered Nurse, and “Business Administration and Management, General”.

- **University of North Dakota**
  - Total Graduates (2017): 3,436

- **North Dakota State University-Main Campus**
  - Total Graduates (2017): 3,056

- **Bismarck State College**
  - Total Graduates (2017): 1,352

- **University of Mary**
  - Total Graduates (2017): 829

- **Minot State University**
  - Total Graduates (2017): 725

- **North Dakota State College of Science**
  - Total Graduates (2017): 607

- **Williston State College**
  - Total Graduates (2017): 401

- **Dickinson State University**
  - Total Graduates (2017): 312

- **Lake Region State College**
  - Total Graduates (2017): 204

- **Valley City State University**
  - Total Graduates (2017): 267

Industry Characteristics

Largest Industries

- Government
- Health Care and Social Assistance
- Retail Trade
- Accommodation and Food Services
- Construction
- Wholesale Trade
- Professional, Scientific, and Technical Services
- Administrative and Support and Waste Management and Remediation Services
- Educational Services
- Arts, Entertainment, and Recreation
- Management of Companies and Enterprises
- Utilities

SBIR / STTR Funds High-Tech Small Business Innovations — that Private Funding Doesn’t

Overview by the Small Business Technology Council

The Small Business Innovation Research Program (SBIR) and Small Business Technology Transfer Program (STTR) form the backbone of high-tech small business funding. America’s high-tech small businesses depend on SBIR/STTR to fund the next generation of high-tech innovations because, for the vast majority of small businesses, private funding simply isn’t available.

On the surface, it appears that private venture capital (VC) seed stage funding is keeping pace with SBIR/STTR funding, with SBIR/STTR awarding a total of $10.8 billion vs. VC Seed Stage deals totaling $9.5 billion over 2012-2016.

But the truth is that VC funding is heavily concentrated by sector and state, with 56% of all VC funding going to companies in California and Massachusetts. Those companies outside that narrow geographical sector cross section end up competing for a relatively small slice of the VC Seed Stage Funding pie. For example, if you exclude all deals in Massachusetts and California AND all Software, Internet, or Telecommunications deals, the remainder adds up to only 10% of VC Seed Stage funding, equal in total on average to about 180 deals and $175 million a year.

While SBIR/STTR also skews in favor of states like California and Massachusetts, the divide is much less severe. States that receive literally no VC funding, like Wyoming and South Dakota, at least receive some SBIR/STTR awards. And SBIR/STTR also funds technology in sectors that VC has no interest in, such as agriculture and biotech.

Recent data has also shown that mergers and acquisitions by large businesses in North America are also slowing down, reducing from a peak of around 14,000 in 2015 to approximately 10,500 in 2017. This reduction in mergers and acquisitions comes in spite of strong economic numbers nationwide over the past 2 years.

EPSCoR / IDeA: A Necessary and Sound Investment in our Nation's Future

The National Science Foundation (NSF) established EPSCoR in 1979 because Congress was troubled by the uneven distribution of federal research and development grants. After World War II, federally funded academic research grew dramatically, but national science policy at the time tended to funnel resources to a small number of centers of excellence. Grants gravitated toward the few states and institutions that had historically benefited. This status quo ignored the dramatic growth in regional educational and research institutions, and therefore, the nation wasn’t profiting fully from the wealth of ingenuity and skill embedded across the country.

EPSCoR, which stands for "Experimental Program to Stimulate Competitive Research," was the answer. Today, four other federal agencies have followed the National Science Foundation in creating EPSCoR or EPSCoR-like programs: the National Institutes of Health, the National Aeronautics and Space Administration, and the Departments of Energy and Agriculture. The National Institute of Health's Institutional Development Award (IDeA) program is the largest of the EPSCoR or EPSCoR-like programs.

EPSCoR/IDeA helps researchers and institutions improve their research capabilities and quality in order to compete more effectively for "mainstream" competitive research funds. EPSCoR/IDeA expands and improves the research capability of scientists and institutions in eligible states, allowing them to compete more effectively for "mainstream" federal academic research and development money, builds eligible states’ technical workforces in order to foster innovation and to contribute to the state’s and the nation’s economy.

EPSCoR/IDeA projects undergo merit reviews at the state level to align projects with state and institutional needs and priorities. At the federal level, they undergo rigorous external merit review to make sure they meet national standards of quality. EPSCoR/IDeA funds only high-quality research that “adds significant value” to the existing science and technology enterprise.

Through EPSCoR/IDeA, 24 states as well as Guam, the Virgin Islands, and Puerto Rico receive about ten percent of federal academic research dollars. Put another way, the research institutions in more than half the states still do not fully participate in the $36.8 billion federal R&D investments in academia. Yet scientific and technological research cannot be limited to a few states if the nation is to maintain world leadership and reach its full potential.

Researchers in EPSCoR/IDeA states are needed for the nation to meet its most pressing priorities in health, cyberinfrastructure, and homeland security. A broad science and technology base is especially important in an era of technological enterprise. And strong academic research centers are important to every state in order to provide sound education and research opportunities for its students (most students attend college within 50 miles of home), a trained workforce, and support for both existing and emerging businesses, especially in the high technology area.

Studies show that high technology businesses tend to cluster where they have a trained workforce and strong research capability and support. Through EPSCoR/IDeA, participating states and territories are building a high-quality, university-based research infrastructure, a backbone to their scientific and technological enterprises, and a strong and stable economic base into the next century.

Source: NSF, Lawson, EPSCoR
How Congress Provides Science/STEM Funding for the States

Every Student Succeeds Act (ESSA)

Title IV-A, Student Support and Academic Enrichment Grants and Science/STEM Education

Congress provided $1.1 Billion for the Title IV-A grant for FY18. Each state will receive an allocation based on their Title I funding formula. Using the same Title I formula, each state must allocate funds to school districts.

Schools or districts that receive an allocation above $30,000 based on their Title I status must do a needs assessment and spend:

- **20%** Well rounded education
  - STEM
  - Music
  - Art
  - Physical Education
- **20%** Safe schools
  - Healthy students
  - Violence prevention
  - School counselors
  - Mental health
- **60%** Technology
  - Materials/Prof Dev
  - Equipment/Devices
  - Digital Content
  - Some funding must go towards tech, with a 15% cap on infrastructure

The remaining 60% of funds can be spent on all 3 priorities, including technology.

Schools or districts that receive an allocation below $30,000:

- Spend money on activities in at least one of the three categories

WINTER/SPRING 2018

- Districts prepare to apply for FY18 ESSA funds, develop ESSA plans based on stakeholder input, district needs assessments, and priorities

SPRING/SUMMER 2018

- Districts submit ESSA plans, submit application for FY18 ESSA funds (Titles I-IV) and any competitive ESSA funds (e.g. 21st Century Community Learning Centers, School Leader Recruitment and Support Fund, Education Innovation and Research grants).

SUMMER/FALL 2018

- FY18 ESSA Title funds are awarded to districts from their State Department of Education

STEM

- Expansion of high-quality STEM courses
- Increased access to STEM for underserved and at-risk student populations
- Support for student participation in STEM nonprofit competitions
- Providing hands-on learning opportunities in STEM
- Integration of other academic subjects, including the arts, into STEM subject programs
- Creation or enhancement of STEM specialty schools
- Integration of classroom based, afterschool, and informal STEM instruction
- Expansion of environmental education

Contact your district’s central office to learn more about ESSA Title IV-A funding.