

Digitization of Talent

What Trends
Indicate and How to
Stay on Top of Them

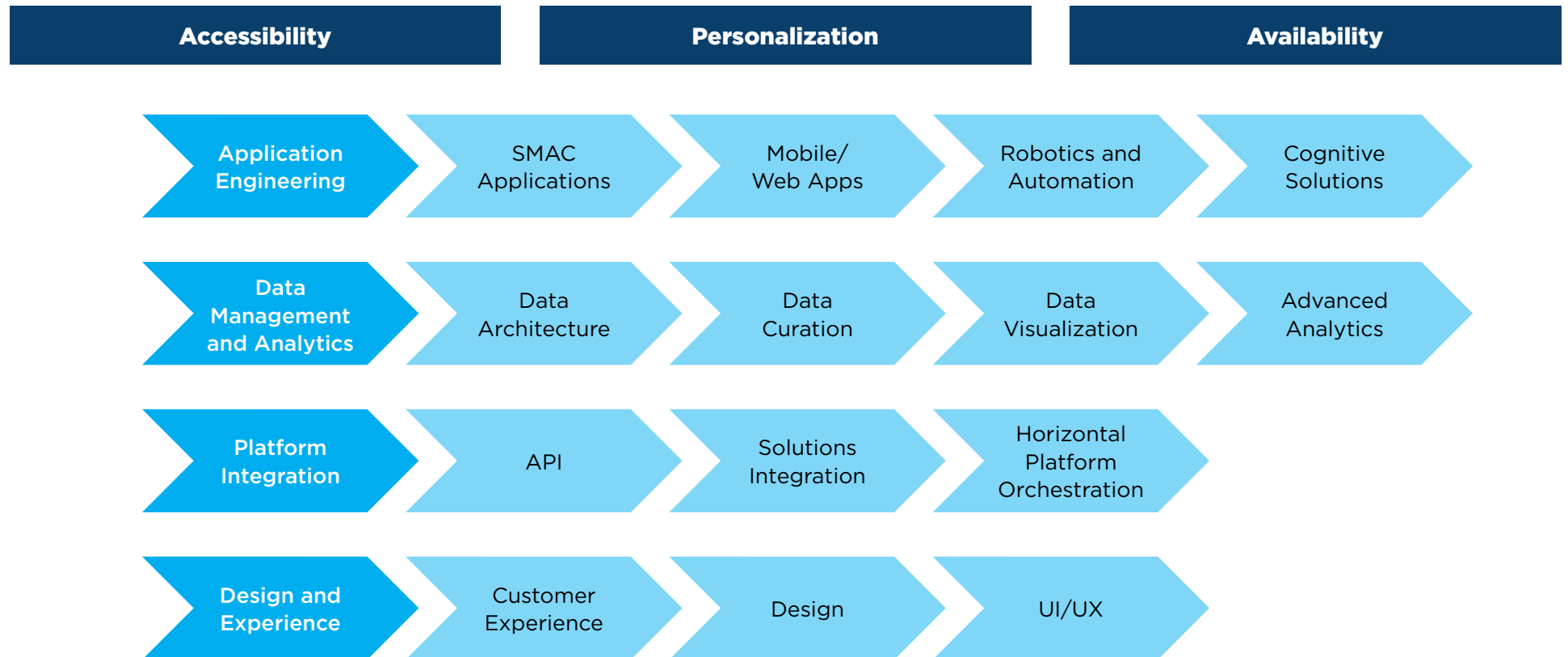
What Is Digitization?

Key Trends in Enterprise Digitization



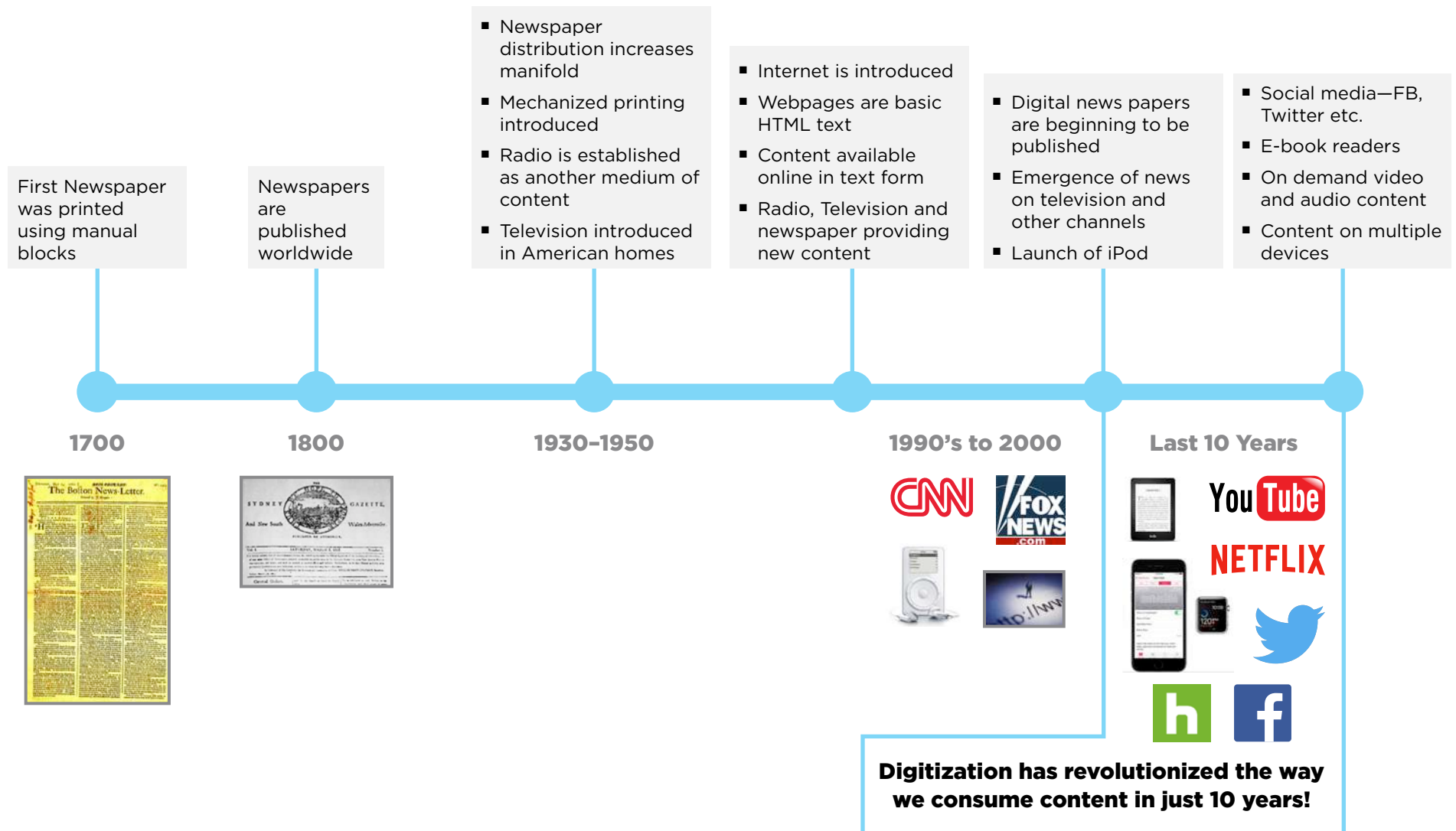
What Is Digitization?

A Shift In Customer Demand Has Increased the Need for Digitization



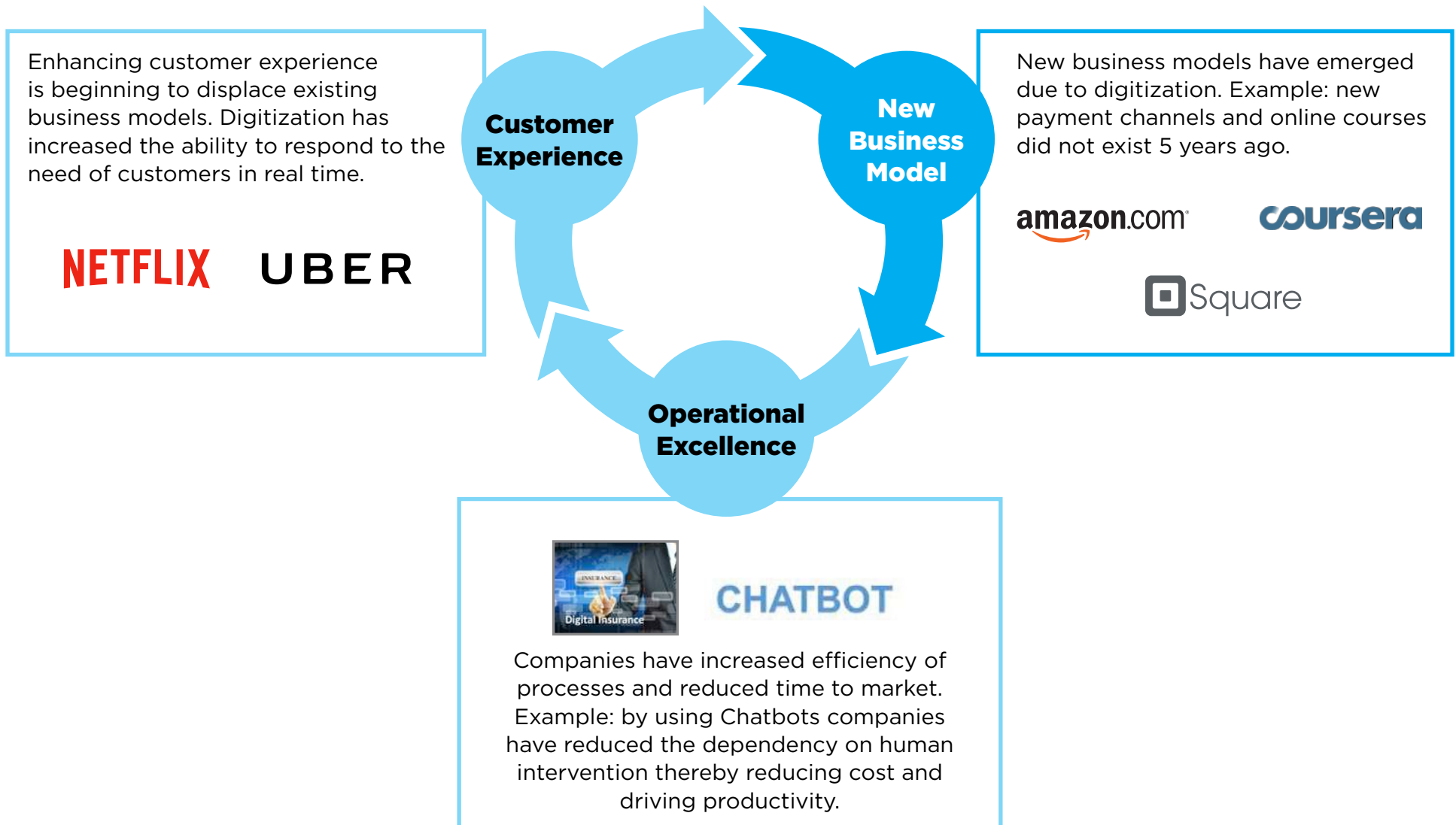
Source: CEB TalentNeuron research and analysis; Cisco Whitepaper; Zinnov Insights; CEB analysis.

Digitization Revolutionized How We Access and Consume Content



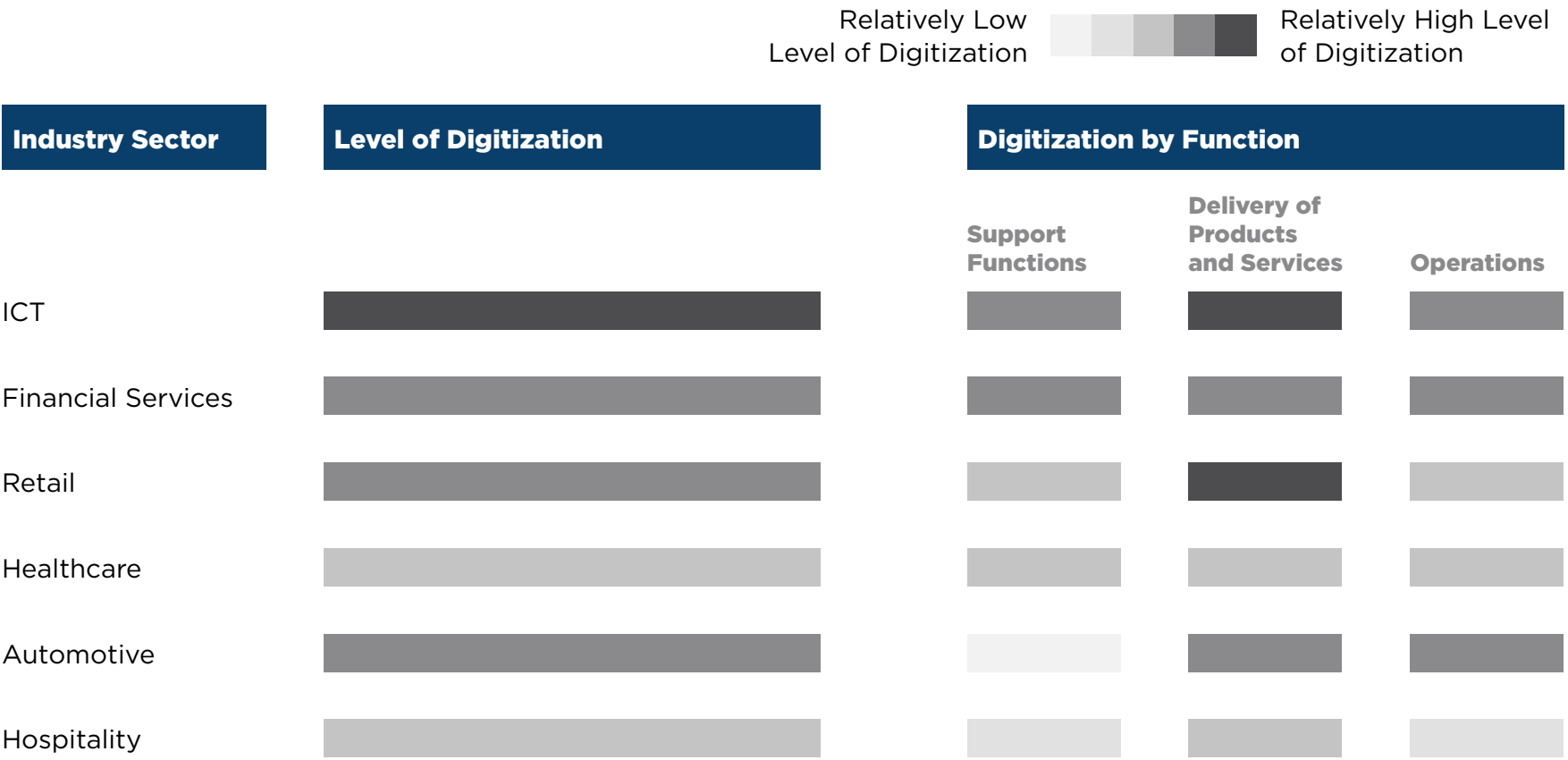
Source: CEB analysis.

Digitization Transformed Traditional Businesses Operations



Source: CEB TalentNeuron research and analysis.

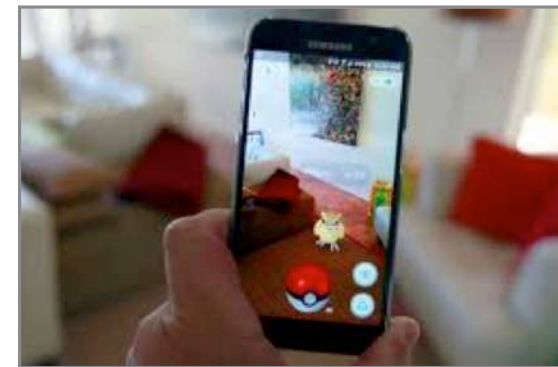
Digitization Is Causing Disruption Across Industries and Roles



Source: CEB TalentNeuron research and analysis, Harvard Business Review, CIO, PwC, Eurostat.
Note: 1. Digitization index based on demand for talent, investment focus on top companies in each sectors and CIO interviews.
2. Support Functions refers to HR, Finance, Marketing, Procurement etc.
3. Focus Geography is US.
4. Retail excludes online retail.

Pokemon Go: 20 Years Worth of Digital Innovation

- Release: July 2016
- Over 10 million downloads in US alone
- 40+ minutes spent by users on an average playing the game daily
- Customized for a user location
- Based on GIS, geo fencing, location tagging etc. to increase familiarity of users to surrounding places in real time
- Gamers buy PokéCoins for in app purchases
- Augmented reality helps blend real work with virtual characters
- Creates a marketing and social platform for local and large businesses



Key Skills Required for Digital Transformation

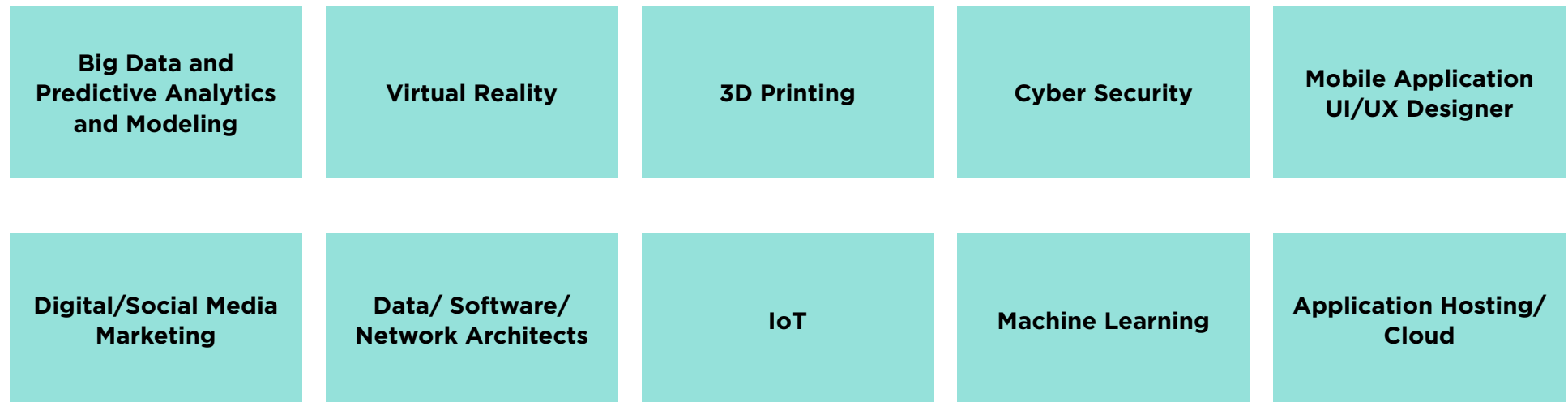
Types of Skills in Demand and the
Challenges in Hiring



Rapidly Increasing Emerging Skills and Function Demand

Horizontal Skills

Functions are witnessing huge demand in the recent past and are predicted to witness similar demand over the next five years.



Source: CEB TalentNeuron research and analysis.

Pockets of Accelerating Demand

Vertical
Specific Skills



ICT

- Wireless Design/Connectivity
- Agile Methodologies
- Storage and Data Management



Financial Services

- Mobile Payments and Touch Point Systems
- Regulatory and Compliance
- Fraud Detection and Analytics



Retail

- Omnichannel
- Information Access Points (QR Codes, Interactive Shopping etc.)
- Distribution and Fulfillment



Healthcare

- Electronic Medical Records
- Robotics/Computer Aided Detection and Surgery
- Wearable Tech



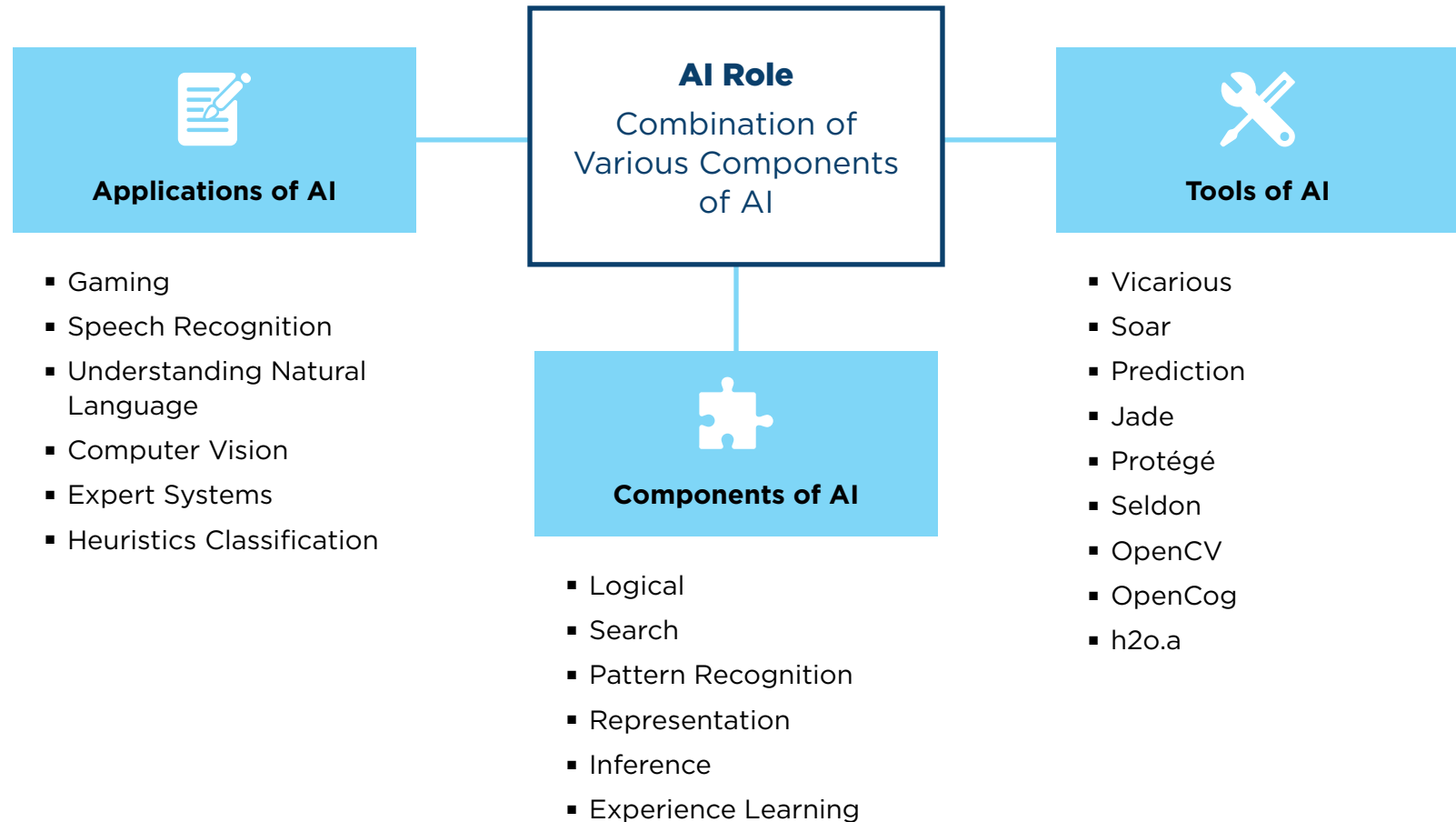
Automotive

- Telematics
- Supply Chain and Vendor Management
- Design and Prototyping

Source: CEB TalentNeuron research and analysis.

Note: Retail excludes online retail; Non Exhaustive List.

Example 1: AI Roles Are a Mix of Components, Tools, and Applications



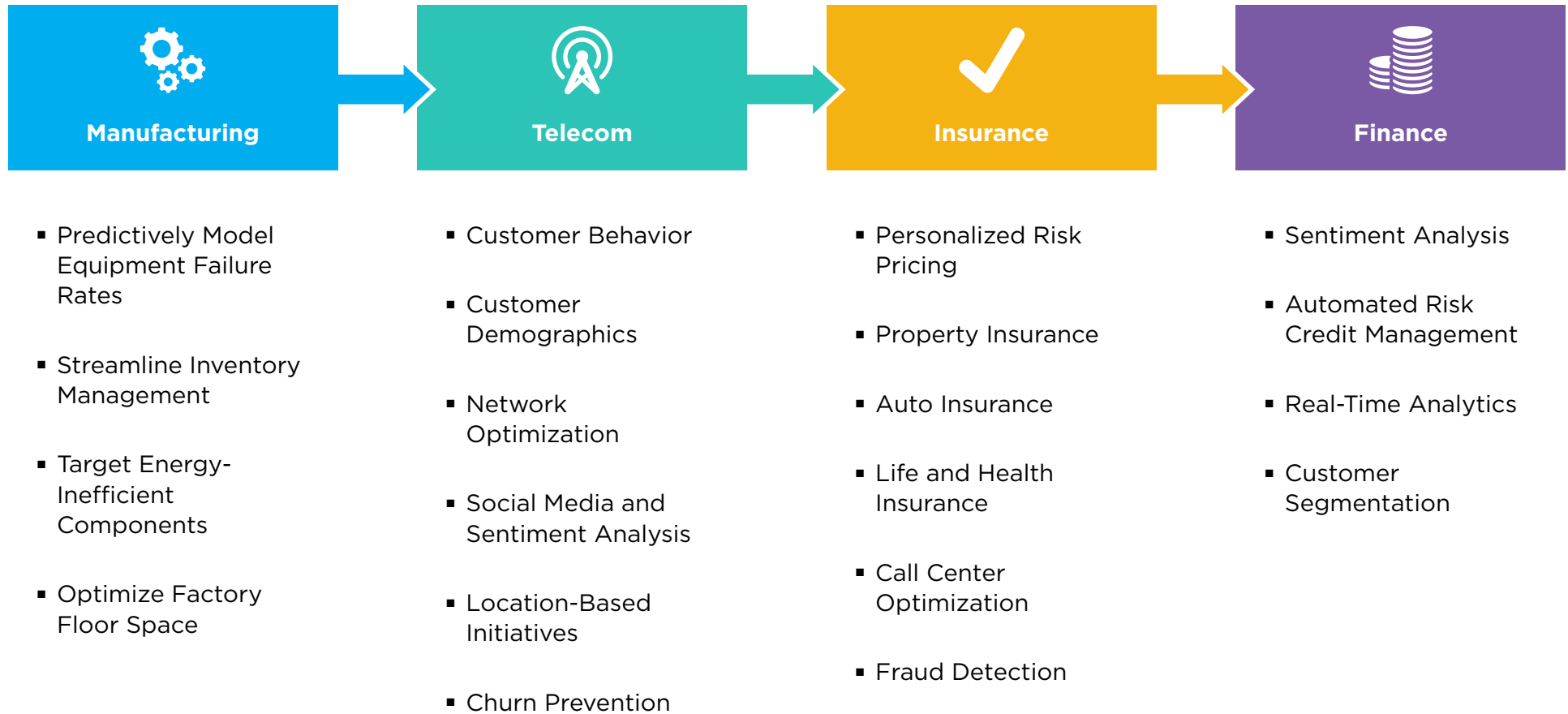
Examples:

Role 1 Key Skills: Expert Systems AND Experience Learning And Patterns AND (Vicarious OR Soar)

Role 2 Key Skills: Natural Language AND (Logical OR Search Patterns) AND Jade

Source: CEB TalentNeuron research and analysis; Crawling of public profiles; Skill predictor algorithms; CEB TalentNeuron Skill Taxonomy and SME interviews.

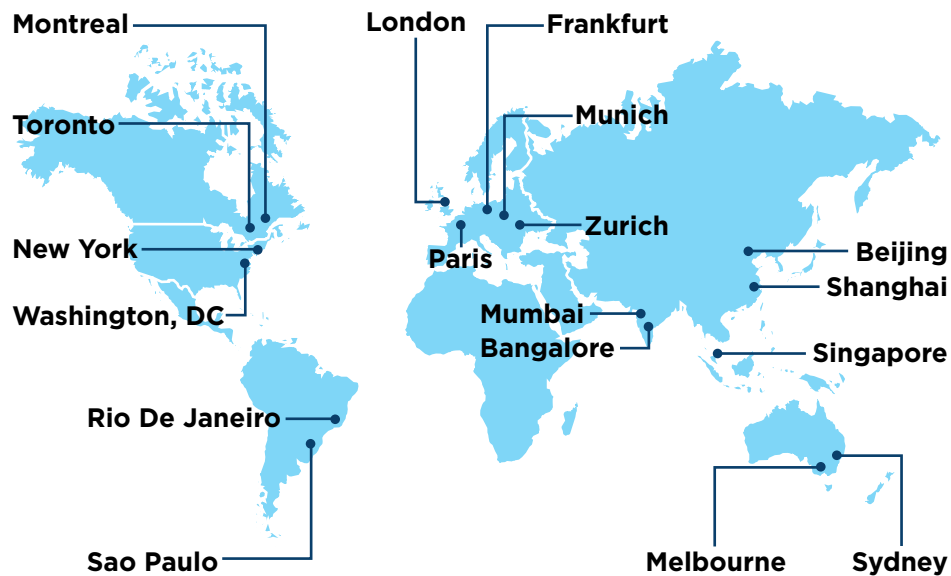
Example 2: Data Scientists Vary By Industry



Source: CEB TalentNeuron research and analysis.

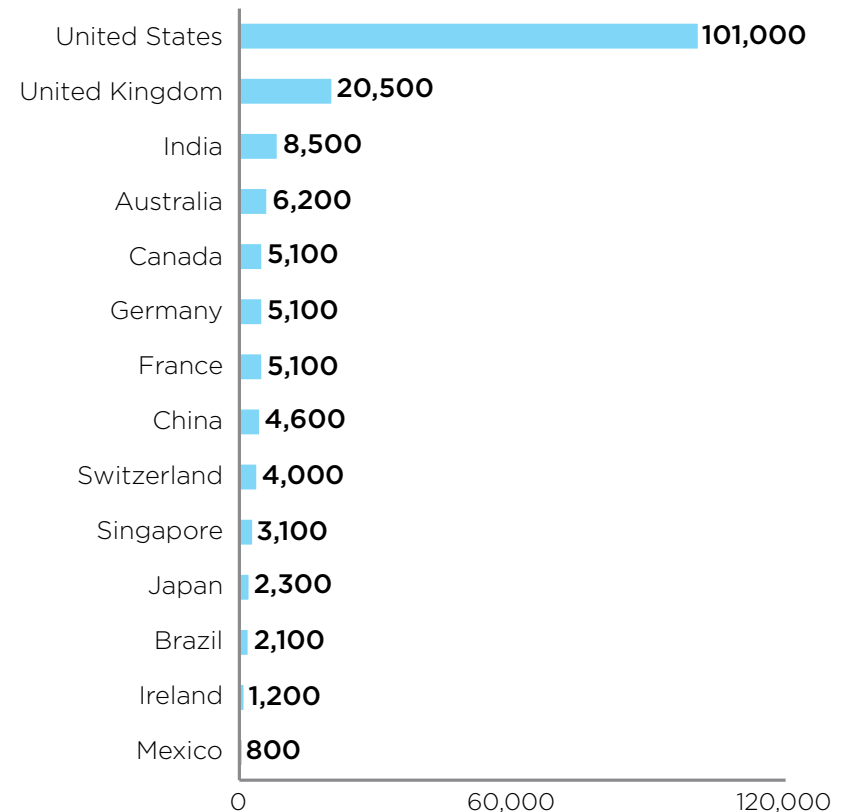
Example 3: Scarcity of Cyber Security Talent Globally

Cyber Security Installed Talent Pool Top Locations by Country



Source: CEB TalentNeuron research and analysis; Crawling of public profiles; Skill predictor algorithms; CEB TalentNeuron Skill Taxonomy and SME interviews.

Total Cyber Security Installed Talent Pool in Top Countries by Region: 169,600



Source: CEB TalentNeuron research and analysis; Crawling of public profiles; Skill predictor algorithms; CEB TalentNeuron Skill Taxonomy and SME interviews.

Example 4: Telematics: In-Car Connectivity Is a Must for Automakers

It is estimated that the penetration of global integrated telematics will reach 88% for new cars by 2025.



Beside Automotive, use of telematics has increased in non-trucking sectors such as utilities; private transportation including taxis, private hire vehicles, and rental fleets; construction and mining; government; emergency services; and local delivery markets.

Faster Networks

**Smartphone and
Tablet Integration**

API

Yard Navigation

Social Media Integration

**Direct Connections with
Customers**

**OEM/Factory-Fit
Telematics**

**Improved Prognostics for
Vehicle Maintenance**

**Addressing Hours of
Service Compliance**

**Adoption by Small
Businesses**

**Security—Remote Door
Lock/Unlock, Stolen
Vehicle Tracking**

**Safety—Automatic Crash
Response, Emergency and
Crisis Assistance**

Source: CEB TalentNeuron research and analysis, Crawling of public profiles, Skill predictor algorithms, CEB TalentNeuron Skill Taxonomy and SME interviews.

Example 5: New Skills ≠ New People: What Were Data Scientists Before?

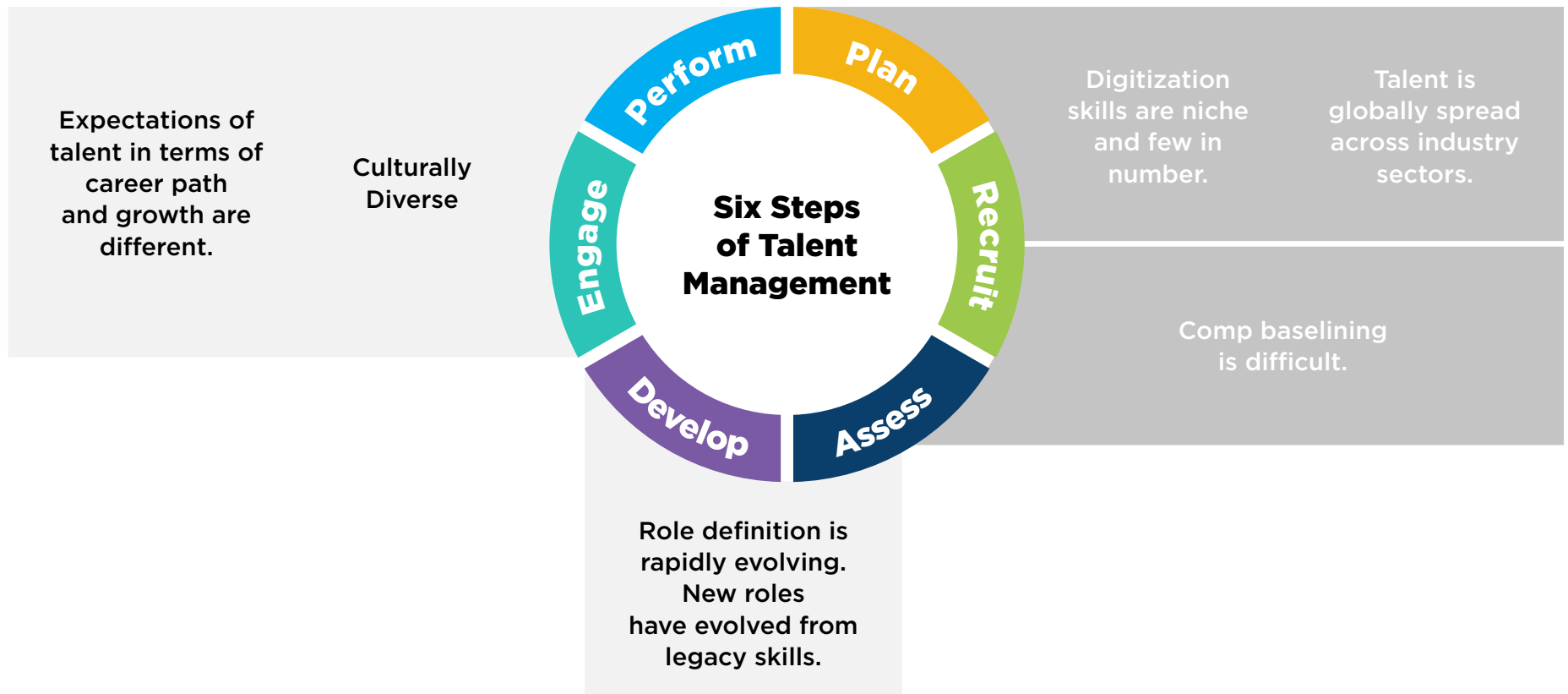
Previous Titles	Previous Skills	Certification
Lead Research and Analyst	SPSS	EMCDSA
Analytics Consultant	Quantitative Research	—
UNIX Engineer	Algorithms, R	CCP
Marketing Consultant	Machine Learning	
Marketing Analytics Manager	Statistics	—
Marketing Officer Analytics	Digital Marketing, SPSS	EMCDSA
Marketing Analytics Consultants	SEO, SAS, SQL, SPSS	
Architect	SQL, Programming	—
HR Analytics	Data Mining, Statistical Modeling, CRM, SDLC	CCP
Lead HR Technical Practice	Predictive Analytics, Data Validation, Statistics	—
Marketing and HR Program Deployment Manager	Text Mining, SQL, R, Predictive Analytics	—
HRIS Executive	Text Mining, SQL, R, Predictive Analytics	—
Web Analytics Consultant	SQL, SPSS	
Astrophysics Engineer	Database, Statistics	CCP

Source: CEB analysis.

How to Prepare for Change



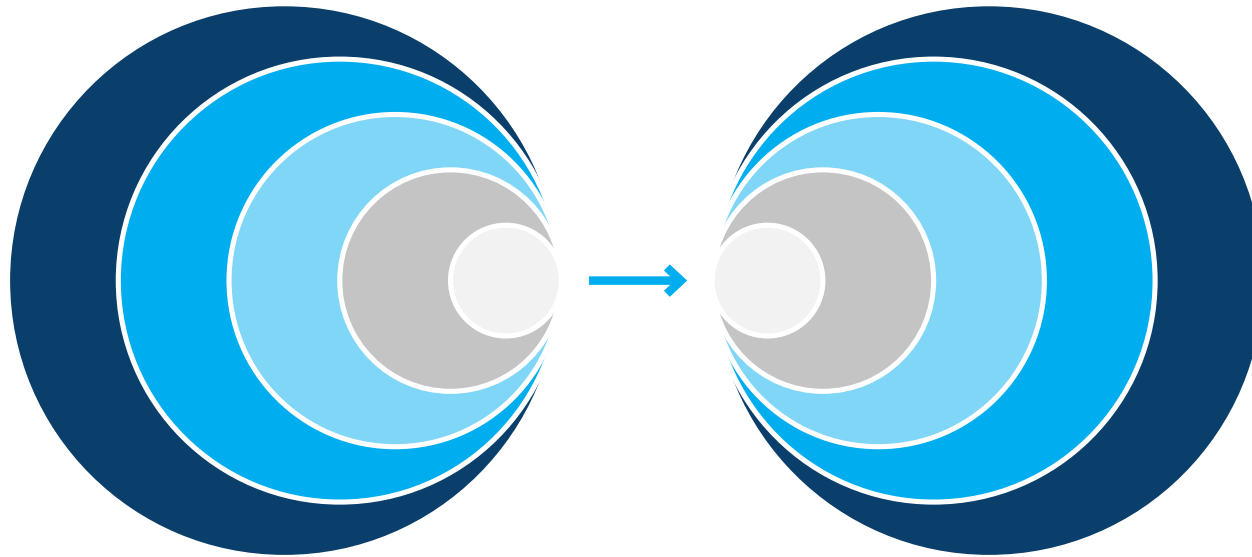
Since the Evolution of Digitization Skills Is Rapid, the Challenges in Identifying and Hiring These Skills Are Also Different



Source: CEB TalentNeuron research and analysis.

A Talent Advisor Is...

More Than a Labor Market Participant, a Labor Market Expert



Use Labor Market Expertise to Optimize Hiring Criteria

Analyze Competitors:

Surface alternative search criteria by poaching intelligence from competitors—verify where and who they are hiring.

Analyze Candidates:

Surface alternative search criteria by building a detailed understanding of prospective candidates' motivations.

Analyze Data:

Surface alternative search criteria by exploring skill, industry, and location dynamics.

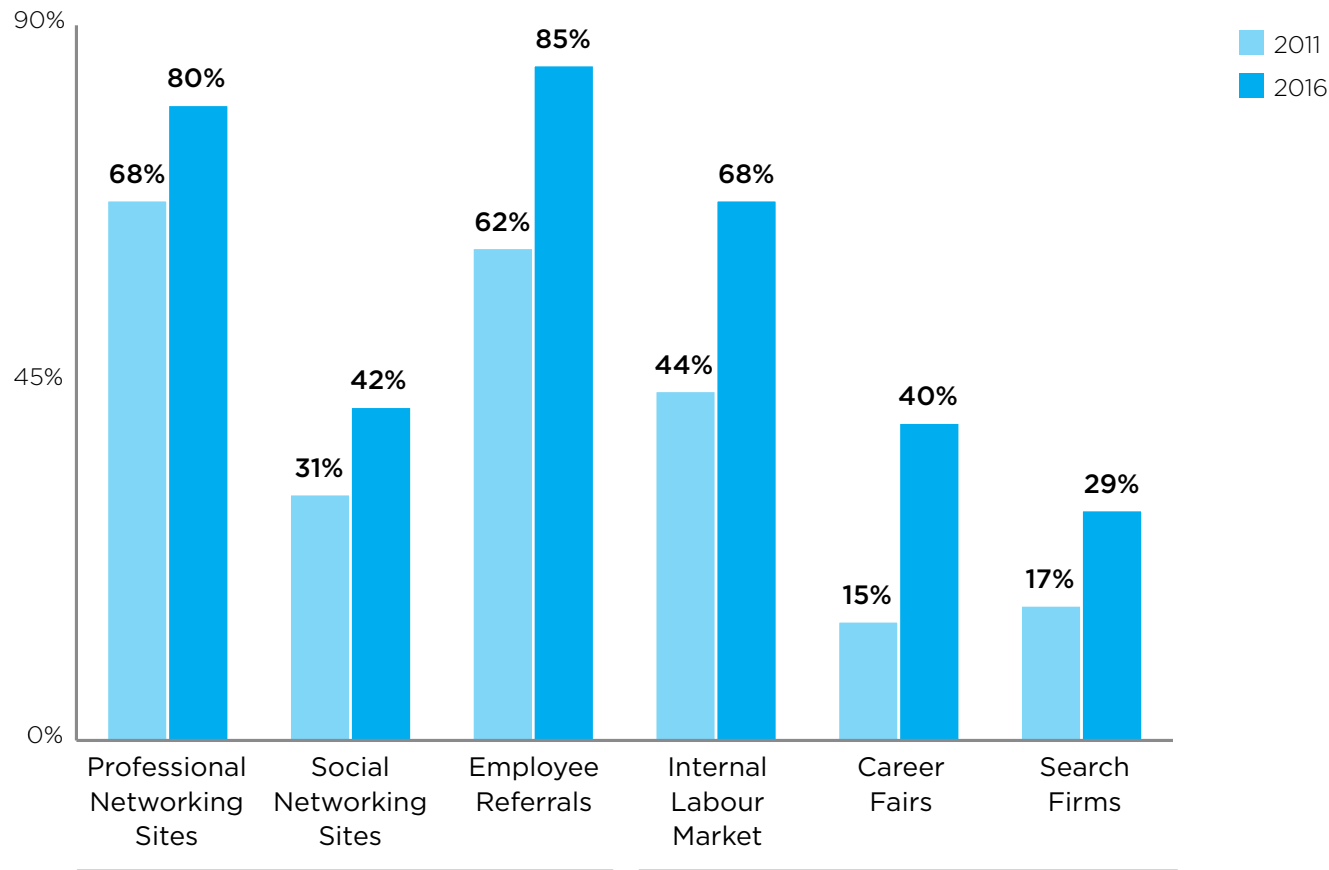
Source: CEB analysis.

Searching Across More Channels



Recruiters Have Expanded Their Channel Mix to Find Enough Prospects That Match Specific Needs

Percentage of Recruiters Frequently Using Channel, 2011 Versus 2016



Average Number of Sourcing Channels Used

2
2011

6
2016

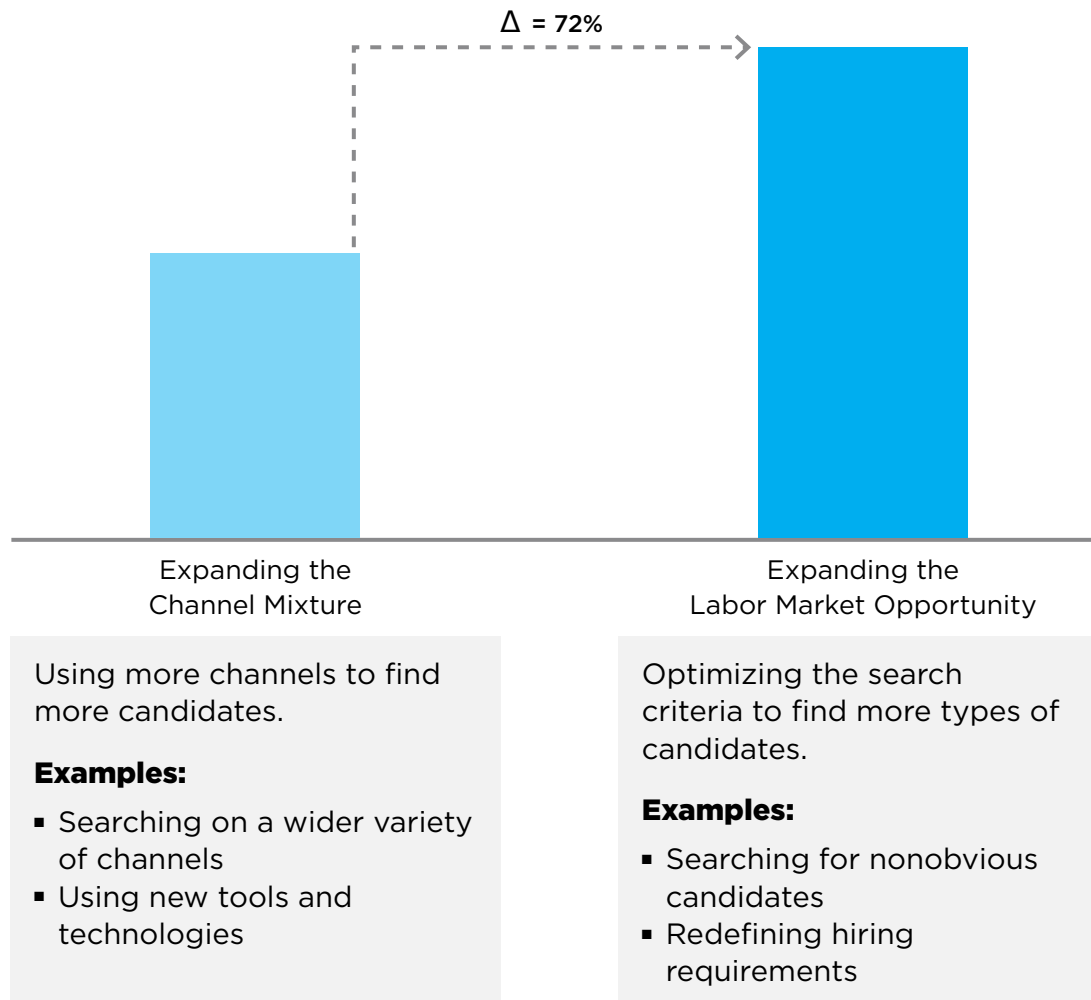
n = 586 (2011); 1,305 (2016)

Source: CEB 2011 Smart Sourcing Survey; CEB 2016 Sourcing Effectiveness Diagnostic.

Focus on More Criteria, Not More Channels



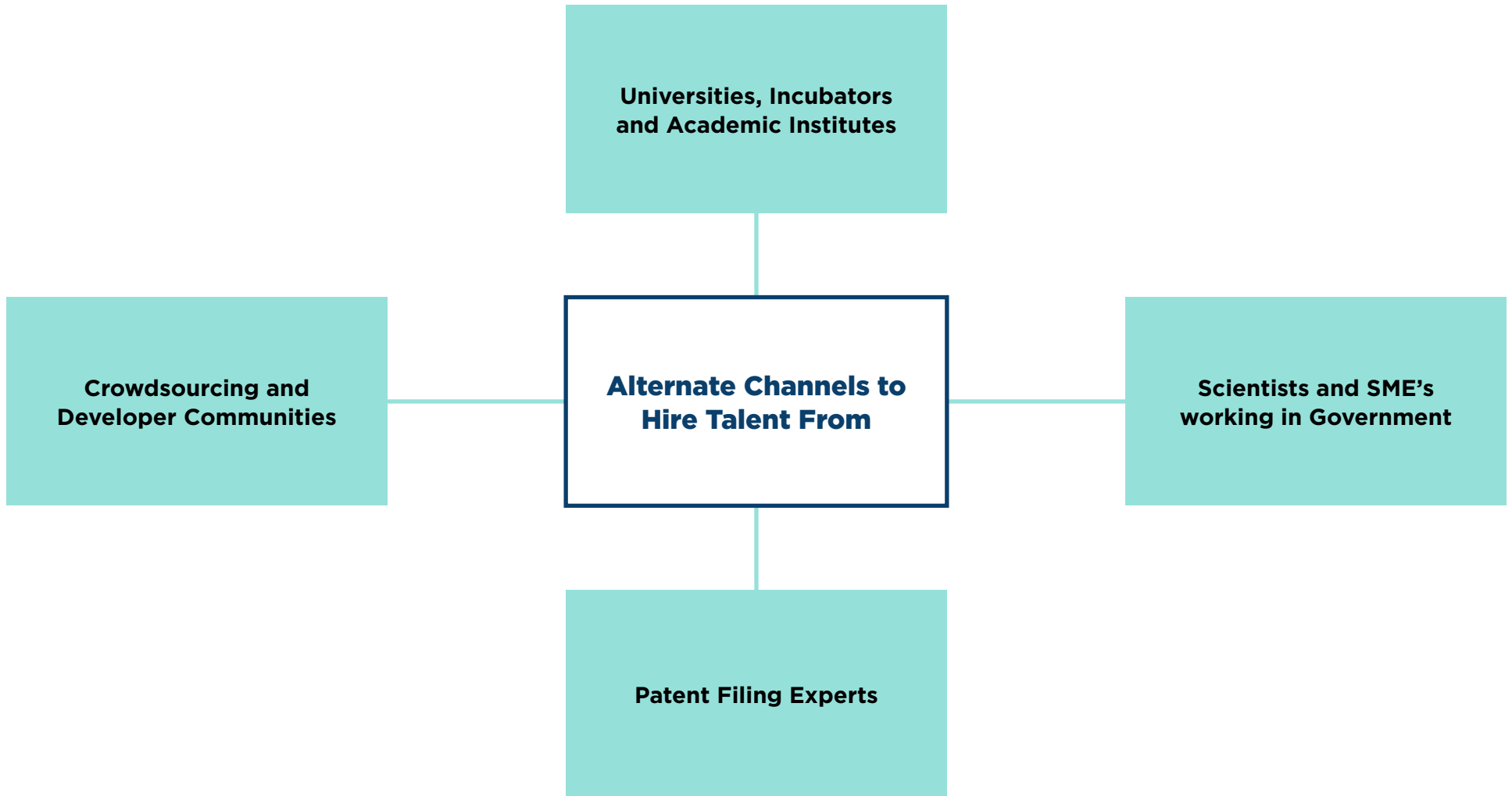
Optimize Search Criteria to Increase Talent Pool Size Without Sacrificing Quality
Increase in Average Number of Qualified Leads Generated



$n = 1,051$.

Source: CEB TalentNeuron research and analysis.

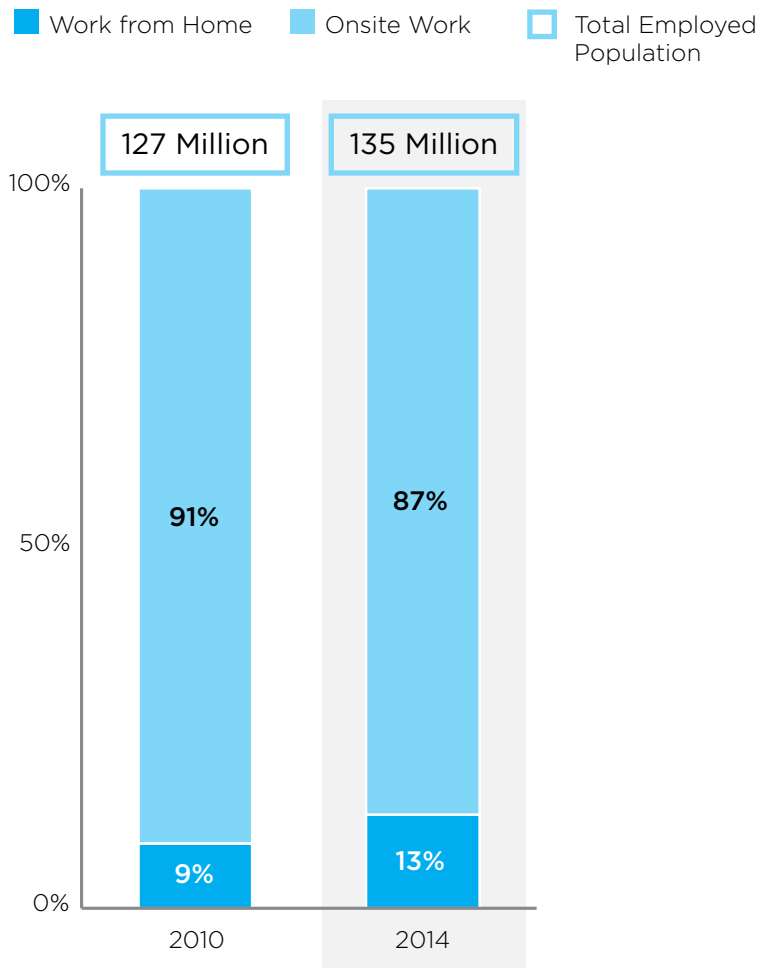
Traditional Recruiting Methods Aren't Working



Source: CEB TalentNeuron research and analysis, Crawling of public profiles, Skill predictor algorithms, CEB TalentNeuron Skill Taxonomy and SME interviews.

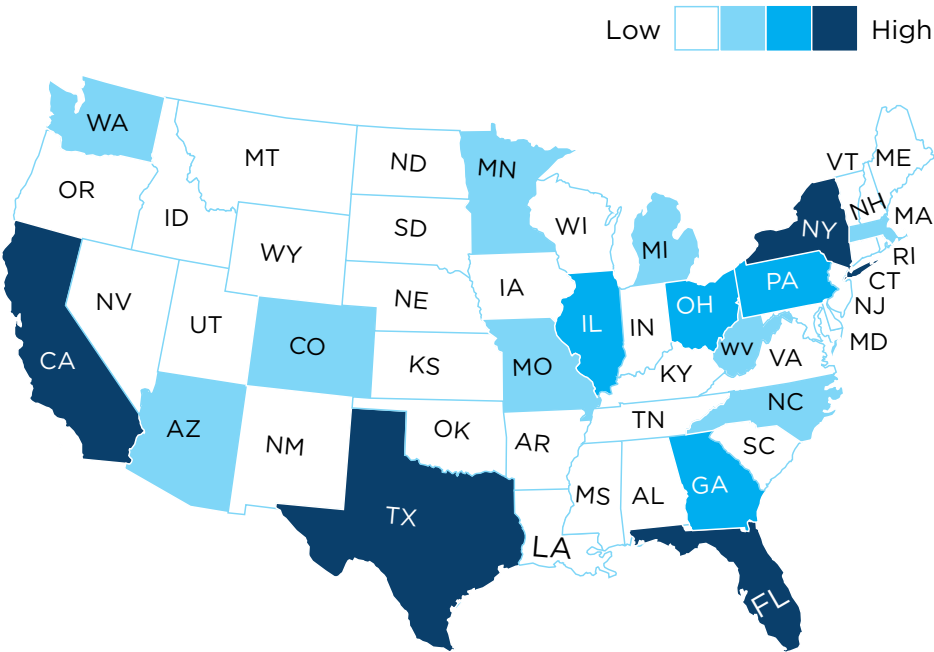
Work from Home Employment Across the US

Work from Home Versus Total Employed Population



Source: Census.gov, U.S. Bureau of Labor Statistics

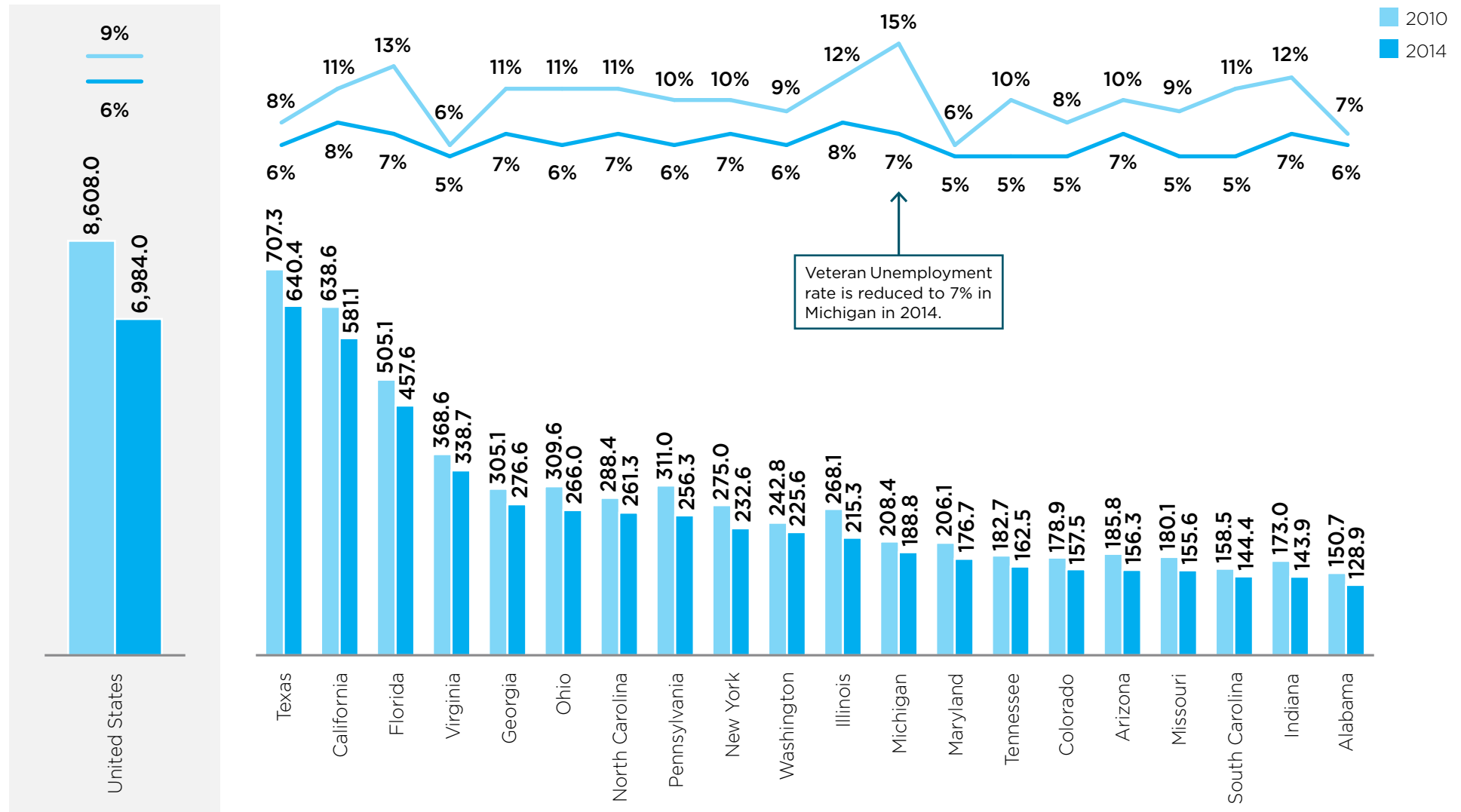
Concentration of Work from Home Professional by State (17.5 Million Workers)



Source: CEB analysis.

Veteran Employment Trend in Top US States (2010-2014)

Veteran Employment Population 18-64 Years In Thousands



Source: Bureau of Labor Statics, Veteran Talent Index Report, Census.gov.

Note: Our Research Indicates that Veteran Employed population decreased by 19% from 2010 to 2014 across United States. Texas, California and Florida remains the top three US states for Veteran Employed Population.

Understand the Critical Skills Needed Across Roles

Function/Area	Machine Learning/ Predictive Analytics
Dominant Skills	Hadoop, Cloudera, R, C, C++, Python, SQL
Dominant Roles	Data Scientist, Machine Learning Engineer, R- Developer
Talent Supply	95,000
Growth Rate 2030	7.80%
Supply Estimate in 2030	298,600

Source: CEB analysis.

Understand the Critical Skills Needed Across Roles

Function/Area	Machine Learning/ Predictive Analytics	Artificial intelligence and Robotics
Dominant Skills	Hadoop, Cloudera, R, C, C++, Python, SQL	Shearlets, Time Frequency Analysis, Fourier Analysis, Convolution, Natural Language processing
Dominant Roles	Data Scientist, Machine Learning Engineer, R- Developer	AI Programmer, Robotics Engineer, Computer Controlled Machine Programmer, Robotic Scientist
Talent Supply	95,000	15,200
Growth Rate 2030	7.80%	14.70%
Supply Estimate in 2030	298,600	108,600

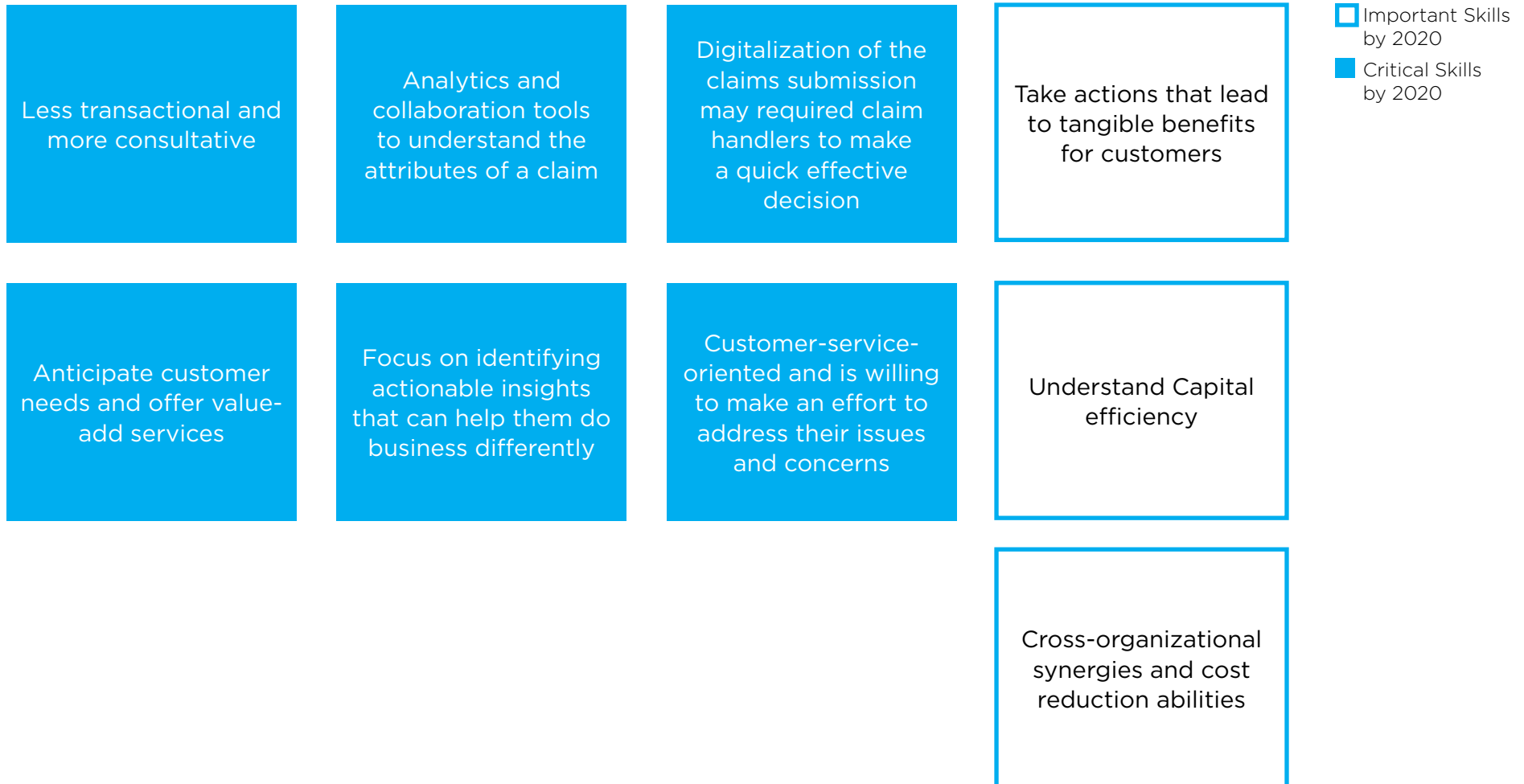
Source: CEB analysis.

Understand the Critical Skills Needed Across Roles

Function/Area	Machine Learning/ Predictive Analytics	Artificial intelligence and Robotics	Cyber Security
Dominant Skills	Hadoop, Cloudera, R, C, C++, Python, SQL	Shearlets, Time Frequency Analysis, Fourier Analysis, Convolution, Natural Language processing	CCNA, LAN/WLAN, CISSP, Cryptography, Defensive Coding practices
Dominant Roles	Data Scientist, Machine Learning Engineer, R-Developer	AI Programmer, Robotics Engineer, Computer Controlled Machine Programmer, Robotic Scientist	Security Engineer, Security Architect, Security Technician
Talent Supply	95,000	15,200	75,000
Growth Rate 2030	7.80%	14.70%	8.90%
Supply Estimate in 2030	298,600	108,600	351,500

Source: CEB analysis.

Underwriting Roles—What Are the Future Skills?

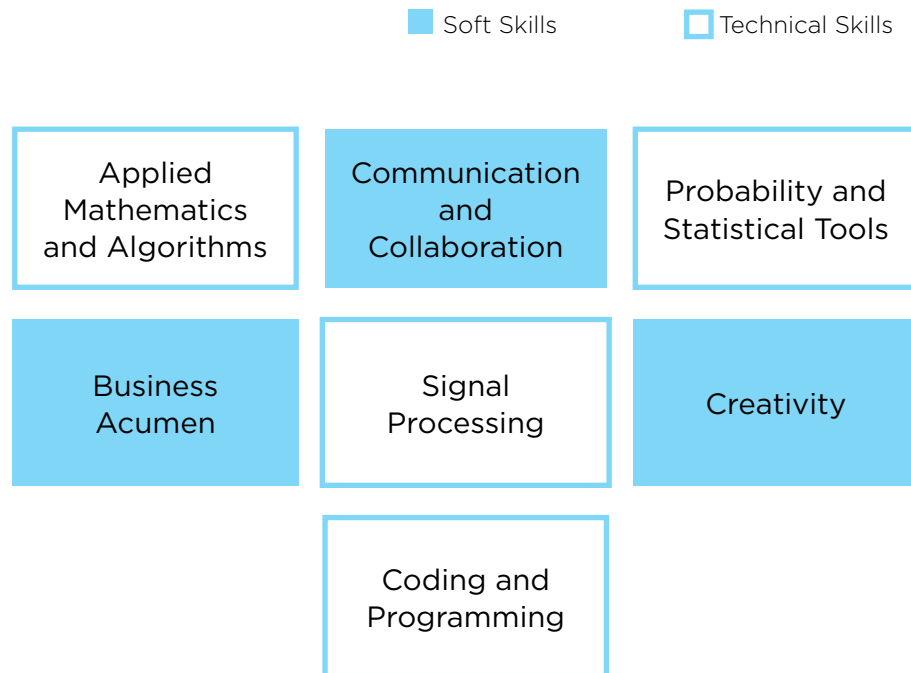


Source: CEB TalentNeuron research and analysis.

Teams Can Fill Critical Roles Instead of Individual Contributors



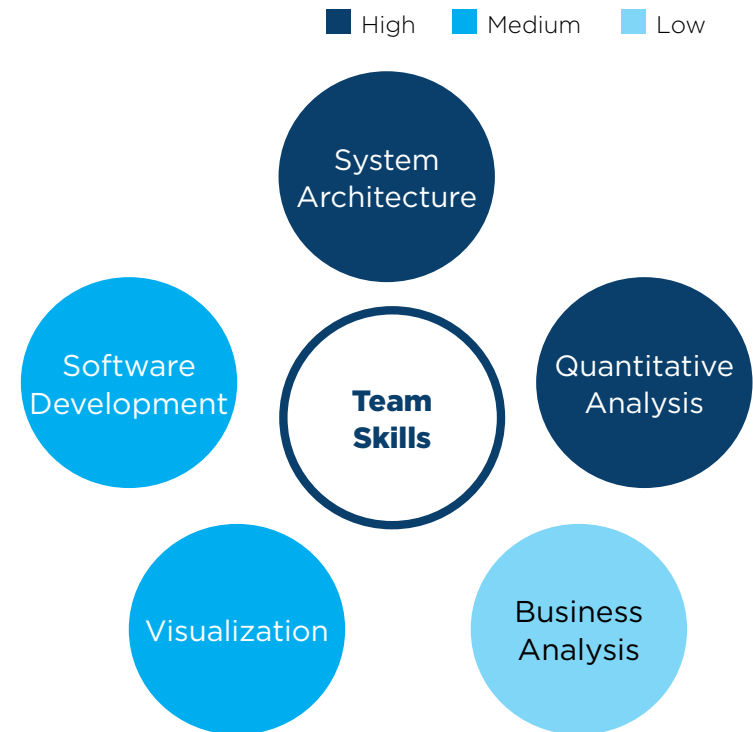
Skill Domains Required for Data Scientist



Source: CEB analysis.

Data Science Team Skills

Criticality of Skills Required to Become a Data Scientist from a Team Skills of Data Science



Source: CEB analysis.

Thank You

We Have Identified Roles and Skills That Are in Demand in Each Function

Function/Area	Current Dominant Skills	Current Dominant Roles
Machine Learning/ Predictive Analytics	Hadoop, Cloudera, R, C, C++, Python, SQL	Data Scientist, Machine Learning Engineer, R-Developer
Data Analytics	BigQuery, Vowpal Wabbit, CUDA, Open CV, Django, Hadoop, SQL, Statistical Modeling, Text Mining, Semantic Data Processing	Data Scientist, Data Architects, Data Visualizers, Advanced Analytics Engineer, Analytics & Algorithms Scientist
Cyber Security	CCNA, LAN/WLAN, CISSP, Cryptography, Defensive Coding practices	Security Engineer, Security Architect, Security Technician
Connected Devices/ Infotainment	Telematics, Infotainment Testing, Embedded and System Software, C Programming, C++	Advanced In-Vehicle Architect, Mobile Device and App Connectivity Engineer, Embedded Modem Engineer, Systems Operations Engineer
Electronic Manufacturing (Engineering)	Atmosphere Dynamics, Telecommunication Systems, Circuit drawing, Digital and Analogue Electronics	Electronics Engineer, Electronic Manufacturing Engineer, Electronics Design Engineer, Electronic Configuration Architect
Additive Manufacturing	Digital Light Processing (DLP), Direct Metal Laser Melting (DMLM), Laminated Object Manufacturing, Stereolithography (SLA), Stereo Laser Sintering (SLS)	Materials Process Engineer, Structural Designer, Algorithms Engineer, Additive Manufacturing Engineer, Flexo Mechanical Engineer
Clinical Research Associates	Source Data Verification, CRF Review	CRA Specialist, CRA III, CRA II, CTA
Bio Statistics	SAS, S-Plus, SPSS, SPAD, Data Cleansing, Simulation, SQL, Statistical Modeling	Biostatistician, Research Specialist, Programmer Analyst
Mobile Devices Programming	CSS, GUID, HTML5, Objective-C, C++	Mobile Application Developer, UI Designer, Visual Designer, Framework Specialist, Full Stack Developer

Source: CEB TalentNeuron research and analysis; Crawling of public profiles; Skill predictor algorithms; CEB TalentNeuron Skill Taxonomy and SME interviews.

We Have Identified Roles and Skills That Are in Demand in Each Function (Continued)

Function/Area	Current Dominant Skills	Current Dominant Roles
Financial Advisor	Quantitative Analysis, ERP, CRM, Fixed Annuities, CRM	Financial Consultant, Investment Advisor Representative, Investment Planning Advisor, Wealth Management Consultant
Contact Center Agent	Social Intelligence, Cross-Cultural Competency, Computational Thinking	Financial Clerks, Information Clerks, Customer Support Specialist
Fuel Cell/Lithium Ion Battery Engineering	Fluid Dynamics, Nanotechnology, Catalysis, Organic Chemistry, Spectroscopy	Fuel Cell Material Research Engineer, Battery Applications Engineer
Digital Marketing	SEO, Customer Strategy, Brand Reputation	SEO Optimizer, Digital Strategist
Precise Genetic-Engineering	Spectrometers, CAD, PERL, Python, Light Scattering Equipment Skills	Medical Scientist, Biochemist, Biophysicist, Bio Production Operator, Bio Manufacturing Specialist
Artificial Intelligence and Robotics	Shearlets, Time Frequency Analysis, Fourier Analysis, Convolution, Natural Language Processing	AI Programmer, Robotics Engineer, Computer Controlled Machine Programmer, Robotic Scientist
Distributed Manufacturing	CNC, Fabrication, Configuration Analysis	CNC Programmer, CNC Operator, Automated Equipment Technician, Configuration Analyst
Digital Genome	Visualization, Profile Data Aggregation, Distributed Systems, Compression Algorithms	Genome Technology Consultant, Digital Genome Analyst, Genomics Specialist
Material Engineering	FEM Analysis, Failure Modeling, Crystallography, Laser Etching	Electrical Engineer, Mechanical Engineer
Nanotechnology	Colloid Chemistry, Syntheses, Biomimetical Procedures, Tissue Engineering	Nanoanalyst, Product Advisor, Nano Specialist, Nanotechnologist, Nano Toxicologist
Outcome Based Sales	ROI Definition & Articulation, Business Value Assessment, Deal Crafting, Concept Ideation, Salesforce/CRM understanding, Transformational Deal Design	Account Representative, Product Sales Specialist, Account Executive

Source: CEB TalentNeuron research and analysis; Crawling of public profiles; Skill predictor algorithms; CEB TalentNeuron Skill Taxonomy and SME interviews.

We Have Identified Roles and Skills That Are in Demand in Each Function (Continued)

Function/Area	Current Dominant Skills	Current Dominant Roles
P&C Insurance Agents	FHLMC, Claims Analysis, Loss Mitigation	Mortgage Analyst, Actuaries, Claims Adjuster, Insurance Sales Representatives
Risk Management (Digital and Regulations)	New Regulations (Solvency II, Basel and MiFID II), BCBS 239 Regulation, Web Analytics	E-Fraud Detector, E-Risk Specialist, Fraud Risk Analyst, Network Security Analyst, Fraud Prevention Specialist, Data Protection Consultant
Product Management	Industry Knowledge, Marketing/Digital Marketing, Consumer Behavior, Market Analysis	Product Manager, Product Marketing Manager
Science R&D	Pharmacology, Drug Safety, Quantitative Pharmacology, Disease Modelling, Statistical Methods, Toxicology, Experimental Design, Quantitative Pharmacodynamics	Pharmacokinetics Scientist, Medical Technologist, Formulation Scientist, Research Specialist, Drug Metabolism Scientist, Research Scientist, Radiologist, Medical Research Specialist, Bioanalysis
Global Project Management	EI, SDLC, Project Management, Risk Management, SEO, Localization, Internationalization, Web Content Management, Budget Development Management	Technical Review Manager, Global Product Marketing Manager, Internationalization QA Specialist
Engineering (General)	Structural Design, CAD, Project Management, Seismic analysis, Foundation Analysis, Deductive Reasoning	Civil Engineer, Structural Engineer, Seismic Engineer, Biomedical Engineer
Healthcare	Stratasys FDM MedModeler, Electromyograph Analysis, Gait Analysis, Artsco OrthoPro Complete, OPIE Practice Management Suite, Ohio Willow Wood OMEG, Tracer System, Polhemus FastSCAN, ARRT certification	Diagnostic Medical Sonographer, Occupational Therapist, Occupational Therapist Assistant, Radiologic Technologist, Physical Therapist, Physical Therapist Assistant, General Physician, Orthotists and Prosthetists

Source: CEB TalentNeuron research and analysis; Crawling of public profiles; Skill predictor algorithms; CEB TalentNeuron Skill Taxonomy and SME interviews.

Function Growth

Functions
Supply

Fastest Growing Include Additive Manufacturing, Digital Marketing, Risk and Product Management, and Healthcare

Less Than 5% 5-8% 8-15% Greater Than 15%

Function/Area	Installed Talent Pool as on Q1 2015 in US	Growth Rate 2020	Growth Rate 2020	Growth Rate 2030	2030 Expected Talent Pool
Machine Learning/Predictive Analytics	95,000	7.80%	8.20%	7.80%	298,600
Data Analytics	250,000	9.00%	12.50%	8.90%	1,061,700
Cyber Security	75,000	9.71%	14.00%	8.90%	351,500
Connected Devices/ Infotainment	44,000	14.00%	9.80%	10.40%	22 1,700
Electronic Manufacturing (Engineering)	220,000	6.30%	5.60%	5.10%	502,800
Additive Mfg./3D Printing	17,500	15.00%	14.01%	13.99%	130,500
Clinical Research Associates	300,000	4.50%	5.10%	4.10%	586,200
Bio Statisticians	2,500	7.57%	8.04%	6.32%	7,200
Mobile Devices Programming	250,000	8.10%	7.80%	7.10%	757,000
Financial Advisor	200,000	5.70%	7.30%	6.20%	507,100
Contact Center Agent	2,162,000	5.20%	4.60%	4.20%	4,284,800
Fuel Cell /Lithium Ion Battery Engineers	17,000	9.20%	10.50%	8.30%	64,800
Digital Marketing	790,000	7.90%	6.30%	6.50%	2,148,600
Precise Genetic-Engineering	9,800	14.52%	7.80%	7.10%	39,600
Artificial Intelligence and Robotics	15,200	13.24%	14.09%	14.70%	108,600

Source: CEB analysis.

Function Growth (Continued)

Functions
Supply

Fastest Growing Include Additive Manufacturing, Digital Marketing, Risk and Product Management, and Healthcare

Less Than 5% 5-8% 8-15% Greater Than 15%

Function/Area	Installed Talent Pool as on Q1 2015 in US	Growth Rate 2020	Growth Rate 2020	Growth Rate 2030	2030 Expected Talent Pool
Distributed Manufacturing	82,000	4.50%	6.69%	5.30%	182,900
Digital Genome	5,000	7.86%	11.36%	8.85%	19,100
Material Engineering	27,000	8.92%	11.20%	7.80%	102,500
Nanotechnology	55,400	6.81%	7.20%	7.50%	156,500
Outcome Based Sales	5,000	6.96%	8.86%	9.31%	16,700
P&C Insurance Agents	160,000	8.10%	8.40%	7.80%	514,600
Risk Management (Digital and Regulations)	95,000	9.30%	9.50%	8.90%	357,300
Product Management	135,000	8.30%	9.40%	9.40%	493,800
Science (R&D Related)	400,000	8.10%	7.80%	7.70%	1,245,600
Globalization Project Manager	23,000	7.81%	8.90%	8.09%	75,700
Healthcare	800,000	8.5%	4.1%	3.2%	1,721,400
Engineer (General)	293,900	6.54%	6.35%	6.95%	356,250

Source: CEB analysis.