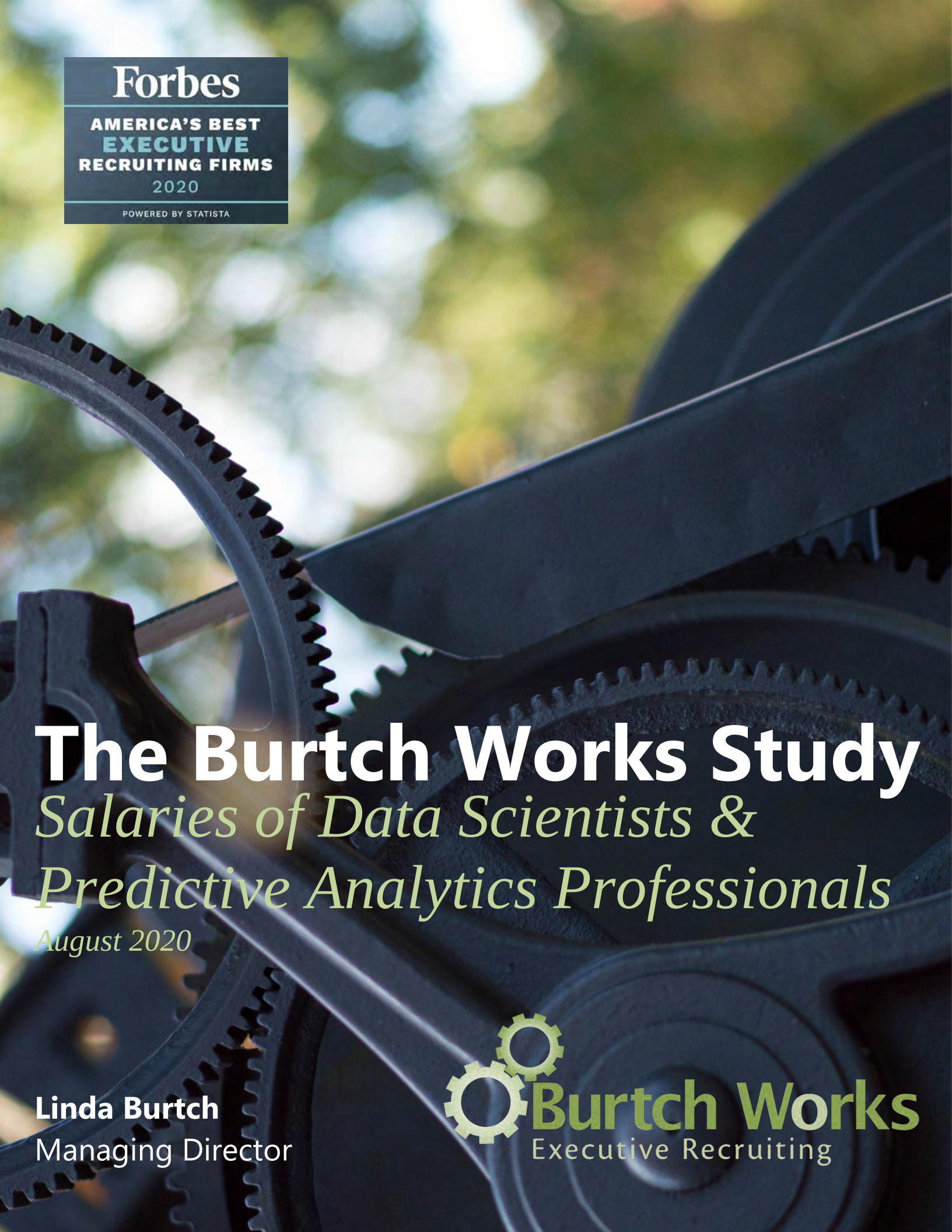

The Burtch Works Study

Salaries of Data Scientists & Predictive Analytics Professionals

August 2020

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SECTION 1

Introduction

Defining Data Science & Predictive Analytics Professionals

We have historically defined predictive analytics professionals (PAPs) as those who can "apply sophisticated quantitative skills to data describing transactions, interactions, or other behaviors to derive insights and prescribe actions".

PAPs are distinguished from business intelligence professionals or traditional financial analysts by the enormous quantity of data with which they work, well beyond what can be managed in Excel. This definition also encompasses data scientists, who are examined separately from PAPs in this study because of their distinguishing ability to work with unstructured data, which results in different compensation.

Data scientists, as we define them, are a subset of PAPs who have the computer science skills necessary to acquire and clean or transform unstructured or continuously streaming data, regardless of its format, size, or source. Unstructured data may include: video streams, audio data, social media web scrapes, sensor data, raw log files, or long blocks of written language.

This report focuses on both PAPs and the Data Scientist subset, showing compensation and demographic information for both groups separately and in comparison. For more information on how we identified predictive analytics professionals and data scientists, see Appendix A on page 48.

Foreword: Disrupting the Way We Work

2020 has been a year of massive disruption all across the US workforce. A global pandemic, a mass social justice movement, and a presidential election year, among other forces, are all having an incredible impact on our country, our lives, and the way we work.

Although we're releasing this report in August, our data collection period ended in April, which meant it was unlikely that these impacts would be apparent in our study data quite yet. However, for the past few months, in addition to our data analysis for this annual report, we've been hard at work gathering data that is more immediate to the current work environment as it continues to shift.

Since these two collections of data are separate, in the **Trends from This Year's Data** section we wanted to cover some of the trends we observed in this year's Burtch Works Study data, and in the **COVID-19 Impacts to the Hiring Market** section we'll be sharing additional data and insights we've been gathering specifically on COVID-19's impact to the data science & analytics hiring market, even though they are not technically reflected in the rest of this report.

2020 Salary & Demographic Trends

Compensation and demographic data of 1,742 PAPs and 503 data scientists are shared in this report, an update to our June 2019 release of The Burtch Works Study: Salaries of Data Scientists and Predictive Analytics Professionals. The data shared here were collected during the months following the collection periods of last years' studies and ending April 2020.

Our salary studies report base salary variations of PAPs and data scientists, both individual contributors and managers. We also report how base salaries have changed since last year's study. Finally, the report explains how salaries of PAPs and data scientists vary based on several characteristics including job level, industry, region, education, residency status, and gender.

For detailed analysis on this year's compensation trends, see Section 2 starting on page 16. For demographic trends and insights, see Section 3 starting on page 25.

1. Salaries Remained Mostly Steady, With Some Modest Increases

Across all job levels for both data scientists and predictive analytics professionals (PAPs), salary medians remained within a few percentage points of what we reported in 2019. While the median for data scientists at individual contributor level 3 decreased by 1%, all other levels either showed no change or increased from 1-3%. For additional details about how salaries vary from last year, see Section 2. For complete information about how salaries vary by demographic characteristics, see Section 3.

Predictive Analytics Professionals

The median base salary of individual contributors at level 1 is $80,000 and increases, based on job level, up to $135,000 for those at level 3. PAPs in management roles earn higher base salaries than individual contributors (see Figure 3 on page 21). Managers at level 1 earn a median base salary of $132,000, which increases to $250,000 for managers at level 3 (see Figure 5 on page 22).

When compared to 2019 data, salaries remained fairly steady, either showing no change or increasing slightly. The largest change was for individual contributors at level 2 where there was a

3% increase from 2019 (see Figure 3 on page 21 and Figure 5 on page 22).

Data Scientists

For data scientists, median base salaries for individual contributors range from $95,500 at level 1 to $165,000 at level 3 (see Figure 4 on page 21). For managers, median base salaries ranged from $150,750 at level 1 to $250,000 at level 3 (see Figure 6 on page 22).

In comparison to 2019 data, median base salaries for 2020 have either remained steady or risen slightly at most levels (see Figure 2 on page 20). The largest change was for managers at levels 1 and 2 where median base salaries increased by 3% compared to 2019 (see Figure 2 on page 20).

2. Data Scientists Continue to Earn Higher Salaries at Most Levels

In keeping with previous years, data scientists continue to earn higher salaries than other predictive analytics professionals at comparable job levels, and the differences are the most evident for individual contributors where data scientists earn from 19-30% more than PAPs (see Figure 7 on page 24).

This can be due to several factors including a higher prevalence of PhDs among data scientists, highly specialized skillsets required to analyze unstructured and/or streaming data, and smaller talent pool that can all drive up salaries. This salary premium decreases for managers and median salaries are equal for both data scientists and PAPs at MG-3, which is likely due to the fact that in leadership positions, management skills tend to be more critical than educational background and heavy technical expertise.

3. Early Career Professionals Continue to Flock to Data Science & Analytics

This year, the median years of experience for both samples was 6.0 years. A large percentage of professionals in both predictive analytics and data science have 10 or fewer years of experience: 64% for PAPs and 72% for data scientists (see Figure 30 on page 45). The increased visibility of both careers in recent years has led to a surge of interest from both students entering the market and career changers alike, which has caused both samples to skew further towards the early career levels.

4. Percentage of Women at Early Career Level is Rising

When examining the gender composition of different job levels in our predictive analytics sample over time, we're able to see a noticeable increase in the percentage of women individual contributors at level 1 (IC-1). In 2015, our IC-1 sample (professionals with 0-3 years' experience) was 28%, which has risen to 36% in 2020.

5. Business Degrees Losing Favor Amongst Both Groups

Looking at the degree specialty for the highest degree earned in both samples, there was a noticeable decline in the prevalence of Business degrees (which includes MBAs and Business Analytics degrees) for both groups. For PAPs, we noticed an increase in Math/Stats degrees, while in data science there was an increase in Engineering degrees. This may be due to candidates opting to strengthen their quantitative credentials for greater career opportunities over the more general MBA track.

COVID-19 Impacts to the Hiring Market: Our Latest Research

Back in March as lockdowns began to spread nationwide, we began several research initiatives to track the impact of the COVID-19 pandemic on the data science and analytics community, and to bring current, helpful information to the candidates, clients, students, and professors in our extended network.

What follows is a summary of some of the data we were able to collect and share, but additional information about all of these projects are tagged on our blog:
https://www.burtchworks.com/category/covid-19

1. Measuring the Impact of COVID-19 to the Analytics Community: March-May 2020

When it became apparent that the effects of COVID-19 on analytics teams were likely to be substantial, we collaborated with the International Institute for Analytics (IIA) to field a joint survey over the course of several months to determine how many teams were being impacted, as well as the most common effects to workload, staffing & hiring, and use of analytics to address the crisis.

Staffing & Hiring Impacts

By the end of May, the number of companies with staffing impacts had nearly tripled over the prior two months to 53.4%. It is also perhaps not surprising that large companies are thus far weathering the storm a bit better than small companies.

When we asked what types of staffing actions have been taken in cases where there *has* been action, by far the most prevalent action is some form of salary cuts, with nearly 80% of impacted analytics and data science organizations experiencing salary cuts. Furloughs (16%) and layoffs (32%) are less common, which is encouraging since those actions are more extreme.

Impact to Analytics Workload & Use of Analytics to Address the Crisis

Another high point is that while nearly 75% of organizations have been pulled into crisis-oriented analytics, there remain very few in a pure panic mode where everything is focused on the crisis (1.1%) and that number is approaching zero.

While 18.2% of organizations reported that decisions are being forced so quickly that there is no opportunity to use proper analytics to address them, the fact that 45% of organizations are keeping analytics front and center could be part of the reason why layoffs and furloughs are still the exception for analytics teams. Being critical to navigating the crisis may be helping to insulate analytics teams. We're seeing many data scientists and analytics professionals being pulled into projects related to COVID-19 since their skills are well suited to tracking and predicting trends related to the pandemic's increasing impact.

Figure A Impacts to analytics projects and workload in response to the COVID-19 crisis

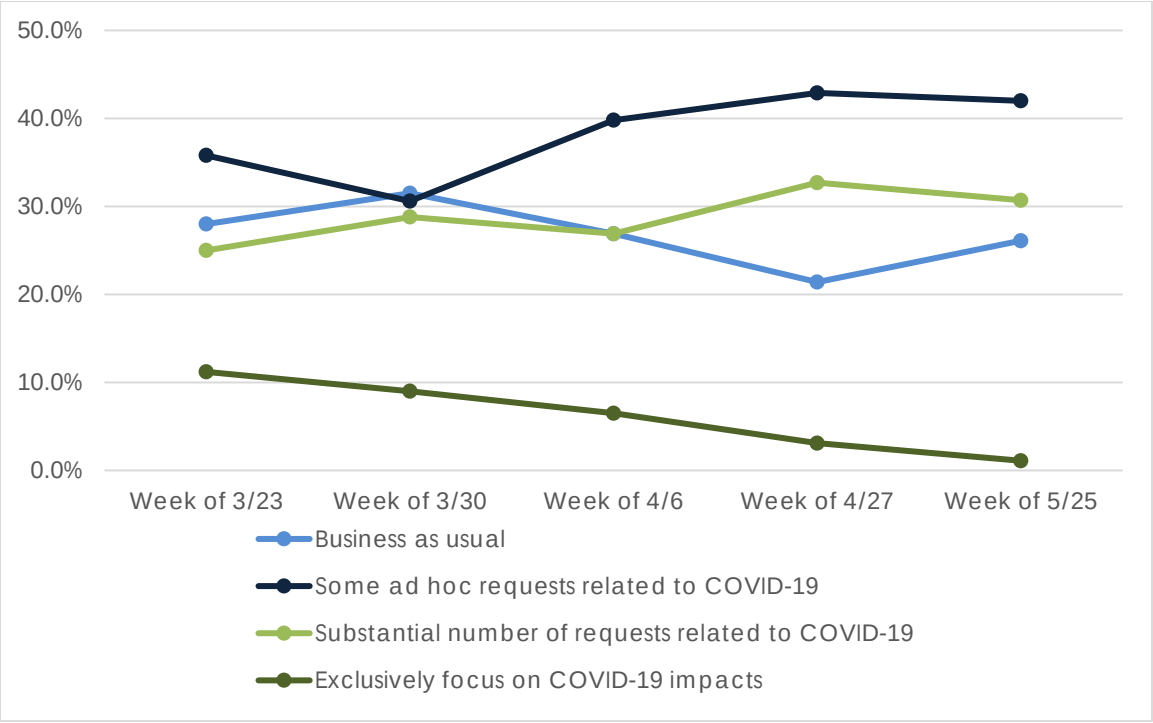
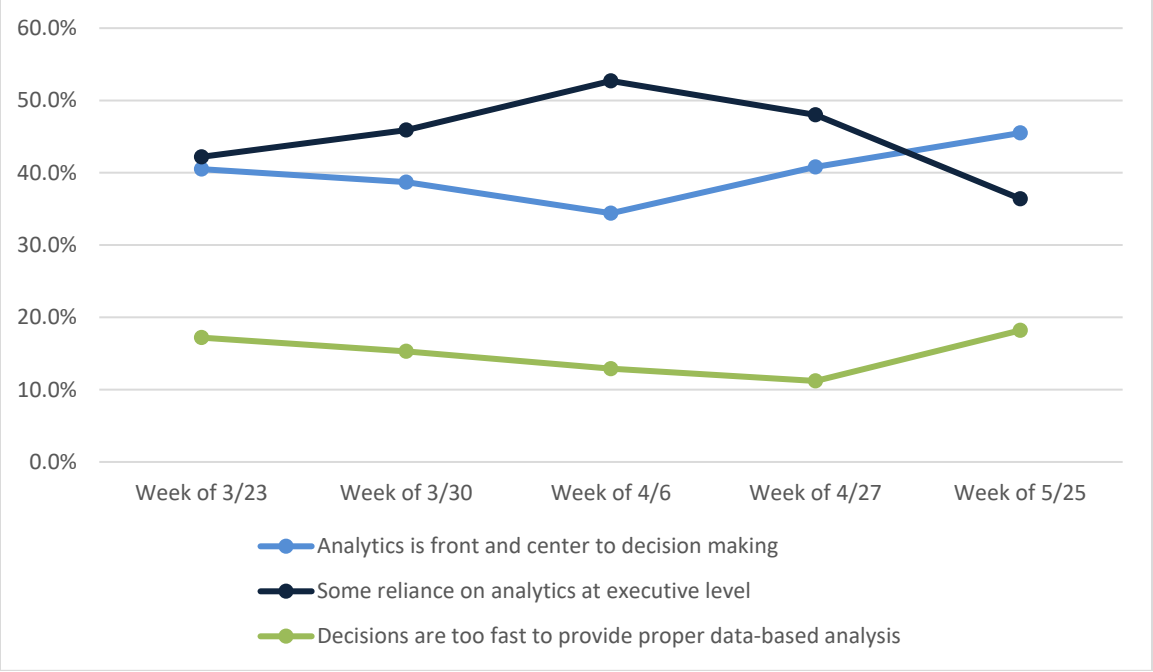


Figure B Use of analytics related to business decisions made in reaction to the COVID-19 crisis



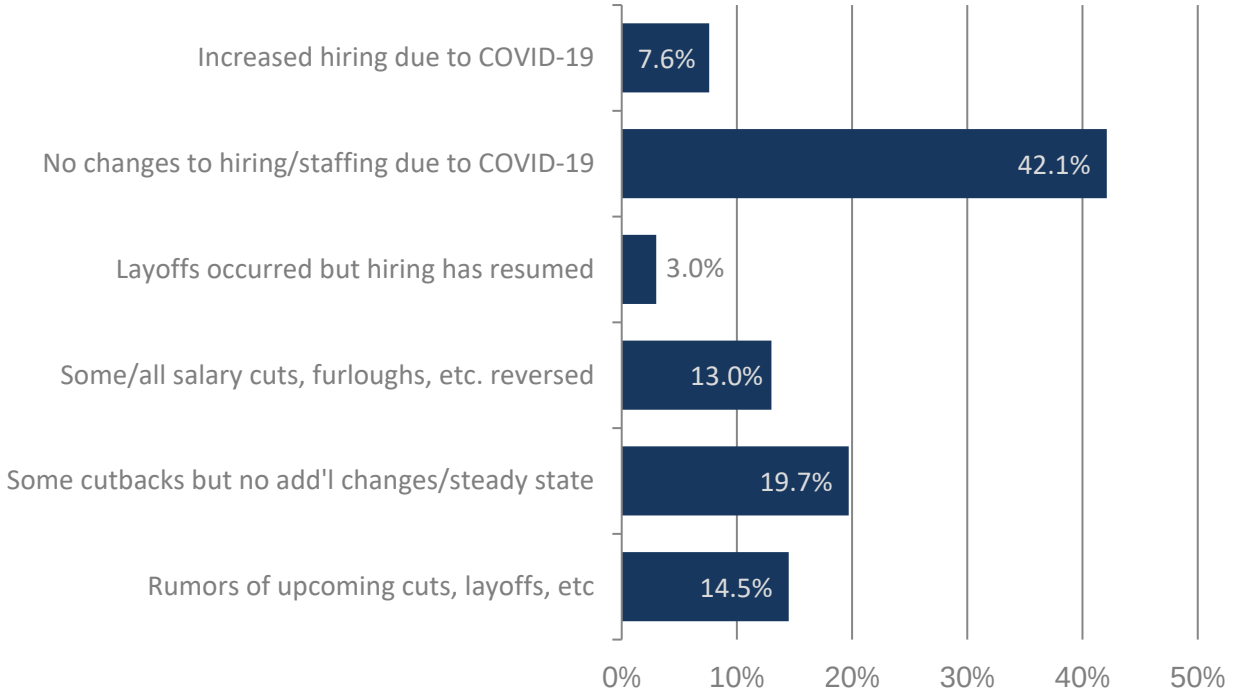
2. Measuring Ongoing Hiring Impacts, WFH Strategies, and Employee Sentiment: July 2020

As the results from our initial survey seemed to indicate that the worst impacts may be behind us, we decided to launch our Analytics Impact Survey 2.0 with new questions to adjust to shifts in the market, and to address the topics we continued to be asked about the most: hiring/layoffs, job/business security, and work from home timelines.

Status of Hiring/Staffing Impacts – Figure C

When asked to give an update on what best describes their team's current status regarding their hiring, we found that 7.6% of data scientists and analytics professionals reported their team actually increased hiring due to the COVID-19 crisis. While 42.1% reported no impact in terms of salary cuts, hiring freezes, layoffs, or furloughs, 35.7% of respondents said their team had been impacted by at least one of these options, and 14.5% said there were still rumors or plans of additional cuts on the way.

Figure C COVID-19's current impact on data science/analytics team hiring/staffing activity



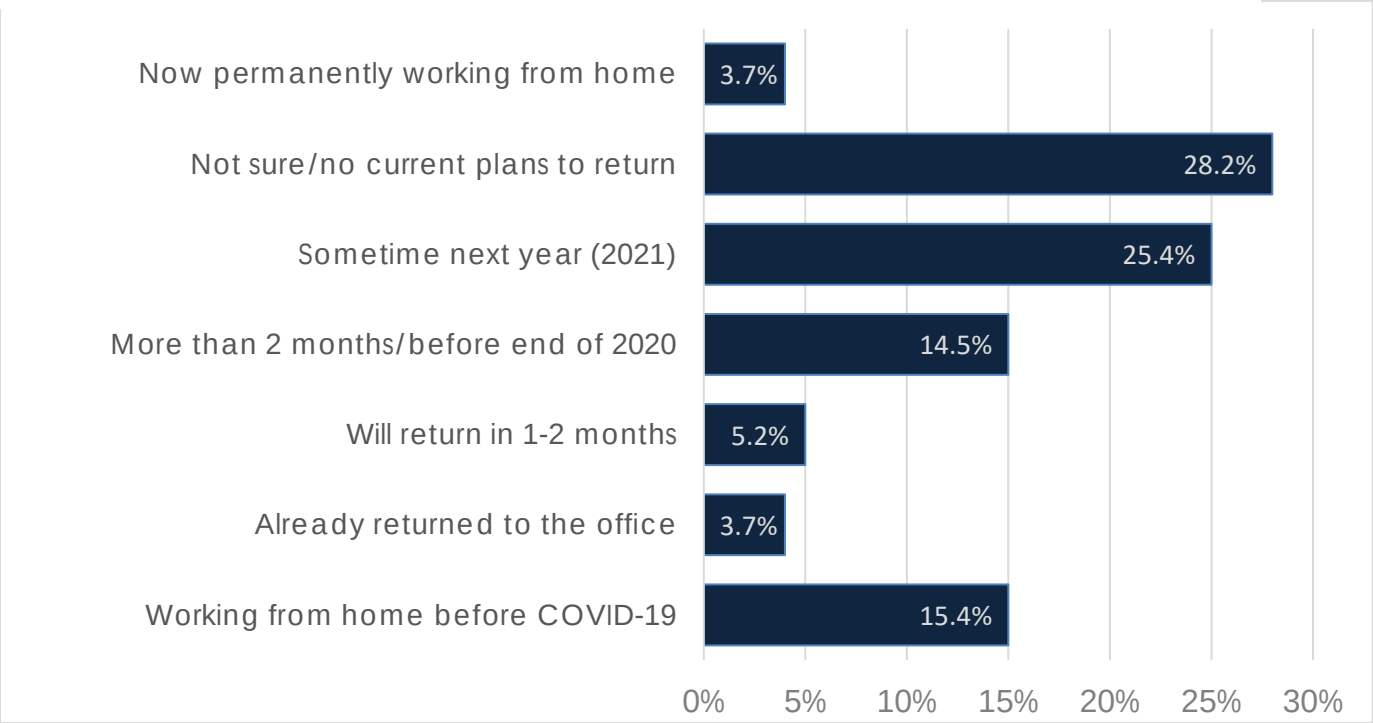
Work from Home Strategies – Figure D

When we'd surveyed our database in May, we discovered that nearly everyone at that point was working from home. By July, as more data science & analytics teams were looking to address the question of if or when to reopen the office, and how to do so, we felt this would be an interesting topic to ask about in our new survey.

We found that 15.4% of respondents were already working from home before the crisis, with an additional 3.7% that have now been moved to permanently working from home. While a small percentage (3.7%) reported already being back in the office, 19.7% said they were planning to return at some point before the end of the year. Just over a quarter (25.4%) reported that they

were planning to return sometime in 2021, while the largest portion (28.2%) said that plans were still undecided.

Figure D Current return to office/work from home plans related to COVID-19



Employee Sentiment: Personal vs. Business Stability – Figures E & F

Our last question aimed to determine whether employees felt generally positive, negative, or neutral, both about their personal job stability and their company's business stability. The results lined up relatively closely – employees generally felt the same sentiment about both aspects rather than a mix. We found 67.7% of respondents feeling positive about their personal situation, and 64.4% feeling positive about their company's business situation. In terms of negative sentiment, 17.6% of respondents reported feeling negative about their personal stability and 18.2% felt negatively about their company's stability.

Figure E Current sentiment about **personal job stability**

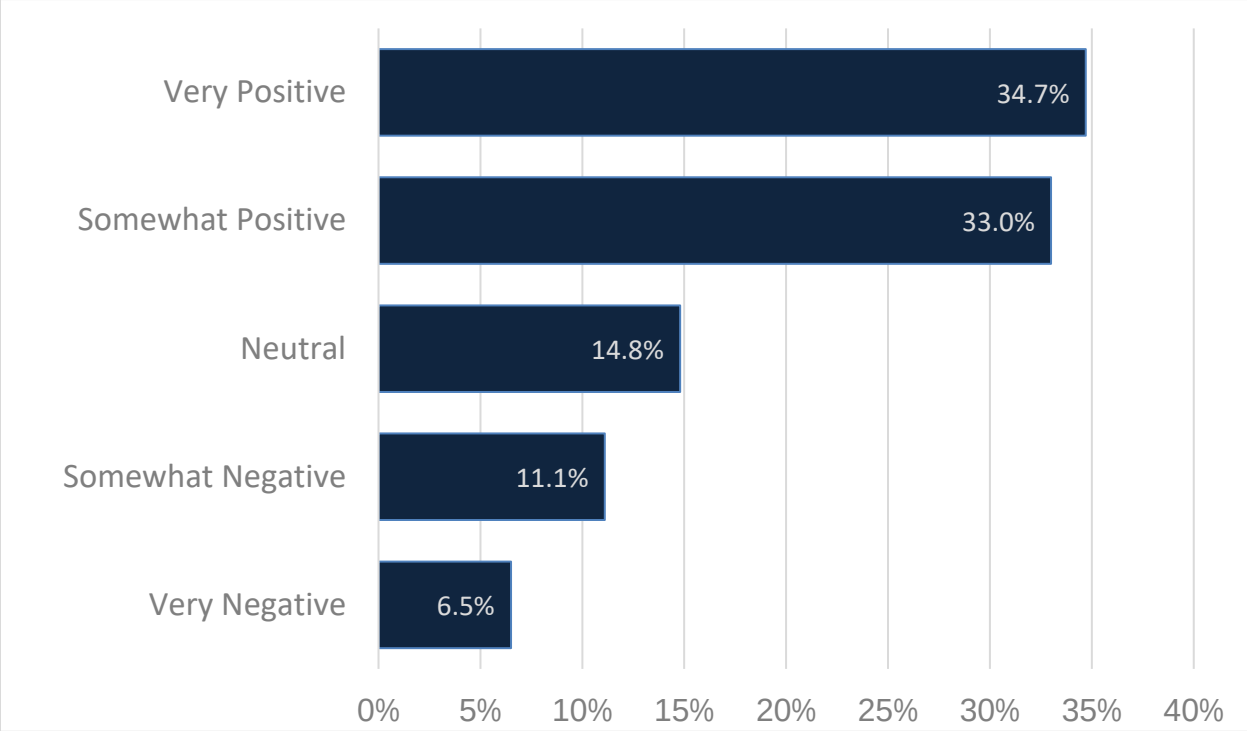
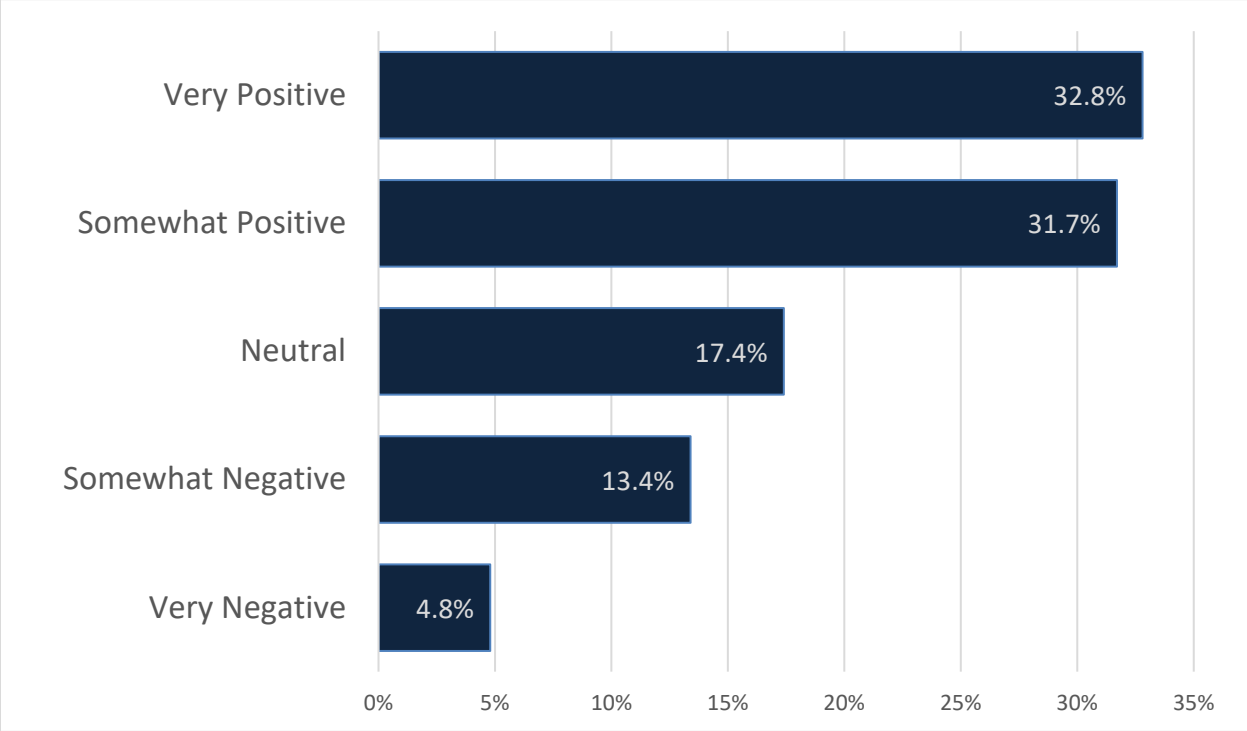


Figure F Current sentiment about **company's business stability**



3. COVID-19 Leaves Students & Grads with Cancelled Internships, Rescinded Job Offers, and More

Among the many cascading effects of the ongoing COVID-19 pandemic has been how data science & analytics students and graduates are seeing their internships and job search plans derailed.

While some have seen internships outright cancelled, the majority of companies moved forward with their internship programs online or remote, which is not without its challenges.
We spoke to students and professors from about 30 different data science & analytics programs across the US, and they reported many challenges impacting student internships this year including:

1. Some companies are moving forward with internships but shortening the length of their program.
2. Logistical issues providing students with technology to participate (such as laptops).
3. Programs may not be able to accommodate international students who have already left the country.
4. Uncertainty about whether internships will be able to translate to full-time opportunities.

We also found that the vast majority of programs – 90% – had at least some of their job seeking students impacted in some way by COVID-19. The most common impact was disruption of interviews, which is not surprising considering how many companies have been freezing their hiring or even going through layoffs. Unfortunately, 37% of schools we talked to knew of students who had secured job offers which ended up being rescinded.

At this stage, there are many questions among students, educators, and recent graduates about what lasting effects this crisis might have on their career prospects moving forward. Schools are grappling with the decision of whether to reopen their campuses, visa policy affecting international students (of which there are many in analytics and data science) has been in flux, and some graduates are having to navigate their first job in a remote-only environment with less or no access to the collaboration and networking found in the in-person office environment.

Looking Forward: Hiring Market Trends and Other Insights

With so much disruption in 2020 already, we wanted to also look ahead to next year and beyond, and share some insights about how some of today's hiring market trends may impact our work lives for years to come.

1. Potential Impacts to 2021 Overall Salary Data:

Widespread Salary Cuts May Decrease Median Salaries

Due to the prevalence of salary cuts impacting data science & analytics teams this year, we may see downward pressure on salaries impacting next year's data. Bonuses are also likely to be negatively impacted.

Layoffs and Furloughs May Impact Job Offers & Candidate Negotiation Power

At the moment, we are not seeing any evidence of job offers being lower than expected as a result of the current crisis. From what we've seen, larger companies at least are currently staying within their prescribed salary bands. However, as this crisis continues it is possible that will change, which could have an effect on 2021 salaries. With the prevalence of layoffs and furloughs disrupting the career plans of many candidates, this may also have an impact on their ability to negotiate higher salaries, which has the potential to flatten salary increases at least temporarily.

Full Impact of Industry Disruption is Likely Yet to Come

Many industries and companies are being hugely disrupted as a result of COVID-19, and the market will likely continue to shift as some organizations that were more "downstream" from the immediate impact of the crisis are now starting to lay off their staff, including some consulting firms, ad agencies, industrial, software, financial services, etc.

Childcare & School Closings Increasing Requests for Modified Schedules

With disruption to childcare and school closings, we've been hearing from some managers that they're seeing an increase in requests for reduced or modified schedules, which could in turn have an impact on salaries.

2. Interview Process Has Become Faster & More Flexible

For those companies that are hiring, we are seeing a much faster interview process because it's easier to schedule. With vacations and travel mostly on hold and many candidates still working from home, there is more flexibility, especially since back-to-back on-site interview schedules can now potentially be more spread out to accommodate different schedules.

3. Start Times Speed Up Due to Remote Work

Because of the current prevalence of remote work, this has quickened start time for candidates that would have typically taken 5 weeks to relocate. Employers have been shipping computers to get talent on board faster to tackle data projects immediately, and in many cases relocation has been postponed due to safety concerns.

4. Technical Assessments Prioritized to Evaluate Technical Skills Sooner in Hiring Process

Given that the interview process has largely shifted to be entirely virtual, we are seeing more of an emphasis to evaluate a candidate's technical skills earlier in the process, often even before a scheduled interview with a hiring manager. This could include technical screenings along with case study presentations.

5. Impact to Industry Demographics

While some industries and companies are finding themselves in an advantageous position if they have products or services that have increased in demand as a result of the COVID-19 crisis, some have found themselves struggling to adapt their business models with travel restrictions, lockdowns, and rapid shifts in demand. Industries such as retail, travel, or hospitality may lose jobs, or areas like tech may increase, so we'll be keeping a close eye on industry demographic data to see whether we can identify any such changes in our 2021 report.

6. Location Shifts: Candidates Leaving the West Coast, Advantage to Suburban Offices?

With the increase in startups going under and some companies announcing permanent WFH strategies, it is likely that the movement of candidates out of the West Coast will accelerate. This is particularly affecting areas like the Bay Area and Seattle, which was already underway in recent years as a result of the high cost of living and lack of affordable housing. This could impact salaries if professionals move to lower cost of living areas and as a result receive lower salaries. It is also yet to be seen whether lockdown restrictions and avoidance of public transit coupled with a more favorable remote work environment could favor suburban offices.

7. With More Talent Open to Change, It's an Advantageous Time to Hire

For some teams, the crisis has had a positive impact on their hiring. Talent that potential employers would not otherwise have access to may be available if they find themselves laid off, furloughed, or otherwise open to make a change because of industry uncertainty. We're already seeing an increase in private equity groups, in the interest of accurately timing business decisions, who have been picking up additional analytics talent throughout the crisis.

8. With Increased Remote Work, Transition to the Cloud is Speeding Up

Due to the increase in remote work, more companies are speeding up their transition to the cloud for their data needs. As a result, experience with cloud computing will be more critical for candidates to stay marketable.

9. Ongoing Competition for Data Science & Analytics Talent

Despite recent job market disruption, we're still seeing fierce competition for top tier talent, with many in-demand candidates receiving multiple offers quickly.

About Burtch Works

Burtch Works Executive Recruiting is the leading resource for quantitative talent, job opportunities, and information about hiring and compensation trends in this industry. Our team has decades of experience in their quantitative specialties, which include predictive analytics, data science, data engineering, quantitative business analytics, web analytics, credit/risk analytics, marketing research, and many more. Each recruiter is well-versed in the subtle nuances of their area of expertise, allowing them to closely follow the talent movement and hiring trends unique to each area, and find individuals perfectly suited to each role.

As data-driven practices have become a necessary strategy to remain competitive, the quantitative fields continue to experience incredible growth. Burtch Works has built a diverse network of tens of thousands of professionals to address the growing number of quantitative positions nationwide, and this network is the foundation of a business built on long-standing relationships with both candidates and clients. Linda Burtch, Burtch Works' Founder and Managing Director, emphasizes that the most rewarding aspect of her career is creating the perfect match, and she has established a dedicated team of recruiters who share this vision for Burtch Works.

Over her 35+ years of recruiting in quantitative disciplines, Linda Burtch has developed an especially comprehensive understanding of the analytics fields. She often writes on topics of interest to the quantitative community, and has maintained a blog on hiring trends for over 10 years, keeping her finger on the pulse of current trends. She has been interviewed for her insights on the data science and analytics talent market by *The New York Times, The Wall Street Journal, CNBC, Mashable, Forbes, The Chicago Tribune, The Economist, Bloomberg, Analytics Magazine, InformationWeek, Hunt Scanlon*, and many more. This year Burtch Works is proud to once again have been recognized by *Forbes* as one of America's Best Recruiting Firms for the third year running.

This year, Burtch Works expanded its research and involvement in the data science and analytics community in response to the COVID-19 pandemic. The joint surveys Burtch Works produces in partnership with the International Institute for Analytics (IIA) have been an invaluable resource for analytics teams navigating the still evolving "new normal" of 2020. In addition, Burtch Works has published other studies and research on current hiring trends, the job market, and how teams are adapting to shifts in the quantitative landscape.

By maintaining such strong relationships with candidates and clients, Burtch Works has the unique opportunity to examine hiring and compensation trends over time, and publishes several highly-anticipated studies each year that investigate demographic and compensation data for predictive analytics, marketing research, and data science professionals. *The Burtch Works Studies* provide an exceptional vantage point on compensation for these professionals across the country, and contain critical information both for individuals mapping their career strategy, and for hiring managers hoping to recruit and retain outstanding personnel to their teams.

SECTION 2

Data Science & Predictive Analytics Professionals: Compensation Changes

The Sample

This sample contains 1,742 predictive analytics professionals (PAPs) and 503 data scientists of the nearly 40,000 quantitative professionals with whom Burtch Works maintains contact. Burtch Works collected the data for this study during interviews conducted over the months immediately following the period of interviews for the 2019 study, with data collection ending in April 2020. Professionals were included in the sample only if (1) they satisfied Burtch Works' criteria for PAPs and data scientists, and (2) Burtch Works obtained complete information about that individual's compensation, demographic, and job characteristics.

For more details on how Burtch Works distinguishes between PAPs and the data scientist subset, see **Identifying Data Science & Predictive Analytics Professionals** on page 48.

How Changes in Compensation Were Measured

While some of the 1,742 PAPs and 503 data scientists in this sample were also in the samples for our previous studies (published annually since 2013), others were not. Therefore, changes in compensation were not measured by differencing current compensation and compensation reported for the previous study and then taking medians (and other percentiles) of the differences. Instead, changes were measured by comparing medians (and other percentiles) of current compensation to those reported in last year's study.

Changes in Base Salaries

Predictive Analytics Professionals

- For individual contributors at level 1, the median base salary remained steady compared to 2019 while those at levels 2 and 3 increased slightly (see Figure 1 on page 19).

- Median salaries for managers held fairly steady this year, with the largest increase at level 1(2%) (see Figure 1 on page 19).

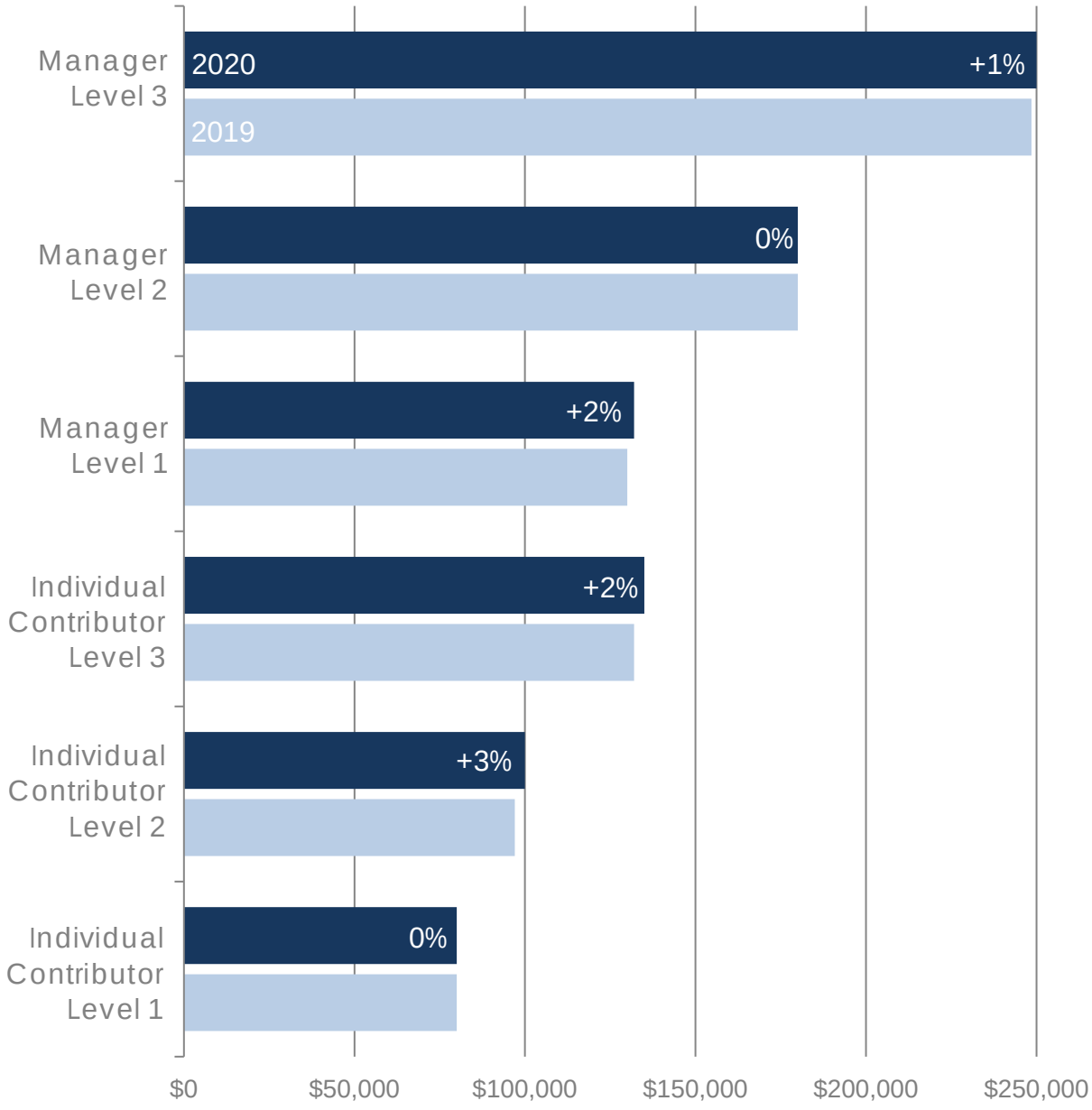
Data Scientists

- Median base salaries for data scientists held steady or increased slightly (by 1-3%) across most levels (see Figure 2 on page 20). good The greatest increase in median base salary was for managers at levels 1 and 2 (3%). good Median salaries for individual contributors at level 3 decreased slightly (-1%).

- The increase in median base salaries for managers at levels 1 and 2 (3% increase at both levels) may be influenced by the need for more professional experience in a discipline that is still relatively young.

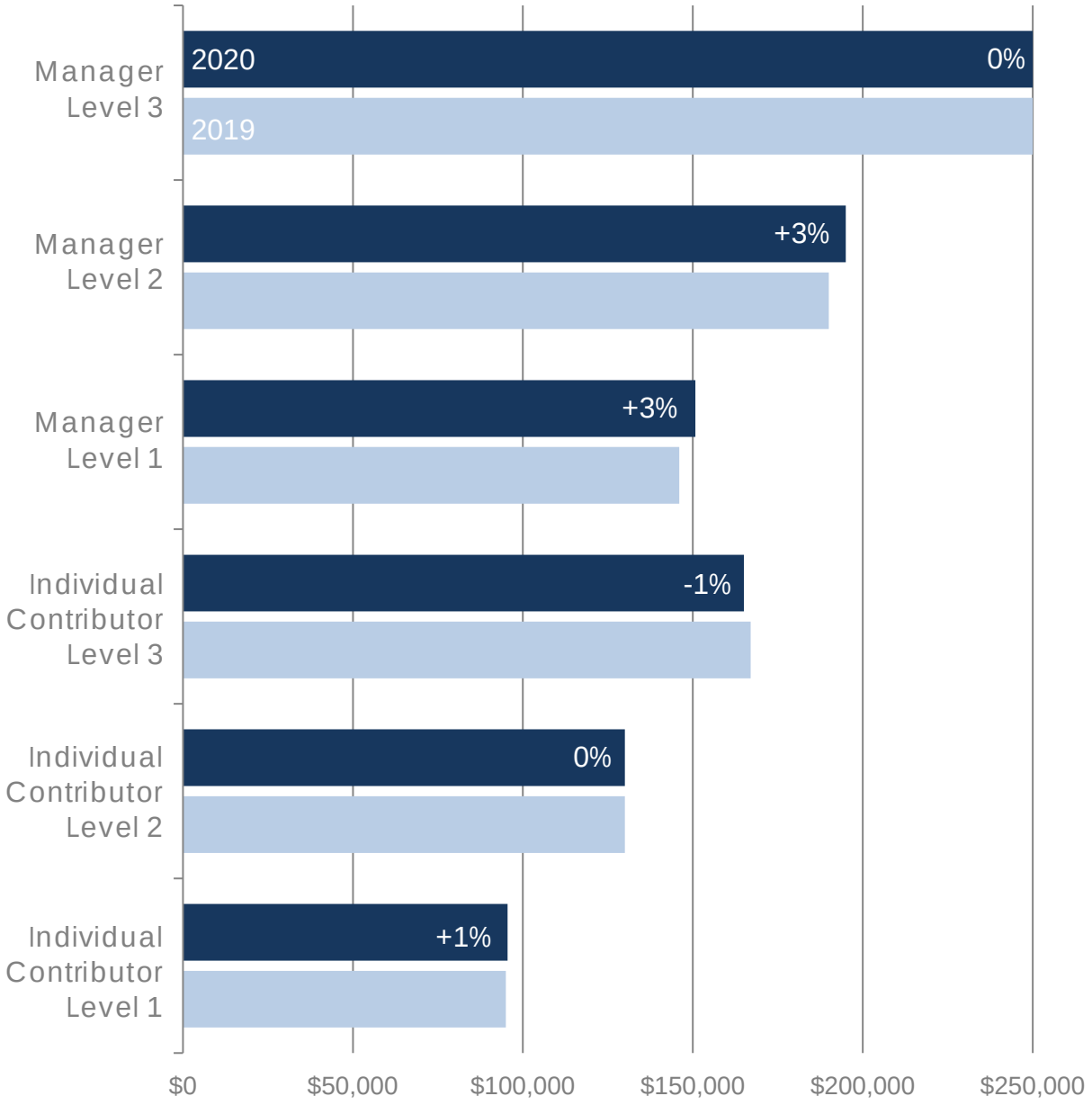
- Median base salaries for individual contributors at level 1 has remained fairly steady over the last few years as the supply of incoming graduates is not as scarce as it once was.

Figure 1 Comparison of **Predictive Analytics Professionals'** Median Base Salaries by Job Category



*See page 47 for job category definitions.

Figure 2 Comparison of **Data Scientists'** Median Base Salaries by Job Category



*See page 47 for job category definitions.

Figure 3 Change in Base Salaries of **Predictive Analytics** Individual Contributors by Job Level

Job Level	Year	25%	Median	Mean	75%	N
Individual Contributor Level 1	2020	$70,000	$80,000	$79,210	$85,000	429
	2019	$70,000	$80,000	$81,607	$90,000	308
	Change	0%	0%	-3%	-6%	
Individual Contributor Level 2	2020	$90,000	$100,000	$103,913	$115,000	383
	2019	$88,400	$97,000	$100,532	$114,000	345
	Change	+2%	+3%	+3%	+1%	
Individual Contributor Level 3	2020	$119,000	$135,000	$137,184	$150,000	230
	2019	$120,000	$132,000	$140,032	$153,000	297
	Change	-1%	+2%	-2%	-2%	

Figure 4 Change in Base Salaries of **Data Science** Individual Contributors by Job Level

Job Level	Year	25%	Median	Mean	75%	N
Individual Contributor Level 1	2020	$85,000	$95,500	$97,394	$110,000	124
	2019	$85,000	$95,000	$97,749	$110,000	73
	Change	0%	+1%	-<1%%	0%	
Individual Contributor Level 2	2020	$120,000	$130,000	$130,750	$140,000	132
	2019	$115,000	$130,000	$133,324	$150,000	104
	Change	+4%	0%	-2%	-7%	
Individual Contributor Level 3	2020	$148,000	$165,000	$172,309	$185,000	55
	2019	$147,000	$167,000	$171,755	$200,000	55
	Change	+1%	-1%	+<1%	-8%	

*See page 47 for job category definitions.

Figure 5 Change in Base Salaries of **Predictive Analytics** Managers by Job Level

Job Level	Year	25%	Median	Mean	75%	N
Manager Level 1	2020	$119,000	$132,000	$132,591	$150,000	252
	2019	$120,000	$130,000	$133,742	$148,800	282
	Change	-1%	+2%	-1%	+1%	
Manager Level 2	2020	$160,000	$180,000	$181,291	$200,000	300
	2019	$160,000	$180,000	$180,605	$200,000	432
	Change	0%	0%	+<1%	0%	
Manager Level 3	2020	$220,000	$250,000	$258,432	$285,000	148
	2019	$220,000	$248,000	$257,591	$285,000	176
	Change	0%	+<1%	0%	0%	

Figure 6 Change in Base Salaries of **Data Science** Managers by Job Level

Job Level	Year	25%	Median	Mean	75%	N
Manager Level 1	2020	$132,000	$150,750	$149,268	$164,000	42
	2019	$130,000	$146,000	$146,475	$157,750	68
	Change	+2%	+3%	+2%	+4%	
Manager Level 2	2020	$180,000	$195,000	$193,141	$210,000	109
	2019	$175,000	$190,000	$191,831	$215,000	77
	Change	+3%	+3%	+1%	-2%	
Manager Level 3	2019	$210,000	$250,000	$250,927	$275,000	41
	2019	$230,000	$250,000	$257,443	$276,400	44
	Change	-9%	0%	-3%	-1%	

*See page 47 for job category definitions.

Compensation | Data Science vs. Others in Predictive Analytics

Burtch Works differentiates data scientists from other predictive analytics professionals (see **Identifying Data Scientists & Predictive Analytics Professionals** on page 48), and reports their respective salaries in this study. Historically, data science salaries are quite different than those seen in predictive analytics, and even though there are some indications of the two groups blending, the compensation trend continues this year.

- In every job category except level 3 managers, higher median base salaries continue to be seen among data scientists when compared to other predictive analytics professionals.

- The difference in base salaries is largest among individual contributors, where data scientists earn from 19% to 30% more than other predictive analytics professionals (see Figure 7 on page 20). Level 1 individual contributors, for instance, earn a median base salary of $95,500 in data science and $80,000 in other predictive analytics roles (see Figures 3 and 4 on page 21).

- For managers, the difference in median base salaries is less pronounced likely because emphasis shifts more toward leadership than technical skills, especially in more senior management roles. However, data science managers still earn more than others within predictive analytics except at the most senior levels. Depending on the job level, managers within data science have median base salaries that are up to 14% higher than others within predictive analytics (see Figure 7 on page 24).

There are several factors which impact this pay difference:

- Data scientists possess more specialized data skills that allow them to work with large, unstructured or streaming datasets (see **Identifying Data Scientists & Predictive Analytics Professionals** on page 48).

- Nearly triple the percentage of data scientists hold a PhD compared to those in predictive analytics: 43% vs. 15% (see Figure 8 on page 27). Since professionals with a PhD tend to earn more, this is a contributing factor in higher compensation for data scientists.

- There continues to be considerable attention on the data science profession and high demand for these professionals, leading to increased competition for talent and high salaries in comparison to PAPs.

How We Define Data Scientists vs. Others in Predictive Analytics

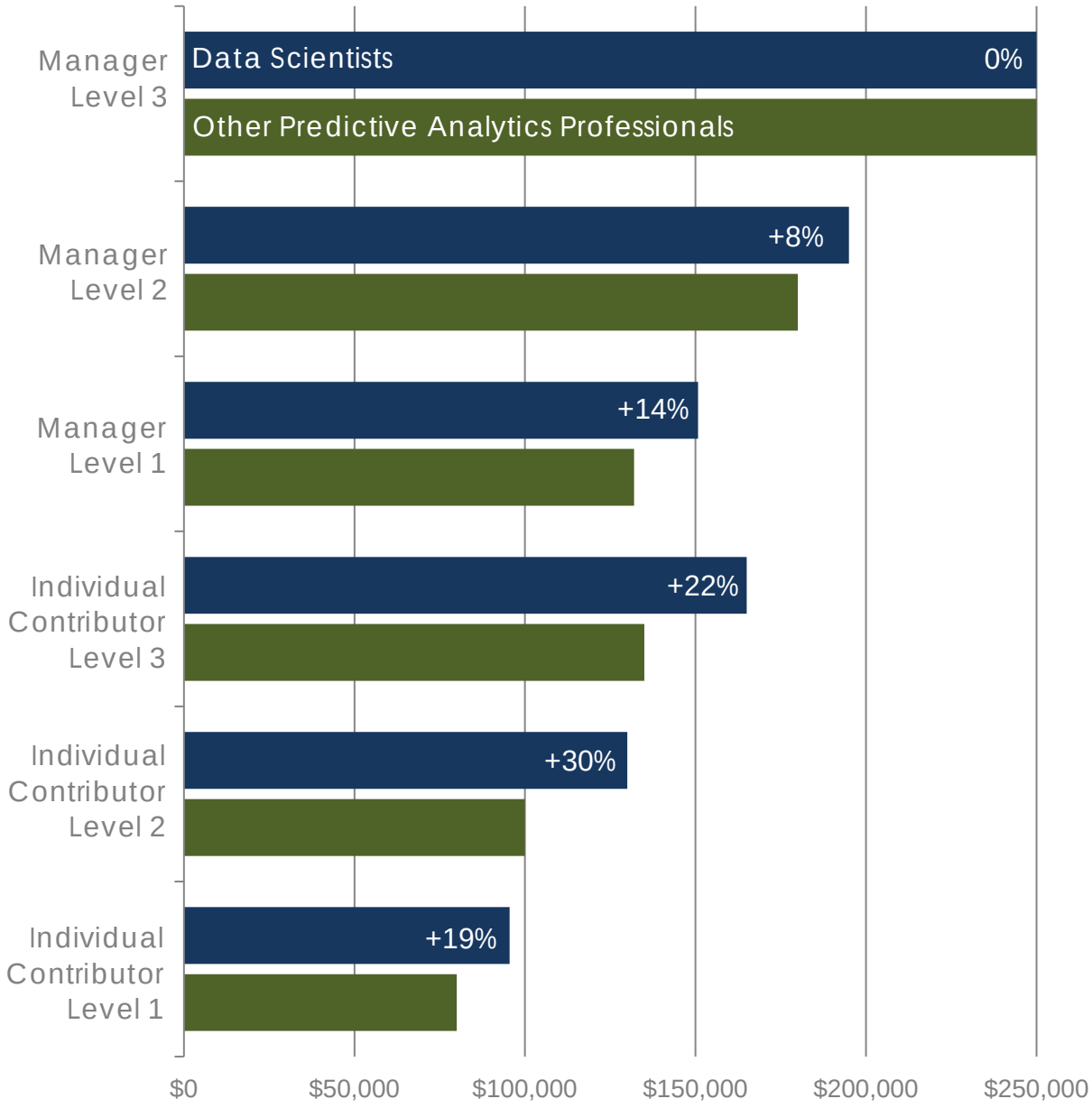
Burtch Works considers a data scientist to be a specific type of predictive analytics professional. Both groups analyze data to glean insights and prescribe action, but data scientists focus on cleaning and analyzing unstructured or streaming data, using sophisticated computer science and programming skills that are not typically seen in the profiles of other predictive analytics professionals. In short, the two groups' skillsets and experience focus on the following:

Data Scientists:
- Quantitative skills
- Structured and unstructured, streaming data
- Computer science/coding

Other Predictive Analytics Professionals:
- Quantitative skills
- Structured data

See page 48 for more information on how we identify data scientists and predictive analytics professionals.

Figure 7 Median Base Salaries of Data Scientists vs. Others in Predictive Analytics



*See page 51 for job category definitions.

SECTION 3

Data Science & Predictive Analytics Professionals: Demographic Profile

Predictive Analytics Professionals

- 83% of PAPs sampled hold an advanced degree. 68% hold a Master's degree and another 15% hold a PhD (see Figure 8 on page 27).
- At most job levels, PAPs earn a higher base salary when they hold an advanced degree, and PAPs with a PhD outearn those with a Masters at all levels except manager level 3 where leadership skills are emphasized more than educational background (See Figure 10 on page 28 and Figure 12 on page 29).
- Over time, the proportion of professionals holding a Bachelors degree versus a graduate degree has increased. In 2015, 14% of PAPs held a Bachelors as their highest degree earned while in 2020, 17% of PAPs earned a Bachelors as their highest degree.
- Math/Statistics continue to be the most common area of study for PAPs with 40% of this year's sample falling into that category. In fact, this has risen since 2019 when 34% of the sample held a Math/Statistics degree.

Data Scientists

- Data scientists are even more likely to hold an advanced degree (see Figure 8 on page 29), with 94% of those sampled having a Master's or PhD (50% hold a Master's and another 43% hold a PhD as their highest degree. 1% of the sample were classified as having all but dissertation completed of their PhD work).
- PhD data scientists earn higher median base salaries than those with a Master's as their highest degree at every level except level 2 and level 3 managers, where in some cases, work experience and management skills may play a larger role than education (see Figure 11 on page 28 and Figure 13 on page 29).
- Data scientists differ from PAPs in the areas of study (based on highest degree) that they come from. While for both groups mathematics/statistics was the largest percentage, data scientists were far more likely than PAPs to come from a computer science, engineering, or natural science educational background (see Figure 9 on page 27).
- A smaller percentage of data scientists are coming out of business-focused programs and a larger percentage are coming from engineering backgrounds. This may indicate that incoming data scientists are questioning the long-term value of an MBA versus a more quantitatively focused degree.

Figure 8 Distribution of Data Scientists & Predictive Analytics Professionals by Education

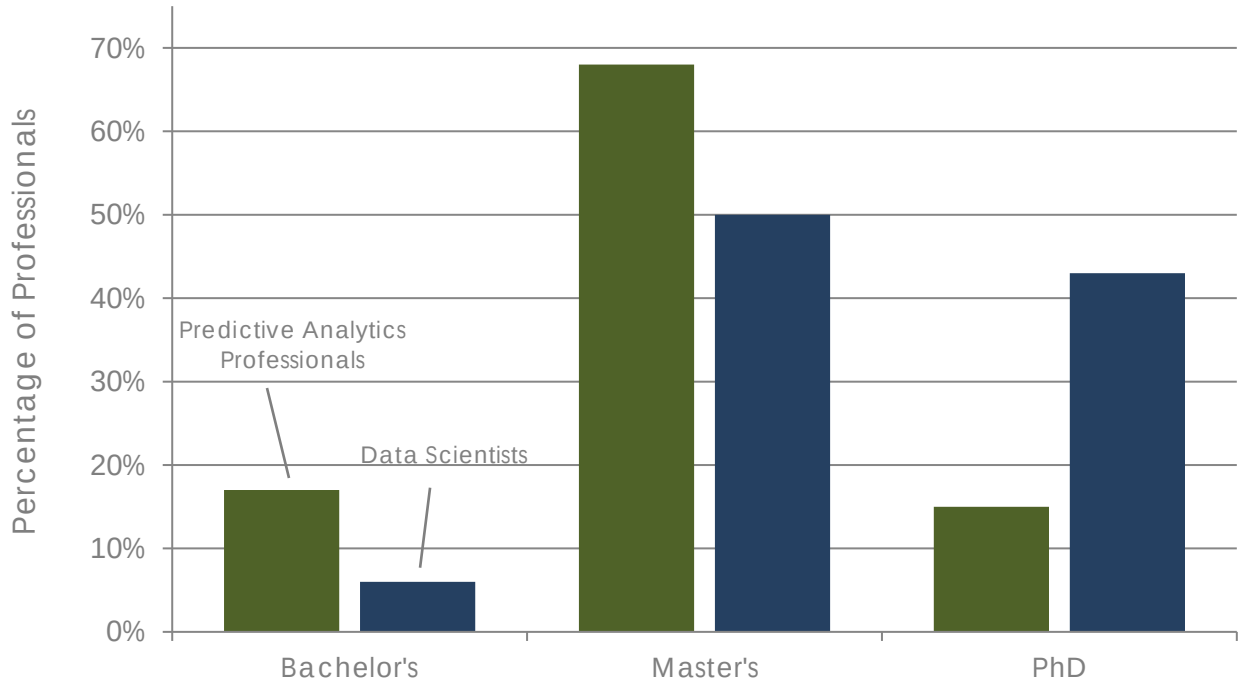


Figure 9 Distribution of Data Science & Predictive Analytics Professionals by Area of Study

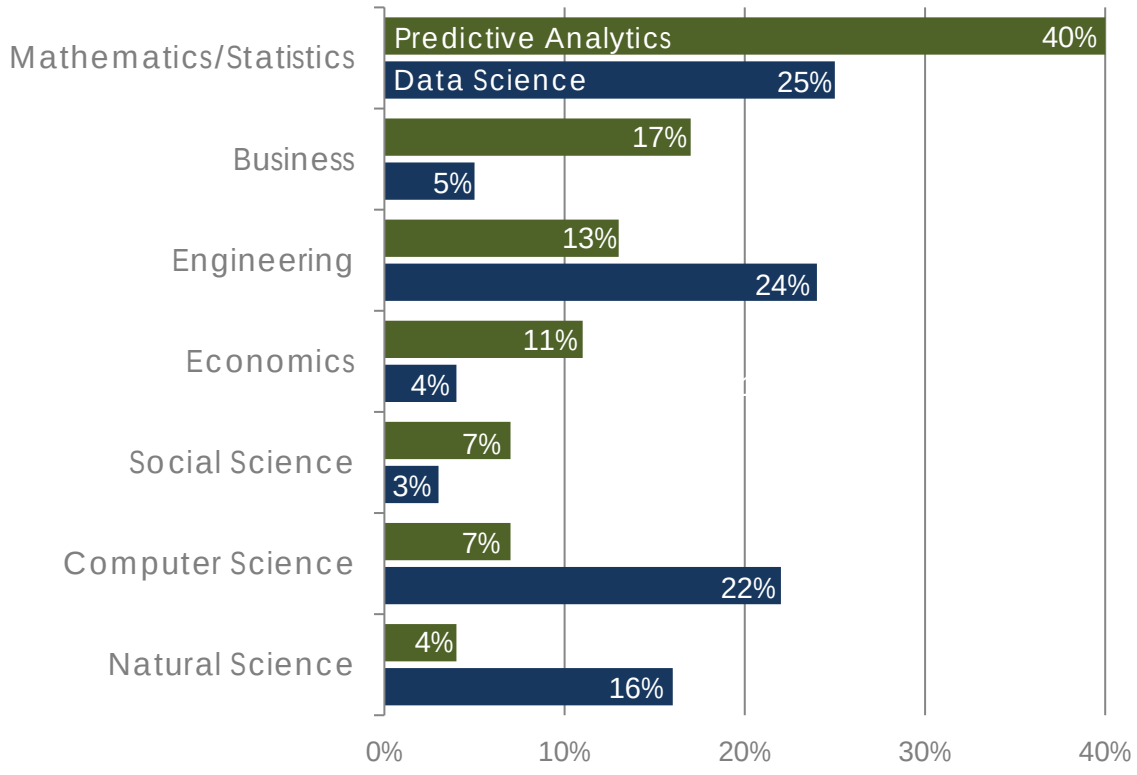


Figure 10 Distribution of Base Salaries of **Predictive Analytics** Individual Contributors by Job Level & Education

Job Level	Education	Base Salary			
		25%	Median	Mean	75%
Individual Contributor Level 1	Bachelor's	$65,000	$75,000	$76,728	$85,000
	Master's	$70,000	$80,000	$79,063	$85,000
	PhD	$85,000	$90,000	$92,857	$95,000
Individual Contributor Level 2	Bachelor's	$85,000	$97,000	$99,880	$110,000
	Master's	$90,000	$98,000	$102,291	$115,000
	PhD	$100,750	$110,000	$112,300	$122,450
Individual Contributor Level 3	Bachelor's	$108,750	$125,500	$127,625	$143,500
	Master's	$115,000	$130,000	$135,482	$155,000
	PhD	$127,500	$145,000	$146,510	$160,000

Figure 11 Distribution of Base Salaries of **Data Science** Individual Contributors by Job Level & Education

Job Level	Education	Base Salary			
		25%	Median	Mean	75%
Individual Contributor Level 1	Master's	$85,000	$95,000	$94,895	$105,000
	PhD	$90,000	$105,000	$102,205	$115,000
Individual Contributor Level 2	Master's	$115,000	$125,000	$129,164	$140,000
	PhD	$125,000	$130,000	$132,123	$145,000
Individual Contributor Level 3	Master's	$144,250	$155,000	$163,938	$180,000
	PhD	$160,000	$173,000	$183,227	$198,750

Figure 12 Distribution of Base Salaries of **Predictive Analytics** Managers by Job Level & Education

Job Level	Education	Base Salary			
		25%	Median	Mean	75%
Manager Level 1	Bachelor's	$120,000	$130,000	$130,037	$145,000
	Master's	$115,000	$132,000	$131,162	$150,000
	PhD	$125,000	$135,000	$138,897	$145,000
Manager Level 2	Bachelor's	$163,750	$175,000	$177,708	$196,250
	Master's	$154,500	$175,000	$179,616	$200,000
	PhD	$167,500	$185,000	$187,664	$202,000
Manager Level 3	Bachelor's	$225,000	$250,000	$259,304	$285,000
	Master's	$215,500	$250,000	$254,685	$280,000
	PhD	$227,500	$250,000	$267,139	$300,000

Figure 13 Distribution of Base Salaries of **Data Science** Managers by Job Level & Education

Job Level	Education	Base Salary			
		25%	Median	Mean	75%
Manager Level 1	Master's	$133,000	$152,750	$151,228	$169,500
	PhD	$132,500	$150,000	$149,200	$160,000
Manager Level 2	Master's	$169,500	$190,000	$188,708	$200,250
	PhD	$184,000	$200,000	$196,444	$216,500
Manager Level 3	Master's	$200,000	$250,000	$236,647	$265,000
	PhD	$231,250	$257,500	$256,591	$296,250

Demographics | Residency Status

Predictive Analytics Professionals

- 32% of PAPs sampled are non-U.S. citizens with permanent residency or an F-1/OPT, H-1B, or another visa which allows them to work in the U.S. (see Figure 14 on page 31).
- Among level 1 individual contributors, 37% of PAPs sampled have a visa or permanent residency. At the senior management level (manager level 3), this decreases to 16% (see Figure 15 on page 32).

Data Scientists

- 39% of Data Scientists sampled are non-U.S. citizens with permanent residency or an F-1/OPT, H-1B, or another visa which allows them to work in the U.S. (see Figure 14 on page 31).
- For Data Scientists, 51% of level 1 individual contributors sampled have a visa or permanent residency. This percentage decreases to 20% for level 3 managers (see Figure 16 on page 32).

Figure 14 Distribution of Data Science & Predictive Analytics Professionals by Residency Status

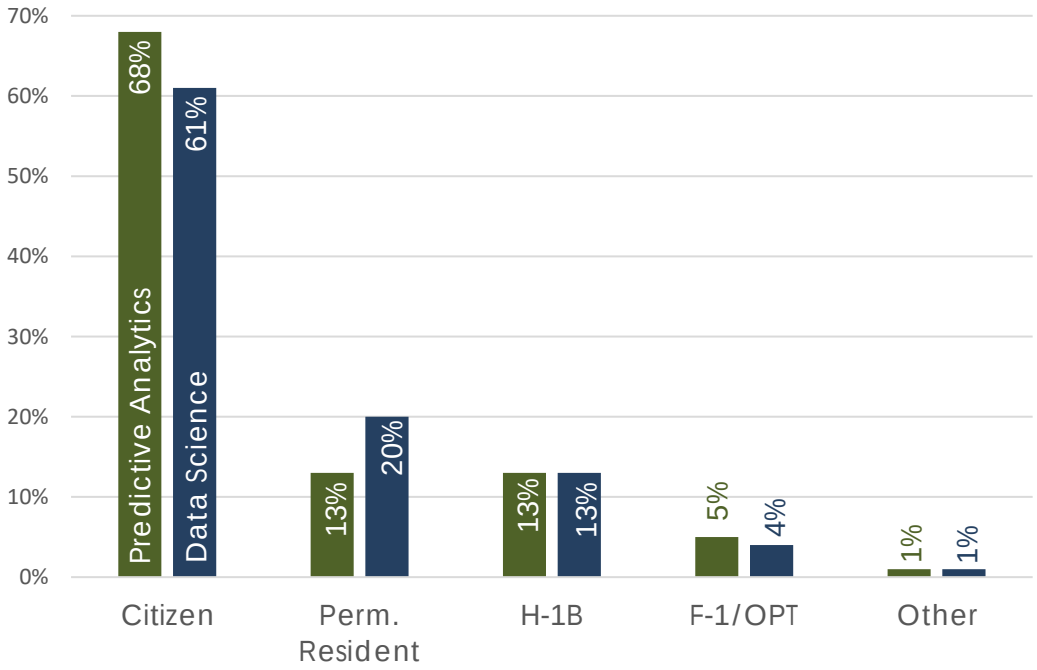


Figure 15 Distribution of **Predictive Analytics Professionals** by Residency Status & Job Level

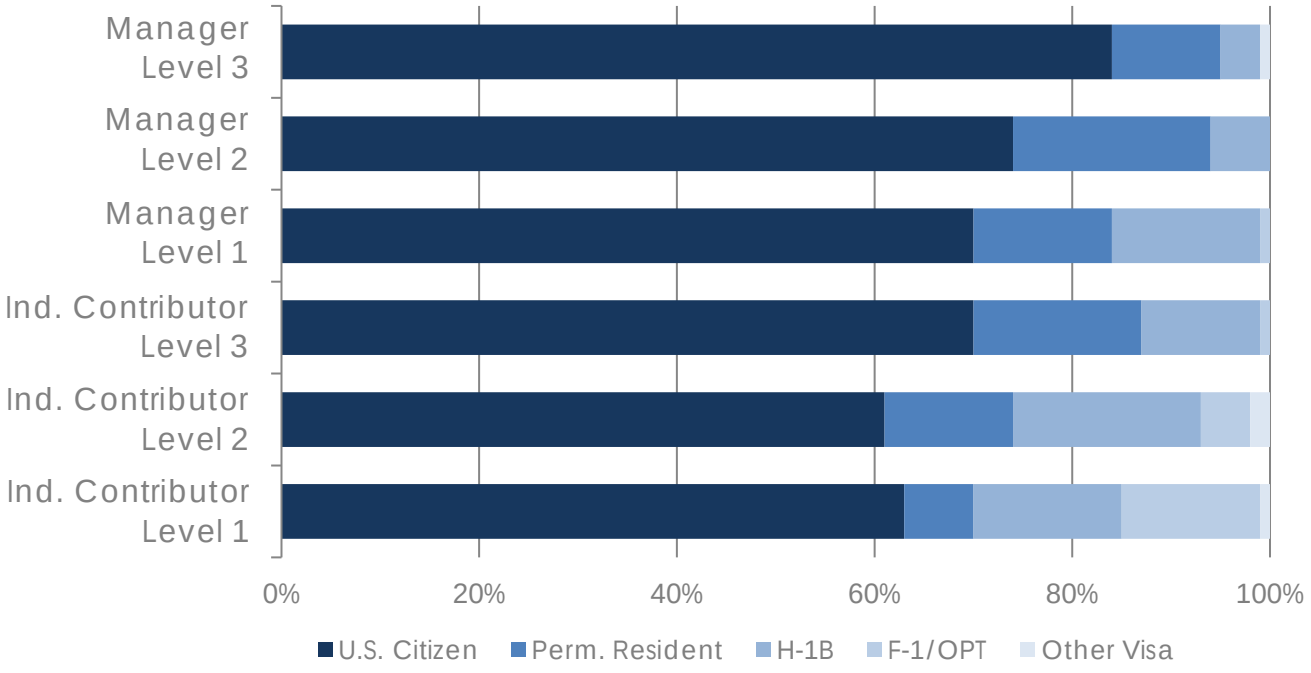


Figure 16 Distribution of **Data Scientists** by Residency Status & Job Level

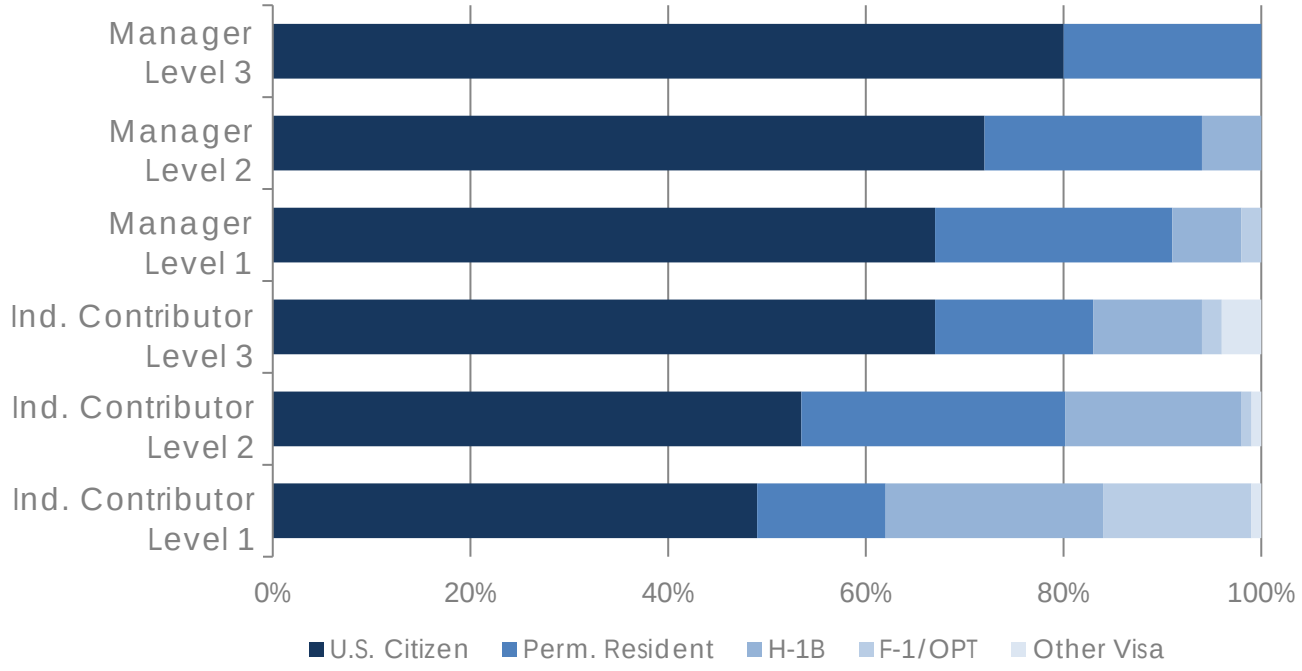


Figure 17 Median Base Salary of **PAPs** by Job Category & Residency Status

Job Level	Residency	Base Salary	
		Median	Difference from Citizen
Individual Contributor Level 1	**Citizen**	**$75,000**	-
	Perm. Resident	$80,000	+7%
	H-1B	$80,000	+7%
	F-1/OPT	$80,000	+7%
Individual Contributor Level 2	**Citizen**	**$100,000**	-
	Perm. Resident	$110,000	+10%
	H-1B	$100,000	0%
	F-1/OPT	$90,000	-10%
Individual Contributor Level 3	**Citizen**	**$137,500**	-
	Perm. Resident	$130,000	-5%
	H-1B	$125,000	-9%
	F-1/OPT	-	-
Manager Level 1	**Citizen**	**$130,000**	-
	Perm. Resident	$140,000	+8%
	H-1B	$130,000	0%
Manager Level 2	**Citizen**	**$180,000**	-
	Perm. Resident	$180,000	0%
	H-1B	$170,000	-6%
Manager Level 3	**Citizen**	**$250,000**	-
	Perm. Resident	$270,000	+8%

Figure 18 Median Base Salary of **Data Scientists** by Job Category & Residency Status

Job Level	Residency	Base Salary	
		Median	Difference from Citizen
Individual Contributor Level 1	**Citizen**	**$95,000**	-
	Perm. Resident	$100,500	+6%
	H-1B	$100,000	+5%
	F-1/OPT	$95,000	0%
Individual Contributor Level 2	**Citizen**	**$130,000**	-
	Perm. Resident	$130,000	0%
	H-1B	$126,000	-3%
Individual Contributor Level 3	**Citizen**	**$165,000**	-
	Perm. Resident	$175,000	+6%
	H-1B	$177,500	+8%
Manager Level 1	**Citizen**	**$151,375**	-
	Perm. Resident	$155,000	+2%
Manager Level 2	**Citizen**	**$195,000**	-
	Perm. Resident	$200,000	+3%
Manager Level 3	**Citizen**	**$250,000**	-
	Perm. Resident	$262,500	+5%

Predictive Analytics Professionals

- Salaries vary by geographic region. In general, PAPs employed on the West Coast or the Northeast earn the highest median base salaries (see Figure 19 on page 36 and Figure 21 on page 37).

Data Scientists

- Data scientists employed on the West Coast earned the highest median base salaries across all levels reported. Those in the Northeast also tended to earn higher salaries than data scientists in the middle regions of the U.S. (see Figure 20 on page 36 and Figure 22 on page 37).

Figure 19 Distribution of Base Salaries of **Predictive Analytics** Individual Contributors by Job Level & Region

Job Level	Region	Base Salary			
		25%	Median	Mean	75%
Individual Contributor Level 1	Northeast	$71,000	$80,000	$78,996	$86,000
	Southeast	$75,000	$85,000	$82,979	$90,000
	Midwest	$68,000	$75,000	$74,891	$82,250
	Mountain	$72,000	$80,000	$79,869	$85,000
	West Coast	$78,000	$85,000	$88,615	$95,000
Individual Contributor Level 2	Northeast	$95,000	$100,000	$106,489	$120,000
	Southeast	$85,000	$95,000	$92,363	$100,000
	Midwest	$85,500	$95,000	$100,284	$110,000
	Mountain	$95,000	$100,250	$103,394	$115,000
	West Coast	$100,000	$115,000	$115,855	$130,000
Individual Contributor Level 3	Northeast	$124,500	$135,000	$137,951	$150,000
	Southeast	$102,250	$119,000	$128,328	$146,250
	Midwest	$105,000	$129,000	$133,519	$157,778
	Mountain	$123,750	$140,000	$143,111	$165,000
	West Coast	$121,500	$140,000	$142,472	$156,250

Figure 20 Distribution of Base Salaries of **Data Science** Individual Contributors by Job Level & Region

Job Level	Region	Base Salary			
		25%	Median	Mean	75%
Individual Contributor Level 1	Northeast	$90,000	$100,000	$101,062	$115,000
	Middle U.S.	$85,000	$92,000	$94,052	$105,000
	West Coast	$83,750	$102,500	$100,400	$111,250
Individual Contributor Level 2	Northeast	$120,000	$130,000	$131,368	$140,000
	Middle U.S.	$115,250	$125,500	$126,685	$139,000
	West Coast	$120,000	$130,000	$139,524	$150,000
Individual Contributor Level 3	Northeast	$145,000	$175,000	$166,609	$180,000
	Middle U.S.	$145,000	$165,000	$167,053	$182,500
	West Coast	$155,000	$190,000	$190,077	$200,000

Figure 21 Distribution of Base Salaries of **Predictive Analytics** Managers by Job Level & Region

Job Level	Region	Base Salary			
		25%	Median	Mean	75%
Manager Level 1	Northeast	$120,000	$140,000	$137,007	$156,000
	Southeast	$113,500	$130,000	$125,652	$140,000
	Midwest	$120,000	$131,000	$131,220	$145,000
	Mountain	$115,000	$128,000	$130,382	$145,000
	West Coast	$129,500	$147,500	$147,083	$156,250
Manager Level 2	Northeast	$175,000	$190,000	$191,276	$200,000
	Southeast	$150,000	$165,000	$169,431	$185,000
	Midwest	$151,000	$175,000	$179,410	$200,000
	Mountain	$145,000	$160,000	$161,150	$175,000
	West Coast	$170,000	$188,000	$193,969	$220,000
Manager Level 3	Northeast	$230,000	$260,000	$260,208	$290,000
	Southeast	$225,000	$249,000	$250,417	$266,250
	Midwest	$207,500	$248,000	$246,404	$267,500
	Mountain	$226,250	$256,000	$263,286	$307,500
	West Coast	$242,500	$255,000	$281,136	$300,000

Figure 22 Distribution of Base Salaries of **Data Science** Managers by Job Level & Region

Job Level	Region	Base Salary			
		25%	Median	Mean	75%
Manager Level 1	Northeast	$140,000	$160,500	$156,727	$171,500
	Middle U.S.	$130,000	$143,500	$141,359	$154,313
	West Coast*	-	-	-	-
Manager Level 2	Northeast	$175,000	$198,000	$186,375	$200,000
	Middle U.S.	$175,000	$194,000	$193,187	$210,000
	West Coast	$192,750	$200,000	$206,500	$221,250
Manager Level 3	Northeast	$238,750	$250,000	$249,500	$271,250
	Middle U.S.	$210,000	$250,000	$249,100	$275,000
	West Coast	$215,500	$260,000	$255,545	$292,500

*Sample size too small to report.

Predictive Analytics Professionals

- The largest segment of PAPs are employed in the advertising and marketing services industry (18%) followed by financial services (16%). (See Figure 23 on page 39.)
- The Corporate-Other category made up 18% of this year's sample. This category includes hospitality (such as hotels), travel (such as airlines), and restaurants.
- While financial services and advertising/marketing services are still the top two industry categories (comprising a total of 34% of the sample), these companies continue to comprise a smaller percentage of the market compared to previous years (in 2015, the combined percentage for these groups was 57% and the number has decreased every year since). This shows a continued industry diversification in analytics.
- Figures 24 and 25 (on pages 40 and 41 respectively) show how salaries for predictive analytics professionals vary by industry.

Data Scientists

- The tech industry continues as the largest segment of the data science market with over a quarter (26%) of data scientists employed in tech/telecom/gaming (see Figure 23 on page 40).
- Industry variations between data scientists and other predictive analytics professionals show a clear demographic difference among the two groups.
- The Corporate-Other cataegory comprised 21% of this year's sample. Manufacturing and energy companies are included in this category. These companies are more likely to employ data scientists than other predictive analytics professionals.
- Salaries by industry were not analyzed for the data science segment as sample sizes for industries outside of tech were too small at most job levels.

Figure 23 Distribution of Data Science & Predictive Analytics Professionals by Industry

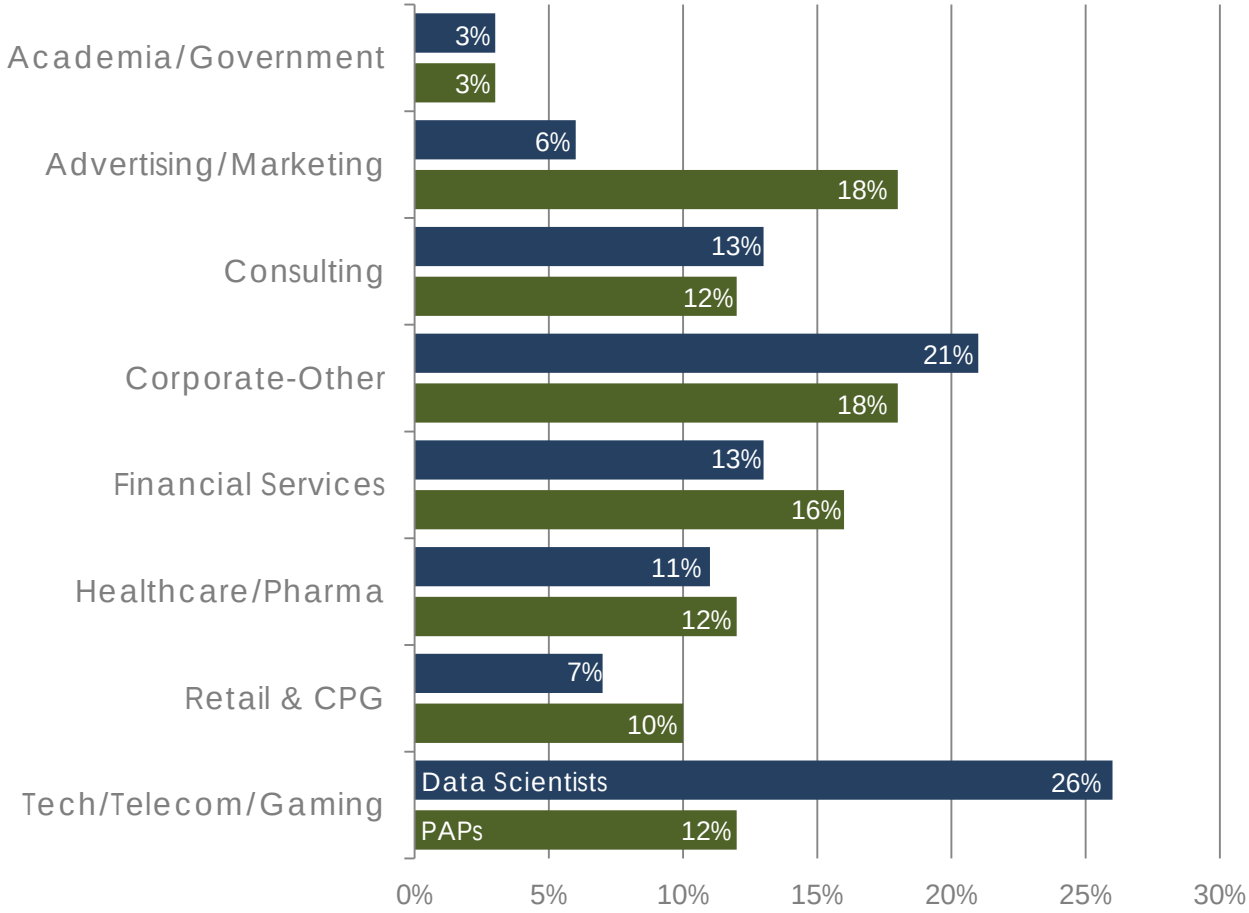


Figure 24 Distribution of Base Salaries of **Predictive Analytics** Individual Contributors by Job Level & Industry

Job Level	Industry*	Base Salary			
		25%	Median	Mean	75%
Individual Contributor Level 1	Advertising/Marketing	$70,000	$75,000	$76,240	$85,000
	Consulting	$65,150	$80,000	$78,275	$87,125
	Financial Services	$77,000	$85,000	$84,111	$90,000
	Healthcare/Pharma	$75,000	$78,000	$79,297	$85,000
	Retail & CPG	$72,250	$77,500	$78,652	$85,000
	Tech/Telecom/Gaming	$73,750	$83,500	$83,969	$90,250
	Other Corporate	$70,000	$75,500	$78,703	$85,000
Individual Contributor Level 2	Advertising/Marketing	$87,000	$97,000	$99,822	$110,000
	Consulting	$95,000	$102,500	$107,071	$120,000
	Financial Services	$93,500	$100,500	$104,291	$120,000
	Healthcare/Pharma	$91,500	$100,000	$107,510	$119,000
	Retail & CPG	$95,000	$97,000	$102,920	$110,000
	Tech/Telecom/Gaming	$90,000	$98,000	$106,196	$120,000
	Other Corporate	$90,000	$100,000	$102,789	$110,000
Individual Contributor Level 3	Advertising/Marketing	$115,000	$132,500	$137,500	$155,000
	Consulting	$108,500	$128,000	$139,800	$162,500
	Financial Services	$110,000	$140,000	$136,333	$153,000
	Healthcare/Pharma	$119,000	$130,000	$134,880	$150,000
	Retail & CPG	$104,500	$130,000	$129,000	$150,000
	Tech/Telecom/Gaming	$125,000	$139,000	$143,978	$164,500
	Other Corporate	$110,000	$135,000	$135,091	$155,000

*Academia/Government salaries not reported due to insufficient sample size.

Figure 25 Distribution of Base Salaries of **Predictive Analytics** Managers by Job Level & Industry

Job Level	Industry*	Base Salary			
		25%	Median	Mean	75%
Manager Level 1	Advertising/Marketing	$110,000	$121,000	$125,158	$144,250
	Consulting	$113,500	$135,000	$134,769	$159,000
	Financial Services	$120,000	$140,000	$135,893	$150,000
	Healthcare/Pharma	$120,000	$130,000	$134,111	$150,000
	Retail & CPG	$118,750	$131,500	$130,875	$150,000
	Tech/Telecom/Gaming	$116,500	$135,000	$132,875	$145,000
	Other Corporate	$120,000	$131,500	$133,779	$150,000
Manager Level 2	Advertising/Marketing	$151,500	$172,000	$174,381	$189,500
	Consulting	$170,000	$190,000	$194,571	$212,500
	Financial Services	$150,500	$170,000	$174,994	$200,000
	Healthcare/Pharma	$165,000	$186,000	$184,654	$204,500
	Retail & CPG	$160,500	$179,000	$182,067	$207,000
	Tech/Telecom/Gaming	$170,500	$186,000	$188,158	$203750
	Other Corporate	$166,250	$177,500	$183,333	$200,000
Manager Level 3	Advertising/Marketing	$205,000	$250,000	$252,600	$295,000
	Consulting	$250,000	$257,500	$268,389	$295,000
	Financial Services	$207,500	$235,000	$239,923	$259,500
	Healthcare/Pharma	$250,000	$267,500	$280,143	$311,250
	Retail & CPG	$208,750	$250,000	$259,111	$301,250
	Tech/Telecom/Gaming	$225,000	$250,000	$263,933	$300,000
	Other Corporate	$220,000	$250,000	$275,000	$270,000

*Academia/Government salaries not reported due to insufficient sample size.

Demographics | Gender

Predictive Analytics Professionals

- For predictive analytics professionals, this year's sample was 72% men and 28% women (see Figure 26 below) showing an increase in women from 2018 where 24% of the sample was women and 2019 where 26% of the sample were women.
- While at most levels women had lower median base salaries than men at the same level, the differences remain small (see Figure 29 on page 44).

Data Scientists

- For data scientists, this year's sample was 82% men and 18% women (see Figure 26 below) showing an increase from 2019 (17%) and 2018 (15%). Women continue to make gradual inroads into data science, but more male candidates are also attracted to the discipline so demographic shifts are gradual.
- Similarly to predictive analytics, level 1 individual contributors showed the largest percentage of women in data science at 29% (see Figure 28 on page 43).
- Sample sizes of women in data science were too small to examine salaries at the different job levels.

Figure 26 Distribution of Data Science & Predictive Analytics Professionals by Gender

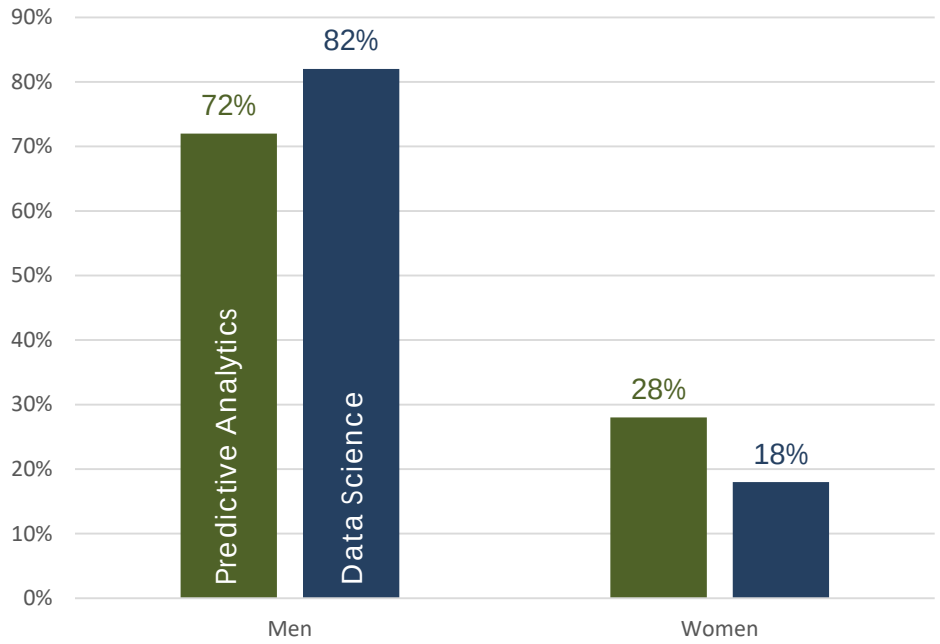


Figure 27 Distribution of **Predictive Analytics Professionals** by Gender and Job Level

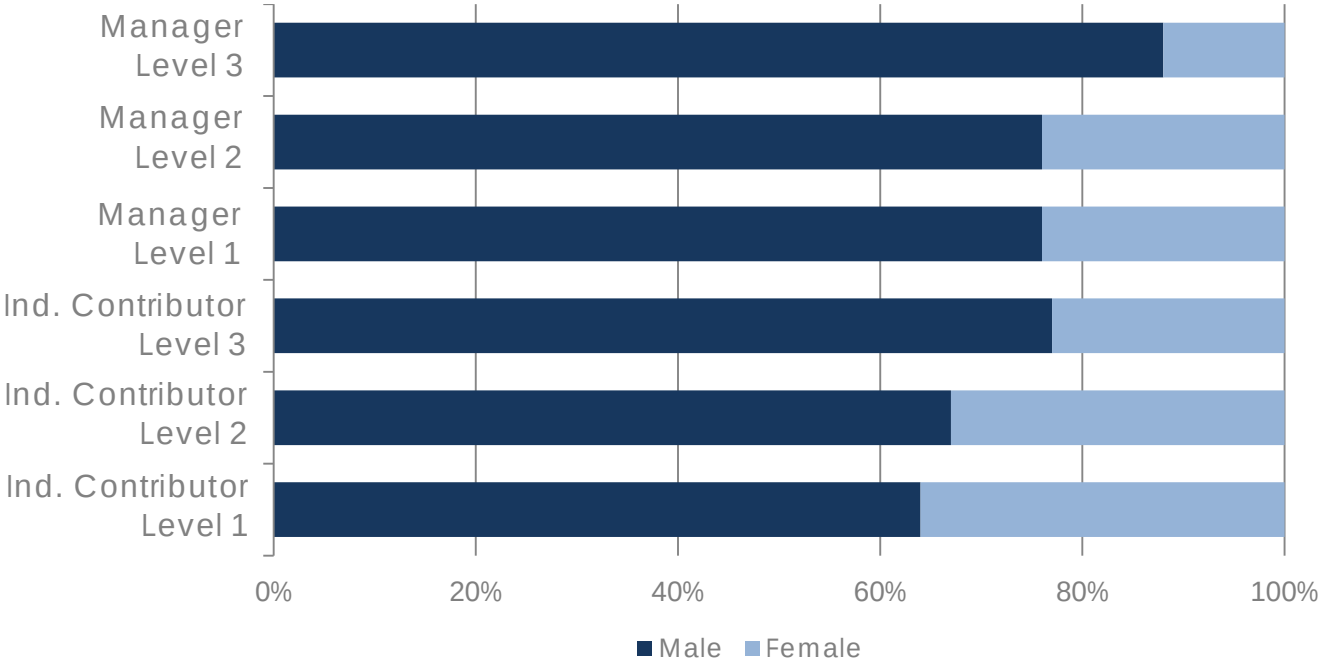


Figure 28 Distribution of **Data Scientists** by Gender and Job Level

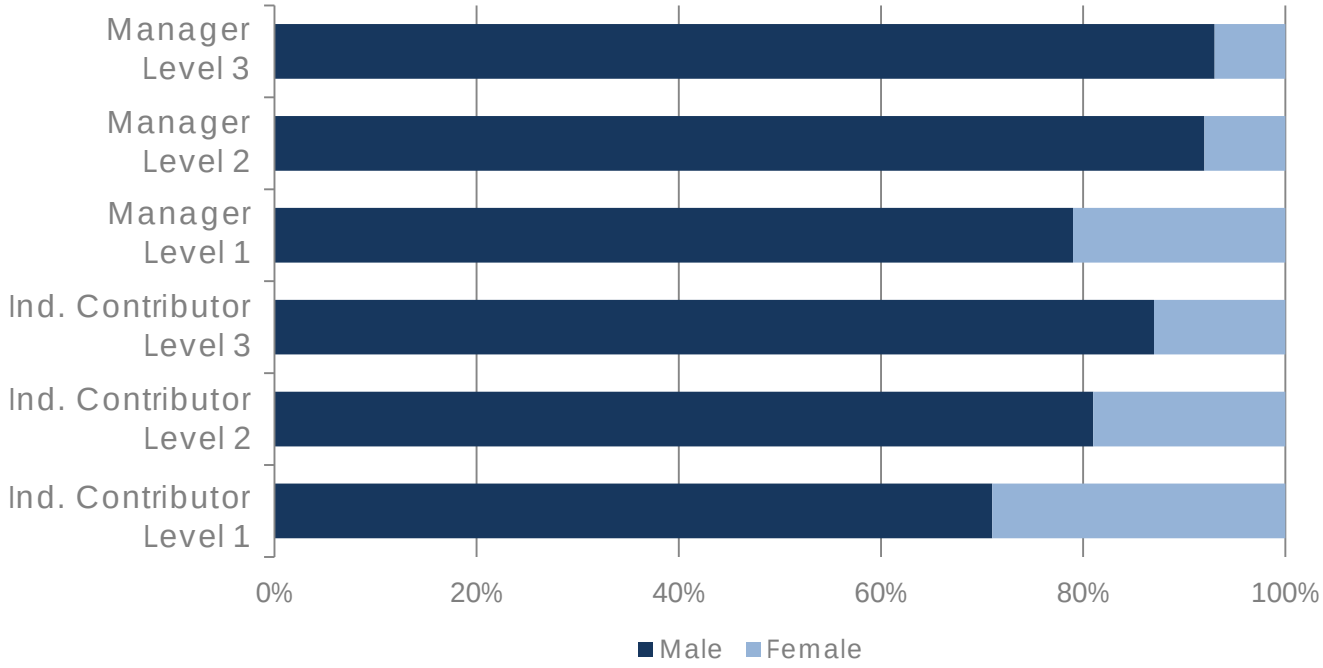
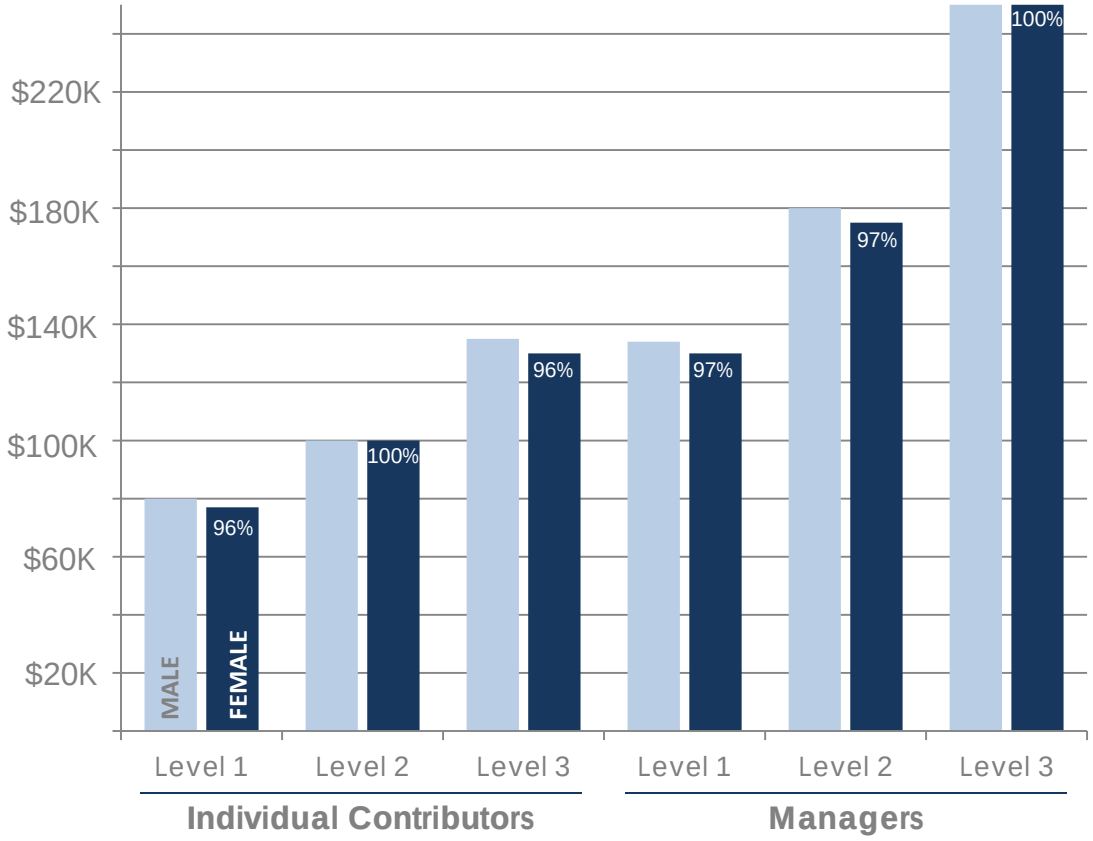


Figure 29 Median Base Salary by Job Category and Gender in **Predictive Analytics**



Demographics | Years of Experience

Predictive Analytics Professionals

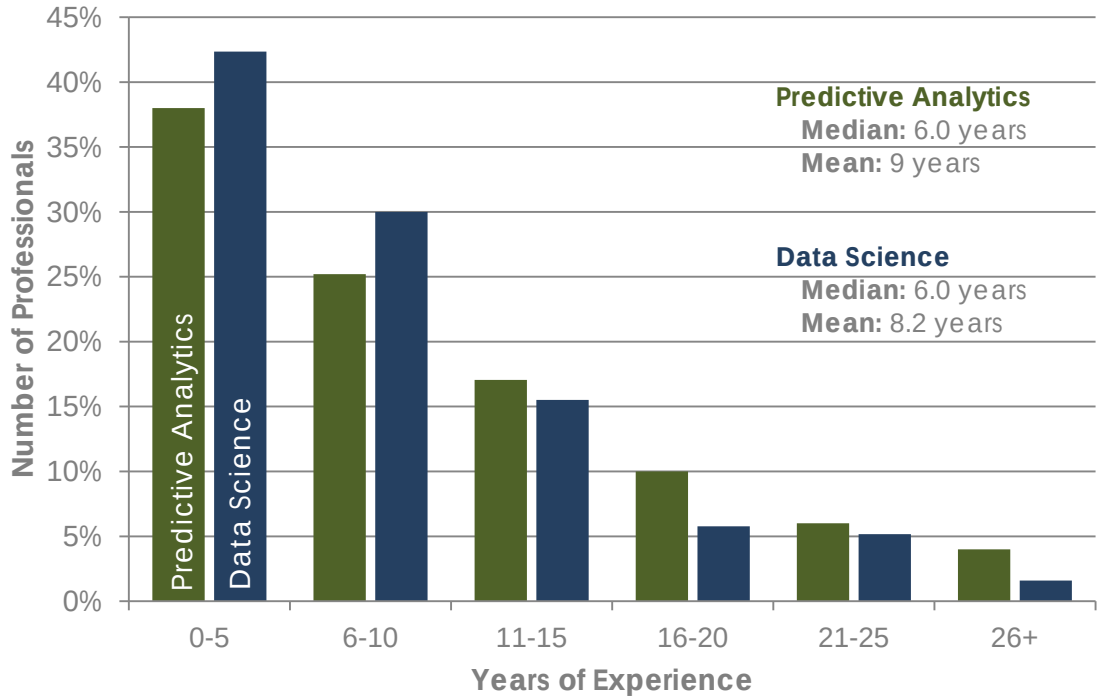
- Almost two thirds (64%) of PAPs sampled have 10 or fewer years of experience (see Figure 30 below). The predictive analytics profession continues to skew younger, due to increased interest and the visibility of analytics as a career.

Data Scientists

- Data science continues to be a young discipline with a median years of experience in this year's sample of 6 years.
- A large proportion (72%) of data scientists sampled had 10 or fewer years of experience (see Figure 30 below). Data science is still a newer discipline so more experienced data scientists remain scarce.
- While the median for both PAPs and Data Scientists was equal this year, the mean years of experience for Data Science was 8.2, (see Figure 30 below) showing that Data Science continues to skew even younger than PAPs though the gap may be closing as more people flock to quantitative disciplines across the board.

Figure 30 Distribution of Data Science & Predictive Analytics Professionals by Years of Experience

DS 6-10 yrs bar should be at 30%



Note: The recruiters at Burtch Works do not ask the age of the professionals with whom they work. However, they do ask them for their years of work experience, which is highly correlated with age, and shown above is the distribution of Data Scientists and PAPs by years of experience. However, salary information is not shown here, because salaries are indirectly related to years of experience through job category.

SECTION 4

Appendix A: Study Objective & Design

Study Objective

This report is a follow-up to last year's reports: *The Burtch Works Study: Salaries of Data Scientists* and *The Burtch Works Study: Salaries of Predictive Analytics Professionals*, which were published in May 2018 and October 2018 respectively. Its goals are to show (1) current compensation of PAPs and data scientists and how it varies, and (2) how their compensation has changed since last year's report. By continuing to interview large numbers of PAPs and data scientists annually, Burtch Works can show both short-term and long-term trends in the demographic attributes of quantitative professionals and their compensation. Additionally, analyzing data scientists and PAPs side-by-side highlights the distinctions between the groups that affect salary.

Why *The Burtch Works Studies* Are Unique

The Burtch Works Studies: Salaries of Data Scientists & Predictive Analytics Professionals contain highly-anticipated salary and demographic data for Data Scientists and other PAPs, and are unique because:

- **Burtch Works' studies focus solely on Data Scientists and PAPs** – The study samples include only professionals who are currently data scientists or PAPs, and exclude professions that other salary reports may include, such as business intelligence, information technology, and consumer insights.

- **Burtch Works' studies distinguish between Data Scientists and other PAPs** – The study separates data scientists (who work with unstructured or streaming data) from other PAPs because of their more specialized skillset. By comparing the two groups, the study shows how this distinction affects salary.

- **Burtch Works obtains this data by interviewing Data Scientists and PAPs** – Instead of relying on data provided by human resources departments or from a self-reported online survey, Burtch Works interviews every professional individually. An important advantage of the interview process is that Burtch Works recruiters are able to obtain information about these quantitative professionals that is not usually provided by human resources departments that may affect their compensation, such as education and residency status. Additionally, because of their nuanced understanding of the profession, recruiters are able to obtain corrections or clarifications when information provided does not seem credible.

- **Burtch Works' salary studies show how compensation varies by job level, region, industry, gender, and education** – The sample size is large enough to show compensation data, collected over the past year, at a granular level. Further long-term trends are illuminated with each consecutive report.

The Sample

This sample contains 1,742 PAPs and 503 Data Scientists of the over 40,000 quantitative professionals with whom Burtch Works maintains contact. Burtch Works collected the data for this study during interviews conducted over the months immediately following the period of interviews for the 2018 studies, ending in April 2019. Professionals were included in the sample only if (1) they satisfied Burtch Works' criteria for PAPs and Data Scientists, and (2) Burtch Works obtained

complete information about that individual's compensation, demographic, and job characteristics.

How Changes in Compensation Were Measured

While some of the 1,742 PAPs and 503 Data Scientists in this sample were also in the samples for our previous studies (published annually since 2013), others were not. Therefore, changes in compensation were not measured by differencing current compensation and compensation reported for the previous study and then taking medians (and other percentiles) of the differences. Instead, changes were measured by comparing medians (and other percentiles) of current compensation to those reported in last year's study.

Identifying Data Science & Predictive Analytics Professionals

PAPs apply sophisticated quantitative skills to very large sets of data describing transactions, interactions, or other behaviors to discern patterns in those behaviors and to prescribe actions for their firms. What distinguishes them from other quantitative professionals, for instance traditional financial analysts or web analytics professionals, is the volume of data with which they work. PAPs include data scientists, but data scientists are analyzed separately in this report because they typically operate on very large sets of *unstructured* data, requiring additional computer science skills, while traditional/other PAPs work with more structured data. Burtch Works included the analysis of data scientist compensation side-by-side with other predictive analytics professionals to highlight the distinction between the two groups.

To identify PAPs, Burtch Works uses these criteria:

1. **Educational Background**

   Predictive Analytics Professionals typically have a degree – usually an advanced degree (a Master's or Ph.D.) – in a quantitative discipline such as Applied Mathematics, Statistics, Economics, or Operations Research. Some professionals with an MBA are also PAPs if their MBA program had a quantitative emphasis.

   Data scientists are even more likely to have an advanced degree, such as a Master's or PhD, than other predictive analytics professionals. These degrees are typically in a quantitative discipline, such as Computer Science, Physics, Engineering, Applied Mathematics, Statistics, Economics, or Operations Research.

   Note: New educational options include data science degree programs, MOOCs (massive open online courses), and bootcamps which continue to take hold in the quantitative community. Some professionals from related careers or fields of study have successfully pivoted into data science and analytics roles through premier bootcamps and mid-career Master's programs.

2. **Skills**

   PAPs are proficient users of analytic tools for discerning patterns in data. Also, they can use one or more tools for operating on large data sets (see criterion 3), such as SAS, R and/or Python. They may also have some experience with other business and data science tools.

Data scientists have expert knowledge of statistical and machine learning methods using tools such as Python and R, with predictive analytics still at the core of the discipline. Data scientists are usually proficient users of relational databases such as SQL, Big Data infrastructures like Hadoop and Spark, related tools like Pig and Hive, cloud computing platforms such as AWS, and languages such as Python, Java, and Scala (among others). They may also use TensorFlow and deep learning techniques, signal processing, and visualization.

3. **Dataset Size**

PAPs: The size of the datasets that PAPs work with are measured in gigabytes or sometimes larger. These datasets are typically structured.

Data scientists typically work with datasets that are measured in gigabytes or larger increments, usually too large to be housed in local memory, and may work with continuously streaming data. These datasets are typically unstructured.

4. **Job Responsibilities**

PAPs have job responsibilities in the following areas:

Analytical Database Marketing – Studies existing customers using methods such as customer segmentation, campaign targeting and effectiveness, propensity modeling, and customer lifetime value analysis.

Credit Risk Analytics – Measures consumer, enterprise, and market risk levels. Results of analyses might impact the price of product, such as the interest rate for a credit card or its availability, as in the case of a loan.

Geospacial Analytics – Analyzes data and makes recommendations around store locations or other physical location decisions.

Human Resources Analytics – Analyzes personnel-related business problems such as talent retention, attrition, compensation, etc.

Marketing Science – Predicts consumer behavior using analytics such as marketing mix modeling. Analysis can use transaction-, store-, or market-level data.

Operations Research – the application of advanced analytical methods for complicated supply chain network design, transportation routing and scheduling, and maximizing revenue based upon a finite capacity, usually in the transportation and hospitality industries.

Survey Statistics – Analyzes the results of structured surveys, conducted using a sample of a given population, in order to extrapolate the population's characteristics using descriptive and inferential statistical methodologies.

Data scientists: Data science specializations may include Natural Language Processing (NLP), Computer Vision, Internet of Things (IoT), Deep Learning, or other areas where unstructured or streaming data is prevalent.

Although they may specialize in a specific area, data scientists are typically equipped to work on every stage of the analytics process which includes:

Data Acquisition – This may involve scraping data, interfacing with APIs, querying relational and non-relational databases, building ETL pipelines, or defining strategy in relation to what data to pursue.

Data Cleaning/Transformation – This may involve parsing and aggregating messy, incomplete, and unstructured data sources to produce datasets that can be used in analytics and/or predictive modeling.

Analytics – This involves statistical and machine learning-based modeling in order to understand, describe, or predict patterns in the data.

Prescribing Actions – This involves interpreting analytical results through the lens of business priorities and using data-driven insights to inform strategy.

Programming/Automation – In many cases, data scientists are also responsible for creating libraries and utilities to operationalize or simplify various stages of this process. Often, they will contribute production-level code for a firm's data products.

Professionals whose jobs are described as business intelligence, marketing research, and information technology are not considered PAPs, because they do not work with large datasets. Although data scientists are a subset of PAPs, they were analyzed separately from the PAPs sample because they have atypical computer science skills to manage unstructured data, resulting in higher compensation bands.

Completeness & Age of Data

A predictive analytics professional or data scientist is included in the sample only if Burtch Works has complete data about their compensation, and demographic and job characteristics.

All of the 1,742 PAPs and 503 Data Scientists in the sample were interviewed over the months immediately following the period of interviews for the 2019 study, ending in April 2020. All were interviewed by Burtch Works recruiters while executing searches for clients.

Data Science & Predictive Analytics Segmentation

To examine how the compensation of data scientists and PAPs varies, Burtch Works used characteristics of their jobs (level, location of employer, industry) and demographic characteristics (gender, years of experience, residency status) to segment data scientists. Burtch Works developed the following job categories:

Individual Contributors

Level	*Responsibility*	*Typical Years of Experience*
Level 1	Learning the job, hands-on analytics and modeling	0-3 years
Level 2	Hands-on with data, working with more advanced problems and models, may help train analysts	4-8 years
Level 3	Considered an analytics Subject Matter Expert, mentors and trains analysts	9+ years

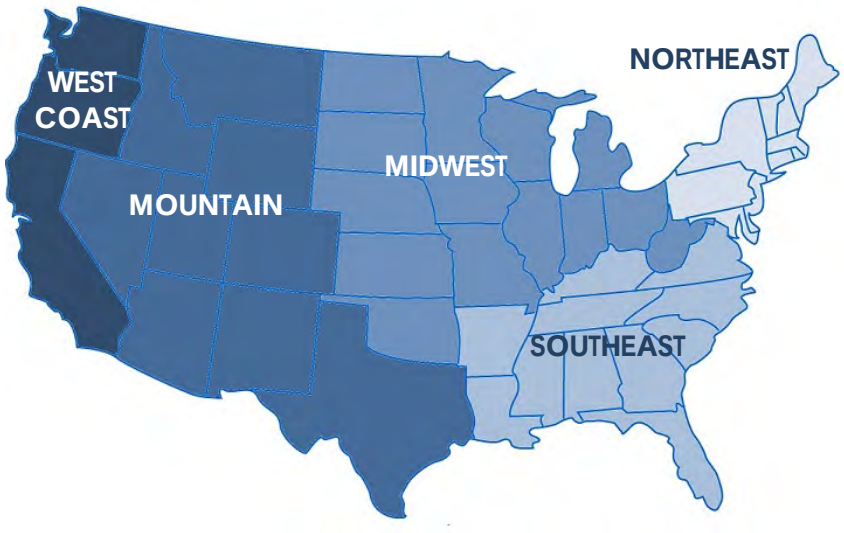
Managers

Level	*Responsibility*	*Typical No. of Reports*
Level 1	Tactical manager who leads a small group within a function, responsible for executing limited projects or tasks within a project	1-3 reports (direct or matrix)
Level 2	Manager who leads a function and manages a moderately sized team, responsible for executing strategy	4-9 reports (direct or matrix)
Level 3	Member of senior management who determines strategy and leads large teams, manages at the executive level	10+ reports (direct or matrix)

Burtch Works divided the U.S. into these five regions:

- Northeast
- Southeast
- Midwest
- Mountain
- West Coast

Figure 31 U.S. Geographic Regions



The firms for which data scientists and PAPs work were divided into these eight industry categories:

- Academia/Government
- Advertising/Marketing Services
- Consulting
- Financial Services
- Healthcare/Pharmaceuticals
- Retail & Consumer Packaged Goods (CPG)
- Technology/Telecom/Gaming
- Other

Each data scientist and PAP was assigned to one of these five residency status categories:

- U.S. Citizen
- Permanent Resident
- H-1B
- F-1/OPT
- Other

Finally, each data scientist and PAP was assigned to one of these three education categories (all of the professionals in this year's sample held a college degree):

- Bachelor's degree
- Master's degree
- PhD

SECTION 5

Appendix B: Glossary

Glossary of Terms

This section provides definitions of terms used in this report.

Base Salary. An individual's gross annual wages, excluding variable or one-time compensation such as relocation assistance, sign-on bonuses, bonuses, and long-term incentive plan compensation.

Data Scientist. A specialized predictive analytics professional who has both the programming proficiency required to make enormous sets of unstructured data accessible and also the analytical skills for deriving useful information from those data.

F-1/OPT. A residency status that allows a foreign undergraduate or graduate student who has a non-immigrant F-1 student visa to work in the U.S. without obtaining an H-1B visa. The student is required to have either completed their degree or pursued it for at least nine months.

Geographic Region. One of five groups of states that together comprise the entire United States. These five groups of states – Northeast, Southeast, Midwest, Mountain, and West Coast – are shown in Figure 31 on page 52.

H-1B. A non-immigrant visa that allows a U.S. firm to temporarily employ a foreign worker in a specialty occupation for a period of three years, which is extendable to six and beyond. If a foreign worker with an H-1B visa quits or loses their job with the sponsoring firm, the worker must either find a new employer to sponsor an H-1B visa, be granted a new non-immigrant status, or leave the United States.

Individual Contributor. An employee who does not manage other employees. Individual contributors among the Data Scientists and PAPs in the Burtch Works sample have all been assigned to one of three levels:

> *Level 1:* Responsible for learning the job; hands-on with analytics and modeling; 0-3 years' experience
>
> *Level 2:* Hands-on with data, working with more advanced problems and models; may help train analysts; 4-8 years of experience
>
> *Level 3:* Considered an analytics Subject Matter Expert; mentors and trains other analysts; 9+ years' experience

Industry. One of eight groups of firms employing most data professionals. These eight industry categories are Academia/Government, Advertising/Marketing Services, Consulting, Financial Services, Healthcare/Pharmaceuticals, Retail & Consumer Packaged Goods (CPG), Technology/Telecom/Gaming, and Other.

> *Academia/Government:* Institutions whose purpose is the pursuit of education or academic research such as public universities, private colleges, and for-profit education companies; or organizations that are a part of the governmental system, such as the Department of Defense and national research laboratories
>
> *Advertising/Marketing Services:* An industry consisting of firms that provide services to other firms that include advertising, market research, media planning and buying, and marketing analysis.
>
> *Consulting:* Industry that includes both large corporations and small "boutique" firms that provide professional advice to the managers of other firms.
>
> *Financial Services:* Firms that provide money management, lending, or risk management services, including banks, insurance companies, and credit card organizations.
>
> *Healthcare/Pharmaceuticals:* Firms that provide healthcare services, such as hospitals, and firms that manufacture medicinal drugs.
>
> *Retail & Consumer Packaged Goods (CPG):* Organizations that purchase goods from a manufacturer to be sold for profit to the end-consumer, and companies whose products are sold quickly and at relatively low cost, including non-durable goods (e.g. groceries, toiletries) and lower quality consumer electronics.

Technology/Telecom/Gaming: Firms that create or distribute technology products or services, such as computer manufacturers and software publishers, and firms that provide telecommunications services.

Other: Companies whose industry falls outside of the categories described above, such as airline companies, distribution firms, media, and entertainment.

Manager. An employee who manages the work of other employees. Managers among the Data Scientists and PAPs in the Burtch Works sample have all been assigned to one of three levels:

Level 1: Tactical manager who leads a small group within a function, responsible for executing limited-scale projects or tasks within a project; typically responsible for 1-3 direct reports or matrix individuals.

Level 2: Manager who leads a function and manages a moderately sized team; responsible for executing strategy; typically responsible for 4-9 direct reports or matrix individuals.

Level 3: Member of senior management who determines strategy and leads large teams; manages at the executive level; typically responsible for 10+ direct reports or matrix individuals.

Mean. Also known as the average, it is the sum of a set of values divided by the number of values. For example, the mean of N salaries is the sum of the salaries divided by N.

Median. The value obtained by ordering a set of numbers from smallest to largest and then taking the value in the middle, or, if there are an even number of values, by taking the mean of the two values in the middle. For example, the median of N salaries is the salary for which there are as many salaries that are smaller as there are salaries that are larger.

N. The number of observations in a sample, sub-sample, or table cell.

OPT. See F-1/OPT.

Permanent Resident. A residency status that allows a foreign national to permanently live and work in the United States. Those with this status have a United States Permanent Residence Card, which is known informally as a green card.

Predictive Analytics Professionals. Individuals who can apply sophisticated quantitative skills to data describing transactions, interactions, or other behaviors to derive insights and prescribe actions. They are distinguished from the "quants" of the past by the sheer quantity of data on which they operate, an abundance made possible by new opportunities for measuring behaviors and advances in technologies for the storage and retrieval of data.

Programming. The process of developing and implementing various sets of instructions to enable a computer to do a certain task. For the purposes of this study, programming refers to the use of general purpose programming/scripting languages such as Python, Java, C, C++, or others.

Salary Study. A study conducted to measure the salary distributions of those in specific occupations. Traditionally, these studies have been executed by obtaining salary data from the human resources departments of firms employing professionals in those occupations or through online surveys, rather than by interviewing those employees themselves.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