



Job Skills for the Future

And the Role of Higher Education

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The Jobs That Will Drive the Decade Ahead

Broad Shifts in the Talent Needs of the Post-Pandemic Economy

The Readiness Economy

- COVID-19 has revealed how ill-prepared we all are – the “black elephant” we’ve been ignoring. Preparedness will **boost demand in healthcare, infrastructure, cybersecurity, environmental tech, insurance**, etc.

The Remote Economy

- As more work gets performed remotely, there will be **growing dependence on the data and software** that are the key underpinnings of the remote economy.

The Logistics Economy

- Manufacturers can see the **vulnerability of supply chains**, etc. **Reshoring** some industries will put greater focus on **advanced manufacturing**. Similarly, there will be greater need for **logistics expertise**.

The Automated Economy

- Employers will prioritize automation over hiring back low-value workers. **Jobs driving automation will thrive**.

The Green Economy

- As the U.S. invests more in changing its energy infrastructure and in ways of fighting climate change, there will be demand for **clean energy expertise**.

Big Growth, Big Challenge, Big Opportunity

Together, these five economies could create 18 million new jobs over the next five years – 1 in every 6 by 2026 – and grow 2x the market

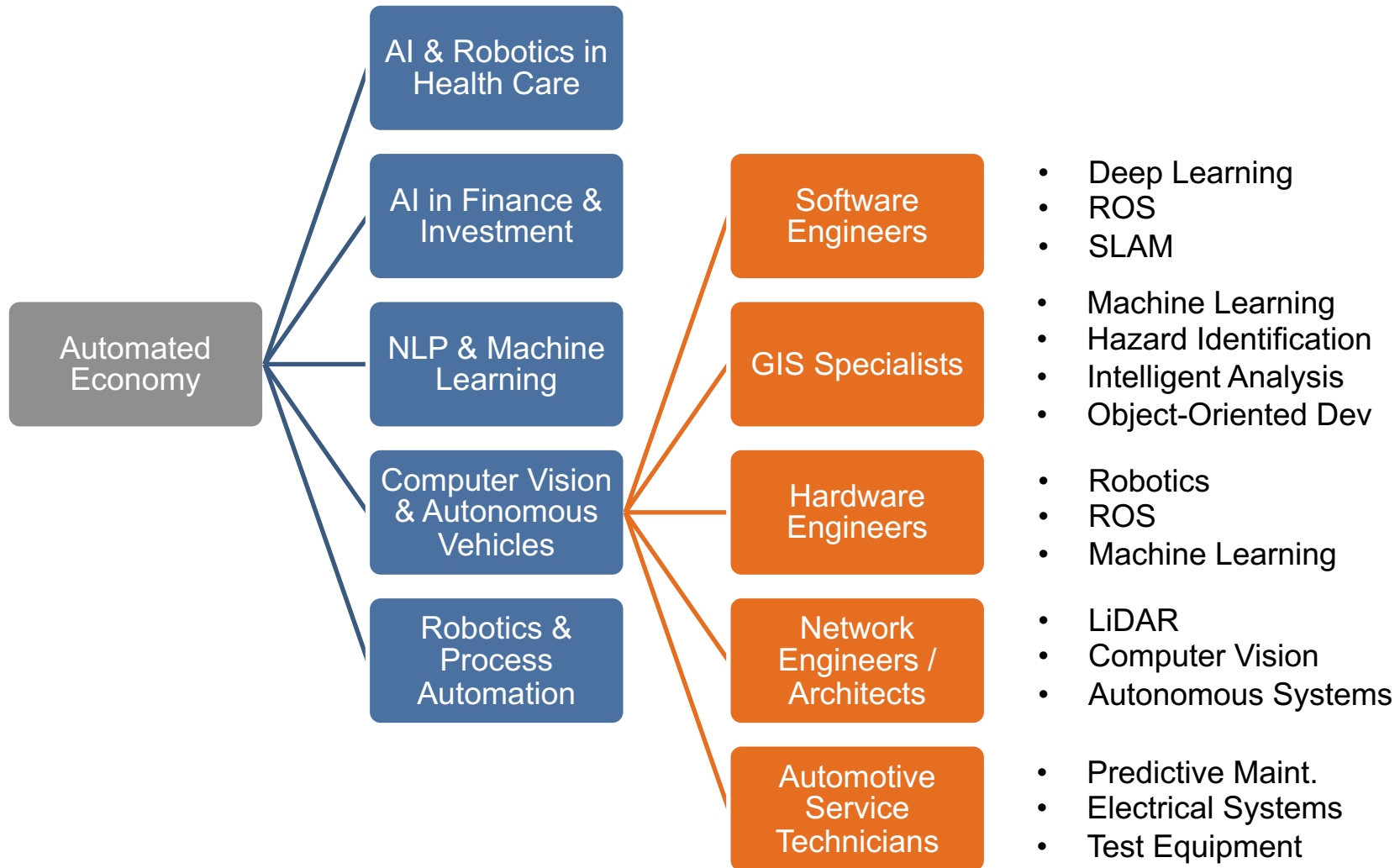
Table 3: Growth Rate Scenarios by Economy

Economy	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
Readiness	8%	1,562,994	10.08%	1,657,439	12.10%	1,756,874
Logistics	3%	4,337,261	4.03%	4,442,036	4.83%	4,549,046
Green	9%	766,323	10.66%	815,248	12.79%	866,902
Remote	11%	5,359,159	13.89%	5,804,660	16.67%	6,282,331
Automated	19%	3,489,665	24.01%	3,988,786	28.82%	4,548,798

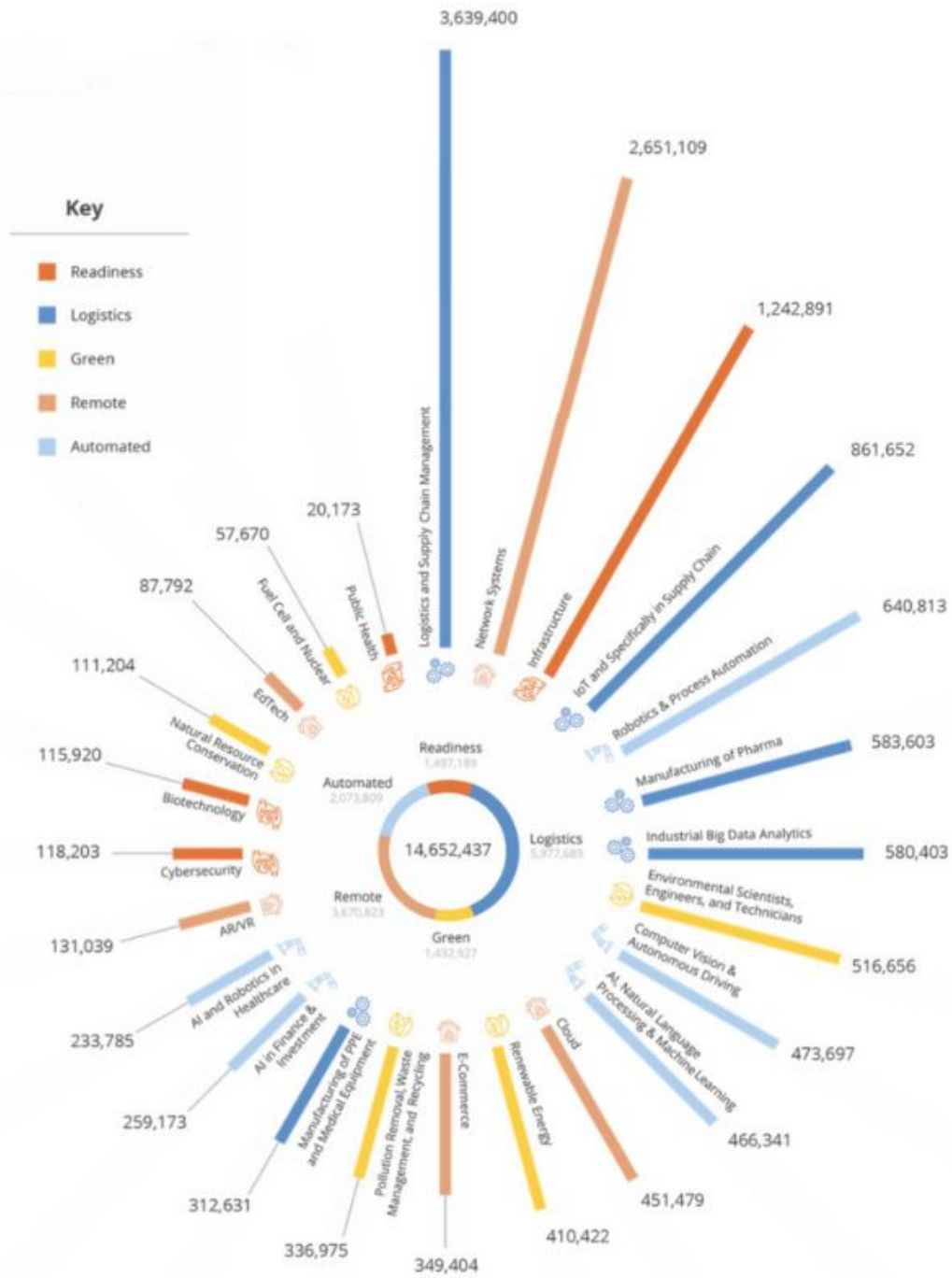
Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

New Opportunities, New Skills

Prepare Students for the Jobs & Skills Powering Each Sector's Growth



The Post-Pandemic Economy Will Offer Opportunities at All Levels But Many Will Require New Skills



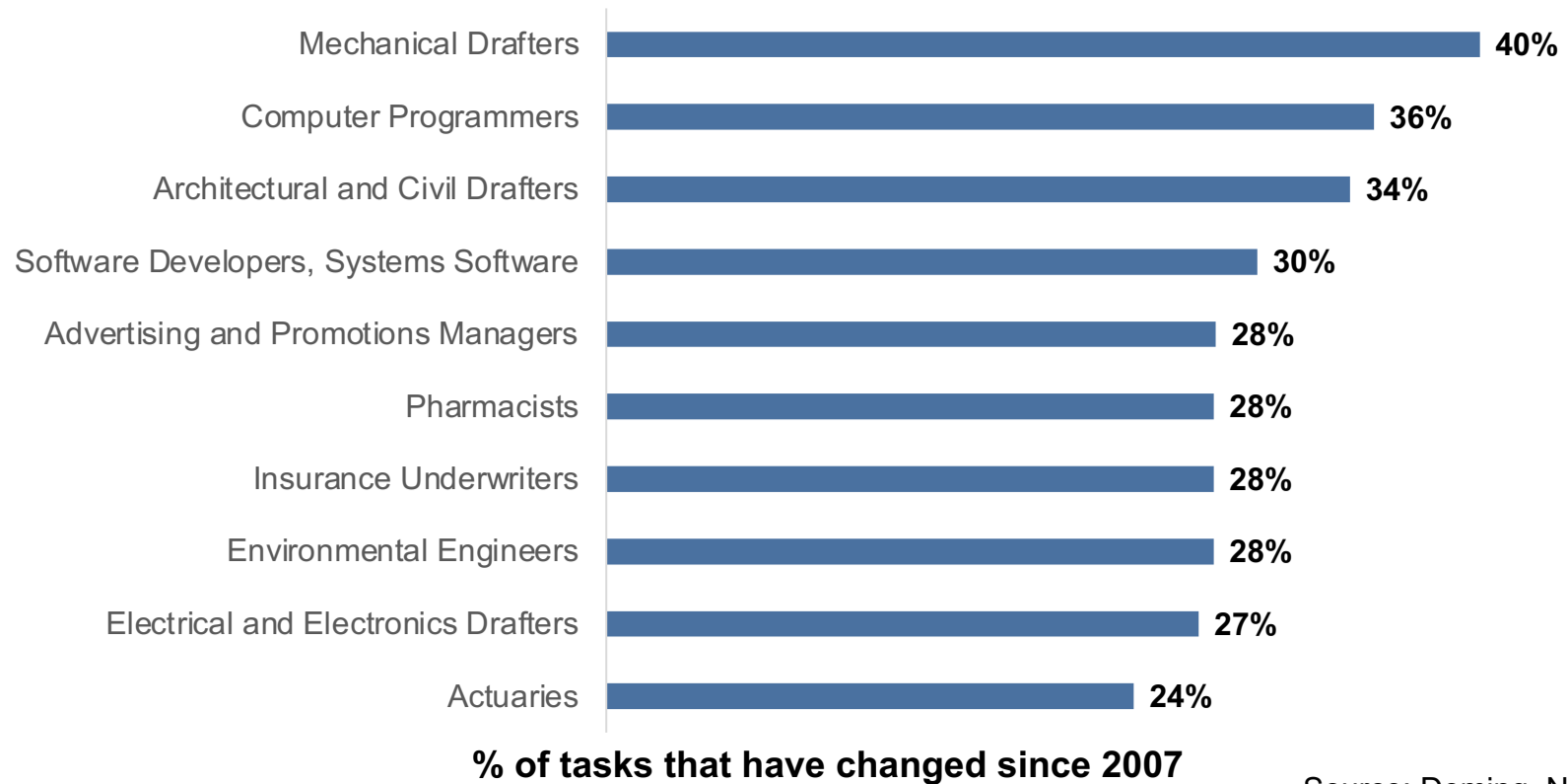
Skills of Mass Disruption

Emerging Skills are Disrupting Supply Chains

Skill Area	Total Job Openings (last 12 months)	Projected 5-Year Demand Growth
Software Dev Methodologies	634,660	35%
Cloud Technologies	462,963	28%
Proactive Security	373,123	39%
IT Automation	282,380	59%
AI and Machine Learning	197,810	71%
Connected Technologies	68,313	104%
NLP	36,941	41%
Fintech	35,667	96%
Parallel Computing	11,056	17%
Quantum Computing	2,718	135%

The Job Title May Look Familiar But Skills Change Rapidly

Fastest-Changing Professional Occupations



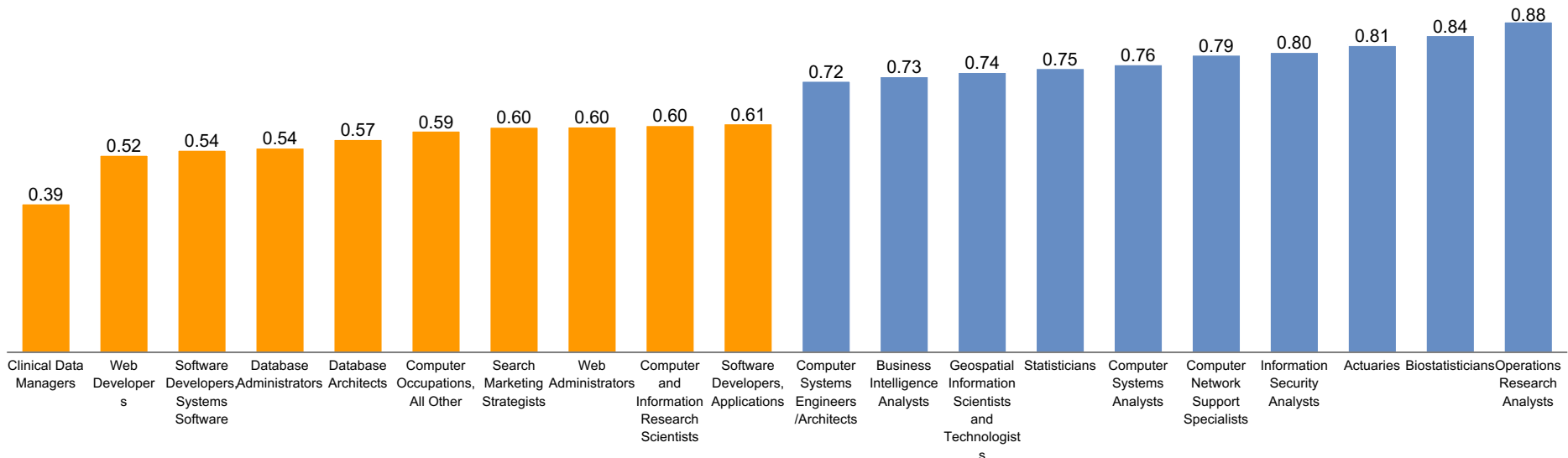
Source: Deming, NBER, 2018, analyzing Burning Glass data

Understanding How Jobs Change Even Among Tech Jobs, Some Change Faster

Skill Change Score: The score can take values between 0 and 1 – the smaller it is, the more a job has changed.

Top 10 fastest changing tech / data jobs

Top 10 tech / data jobs changing the least



Note: the job titles follow the ONET taxonomy and only the jobs with more than 10,000 appearances in online postings in 2018 were considered

1. Intra-similarity score: based on the changes in skills, education and experience required to perform a certain job over 2015-2018

2. Changes in skills, education and experience: by % of online postings in which they were required; only skills required in at least 10% of postings in either 2015 or 2018 were included

Source: Burning Glass; BCG analysis


Clinical Data Managers: More Focus on Data, Less on Bureaucracy

What skills are rising...



Clinical Research: 109%
Biologics Industry Knowledge: 85%
People Management: 40%
Quality Assurance and Control: 75%
Scheduling: 142%
SQL Databases and Programming: 100%

...and in decline



Clinical Informatics: -23%
Project Management: -21%
Billing and Invoicing: -70%
Business Process and Analysis: -69%



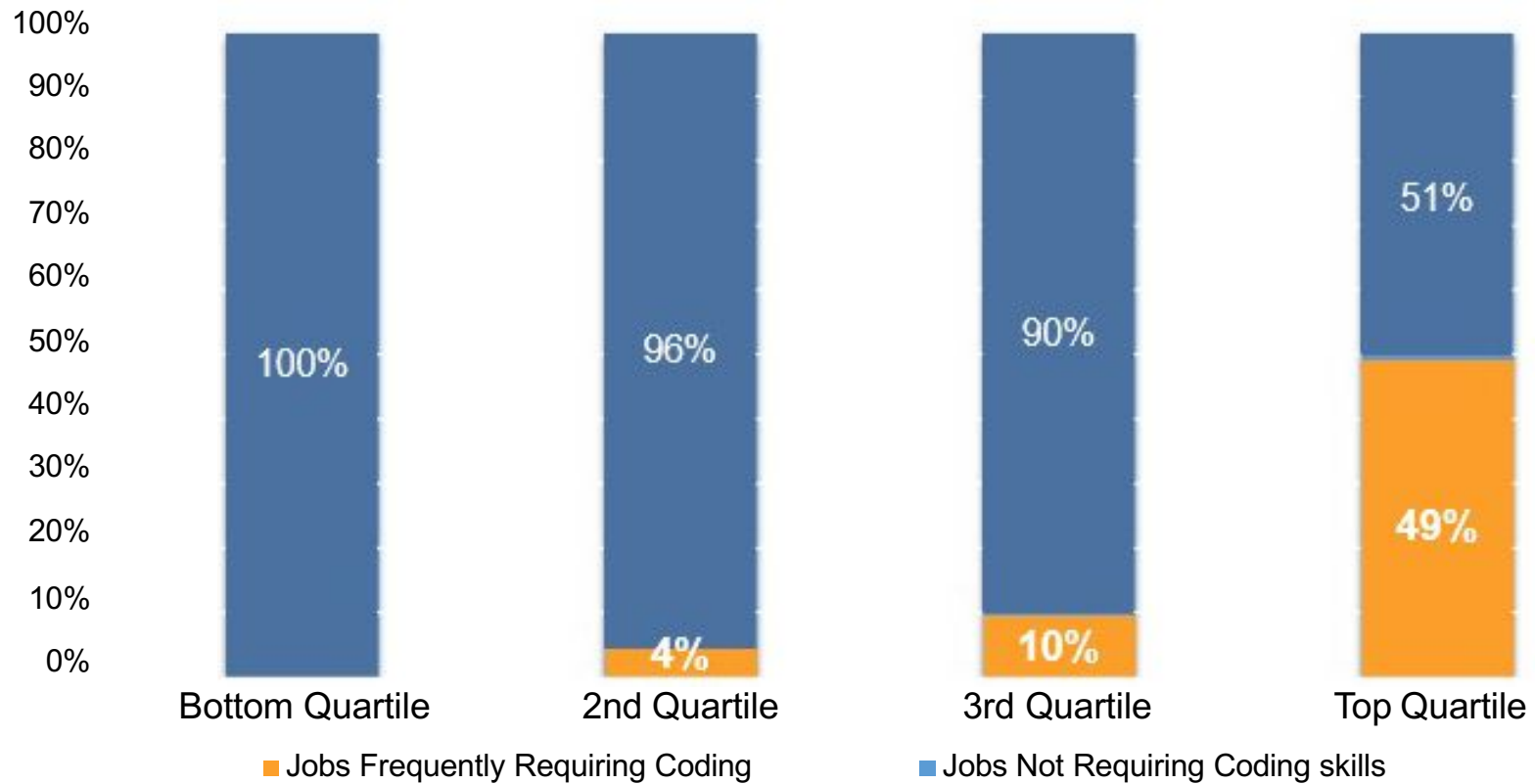
Are employers raising
the bar on experience
and education?

6 to 8 years experience: 85%
0 to 2 years experience: -25%

Skills Are Cropping Up In The Darndest Places

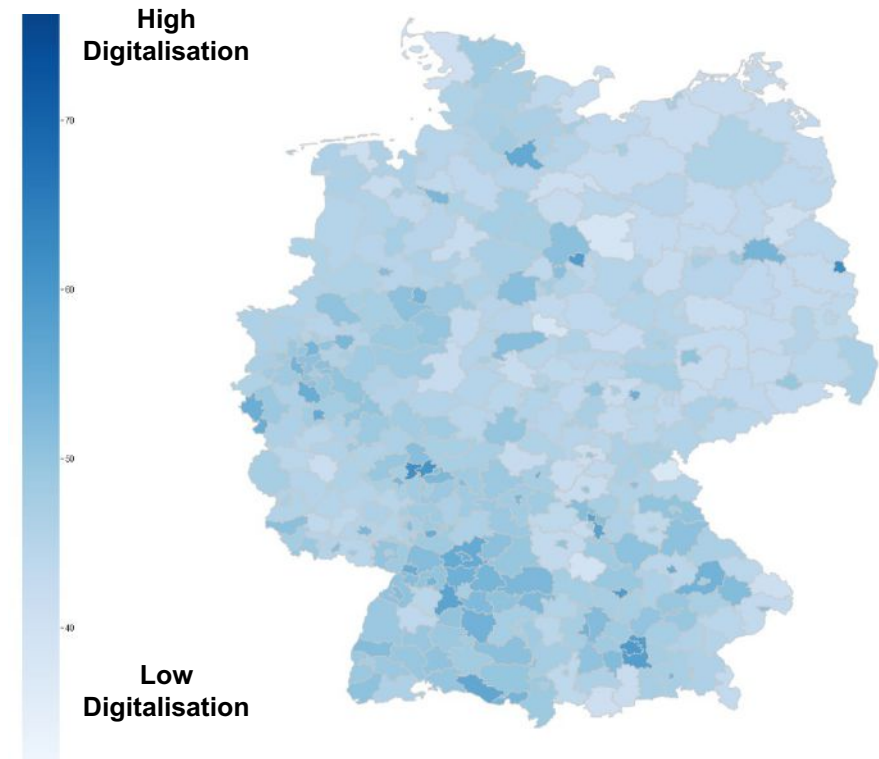
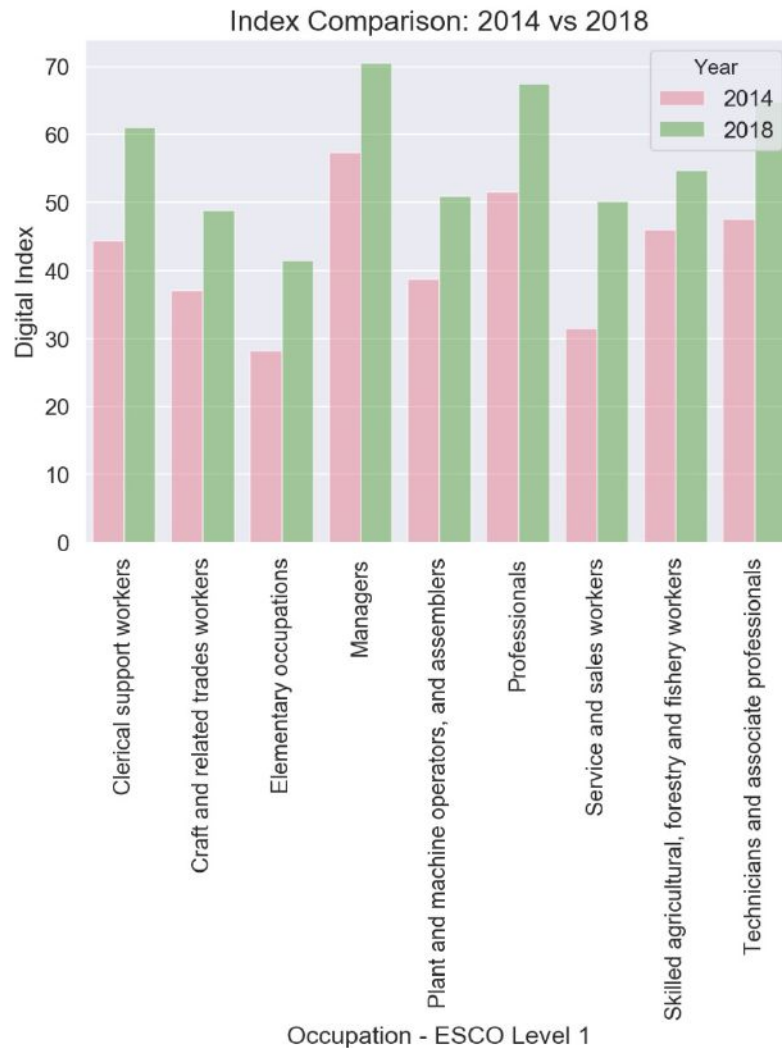


Prevalence of Coding Skills in Jobs Across Income Levels



Digitalisation is Rising

Broad Impact Across Occupations & Regions, Including Those That Have Previously Lagged



Jobs Are Evolving

The Emergence Of A Hybrid Genome

Accountant

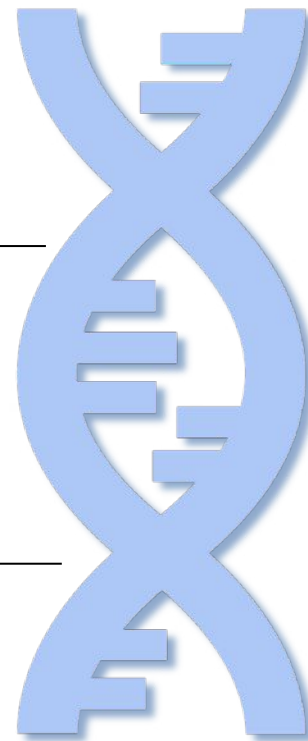
Data Scientist

ACCOUNTING

Accounting
Account Reconciliation
General Ledger
Financial Statements
Generally Accepted Accounting Principles
Financial Reporting
Balance Sheets

SOFT SKILLS

Communication Skills
Detail-oriented
Excel



+23%

Since 2013



+598%

Since 2013

PROGRAMMING

Python
SQL
Hadoop
R

DATA SKILLS

Data Visualization
Tableau
Excel
MapReduce

BUSINESS SKILLS

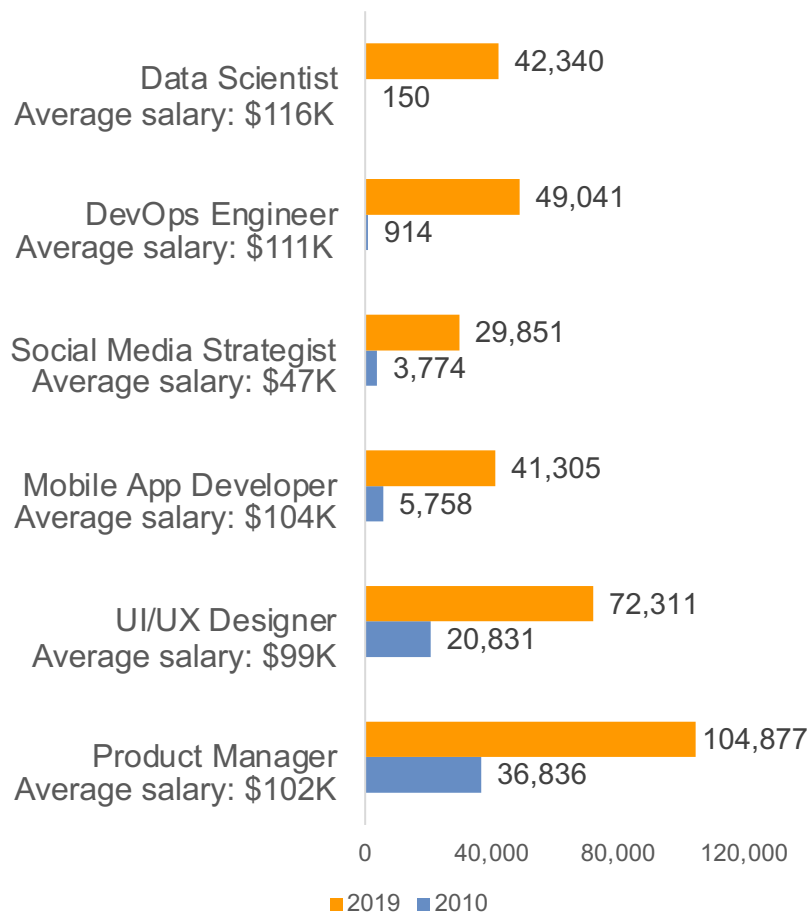
Predictive Models
Business Process
Economics
Strategic Planning

SOFT SKILLS

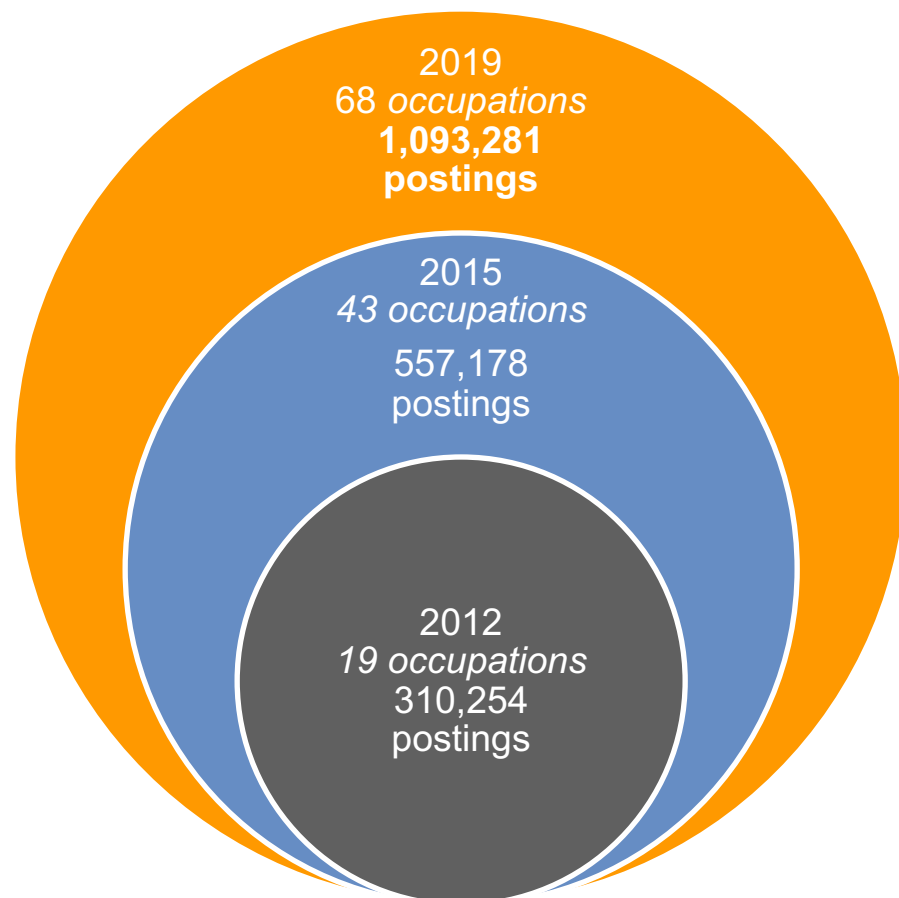
Problem Solving
Writing
Teamwork

New Jobs Are Being Created But The Bigger Impact Is In Existing Jobs

Job Postings Growth in New Hybrid Roles



Occupations with at least 10,000 postings requesting data skills



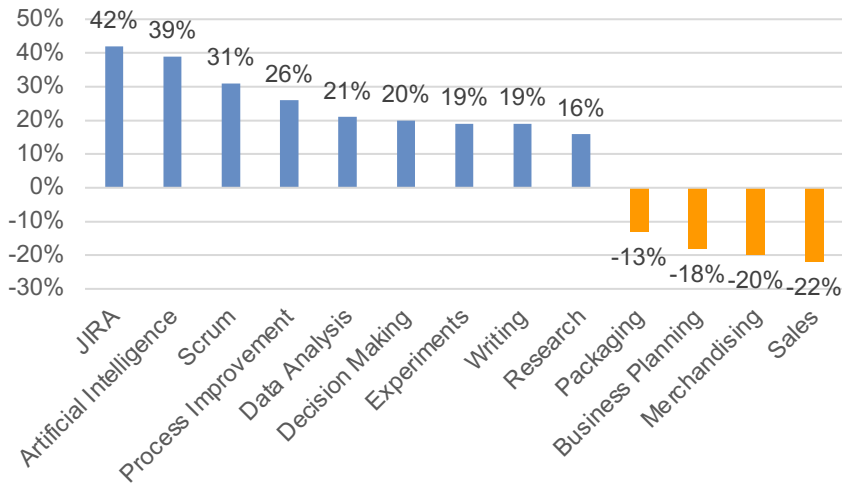
The Roles They Are a-Changin’



Just Since the Start of the Pandemic, Many Roles Demand New Skills

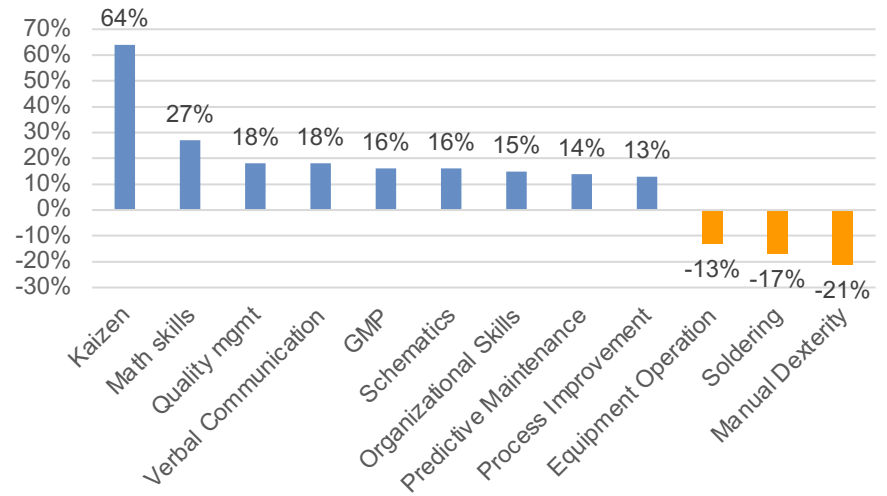
Key Changes in Product Manager Skills

Change in relative demand, last 30 days vs. 2019



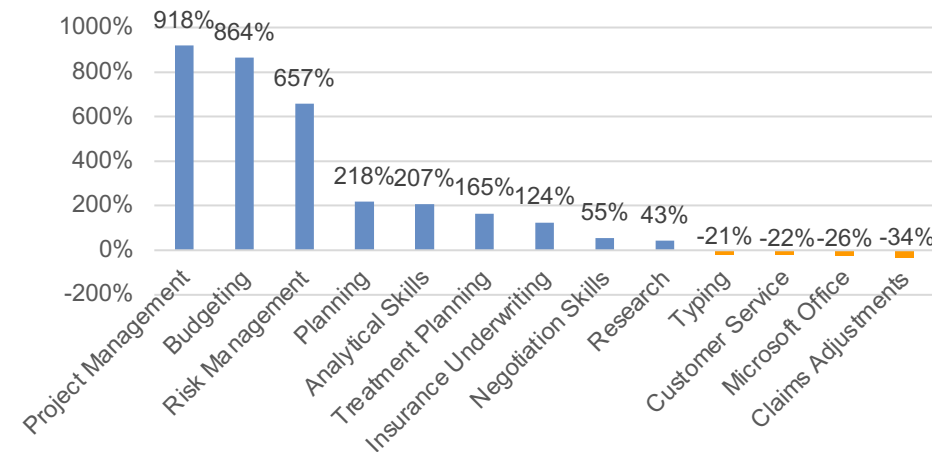
Key Changes in Production Technician Skills

Change in relative demand, last 30 days vs. 2019



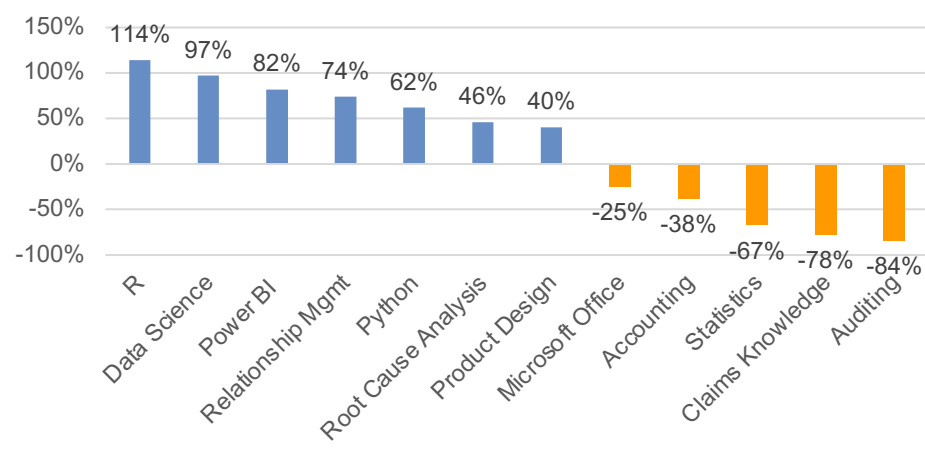
Key Changes in Insurance Claims Clerk Skills

Change in relative demand, last 30 days vs. 2019



Key Changes in Actuary Skills

Change in relative demand, last 30 days vs. 2019



With Jobs Changing So Fast

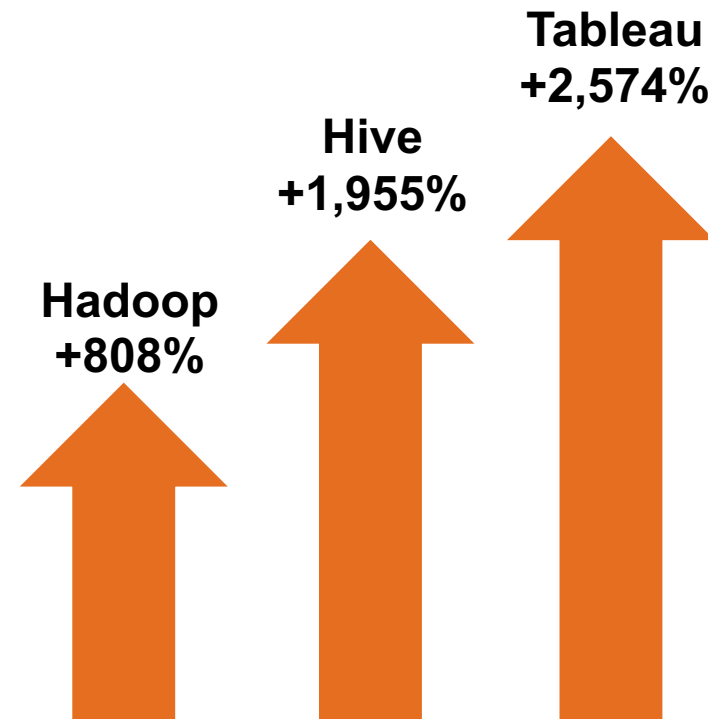
Can Higher Education Keep Up?



Even if you had an MS in Data Science 5 years ago, its curriculum would already be out-of-date

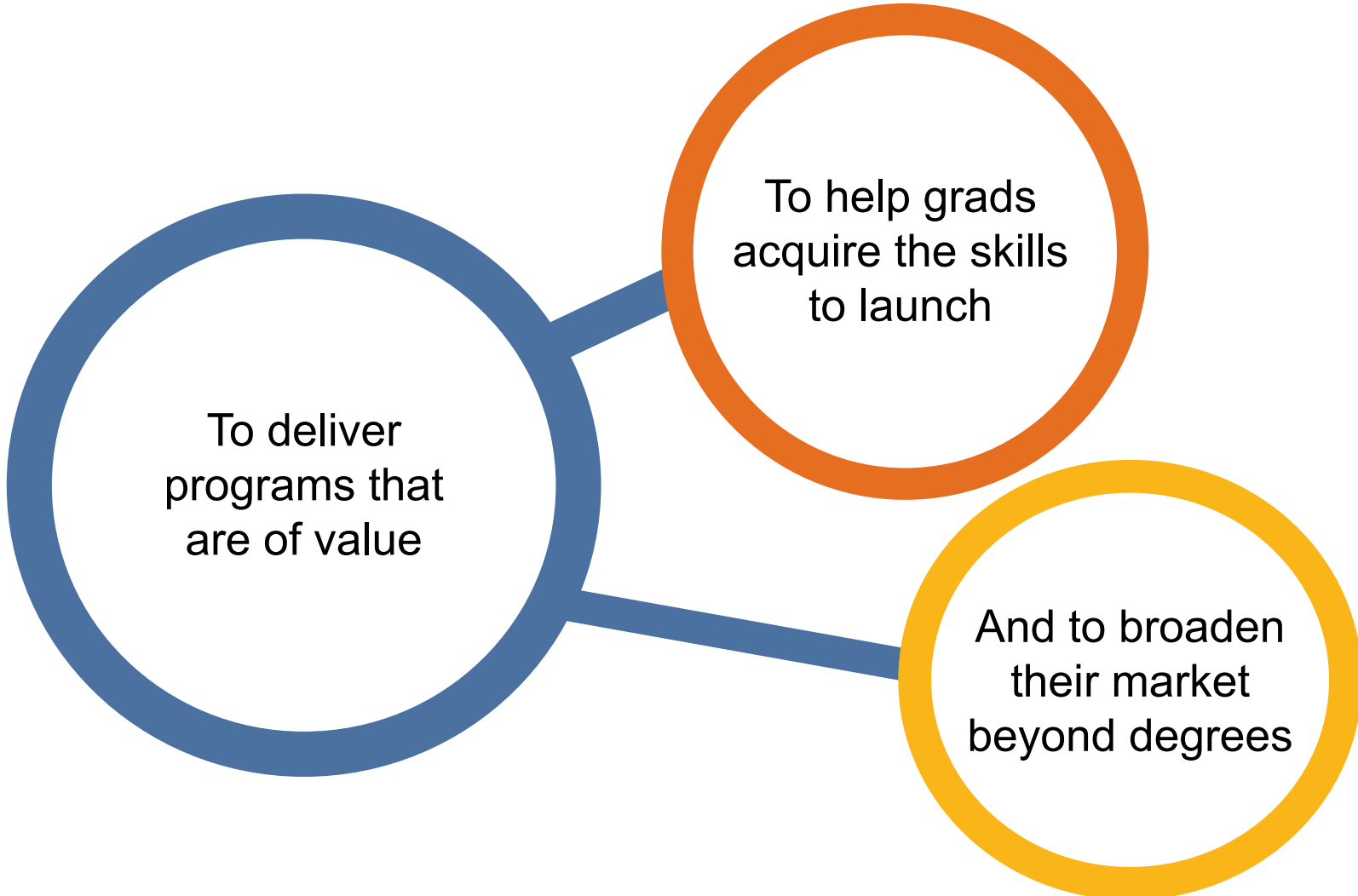


Example: Jobs in Data Analytics



**Fastest growing skills in
Data Analytics jobs**

An Imperative for Higher Education

A diagram consisting of three circles connected by lines. The leftmost circle is blue and contains the text "To deliver programs that are of value". Two lines extend from its right side to connect to two other circles: an orange one above and a yellow one below. The orange circle contains the text "To help grads acquire the skills to launch", and the yellow circle contains the text "And to broaden their market beyond degrees".

To deliver programs that are of value

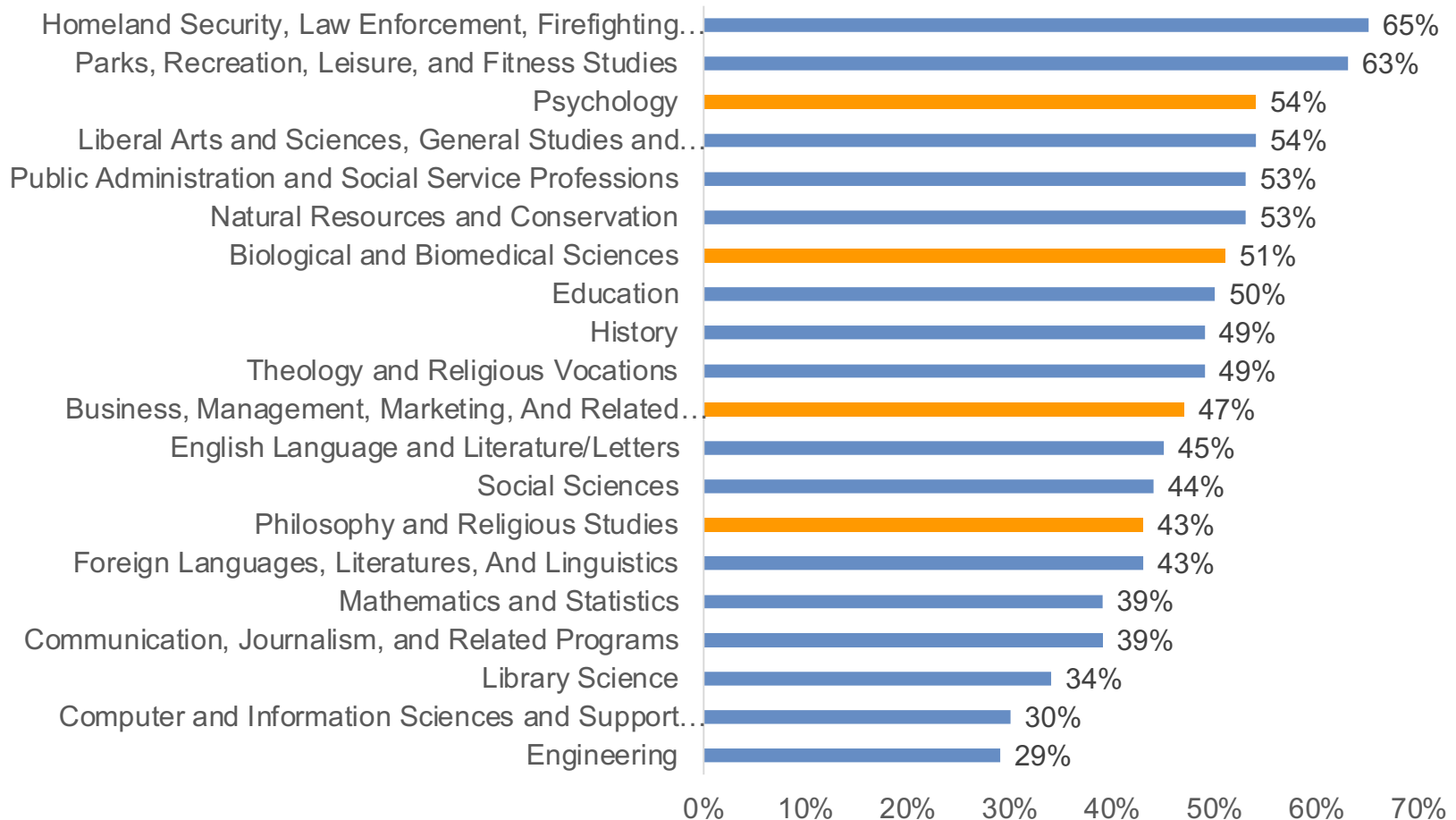
To help grads acquire the skills to launch

And to broaden their market beyond degrees

Programs Matter

For Students, What You Study Has a Big Impact on How You Launch

% of College Graduates Underemployed (first job)

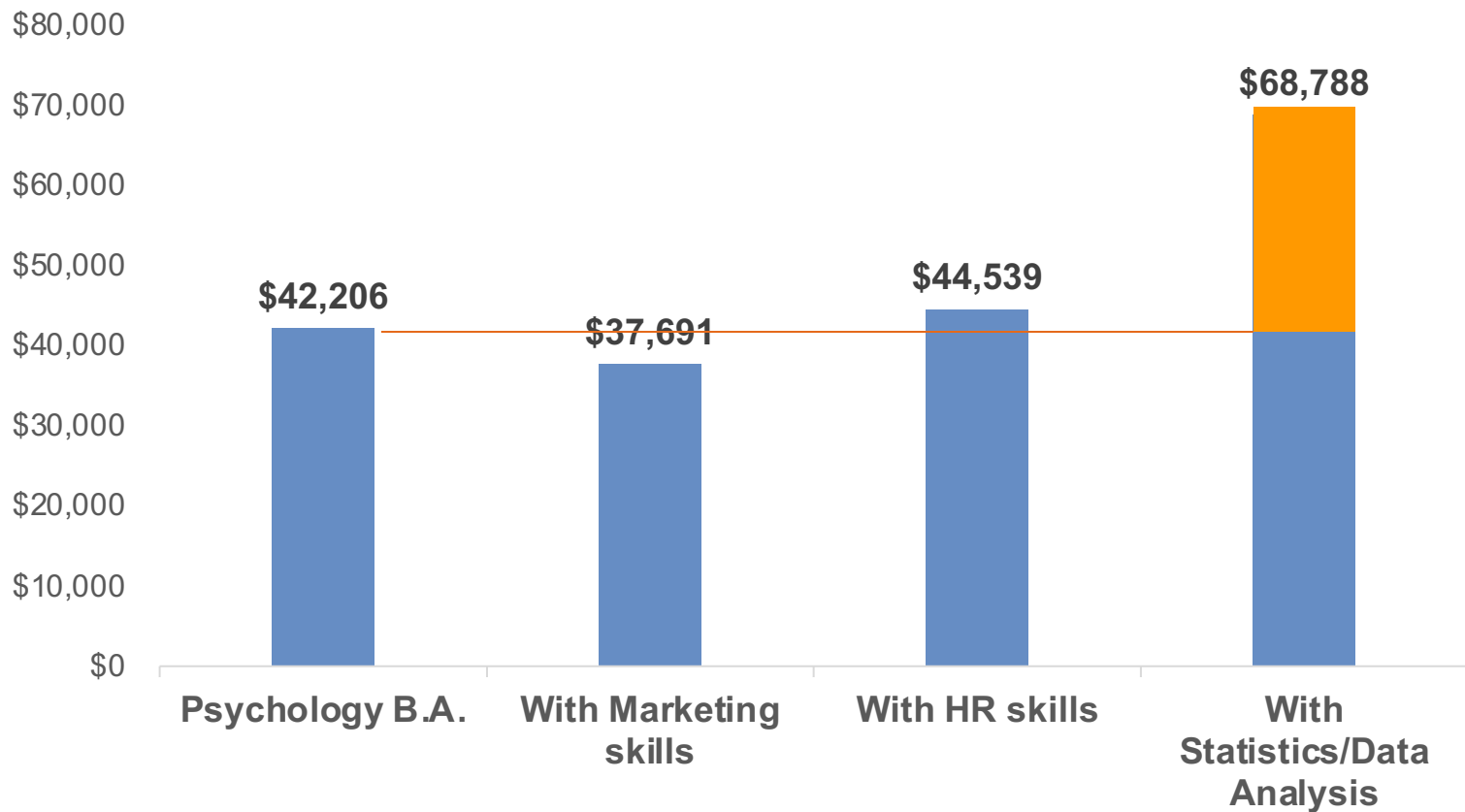


Skills Matter More

Specific Skills Boost Grads' Pay & Employability



Entry level salaries for Psychology majors



Adding A Few Extra Skills Can Make Grads More Employable

We identified eight skill sets that university graduates can develop through a modest amount of coursework, such as a minor or online training or internships, that **double their job prospects**:

IT NETWORKING & SUPPORT

+ \$1,058 premium
66,429 postings

SALES

567,855 postings

GENERAL BUSINESS

+ \$11,144 premium
577,787 postings

SOCIAL MEDIA

+ \$3,424 premium
399,577 postings

DATA ANALYSIS & MANAGEMENT

+ \$12,703 premium
136,757 postings

MARKETING

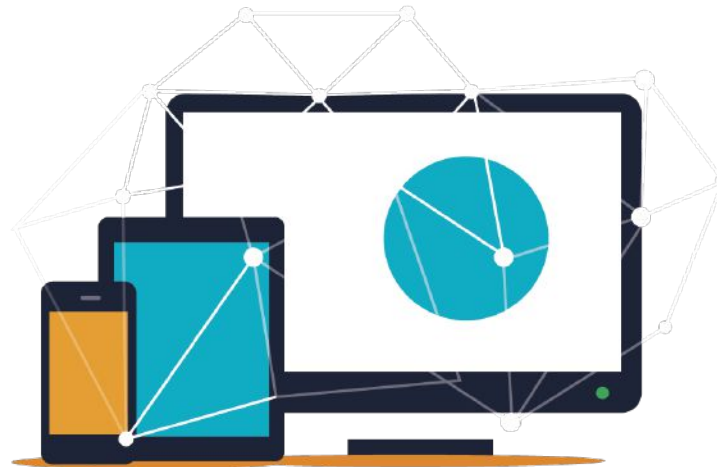
+ \$336 premium
359,916 postings

GRAPHIC DESIGN

+ \$9,188 premium
134,090 postings

COMPUTER PROGRAMMING

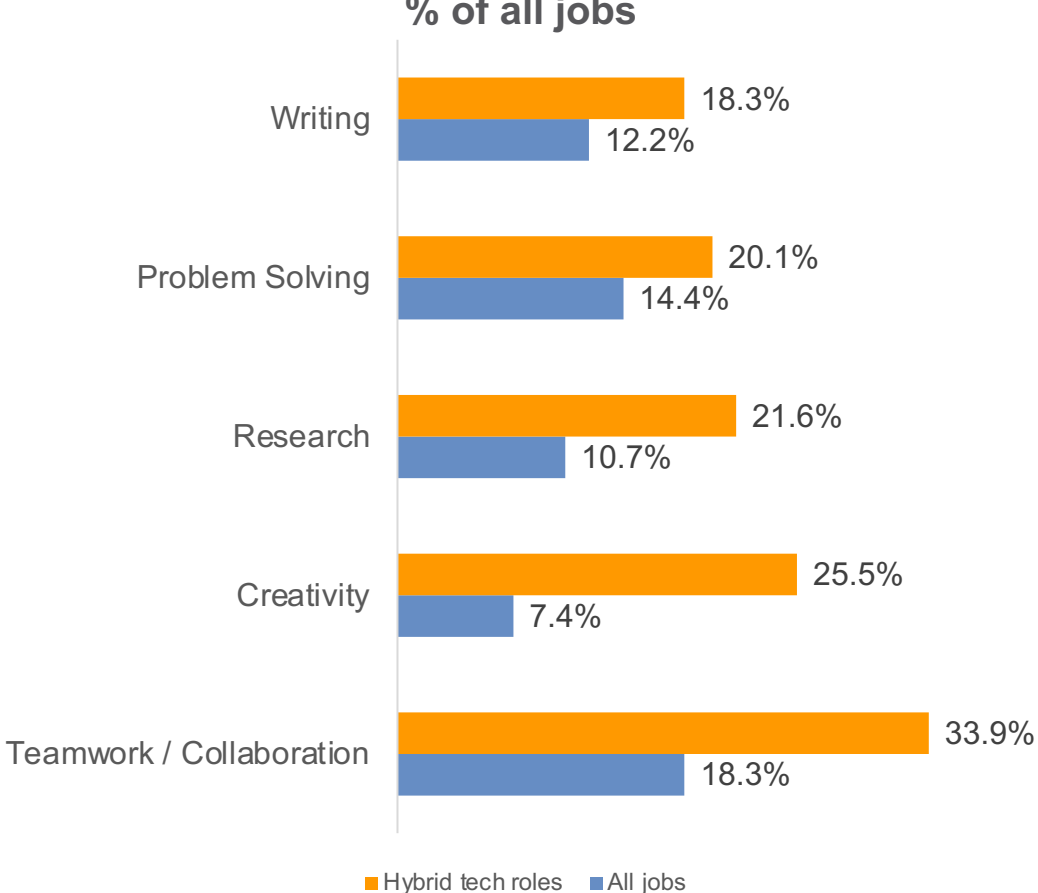
+ \$17,753 premium
52,822 postings



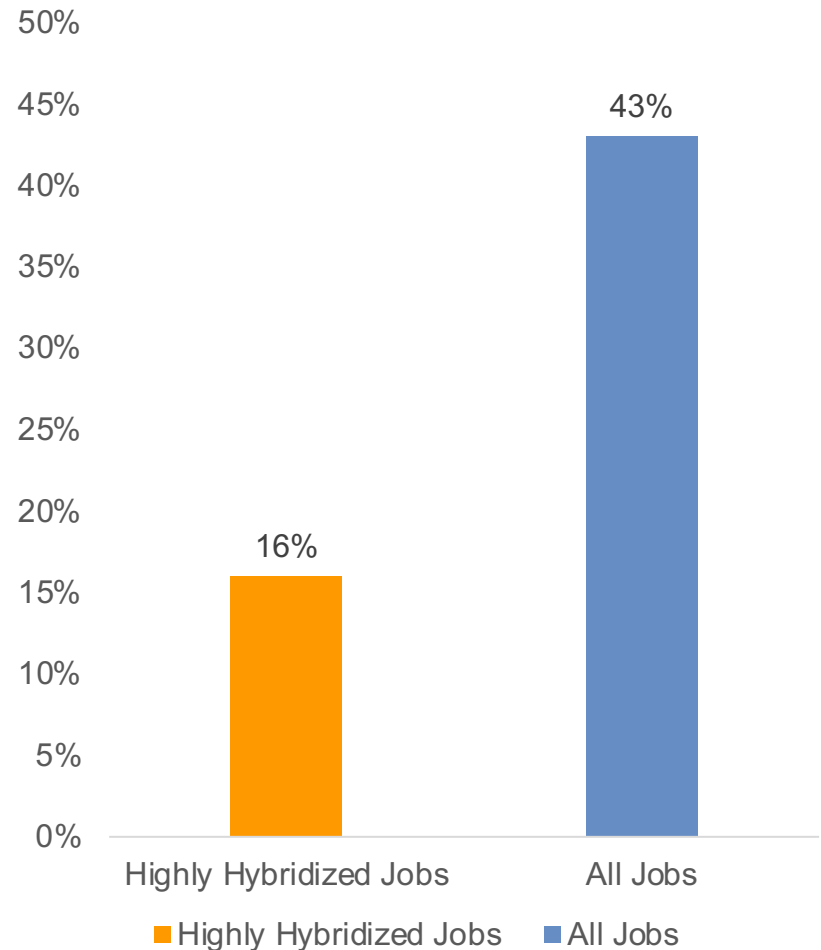
High Value Work Demands Foundational Skill

The New Foundational Skills are Central to New Economy Opportunity

% of hybrid jobs requesting key soft skills vs. % of all jobs



Vulnerability to Automation



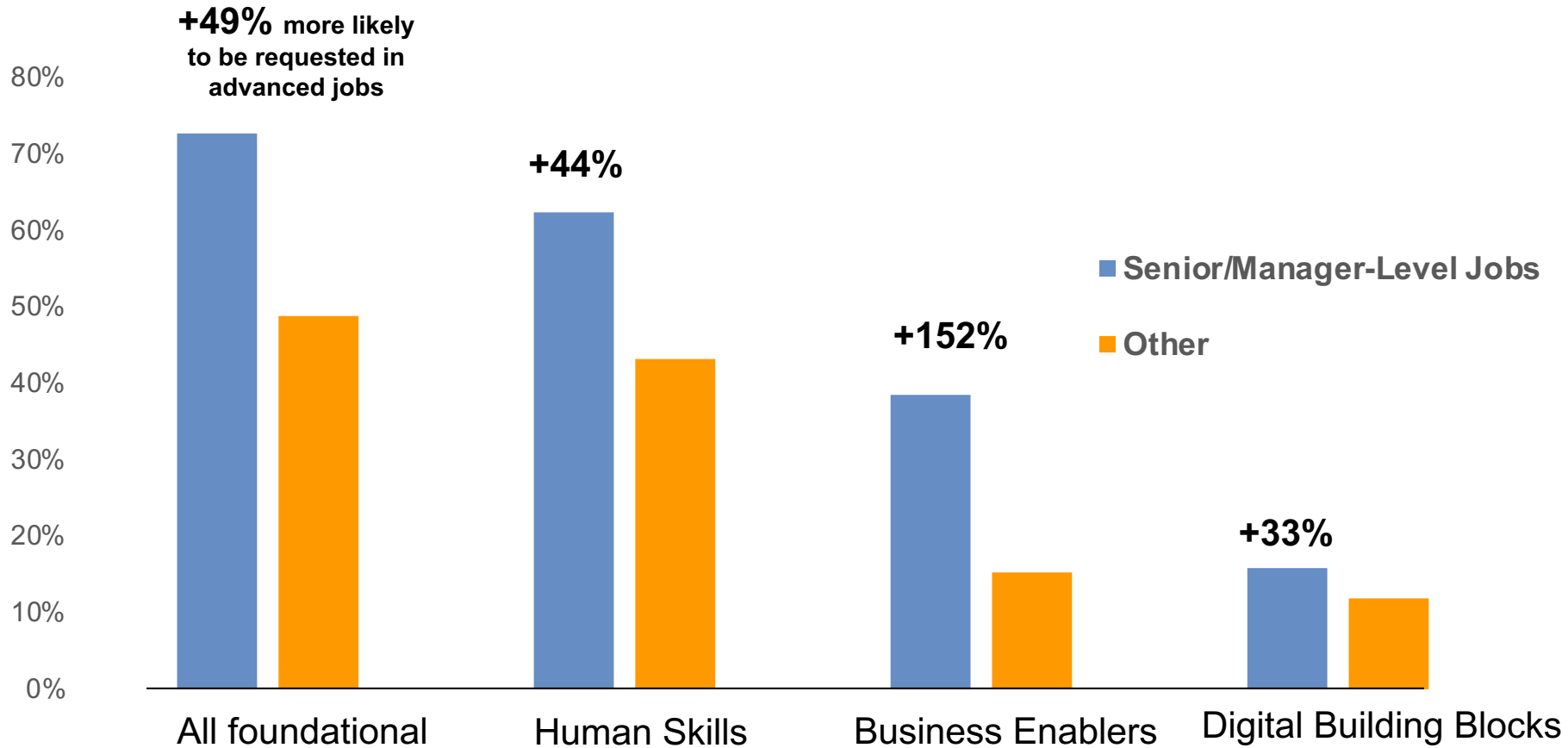
A New Set of Foundational Skills Unlock New Economy Opportunity

Bolster Current Studies with Key Skills

Foundational Skill Group	Foundational Skill Area	Total Openings in Entry-Level Postings in BA-plus SOCs: March 2019 - Feb 2020	Growth in Number of Postings: 2017-2019	Share of Openings Outside IT and Analysis Job Families	Average Salary Premium
Business Enablers	Business Process	370,883	29%	67%	12%
	Project Management	281,999	51%	69%	14%
	Digital Design	152,960	44%	64%	-
	Communicating Data	39,897	101%	34%	27%
Digital Building Blocks	Managing Data	292,817	49%	28%	34%
	Analyzing Data	217,623	48%	55%	21%
	Software Development	263,261	48%	17%	43%
	Computer Programming	203,328	56%	13%	45%
	Digital Security and Privacy	67,879	30%	29%	38%
Human Skills	Communication	1,264,535	48%	81%	-
	Collaboration	595,402	58%	79%	2%
	Critical Thinking	587,966	52%	66%	0%
	Analytical Skills	490,311	44%	76%	1%
	Creativity	276,003	60%	82%	-

Human Skills: Worth More As You Rise

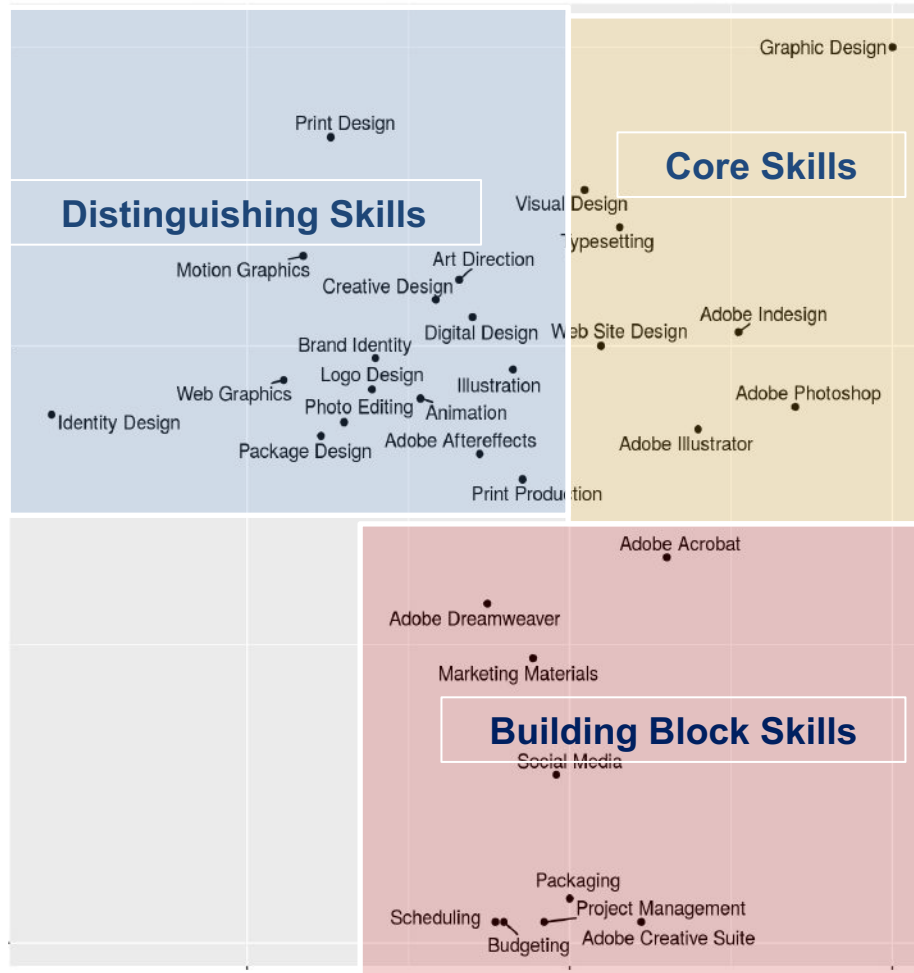
Share of Openings Requesting Skills



Don't Just Help Students Get Skills, Help Them Get Skills That Matter



Graphic Designer / Desktop Publisher (BGTOcc)



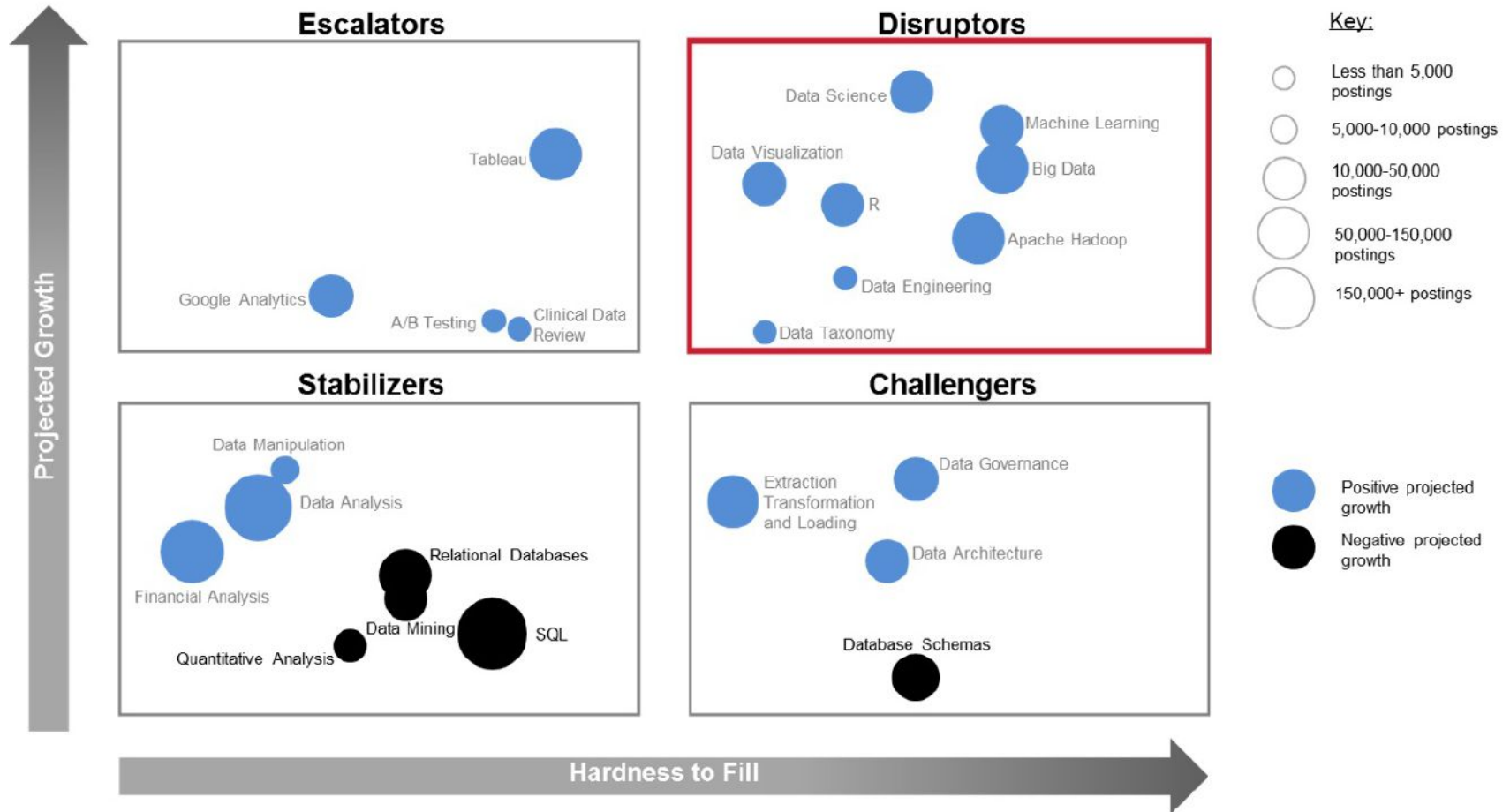
Core Skills: Definitional skills to each occupation which students will need in order to contribute

Building Block Skills: Although these are required and relevant across many roles, **they aren't always included in curriculum, putting graduates at a disadvantage**

Distinguishing Skills: These are emerging, fast-growth skills or core opportunities for specialization that **enable students to differentiate themselves – and often command significant salary premiums**

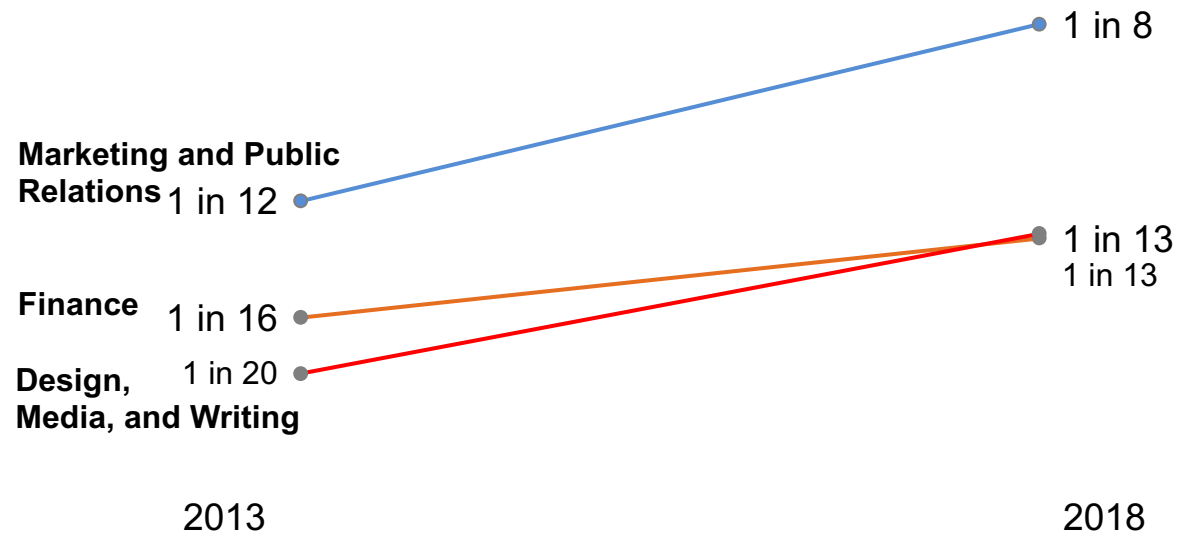
Not All Skills Are Created Equal

Even In High Growth Fields, Some Are Disruptive



Analytics Skills are Reshaping Jobs Well Beyond the Data & Tech Worlds

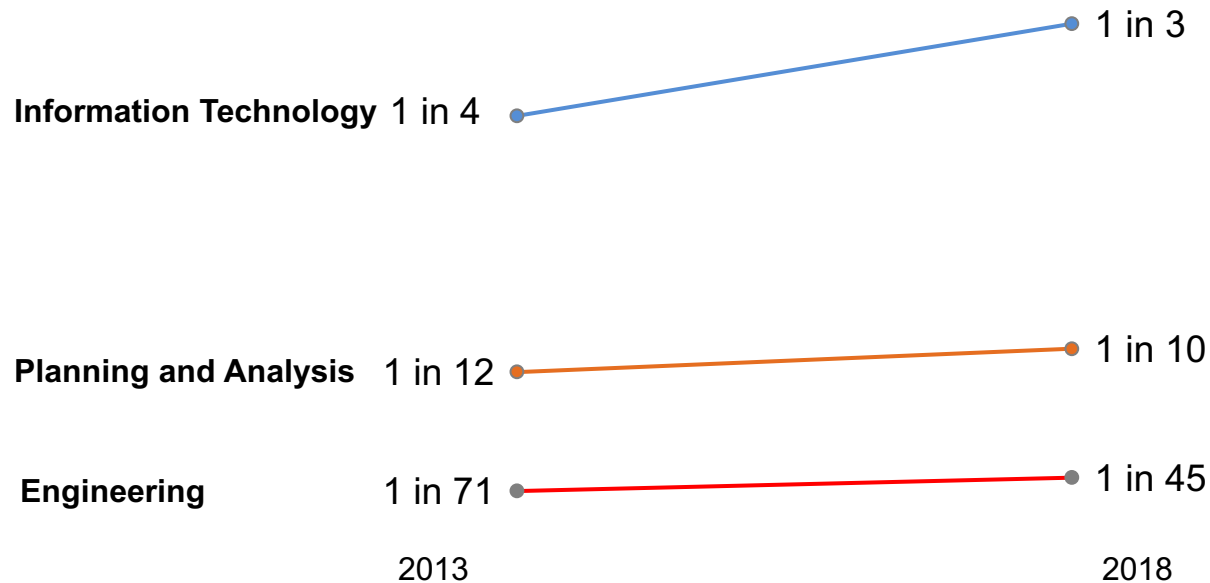
Share of Job Postings Requesting Analysis Skills



For Engineers & Technologists

Management Skills are Key to Moving Up

Share of Job Postings in Technical Occupations Requesting Business Leadership Skills



Learning Can Be Arbitrage

Help Learners Get A Return On Investment In Themselves



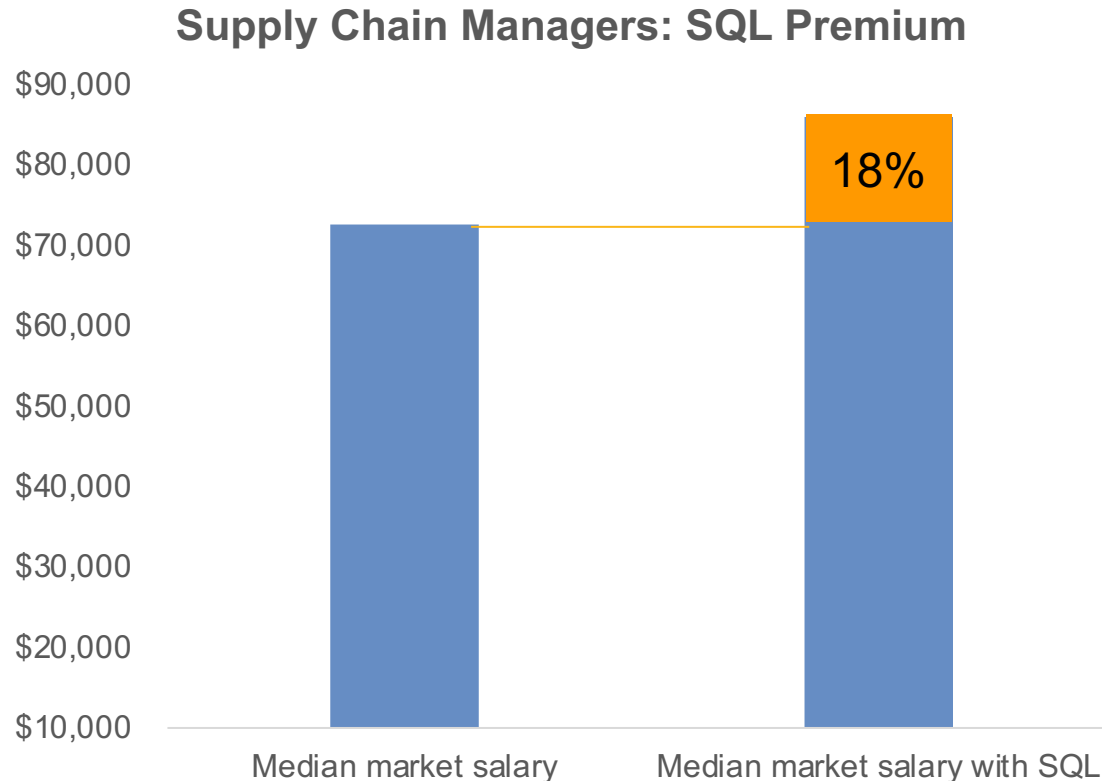
The skills a student acquires in a program...



..should be worth more in salary – and in boost to the local community – than the cost of the program

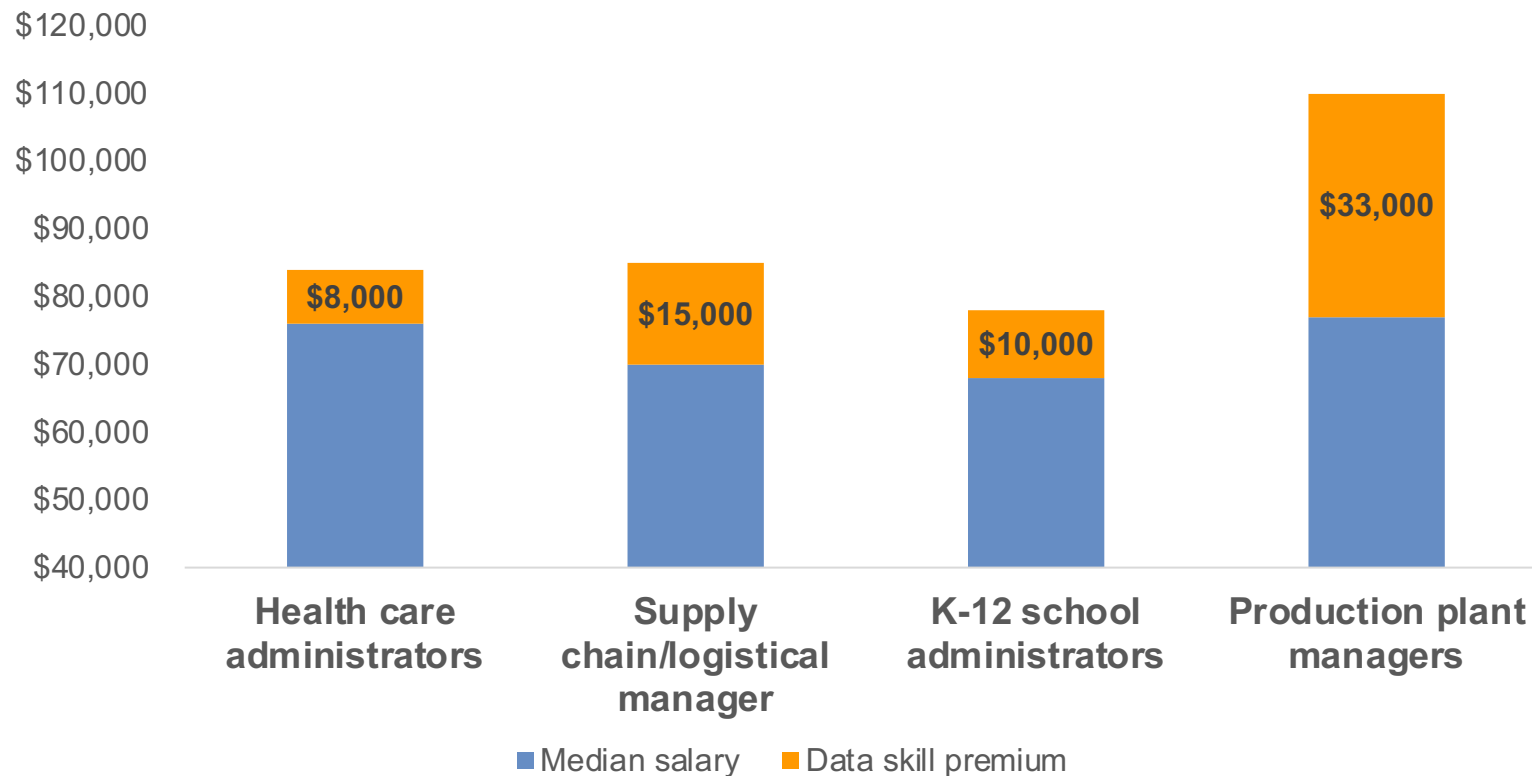
In a Hybrid Economy, Skills Arbitrage Careers

It Doesn't Cost \$14,000 to Learn SQL



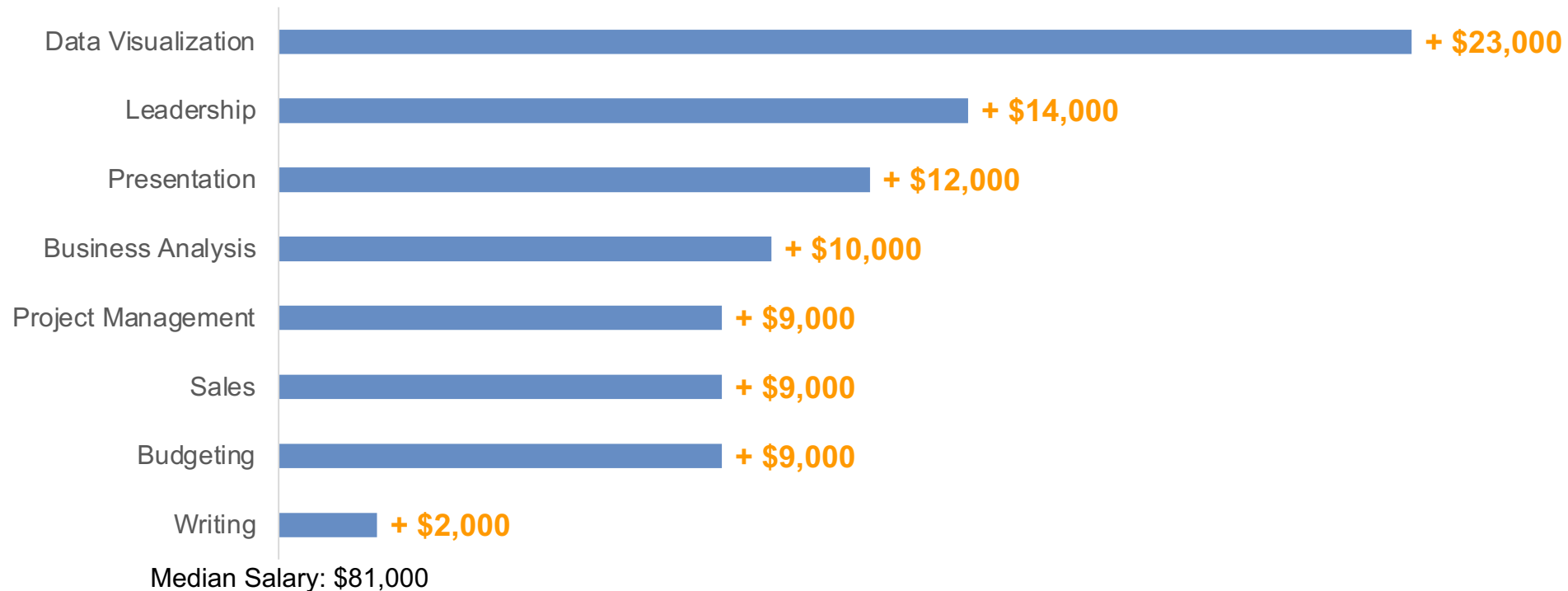
Across Careers Skilling Up Has Strong Returns

Salary premium for data skills across occupations



For Engineers & Tech Workers, Key Business Skills Unlock Opportunity & Mobility

Salary Premium for Key Business Skills among Engineering and IT Professionals

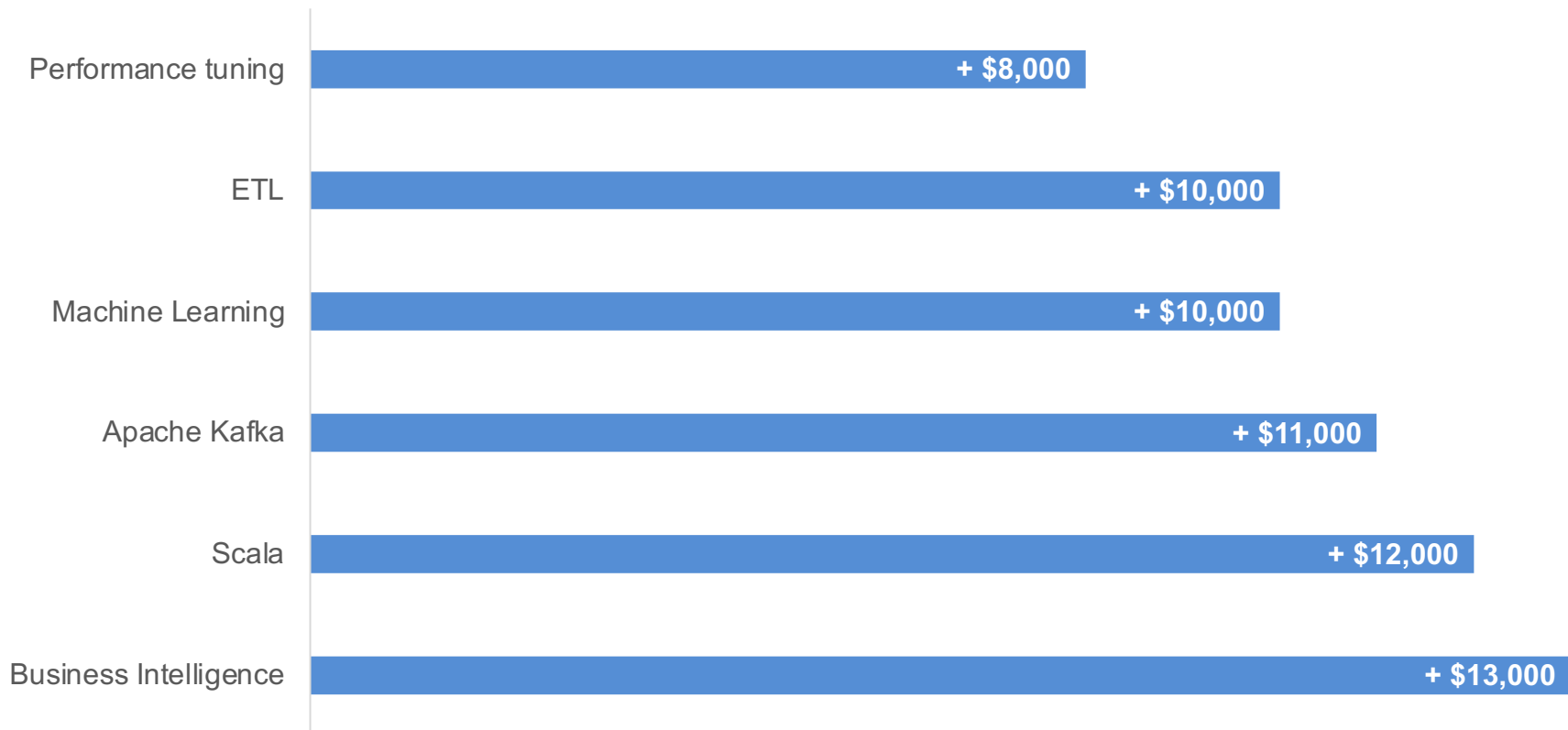


Build Programs to Deliver the Specific Skills That Boost Careers

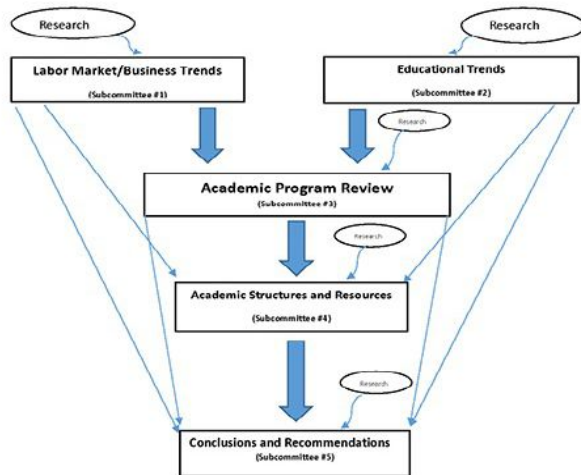


Develop Certificate Programs That Build the Skills That Deliver Immediate ROI

Skills for Big Data Architects that Command a Salary Premium



Build a Skills Strategy for Education



As part of its Academic Master Plan process, BCC reviewed 60+ programs for alignment with high-value careers

The college identified areas for additional educational pathways.

The analysis also recommended closing programs aimed at careers that aren't in demand or that lead to low-wage jobs



WESTERN GOVERNORS UNIVERSITY



Data Science Occupations

Skill Name	Percent of Job Postings Calling for Skill
Data Science	75%
Python	72%
Machine Learning	62%
SQL	47%
Apache Hadoop	36%
Big Data	34%
Java	34%
R	24%
Data Analysis	24%
Data Mining	22%
Apache Hive	20%
SAS	20%
Predictive Models	20%
Scala	18%
C++	17%



Data Analysis Occupations

Skill Name	Percent of Job Postings Calling for Skill
Data Analysis	53%
SQL	46%
SAS	34%
Python	30%
Statistics	25%
Data Science	23%
Economics	20%
Tableau	20%
Statistical Analysis	19%
Project Management	18%
R	18%
Machine Learning	16%
Data Management	15%
Data Mining	12%
Data Visualization	12%

Legend

Bubble Shading

Alignment with labor-market skill demand: the more in-demand skills taught by the MA in Data Analytics program, the darker the bubble shading. The shading therefore reflects the number of skills in bold in the list of top skills beneath each occupation group.

Skill %

A skill is in bold if it is mapped to the Competencies

Skill %

A skill is grayed out if it represents a gap between labor market demand and the MA in Data Analytics (skill not mapped to WGU competencies)

This >100K student public online university built from the ground up for working learners is using postings data to assess the alignment between the skills taught in their programs and the skills employers require of students and identify curricular blind spots

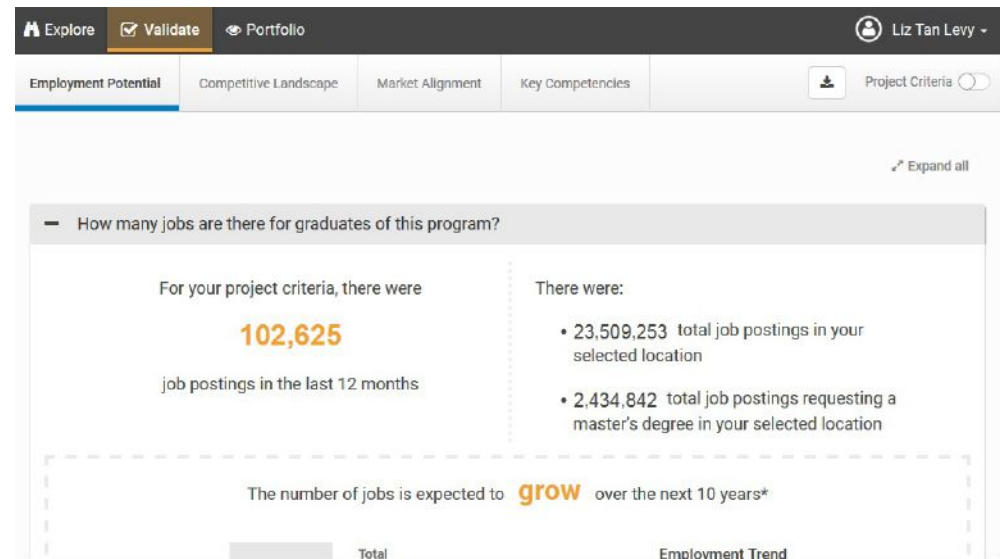
Case Study:

Empowering Faculty

To Unlock the Full Value of Courses



- USF's Provost initiated a curricular review of 65 undergraduate programs across 34 departments to determine if they were aligned to the labor market and if they were preparing students for their careers
- Faculty gained robust understanding of the skills their students would need to launch successfully in their careers
- Curricula revised to ensure courses emphasized high value skills.
- Departments building course pathways to ensure students know how to acquire high value skills
- Departments feel empowered to talk to local employers about their students



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