

FOR IMMEDIATE RELEASE

Contact: Bill Reynolds (billr@footepartners.com) Ted Lane (tlane@footepartners.com)
772-234-2787

Average market value for 602 non-certified tech skills declined in the fourth quarter of 2020, with nearly forty percent changing in value from the prior quarter—the most in a single calendar quarter since 2014.

525 tech certifications continued their more than two-year plunge in quarterly average market value, now at its lowest point since mid-2013 with recent losses in all categories except Architecture/Project Management/Processes and Web Development.

COVID-19 is continuing to profoundly reorder the tech labor landscape, and not in negative ways. Many areas of transformation and growth are being exploited by employers after years of uneven efforts at managing change.

NOTE: This news release is a summary extract of content in the 1st Quarter 2020 update of Foote Partners' *IT Skills Demand and Pay Trends Report* and *IT Skills and Certification Volatility Index*, two market intelligence trend reports updated every 3 months from data contributed by 3,700 U.S. and Canadian employers. It contains tech jobs and skills trends published in the firm's *IT Professional Salary Survey* and *IT Skills and Certifications Pay Index™* and deep-dive supply/demand benchmark and empirical research from Foote Partners field interviews.

Vero Beach, FL – February 17, 2021 - Extra pay awarded by employers to talented tech professionals for **602 non-certified tech skills** ---also known as cash pay premiums---declined in the final calendar quarter of 2020, **only the second time this has occurred in two years**. Currently averaging the equivalent of 9.5 percent of base salary on average for a single non-certified skill, this is just shy of the highest average premium in 20 years. Conversely, average market values for **525 tech certifications** decreased again from October to December, down 1.3 percent overall, currently earning the equivalent of 6.7 percent of base salary on average for a single certification. **That's the lowest average pay premium for IT certifications in 7 years and the widest gap between certified and noncertified tech skills pay since mid-2000s.**

This according to the latest quarterly update of Foote Partners' **IT Skills and Certifications Pay Index™** (ITSCPI) based on compensation data provided by 3,700 private and public-sector employers in 83 U.S. and Canadian cities who partner with the firm to report pay for their 335,785 technology professionals in the U.S. and Canada.

Since its launch in 1999, the **IT Skills and Certifications Pay Index™** has continuously tracked cash pay premiums paid to tech professionals by their employers for an ever-increasing number of popular tech skills and certifications. Rigorously validated data and detailed market analyses are updated and published by Foote Partners every 90 days. Currently, premiums are reported for 1,127 certifications and non-certified skills.

Pay Performance, 3/12/24/36 months Certified vs. Non-certified Tech Skills

(82,273 IT professionals, data through 1/1/2021)

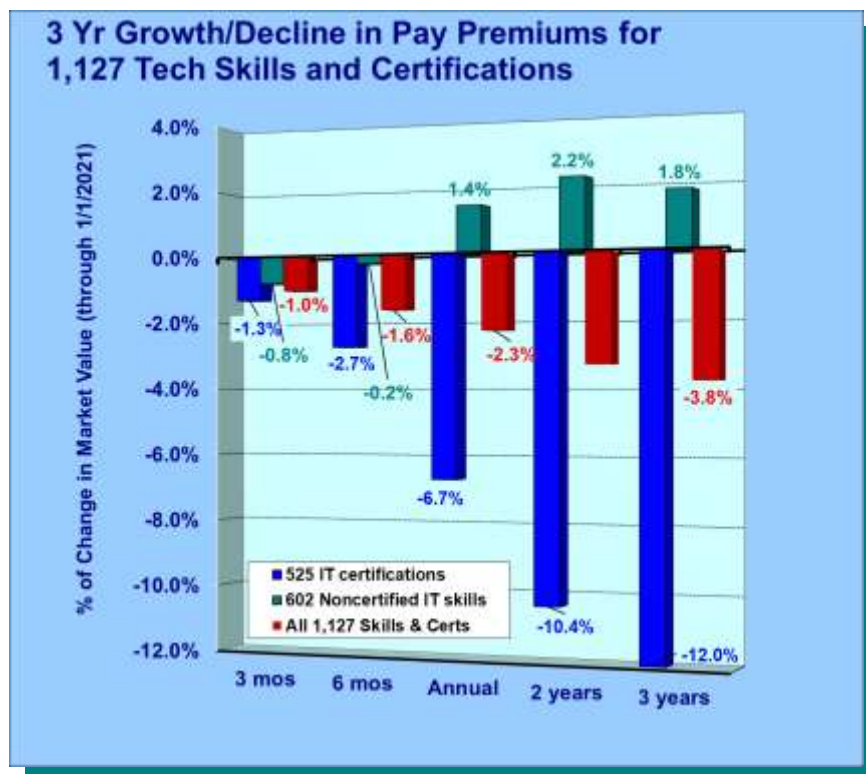
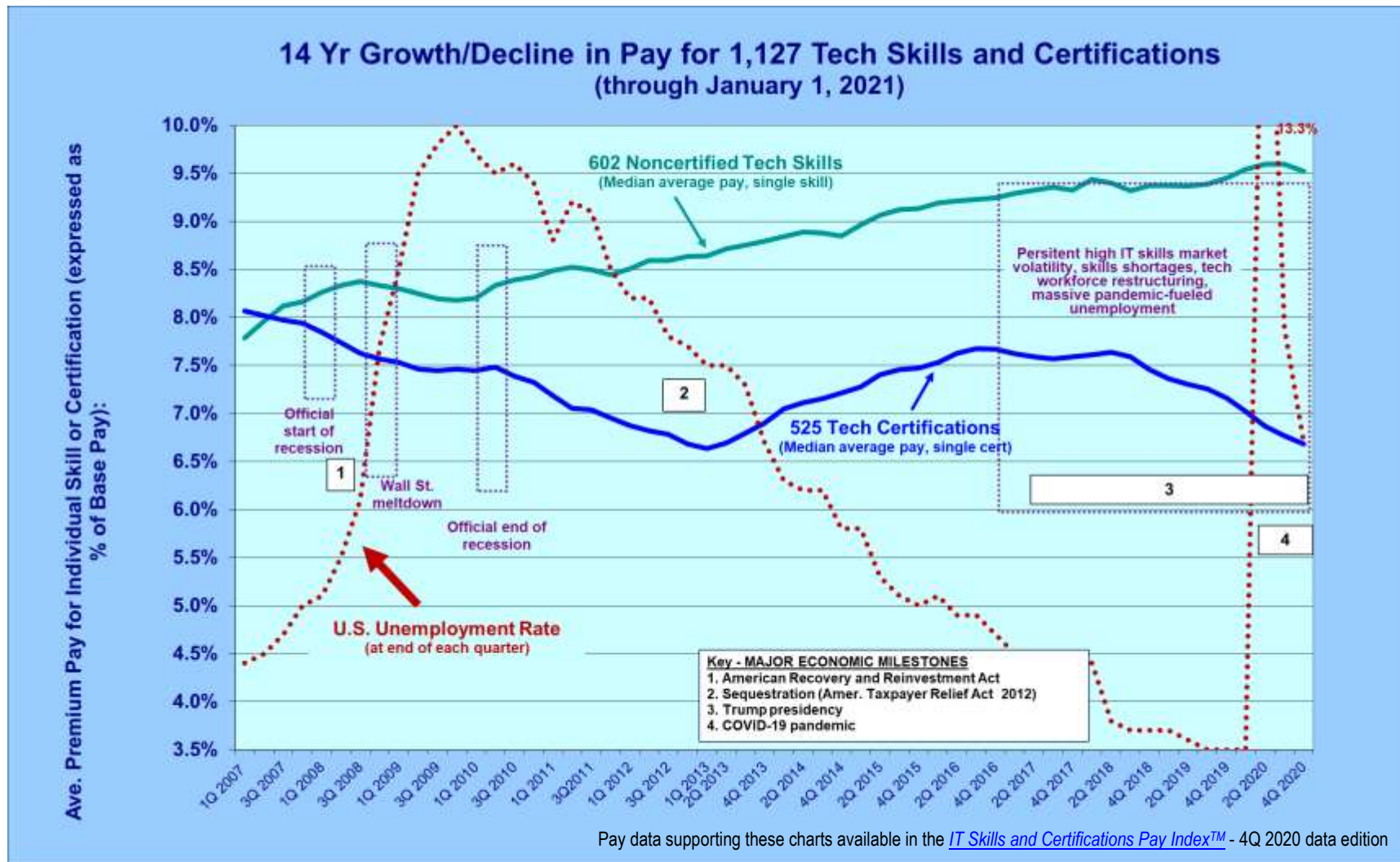


Figure 1

Source: Foote Partners, *IT Skills and Certifications Pay Index™* (4Q2017 – 4Q2020 datasets)

MULTI-YEAR PAY PREMIUM TRENDS: Certified versus Noncertified IT Skills

Average median cash pay premiums for a single certified or non-certified IT skill. 82,273 IT Professionals



IT NON-CERTIFIED SKILLS PAY SUMMARY – Through January 1, 2021

A. NON-CERTIFIED TECH SKILLS PAY PERFORMANCE: By Category

NON-CERTIFIED TECH SKILLS. 234 non-certified tech skills changed cash market value in the fourth quarter of 2020 compared to 186 in the prior quarter, a 26% increase. Average cash pay premium for **602 non-certified skills declined by nearly 1%, only the second time in two years this has occurred.** Pay performance from October to December was higher for four of eight non-certified tech skills categories reported. For the twelve-month period ending January 1st pay was higher for five categories.

Noncertified IT Skills - % Growth/Decline 3 months & 12 months

(602 skills, data through 1/1/2021)

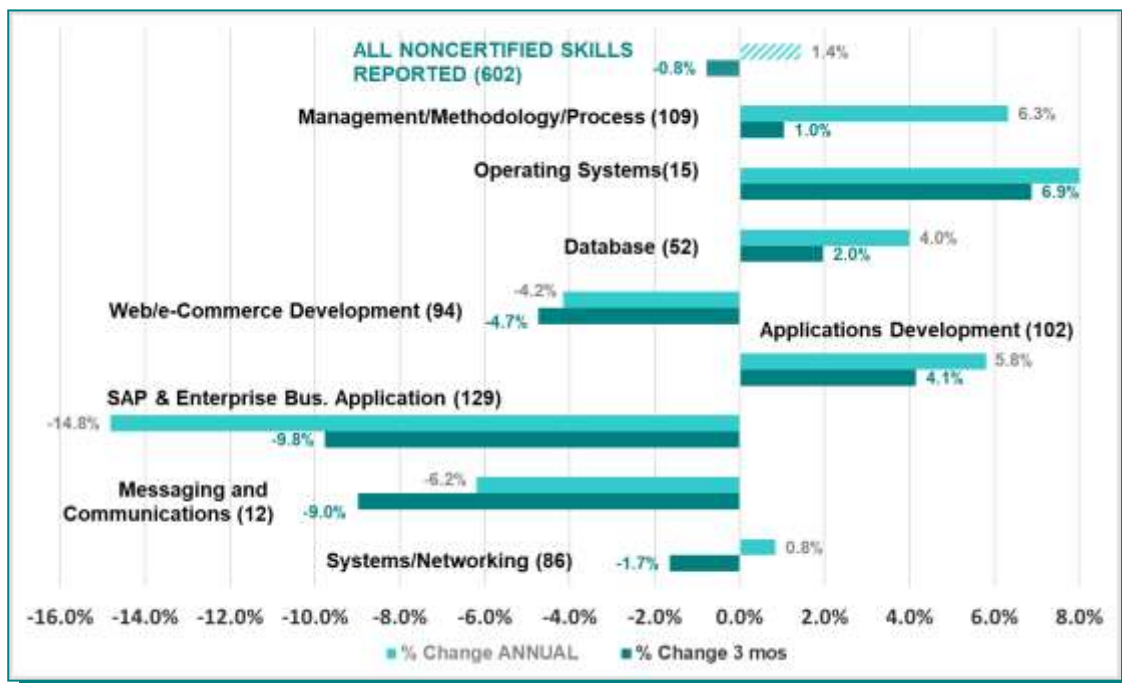
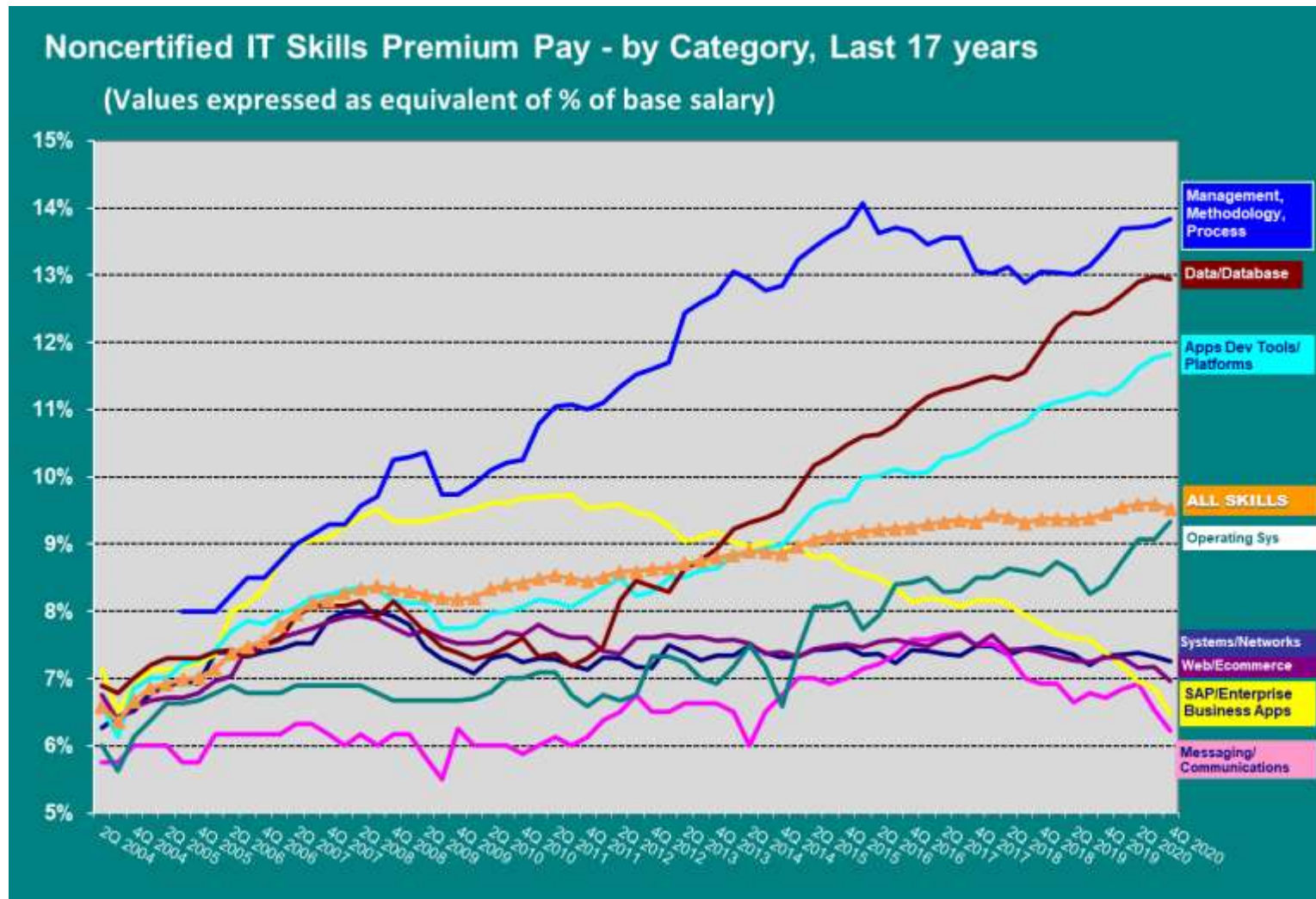


Figure 2

Source: Foote Partners [IT Skills & Certifications Pay Index™](#), 4th Quarter 2020 data

17-YEAR NON-CERTIFIED IT SKILLS PAY TRENDS BY CATEGORY

Average median cash pay premium for a single non-certified IT skill. Data through January 1, 2021 – 82,273 IT Professionals



Pay data supporting these charts available in the [IT Skills and Certifications Pay Index™](#) - 4Q 2020 data edition

NON-CERTIFIED IT SKILLS TREND HIGHLIGHTS: Market Value **Gainers** & Highest Paying – 4th Quarter 2020

These noncertified tech skills **gained 10% or more in market value** in the three months ending January 1, 2021 vs. prior quarter (seen below grouped by segment). **Listed in descending order of amount of % gain and cash pay premium** (including ties). Highest paying skills listed on right in **alphabetical order**.

TECH SKILLS (noncertified)			Highest Paying – Cash Premiums (A-Z)
<u>Applications Development skills</u> Progress 4GL/Development tools JBehave Cognos PL/SQL Apache Flex Apache Struts/Struts2 Erlang C++ /CLI Microsoft Team Foundation Server Transact-SQL/tSQLt Apache Cordova	<u>Systems/Networking skills</u> CA Endevor Virtualization (various) vCloud Cisco UCCX EIGRP Apache Flume Arista Cisco ISE (Identity Services Engine) VMware NSX	SAP FI - FSCM SAP GRC SAP MDM Workday HCM PeopleSoft (CRM/Financials/HCM) SAP SD SAP PSCD SAP FI - CA (Contract Accounting) SAP MM SAP BPC SAP CO SAP FI (Financial Accounting) SAP PP SAP SRM SAP APO SAP S/4HANA SAP PM	<ul style="list-style-type: none"> • DevSecOps • Elixir • Erlang • Flink • Natural language processing • Neural Networks • PyTorch • Risk analytics/assessment • RStudio • Rust • Security architecture and models • Six Sigma/Lean Six Sigma • Smart Contracts
<u>Database Skills</u> Oracle Enterprise Manager Oracle Application Server Java Database Connectivity (JDBC) Sqoop TIBCO Spotfire GIS	<u>Management, Process & Methodology skills</u> Complex Event Processing/Event Correlation Quantitative Analysis/Regression Analysis Data Privacy E-Discovery Social media analysis/analytics IT Governance Zachman Framework Webtrends analytics	<u>Web/SOA/E-Commerce skills</u> Joomla! Scalable Vector Graphics (SVG) WSDL (Web Services Description Language) Apache Solr JavaScript Mobile applications development REST Spring Framework (Batch, Boot, Cloud, etc.) JavaBeans/EJB 3.0 TIBCO	
<u>Messaging/Comm. skills</u> TIBCO Enterprise Message Service	<u>Operating System skills</u> OpenStack VMware vSphere HPUX	<u>SAP & Enterprise Business Applications skills</u> SAP Oil & Gas SAP QM	

Source: Foote Partners [IT Skills & Certifications Pay Index™](#), 4th Quarter 2020 data edition

NON-CERTIFIED IT SKILLS TREND HIGHLIGHTS: Market Value Losers – 4th Quarter 2020 data

These noncertified IT skills **declined 10% or more in market value in the three months ending January 1, 2021** (grouped by segment).
Listed in descending order of amount of % decline, including ties.

TECH SKILLS (Noncertified)

Applications Development skills

Apache Cloudstack
Objective Caml (Ocaml)
Oracle Applications Developer Framework
Delphi
WebSphere MQ (MQSeries)
Cerner Millennium
Cloudera software
Next.js
MapReduce

Systems/Networking skills

Citrix Hypervisor (XenServer)
IPX/SPX
Wireless security
Prometheus
Gigabit Ethernet
Rackspace Cloud
VoIP/IP telephony
Cisco Prime
Routing (e.g., OSPF, RIP, IGRP)
Citrix Virtual Apps (XenApp)
SolarWinds
Cisco Nexus
Kubernetes
Intrusion prevention/detection systems
Amazon Elastic Kubernetes Service (Amazon EKS)

SAP & Enterprise Business Applications skills

SAP Basis Components
SAP WEBI
Baan
Oracle HRMS
SAP Solution Manager
SAP AFS
Oracle E-Business suite
Oracle ERP
SAP CRM
SAP HANA
SAP Business One
Oracle Retail
Oracle HFM
SAP Forecasting and Replenishment
Software AG webMethods
SAP HCM (SAP HR)
Oracle Eloqua
SAP Lumira
Enterprise Application Integration (EAI)
SAP MDG
SAP GTS
IBM Sterling
SAP ALE
SAP BODI
SAP EPM
SAP FI - Travel Management
SAP Exchange Infrastructure (XI)
Oracle NetSuite

SAP LO (Logistics General)
Oracle CRM
SAP SCM
SAP PI (NetWeaver Process Integration)
Oracle Financials
Oracle Payroll/Receivables
SAP WM - EWM
SAP WM
ABAP
Microsoft Dynamics/Dynamics 365
SAP HCM ESS/MSS
SAP Leonardo
Salesforce
SAP HR-PY
SAP IS-U (Utilities)
SAP FS (Insurance)
J.D. Edwards (Oracle)
Oracle Payables
SAP BI (SAP BW)
Oracle BPM
SAP Hybris

Management, Process & Methodology

E-Procurement
Azure Machine Learning
Data Security
Web Analytics
Cyber Threat Intelligence

Data/Database

HBase
Cloudera Impala
Amazon Athena
dBASE/xBASE
Base SAS
Oracle Business Intelligence Enterprise Edition Plus
Oracle Coherence
Master data management

Messaging & Communications skills

TIBCO Rendezvous
Oracle Communications Messaging Server
Unified communications/messaging
RabbitMQ
ActiveMQ

Source: Foote Partners [IT Skills & Certifications Pay Index™](#), 3rd Quarter 2020 data edition

IT CERTIFICATIONS PAY SUMMARY

B. IT CERTIFICATIONS PAY PERFORMANCE: By Category

TECH CERTIFICATIONS. Cash pay for tech certifications is currently at its five-year low. 525 tech certifications lost even more value overall in final three months of 2020, down an average of 1.3% as 75 changed in value. Pay performance from October to December was lower or unchanged for all eight certification segments in both the last three months and for the twelve-month period ending January 1, 2021.

IT Certifications - % Growth/Decline 3 months & 12 months

(525 certifications, data through 1/1/2021)

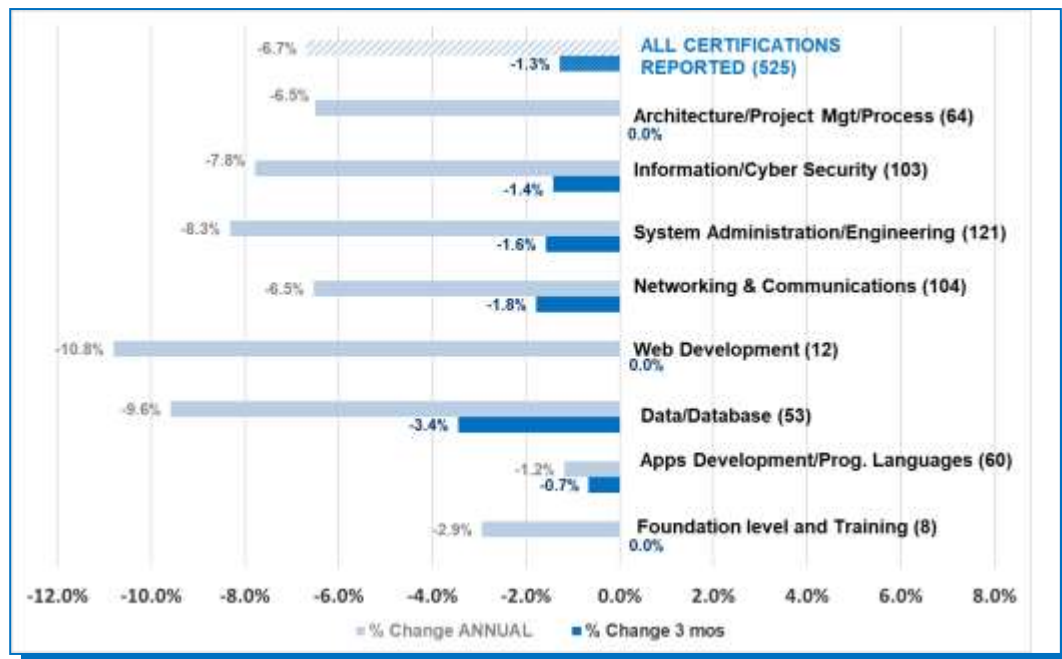
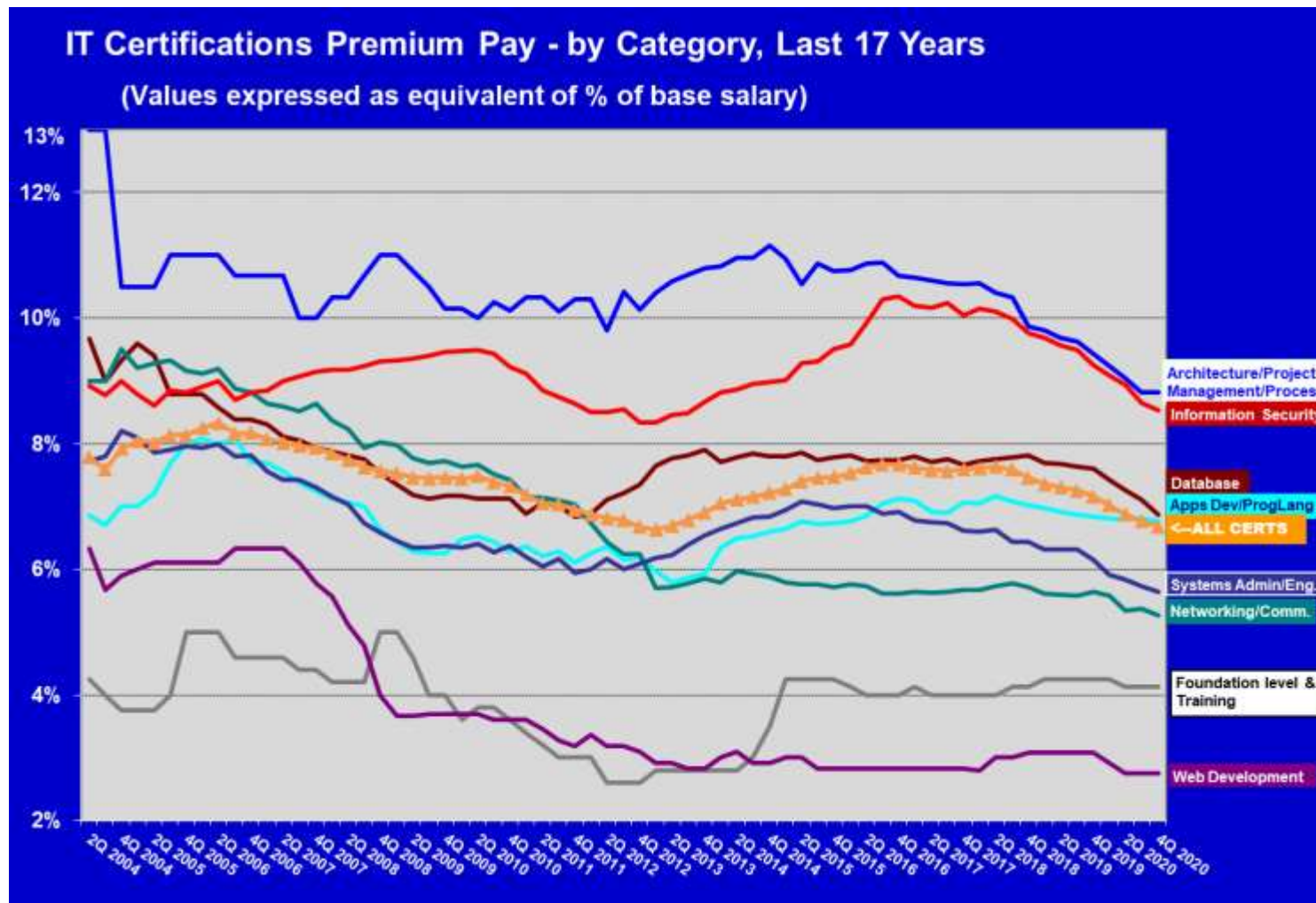


Figure 3

Source: Foote Partners [IT Skills & Certifications Pay Index™](#), 4th Quarter 2020 data

17-YEAR IT CERTIFICATIONS PAY TRENDS BY CATEGORY

Average median cash pay premium for a single IT certification. Data through January 1, 2021 – 82,273 IT Professionals



Pay data supporting these charts available in the [IT Skills and Certifications Pay Index™](#) - 4Q 2020 data edition

IT CERTIFICATIONS PAY TREND HIGHLIGHTS: Market Value Gainers & Highest Paying – 4th Quarter 2020 data

These tech certifications **gained 10% or more in market value in the three months ending January 1, 2021** (seen below grouped by segment). **Listed in descending order of amount of % gain in cash pay premium** (including ties). Highest paying skills listed on right in **alphabetical order**.

TECH CERTIFICATION Gainers		Highest Paying – Cash Premiums (A – Z)
<p><u>Info/Cyber Security certifications</u> GIAC Certified Incident Handler (GCIH) GIAC Certified Intrusion Analyst (GCIA) Certified in Risk and Information Systems Control (CRISC)</p> <p><u>Networking and Communications certifications</u> Cisco Certified Network Associate (CCNA Routing and Switching) Juniper Networks Certified Internet Professional (JNCIP) Cisco Certified Network Associate (was CCNA Cloud)</p> <p><u>Systems Administration certifications</u> Linux Professional Institute certification (LPIC-Level 2) Linux Professional Institute certification (LPIC-Level 3) Red Hat Certified Systems Administrator (RHCSA)</p>	<p><u>Architecture, Project Management, and Process Certifications</u> PMI Certified Associate in Project Management (CAPM) Six Sigma Green Belt Six Sigma Master Black Belt Six Sigma Black Belt</p>	<ul style="list-style-type: none"> • Certified Computer Examiner (CCE) • Certified Cyber Forensics Professional • Certified Forensic Computer Examiner (CFCE) • Certified ScrumMaster • Check Point Certified Security Expert (CCSE) • Check Point Certified Security Master (CCSM) • Cisco Certified Architect • CompTIA Advanced Security Practitioner (CASP) • CyberSecurity Forensic Analyst (CSFA) • EC-Council Certified Encryption Specialist (ECES) • GIAC Certified Forensics Analyst (GCFA) • GIAC Certified Penetration Tester (GPEN) • GIAC Security Expert (GSE) • GIAC Security Leadership (GSLC) • PMI Program Management Professional (PgMP) • PMI Risk Management Professional (PMI-RMP) • Zachman Certified - Enterprise Architect
Source: Foote Partners IT Skills & Certifications Pay Index™ , 4th Quarter 2020 data edition		

IT CERTIFICATIONS PAY TREND HIGHLIGHTS: **Market Value Losers** – 4th Quarter 2020 data

These tech IT certifications **declined 10% or more in market value in the three months ending January 1, 2021** vs. prior quarter (grouped by segment).
Listed in descending order of amount of % decline, including ties.

TECH CERTIFICATIONS Losers

Application Development/Programming

Languages

Microsoft Certified Solutions Developer (MCSD)
AWS Certified Developer - Associate
Microsoft Certified Solutions Expert: Business Applications
Microsoft Certified Solutions Developer: Applications Builder

Data/Database

SAS Certified Statistical Business Analyst - SAS 9
SAS® Certified BI Content Developer for SAS®9
SAS® Certified Data Quality Steward for SAS®
Oracle Certified Associate - MySQL 5
SAS Certified Predictive Modeler - SAS Enterprise Miner 14
Oracle Certified Professional - Database Cloud Administrator
Oracle Certified Professional - MySQL 5 Database Administrator
Oracle Certified Professional - MySQL 5 Developer
SAS Certified Big Data Professional Using SAS 9
SAS Certified Data Integration Developer for SAS 9
SAS Certified Data Scientist Using SAS 9
Oracle Certified Expert - MySQL 5.1 Cluster Database Administrator
Oracle Exadata 11g Certified Implementation Specialist

Info/Cyber Security certifications

EC-Council Certified Incident Handler V2 (ECIH)
GIAC Certified Forensics Examiner (GCFE)
EC-Council Computer Hacking Forensic Investigator (CHFI)
InfoSys Security Architecture Professional (ISSAP/CISSP)
CompTIA Advanced Security Practitioner (CASP)
Check Point Certified Security Administrator (CCSA)
EC-Council Certified Ethical Hacker (CEH)
InfoSys Security Engineering Professional (ISSEP/CISSP)

Systems Administration certifications

VMware Certified Design Expert (all)
Citrix Certified Associate - Virtualization
IBM Advanced Systems Administrator (all)
IBM Certified Systems Administrator (all)
Citrix Certified Associate - Networking
HP Master Accredited Solutions Expert (MASE - all)
IBM Certified Solution Advisor - Cloud Computing Architecture V5
VMware Certified Design Expert - Cloud Mgt and Automation
IBM Certified Solution Architect – Cloud Computing Infrastructure V1
Microsoft Certified: Azure Administrator Associate
AWS Certified SysOps Administrator--Associate (Cloud)

Networking and Communications

Avaya Certified Implementation Specialist
BICSI Technician and Registered Communications Distribution Designer
Avaya Certified Solutions Specialist (ACSS)
BICSI ITS Technician
Avaya Certified Design Specialist (ACDS)
Avaya Certified Integration Specialist (ACIS)
Avaya Professional Design Specialist (APDS)
Cisco Certified Network Associate (was Design Associate)
AWS Certified Solutions Architect - Associate (Cloud)
AWS Certified Solutions Architect - Professional (Cloud)

Architecture, Project Management, and Process Certifications

ITIL Expert Certification
Certified Business Analysis Professional (CBAP)
ITIL Master
SAS® Certified Advanced Analytics Professional Using SAS®9

Source: Foote Partners [IT Skills & Certifications Pay Index™](#), 4th Quarter 2020 data

IT Skills & Certifications Pay Data Trend Charts & Analysis

IT Skills and Certifications Pay Index™ – 4th Quarter 2020 data edition

(Data collected through January 1, 2021)

- **IT Certifications** (Page 14)
- **Noncertified IT Skills** (Page 24)
- **Pandemic Tech Labor Trends Discussion & Analysis** (Page 36)
- **IT Skills & Certifications Volatility Index™** (Page 50)

How to interpret gains and losses in IT skills and certifications pay premiums

Quarterly gains and losses in premium pay reflect a widening or narrowing, respectively, in the gap between supply and demand for skills and certifications. This may occur for any number of reasons. For example, a quarterly decline in pay for a skill may signal that the market supply of talent for that skill is catching up to demand—not necessarily that demand is starting to wane. IT professionals are often attracted to a skill or certification if they perceive that it has rising value in the marketplace and therefore can help them to achieve higher pay, greater job security, a promotion, or more flexibility in their career choices. As they pursue greater competency in that skill or as more workers attain certification, supply increases and market pricing (which is elastic to the laws of supply and demand) will be driven downward unless demand is rising at the same proportional rate. Conversely, if demand rises and supply is not increasing to match that level of demand, pay premiums for specific skills and certifications will increase.

Therefore, when interpreting gains and losses in market pay it is important to consider all factors that could be driving supply and demand and market perception. Those factors range from:

- aggressive marketing of certifications by vendors;
- changes in certification programs (e.g., certification extensions or retirement);
- new technology and evolution/maturation of current technologies;
- technology adoption rate;
- product integration strategies,
- economic conditions;
- employment opportunities;
- mergers/acquisitions;
- budget cycles and the timing of skills and talent acquisition by employers;
- changes in labor sourcing plans pursuant to company strategies.

IT Certifications

(Data collected through January 1, 2020)

Cash pay premiums are reported for these IT certifications (525)

Avaya Certified Design Specialist
Avaya Certified Implementation Specialist
Avaya Certified Integration Specialist
Avaya Certified Solution Specialist
Avaya Professional Design Specialist
AWS Certified Developer - Associate
AWS Certified DevOps Engineer – Professional
AWS Certified Security - Specialty
AWS Certified Solutions Architect - Associate (Cloud)
AWS Certified Solutions Architect - Professional (Cloud)
AWS Certified SysOpsAdministrator-Associate (Cloud)
BICSI ITS Technician
BICSI Technician and Registered Communications Distribution Designer
Brocade Certified Network Engineer
Brocade Certified Network Professional
Brocade Certified Fabric Designer
Brocade Certified Fabric Professional (BCFP)
Certificate of Cloud Security Knowledge
Certification Authorization Professional (CAP)
Certification of Capability in Business Analysis (CCBA)
Certified Analytics Professional (CAP)
Certified Business Analysis Professional (CBAP)
Certified Business Continuity Professional (CBCP)
Certified Cloud Architect
Certified Cloud Security Professional (CCSP)
Certified Cloud Technology Professional
Certified Computer Examiner (CCE)
Certified Computing Professional (CCP-ISC2)
Certified Cyber Forensics Professional
Certified Data Centre Management Professional (CDCMP)
Certified Data Management Professional (CDMP)
Certified Disaster Recovery Engineer (C/DRE)
Certified Forensic Computer Examiner (CFCE)
Certified Fraud Examiner
Certified Healthcare Information Security and Privacy Practitioner (HCISPP)
Certified in Convergent Network Technologies (CCNT)
Certified in Governance, Risk and Compliance
Certified in Risk and Information Systems Control (CRISC)
Certified in the Governance of Enterprise IT (CGEIT)
Certified Information Privacy Manager- all countries
Certified Information Privacy Professional - all countries
Certified Information Privacy Technologist- all countries
Certified Information Security Manager (CISM)
Certified Information Systems Auditor (CISA)

Certified Information Systems Security Professional (CISSP)
Certified IP Telecom Network Specialist (CIPTS)
Certified IT Architect (IASA CITA)Certified IT Compliance Professional
Certified Manager of Software Quality (CMSQ)
Certified Penetration Testing Engineer (CPTe)
Certified Project Management Practitioner
Certified Protection Professional
Certified ScrumMaster
Certified Scrum Coach
Certified Scrum Developer
Certified Scrum Product Owner
Certified Scrum Professional
Certified Scrum Trainer
Certified Secure Software Lifecycle Professional (CSSLP)
Certified Software Quality Analyst (CSQA)
Certified Telecommunications Network Specialist (CTNS)
Check Point Certified Security Administrator (CCSA)
Check Point Certified Security Expert (CCSE)
Check Point Certified Security Master (CCSM)
Cisco Certified Architect
Cisco Certified CyberOps Associate
Cisco Certified Design Expert (CCDE)
Cisco Certified DevNet Associate
Cisco Certified DevNet Professional
Cisco Certified Entry Network Technician (CCENT)
Cisco Certified Internetwork Expert (CCIE, all variations)
Cisco Certified Network Associate - Data Center
Cisco Certified Network Associate (CCNA Routing and Switching)
Cisco Certified Network Associate (was CCNA Cloud)
Cisco Certified Network Associate (was CCNA Collaboration)
Cisco Certified Network Associate (was CCNA Wireless)
Cisco Certified Network Associate (was Design Associate)
Cisco Certified Network Professional - Collaboration
Cisco Certified Network Professional - Data Center
Cisco Certified Network Professional - Data Center (CCNP Cloud)
Cisco Certified Network Professional - Enterprise (was CCNP Routing and Switching)
Cisco Certified Network Professional - Enterprise (was CCNP Wireless)

Cisco Certified Network Professional - Security
Cisco Certified Network Professional (CCNP)
Cisco Certified Network Professional (was CC Design Professional)
Cisco Certified Systems Instructor (CCSI)
Cisco Data Center Unified Computing Design Specialist
Cisco Data Center Unified Fabric Support Specialist
Citrix Certified Associate - Networking (CCA)
Citrix Certified Associate – Virtualization
Citrix Certified Expert - Networking
Citrix Certified Expert - Virtualization
Citrix Certified Instructor (CCI - Virtualization, Networking, or Mobility)
Citrix Certified Professional - Networking
Citrix Certified Professional-Virtualization (CCP-V)
Citrix XenServer Certified (CC-XenServer)
CIW Certified Database Design Specialist
CIW Web Design Professional
CIW Web Development Professional
CIW Web Foundations Associate
CIW Web Security Professional
Cloud U (Rackspace)
Cloudera Certified Associate Administrator
Cloudera Certified Associate Data Analyst
Cloudera Certified Associate Spark and Hadoop Developer
Cloudera Certified Professional: Data Engineer
CompTIA A+
CompTIA Advanced Security Practitioner
CompTIA Certified Technical Trainer
CompTIA Cloud Essentials
CompTIA Cloud+
CompTIA Cybersecurity Analyst+
CompTIA Linux+
CompTIA Mobile App Security+
CompTIA Mobility+
CompTIA Network (Network+)
CompTIA Penetration Tester
CompTIA Project+
CompTIA Security+
CompTIA Server+
CompTIA Storage+
Convergence Technologies Professional (CTP)
CSX CyberSecurity Practitioner (CSXP)
CWNP Certified Wireless Security Professional (CWSP)
CWNP/Certified Wireless Analysis Professional (CWAP)
CWNP/Certified Wireless Design Professional (CWDP)
CWNP/Certified Wireless Network Administrator (CWNA)
CWNP/Certified Wireless Network Trainer (CWNT)
CWNP/Certified Wireless Network Expert (CWNE)

CWNP/Certified Wireless Technology Specialist (CWTS)
Cyber Security Forensic Analyst
EC-Council Certified Application Security Engineer (CASE)
EC-Council Certified Encryption Specialist (ECES)
EC-Council Certified Ethical Hacker (CEH)
EC-Council Certified Incident Handler V2 (ECIH)
EC-Council Certified Network Defender
EC-Council Certified Network Defense Architect (CNDA)
EC-Council Certified Security Analyst (ECSA)
EC-Council Computer Hacking Forensic Investigator (CHFI)
EC-Council Disaster Recovery Professional (EDRP)
EC-Council Licensed Penetration Tester (LPT)
EMC Cloud Architect Expert
EMC Cloud Architect Specialist
EMC Cloud Engineer (EMCCE)
EMC Data Center Architect (EMCDCA - all versions)
EMC Data Science Associate
EMC Data Science Specialist, Advanced Analytics
EMC Implementation Engineer - Expert (EMCIE)
EMC Implementation Engineer - Specialist (EMCIE)
EMC Information Storage Associate (EMCISA)
EMC Platform Engineer - Specialist (EMCPE)
EMC Storage Administrator - Associate (EMCSA-A)
EMC Storage Administrator - Expert (EMCSA-E)
EMC Storage Administrator - Specialist (EMCSA-S)
EMC System Administrator – Documentum Specialist (EMCSyA)
EMC Technology Architect - Expert (EMCTA)
EMC Technology Architect - Specialist (EMCTA)
GIAC Assessing Wireless Networks
GIAC Certified Defending Advanced Threats (GDAT)
GIAC Certified Detection Analyst (GCDA)
GIAC Certified Enterprise Defender (GCED)
GIAC Certified Forensics Analyst (GCFA)
GIAC Certified Forensics Examiner
GIAC Certified Incident Manager (GCIH)
GIAC Certified Intrusion Analyst (GCIA)
GIAC Certified Penetration Tester (GPEN)
GIAC Certified Perimeter Protection Analyst (GPPA)
GIAC Certified Project Manager (GCPM)
GIAC Certified Unix Security Administrator (GCUX)
GIAC Certified Web Application Defender
GIAC Certified Windows Security Administrator (GCWN)
GIAC Critical Controls Certifications (GCCC)

GIAC Cyber Threat Intelligence (GCTI)
GIAC Exploit Researcher and Advanced Penetration Tester
GIAC Information Security Fundamentals (GISF)
GIAC Information Security Professional (GISP)
GIAC Mobile Device Security Analyst (GMOB)
GIAC Network Forensic Analyst (GNFA)
GIAC Python Coder (GPYC)
GIAC Reverse Engineering Malware (GREM)
GIAC Secure Software Programmer--Java
GIAC Secure Software Programmer--.NET
GIAC Security Essentials (GSEC)
GIAC Security Expert (GSE)
GIAC Security Leadership (GSLC)
GIAC Systems and Network Auditor (GSNA)
GIAC Web Application Penetration Tester (GWAPT)
Google Associate Cloud Engineer
Google Certified Professional Cloud Architect
Google Cloud Certified - Professional Data Engineer
Google Professional Cloud Developer
Google Professional Cloud Network Engineer
Google Professional Cloud Security Engineer
HDI Customer Service Representative
HDI Desktop Support Manager
HDI Desktop Support Technician
HDI Support Center Analyst
HDI Support Center Director
HDI Support Center Manager
HDI Support Center Team Lead
HDI Technical Support Professional
Help Desk Analyst: Tier 1 Support Specialist/Ed2Go
Help Desk Team Lead/RCCSP
Hitachi Qualified Professional - Storage Administration
HP Accredited Integration Specialist (AIS)
HP Accredited Solutions Expert (ASE - all)
HP Accredited Technical Professional (ATP - all)
HP ASE – Cloud Integrator V2
HP ASE - Storage Solutions Architect V1 /V2
HP ASE Cloud Architect V2
HP ASE Vertica Big Data Solutions Administrator V1
HP ATP - Cloud Administrator V1
HP ATP - Storage Solutions V1 /V2
HP ATP Big Data Vertica Solutions V1
HP Master Accredited Solutions Expert (MASE - all)
Huawei Certified Network Associate (all)
Huawei Certified Network Professional (all)
Huawei Certified Network Expert (all)
IBM Advanced Systems Administrator (all)
IBM Certified Administrator - Cognos
IBM Certified Advanced Application Developer (all)
IBM Certified Application Developer (all)

IBM Certified Data Engineer - Big Data
IBM Certified Database Administrator - DB2
IBM Certified Designer - Cognos BI
IBM Certified Developer - Cognos
IBM Certified Solution Advisor - Cloud Computing Architecture V5
IBM Certified Solution Advisor - DevOps V2
IBM Certified Solution Architect – Cloud Computing Infrastructure V1
IBM Certified Solution Designer (all)
IBM Certified Solution Developer - DB2 SQL
IBM Certified Solution Developer: WebSphere (all)
IBM Certified Specialist - z System (all)
IBM Certified Specialist - Virtualized Storage V1
IBM Certified Administrator: WebSphere DataPower SOA
IBM Certified Systems Administrator - AIX V1
IBM Certified Systems Administrator - WebSphere AS
IBM Certified Systems Administrator (all)
InfoSys Security Architecture Professional (ISSAP/CISSP)
InfoSys Security Engineering Professional (ISSEP/CISSP)
InfoSys Security Management Professional (ISSMP/CISSP)
ITIL Expert Certification
ITIL Foundation Certification
ITIL Intermediate Certification
ITIL Master Certification
JBoss Certified Developer (Seam, Persistence, ESB)
Juniper Networks Certified Internet Associate
Juniper Networks Certified Internet Expert
Juniper Networks Certified Internet Professional
Juniper Networks Certified Internet Specialist
Linux Foundation Certified Engineer
Linux Foundation Certified System Administrator
Linux Professional Institute certification (LPIC- 2)
Linux Professional Institute certification (LPIC- 3)
Magento 2 Certified Professional Developer
MCSE: Core Infrastructure
Microsoft Certified Azure Data Engineer Associate
Microsoft Certified Azure Administrator
Microsoft Certified Azure AI Engineer Associate
Microsoft Certified Azure Data Scientist Associate
Microsoft Certified Azure Security Engineer Associate
Microsoft Certified Azure Solutions Architect Expert
Microsoft Certified Professional
Microsoft Certified Solutions Associate(all)
Microsoft Certified Solutions Associate: BI Reporting

Microsoft Certified Solutions Associate: Cloud Platform
Microsoft Certified Solutions Associate: Microsoft Dynamics 365
Microsoft Certified Solutions Associate: SQL 2016 DBA
Microsoft Certified Solutions Associate: SQL Server 2012/2014/2016
Microsoft Certified Solutions Associate: Web Applications
Microsoft Certified Solutions Associate: Windows Server 2012/2016
Microsoft Certified Solutions Developer (MCSRD)
Microsoft Certified Solutions Developer: Applications Builder
Microsoft Certified Solutions Expert: Server Infrastructure
Microsoft Certified Solutions Expert: Business Applications
Microsoft Certified Solutions Expert: Business Intelligence
Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure
Microsoft Certified Solutions Expert: Data Management and Analytics
Microsoft Certified Solutions Expert: Data Platform
Microsoft Certified Solutions Expert: Desktop Infrastructure
Microsoft Certified Trainer (MCT)
Microsoft Certified: Azure Administrator Associate
Microsoft MTA: Windows OS
Microsoft Office Specialist
Mongo DB Certified DBA
Mongo DB Certified Developer
MongoDB Certified Developer Associate
NetApp Certified Data Administrator, ONTAP (NCDA)
NetApp Certified Implementation Engineer (NCIE)
NetApp Certified Storage Associates – Hybrid Cloud
NetScout/nGenius Certified Analyst (nCA)
NetScout/nGenius Certified Expert (nCE)
NetScout/nGenius Certified Master (nCM)
NetScout/nGenius Certified Professional (nCP)
Novell/Certified Administrator (CNA)
Novell/Certified Novell Engineer (CNE)
Novell Certified Instructor
Novell Certified Linux Engineer (Novell CLE)
Novell Certified Linux Professional (Novell CLP)
Novell Identity Manager Administrator
Okta Certified Administrator
Okta Certified Developer
Okta Certified Professional
Open Group Certified Architect (Open CA)
Open Group Certified IT Specialist (Open CITS)
Oracle Business Intelligence Foundation Suite 11G Certified Implementation Specialist
Oracle Certified Associate - DBA (OCA)
Oracle Certified Associate - Java SE Programmer
Oracle Certified Associate - MySQL 5

Oracle Certified Associate - WebLogic Server Administrator
Oracle Certified Expert - Java Platform EE Developer (all)
Oracle Certified Expert - MySQL 5.1 Cluster Database Administrator
Oracle Certified Expert - Siebel CRM Business Analyst
Oracle Certified Expert - Solaris 10 Network Administrator for Solaris
Oracle Certified Master - DBA (OCM)
Oracle Certified Master - Java EE Enterprise Architect
Oracle Certified Master - Java SE Developer
Oracle Certified Professional - Advanced PL/SQL Developer
Oracle Certified Professional - Application Server Administrator
Oracle Certified Professional - Database Cloud Administrator
Oracle Certified Professional - DBA (OCP)
Oracle Certified Professional - E-Business Suite 12
Oracle Certified Professional - Fusion Middleware 11g Forms Developer
Oracle Certified Professional - Java EE Web Services Developer
Oracle Certified Professional - Java SE Programmer
Oracle Certified Professional - MySQL 5 Database Administrator
Oracle Certified Professional - MySQL 5 Developer
Oracle Certified Professional - PL/SQL Developer
Oracle Certified Professional - Solaris 10 Systems Administrator
Oracle Certified Professional, Java EE Web Component Developer
Oracle Certified WebLogic Server System Administrator Certified Expert
Oracle Exadata 11g Certified Implementation Specialist
Oracle Linux Certified Administrator (OCA)
Oracle SOA 12c Infrastructure Implementation Certified Expert
Oracle VM 3.0 for x86 Certified Implementation Specialist
Pegasystems Certified Lead System Architect
Pegasystems Certified Robotics System Architect
Pegasystems Certified Senior Systems Architect
Pegasystems Certified System Architect
Pegasystems Certified Pega Business Architect
Pegasystems Certified UI Specialist

PHP Certification
Pivotal Application Architect
Pivotal Cloud Foundry Operator certification
Pivotal Developer
PMI Agile Certified Practitioner (PMI-ACP)
PMI Certified Associate in Project Management (CAPM)
PMI Portfolio Management Professional (PfMP)
PMI Professional in Business Analysis (PMI-PBA)
PMI Program Management Professional (PgMP)
PMI Project Management Professional (PMP)
PMI Risk Management Professional (PMI-RMP)
Prince2 Foundation
Prince2 Practitioner
Professional Certified Investigator
Professional in Project Management (GAQM)
QlikView Business Analyst
QlikView Data Architect
Qualified Information Security Professional Q/ISP
Rackspace Certified Technician
Red Hat Certified Architect (RHCA)
Red Hat Certified Architect: Application Development
Red Hat Certified Architect: Application Platform
Red Hat Certified Architect: Cloud
Red Hat Certified Architect: DevOps
Red Hat Certified Datacenter Specialist (RHCDs)
Red Hat Certified Engineer in Red Hat OpenStack
Red Hat Certified Engineer (RHCE)
Red Hat Certified System Administrator in Red Hat OpenStack
Red Hat Certified Systems Administrator (RHCSA)
Red Hat Certified Specialist in Virtualization
RSA Certified Administrator (RSA/CA)
RSA Certified Instructor (RSA/CI)
Salesforce Certified Administrator
Salesforce Certified Advanced Administrator
Salesforce Certified Application Architect
Salesforce Certified Data Architecture and Management Designer
Salesforce Certified Mobile Solutions Architecture Designer
Salesforce Certified Platform Developer
Salesforce Certified Systems Architect
Salesforce Certified Technical Architect
Salesforce Commerce Cloud Digital Developer
Salesforce Platform App Builder
SAS Certified Advanced Programmer for SAS 9
SAS Certified Base Programmer for SAS 9
SAS Certified Big Data Professional Using SAS 9
SAS Certified Data Integration Developer for SAS 9
SAS Certified Data Scientist Using SAS 9

SAS Certified Predictive Modeler - SAS Enterprise Miner 14
SAS Certified Statistical Business Analyst - SAS 9
SAS® Certified Advanced Analytics Professional Using SAS®9
SAS® Certified BI Content Developer for SAS®9
SAS® Certified Data Quality Steward for SAS®
Siebel 8 Consultant Certified Expert
Six Sigma Black Belt
Six Sigma Green Belt
Six Sigma Master Black Belt
Six Sigma Yellow Belt
SNIA Certified Storage Architect
SNIA Certified Storage Networking Expert (SCSN-E)
SNIA Certified Storage Professional
SNIA Certified Systems Engineer Sniffer Certified Expert
SolarWinds Certified Professional (SCP)
SUSE Certified Administrator
SUSE Enterprise Engineer (SCE)
SUSE Enterprise Architect or (SEA)
Systems Security Certified Practitioner (SSCP)
Tableau Desktop Certified Professional
Tableau Server Certified Professional
Teradata 14 Certified Associate
Teradata 14 Certified Database Administrator
Teradata 14 Certified Enterprise Architect
Teradata 14 Certified Master
Teradata 14 Certified Professional
Teradata 14 Certified Solutions Developer
Teradata 14 Certified Technical Specialist
TIBCO Certified Professional
TIBCO Certified SOA Architect
TOGAF 9 Certified
VMware Certified Advanced Professional 6.5 - Data Center Virtualization Design
VMware Certified Advanced Professional – Network Virtualization
VMware Certified Advanced Professional (all)
VMware Certified Advanced Professional 6 - Data Center Virtualization Deployment
VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Deployment
VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Design
VMware Certified Associate - Cloud
VMware Certified Associate - Data Center Virtualization

VMware Certified Design Expert – Network Virtualization
VMware Certified Design Expert - Cloud Mgt and Automation
VMware Certified Design Expert (all)
VMware Certified Design Expert – Network Virtualization
VMware Certified Design Expert - Cloud Mgt and Automation
VMware Certified Design Expert (all)
VMware Certified Design Expert 6 - Data Center Virtualization
VMware Certified Professional - Digital Workspace
VMware Certified Professional – Desktop and Mobility 2019
Professional 6/7 - Cloud Mgt and Automation
VMware Certified Professional - Network Virtualization
VMware Certified Professional 6 - Data Center Virtualization (VCP6-DCV)
VMware Certified Professional 6.5 - Data Center Virtualization (VCP6.5-DCV)
VMware Certified Professional 6/6.5
VMware Certified Professional 6/7 - Cloud Mgt and Automation
Zachman Certified - Enterprise Architect

CERTIFICATION ANALYSIS – Pandemic Winners/Losers

A. HIGH-PAYING TECH CERTIFICATIONS ALSO LOSING THE MOST MARKET VALUE IN 2020

The average market value for 525 tech certifications **decreased 1.3 percent overall in the final quarter of 2020**, the tenth consecutive calendar quarter of **losses that total nearly 12% over the same period**. Pay premiums for single certifications are averaging the equivalent of 6.7% of base salary in 4th Quarter 2020.

Why have more certifications been losing value than gaining value?

Certifications decline in market value for a number of obvious and not so obvious reasons. Pay premiums may diminish as a certification expires, is retired, or is replaced with more appropriate certifications as technology evolves. Also, there remains a lingering bias that taking a proctored exam does not confer expertise in a subject on the test taker, especially when the pass rate is 70 percent correct answers. The certification industry has fought back against this bias by adding laboratory requirements and even peer review panels that decide if the candidate has qualified to receive designation.

But just as often it's their popularity that drives down pay premiums for a certification: as interest in a certification escalates and more people attain the certification the gap between supply and demand for the certification narrows, driving down its market value as the laws of scarcity would dictate. This has been documented in the case of dozens of certifications over the 20 years Foote Partners has been tracking and reporting their cash pay premiums in the ***IT Skills and Certifications Pay Index***.

* * *

The following tech certifications are distinctive for two reasons:

- They **lost the most in cash market value** in the twelve months ending December 31, 2020
- They are **still earning cash pay premiums significantly higher than the average** of all 525 certifications being reported.

As referenced above, many are attracting more attention from workers looking to improve their job and career prospects by attaining the certifications, thereby narrowing the gap between supply and demand.

CERTIFICATION ANALYSIS - cont'd.

1. [Tie] Cybersecurity Forensic Analyst (CSFA) PMI Program Management Professional (PgMP)

Average Pay Premium: 13 percent of base salary equivalent

Market Value Decrease: -18.8 percent (in the six months through January 1, 2021)

The Cybersecurity Institute's *Cybersecurity Forensic Analyst (CSFA)* certification validates that an analyst has the skills needed to conduct a thorough, sound forensic examination of a computer system and other digital devices, properly interpret the evidence, and communicate the results clearly and effectively. The CSFA is designed for security professionals with at least two years of experience performing digital forensic analysis on computers and devices running the Windows operating system and creating comprehensive investigative forensic analysis reports (typically for subpoenas, motions, and affidavits). The Cybersecurity Institute services are mostly aimed at law firms but also for other businesses.

The highly regarded Project Management Institute (PMI) is perhaps best known for its Project Management Professional (PMP) credential but it also offers the *PMI Program Management Professional (PgMP)*, often considered the next step after the PMP. This certification addresses the community of professionals who are responsible for the coordinated management of multiple projects that are in alignment with organizational objectives and therefore required to direct and manage complex activities that may span functions, organizations, cultures and geographies.

3. Certified Forensic Computer Examiner (CFCE)

Average Pay Premium: 12 percent of base salary equivalent

Market Value Increase: -25 percent (in the six months through January 1, 2021)

The International Association of Computer Investigative Specialists (IACIS), the organization behind the *Certified Forensic Computer Examiner (CFCE)* credential, caters primarily to law enforcement personnel. In fact, you must be employed in law enforcement to qualify for the CFCE. To obtain the CFCE credential there is a two-step process that includes a peer review and CFCE certification testing:

- The peer review consists of accepting and completing four assigned practical problems based on core knowledge and skills areas for the credential. These must be solved and then presented to a mentor for initial evaluation before being presented for peer review. Candidates have 30 days to complete each of the practical problems.
- Upon successful conclusion of the peer review, candidates automatically progress to the certification phase.
- Candidates must begin work on a hard-drive practical problem within seven days of the completion of the peer review phase. Forty days are allotted to candidates to independently analyze and report upon a forensic image of a hard drive provided to them. Following specific instructions, a written report is prepared to document the candidate's activities and findings.

Once that report is accepted and passed, the process concludes with a 100-question written exam. Candidates have 14 days to complete the written examination. A passing score of 80 percent or better is required for both the forensic report and the written exam to earn the CFCE.

4. [Tie] Certified ScrumMaster Cisco Certified Architect

Average Pay Premium: 12 percent of base salary equivalent

Market Value Increase: -14.3 percent (in the six months through January 1, 2021)

The *Certified ScrumMaster (CSM)* certification sets the standard for establishing Scrum theory, developing practical applications and rules, and leading teams and stakeholders through the development process. As agile practices have become de rigueur in project and product management across many industries, and the Scrum master has an important leadership role in this area. The CSM is an entry-level

CERTIFICATION ANALYSIS - cont'd.

certification aimed at providing professionals with an awareness of the methodologies and values of Scrum, including team performance, accountability, and iterative progress. To earn a CSM credential, applicants must first understand the Scrum framework, as well as its principles and practices. Applicants need to pass a CSM exam which cannot be taken without attending a two-day course.

Cisco Certified Architect (CCAr) is the highest level of accreditation achievable within the Cisco Certification program. It is the pinnacle for individuals in the design knowledge wishing to show formal validation of their knowledge of Cisco technologies and infrastructure architecture, specifically senior network infrastructure architects who produce technical specifications for the network to support business objectives. The curriculum focuses on understanding the business strategy and translating it into technical infrastructure requirements. CCAr is the cream of the crop in the Design certifications track---which includes the CCDA, CCDP, CCDE--- but it's much more than technical work. Cisco describes the CCAr as focusing "on understanding the business strategy and translating it into technical infrastructure requirements." Engineers at this level must work through complex networking problems *and* business requirements to create design solutions to satisfy both requirements.

6. Information Systems Security Architecture Professional (ISSAP/CISSP)

Average Pay Premium: 11 percent of base salary equivalent

Market Value Increase: -21.4 percent (in the six months through January 1, 2021)

The **CISSP-ISSAP** is an appropriate credential if you're a chief security architect or analyst, or work as an independent consultant or in a similar capacity. As the architect, you play a key role in the information security department. Your responsibilities fall between the C-suite and upper managerial level and the implementation of the security program. Although your role is tied closely to technology, it may be closer to the consultative and analytical process of information security.

This security architect certification proves your expertise developing, designing and analyzing security solutions. It also shows you excel at giving risk-based guidance to senior management in order to meet organizational goals. CISSP-ISSAP Domains:

- Domain 1. Architect for Governance, Compliance and Risk Management
- Domain 2. Security Architecture Modeling
- Domain 3. Infrastructure Security Architecture
- Domain 4. Identity and Access Management (IAM) Architecture
- Domain 5. Architect for Application Security
- Domain 6. Security Operations Architecture

7. [Tie] Cisco Certified Network Professional - Security GIAC Exploit Researcher and Advanced Penetration Tester (GXPN)

Average Pay Premium: 11 percent of base salary equivalent

Market Value Increase: -15.4 percent (in the six months through January 1, 2021)

The Cisco Certified Network Professional (CCNP) takes aim at platforms and products from a leading networking equipment vendor found at most communications and internet service providers, enterprises and businesses of all sizes, including government, research, and academia. The CCNP is its most important midrange credential across a wide variety of specialties: Cloud, Collaboration, Data Center, Routing and Switching, Security, Service Provider, and Wireless.

The **Cisco Certified Network Professional - Security (CCNP Security)** certification program is aligned specifically to the job role of the Cisco Network Security Engineer responsible for Security in Routers, Switches, Networking devices and appliances, as well as choosing, deploying, supporting and troubleshooting Firewalls, VPNS, and IDS/IPS solutions for their networking environments. To earn CCNP Security, you pass two exams: a core exam and a security concentration exam. The core exam focuses on knowledge of security infrastructure while the concentration exams focus on emerging and industry-specific topics.

CERTIFICATION ANALYSIS - cont'd.

The *GIAC Exploit Researcher and Advanced Penetration Tester* certification targets security personnel whose job duties involve assessing target networks, systems and applications to find vulnerabilities. The GXPN certifies that candidates have the knowledge, skills, and ability to conduct advanced penetration tests, model the behavior of attackers to improve system security, and the knowledge to demonstrate the business risk associated with these behaviors.

9. [Tie] **Certified Cloud Security Professional (CCSP)**
Certified Information Security Manager (CISM)
Certified Information Systems Auditor (CISA)
Certified Information Systems Security Professional (CISSP)
Average Pay Premium: 11 percent of base salary equivalent
Market Value Increase: -8.3 percent (in the six months through January 1, 2021)

The *Certified Cloud Security Professional (CCSP)* from (ISC)² is a comprehensive global certification that covers core specialty areas like cloud application security and cloud platform security, recognizing IT and information security leaders who have the knowledge and competency to apply best practices to cloud security architecture, design, operations and service orchestration. Holders of this certification have a deep knowledge and hands-on experience with cloud security architecture, design, operations and service orchestration. Qualifying for this certification has a prerequisite of 5 years of cumulative, paid, full-time work experience in information technology; 3 years of that experience must be in information security. One year experience can be in any of the CCSP common body of knowledge (CBK) six domain areas. You can reduce the prerequisite to 4 years of work experience if you have the Cloud Security Knowledge (CCSK) certification.

The ISACA's *Certified Information Security Manager (CISM)* certification covers enterprise-level information security governance — a topic that is a growing concern for businesses globally. The certification is designed for IT pros who work with or manage IT security and want to demonstrate their expertise in information security governance, information risk management, information security program development and management and information security incident management. Credential holders possess advanced and proven skills in security risk management, program development and management, governance, and incident management and response. It's recommended to have experience in IS or IT security — the certification is aimed at those working in IT who have an eye on the management track. Holders of the CISM credential pass a comprehensive examination and possess at least five years of security experience (three of which must have been in information security management in three or more of the job practice analysis areas). Some combinations of education and experience may be substituted for the experience requirement.

The *Certified Information Systems Security Professional (CISSP)* is an advanced-level certification offered through the (ISC)² that demonstrates your knowledge and abilities with IT security and information assurance. It is designed for experienced security professionals, covering topics such as organizational structure, security and risk management, asset security, security operations, identity and access management (IAM), security assessment and testing and security architecture and engineering. You need at least five years of cumulative, paid work experience in two or more of the eight domains included in the (ISC)² CISSP Common Body of Knowledge: security and risk management, asset security, security architecture and engineering, communications and network security, identity and access management, security assessment and testing, security operations, and software development security.

Globally recognized, ISACA's *Certified Information Systems Auditor (CISA)* is the gold standard for IT professionals seeking to practice in information security, audit control and assurance. Ideal candidates are able to identify and assess organizational threats and vulnerabilities, assess compliance, and provide guidance and organizational security controls. CISA-certified professionals are able to demonstrate knowledge and skill across the CISA job practice areas of auditing, governance and management, acquisition, development and implementation, maintenance and service management, and asset protection.

To earn the CISA, candidates must pass one exam, submit an application, agree to the code of professional ethics, agree to the continuing professional education requirements, and agree to the organization's information systems auditing standards. In addition, candidates must possess at least one year of experience working with information systems. Some substitutions for education and experience with auditing are permitted.

CERTIFICATION ANALYSIS - cont'd.

13. [Tie] EC-Council Licensed Penetration Tester (LPT) GIAC Reverse Engineering Malware (GREM) PMI Portfolio Management Professional (PfMP) PMI Professional in Business Analysis (PMI-PBA) Certified Scrum Professional Cloudera Certified Professional: Data Engineer

Average Pay Premium: 10 percent of base salary equivalent

Market Value Increase: -16.7 percent (in the six months through January 1, 2021)

Penetration testing is the process of exploiting known vulnerabilities in a network. Network security has become extremely popular, especially after critical events such as 9-11. Organizations are extremely aware of how important it is to ensure their network is not being exploited to cyberattacks---which can cost a company millions of dollars---so the investment in hiring a Penetration Tester is well worth the cost. *EC-Council's Licensed Penetration Tester (LPT)* is an expert-level EC-Council certification and typically the next step after earning their Certified Ethical Hacker and Certified Security Analyst. To get the LPT you progress through three different levels, each containing three challenges, in real-life scenarios involving a hardened infrastructure. Each level is a six-hour exam. The candidate has a limited time to work against a multi-layered network architecture that has defense-in-depth controls and make multiple decisions related to what exploits and approaches to use as you maneuver through the network and web applications in an attempt to exfiltrate data.

Global Information Assurance Certification (GIAC), *Reverse Engineering Malware (GREM)* is an advanced level certification designed for candidates who possess the knowledge and skills to analyze and reverse-engineer malicious software that targets common platforms such as Microsoft Windows and web browsers as well as how to examine inner-workings of malware in the context of forensic investigations, incident response, and Windows system administration. GREM is targeted toward System and Network Administrators, Auditors, Security Consultants, and Security Managers and other individuals responsible for protecting an organization from malicious code. These individuals know how to examine inner-workings of malware in the context of forensic investigations, incident response, and Windows system administration. GREM does not require any prerequisites or specific training but GREM candidates are required to pass a written exam.

The highly regarded Project Management Institute (PMI) is perhaps best known for its Project Management Professional (PMP) credential. But the fact is that formal portfolio management is the most effective way to implement strategic initiatives because it bridges the gap between strategy and implementation and promotes the meeting of ROI objectives. The PMI's *Portfolio Management Professional (PfMP)* signifies advanced competency in the coordinated management of one or more portfolios to achieve strategic objectives. Organizations with mature project portfolio management practices complete 35 percent more of their programs successfully according to a 2015 PMI-published thought leadership report entitled "Delivering on Strategy: The Power of Project Portfolio Management".

The *PfMP* is intended for executive or senior-level practitioners managing a portfolio of projects and programs aligned with organizational strategy and focused on doing the right work, Prerequisites include:

- All applicants must possess a minimum of 96 months of professional business experience within the last 15 years AND
- Secondary degree (high school diploma, associate's degree or the global equivalent)
- 84 months of portfolio management experience

OR

- All applicants must possess a minimum of 96 months of professional business experience within the last 15 years AND
- Four-year degree (bachelor's degree or the global equivalent)
- 48 months of portfolio management experience

CERTIFICATION ANALYSIS - cont'd.

Inaccurate requirements gathering consistently ranks in the top three causes of project failure yet only half of organizations have the resources in place to perform this function properly according to Project Management Institute research. This is why business analysis is a topic of immense importance to projects and programs. The marketplace reflects this importance, as practitioners increasingly embrace techniques for uncovering business needs, managing requirements, and creating effective solutions to business problems. The [PMI Professional in Business Analysis \(PMI-PBA\)](#) certification promotes this by recognizing an individual's expertise in business analysis using these tools and techniques to improve the overall success of projects. It requires a combination of business analysis training, experience working on projects, and examination on business analysis principles, practices, tools, and techniques.

Candidates are business analysts, hybrid business analyst/project managers, project and program managers who perform business analysis, and anyone working with project teams and managing requirements or product development. Prerequisites include:

- Secondary degree (high school diploma, associate's degree)
- 60 months of business analysis experience
- 35 contact hours of education in business analysis

OR

- Bachelor's degree or the global equivalent
- 36 months of business analysis experience
- 35 contact hours of education in business analysis

The [Certified Scrum Professional \(CSP\)](#) is an advanced certification that indicates the recipient is both knowledgeable and experienced in the practical and theoretical use of Scrum. These certificants challenge their teams to improve the way Scrum and Agile principles are applied. They have demonstrated experience, documented training, and proven knowledge in Scrum. Therefore, candidates must already have obtained one or more of the foundational Scrum certifications: Certified Scrum Master (CSM), Certified Scrum Product Owner (CSPO), Certified Scrum Developer (CSD). Moreover, to qualify for the CSP certification you need to demonstrate "a minimum of 36 months of successful Agile/Scrum work experience gained within the past 5 years implementing Scrum inside organizations as team member, product owner, ScrumMaster, or 'Other.'"

Becoming a CSP is not just a matter of book knowledge crammed before a test. Rather, it's a formal acknowledgment of both the knowledge and the experience you have applying that knowledge in real-world Agile environments.

Cloudera's [Certified Professional \(CCP\) Data Engineer](#) is a certification that enhances your data engineering skills to become a professional engineer. Moreover, this certification proves that you are a reliable developer and data analyzer who can help in optimizing data sets for a variety of workloads by understanding data ingest, data transformation, data storage, and data analysis. Likewise, it illustrates that you can tackle data into a clean, useful platform, which can be used vastly by different people, for various purposes. An experienced open-source developer who earns the CCP-Data Engineer credential is able to perform core competencies required to ingest, transform, store, and analyze data in Cloudera's CDH environment.

CCP Data Engineers possess the skills to develop reliable, autonomous, scalable data pipelines that result in optimized data sets for a variety of workloads. In other words: CCP Data Engineer demonstrates that you can wrangle data into a clean, useful shape that can be used by different people, for different purposes.

All Cloudera exams are open to everyone without any prerequisite, training, certification, or otherwise. You should, however, have a high-level of mastery of data ingest, data transformation/state/store, data analysis, and workflow (i.e., the ability to create and execute various jobs and actions that move data towards greater value and use in a system.)

IT Skills (Non-certified): Pandemic winners

(Data collected through October 1, 2020)

602 Non-Certified Tech Skills Reported

Foote Partners News Release – February 17, 2021

Apps Dev. Tools/Platforms

Agile software development
Amazon Kinesis
Amazon Web Services
Apache Airflow
Apache Ant
Apache Camel
Apache Cloudstack
Apache Cordova
Apache Flex
Apache Hadoop
Apache Lucene
Apache Maven
Apache Pig
Apache Spark
Apache Struts/Struts2
Apache Tomcat
Apache Zookeeper
Appium
Automated Testing
AWS CloudFormation
AWS Lambda
Bamboo
Behavior-Driven Development
Bitbucket
Boost C++
Business Objects
C
C#
C++
C++ /CLI
CA PPM (Clarity PPM)
Cerner Millennium
Clojure
Cloudera software
Cloud Foundry PaaS
Cobol
Cognos
Confluence
Cucumber
Delphi
Drupal
Eclipse
Elixir
Epic Systems applications
Erlang
Ethereum
F#
Git/GitHub
GitLab

Go language (Golang)
Gosu/Guidewire
Gradle
Groovy/Grails
Grunt
Hibernate/NHibernate
HP ALM (App. Lifecycle Mgt)
HP Unified Functional Testing
Integration Testing
iRise
Jasmine
Java SE/Java EE
JBehave
Jenkins
JIRA
JUnit
Kotlin
MapReduce
MATLAB
Microsoft Azure
Microsoft SQL Server Mgt Studio
Microsoft Team Foundation Server
NetWeaver
Next.js
Nim
NUnit
Objective-C
Objective Caml (Ocaml)
OpenShift
Oracle APEX
Oracle Apps Developer Framework
PL/SQL
Powerbuilder
Progress 4GL/Development tools
R language
Red Hat Fuse
Rstudio
Ruby
Ruby on Rails
Rust
SaaS
SAS
Scala
Scrum
Selenium
ServiceNow ITSM
SPSS
SQL
Swift
Tcl

TestNG
Transact-SQL/ISQLt
UML (unified modeling language)
Visual Basic 6.0
Visual C++
VMware Cloud Foundry PaaS
WebSphereMQ
Xcode

SAP & Enterprise Bus. Apps.

ABAP (all modules)
Baan
Enterprise Application Integration (EAI)
IBM Sterling
J.D. Edwards /Oracle
Lawson
Microsoft Dynamics/Dynamics 365
NetWeaver
NetWeaver Portal (SAP EP)
Oracle BPM
Oracle CRM
Oracle E-Business suite
Oracle Eloqua
Oracle ERP
Oracle Financials
Oracle HFM (Hyperion Fin. Mgt)
Oracle HRMS
Oracle NetSuite
Oracle Payables
Oracle Payroll
Oracle Retail
Oracle SCM
Oracle SOA Suite
Pega
PeopleSoft (CRM/Financials/HCM)
Remedy ITSM
Salesforce
Accelerated SAP (SLM)
SAP AFS
SAP ALE
SAP APO
SAP Auto-ID infrastructure
SAP Basis Components
SAP BI Accelerator
SAP BODI
SAP Data Services (SAP BODS)
SAP BOXI (aka Crystal Reports)
SAP BPC

SAP BSP
SAP Business One
SAP Business Workflow/Webflow
SAP CA
SAP CAF
SAP CAR
SAP CCM
SAP CE
SAP CFM
SAP CO
SAP CO-PA
SAP CRM
SAP Crystal Reports
SAP CS
SAP Digital Banking
SAP EBP
SAP EDI
SAP EHS
SAP EPM
SAP ERP
SAP ESA
SAP Exchange Infrastructure (XI)
SAP FI (Financial Accounting)
SAP FI - CA
SAP FI - FSCM
SAP FI - Travel Management
SAP Fiori
SAP F&R
SAP FS (Insurance)
SAP GRC
SAP GTS
SAP HANA
SAP HCM (SAP HR)
SAP HCM ESS/MSS
SAP HR-PA
SAP Hybris
SAP IBP (Integrated Business Planning)
SAP IS-U (Utilities)
SAP ITS
SAP Leonardo
SAP LES
SAP LO
SAP Lumira
SAP Manufacturing
SAP MDG (Master Data Governance)
SAP MDM
SAP MDX
SAP MI
SAP MII
SAP MM
SAP MRO
SAP MRS
SAP Netweaver Applications Server
SAP Netweaver BW (BIW)
SAP NetWeaver Visual Composer
SAP NWDI
SAP NWDS
SAP Oil & Gas
SAP PI (NetWeaver Process Integ.)
SAP PLM
SAP PM
SAP POSDM
SAP PP
SAP PS
SAP PSCD
SAP Public Sector Management
SAP PY (Payroll)
SAP QM
SAP for Retail
SAP Service & Asset Mgt
SAP S/4HANA
SAP SCM
SAP SD
SAP SD - GTS
SAP Security
SAP SEM
SAP SM
SAP Smart Forms
SAP Solution Manager
SAP SRM
SAP TM
SAP UI5 (UI development toolkit for HTML5)
SAP Web Application Server
SAP WEBI
SAP WM
SAP WM – EWM
SAP Xcelsius
Siebel/Siebel Analytics
Software AG webMethods
SuccessFactors
Web Dynpro
Workday HCM

602 Non-Certified Tech Skills Reported

Foote Partners News Release – February 17, 2021

Web/e-Commerce Development

Active Server Pages
ActiveX
Adobe Experience Manager
Ajax
Amazon Cloudwatch
AngularJS
Apache Solr
Apache web server
Apache Velocity
Apache Wicket
Apex Code
Backbone.js
CGI
Cold Fusion MX
Content management systems
CSS/CSS3
Django
Docker /Docker Swarm
Documentum
Elasticsearch
Ember.js
Front End Development
GatsbyJS
Google Analytics
Google App Engine
Google Cloud Platform
HTML5
JavaBeans/EJB 3.0
JavaFX
JavaScript
Java Server Pages
JBoss/Wildfly
Jetty
Joomla!
jQuery
JSON
Julia
KnockoutJS
Laravel PHP
Magento
Magnolia
Microsoft .NET
Microsoft BizTalk Server
Microsoft Commerce Server
Microsoft Identity Integration Server
Microsoft Internet Information Services
Microsoft Forefront Threat Management Gateway (formerly ISA)

Microsoft SharePoint/SharePoint Server
Microsoft Silverlight
Microsoft Visual Studio
Mobile applications development
Mule/MuleESB
Node.js
Oracle Fusion
Oracle WebLogic/
Oracle Workflow
Pandas
Perl
PHP (all)
Python
React
Redux
REST
RESTful
SailPoint
Scalable Vector Graphics (SVG)
Secure software development/coding
Sitecore CMS
SOAP
Social Media/Networks
Spring Framework
Spring Boot
Spring Cloud
Spring Integration
Spring MVC
Spring Security
TIBCO
UDDI
Umbraco
VBScript
Video/graphics editing
Visual Interdev
VoiceXML
Web collaboration appliances
Web Content Development
Web Design
WebSphere
WebSphere Datapower
Wikis
WSDL
XAML/XACML
XHTML MP
XML (all variants)

Management, Methodology and Process

Artificial Intelligence
Azure Machine Learning
Big Data Analytics
Bioinformatics
Business Analysis
Business Analytics
Business intelligence
Business performance management
Business process management/
modeling/improvement
Caffe
Capacity Planning/Management
Change management
COBIT
Collaboration software
Complex Event Processing/Event
Correlation
Configuration Management
Continuous Improvement
Continuous Integration
CRM
Cryptography (encryption, VPN)
Cybersecurity
Cyber Threat Intelligence
Data Acquisition and Control Systems
Data Analytics
Data Architecture
Data Cleansing
Data Engineering
Data Governance
Data Integration
Data Management
Data Mining
Data Modelling
Data Privacy
Data Quality
Data Science
Data Security
Data Transformation
Data Visualization
DevOps
DevSecOps
Digital Analytics
Digital Forensics
Digital Marketing
eDiscovery
E-Procurement

ERP
Flink
Functional Programming
Game Development
General Data Protection Regulation (GDPR)
Google TensorFlow
HL7
Identity and access management
Incident Management
Information management
IT Audit
IT Governance
ITIL V3
Kanban
Keras
Machine Learning
Marketo
Metadata design and development
Microservices
Microsoft SQL Server Analysis Services
Microsoft Visio
Natural language processing
Network Architecture
Neural Networks
NIST
Penetration testing
Power BI
Predictive Analytics and Modeling
Prescriptive Analytics
Program Management
Project management/governance
PyTorch
QlikView
Quality Assurance/QA Automation
Quality management/TQM
Quantitative Analysis/Regression Analysis
Razor
Requirements Engineering/Analysis
Risk analytics/assessment
Risk management
Robotic Process Automation
Security architecture and models
Security auditing
Security management
Security testing
SEO
Service Management

Six Sigma/Lean Six Sigma
Splunk
Social media analysis/analytics
Software development lifecycle management
Tableau
Test automation
Test Driven Development/Scripting
TIBCO ActiveMatrix BusinessWorks
TOGAF (Enterprise Architecture)
Usability Research/Human Factors Research
User Acceptance Testing
User Experience/Interface Design
Vulnerability Scanning/Assessment/Management
Waterfall
Web Analytics
Webtrends analytics
Zachman Framework

Messaging & Communications

ActiveMQ
Apache Camel
Apache Kafka
HCL Domino
Java Messaging Service
Message-oriented Middleware (Wave, XMPP/Jabber, etc.)
Microsoft Exchange
Novell Groupwise
Oracle Comm Messaging Server
RabbitMQ
TIBCO Enterprise Message Service
TIBCO Rendezvous
Unified Communications/Messaging

602 Non-Certified Tech Skills Reported

Foote Partners News Release – February 17, 2021

Systems/Networks

Active Directory
Amazon Elastic Kubernetes Service
Ansible
Apache Flume
Arista
ATM
Azure Active Directory
Business continuity and disaster recovery planning
CA Endevor
Chef/Opencode
Cisco ASA
Cisco CUCM
Cisco ICM
Cisco IPCC
Cisco ISE/Identity Services Engine
CiscoNexus
Cisco Prime
Cisco UCCE
Cisco UCCX
Citrix Hypervisor (XenServer)
Citrix Virtual Apps (XenApp)
Cloud architecture
Cloud security
DHCP
EIGRP
Ethernet
Fast Ethernet
Gigabit Ethernet
HP ConvergedSystem
HP Quality Center
HTTPS
IaaS (Infrastructure as a Service)
Infrastructure architecture
Intrusion prevention/detection sys
IPX/SPX
Juniper
Kubernetes
LAN
Microsoft Application Virtualization
Microsoft Hyper-V
Microsoft SCCM
Microsoft SCVMM
Microsoft Virtual Server
Mobile device management
Mobile security
Multiprotocol Label Switching
NAS/Network Attached Storage

Network access control/Identity mgt systems
Network security management
Novell Netware
PaaS
Performance Analysis/Tuning
Performance Testing
Prometheus
Puppet
Rackspace Cloud
RedHat OpenShift
Routing (e.g., OSPF)
Salt
SAN/Storage Area Networks
Security skills (project-based)
Security Information and Event Management (SIEM)
SMTP
SNA
SolarWinds
Storage virtualization/administration
TCP/IP
Terraform
Tivoli
Vagrant
vCloud
Virtualization (various)
Virtual security
VMware ESXi Server
VMware NSX
VoIP/IP telephony
VPN/OpenVPN
WAN/3G/4G services
Web Infrastructure
Web services security
Wireless Network Mgmt
Wireless security
Wireless sensors/RFID
Wireline Networking/Telecomm.
WML

Data/Database

Amazon Athena
Amazon DynamoDB
Amazon RedShift
Apache Cassandra
Apache CouchDB
Apache Hive

Azure Cosmos DB
Azure Data Factory
Azure SQL Database
Azure Synapse Analytics
Base SAS
Big Data
Blockchain
Cloudera Impala
Couchbase Server
Data mining
Data security
Database management
DB2
dBASE/xBASE
ETL (Extract, transform, load)
GIS
Google Big Query
Hbase
Informatica
Java Database Connectivity
Master data management
Microsoft Access
Microsoft Exchange Server
2007/2010/2013
Microsoft SQL Server Integration Services
Microsoft SQL Server
2016/2014/2012/2008
MongoDB
MySQL
NewSQL
NoSQL
OpenEdge ABL
Oracle Application Server
Oracle Business Intelligence Enterprise Edition Plus
Oracle Coherence
Oracle DB 9i/10g/11i/12c
Oracle Enterprise Manager
Oracle Exadata
Oracle Forms
Oracle Reports
PostgreSQL
Redis
Riak
Smart Contracts
Sqoop

Sybase Adaptive Server
Teradata
TIBCO Spotfire
Visual SQL

Operating Systems

AIX
Apache Cloudstack
CoreOS
HP-UX
Linux
Mac OS X
Mobile operating systems (iOS, Android)
OpenStack
Red Hat Enterprise Linux
Solaris
SUSE
Unix (all)
VMware vSphere
Windows 8/10
Windows NT
Windows Server 2008/2012

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners

A. NON-CERTIFIED TECH SKILLS EARNING HIGH PAY---AND STILL GROWING IN VALUE

The following non-certified tech skills meet two prerequisites:

- They are **earned workers cash pay premiums well above the average** of all 602 skills reported in our *IT Skills and Certifications Pay Index™*,
- They **recorded gains in cash market value in the six months** ending December 31, 2020.

No skill below is earning less than the equivalent of 16 percent of base salary—significant considering the average for all skills reported is 9.6 percent of base—and are listed in descending ranked order of cash premium and market value increases (including ties). Not surprising, the list contains a number of security, coding, database, analytics and artificial intelligence related skills.

1. Security architecture and models

Average Pay Premium: 19 percent of base salary equivalent

Market Value Increase: 5.6 percent (in the six months through January 1, 2021)

Two fundamental concepts in computer and information security are the **security model**, which outlines how security is to be implemented—in other words, providing a “blueprint”—and the **security architecture** of a computer system, which fulfills this blueprint. Security architecture is a view of the overall system architecture from a security point and how the system is put together to satisfy the security requirements. It describes the components of the logical hardware, operating system, and software security components, and how to implement those components to architect, build and evaluate the security of computer systems. With cybersecurity related skills gaining prominence and the threat landscape continuing to be a core business issue, we expect security models and architecting skills to continue to be strong going forward.

2. Erlang

Average Pay Premium: 18 percent of base salary equivalent

Market Value Increase: 20 percent (in the six months through January 1, 2021)

Erlang is a general-purpose, concurrent, functional programming language and a garbage-collected runtime system used to build massively scalable soft real-time systems with requirements on high availability. Some of its uses are in telecoms, banking, e-commerce, computer telephony and instant messaging. Erlang's runtime systems have built-in support for concurrency, distribution and fault tolerance. The term Erlang is used interchangeably with Erlang/OTP, or Open Telecom Platform (OTP), which consists of the Erlang runtime system, several ready-to-use components (OTP) mainly written in Erlang, and a set of design principles for Erlang programs.

The Erlang runtime system is designed for systems with these traits:

- Distributed
- Fault-tolerant
- Soft real-time
- Highly available, non-stop applications
- Hot swapping, where code can be changed without stopping a system.

The Erlang programming language has immutable data, pattern matching, and functional programming. The sequential subset of the Erlang language supports eager evaluation, single assignment, and dynamic typing.

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

3. Smart Contracts

Average Pay Premium: 18 percent of base salary equivalent

Market Value Increase: 6 percent (in the six months through January 1, 2021)

Smart contracts help you exchange money, property, shares, or anything of value in a transparent, conflict-free way while avoiding the services of a middleman. They're the product of the decentralized ledger systems that run the blockchain and so skills in smart contracts are being catapulted along with Ethereum and others for an almost unlimited number of uses ranging from financial derivatives to insurance premiums, breach contracts, property law, credit enforcement, financial services, legal processes and crowdfunding agreements.

4. [Tie] Apache Flink

Apache Zookeeper

Elixir

Six Sigma/Lean Six Sigma

Average Pay Premium: 17 percent of base salary equivalent

Market Value Increase: 13.3 percent (in the six months through January 1, 2021)

Apache Flink is an open-source, unified stream-processing and batch-processing framework developed by the Apache Software Foundation. The core of Flink is a distributed streaming data-flow engine written in Java and Scala. Flink executes arbitrary dataflow programs in a data-parallel and pipelined (hence task parallel) manner. Flink's pipelined runtime system enables the execution of bulk/batch and stream processing programs. Furthermore, Flink's runtime supports the execution of iterative algorithms natively.

Flink provides a high-throughput, low-latency streaming engine as well as support for event-time processing and state management. Flink applications are fault-tolerant in the event of machine failure and support exactly-once semantics. Programs can be written in Java, Scala, Python and SQL and are automatically compiled and optimized into dataflow programs that are executed in a cluster or cloud environment.

Apache ZooKeeper is an open source Apache project that provides a centralized service for providing configuration information, naming, synchronization and group services over large clusters in distributed systems. The goal is to make these systems easier to manage with improved, more reliable propagation of changes.

If you had a Hadoop cluster spanning 500 or more commodity servers, you would need centralized management of the entire cluster in terms of name, group and synchronization services, configuration management, and more. Other open source projects using Hadoop clusters require cross-cluster services. Embedding ZooKeeper means you don't have to build synchronization services from scratch. Interaction with ZooKeeper occurs by way of Java™ or C interface time.

For applications, ZooKeeper provides an infrastructure for cross-node synchronization by maintaining status type information in memory on ZooKeeper servers. A ZooKeeper server keeps a copy of the state of the entire system and persists this information in local log files. Large Hadoop clusters are supported by multiple ZooKeeper servers, with a master server synchronizing the top-level servers.

Put simply, applications can synchronize their tasks across the distributed cluster by updating their status in a ZooKeeper file that persists in memory on the ZooKeeper servers (called a 'znode'). The znode then informs the rest of the cluster of a specific node's status change. This cluster-wide status centralization service is critical for management and serialization tasks across a large distributed set of servers.

Elixir is a dynamic, functional, concurrent general-purpose programming language that runs on the BEAM virtual machine used to implement the Erlang programming language. Elixir builds on top of Erlang and shares the same abstractions for building distributed, fault-tolerant scalable and maintainable applications while also being successfully used in web development, embedded software, data ingestion, and multimedia processing domains. Elixir also provides productive tooling and an extensible design. The latter is supported by compile-time metaprogramming with macros and polymorphism via protocols

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

Platform features of Elixir:

- *Scalability.* All Elixir code runs inside lightweight threads of execution (called processes) that are isolated and exchange information via messages. Due to their lightweight nature, it is not uncommon to have hundreds of thousands of processes running concurrently in the same machine. Isolation allows processes to be garbage collected independently, reducing system-wide pauses, and using all machine resources as efficiently as possible (vertical scaling). Processes are also able to communicate with other processes running on different machines in the same network. This provides the foundation for distribution, allowing developers to coordinate work across multiple nodes (horizontal scaling).
- *Fault-tolerance.* The unavoidable truth about software running in production is that things will go wrong. Even more when we take network, file systems, and other third-party resources into account. To cope with failures, Elixir provides supervisors which describe how to restart parts of your system when things go awry, going back to a known initial state that is guaranteed to work.

Language features of Elixir:

- *Functional programming.* *Functional programming promotes a coding style that helps developers write code that is short, concise, and maintainable. For example, pattern matching allows developers to easily destructure data and access its contents. When mixed with guards, pattern matching allows us to elegantly match and assert specific conditions for some code to execute. Elixir relies heavily on those features to ensure your software is working under the expected constraints.*
- *Extensibility and DSLs.* Elixir has been designed to be extensible, letting developers naturally extend the language to particular domains, in order to increase their productivity.

Tooling features of Elixir:

- *A growing ecosystem.* Elixir ships with a great set of tools to ease development. Mix is a build tool that allows you to easily create projects, manage tasks, run tests, manage dependencies, and integrates with the Hex package manager, which performs dependency resolution, fetches remote packages, and hosts documentation for the whole ecosystem.
- *Interactive development.* Tools like IEx (Elixir's interactive shell) are able to leverage many aspects of the language and platform to provide auto-complete, debugging tools, code reloading, as well as nicely formatted documentation.
- *Erlang compatible.* Elixir runs on the Erlang VM giving developers complete access to Erlang's ecosystem, used by companies like Heroku, WhatsApp, Klarna and many more to build distributed, fault-tolerant applications. An Elixir programmer can invoke any Erlang function with no runtime cost.

Six Sigma is a method that provides organizations tools to improve the capability of their business processes. The increase in performance and decrease in process variation helps lead to defect reduction and improvement in profits, employee morale, and quality of products or services. **Six Sigma** focuses on reducing process variation and enhancing process control, whereas lean drives out waste (non-value-added processes and procedures) and promotes work standardization and flow. The distinction between Six Sigma and lean has blurred, with the term "lean Six Sigma" being used more and more often because process improvement requires aspects of both approaches to attain positive results.

Lean Six Sigma is a fact-based, data-driven philosophy of improvement that values defect prevention over defect detection. It drives customer satisfaction and bottom-line results by reducing variation, waste, and cycle time, while promoting the use of work standardization and flow, thereby creating a competitive advantage. It applies anywhere variation and waste exist, and every employee should be involved.

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

Lean and Six Sigma both provide customers with the best possible quality, cost, delivery, and a newer attribute, nimbleness. There is a great deal of overlap between the two disciplines; however, they both approach their common purpose from slightly different angles:

- Lean focuses on waste reduction, whereas Six Sigma emphasizes variation reduction.
- Lean achieves its goals by using less technical tools such as kaizen, workplace organization, and visual controls, whereas Six Sigma tends to use statistical data analysis, design of experiments, and hypothesis testing

Often successful implementations begin with the lean approach, making the workplace as efficient and effective as possible, reducing waste, and using value stream maps to improve understanding and throughput. If process problems remain, more technical Six Sigma statistical tools may then be applied.

8. RStudio

Average Pay Premium: 17 percent of base salary equivalent

Market Value Increase: 21.4 percent (in the twelve months through January 1, 2021)

RStudio is an integrated development environment for R, a programming language for statistical computing and graphics, and for Python. It is available in two formats, RStudio Desktop and web browser-accessible RStudio Server running on a remote server. RStudio is partly written in the C++ programming language and uses the Qt framework for its graphical user interface however a bigger percentage of the code is written in Java and JavaScript.

The keys for RStudio's popularity for analyzing data in R include:

- *R is open source.* It's free which is an advantage against paying for MATLAB or SAS licenses. This is also important if you're working with global teams in areas where software is expensive or inaccessible. It also means that R is actively developed by a community and there are regular updates.
- *R is widely used.* R is used in many subject areas (not just bioinformatics) making it more likely for finding help online when it's needed.
- *R is powerful.* R runs on multiple platforms (Windows/MacOS/Linux). It can work with much larger datasets than popular spreadsheet programs like Microsoft Excel, and because of its scripting capabilities it is more reproducible. There are thousands of available software packages for science, including genomics and other areas of life science.

9. [Tie] Neural Networks

PyTorch

Average Pay Premium: 17 percent of base salary equivalent

Market Value Increase: 6.3 percent (in the six months through January 1, 2021)

PyTorch is an open source machine learning framework based on the Torch library that accelerates the path from research prototyping to production deployments. It is used for applications such as computer vision and natural language processing, primarily developed by Facebook's AI Research lab (FAIR). Although the Python interface is more polished and the primary focus of development, PyTorch also has a C++ interface. A number of pieces of Deep Learning software are built on top of PyTorch, including Tesla Autopilot, Uber's Pyro, PyTorch Lightning, and Catalyst.

PyTorch provides two high-level features:

- Tensor computing (like NumPy) with strong acceleration via graphics processing units (GPU)
- Deep neural networks built on a tape-based automatic differentiation system

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

Key features and capabilities of PyTorch include:

- *Production Ready. Transition seamlessly between eager and graph modes with TorchScript, and accelerate the path to production with TorchServe*
- *Distributed Training. Scalable distributed training and performance optimization in research and production is enabled by the torch.distributed backend.*
- *Robust Ecosystem. A rich ecosystem of tools and libraries extends PyTorch and supports development in computer vision, NLP and more.*
- *Cloud Support. PyTorch is well supported on major cloud platforms, providing frictionless development and easy scaling.*

Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret sensory data through a kind of machine perception, labeling or clustering raw input. The patterns they recognize are numerical, contained in vectors, into which all real-world data, be it images, sound, text or time series, must be translated.

Neural networks help us cluster and classify. You can think of them as a clustering and classification layer on top of the data you store and manage. They help to group unlabeled data according to similarities among the example inputs, and they classify data when they have a labeled dataset to train on. Neural networks can also extract features that are fed to other algorithms for clustering and classification, so you can think of deep neural networks as components of larger machine-learning applications involving algorithms for reinforcement learning, classification and regression.)

11. Keras

Average Pay Premium: 16 percent of base salary equivalent

Market Value Increase: 23.1 percent (in the six months through October 1, 2020)

Keras is a high-level deep learning API written in Python, running on top of the machine learning platform TensorFlow. It was developed with a focus on enabling fast experimentation: being able to go from idea to result as fast as possible. TensorFlow 2.0 is an end-to-end, open-source machine learning platform. You can think of it as an infrastructure layer for differentiable programming, combining four key abilities:

- Efficiently executing low-level tensor operations on CPU, GPU, or TPU.
- Computing the gradient of arbitrary differentiable expressions.
- Scaling computation to many devices
- Exporting programs ("graphs") to external runtimes such as servers, browsers, mobile and embedded devices.

Keras is an approachable, highly-productive interface for solving machine learning problems, with a focus on modern deep learning. It provides essential abstractions and building blocks for developing and shipping machine learning solutions with high iteration velocity. It contains numerous implementations of commonly used neural-network building blocks such as layers, objectives, activation functions, optimizers, and a host of tools to make working with image and text data easier to simplify the coding necessary for writing deep neural network code. The code is hosted on GitHub, and community support forums include the GitHub issues page, and a Slack channel.

In addition to standard neural networks, Keras has support for convolutional and recurrent neural networks. It supports other common utility layers like dropout, batch normalization, and pooling. Keras allows users to productize deep models on smartphones (iOS and Android), on the web, or on the Java Virtual Machine. It also allows use of distributed training of deep-learning models on clusters of Graphics processing units (GPU) and tensor processing units (TPU).

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

12. [Tie] Sqoop Teradata

Average Pay Premium: 16 percent of base salary equivalent

Market Value Increase: 14.3 percent (in the six months through January 1, 2021)

Sqoop efficiently transfers bulk data between Apache Hadoop and structured datastores such as relational databases and helps offload certain tasks (such as ETL processing) from the Enterprise Data Warehouse to Hadoop for efficient execution at a much lower cost. Sqoop can also be used to extract data from Hadoop and export it into external structured datastores. It offers a lot of Big Data advantages including satisfying the growing need to move data from mainframe to HDFS; creates faster performance and optimal system utilization; and improves the efficiency of data analysis by combining structured data with unstructured data in schema-on-read data lakes.

Teradata Corporation provides database and hybrid enterprise cloud analytics-related software, product, and services for various industries comprising communications, financial services, government, healthcare, insurance, manufacturing, media and entertainment, oil and gas, retail, travel and transportation, and utilities. Teradata's cloud and hardware-based data warehousing, business analytics, and consulting services have been around for many years, including its Vantage platform introduced in 2018. What's giving it a boost lately has been the boom in big data and advanced data analytics solutions which we have discuss in detail in this MI reports and in past issues.

14. [Tie]Blockchain Clojure Functional Programming Informatica IT Governance Risk management TIBCO Spotfire

Average Pay Premium: 16 percent of base salary equivalent

Market Value Increase: 6.7 percent (in the six months through January 1, 2021)

Based on a peer-to-peer (P2P) topology, **blockchain** is a distributed ledger technology (DLT) that allows data to be stored globally on thousands of servers – while letting anyone on the network see everyone else's entries in near real-time. That makes it difficult for one user to gain control of, or game, the network and to change, hack, or cheat the system. For businesses, blockchain holds the promise of transactional transparency: the ability to create secure, real-time communication networks with partners around the globe to support everything from supply chains to payment networks to real estate deals and healthcare data sharing. Because businesses run on information, the faster it's received and the more accurate it is, the better. Blockchain is ideal for delivering that information because it provides immediate, shared and completely transparent information stored on an immutable ledger that can be accessed only by permissioned network members. A blockchain network can track orders, payments, accounts, production and much more. And because members share a single view of the truth, you can see all details of a transaction end-to-end, giving you greater confidence, as well as new efficiencies and opportunities.

An annual survey of blockchain service providers by research analyst firm Gartner revealed that 14% of enterprise blockchain projects moved into production in 2020, up from 5% in 2019. Moreover, bitcoin market value—perhaps blockchains most well-known use case—reached all-time highs in the last few months as mainstream investors have embraced it. Understanding how Blockchain integrates with IoT, Artificial Intelligence, Machine Learning, Robotics, and other technologies is a plus now for architects but will be a requirement in the future as these other technologies mature and adoption rates increase.

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

Clojure is a general-purpose, dynamic, compiled, and predominantly functional programming language from the Lisp family tree. Amazon, Staples, and Walmart are just some examples of major companies that use it in their technology stacks. Clojure embraces **Functional Programming (FP)**. Functions are treated as first-class citizens, and data is immutable by default. When you create lists, maps, vectors, etc., they are immutable by definition.

Functional features of Clojure include:

- *Declarative programming model.* You express the logic of a program's structure and elements (what you want data to do) without having to describe its control flow (how it's done).
- *Support for higher order functions.* These are functions that can take in functions as arguments and/or return functions as results.
- *Immutable persistent data structures.* When a change occurs, the old data structure is preserved, and a new structure is returned expressing the relevant parts of the old structure with the newly created data. Because they are immutable, they eliminate many typical errors found in most concurrent programming.
- *Absence of side effects.* While complete absence of side effects is impossible for real-world applications, Clojure's immutable information model does a good job of isolating them. Clojure uses side effects explicitly via its language syntax.

Clojure is unique in several ways, which may be why employers are willing to pay higher cash pay premiums for it. One is that it was designed to be a hosted language: Instead of defining its own platform (as Python, Ruby, Java, etc.) have done, Clojure was meant to take advantage of existing platforms and to build on top of them. Clojure currently is developed on two platforms, the Java Virtual Machine and JavaScript. Clojure has incredible reach, running wherever Java does, any web browser, or any mobile device. While most functional languages, such as Scala and Haskell, tend toward static types, Clojure is dynamic. The tool's REPL (Read-Eval-Print Loop) makes it easier to catch errors as you code, and dynamism makes code more flexible and extensible.

Clojure is particularly good at data processing and concurrent programming, two applications that have become increasingly relevant in computing. Clojure is used for everything from simple web sites to desktop applications to music synthesis systems to cloud-based Twitter analysis engines to high-frequency trading. It's a powerful tool for building high-leverage abstractions. And its simplicity makes it great for managing the complexity of the real-world.

Functional programming has become a really hot topic in the JavaScript world. Just a few years ago, few JavaScript programmers even knew what functional programming is, but every large application codebase I've seen in the past 3 years makes heavy use of functional programming ideas. Often abbreviated FP, functional programming is the process of building software by composing pure functions, avoiding shared state, mutable data, and side-effects. Functional programming is declarative rather than imperative, and application state flows through pure functions. Contrast with object-oriented programming, where application state is usually shared and collocated with methods in objects.

Functional programming is a programming paradigm, meaning that it is a way of thinking about software construction based on some fundamental, defining principles (listed above). Other examples of programming paradigms include object-oriented programming and procedural programming.

Functional code tends to be more concise, more predictable, and easier to test than imperative or object-oriented code — but if you're unfamiliar with it and the common patterns associated with it, functional code can also seem a lot denser, and the related literature can be impenetrable to newcomers.

Informatica is a software development company whose core products include enterprise cloud data management, data integration (extract, transform, load), information lifecycle management, business-to-business data exchange, cloud computing integration, complex event processing, data masking, data quality, data replication, data virtualization, master data management, ultra messaging, and data governance. It has a customer base of more than 9,500 companies.

NON-CERTIFIED IT SKILLS ANALYSIS – Pandemic Winners, cont'd.

At its essence **IT governance** provides a structure for aligning IT strategy with business strategy. By following a formal framework, organizations can produce measurable results toward achieving their strategies and goals. A formal program also takes stakeholders' interests into account, as well as the needs of staff and the processes they follow. In the big picture, IT governance is an integral part of overall enterprise governance.

But what is driving popularity in IT governance right now that has resulted in higher pay premiums than before? We believe it's because organizations are being subjected to more and more regulations governing the protection of confidential information, financial accountability, data retention and disaster recovery, among others. They're also under more pressure from shareholders, stakeholders and customers. To ensure they meet internal and external requirements, more organizations are implementing formal IT governance programs that provide a framework of best practices and controls. This applies to both public- and private-sector organizations; a formal IT governance program should be on the radar of any organization in any industry that needs to comply with regulations related to financial and technological accountability. Implementing a comprehensive IT governance program requires a lot of time, effort and especially expertise that should be rewarded with pay premiums.

There's also GRC (governance, risk and compliance) which is practically the same thing as IT governance but necessarily incorporates security domains. While GRC is the parent program, what determines which framework is used is often the placement of the CISO and the scope of the security program. For example, when a CISO reports to the CIO, the scope of GRC is often IT focused. When security reports outside of IT, GRC can cover more business risks beyond IT.

Risk management is the identification, evaluation, and prioritization of risks commonly defined as the effect of uncertainty on objectives) followed by coordinated and economical application of resources to minimize, monitor, and control the probability or impact of unfortunate events or to maximize the realization of opportunities. Evaluating and managing risk is an obsession for most businesses; for others it is something to ignore at great peril to their future success.

The field of risk analytics and evaluation has entered its prime: recent projections put the global fraud detection and prevention market at [\\$106.71 billion by 2027, up from \\$19.82 billion in 2019](#). The spike in interest for non-certified skills to prevent misappropriation of assets, bribery and corruption, fraud, data theft or money laundering in financial services, government or public utilities is in full force in our latest findings. Most employers are rewarding people who can incorporate data and insights from many sources to better identify, measure, and mitigate risk. McKinsey & Company recently published an excellent [paper](#) describing what this is all about.

TIBCO's **Spotfire** is a data visualization tool that allows users to access and combine data in a single analysis, enabling business users to visualize and analyze their data with little to no IT support. It allows users to define KPIs and send alerts to iPhone or Android phones, enabling teams to collaborate on mobile devices while management can simultaneously get timely information and manage by exception. Spotfire is open source and can perform Big Data, Content and Predictive Analytics.

Spotfire can be deployed either in cloud or on-premise and supports a broad range of use cases, from building dashboards and data analytics to sophisticated predictive and real-time analytics and continually helping user discover insights that they can act on. It complements existing business intelligence and reporting tools. Spotfire provides connectivity to databases including big-data tools and applications such as CRM, ERP, Excel and MS Access. It also provides native connectivity to R Project for advanced statistical analytics, automation services to automate sending PDF/MS PowerPoint reports and an API and software development kit. Among all the above features driving growth in Spotfire pay premiums is that it keeps the total cost of ownership low by allowing users to build once and publish to thousands of users over internet or intranet, as a PDF or as MS PowerPoint reports.

1Q 2021 Pandemic Tech Labor Trends Discussion & Analysis

Data collected through October 1, 2020 to January 1, 2021

TECH LABOR TRENDS DISCUSSION & ANALYSIS – 4th Quarter 2020

A. UPDATE ON PANDEMIC EFFECT ON THE TECH WORKFORCE

[Note: This is an update on the detailed analysis of tech jobs and IT workforce management in the [October 2020 edition of the IT Skills Demand and Pay Trends Report.](#)]

Thanks to the tumultuous events of the past year, in 2021, IT professionals and the people who manage them will face challenges in the workplace they've never seen before. There was no roadmap for taking much of the American workforce remote overnight, and none exists for a large-scale, staggered return to the hybrid environment of in-person and remote work that most organizations expect to make work in the months to come.

The fact is, COVID-19 has stressed business and operating models to the point of breaking. As they reset, organizations are reducing or retiring some activities, shifting capabilities and capacity, switching production facilities to create new product suites, and retailing in new ways and new ecosystems. Some examples are stores expanding digital ordering, restaurants entering grocery markets and grocery stores becoming dark fulfillment centers. These new and shifting business models have radical implications for every aspect of talent and workforce planning.

Besides laying the technical groundwork for a new workplace environment, HR and tech leaders will be faced with a number of other pandemic-inflected challenges this year, some unique to this era of collaborating at a distance and others ongoing, such as balancing budgets and stocking up on talent. But there are myriad other issues impacting tech labor that will require hard choices this year and going forward.

Framing the Future of Work

We frame the challenges of the next few years by starting with a few fundamental assumptions and ask a few key questions.

- All companies have become tech companies. How they manage technology and their tech workforces in executing business strategies ultimately determines how competitive they are in the marketplace.
- *Tech and business roles/responsibilities have been 'folding into' each other for nearly three decades*, creating a very broad and deep hybridization of work along a tech-business continuum
- *We are in a pandemic which has dramatically altered the business and tech landscape*. As we come out of the pandemic, these landscapes will be altered again, all rolling up to a New Normal for jobs, skills supply/demand, and pay.
- *What will the post-pandemic world look like* for jobs, skills, pay and total rewards.
- *There is industry, geographical, enterprise size, and timeline differentials* in all of the above. What do all this mean for your company?

A powerful reality took hold across all businesses after the explosion of personal computing, networking and the world wide web in the 1980s and 1990s: If their actual product and services were not themselves technology, how they developed, delivered and/or supported them depended on tech. Today all soft and hard infrastructure and protections requires tech expertise and for most companies their decision-making is now heavily influenced and facilitated by powerful advanced analytics and computing technology.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

It is hybridization of tech and business roles and skills that has most confounded HR departments who must accommodate countless variations of hybrid skills and competencies along this continuum tech-business continuum. Determining how to pay talent is especially difficult as tech skills are vastly more volatile in the marketplace than most any business skills. Flexibility and agility in talent acquisition, compensation, benefits and reward programs is more critical than ever, requiring architectural thinking and discipline.

As for COVID-19, if you're not already at work on building your tech workforce scenarios and solutions for the post-pandemic world, you're in trouble. These solutions will take more than one budget cycle to implement so it's essential to put a stake in the ground now on what the competitive post-pandemic world will look like for your company and its tech jobs and skill requirements. Even considering the uncertainty of macroeconomic conditions and the timing of COVID herd immunity which affects all employers, every industry and business segment will have a different strategy scenario and plans for building the tech labor force needed to execute.

This will require a shift from static to dynamic planning assumptions in navigating talent planning decision and no small amount of talent market intelligence. Labor market analytics will be key for educating leaders on market dynamics and proposing strategic solutions because current data suggests that the majority of your leaders feel poorly prepared for the future. You'll need to drive decisions around skills inventory and redeployment by evaluating your enterprise-wide skills architecture and pipeline compared to the marketplace. Also, you will need to properly educate and equip HR business partners and recruiters to develop more effective sourcing strategies and operate as market experts.

Moreover, nearly half of all employees complain that they complete tasks on-the-job that are outside their job descriptions, proving that roles are ill-designed to capture the skills required for today's workflows. This is a role architecture problem that has existed for years; after the pandemic these problems will multiply out of control until employers institute a [technology people architecture framework](#) for aligning jobs and skills enterprise wide and layering agile compensation programs on top of this architecture. Only then can employers create resilience in the tech workforce and improve their internal labor market by identifying needed emerging skills and cross-training individuals to develop critical skill sets.

How long will the COVID-19 pandemic last?

This is, of course, the key question for forecasting the state of the economy and in turn the future of tech employment. Beginning last summer Foote Partners began evaluating several variables and speaking with experts in the fields of immunology, epidemiology, healthcare, social sciences, and economics in addition to our usual research partner network of 3,700 public and private sector employers. Our aim has been to define what may constitute a new normal given the likelihood that society will be learning to live with virulent strains of the flu for years to come.

We have revised our October forecast as follows.

Vaccine acceptance. Of particular concern to us at that time were the latest data on the public's acceptance of vaccines. Prior to this pandemic the percent of Americans who routinely opposed vaccinations of any kind had been reported to be in the 16% to 20% range. A survey conducted September 8-13, 2020 by the Pew Research Center (10,093 U.S. adults) found that about half of adults (49%) said they would "definitely not" or "probably not" get a vaccine to prevent COVID-19 if it were available.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

[An update of the same survey](#), conducted November 18-29, reduced that vaccination resistance from 49% to 39%, with 60% of Americans saying they would get the vaccine (up from 51%). We believe this acceptance rate is most likely even higher now since the arrival of the more virulent British, South African, and Brazilian strains of the coronavirus in December/January. Also creating more positivity towards vaccinations has been the successful inoculation of 24.1 million persons with minimal side effects as of this writing

Vaccine availability. In September, CDC Director Robert Redfield testified before Congress that most of the American public will not have access to a vaccine against the novel coronavirus until late spring or summer of 2021 and this appears to be unchanged based on well-publicized snafus in distributing the Pfizer and Moderna vaccines.

Macroeconomic trends. On the economic front, macroeconomists are citing historical evidence and the state of current indicators such as the current-account deficit, the so-called net national savings rate, and recent economic output trending in suggesting the specter a U.S. dollar collapse against other currencies as early as the end of 2021. The odds of a “double-dip” recession in the U.S---defined as a recession followed by a brief recovery and then another recession---have dipped somewhat since our last reporting as Congress passed the \$900 Billion Coronavirus Relief Bill in December and are currently engaged in a new economic relief bill.

Considering all data and insights we have collected and analyzed, ***our forecast remains the same as in October: we will likely not see anything resembling a sense of ‘normalcy’ in the U.S. until the fourth quarter of 2022.*** In other words, it will not be until then that many Americans feel a general sense of relief that controls have been put in place to ensure their safety and their futures have become more predictable. We are concerned about these coronavirus variants gaining a bigger foothold, in effect creating two separate COVID-19 epidemics. These mutations could easily extend the pandemic another several years according to experts we interviewed.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

B. UNDERSTANDING THE NEW LABOR LANDSCAPE

The Big Picture: Next 5 Years

According to an October report entitled [The Future of Jobs 2020](#) published by the World Economic Forum (WEF), advances in robotics and artificial intelligence will lead to a net increase in jobs over the next five years. But the coronavirus pandemic will result in “double-disruption” scenario for workers. That is, in addition to the current employment disruption from the pandemic-induced lockdowns and economic contraction, technological adoption by companies will transform tasks, jobs and skills by 2025.

Forty-three percent of businesses surveyed indicate that they are set to *reduce their workforce* due to technology integration, 41% plan to *expand their use of contractors* for task-specialized work, and 34% plan to *expand their workforce* due to technology integration. In a stunning prediction, the WEF believes that by 2025 the time spent on current tasks at work by humans and machines will be equal. Moreover, in the next five years a significant share of companies also expects to make changes to locations, their value chains, and the size of their workforce due to factors beyond technology.

The WEF believes that the rise of machines and automation will eliminate a huge 85 million jobs by 2025 while at the same time creating 97 million new jobs, meaning *an overall addition of 12 million jobs globally*. This will require employers to achieve a significant level of “reskilling” and “upskilling” to ensure staff are sufficiently equipped for the future of work. According to the WEF, half of all employees will need some level of retraining in the next five years, a very short window that will require an intensive effort from business, government and the workers themselves. In this study 94% of business leaders report that they expect employees to pick up new skills on the job, a sharp uptake from 65% in 2018.

The WEF identifies twenty job roles increasing in demand including these fourteen tech and tech-business hybrid roles in rank order of demand:

- Data analysts and scientists
- AI and machine learning specialists
- Big data specialists
- Digital marketing and strategy specialist
- Information security analysts
- Software and applications developers
- Internet of things specialists
- Project Managers

Remote Workforce Evolution: Post-pandemic

Organizations have been leaning heavily on IT during the COVID-19 pandemic as they transform their businesses. IT is helping get products and product bundles to market faster, creating and tracking successful pricing models, taking data the company has been sitting on and turning it into new revenue streams, and utilizing collaboration tools to become co-innovators with their customers, actually developing products their customers already want to buy.

In the year ahead, attention will also turn to the post-pandemic future. Many companies will pivot from a focused pandemic response to their long-term product roadmaps, particularly with regard to apps and services. Project management, software development and engineering, and data-related proficiencies will be paramount.

The New Normal for tech workforce composition and management has inspired a lot of speculation. The WEF report predicts that employers will move as much as 44% of their workforce to operate remotely but more than three-quarters of business leaders surveyed expect current ways of working to negatively impact productivity as some industries struggle to adapt. A recent Gartner poll showed that 48% of employees will likely work remotely at least part of the time after COVID-19 versus 30% before the pandemic.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

A [survey by PwC](#) of 133 executives and 1,200 office workers in December found that employees want to return to the office more slowly than employers expect: 75% of executives in the survey anticipate at least half of the office workforce will be back on-site by July 2021, compared with 61% of office workers, who expect to return to the office for at least half of their time by this date.

Just under one in five executives want to get back on-site as soon as possible; they see the office as critical to their success and company culture. This can be a good strategy for companies (and industries) with a great employment brand, but those who already struggle to attract talent may need to mitigate risks of losing talent who want flexibility to work remotely more frequently.

Employee perceptions of their ability to be productive while remote appear to factor in their thinking about returning to the office: Employees surveyed who report decreased productivity when working remotely are more likely to envision being in the office earlier: 55% are already back in the office or say they expect to spend at least half of their time in the office by April 2021, compared with just 36% of respondents who report being more productive during the pandemic.

Executives still highly value physical offices. Most surveyed executives (68%) believe that people should be in the office at least three days a week to maintain a distinctive company culture once the pandemic is no longer a concern. Moreover, 65% believe the office is “very important” to increasing employee productivity, while over half also consider the office very important for employee collaboration, providing spaces to meet with clients and enabling the company culture.



Fig. 4

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

There is a mismatch between perceptions by management and employees towards benefits in the remote workforce. Employees who report lower productivity are more likely to cite difficulties in balancing work with home duties, in addition to challenges collaborating with colleagues or accessing information. While 81% of executives in the PwC survey say their company has been successful in extending benefits for childcare, just 45% of employees say the same. Women are less likely to say childcare measures have been a success.

To be sure, optimizing the hybrid workplace requires accelerating investments to support virtual collaboration and creativity, as well as for scheduling and safety. Also, training for managers to be able to manage virtual workforce. Over 60% of executives expect to invest more in areas that support hybrid working models, including hoteling apps (50%) and communal space in the office (48%).

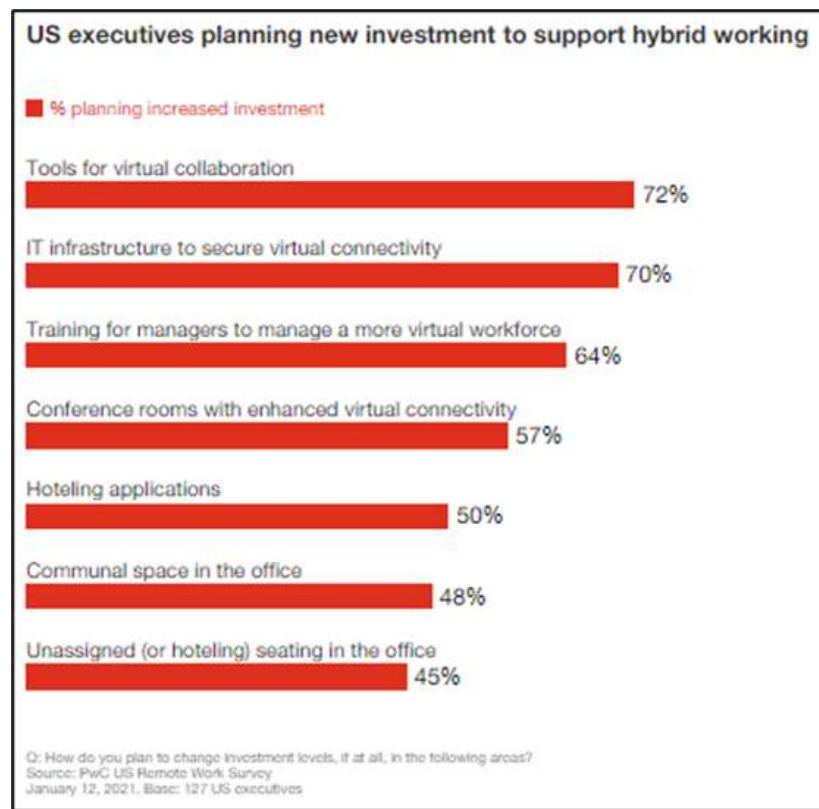


Fig. 5

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

Moreover, employers believe performance has improved in many key respects during the pandemic while work was performed remotely, especially in the areas of collaboration, new customer relationships, and employee coaching.

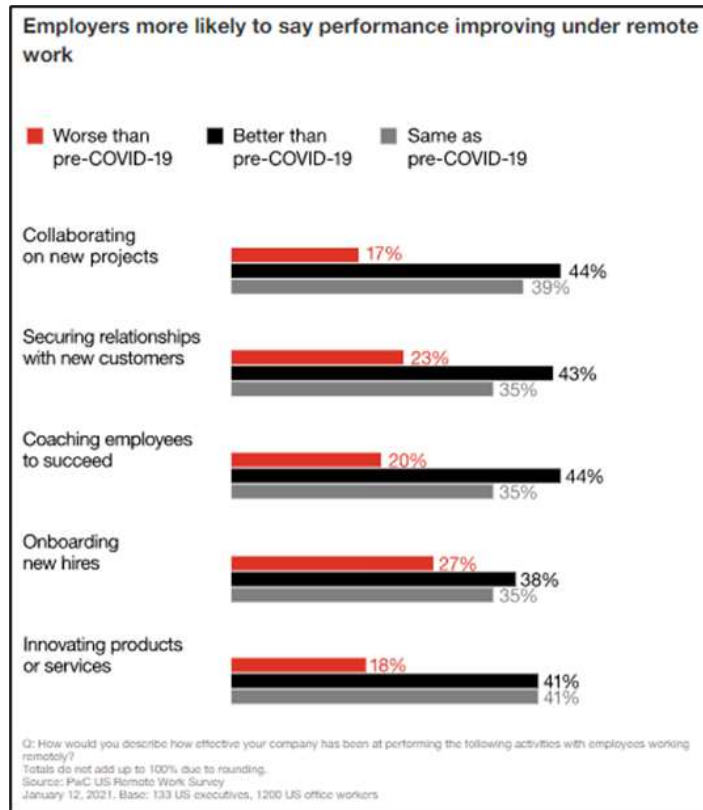


Fig. 6

Returning to the office won't be simple. The rollout of vaccines is raising confidence in returning to the hybrid office, but uncertainties remain about how to bring employees back safely, as well as how to align workforce scheduling with school reopenings or when to resume business travel. Companies should develop a strategy that helps meet their goals, while also addressing employee safety expectations and the need for increased flexibility. Employees are likely to expect to work in less densely configured spaces and to seek assurances that health checks are being made.

But employees and employers don't see eye to eye on the optimal schedule for remote work: they differ on preferred remote schedules for the workweek once the pandemic recedes. Over half of employees (55%) in the PwC survey say they'd like to be remote at least three days a week. In contrast, when asked how they feel about remote work at their company, 43% of executives prefer limited schedules or want to be fully back in the office as soon as feasible, while only 24% expect many or all office to work remotely for a significant amount of their time. As organizations shift to more permanent remote work operations, they'll need to consider whether and how to shift performance goal-setting and employee evaluations.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

Expect some friction. Employers may be in for a surprise. For example, 34% of younger respondents, aged 18 to 24, are more likely to prefer a remote schedule of one day a week or less, compared to 20% of all respondents. On the other hand, female respondents are slightly more likely to prefer three or more days of remote work than males: 58% vs. 51%. Employers will need to be prepared to set new guidelines that outline what's expected, especially for front-line managers who may require training to understand what good coaching and feedback look like in today's hybrid workplace. Over 30% of employees say coaching and onboarding new hires is worse than pre-COVID.

Employers will have to recognize that workforce needs and desires have shifted due to the pandemic. They need to understand the concerns of their employees and work with them to build policies and approaches. The return to work will be effective only when employees are on board. If they're not, companies should be prepared to lose talent remotely for a significant amount of their time. To address concerns about productivity and well-being, about one-third of all employers according to the World Economic Forum's report expect to also take steps to create a sense of community, connection and belonging among employees through digital tools, and to tackle the well-being challenges posed by the shift to remote work.

The pandemic has also increased the trend of employers playing an expanded role in their employees' financial, physical and mental well-being, or 'social safety net'. Support includes enhanced sick leave, financial assistance, adjusted hours of operation and child care provisions. Some organizations support the community by, for instance, shifting operations to manufacturing goods or providing services to help combat the pandemic and offering community relief funds and free community services.

Finally, the current economic crisis has pushed the bounds of how employers view the employee experience. Personal factors rather than external factors take precedence over what matters for organizations and employees alike. Employing such measures can be an effective way to promote physical health and improve the emotional well-being of employees.

Managing your tech workforce: Post-Pandemic

The success of remote work has reimagined how corporate work gets done, as well as where the work takes place. But it's also radically changed how critical skills are identified, acquired (or developed internally) and managed in delivering business performance. Our labor market and talent tracking data has long suggested that too many companies have unwittingly built the wrong workforce to drive their future.

Before the pandemic, employers were struggling with shifts in workforces and workforce planning. New tasks and responsibilities emerged suddenly, outdating role titles and definitions. Work trends driven by COVID-19 — such as remote work, rapid digital transformation and gig work— are all exacerbating these shifts. Even before the pandemic, there were shifts in workforces and workforce planning. New tasks and responsibilities emerged suddenly, outdating role titles and definitions. Work trends driven by COVID-19 — such as remote work, rapid digital transformation and gig work— are all exacerbating these shifts.

Almost two out of three HR executives report to us that their CEOs have prioritized that employees have the skills needed for the future. As the current disruption resets business models and objectives, the skills needed to deliver business performance are likely to change even more radically and rapidly — and the existing workforce will be even less fit for purpose.

Legacy HR talent-planning approaches have unwittingly exacerbated the problem by focusing on roles — which group unrelated skills — rather than on the skills needed to drive the organization's competitive advantage and the workflows that fuel that advantage. When tasks and responsibilities change quickly, as they do during business disruption, roles become less and less useful as a proxy for required skills.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

Differentiating skills by enterprise. The critical skills specified for tech roles at one employer can be very different than the critical skills in another. In other words, the specific skills sought for software developers at Silicon Valley social media companies can be significantly different than the average company so differentiating by enterprise---and even within the enterprise in some cases--is key. And even among social media companies in the example above, profiles for these jobs can be totally different. It's very much a product of the industry, size of enterprise, infrastructure vendors, and product and services, among other workforce differentiators.

You'll need to create a realistic and aspirational talent development and acquisition **plan** driven by data on the supply-demand profile for, and location of, critical skills. Ask what clusters of skills sets (sometimes referred to as adjacent skills) you can develop and hire for competitive advantage.

It's important to remember that you may be hiring a candidate to fill a role, but roles are essentially a bag of skills. People with the skills necessary to perform a role's duties may never have held that specific role or a position with that specific title. Certain skills are related to others in a way that might not seem obvious, but pools of skills can be expanded with skills adjacencies.

Here's [an example](#). Need someone with natural-language processing (NLP) skills? Maybe try looking for your next hire from within marketing. NLP skills are closely related to the skills required to be successful in Python, topic modeling, or machine learning. Given the proximity, it's possible that an employee proficient in machine learning, Python or TensorFlow is more likely to learn NLP quickly than someone without those related skills, making it more efficient to upskill them even if they have no prior NLP role experience.



Fig. 7

Source: Gartner

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

While these direct adjacencies offer some new opportunities to fill skills gaps within a single domain like IT, the real potential of the adjacencies approach lies in identifying and leveraging stepping-stone skills — those that bridge the gap between domains. By understanding this connection, HR leaders can look to one part of the organization to fill open positions in another, seemingly unrelated part of the organization.

Consider the NLP example. As the figure below shows, Python is directly adjacent to NLP within the IT domain, but there is also a complementary skill set in marketing: *Sentiment analysis*, the process of detecting positive or negative sentiment in text often used by businesses to detect sentiment in social data, gauge brand reputation, and understand customers. Sentiment analysis bridges two discrete collections of skills, and provides a stepping stone from marketing skills to IT skills. Specifically, a marketing employee with social listening skills is more likely to be familiar with, and ideally suited for, upskilling into sentiment analysis. From there, it's a more direct progression to NLP skilling.

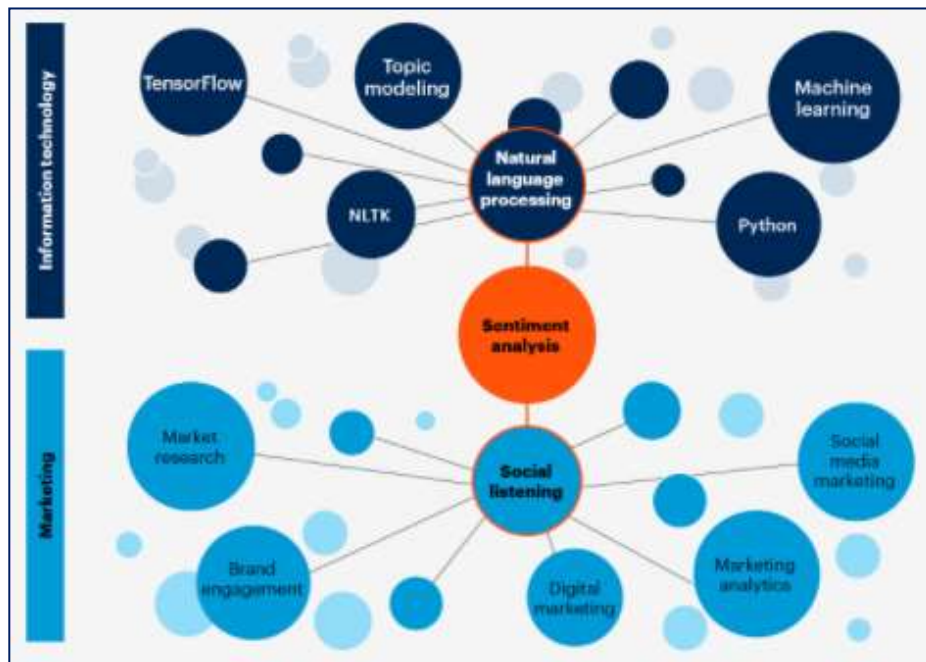


Fig. 8

Source: Gartner

By exploiting this adjacency, HR can expand its pool for upskilling and recruiting to target marketers for NLP roles, instead of looking only in the more competitive IT domain.

The reality is that the pace of change has overwhelmed employees. A majority we survey say they haven't yet mastered the skills they need for the job they have today while about one in five says they have the skills they need for both their current roles and future careers.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

Contingent worker expansion. The economic uncertainty of the pandemic has caused many workers to lose their jobs and exposed others for the first time to nonstandard work models. Many organizations responded to the pandemic's economic impact by reducing their contractor budgets, but there has since been a shift. Recent analysis shows that organizations will continue to expand their use of contingent workers to maintain more flexibility in workforce management post-COVID-19, and will consider introducing other job models they have seen during the pandemic, such as talent sharing and 80% pay for 80% work.

Our research finds that about one-third of organizations are replacing full-time employees with contingent workers as a cost-saving measure. Interestingly, in some cases employers are bringing back laid off employees as contingent workers but not at the same pay. As employers they increasingly automate work, these returning workers are assigned with automating aspects of their former jobs, in effect becoming 'digital coworkers' (powered by AI, robotics and IPA) and furthering human-machine collaborations. This can be a win-win for employer/employee for a variety of reasons: not only are the returning workers employed and once again covered by an employer health care plan but they have an inside track in applying to new internal job opportunities. IDC forecasts that by 2022, 45% of repetitive work tasks in large enterprises will be automated and/or augmented by using digital coworkers.

While gig workers offer employers greater workforce management flexibility, HR leaders will need to evaluate how performance management systems apply to these workers and determine whether they will be eligible for the same benefits as their full-time peers.

The Focus is on Skills Not Jobs

Before COVID-19, critical roles were viewed as jobs with critical skills, or the capabilities an organization needed to meet its strategic goals. During the height of the coronavirus pandemic, it has become clear that taking a fresh look at employees through a skills lens (rather than a job lens) is the key to business survival. Skills-based talent models enable greater adaptability and help companies deliver on their goals as they seek to build more flexibility into their business models. Skills are the means by which companies could move talent rapidly to the most pressing needs and stay relevant.

To build the workforce you'll need post-pandemic, focus less on roles than on the skills needed to drive the organization's competitive advantage and the workflows that fuel that advantage. Encourage employees to develop critical skills that potentially open up multiple opportunities for their career development, rather than preparing for a specific next role. Offer greater career development support to employees in critical roles who lack critical skills.

Even prior to the pandemic, some companies were coalescing their thinking around the power of skills and reskilling. But adopting a skills-based talent model has been difficult to implement, requiring [architectural thinking](#). In part, HR operating in silos has resulted in piecemeal initiatives — concentrating on talent acquisition, learning and, more recently, pay-for-skills.

Without integration and reinforcement across HR process areas, the weight of maintaining skills data and repeatedly having to advocate nonconnected people programs has led to many programs growing outdated. So right now, it's smart to add a layer to 'post-COVID' work that focuses on expanding the segmentation of 'workers' beyond full-time, contractor and open source to include essential workers, in-office staff and work-from-anywhere employees. This increased bifurcation requires more sophisticated workplace planning tools that look at employee segments from a multidimensional lens.

Still, employers are realizing that there is another category of critical roles — roles that are critical to the success of essential workflows. In 2019 we found that 55% of organizational redesigns were focused on streamlining roles, supply chains and workflows to increase efficiency. While this approach captured efficiencies, it also created fragilities, as systems have no flexibility to respond to disruptions. Resilient organizations were better able to respond — correct course quickly with change.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

Advice to HR Leaders in 2021

A recent survey of more than 800 HR leaders shows that although many expect their organizations to focus on growth in 2021, cost optimization features more widely than it did previously — and improving operational excellence remains paramount. To support these and other business priorities, 68% of HR leaders say they will be building critical skills and competencies, an objective that has topped the priorities of HR leaders for three consecutive years.

As organizations move from their initial pandemic response to more sustainable operations, they're trying to build resilience into everything, from strategy to work design, so as to enable the organization, its leadership and employees to sense and respond to change, repeatedly.

Among top priorities for HR leadership is *building critical skills and competencies*. One-third of HR leaders agree the major challenges include their lack of visibility and understanding of current skill gaps and being unable to integrate learning effectively into employee workflows. Traditional ways of predicting needs and upskilling the tech workforce aren't working in today's highly changeable conditions, where employees need more skills for every job and many of those skills are new. Our data shows that the total number of skills required for a single job is increasing by 10% year over year, and one-third of the skills present in an average 2017 job posting won't be needed by 2021.

Furthermore, many employees aren't learning the right new skills — for their personal development or the benefit of the organization. Research shows that HR leaders need to adopt a *dynamic approach* to reskilling and redeploying talent, one in which all impacted stakeholders work together to sense shifting skill needs and find ways to develop skills as those new needs arise. Currently, only 21% of HR leaders say peers share accountability or partner with HR to determine future tech skill needs. Our research shows that when using this type of dynamic approach to reskilling, employees apply 75% of the new skills they learn — far more than with other approaches — and learning begins sooner, as needs are identified faster.

Organizational design and change management are the top priority for 46% of HR leaders. And it is key to driving many enterprise business goals, including cost optimization (which aligns costs and resources to business priorities). Many organizations have experienced, in trying to respond at speed to the effects of the pandemic, that their years-long focus on efficiency has actually left them with rigid structures, workflows, role design and networks that don't meet today's needs or flex with fast-changing conditions.

Work friction weighs down employees. Research shows that only 19% of HR leaders report that their workforce can effectively change direction based on changing needs or priorities. Less than 40% believe employees can effectively detect when they are working on the right things for customers.

This work friction adds to the burden of incessant everyday change that is driving widespread change fatigue. That fatigue means employees are unable to process change at a time when organizations most need them to be responsive and adaptable.

What is keeping employees from adapting to change? Our research indicates outdated work design is the cause. Future-forward work design is what's needed to ensure employees can be responsive — that is, in sync with customer needs, in a position to anticipate changes in those needs, and with the ability to adapt their approach and activities accordingly.

Unlocking employee responsiveness. HR leaders can help prevent change fatigue, and address the specific factors that contribute to work friction. Rethinking work design strategies can help to unlock responsiveness at scale across the workforce and build organizational resilience.

TECH LABOR TRENDS DISCUSSION & ANALYSIS – cont'd.

Tactics include realigning work design to the way work really happens and resetting rigid permissions and signoff processes and hurdles so they don't unnecessarily impede innovation and action.

This type of shift from designing for efficiency to designing for flexibility is expected, according to 52% of HR leaders, to have a significant impact on their organizations into 2021. Only 8% say they expected no impact from this evolution.

Q4 2020 Data Trend Charts

2021 IT Skills & Certifications Volatility Index™

(Data collected through January 1, 2021)

Demand dynamics in benchmarked certified and non-certified IT skills pay

TRENDS HIGHLIGHTS

2021 IT Skills & Certifications Volatility Index™

Volatility in market value for individual IT skills and certifications---defined as incidence of gains or declines over a period of time in premium pay earned by IT professionals for specific technical and business skills---increased from to October 1, 2020 to January 1, 2021 according to the latest update of Foote Partners' long-running *IT Skills and Certifications Pay Index™* of market values for tech skills. Market value is measured by tracking additional cash compensation paid to workers by their employers for specific certified and non-certified skills they possess.

Current Quarterly Recap (data collected through January 1, 2021)

TOTAL: All Skills and Certifications

- 27.8% of skills and certifications (309 of 1,127) changed in market value in 4th Quarter 2020 compared to 24.2% in the prior quarter, 28.2% in the 2nd Quarter, and 28.9% in the 1st Quarter of 2020. Average volatility for the prior year 2019 measured only 21%.
- 117 gained value and 192 declined in value in the final quarter of 2020.

CERTIFIED SKILLS

- 14.5% of reported certifications (75 of 516) changed market value in 4th Quarter 2020, slightly lower than the 15.7% in the prior quarter and a whopping seven points lower than the 25% volatility in the first half of 2020. This amounts to a return to 2019 volatility rates which averaged 14%.
- 15 certifications gained market value; 60 declined in value

NON-CERTIFIED SKILLS

- 39.4% of reported skills (234 of 594) changed value in 4th Quarter 2020, a huge 8 points higher than the 31.4% in the prior quarter and twelve points higher than 27.1% average volatility for the prior year 2019. 98 noncertified skills gained in market value; 102 declined in value in 4Q (up from 88 in the prior quarter)

Tracking skills volatility is useful in many ways: analyzing and forecasting demand for skills; monitoring IT workforce transition; and understanding IT management decision making. In fact, we believe statistical volatility in IT skills pay offers a more complete story of true labor market conditions than salary movements and hiring behavior, among other common indicators. Important in this distinction is that skills can be segmented and benchmarked more meaningfully than jobs allowing to microanalyses.

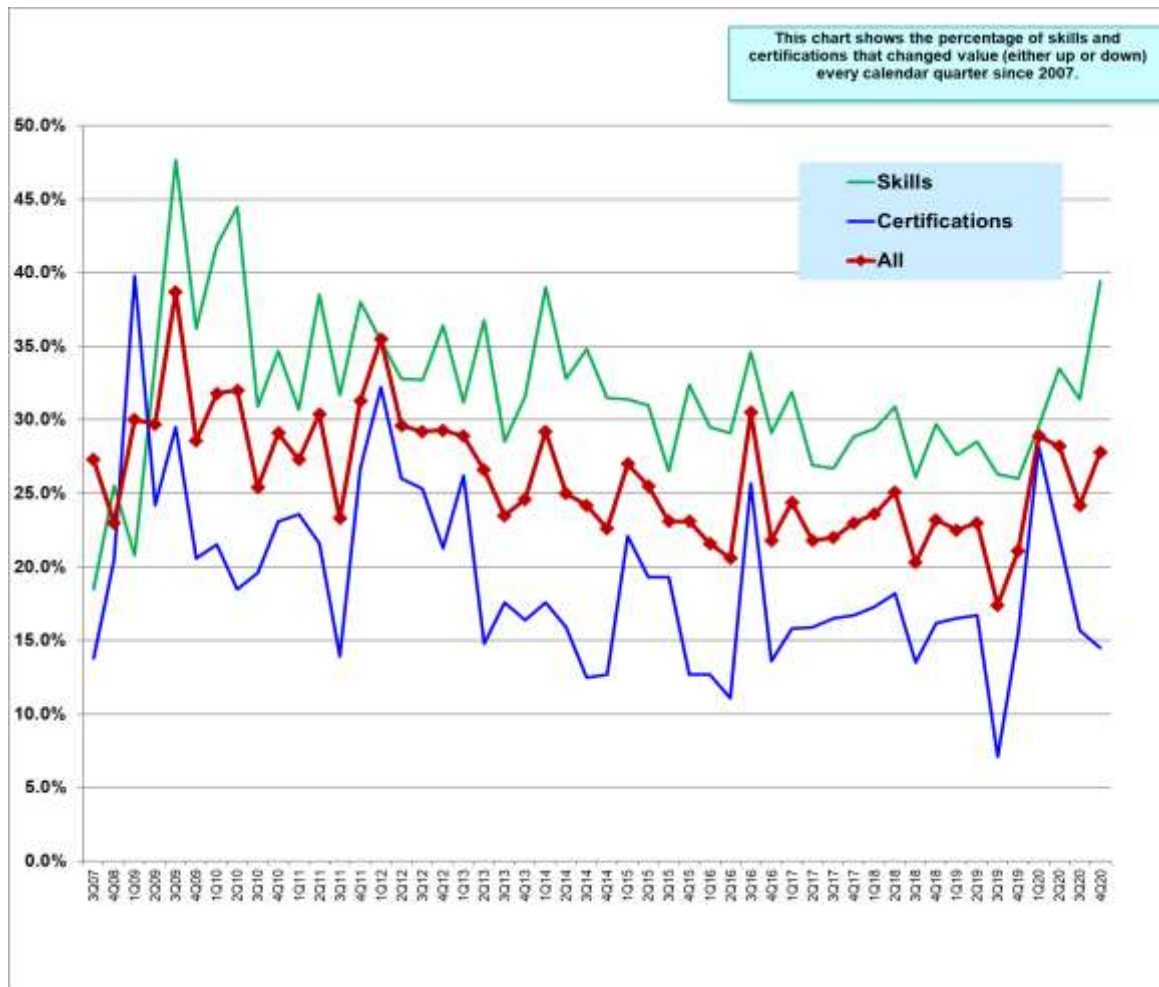
Similar to jobs, IT skills have broad skills categories that can be tracked (e.g., security, networking, systems, database, applications development). But unlike jobs, skills pay can be pinpointed to hundreds of niches and specialization. Also, unlike most job trends analyses, within skills categories and niches are vendor-specific and vendor independent skill specializations for more granular tracking, analysis, and forecasting.

Skills and certifications volatility prior to 2008 averaged in the 14% - 19% range. Quarterly volatility in the last two years has been in the 20% to 31% range. This is an important shift that we believe signals a move that employers are taking a more long-term view to building their tech workforces for emerging technologies such as Blockchain, AI/Machine learning, and a variety of digital solutions. Tech leaders right now are demanding more agility, faster reaction times, and more predictable execution; this is keeping volatility high as skills markets constantly adjust to meet surges in demand for specific certified and non-certified skills.

They will be able to achieve those capabilities through applying architecture principles and practices to people management. We discuss this in greater detail earlier in this report.

VOLATILITY HIGHLIGHTS - 15 Year Trending

IT Skills and Certifications Volatility Index™ – 1,127 Skills and Certifications



Recent IT skills and certifications volatility trends

QUARTERLY SUMMARY

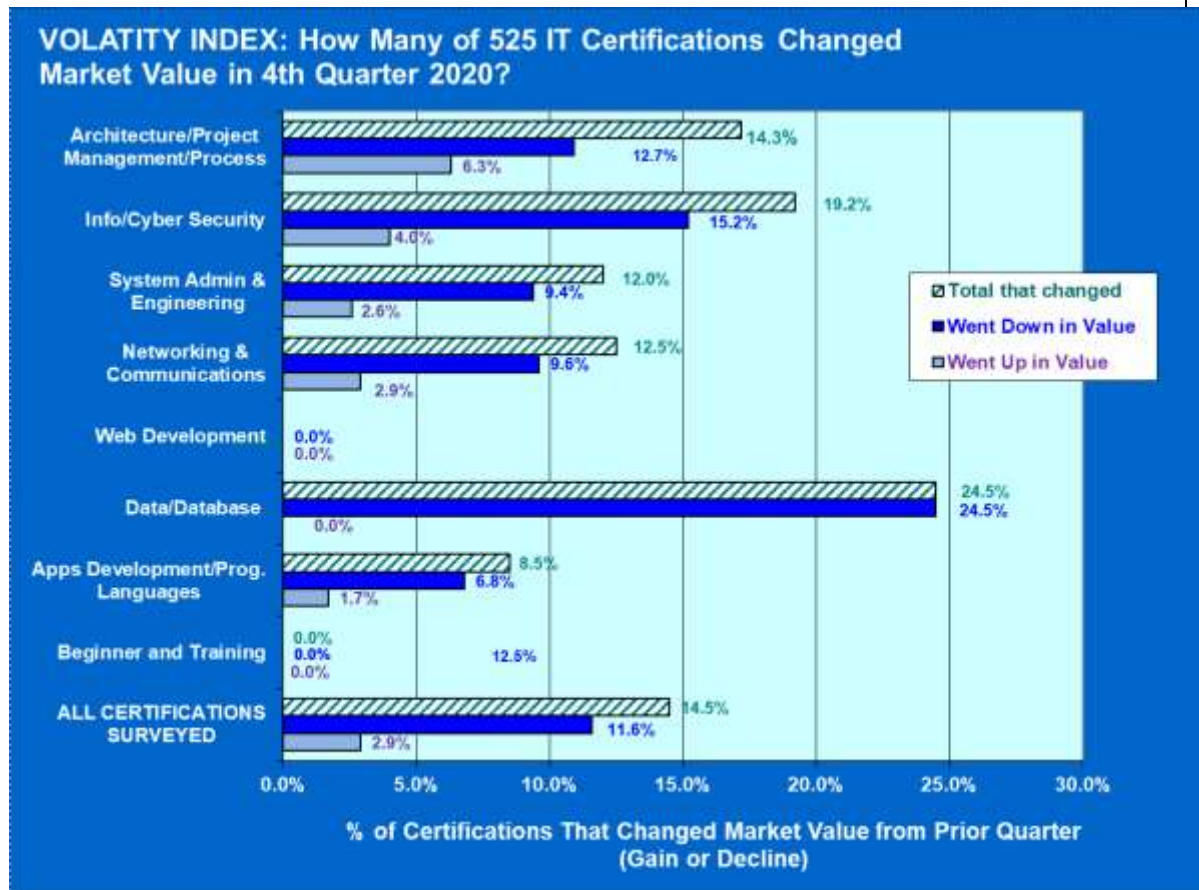
4th Quarter 2020 volatility in skills and certifications values rose for the first time since the first quarter of 2020, measuring 27.8%. That's nearly seven points higher than the same quarter one year ago.

NONCERTIFIED SKILLS VOLATILITY in 4Q 2020 (39.4%) recorded the most volatility in a single quarter since early 2014, rising eight points from the prior calendar quarter.

IT CERTIFICATIONS VOLATILITY in 4Q 2020 dropped to 14.5% from 15.7% in the prior quarter. This is significantly lower than 25% average for the first half of 2020.

(Pay data supporting these charts available in the [IT Skills and Certifications Pay Index™](#) – 2007 to 2020 quarterly data edition)

VOLATILITY HIGHLIGHTS IT Certifications – 4th Quarter 2020 data



(Source: Foote Partners LLC, [2021 IT Skills & Certifications Pay Index™](#))

IT Skills and Certifications Volatility Index™ 4Q 2020 data edition findings: IT Certifications

IT Certifications Volatility Highlights

Among all 525 certifications surveyed, **highest volatility (>15%)** occurred in these segments (ranked highest to lowest):

- Data/Database
- Info/Cybersecurity
- Architecture/Project Mgt/Process

Within segments, notable upward volatility (value **gains**) occurred most in these:

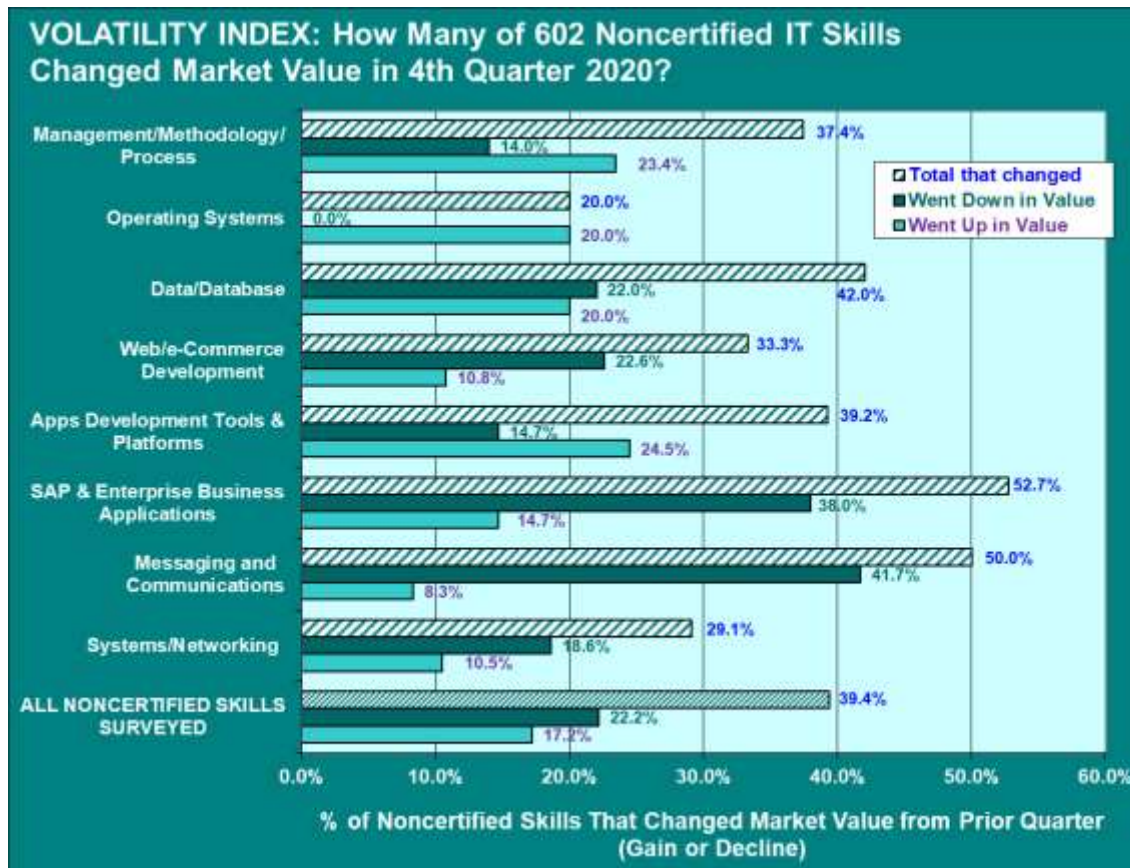
- No certification category exceeded 7% quarterly growth. Most growth occurred in Applications Development and Info/Cybersecurity segments.

Within segments, notable downward volatility (value **declines**) occurred most in these (ranked):

- Info/Cybersecurity
- Data/Database

(Pay data supporting these charts available in the [IT Skills and Certifications Pay Index™](#) – 2007 to 2020 quarterly data edition)

VOLATILITY HIGHLIGHTS Non-certified IT Skills – 4th Quarter 2020 data



(Source: Foote Partners LLC, [2021 IT Skills & Certifications Pay Index™](#))

IT Skills and Certifications Volatility Index™ 4Q 2020 data edition findings: Non-certified IT Skills

Noncertified IT Skill Pay Volatility Highlights

Among all 602 noncertified IT skills surveyed, **high volatility (>20%)** occurred in all but one segments (ranked highest to lowest):

- SAP & Enterprise Business Apps
- Messaging and Communications
- Data/Database
- Applications Development Tools & Platforms
- Management/Methodology/Process
- Web/E-commerce Development
- Systems/Networking

Within segments, notable upward volatility (value **gains**) occurred most in these (ranked):

- Applications Development Tools & Platforms
- Management/Methodology/Process
- Data/Database
- Operating Systems

Within segments, notable downward volatility (value **declines**) occurred most in these (ranked):

- Messaging and Communications
- SAP & Enterprise Business Apps
- Web/E-commerce Development
- Data/Database

(Pay data supporting these charts available in the [IT Skills and Certifications Pay Index™](#) – 2007 to 2020 quarterly data edition)

2021 IT Skills and Certifications Pay Index™ (4th Quarter Data edition)

- Pay premiums for **1,127 certified and noncertified IT skills**
 - Three data points for each position: 10th, 50th, 90th percentile
- Verified and validated IT skills pay data from **82,273 IT professionals at 3,700 employers** in US and Canada
- Current data collected through January 1, 2021 (updated quarterly)
- Excel format data tables. Master agreements for data loading in place with MarketPay, CompAnalyst, WillisTowersWatson.
- Certifications Guide containing basic information about surveyed IT certifications (pre-requisites; costs; test content; lab requirements, etc.)

Pricing: \$5,800 single edition. \$19,800 annual subscription

Definition of IT skills premium pay

- Pay that IT workers receive for possessing high-value IT and business skills used on the job
- Given in the form of a bonus, or embedded in base salary to adjust for the presence of a dominant vendor or technology central to job performance (examples: Cisco Network Engineer, Python Software Engineer, Redhat Linux Systems Administrator, or SAP Developer.)
- Often used to adjust either base pay or total pay in situations where job title does not match actual on-the-job duties and responsibilities, and changing the job title is not an attractive option
- May be used as a reward, recruiting inducement, retention tool, or as a guide for creating consulting rate cards

ABOUT THIS RESEARCH

Foote Partners' primary research survey for tracking IT skills and certifications pay and supply/demand volatility is the industry-leading ***IT Skills and Certifications Pay Index™ (ITSCPI)***, launched in 1999 and updated every three months since that time. Data covering 335,785 tech professionals at 3,700 employers in 83 U.S. and Canada cities are reported for IT salaries and skills pay earned for 250 positions and 1,127 certified and noncertified technical and business skills. Verified and validated pay data for 82,273 tech workers has been included in the 4th Quarter 2020 data edition of the ITSCPI, compiled from data collected through January 1, 2021.

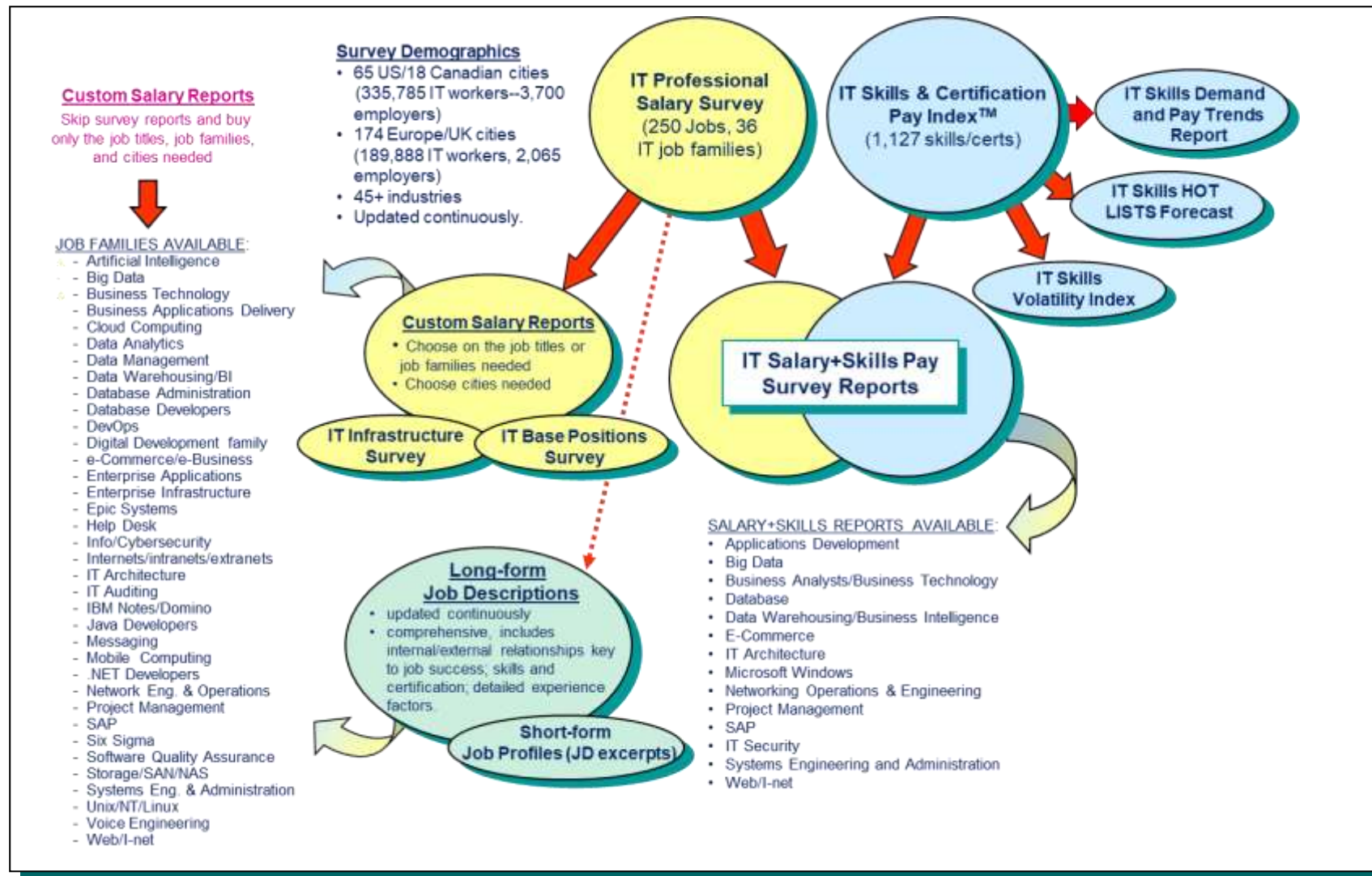
Demographics of the participating organizations for our latest update are as follows, measured most appropriately for the type of business, by revenues, assets, total premiums and operating budgets:

- 18% of participating organizations have \$5 billion+ in sales/\$15+ billion in total assets
- 28% of participating organizations earn more than \$1 billion in annual revenues or more than \$5 billion in total assets
- 46% of participating organizations have \$500+ million in sales/\$1+ billion in total assets/\$500+ million in premiums/\$500+ million operating budget (government, educational, not-for-profit)
- 54% of participating organizations fall in the SMB (small-to-medium sized business) segment, generally defined as organization under \$500 million in sales.
- [Public sector] 5% have operating budgets of \$500 million or more, [nonprofit/educational sectors] 4% with operating budgets \$100 million to less than \$500 million

TO OBTAIN A COPY OF THE LATEST ***IT Skills and Certifications Pay Index™***

Please visit the Foote Partners web site: [IT Skills and Certifications Pay Index](https://www.footepartners.com/ITSCPI)

Foote Partners 1Q 2021 IT Compensation Survey Product Map



ABOUT FOOTE PARTNERS

Foote Partners, LLC is a technology analyst firm and independent benchmark research organization focusing on the people (versus vendor) side of managing technology and technology value creation. A thought leader and trusted advisor to thousands of employers on five continents who purchase our products and services, our company provides pragmatic benchmark research and forward-thinking advice and market intelligence targeting the tech workforce in the modern highly integrated business/IT hybrid environment in which all private and public organizations now operate.

Our products are deeply grounded in specialized proprietary data-driven statistical and empirical research, benchmark surveys, and business intelligence collected from thousands of North American employers with whom we have deep longstanding research partnerships. These partnerships have been created and supported specifically to enable unique market intelligence views and difficult-to-find decision support research on the multiple facets of IT human capital management. As a group, these U.S., Canadian, and European partners were selected to meet strict criteria for what we believe is the most meaningful demographic representation for tech professionals in each local labor markets.

Founded in 1997 and comprised of former Gartner industry analysts, McKinsey & Company, Mercer and WillisTowersWatson senior consultants, and former corporate HR, IT, and business executives, the firm's research division publishes 70+ quarterly-updated benchmarking, analytical research and forecasting products that help employers benchmark their IT compensation, solve difficult information technology management and workforce problems, and strengthen their ability to execute complex business solutions.

Foote Partners tech compensation survey findings and labor market trend analyses are featured regularly in countless business, HR, and IT media sources and periodicals around the globe, including *Bloomberg BusinessWeek*, *Forbes*, *Fortune*, *Wall Street Journal*, *New York Times*, *CIO Magazine*, *ComputerWorld*, and *WorldatWork's Journal* and *Workspan Magazine*; and in appearances on network and cable television, National Public Radio, and countless podcasts and webcasts.

Headquarters:

4445 North A1A, Suite 200
Vero Beach, FL 32963
Tel: 772-234-2787
www.footepartners.com
Twitter: [@FPview](https://twitter.com/FPview)
Blog: [Tech People Architecture](#)