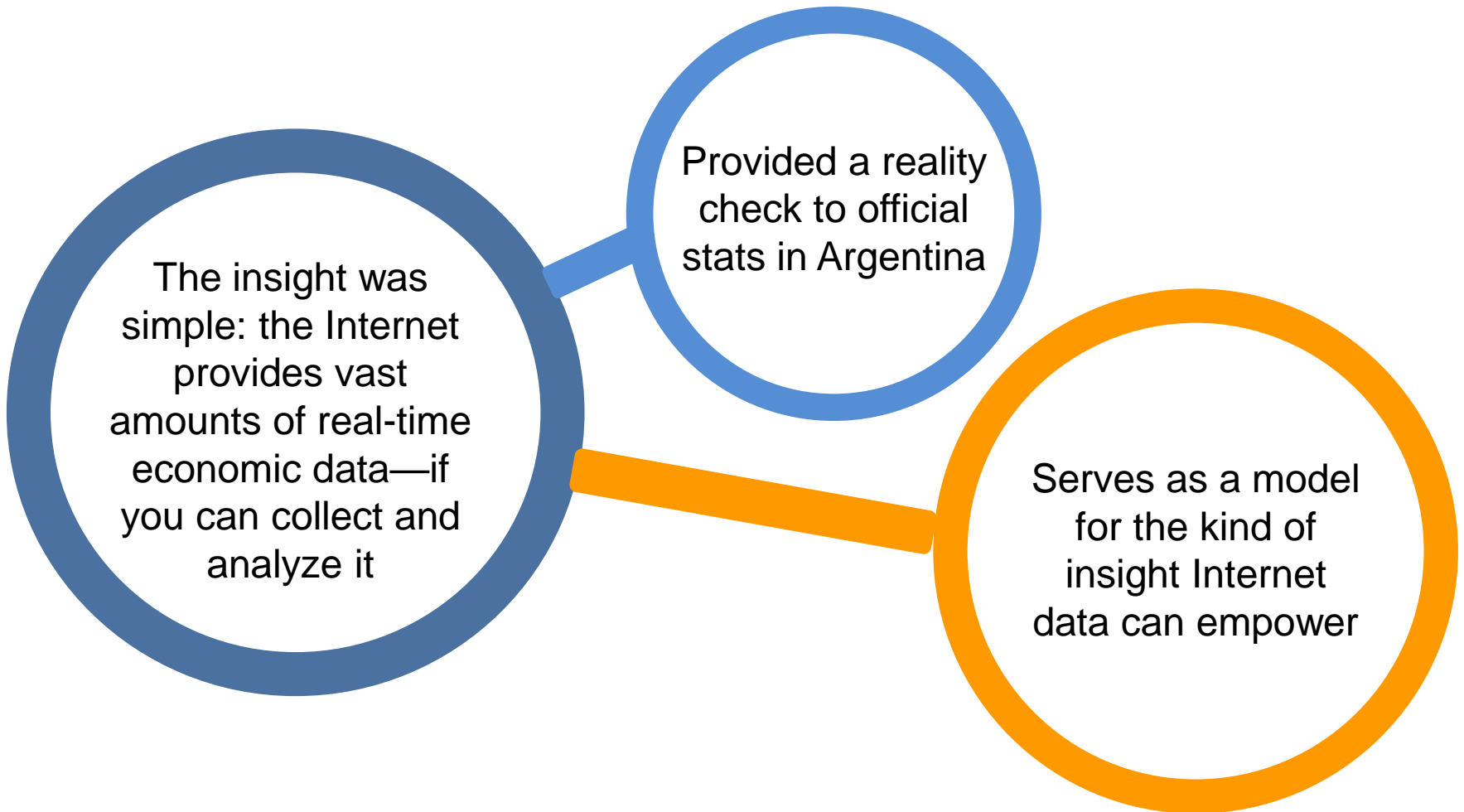# What a Billion Jobs Can Tell Us
Real-Time Data in the Labour Market

Davor Miskulin, Head of International Business Development
Burning Glass Technologies
ETF and EC Workshop about Skills Matching and Anticipation- Milan
June, 2019

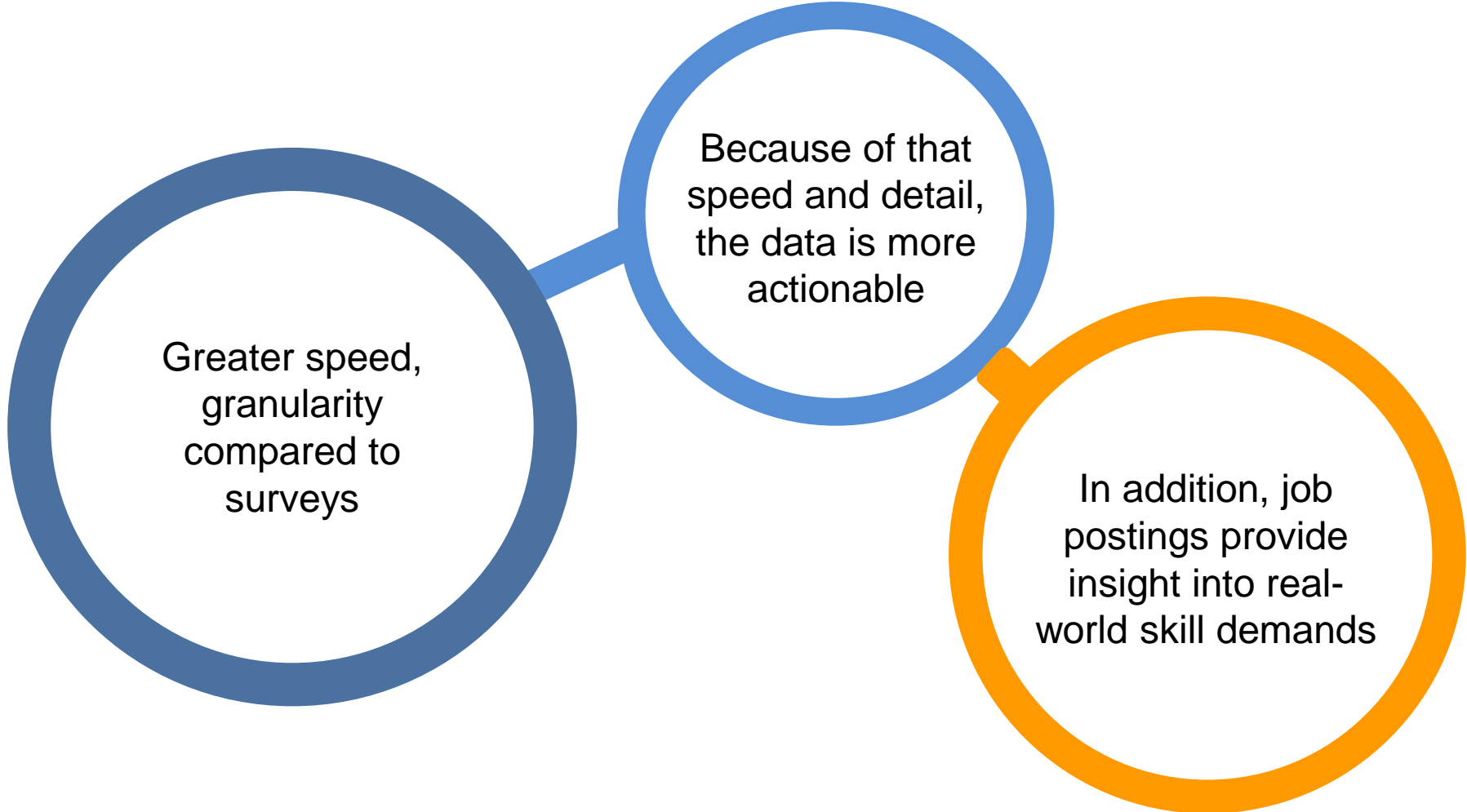# Applying Big Data to the Economy:
The Billion Prices Project

The insight was simple: the Internet provides vast amounts of real-time economic data—if you can collect and analyze it

Provided a reality check to official stats in Argentina

Serves as a model for the kind of insight Internet data can empower

What a Billion Jobs Can Tell Us
vs. Traditional Labour Market Information

Greater speed, granularity compared to surveys

Because of that speed and detail, the data is more actionable

In addition, job postings provide insight into real-world skill demands

The Process:
Collecting Real-Time Labour Market Data

Visit Online Job Sites

Collect & Deduplicate Job Postings

Tagging & Normalising Postings to Generate Detailed Data

- Job Title & Occupation
- Employer & Industry
- Technical Skills
- Foundational Skills
- Certifications
- Educational Requirements
- Experience Levels
- Salaries

What it Takes:
Collection Infrastructure

The effort needed to build a comprehensive data collection structure is significant, as our experience shows.

3.4 million

Active jobs collected weekly

40,000

Sources across the web - job boards and corporate sites

>1 million

Firms represented, from large corporations to SME's US, UK, CA, ANZ, SG

Dynamic Labour Market Ontology

23	Career Areas
2,000	Occupations
18,000	Skills
60,000	Skill Variants

80%

Deduplication ensuring integrity and consistency

300 million

CV's processed per annum

1 billion

Historical job market records

Job Posting Data Correlates With Other Sources

Figure 5: JOLTS and Burning Glass Data
(January 2010-April 2017)

Correlation of the two time series is 0.89

Legend: JOLTS Adjusted — BGT New Postings
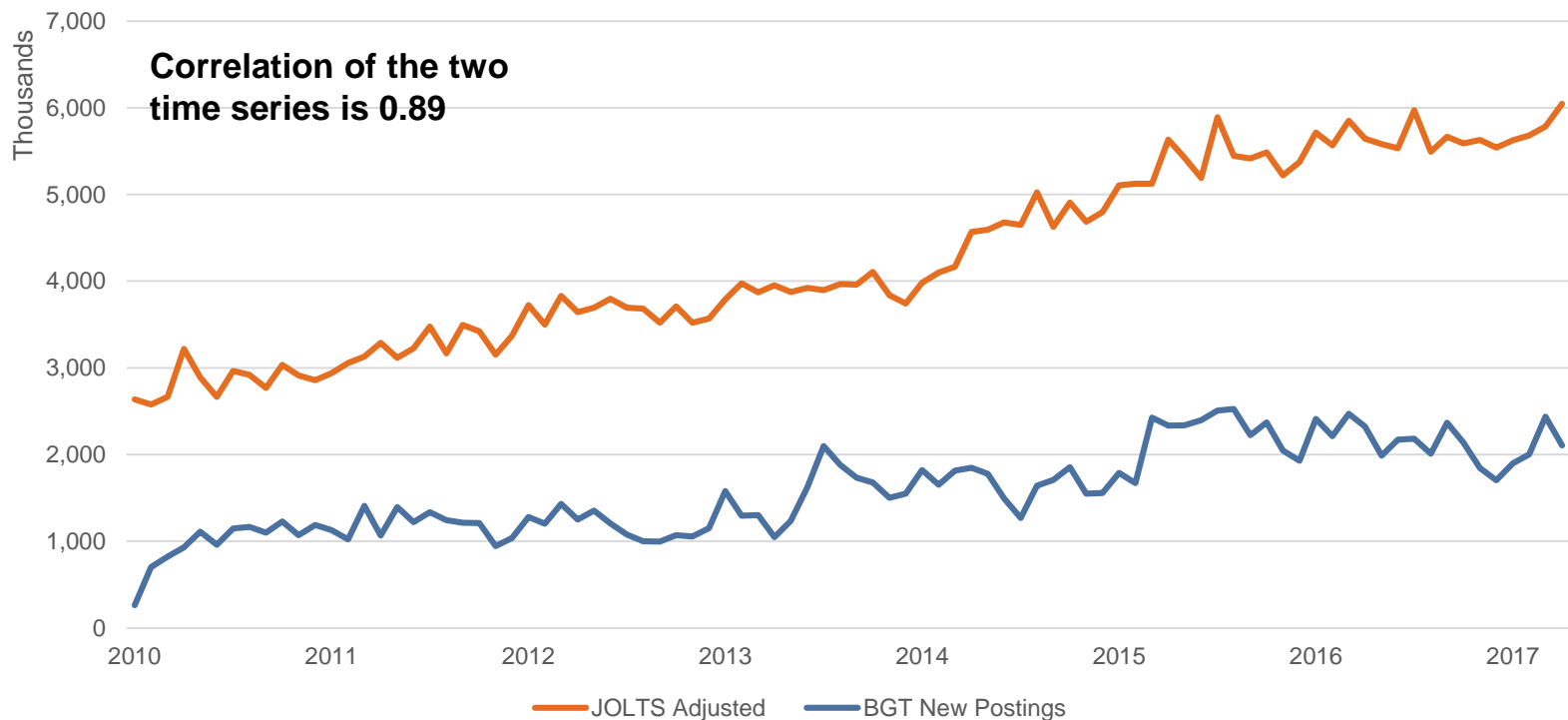
Note: Burning Glass data cannot be directly compared to JOLTS, because of the differences in the collection method. Burning Glass data represent only new postings which are collected for a specific month, while JOTLS data includes openings which could have also existed in previous months.

What This Data Can Tell Us
Real-time Data Examines the DNA of Jobs

- Jobs are bundles of skills

- Traditionally, we've understood those skills via expert analysis

- But job posting data allows us to see how jobs bundle and unbundle skills in the real world, in real time
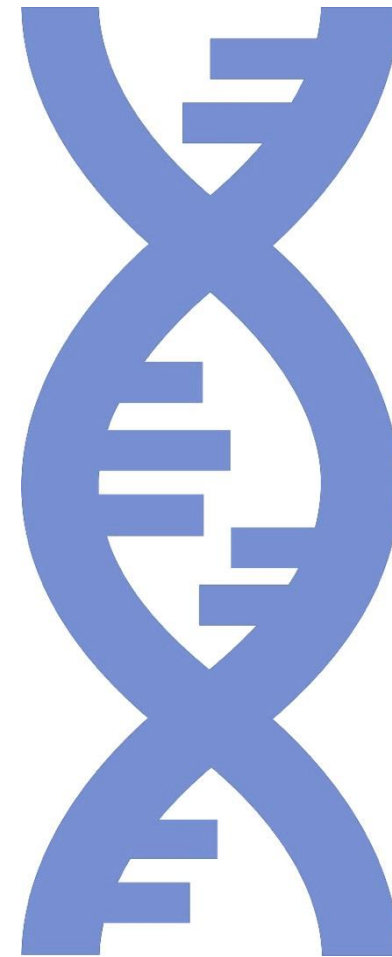
Yields Insight on Sub-Occupational Diversity

Graphic Designer / Desktop Publisher (BGTOcc)
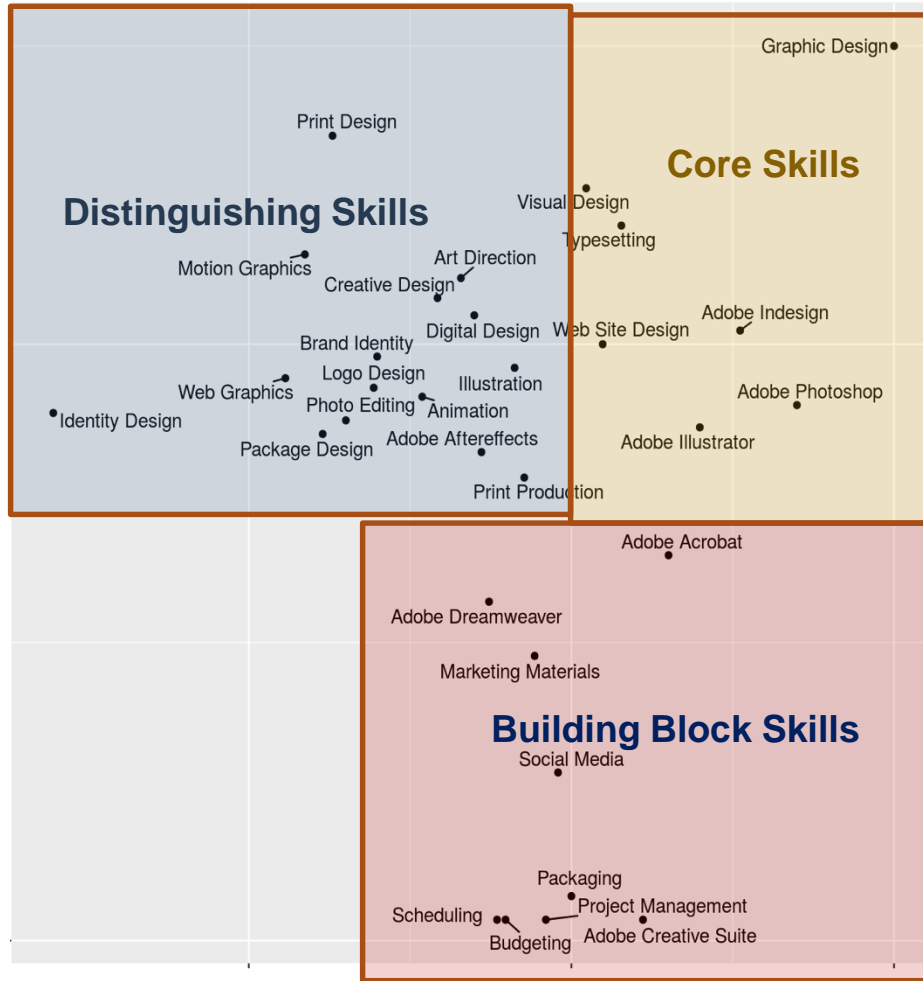
Core Skills: Definitional skills to each occupation which job seekers need in order to contribute.

Building Block Skills: Required and relevant across many roles and represent foundational, but not unique skills.

Distinguishing Skills: These are the core specializations and differentiations that drive performance – and often time and cost to hire

Jobs are Mutating
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

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

+23%
Since 2013

+598%
Since 2013

Posting Data Shows
How Existing Occupations Can Evolve Dramatically in Just a Few Years

Fastest-Changing Professional Occupations

Occupation	%
Mechanical Drafters	40%
Computer Programmers	36%
Architectural and Civil Drafters	34%
Software Developers, Systems Software	30%
Advertising and Promotions Managers	28%
Pharmacists	28%
Insurance Underwriters	28%
Environmental Engineers	28%
Electrical and Electronics Drafters	27%
Actuaries	24%

% of tasks that have changed since 2007
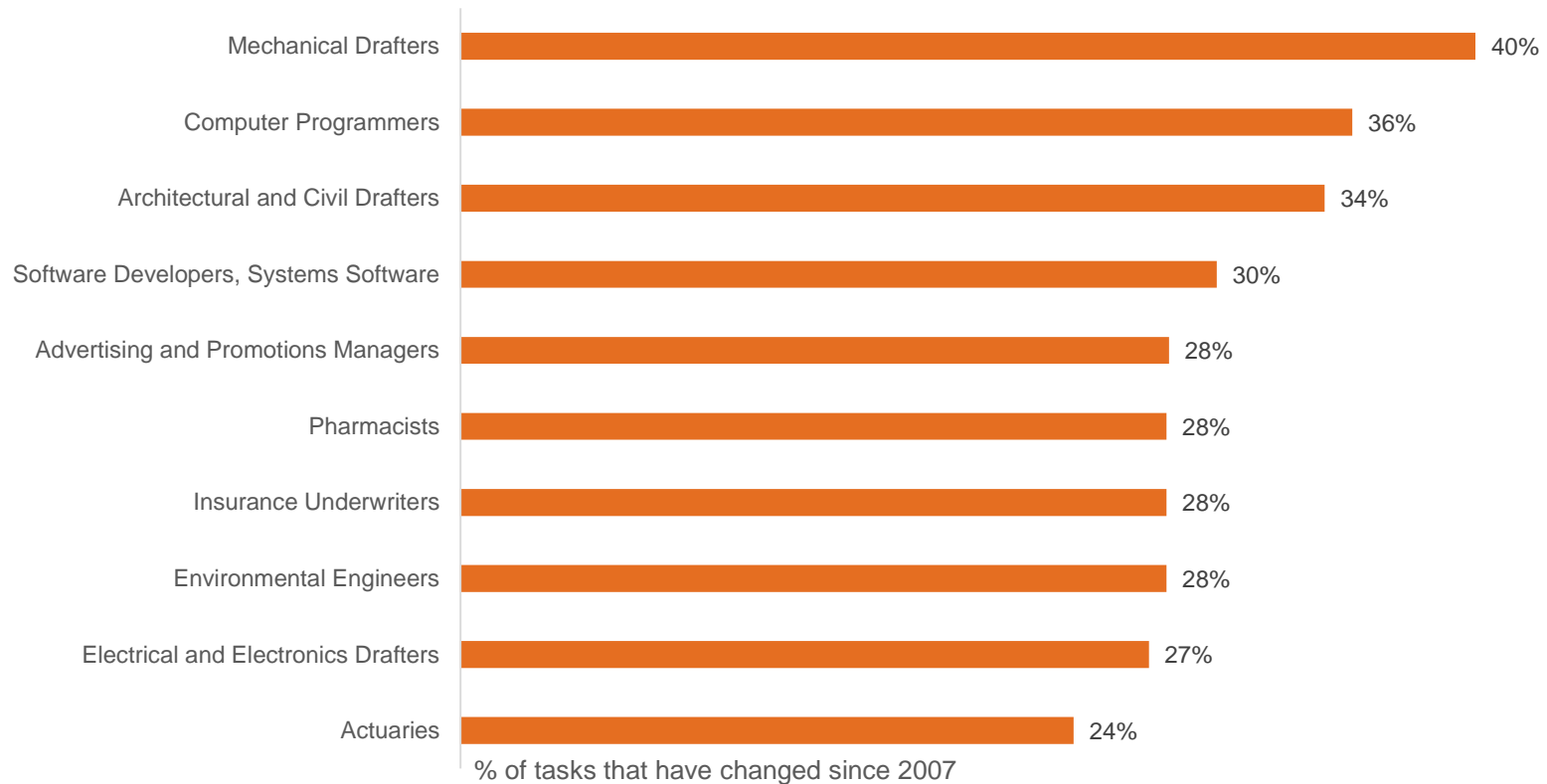
Source: Deming, NBER, 2018, analysing Burning Glass data

Hybrid skills are redefining the market

A key trend is jobs that combine skills from different fields, such as technology and marketing, or product management and data analytics
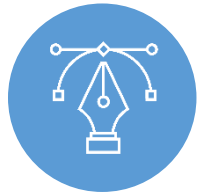
WEB DEVELOPMENT AND DESIGN

67,250
JOB COUNT
LAST 12 MONTHS

3%
CHANGE SINCE 2011

$87,217
AVG. SALARY

DIGITAL MARKETING & MARKETING AUTOMATION

45,991
JOB COUNT
LAST 12 MONTHS

145%
CHANGE SINCE 2011

$76,783
AVG. SALARY

PROJECT MANAGEMENT

40,752
JOB COUNT
LAST 12 MONTHS

7%
CHANGE SINCE 2011

$106,471
AVG. SALARY

USER EXPERIENCE / USER INTERFACE (UI/ UX)

29,825
JOB COUNT
LAST 12 MONTHS

15%
CHANGE SINCE 2011

$99,177
AVG. SALARY

MOBILE DEVELOPMENT

41,032
JOB COUNT
LAST 12 MONTHS

135%
CHANGE SINCE 2011

$111,380
AVG. SALARY
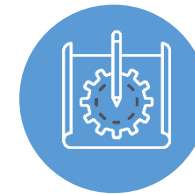
DATA ANALYTICS

41,000
JOB COUNT
LAST 12 MONTHS

372%
CHANGE SINCE 2011

$105,540
AVG. SALARY

Source: Burning Glass: Hybrid Jobs Report

Soft Skills Matter: And employers struggle to fill them
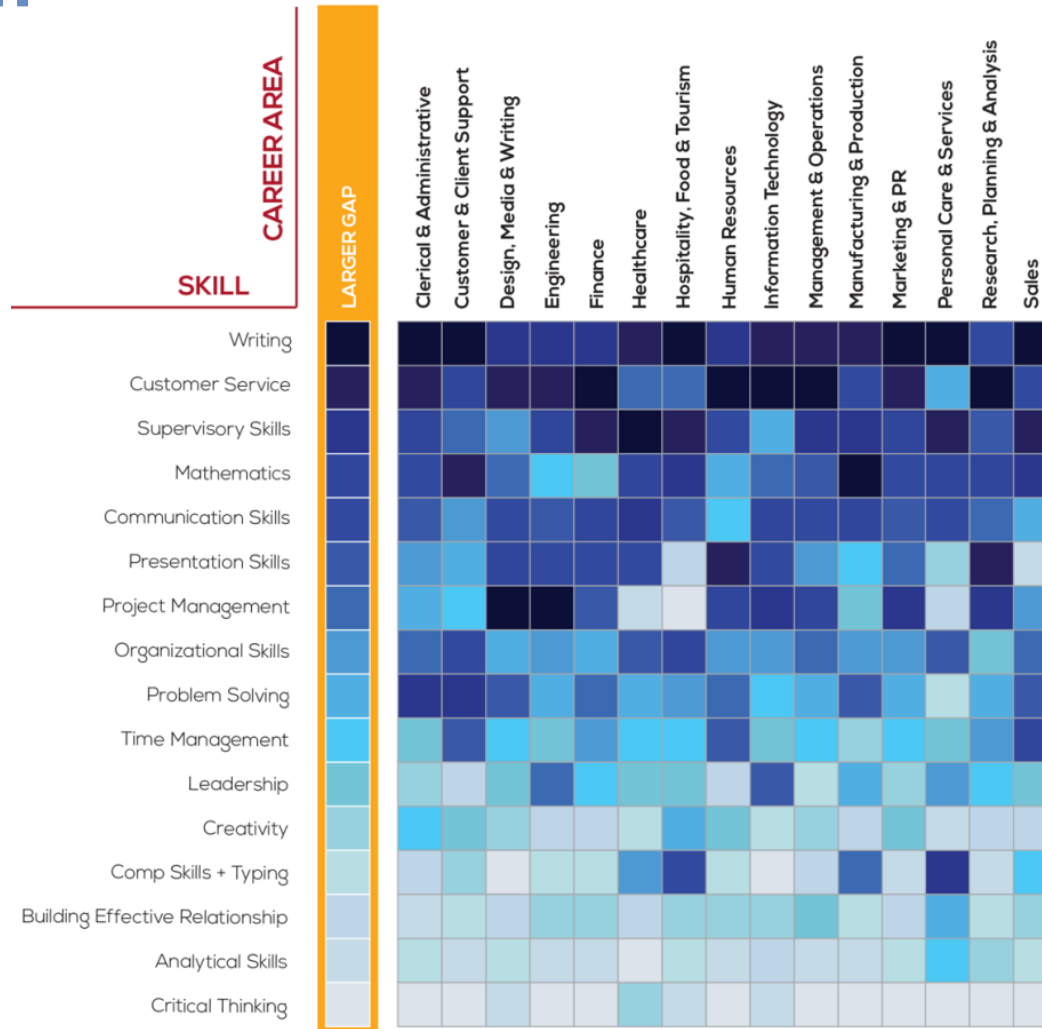
Source: Human Factor

Jobs That Mix Skills are Growing Fastest

Harvard economist David Deming: Jobs requiring a combination of math and social skills are growing fastest.

KEY: **Change in share of jobs, 1980 to 2012** ● Fell ● About the same ● Grew

REQUIRES SOCIAL SKILLS

Lawyers and judges
Social workers
Financial managers
Vocational counselors
Economists
Mgmt. analysts
R.N.s
Physicians
Designers
Police
Computer scientists
Nurses aides
Dentists
Accountants
Child-care workers
Health technicians
MATH SKILLS
Truck drivers
Mathematicians
Bank tellers
Food scientists
Auto mechanics
Janitors
Machinists
Accounting clerks
Electricians
Carpenters
Biological technicians
Laborers
Welders
Machine operators
Statistical clerks
Tool and die makers

Source: David Deming, Harvard University

Source: Jobs of the Future

Using the Data
Identifying Future Skill Demands

|	Top IT Skills (Total postings)	Highest Paying IT Skills (Mean advertised salary)	Fastest Growing IT Skills (24 month projections)	Hardest to Fill IT Skills (Mean posting duration)
1.	SQL	Zookeeper	TensorFlow	Public Cloud Security
2.	Java	TensorFlow	General Data Protection Regulation (GDPR)	Infrastructure as a Service (IaaS)
3.	JavaScript	Scala	Kubernetes	Cloud Technology Architecture
4.	Linux	AWS Redshift	Spring Boot	Cloud Infrastructure
5.	Python	AWS DynamoDB	Webpack	Ansible
6.	Data Analytics	Go Programming Language (Golang)	AWS Lambda	Apache Mesos
7.	Salesforce	Pig	Salesforce Lightning	Data Protection Planning
8.	C#	Apache Mesos	Redux	Work Breakdown Structure
9.	Scrum	AWS CloudFormation	Financial Microservices	Hadoop Cloudera
10.	C++	Deep Learning	Apache Kafka	OpenShift

Evaluating skill demands of
Emerging Sectors

AR/VR: Growth by Industry
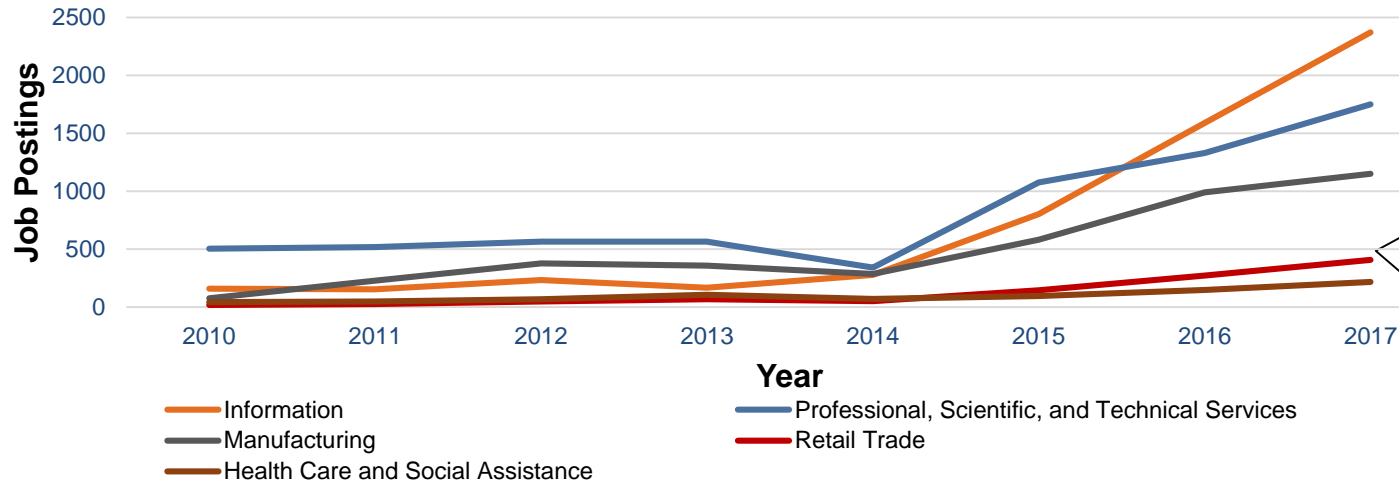
The Retail industry, which to a large extent represents the consumers of AR/VR, has shown increasingly fast growth in demand after 2015

Legend:
- Information
- Professional, Scientific, and Technical Services
- Manufacturing
- Retail Trade
- Health Care and Social Assistance

Examples of growing demand for AR/VR in occupations

Legend:
- Video Game Designer
- Hardware Engineer
- Marketing Manager
- Product Manager
- Market Research Analyst
- Mobile Applications Developer
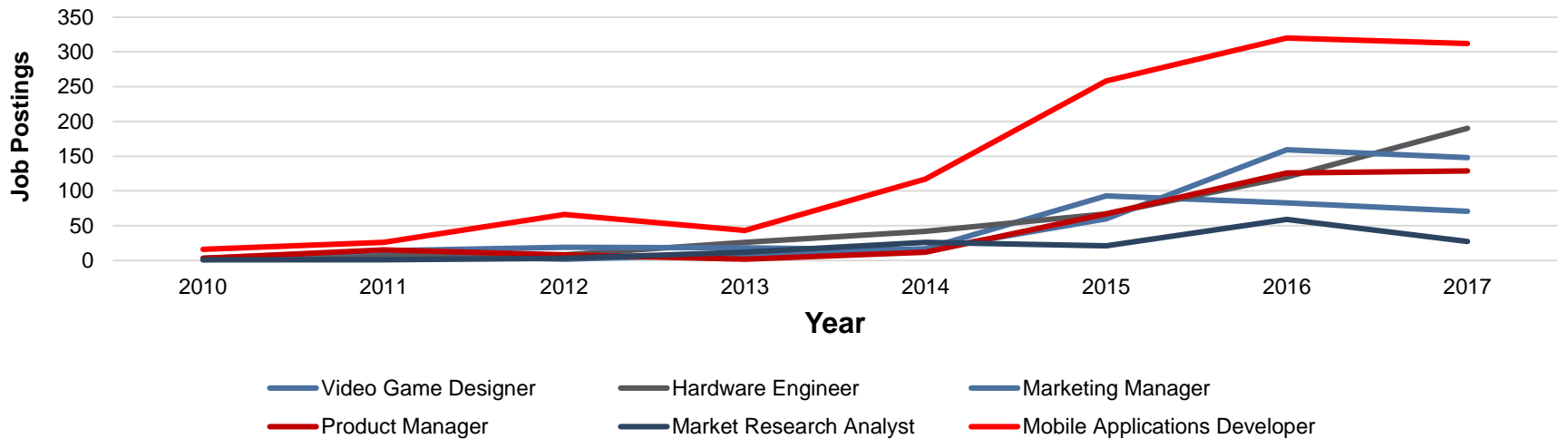
For new entrants: Highlight skills critical for workforce success

Welder / Solderer

Manufacturing Operations
- Forklift Operation

Hand Tools
- Band Saw
- Calipers
- Hand Tools
- Measuring Tape
- Power Tools

Welding
- ❖ *Welding*
- ❖ *MIG and TIG Welding*
- ❖ *Flux Core Welding*
- ❖ ***Gas-Metal Arc Welding (GMAW)***
- ❖ *Pipe Welding*
- ❖ *Gas-Tungsten Arc Welding (GTAW)*
- Arc Welding
- Shielded Metal Arc Welding (SMAW)
- Soldering
- Spot Welding
- Stick Welding
- Welding Equipment

Machining & Manufacturing Technology
- ❖ *Blueprints*
- Computer Numerical Control (CNC)
- Drill Presses
- Grinders
- ↑ **Lathes**
- Machining
- Robotics

Welder / Solderer

- ❖ *Italicized skills* indicate those that are defining to the roles
- ↑ **Bolded** skills indicate those that make a job more difficult to fill.

Occupation Profile

Welder / Solderer: Uses welding equipment to solder or heat and bind pieces of metal together.

Common job titles include:
Welder
MIG Welder
Welder Fabricator
TIG Welder
Pipe Welder

National Postings	% BA	% Entry Level
★★★ 34,208	○ 0%	◔ 31%

Posting Counts
|	
★	Below 10,000
★★	10,000-25,000
★★★	25,000-75,000
★★★★	75,000-150,000
★★★★★	Above 150,000

Employability Skills:
- Mathematics
- Communication Skills
- English
- Detail-Oriented
- Organizational Skills
- Troubleshooting
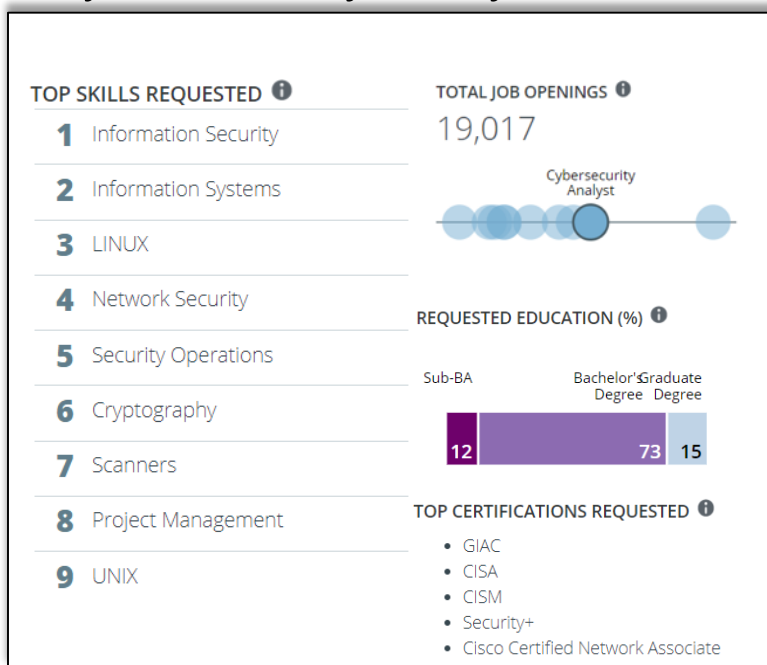- Quality Assurance and Control

Skill-based Career Pathways

- Understand career progression based on skill adjacency to retain and promote mobility
- Align occupations to realities of the labor market so employees understand the impact of their career progression
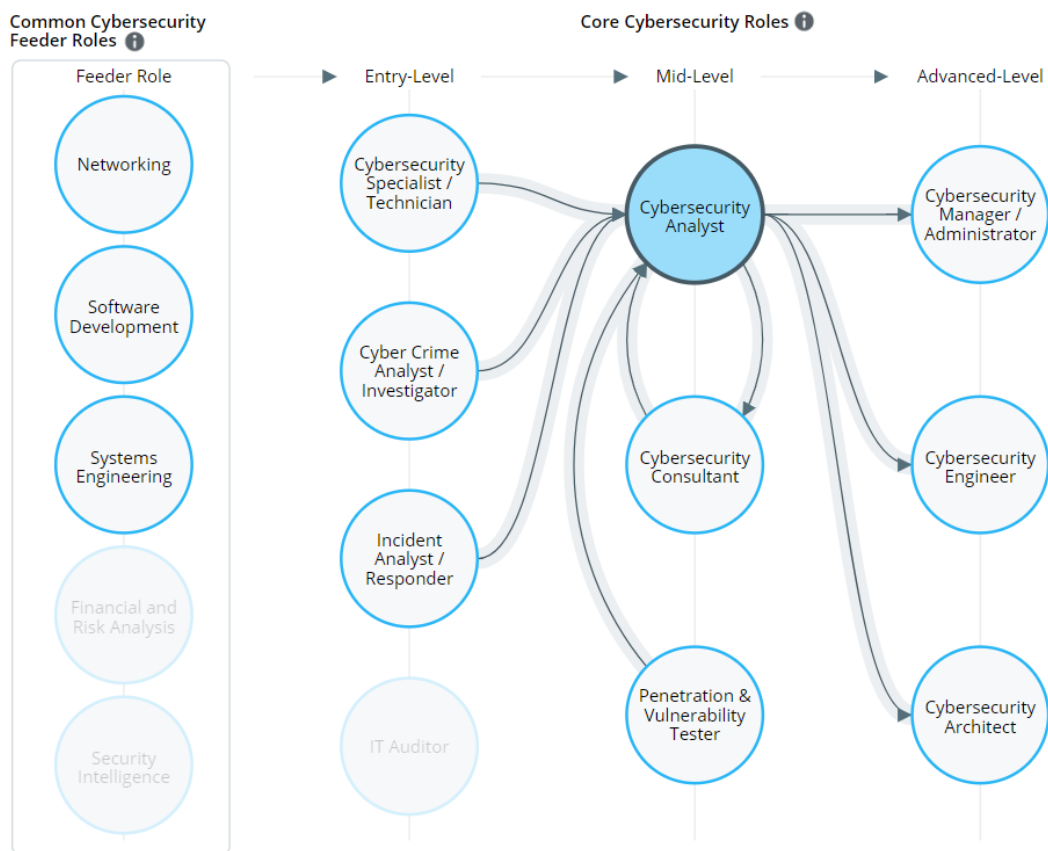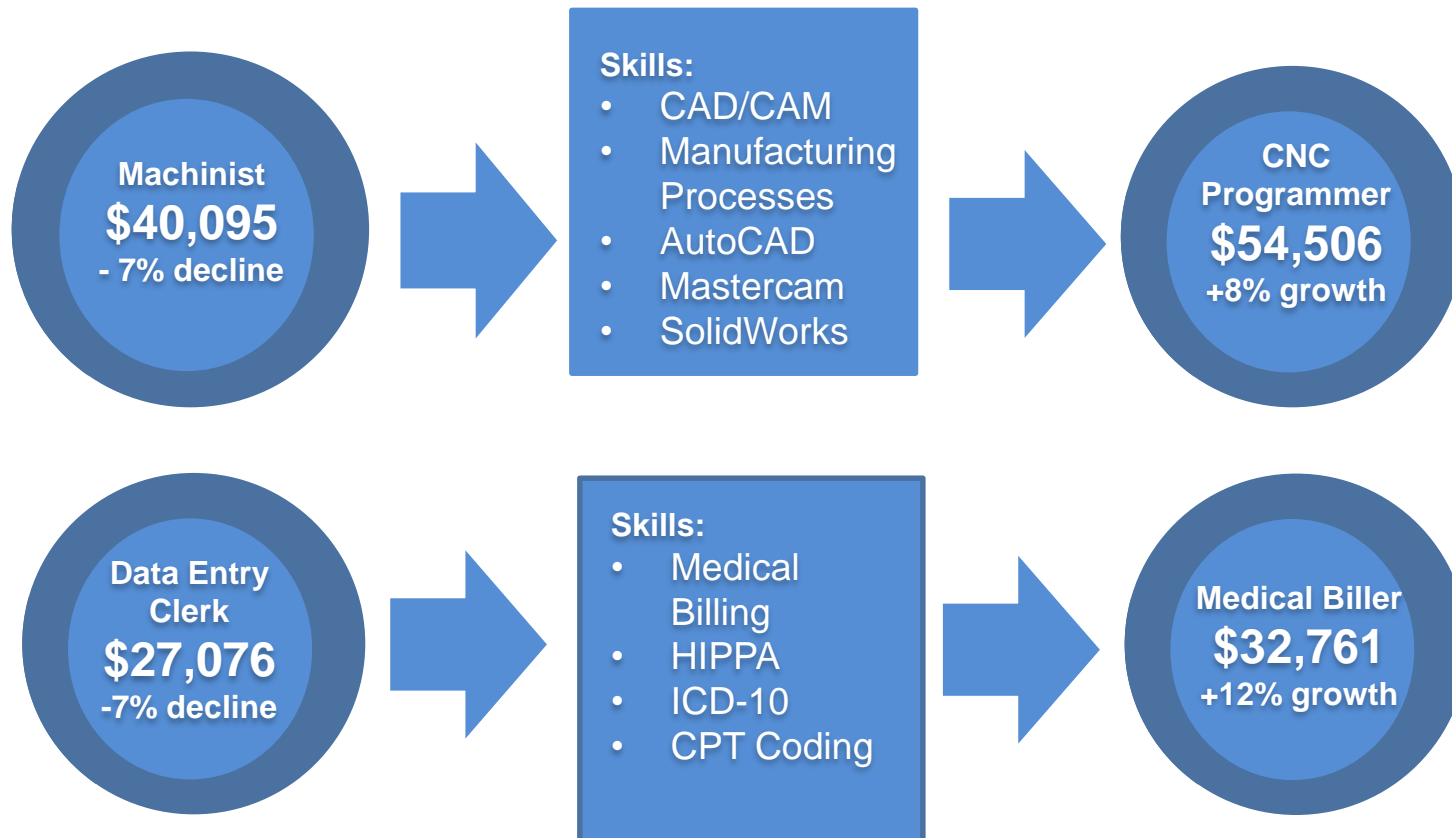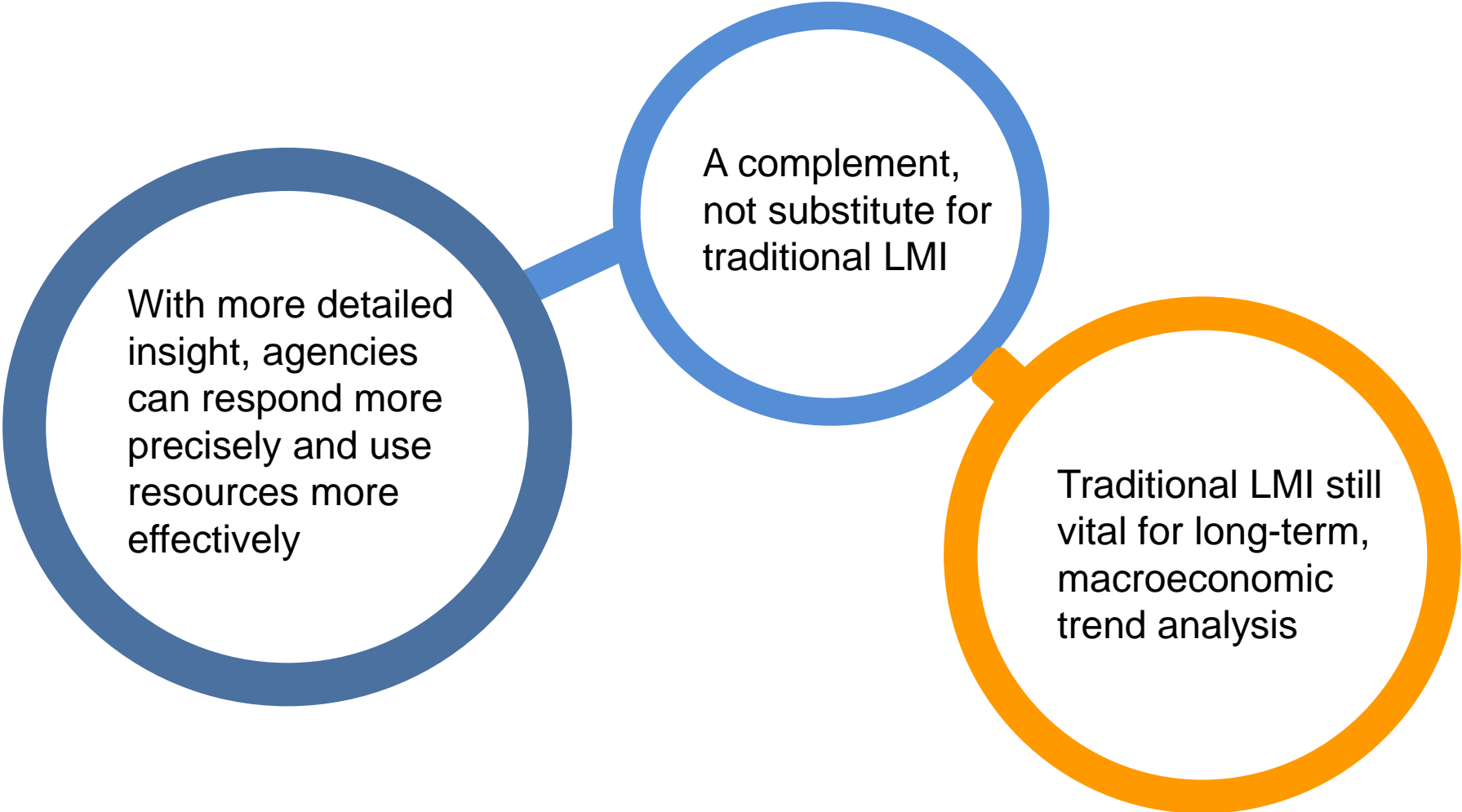

Cybersecurity Analyst

Source: www.cyberseek.org

Reskilling to Survive Automation
Identifying Options for Workers at Risk

Machinist
$40,095
- 7% decline

Skills:
- CAD/CAM
- Manufacturing Processes
- AutoCAD
- Mastercam
- SolidWorks

CNC Programmer
$54,506
+8% growth

Data Entry Clerk
$27,076
-7% decline

Skills:
- Medical Billing
- HIPPA
- ICD-10
- CPT Coding

Medical Biller
$32,761
+12% growth

How Real-Time Data Inform Policy & Programs

With more detailed insight, agencies can respond more precisely and use resources more effectively

A complement, not substitute for traditional LMI

Traditional LMI still vital for long-term, macroeconomic trend analysis

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