

SKILLS, NOT JOBS

HOW HIGHER ED CAN CAPITALIZE ON BIG DATA'S DISRUPTIVE MOMENT

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BURNING GLASS TECHNOLOGIES
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New Jersey Big Data Alliance

DATA SCIENCE AND ANALYTICS: A RISING FORCE IN THE JOB MARKET



Of nearly 27 million postings examined in 2017, there were more than **2,000,000** Data Science and Analytics job listings. Some **224,000** were entry level jobs.

By 2020, DSA openings are projected to grow **15%**

DSA jobs remain open **13%** longer than average

DSA jobs advertise average salaries of **\$80,265** – a **\$8,736** premium over all BA+ jobs

IT'S A GLOBAL PHENOMENON



UK



725,000 DSA job listings in 2015, advertising average salaries of **£45,757**

Data Scientists growing **56%** faster than the national average growth



CAN



148,000 DSA job listings in 2015, advertising average salaries of **\$81,988**

Data Scientists growing **179%** faster than the national average growth



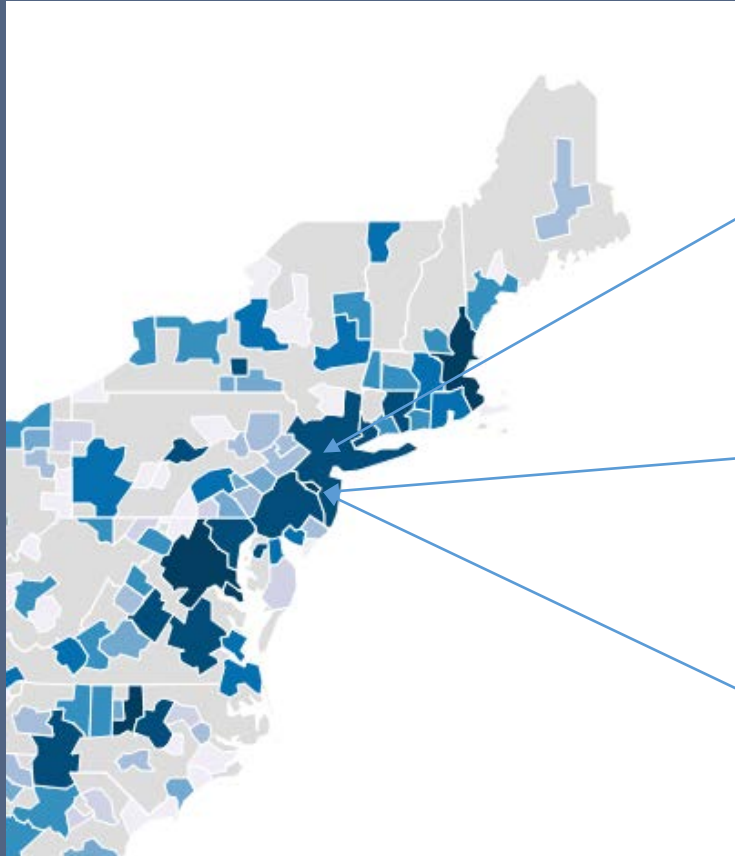
ANZ



113,000 DSA job listings in 2015, advertising average salaries of **\$111,326**

Data Scientists growing **57%** faster than the national average growth

NEW JERSEY IS AT THE CENTER OF THE NORTHEAST DATA CORRIDOR



New York-Newark-Jersey City, NY-NJ-PA

74,157 postings in Last 12 months

84.86 postings per **10,000** people employed, last 12 months

Philadelphia-Camden-Wilmington, PA-NJ-DE-MD

22,210 postings in Last 12 months

84.07 postings per **10,000** people employed, last 12 months

Trenton, NJ

3,984 postings in Last 12 months

169.42 postings per **10,000** people employed, last 12 months

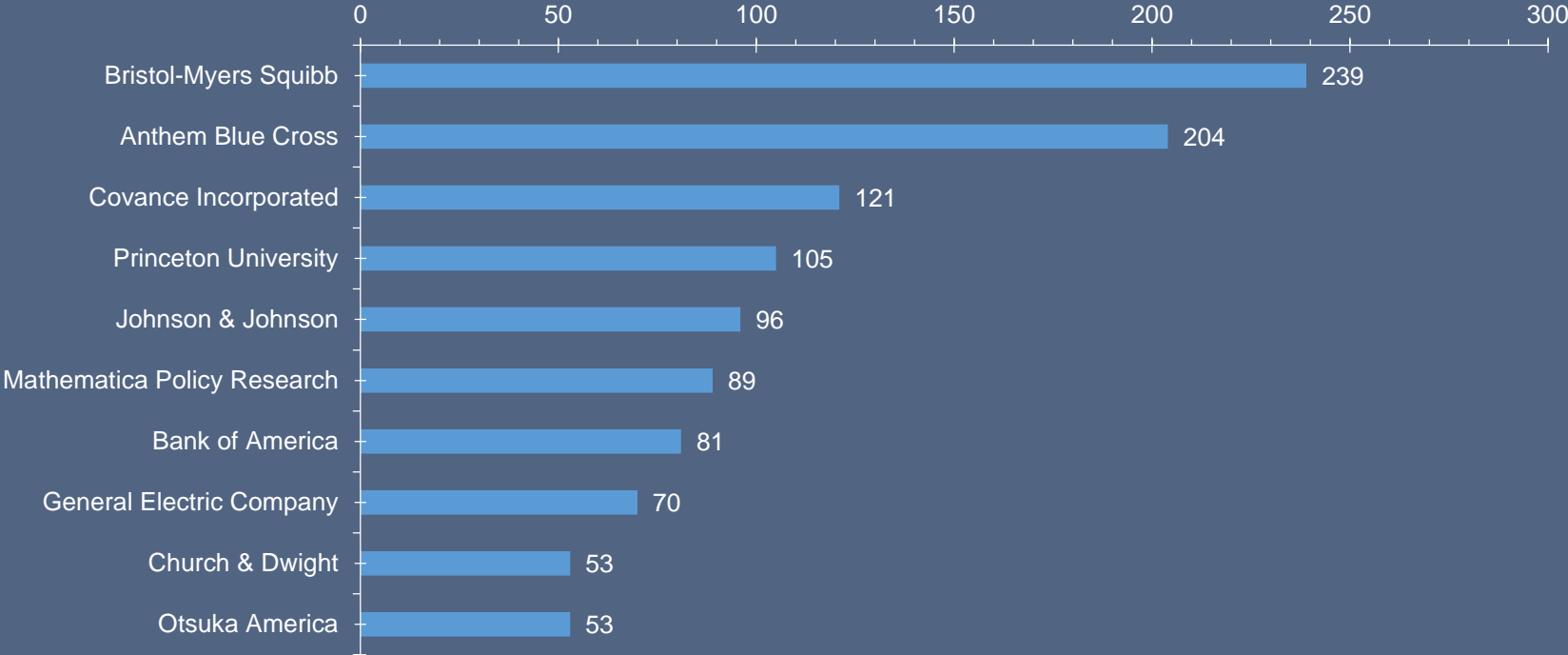


Much higher demand than average

TRENTON COMPUTES, THE WORLD SALUTES

MERCER COUNTY PUNCHES ABOVE ITS WEIGHT IN BIG DATA JOBS

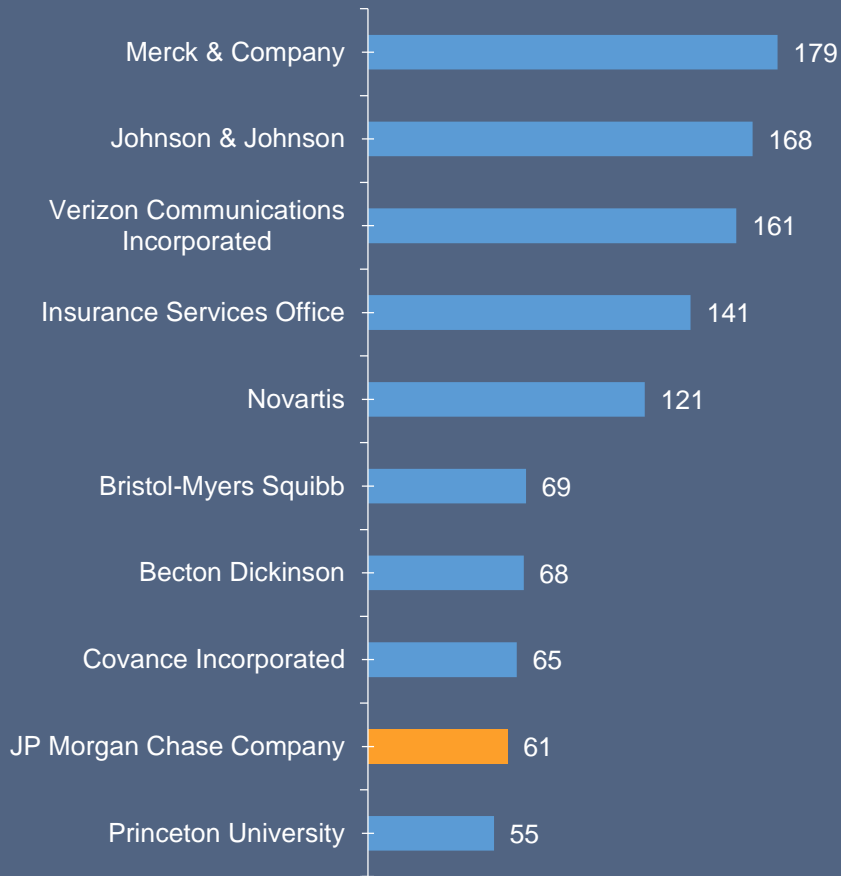
Top Big Data Employers, last 12 months



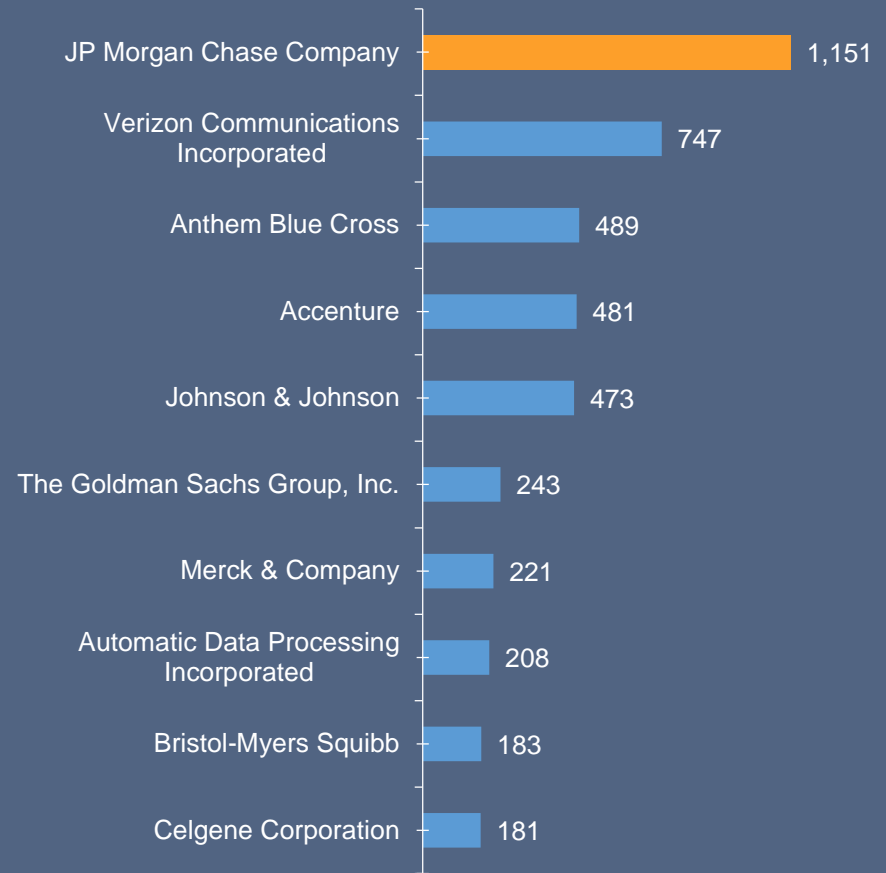
MORE DEMAND, NEW PLAYERS

NJ'S BIG DATA JOB MARKET IS GROWING FAST

NJ Data Science Employers,
2012



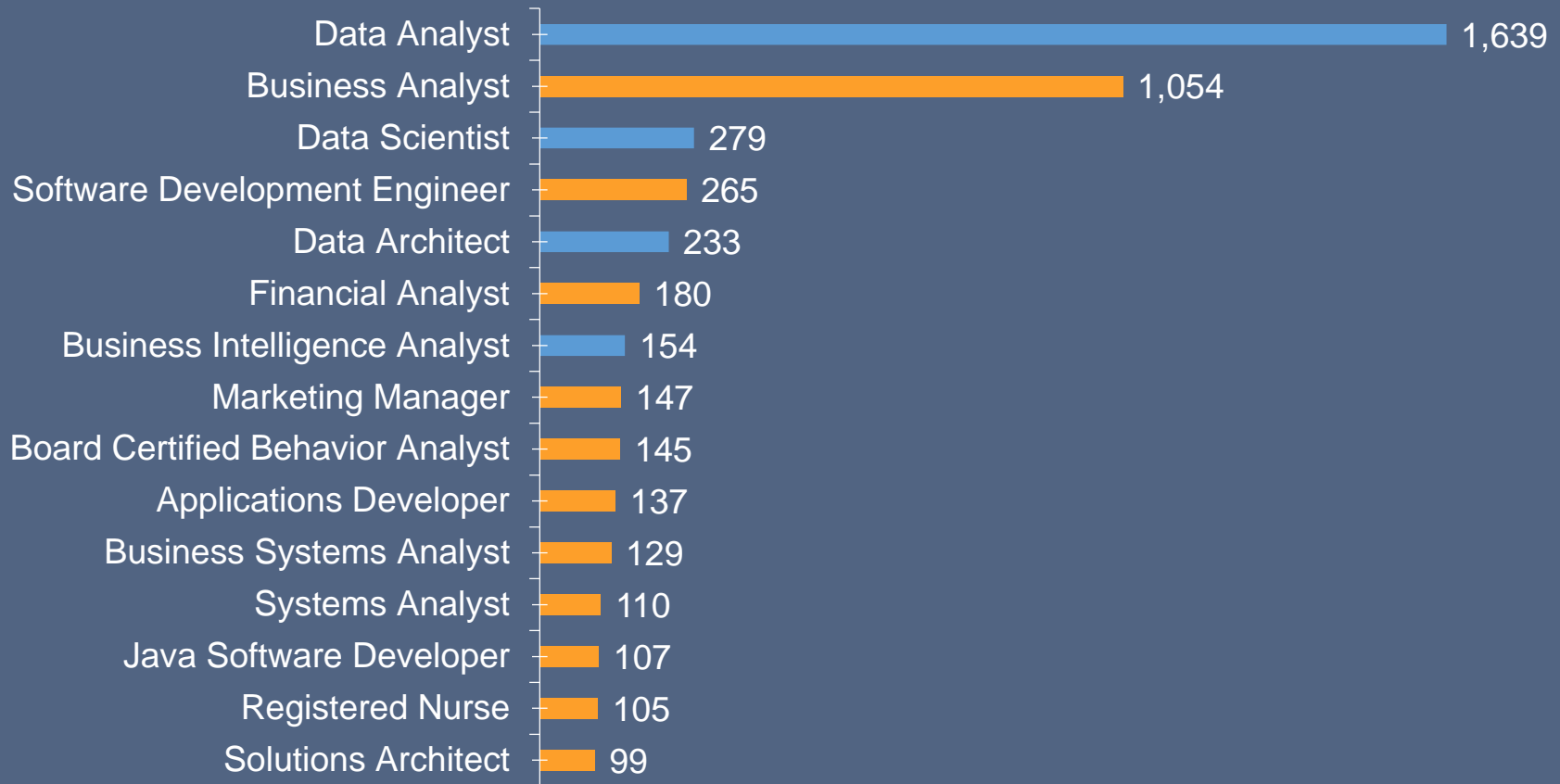
NJ Data Science Employers,
2017



TOP NJ JOBS DEMANDING DATA SKILLS

THE 'M' IN STEM IS NOT JUST FOR ACTUARIES

Roles Requesting Data Skills, 2017



DEMAND FOR BIG DATA SKILLS GOES WELL BEYOND BIG DATA JOBS

Big data is hitting the economy at a moment when jobs are changing

More jobs are hybrids, mixing and matching skills from different domains

This isn't about data jobs—it's about data skills

JOBS HAVE A GENOME AND THAT GENOME IS SPECIFIC & DYNAMIC

Jobs are bundles of skills

Education is also built
around skills

Mapping between skills and
jobs creates a powerful,
ongoing bridge between
education and work



JOBS ARE HAVING SEX

THE EMERGENCE OF A HYBRID GENOME

Welder

WELDING

Mig and Tig Welding
Repair
Inspection
Gas-metal Arc Welding
Flux Core Welding
Calipers
Shielded Metal Arc Welding
Schematic Diagrams

SOFT SKILLS

Detail oriented
Work area maintenance
Quality assurance



+15%
Since 2013



Data Scientist

PROGRAMMING

Python
SQL
Hadoop
R

DATA SKILLS

Data Visualization
Tableau
Excel
MapReduce

BUSINESS SKILLS

Predictive Models
Business Process
Economics
Strategic Planning

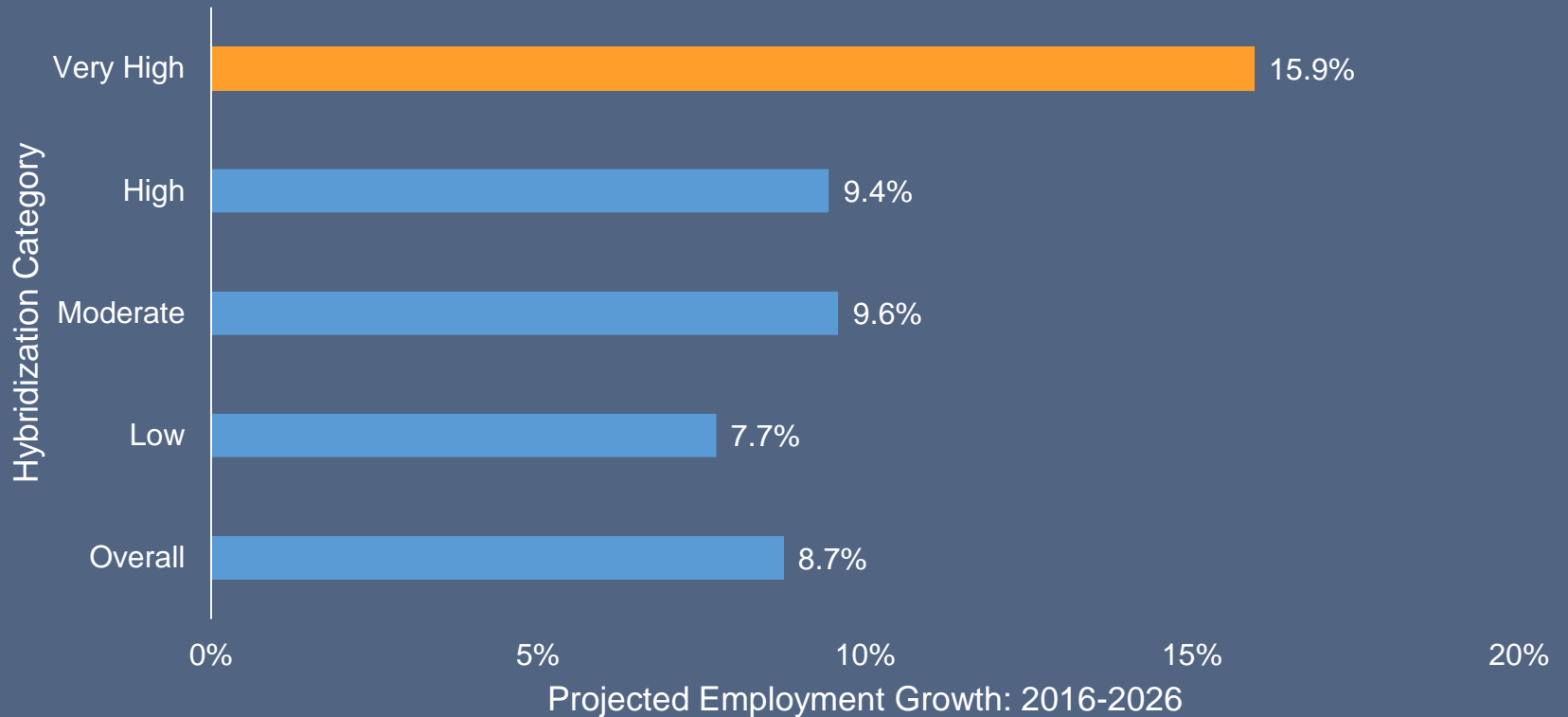
SOFT SKILLS

Problem Solving
Writing
Teamwork



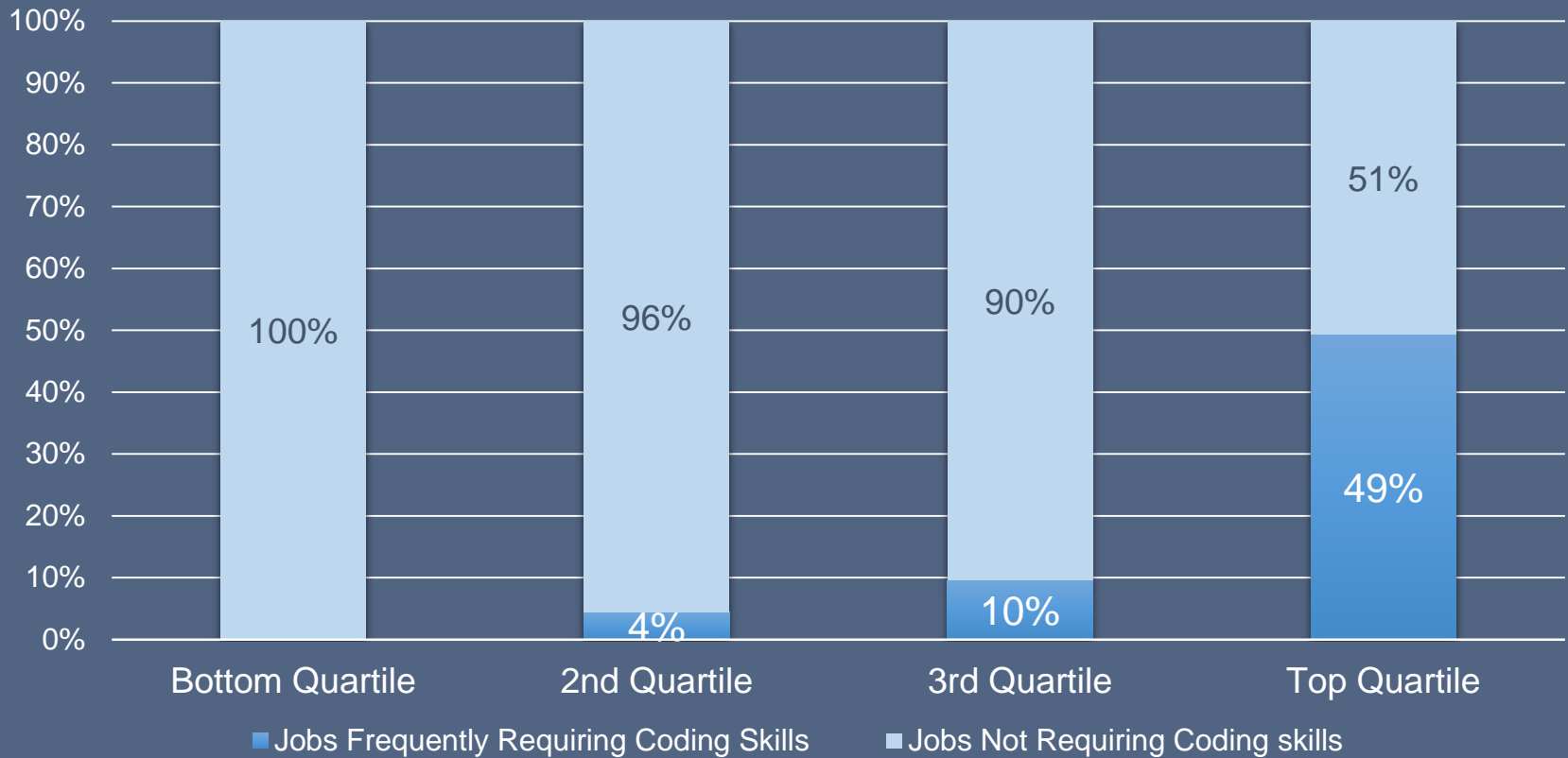
+424%
Since 2013

HYBRID JOBS ARE GROWING FAST NEARLY TWICE AS FAST AS JOBS OVERALL



SKILLS ARE CROPPING UP IN THE DARNDDEST PLACES

Prevalence of Coding Skills in Jobs Across Income Levels

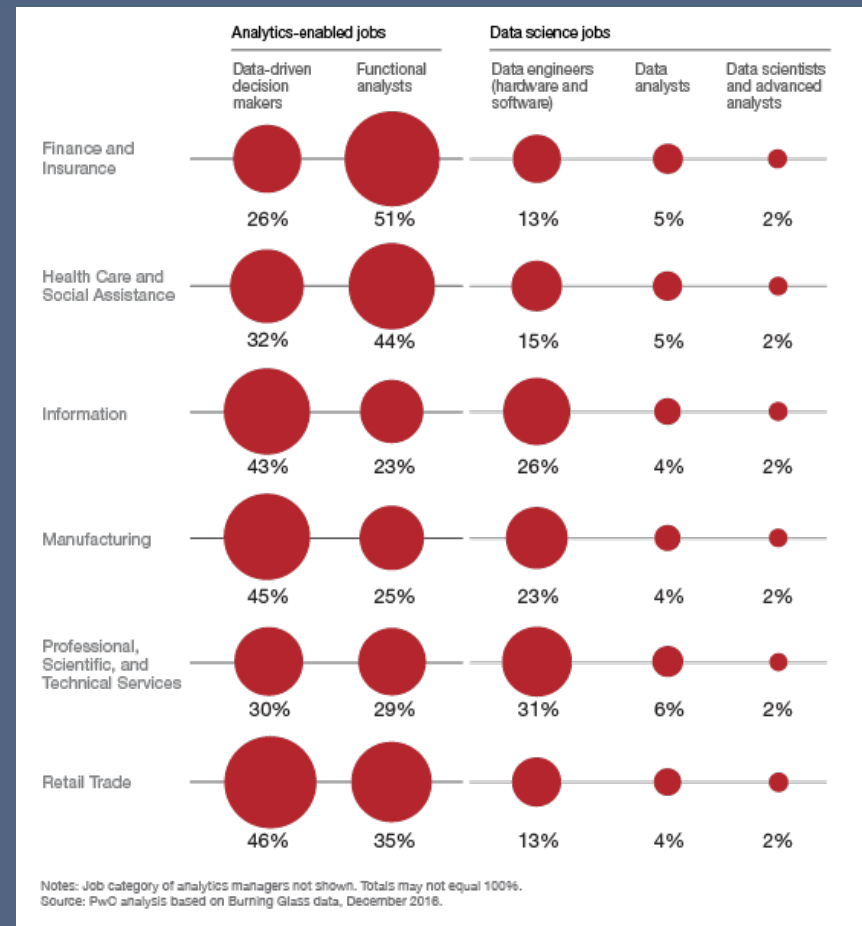


DEMAND FOR DATA SKILLS ISN'T ABOUT DATA SCIENCE JOBS







67% of jobs calling for data science & analytics (DSA) skills are “analytics-enabled”.

These jobs apply data to business cases. In other words, they make decisions based on data.

Only one-third of jobs calling for DSA skills are in data science.



DEFINING ROLES IN DATA SCIENCE

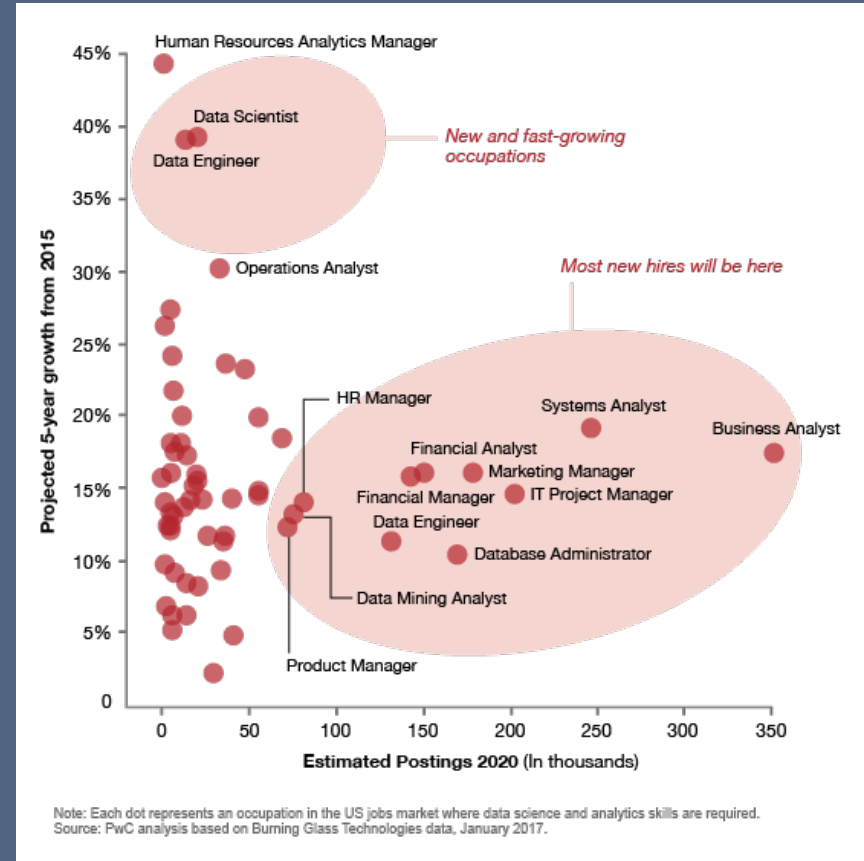
| | DSA Framework Category | Functional Role | Sample Occupations |
|---------------------------|---|--|--|
| Analytical Requirements ↑ | Data Scientists & Advanced Analysts  | Create sophisticated analytical models used to build new datasets and derive new insights from data | Data Scientist Economist |
| | Data Analysts  | Leverage data analysis and modeling techniques to solve problems and glean insight across functional domains | Data Analyst Business Intelligence Analyst |
| | Data Systems Developers  | Design, build, and maintain an organization's data and analytical infrastructure | Systems Analyst Database Administrator |
| | Analytics Managers  | Oversee analytical operations and communicate insights to executives | Chief Analytics Officer Marketing Analytics Manager |
| | Functional Analysts  | Utilize data and analytical models to inform domain-specific functions and business decisions | Business Analyst Financial Analyst |
| | Data-Driven Decision Makers  | Leverage data to inform strategic and operational decisions | IT Project Manager Marketing Manager |

BIG DATA'S BIGGEST IMPACT WILL BE IN EXISTING ROLES

2.7 million DSA jobs projected in 2020

While quant roles are growing fast, much of this hiring will be in *existing* jobs

The biggest single area of hiring: Business Analyst, with an estimated 349,662 openings in 2020



OPPORTUNITIES FOR HIGHER ED

Specialized
data degrees

Data as a “last
mile skill”

Learning as
arbitrage

JOINT BUSINESS/DATA PROGRAMS?

NY FINANCE LOOKING FOR BUSINESS AND DATA SKILLS

| Skill | Postings Requesting | National Projected Growth (2017-2019) | Competitive Advantage ▼ |
|-------------------------------------|---------------------|---------------------------------------|-------------------------|
| SAS | 703 (17%) | 14.15% | ● |
| Budgeting | 550 (14%) | -0.34% | ● |
| Oracle | 447 (11%) | -4.58% | ● |
| Data Management | 431 (11%) | -0.39% | ● |
| Customer Service | 374 (9%) | 15.55% | ● |
| Information Systems | 270 (7%) | -10.25% | ● |
| Microsoft Access | 234 (6%) | -15.49% | ● |
| Business Administration | 167 (4%) | -3.91% | ● |
| Supervisory Skills | 146 (4%) | -7.95% | ● |
| Visual Basic for Applications (VBA) | 143 (4%) | 15.37% | ● |

BIG DATA JOBS ARE LIBERAL ARTS JOBS



The combination of data, business knowledge and soft skills makes liberal arts majors viable candidates.

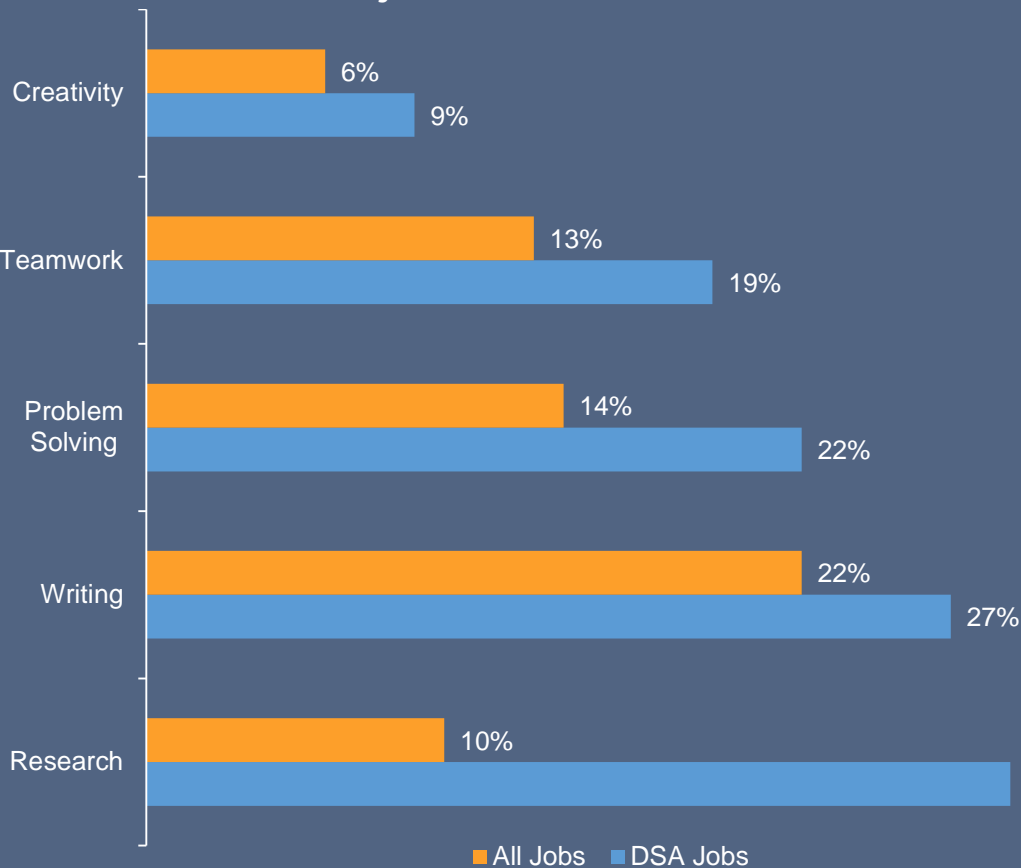
32% of data science jobs are already filled by liberal arts majors

Adding DSA skills to a BA can bring a **\$17,000** early career salary premium over the average liberal arts major's salary

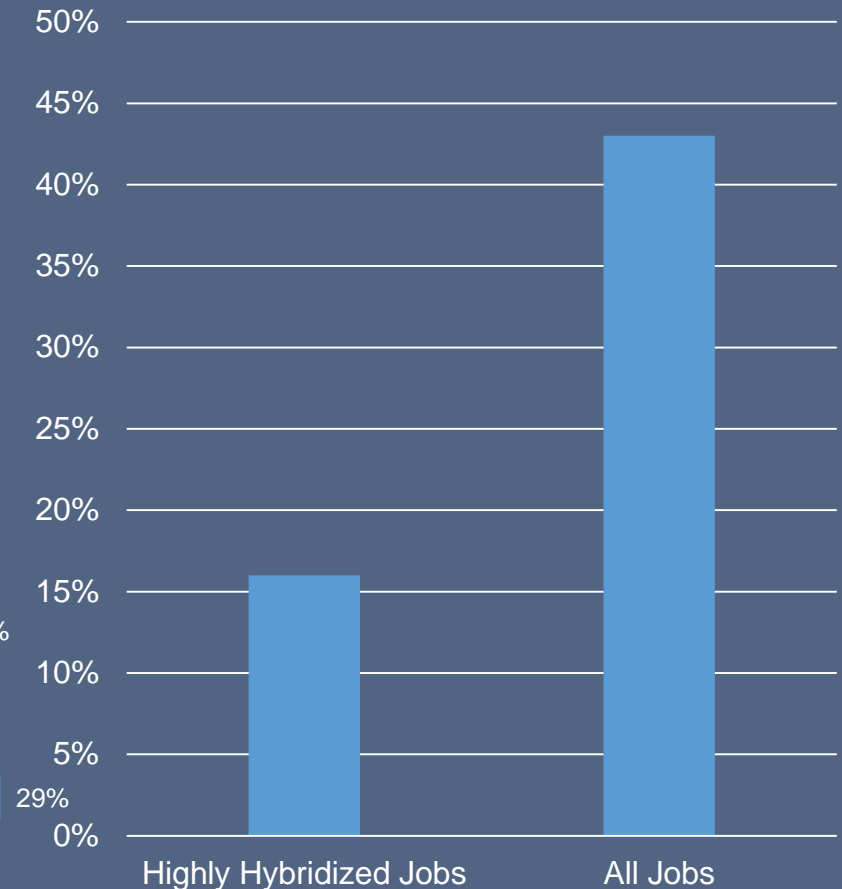
DATA JOBS ARE MORE HUMAN

MORE SOFT SKILLS, MORE RESISTANT TO AUTOMATION

% of Data Science jobs requesting key soft skills vs. % of all jobs



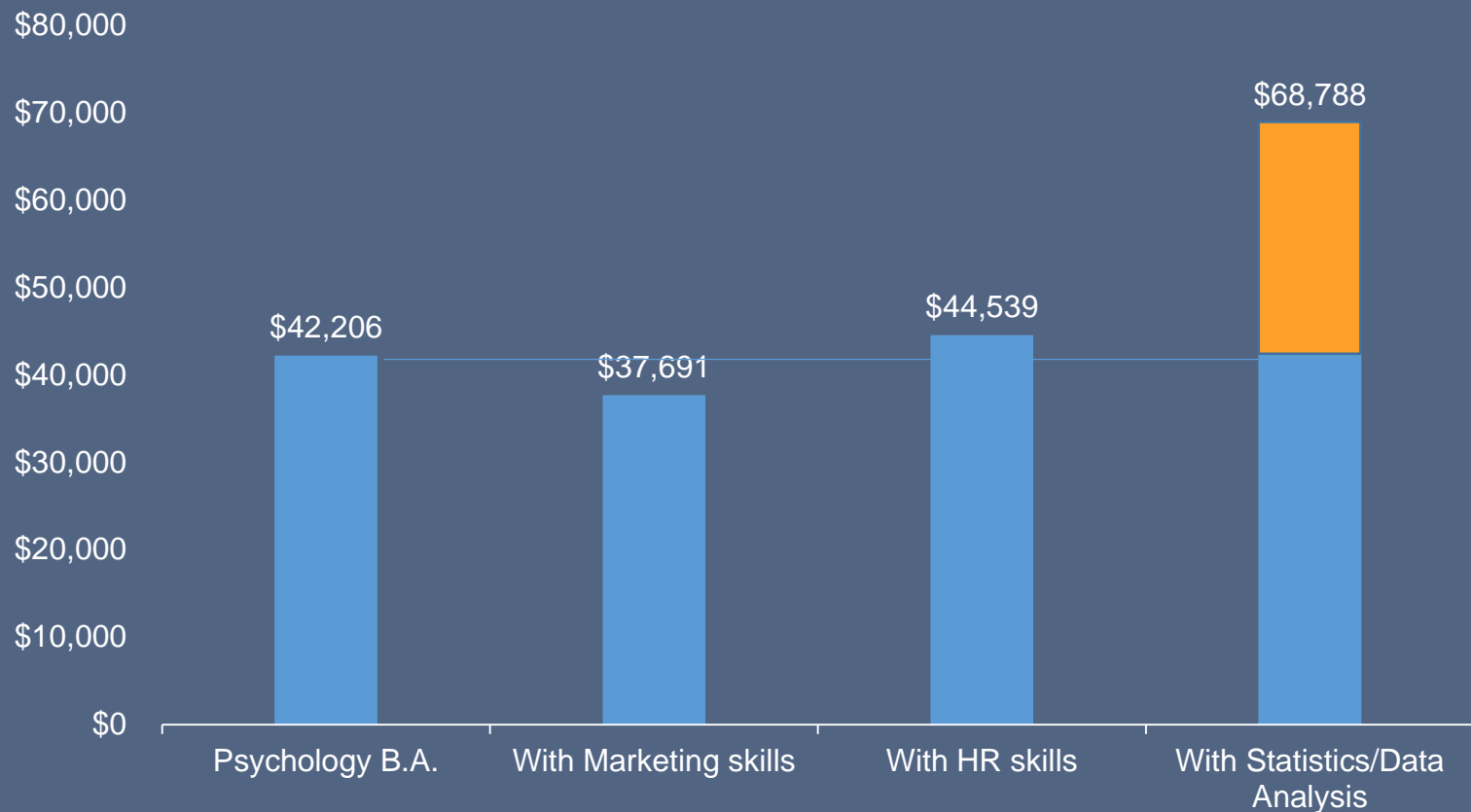
Vulnerability to Automation



THE LAST MILE

DATA SKILLS CAN CLINCH A JOB, RAISE PAY

Entry level salaries for Psychology majors



DATA SKILLS CLOSE THE GAP

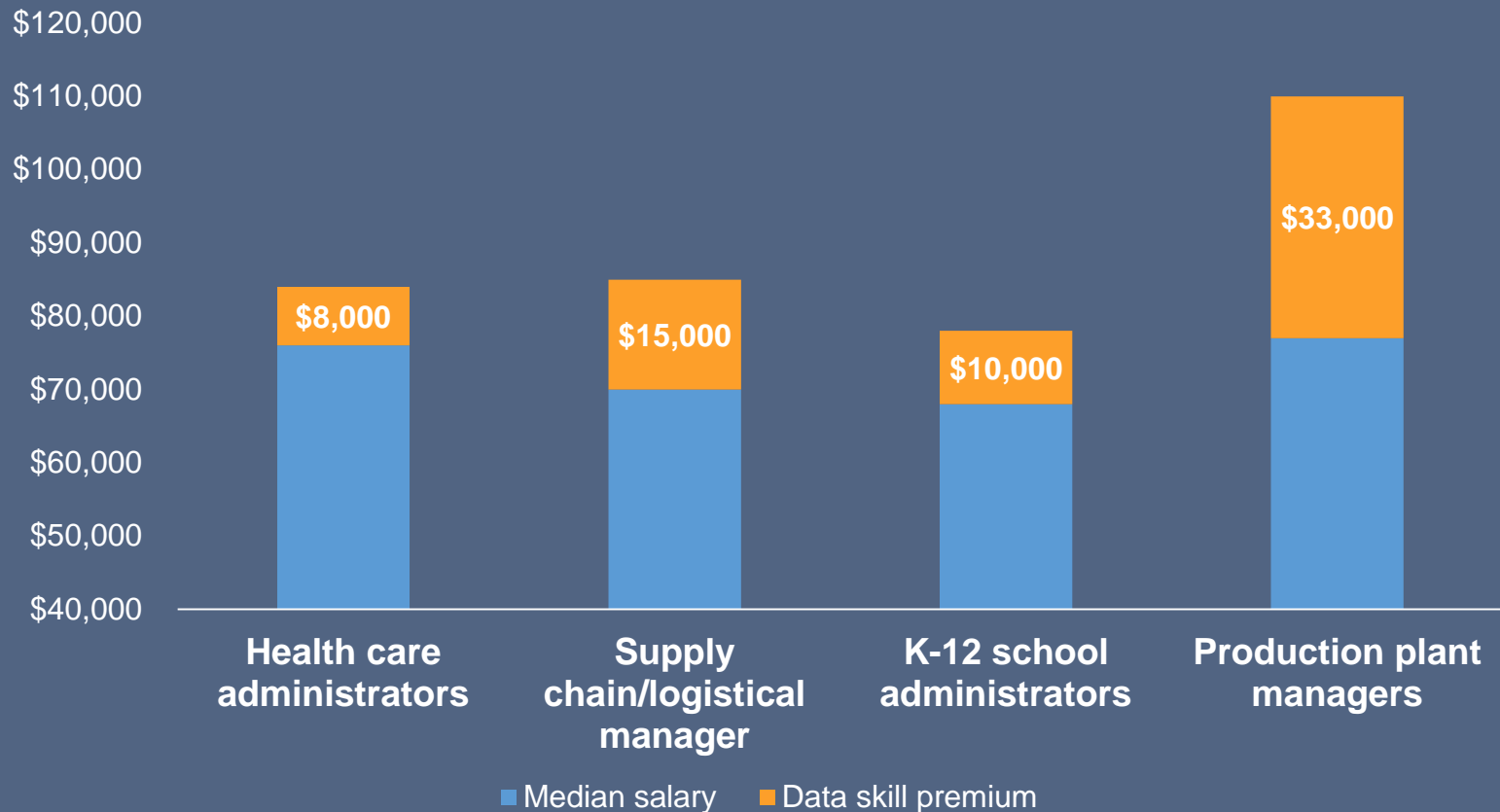
PUTTING LIBERAL ARTS SALARIES ON PAR WITH STEM

| Career Cluster | Entry-Level Openings | Expected Salary in Five Years |
|--------------------------------------|----------------------|-------------------------------|
| Business Administration | 276,199 | \$77,360 |
| Data Analysis and Data Management | 224,607 | \$82,070 |
| Human Resources | 191,164 | \$70,147 |
| IT and Networking | 173,691 | \$75,837 |
| Sales | 157,127 | \$92,320 |
| Programming and Software Development | 144,581 | \$87,811 |
| Finance | 125,980 | \$80,954 |
| Marketing and PR | 106,550 | \$75,395 |
| Design | 49,047 | \$66,957 |
| Media and Communication | 25,761 | \$68,283 |
| Average for all graduates | | \$68,513 |
| Average for STEM graduates | | \$76,556 |
| Average for Liberal Arts graduates | | \$63,213 |

LEARNING IS ARBITRAGE

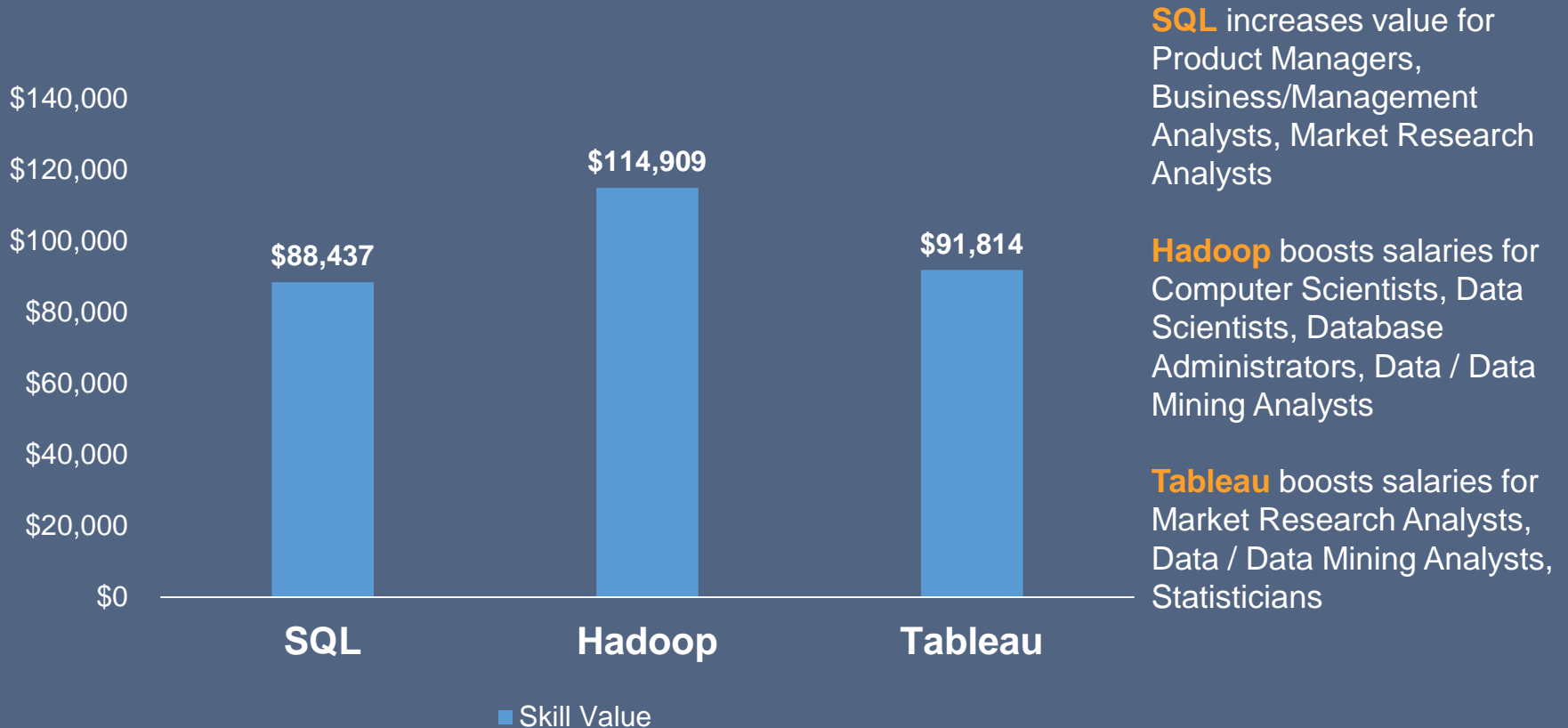
SKILLING UP HAS STRONG RETURNS

Salary premium for data skills



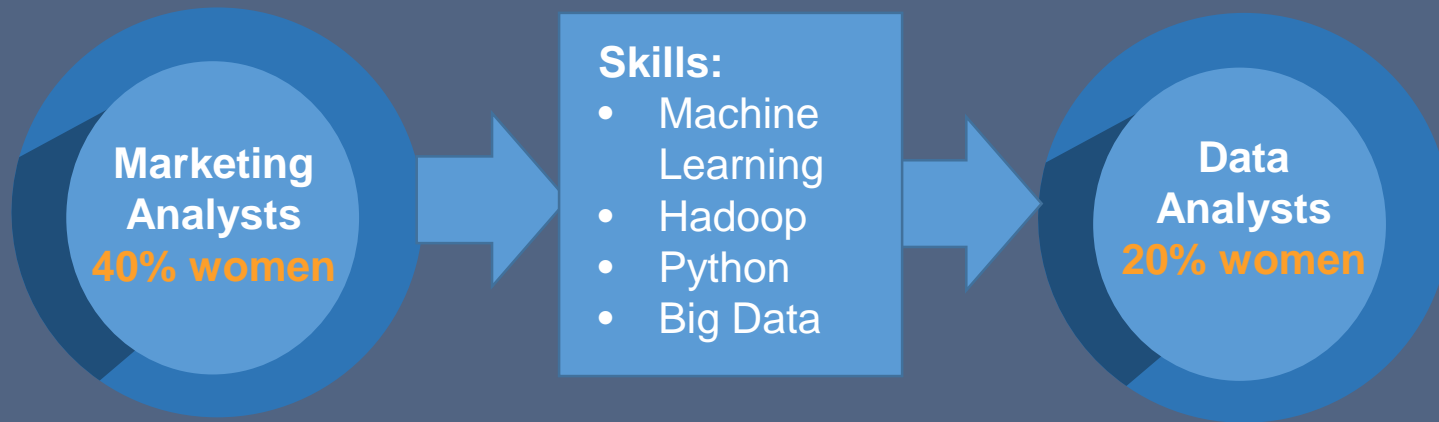
DATA SKILLS ADD VALUE ACROSS ROLES

SALARY BY SKILL



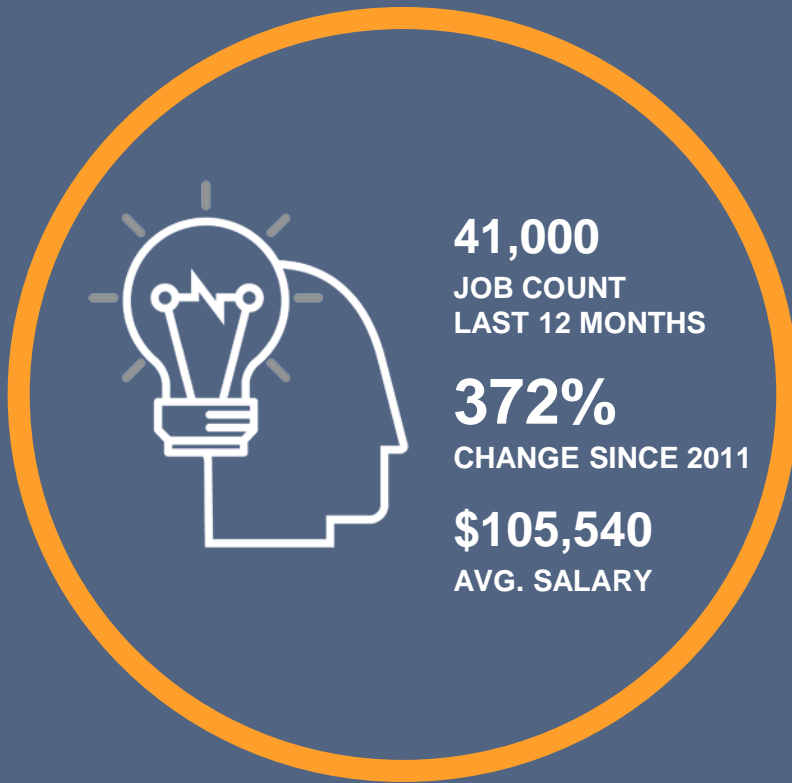
DATA SKILLS AND THE GLASS CEILING

DIVERSITY ISN'T A ZERO-SUM GAME

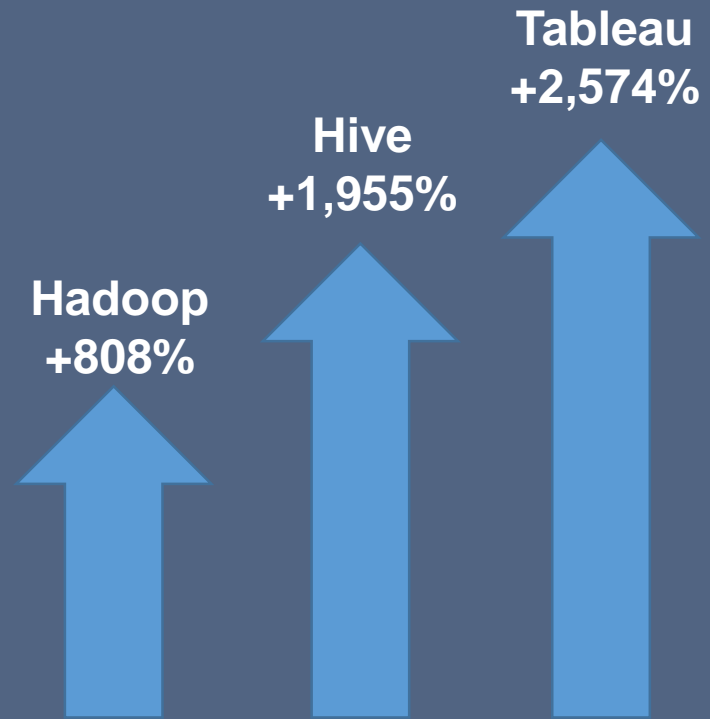


Data skills can be leveraged into higher-paying roles

THE DATA ECONOMY IS DYNAMIC CAN HIGHER EDUCATION KEEP UP?



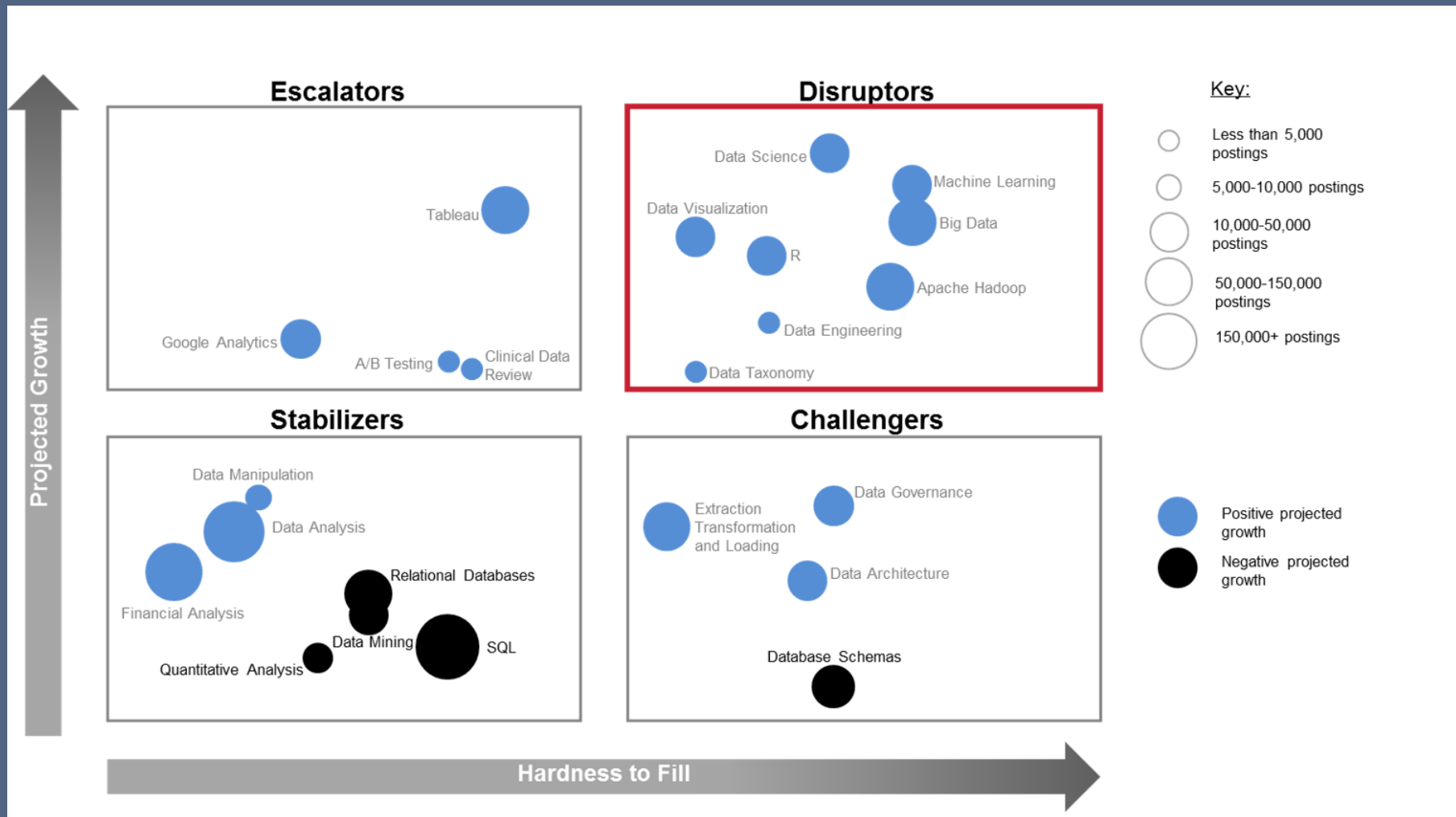
Example: Jobs in Data Analytics



Fastest growing skills in
Data Analytics jobs

BIG DATA IS DISRUPTING THE JOB MARKET

TARGET PROGRAMS TO THE MOST DISRUPTIVE SKILLS

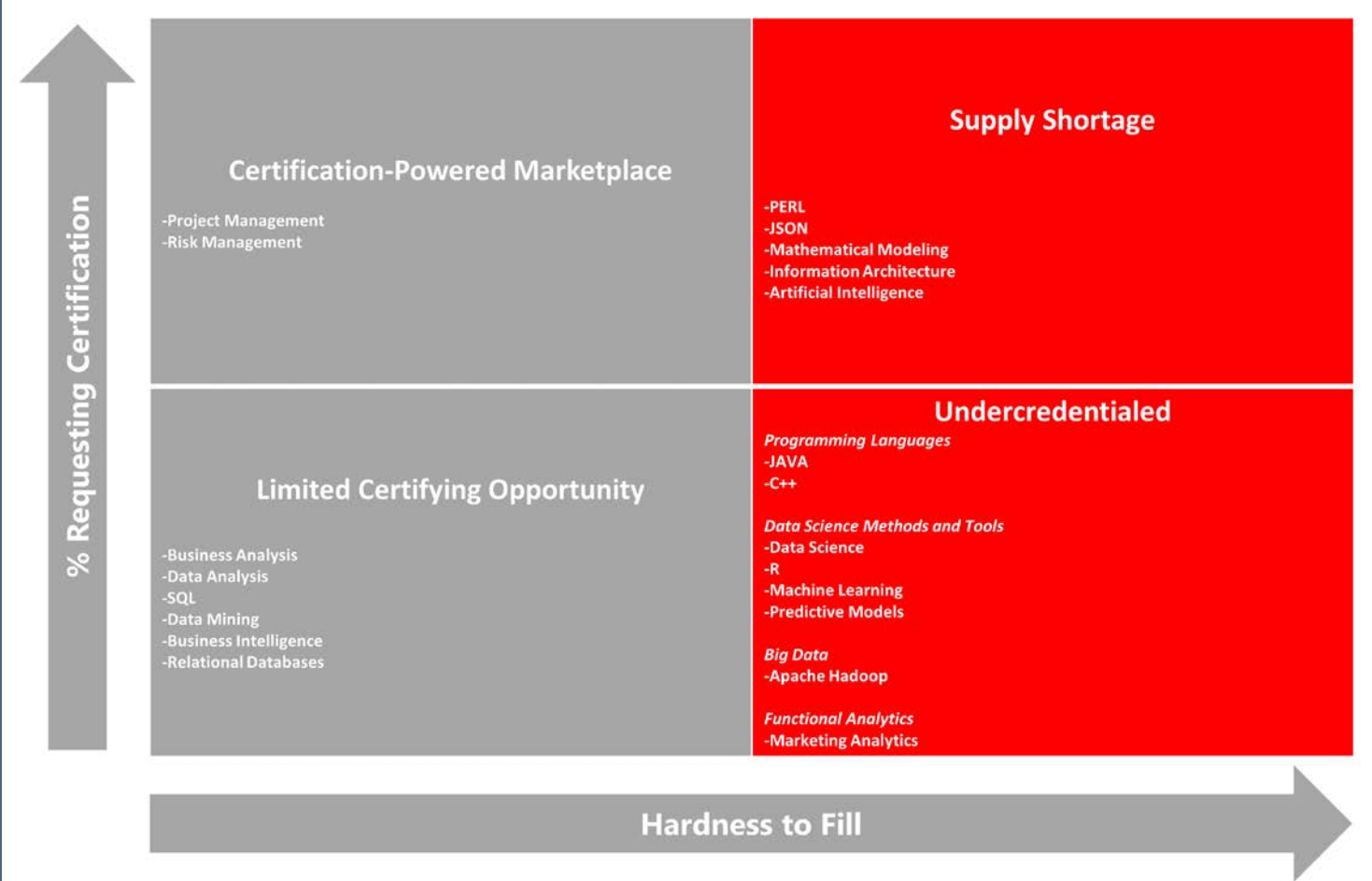


EMPLOYERS NEED BETTER VALIDATION OF SKILLS IN A NEW AND RAPIDLY CHANGING FIELD

| DSA Framework Category | % Requesting Experienced Workers (at least 3 years' prior work experience) | % Postings requiring MA or higher |
|-------------------------------------|--|-----------------------------------|
| All | 81% | 6% |
| Data-Driven Decision Makers | 88% | 5% |
| Functional Analysts | 71% | 6% |
| Data Systems Developers | 84% | 3% |
| Data Analysts | 76% | 6% |
| Data Scientists & Advanced Analysts | 78% | 39% |
| Analytics Managers | 94% | 11% |

IDENTIFY 'VALUE CERTIFICATIONS' OPPORTUNITIES TO BOOST CREDENTIALING

Certification Opportunity Landscape for Planning and Analysis Jobs



THE CHALLENGE IS ALSO THE SOLUTION

Use Data Science to...

Pick Up on Emerging Trends

Data analysis can serve as job market radar, picking up on new roles and skill sets (such as the Internet of Things) as they first emerge on the market. That gives educators and employers more room to react.

Identify Crucial Data Skills

Data analysis can map the “genome” of jobs, identifying DSA skills that are rewriting the DNA of existing jobs. Organizations can identify DSA skills that are most costly, most difficult to fill, or that provide the greatest career advantage. In addition, analytics allow a highly localized response.

Develop Industry-Specific Data Science Pathways

Higher education and industry can create specific training programs to bolster talent pipelines for key positions. This allows colleges to shape programs to meet industry needs and provide training in-depth.

Understand Existing Capabilities

Analytics talent may already exist within organizations. Firms can use analytics to identify current employees who could transition into their hardest-to-fill DSA roles.

DISRUPTION BRINGS OPPORTUNITY BUT YOU HAVE TO BE LOOKING AHEAD

Higher education has traditionally done a bad job of spotting the next big thing in the job market

Big data could change the market in unforeseen ways

Higher ed needs radar to pick up on emerging trends

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