FOR IMMEDIATE RELEASE

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

NOTE: This news release is a summary extract of content in the January 2019 update of Foote Partners’ Tech Skills Demand and Pay Trends Report, a market intelligence trend report updated every 3 months from data contributed by 3,305 U.S. and Canadian employers. It contains tech jobs and skills compensation published in the firm’s IT Professional Salary Survey and IT Skills and Certifications Pay Index™ and deep-dive supply/demand benchmark research from Foote Partners field interviews.

Average market value for 551 non-certified tech skills gained in overall value from October to December reversing recent losses, while 466 tech certifications declined for a second consecutive calendar quarterly.

Why are tech certification cash market values at their lowest in four years?

Vero Beach, FL – January 20, 2019 - Extra pay awarded by employers to talented tech professionals for 551 non-certified tech skills ---also known as skills pay premiums and currently averaging the equivalent of 9.4 percent of base salary on average for a single non-certified skill---increased nearly 2 percent overall in the fourth quarter of 2018. Conversely, average market values for 466 tech certifications decreased, down nearly 2 percent overall, currently earning the equivalent of 7.5 percent of base salary on average for a single certification.

This according to the latest quarterly update of Foote Partners’ IT Skills and Certifications Pay Index™ (ITSCPI) based on compensation data provided by 3,305 private and public-sector employers in 83 U.S. and Canadian cities who partner with the firm to report pay for their 298,440 IT 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 1,017 certifications and non-certified skills.

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

(77,977 IT professionals, data through 1/1/2019)

![Figure 1](image-url)

SUMMARY: Quarterly and Annual Results – Through January 1, 2019

A. TECH SKILLS AND CERTIFICATIONS PAY PERFORMANCE: BY CATEGORY

NON-CERTIFIED TECH SKILLS

Cash pay premiums for 551 non-certified skills increased overall in October/November/December, gaining an average of 0.6 percent in market value. Pay performance in the final quarter of 2018 was higher for four non-certified tech skills categories reported: Database; Applications Development; Management/Methodology/Process; and Systems/Networking skills.

For calendar year 2018 pay was higher across all skills reported overall, led by annual increases in three non-certified skills categories: Database, Applications Development, and Operating Systems skills.

Noncertified Tech Skills - % Growth/Decline
3 months & 12 months
(551 skills, data through 1/1/2019)

Figure 2

Source: Foote Partners, IT Skills & Certifications Pay Index™, 4th Quarter 2018 data
NONCERTIFIED TECH SKILLS TREND HIGHLIGHTS: Largest Market Value Gainers That are Also Highest Paying

These noncertified tech skills **gained 10% or more in market value** in the three months ending January 1, 2019 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**. They are averaging pay in a range 15% to 17% equivalent of base salary.

<table>
<thead>
<tr>
<th>TECH SKILLS (noncertified)</th>
<th>Highest Paying – Cash Premiums(A-Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applications Development skills</strong></td>
<td>Amazon Kinesis</td>
</tr>
<tr>
<td>Amazon Kinesis</td>
<td>- Amazon Kinesis</td>
</tr>
<tr>
<td>Boost C++</td>
<td>- Amazon RedShift</td>
</tr>
<tr>
<td>Git/GitHub</td>
<td>- Apache Hive</td>
</tr>
<tr>
<td>F#</td>
<td>- Apache Pig</td>
</tr>
<tr>
<td>JBehave</td>
<td>- Apache Spark</td>
</tr>
<tr>
<td>Apache Flex</td>
<td>- Artificial Intelligence</td>
</tr>
<tr>
<td>WebSphere MQ (MQSeries)</td>
<td>- Big Data analytics</td>
</tr>
<tr>
<td>C#</td>
<td>- Blockchain</td>
</tr>
<tr>
<td>HP ALM (Application Lifecycle Management)</td>
<td>- Cloud Foundry PaaS</td>
</tr>
<tr>
<td>Apache Cordova</td>
<td>- Cloudera Impala</td>
</tr>
<tr>
<td>C++</td>
<td>- Cloudera software</td>
</tr>
<tr>
<td>Xcode</td>
<td>- Cryptography (encryption, VPN, SSL/TLS, Hybrids)</td>
</tr>
<tr>
<td>Cucumber</td>
<td>- Cybersecurity</td>
</tr>
<tr>
<td>Microsoft Azure</td>
<td>- Data Architecture</td>
</tr>
<tr>
<td>Ruby on Rails</td>
<td>- Data Science</td>
</tr>
<tr>
<td>ServiceNow ITSM</td>
<td>- Data Visualization</td>
</tr>
<tr>
<td>Transact-SQL/SQLt</td>
<td>- DevOps</td>
</tr>
<tr>
<td><strong>Database Skills</strong></td>
<td>- Ethereum</td>
</tr>
<tr>
<td>Teradata</td>
<td>- Hbase</td>
</tr>
<tr>
<td>MongoDB</td>
<td>- IT Governance</td>
</tr>
<tr>
<td>Informatica</td>
<td>- Machine Learning</td>
</tr>
<tr>
<td>Microsoft Exchange Server 2007/2010/2013</td>
<td>- MapReduce</td>
</tr>
<tr>
<td>Oracle Forms</td>
<td>- Master data management</td>
</tr>
<tr>
<td><strong>Management, Process &amp; Methodology skills</strong></td>
<td>- Metadata design and development</td>
</tr>
<tr>
<td>Data Visualization</td>
<td>- Microservices</td>
</tr>
<tr>
<td>Marketo</td>
<td>- Objective Caml (Ocaml)</td>
</tr>
<tr>
<td>TIBCO ActiveMatrix BusinessWorks</td>
<td>- Predictive Analytics and Modeling</td>
</tr>
<tr>
<td>Big Data analytics</td>
<td>- Quality management/TQM</td>
</tr>
<tr>
<td>E-Procurement</td>
<td>- Quantitative Analysis/Regression Analysis</td>
</tr>
<tr>
<td>Quality management/TQM</td>
<td>- Risk analytics/assessment</td>
</tr>
<tr>
<td>Quantitative Analysis/Regression Analysis</td>
<td>- Scala</td>
</tr>
<tr>
<td><strong>Messaging &amp; Communications skills</strong></td>
<td>- Security architecture and models</td>
</tr>
<tr>
<td>Unified communications/messaging</td>
<td>- Security skills (DW/BI, ERP, Web, project assignments)</td>
</tr>
<tr>
<td><strong>Operating Systems/Systems Software Skills</strong></td>
<td>- Smart Contract</td>
</tr>
<tr>
<td>Windows Server 2012/2008</td>
<td>- Splunk</td>
</tr>
<tr>
<td><strong>Systems/Networking skills</strong></td>
<td>- Sqoop</td>
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<tr>
<td>Storage virtualization/administration</td>
<td>- Sqoop</td>
</tr>
<tr>
<td>Rackspace Cloud</td>
<td>- Splunk</td>
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<tr>
<td>Wireless sensors/RFID</td>
<td>- Splunk</td>
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<tr>
<td>Cisco CUCM</td>
<td>- Splunk</td>
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<tr>
<td>Cisco UCCE</td>
<td>- Splunk</td>
</tr>
<tr>
<td>Cisco UCX</td>
<td>- Splunk</td>
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<tr>
<td>RedHat OpenShift</td>
<td>- Splunk</td>
</tr>
<tr>
<td>Intrusion prevention/detection systems</td>
<td>- Splunk</td>
</tr>
<tr>
<td>Arista</td>
<td>- Splunk</td>
</tr>
<tr>
<td><strong>SAP/ERP skills</strong></td>
<td>- Splunk</td>
</tr>
<tr>
<td>SAP PLM (Product Lifecycle Management)</td>
<td>- Bluemix</td>
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<tr>
<td>SAP BOXI (Business Objects XI)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP Business Workflow/Webflow</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Peoplesoft (CRM/Financials/HCM)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP Hybris</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Pega</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP CO-PA (Profitability Analysis)</td>
<td>- Bluemix</td>
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<tr>
<td>SAP FS (Insurance)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP Smart Forms</td>
<td>- Bluemix</td>
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<tr>
<td>SAP WM (Warehouse Management)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP Basis Components</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP Security</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>SAP EHS (Environment, Health &amp; Safety)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Enterprise Application Integration (EAI)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td><strong>Web/SOA/E-Commerce skills</strong></td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Apache Wicket</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Oracle WebLogic</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Google Analytics</td>
<td>- Bluemix</td>
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<tr>
<td>KnockoutJS</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Ajax (Asynchronous JavaScript and XML)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Microsoft Internet Security and Acceleration Server (ISA)</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Microsoft SharePoint/Sharepoint Server</td>
<td>- Bluemix</td>
</tr>
<tr>
<td>Google Cloud Platform</td>
<td>- Bluemix</td>
</tr>
</tbody>
</table>

Source: Foote Partners IT Skills & Certifications Pay Index™, 4th Quarter 2018 data
NONCERTIFIED TECH SKILLS TREND HIGHLIGHTS: Market Value Losers

These noncertified IT skills *declined 10% or more in market value* in the three months ending January 1, 2019 (grouped by segment). Listed in *descending order of amount of % decline*, including ties.

<table>
<thead>
<tr>
<th>TECH SKILLS (Noncertified) Lossers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applications Development skills</strong></td>
</tr>
<tr>
<td>Oracle Applications Developer Framework</td>
</tr>
<tr>
<td>Gosu/Guidewire</td>
</tr>
<tr>
<td>Cerner Millennium</td>
</tr>
<tr>
<td>iRise</td>
</tr>
<tr>
<td>Apache Cloudstack</td>
</tr>
<tr>
<td>NetWeaver</td>
</tr>
<tr>
<td><strong>Web/E-commerce Development skills</strong></td>
</tr>
<tr>
<td>Documentum</td>
</tr>
<tr>
<td>Microsoft Commerce Server</td>
</tr>
<tr>
<td>JavaFX</td>
</tr>
<tr>
<td>UDDI (Universal Description, Discovery and Integration)</td>
</tr>
<tr>
<td>Microsoft Silverlight</td>
</tr>
<tr>
<td>Sitecore CMS</td>
</tr>
<tr>
<td>WSDL (Web Services Description Language)</td>
</tr>
<tr>
<td>Oracle WorkFlow</td>
</tr>
<tr>
<td>WebSphere Datapower</td>
</tr>
<tr>
<td>Apache Solr</td>
</tr>
<tr>
<td><strong>Management, Process &amp; Methodology</strong></td>
</tr>
<tr>
<td>COBIT</td>
</tr>
<tr>
<td><strong>Messaging &amp; Communications skills</strong></td>
</tr>
<tr>
<td>Oracle Communications Messaging Server</td>
</tr>
<tr>
<td>Apache Kafka</td>
</tr>
</tbody>
</table>

| **SAP & Enterprise Business Applications skills** |
| SAP MII (Manufacturing Integration and Intelligence) |
| SAP BSP (Business Server Pages) |
| SAP PSCD (Collection and Disbursement) |
| SAP BusinessObjects Dashboards (Xcelsius) |
| SAP IS-U (Utilities) |
| SAP NWDS (NetWeaver Studio) |
| Workday HCM |
| SAP F1 - CA (Contract Accounting) |
| Web Dynapro |
| SAP MRS (Multi Resource Scheduling) |
| SAP BODI (Business Objects Data Integrator) |
| SAP NetWeaver Visual Composer |
| NetWeaver Portal (SAP EP) |
| SAP MDM (Master Data Management) |
| Oracle CRM (Customer Relationship Management) |
| SAP HCM (SAP HR) |
| SAP Data Services (SAP BODS) |
| Oracle Retail |
| SAP Lumira |
| Microsoft Dynamics/Dynamics 365 |
| Oracle Financials |
| Oracle HFM (Hyperion Financial Management) |
| Oracle HRMS |
| Oracle Payroll |
| SAP SRM (Supplier Relationship Management) |
| SAP Exchange Infrastructure (XI) |
| SAP MDM (Master Data Governance) |
| SAP F1 - FSCM (Financial Supply Chain Management) |

| **Systems/Networking skills** |
| Security Information and Event Management (SIEM) |
| HP Converged System |
| Citrix XenServer |
| Tivoli |
| IaaS (Infrastructure as a Service) |
| Cisco ISE (Identity Services Engine) |

Source: Foote Partners IT Skills & Certifications Pay Index™, 4th Quarter 2018 data
SUMMARY – cont’d.

TECH CERTIFICATIONS

Cash pay for tech certifications is currently at a four-year low. In October/November/December 466 tech certifications lost even more value, losing an average of 1.8 percent in the quarter. Pay performance in the final quarter of 2018 was lower for four certification segments: Architecture/Project Management/Process; Info/Cyber Security; Networking & Communications; Applications Development/Programming Languages.

Despite significant losses in the second half of 2018, for the entire year pay was higher in four of eight tech certifications categories: Web Development; Foundation level and Training; Database; Networking & Communications.

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

(466 certifications, data through 1/1/2019)

Figure 3

Source: Foote Partners IT Skills & Certifications Pay Index™, 4th Quarter 2018 data
**TECH CERTIFICATION PAY TREND HIGHLIGHTS:** Largest Market Value Gainers That are Also Highest Paying

These tech certifications *gained 10% or more in market value* in the three months ending January 1, 2019 (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*. They are averaging pay in a range 13% to 17% equivalent of base salary.

<table>
<thead>
<tr>
<th>TECH CERTIFICATION Gainers</th>
<th>Highest Paying – Cash Premiums (A – Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application Development/Programming Languages</strong></td>
<td>- Certified Cyber Forensics Professional</td>
</tr>
<tr>
<td>Oracle Certified Professional - PL/SQL Developer</td>
<td>- Certified Forensic Computer Examiner (CFCE)</td>
</tr>
<tr>
<td>AWS Certified DevOps Engineer - Professional</td>
<td>- Certified in Risk and Information Systems Control (CRISC)</td>
</tr>
<tr>
<td><strong>Info/Cyber Security certifications</strong></td>
<td>- Certified in the Governance of Enterprise IT (CGEIT)</td>
</tr>
<tr>
<td>InfoSys Security Engineering Professional (ISSEP/ CISSP)</td>
<td>- Certified Information Systems Auditor (CISA)</td>
</tr>
<tr>
<td>GIAC Certified Windows Security Administrator (GCWN)</td>
<td>- Certified ScrumMaster</td>
</tr>
<tr>
<td>Certified Forensic Computer Examiner (CFCE)</td>
<td>- Check Point Certified Security Master (CCSM)</td>
</tr>
<tr>
<td>InfoSys Security Management Professional (ISSMP/ CISSP)</td>
<td>- Cisco Certified Architect</td>
</tr>
<tr>
<td>CompTIA Advanced Security Practitioner (CASP)</td>
<td>- CyberSecurity Forensic Analyst (CSFA)</td>
</tr>
<tr>
<td><strong>Database certifications</strong></td>
<td>- GIAC Security Expert (GSE)</td>
</tr>
<tr>
<td>Oracle Certified Associate - DBA (OCA)</td>
<td>- GIAC Web Application Penetration Tester (GWAPT)</td>
</tr>
<tr>
<td><strong>Web Development</strong></td>
<td>- ITIL Master</td>
</tr>
<tr>
<td>Microsoft Certified Solutions Associate: Web Applications</td>
<td>- PMI Portfolio Management Professional (PMP)</td>
</tr>
<tr>
<td><strong>Networking and Communications certifications</strong></td>
<td>- PMI Professional in Business Analysis (PMI-PBA)</td>
</tr>
<tr>
<td>CWNP/Certified Wireless Network Expert (CWNE)</td>
<td>- PMI Program Management Professional (PgMP)</td>
</tr>
<tr>
<td>AWS Certified Solutions Architect - Professional (Cloud)</td>
<td>- PMI Risk Management Professional (PMI-RMP)</td>
</tr>
<tr>
<td><strong>Systems Administration certifications</strong></td>
<td>- Six Sigma Master Black Belt</td>
</tr>
<tr>
<td>Microsoft Certified Solutions Associate(all)</td>
<td>- Six Sigma Yellow Belt</td>
</tr>
<tr>
<td>HP Accredited Solutions Expert (ASE - all)</td>
<td>- Check Point Certified Security Master (CCSM)</td>
</tr>
<tr>
<td>HP Master Accredited Solutions Expert (MASE - all)</td>
<td>- Cisco Certified Architect</td>
</tr>
<tr>
<td><strong>Architecture, Project Management and Process certifications</strong></td>
<td>- CyberSecurity Forensic Analyst (CSFA)</td>
</tr>
<tr>
<td>PMI Program Management Professional (PgMP)</td>
<td>- GIAC Security Expert (GSE)</td>
</tr>
<tr>
<td>Six Sigma Yellow Belt</td>
<td>- GIAC Web Application Penetration Tester (GWAPT)</td>
</tr>
</tbody>
</table>

Source: Foote Partners *IT Skills & Certifications Pay Index™*, 4th Quarter 2018 data

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TECH CERTIFICATION PAY TREND HIGHLIGHTS: Market Value Losers

These tech IT certifications *declined 10% or more in market value* in the three months ending January 1, 2019 vs. prior quarter (grouped by segment).

Listed in *descending order of amount of % decline*, including ties.

### TECH CERTIFICATIONS Losers

<table>
<thead>
<tr>
<th>Application Development/Programming Languages</th>
<th>Networking &amp; Communication certifications</th>
<th>Info/Cyber Security certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Certified Base Programmer for SAS 9</td>
<td>CWNP/Certified Wireless Network Administrator</td>
<td>GIAC Systems and Network Auditor (GSNA)</td>
</tr>
<tr>
<td>SAS Certified Advanced Programmer for SAS 9</td>
<td>CWNP/Certified Wireless Design Professional</td>
<td>GIAC Certified Forensics Analyst (GCFA)</td>
</tr>
<tr>
<td>Oracle Certified Master - Java SE Developer</td>
<td>EMC Technology Architect - Specialist (EMCTA)</td>
<td>EC-Council Certified Security Analyst (ECSA)</td>
</tr>
<tr>
<td></td>
<td>Cisco Certified Design Professional (CCDP)</td>
<td>GIAC Certified Forensics Examiner (GCFE)</td>
</tr>
<tr>
<td></td>
<td>CWNP/Certified Wireless Analysis Professional</td>
<td>GIAC Enterprise Defender (GCED)</td>
</tr>
<tr>
<td></td>
<td>Cisco Certified Design Expert (CCDE)</td>
<td>GIAC Information Security Professional (GISP)</td>
</tr>
<tr>
<td></td>
<td>EMC Information Storage Associate (EMCISA)</td>
<td>Certified Healthcare Information Security and Privacy Practitioner (ISC2)</td>
</tr>
<tr>
<td></td>
<td>Cisco Certified Internetwork Expert (CCIE, all variations)</td>
<td>Check Point Certified Security Administrator (CCSA)</td>
</tr>
<tr>
<td></td>
<td>EMC Technology Architect - Expert (EMCTA)</td>
<td>EC-Council Computer Forensic Investigator (CHFI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIAC Security Leadership (GSLC)</td>
</tr>
<tr>
<td>Architecture, Project Management, and Process</td>
<td>Systems Administration certifications</td>
<td>GIAC Web Application Penetration Tester (GWAPT)</td>
</tr>
<tr>
<td>Certifications</td>
<td></td>
<td>GIAC Certified Intrusion Analyst (GCIA)</td>
</tr>
<tr>
<td>Open Group Certified Architect (Open CA)</td>
<td>NetApp Certified Data Administrator, ONTAP</td>
<td></td>
</tr>
<tr>
<td>HDI Customer Service Representative</td>
<td>Cloudera Certified Administrator for Apache</td>
<td></td>
</tr>
<tr>
<td>Salesforce.com Certified Technical Architect</td>
<td>Hadoop</td>
<td></td>
</tr>
<tr>
<td>Open Group Certified IT Specialist (Open CITS)</td>
<td>Citrix Administrator - Networking (CCA)</td>
<td></td>
</tr>
<tr>
<td>SAS Certified Advanced Analytics Professional</td>
<td>NetApp Certified Storage Associates – Hybrid Cloud</td>
<td></td>
</tr>
<tr>
<td>Professional in Project Management (GAQM)</td>
<td>NetApp Certified Implementation Engineer (NCIE)</td>
<td></td>
</tr>
<tr>
<td>HDI Desktop Support Manager</td>
<td>VMware Certified Professional 6.5 - Data Center Virtualization (VCP6.5-DCV)</td>
<td></td>
</tr>
<tr>
<td>HDI Support Center Analyst</td>
<td>VMware Certified Professional 6/7 - Cloud Mgt and Automation</td>
<td></td>
</tr>
<tr>
<td>HDI Support Center Manager</td>
<td>Red Hat Certified Architect (RHCA)</td>
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<tr>
<td>HDI Support Center Team Lead</td>
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<tr>
<td>Help Desk Team Lead/RCCSP</td>
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<tr>
<td>HP ASE Cloud Architect V2</td>
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<tr>
<td>HP ASE--Data Center and Cloud ArchitectV1</td>
<td></td>
<td></td>
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<tr>
<td>Prince2 Foundation</td>
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</tr>
</tbody>
</table>

Source: Foote Partners *IT Skills & Certifications Pay Index™, 4th Quarter 2019 data*
B. FAST GROWING NON-CERTIFIED TECH SKILLS THAT ARE ALSO EARNING HIGHEST PAY

The following non-certified tech skills meet two prerequisites: they recorded gains in cash market value in the final six months of 2018 in our IT Skills and Certifications Pay Index™ and they are also earning workers a pay premium well above the average of all 551 skills surveyed. Pay Index™.

No skill below is earning less than the equivalent of 16 percent of base salary — the average for all skills reported is 9.34 percent — and are listed in descending ranked order of cash premium (including ties).

1. Data Visualization
   Quantitative Analysis/Regression Analysis
   - Average Pay Premium: 17 percent of base salary equivalent
   - Market Value Increase: 21.4 percent (in the past six months through January 1, 2019)

   Data Visualization is a general term describing any effort to help people understand the significance of data by placing it in a visual context. Patterns, trends and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software. It has become the de facto standard for modern business intelligence; as such, any database-centric product that does not incorporate built-in data visualization functions or easy integration with Tableau or Qlik will negatively affect its popularity. The tools used today are more sophisticated than just a few years ago and may include interactive capabilities, enabling users to manipulate them or drill into the data for querying and analysis. An important trend is the democratization of data and analytics, making data-driven insights available to workers throughout an organization. This has led to a rise in lines of business implementing data visualization tools on their own, driving skills demand and pay upwards. Moreover, data visualization software plays an important role in big data and advanced analytics projects. Quantitative Analysis/Regression Analysis may be a subset of data science and is hugely popular and widespread in popularity.

2. Big Data Analytics
   Metadata design and development
   - Average Pay Premium: 17 percent of base salary equivalent
   - Market Value Increase: 6.3 / 13.3 percent (in the past six months through January 1, 2019)

   Big Data Analytics related skills and certifications have grown in market value every quarter in the past two years. On average, 89 Big Data related non-certified skills cash premiums are averaging the equivalent of 12.3 per cent of base salary, gaining nearly a half percent in the past year. For all the interest in the use of advanced data analytics to enable companies to understand, package, and visualize data for enhanced decision making, the truth is that the marketplace for so-called Big Data skills has been surprisingly volatile: 28 of 89 Big Data related non-certified skills tracked in our benchmark research have changed market value in the final quarter of 2018 (and 35 the prior quarter).
SUMMARY - cont’d.

Fast growing/highest paying non-certified tech skills – cont’d.

**Metadata design and development.** Data can be replicated and delivered anywhere in the world instantaneously—it is the fundamental resource in the new economy. The business rocket ship known as digital innovation depends on data, metadata, and A.I. working in concert to create systems that get smarter over time. But while data is used to drive decision-making and insights, it’s the *metadata* that stores what is learned—what works, when to use it, what is still uncertain—and this the key to “smarter”. Digital transformation is driving a new wave of interest in metadata design and development skills in 2018.

3. **Microservices**

   *Average Pay Premium:* 16 percent of base salary equivalent  
   *Market Value Increase:* 6.7 percent (in the past six months through January 1, 2019)

**Microservices architecture** is a distinctive method of developing software systems that tries to focus on building single-function modules with well-defined interfaces and operations known as containers. By holding an application’s complete runtime environment, including libraries, binaries, and configuration files, platform and infrastructure are abstracted, allowing the application to run more or less anywhere. The trend has grown popular in recent years as enterprises look to become more agile and move towards a DevOps and continuous testing. The idea behind microservices is to allow developers to build their applications from various independent components which can easily be changed, removed or upgraded without affecting the whole application. Microservices create scalable, testable software that can be delivered in very short periods of time. Netflix, eBay, Amazon, Twitter, PayPal, and many other tech stars have all evolved from microservices architecture. Containers are available from all the major cloud providers as well as in on-premises data centers and hybrid clouds.

4. **Ethereum**

   *Average Pay Premium:* 17 percent of base salary equivalent  
   *Market Value Increase:* 6.3 percent (in the past six months through January 1, 2019)

Blockchain! **Ethereum** is arguably the most popular open source, public blockchain-based distributed computing platform and OS for smart contract functionality. If you want to become a blockchain expert, learning how to build apps on Ethereum is a great place to start.

5. **Smart Contract**

   *Average Pay Premium:* 16 percent of base salary equivalent  
   *Market Value Increase:* 23.1 percent (in the past six months through January 1, 2019)

**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.
Summary - cont’d.

Fast growing/highest paying non-certified tech skills – cont’d.

6. Quality management/TQM
   
   *Average Pay Premium:* 16 percent of base salary equivalent
   
   *Market Value Increase:* 23.1 percent (in the past six months through January 1, 2019)

   **Quality Management** technology is trending upwards for a multitude of reasons, but five bear special mention: rising cloud computing adoption rates; the next-gen Internet of Things wave; continued growth of enterprise mobility; Big Data intensity; and a rising popularity of enterprise quality management software (EQMS) tools to manage the integration and automation all cloud, mobile, IoT and Big Data technologies. Businesses are in contact with customers all the time from a combination of collaboration platforms, chat and voice-bot customer support technology and multiple mobile device support, and this increase in customer contacts and spread of workflows over collaboration channels increases the need for solid quality control measures. While quality increases in prominence, there is a correlating need for more visibility into risks of an organization. Managing quality as a project or process allows the concepts to breathe life, but for an organization to be able to effectuate improvements, risks must be visible. With the broadening of quality has come the need for a broader view of how quality management systems are deployed throughout an organization. And with analytics continually driving quality, employers are desperate for skilled professionals with a variety of QM skills and willing to pay a premium for these skills.

7. Cloudera Impala
   
   *Average Pay Premium:* 16 percent of base salary equivalent
   
   *Market Value Increase:* 14.3 percent (in the past six months through January 1, 2019)

   **Cloudera Impala** is an open source Massively Parallel Processing (MPP) query engine that provides high-performance, low-latency SQL queries on data stored in popular Apache Hadoop file formats. The fast response for queries enables interactive exploration and fine-tuning of analytic queries rather than long batch jobs traditionally associated with SQL-on-Hadoop technologies, meaning that data can be stored, shared, and accessed using various solutions that avoids data silos and minimizes expensive data movement. Impala returns results typically within seconds or a few minutes, rather than the many minutes or hours that are often required for Hive queries to complete. We cannot underestimate the value of this to advanced data analytics platforms and the work of data scientists and analysts engaged in Big Data initiatives and the impact this has on skills acquisition demand going forward.

8. Hbase
   
   *Average Pay Premium:* 16 percent of base salary equivalent
   
   *Market Value Increase:* 6.7 percent (in the past six months through January 1, 2019)

   **Apache HBase** is an open source NoSQL database that runs on top of Hadoop Distributed File System (HDFS) and provides real-time read/write access to large datasets. HBase scales linearly to handle huge data sets with billions of rows and millions of columns, and it easily combines data sources that use a wide variety of different structures and schemas. HBase employs a collection of battle-tested technologies from the Hadoop world, and it’s a proven winner when building a large, scalable, highly available, distributed database, particularly for those applications where strong consistency is important.
C. TECH CERTIFICATIONS CURRENTLY EARNING WELL ABOVE-AVERAGE PAY BUT DECLINING THE MOST IN CASH MARKET VALUE – Second Half, 2018

Average market values for 466 tech certifications decreased in the last quarter of 2018, down 1.8 percent overall, and lost 2.4 percent of their value in all of 2018 after two consecutive quarterly losses closing out the year. Pay premiums for single certifications were averaging the equivalent of 7.5% of base salary now after 57 certifications recorded pay premium losses against only seven gaining value in the final quarter of 2018.

*Why are certifications losing their 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 18 years Foote Partners has been tracking and reporting their market values in the *IT Skills and Certifications Pay Index*.

Below are tech certifications currently earning well above-average pay but recording substantial declines in market value during the last six months of 2018. These certifications are adjusting to market forces as explained above.

INFO / CYBERSECURITY CERTIFICATIONS

**GIAC Security Leadership Certification (GSLC)**

*Average Pay Premium: 12 percent of base salary equivalent*

*Market Value Decrease: -29.4 percent (in the past six months through January 1, 2019)*

The GSLC targets security professionals with managerial or supervisory responsibility for information security staff. Certification holders’ knowledge includes having an understanding of risks of 802.11 wireless networks and how to secure them, access control and password management, building a security awareness program, and cryptography applications, VPNs and IPSec. This certification is awarded with a passing score of 88% on a 115-question proctored exam. We believe employers require a lot more than an exam to assess leadership abilities in today’s info/cybersecurity field and this is contributing to not only losses in market value in this certification but management-level security solutions certifications such as the ISSAP and ISSMP below.
Certifications declining in value but still paying above-average – cont’d.

Info/Cybersecurity – cont’d.

**Information Systems Security Architecture Professional (ISSAP/CISSP)**

**Information Systems Security Management Professional (ISSMP/CISSP)**

- **Average Pay Premium:** 12 percent of base salary equivalent
- **Market Value Decrease:** -14.3 percent (in the past six months through January 1, 2019)

The **ISSAP** permits Certified Information Systems Security Professionals (CISSPs) to concentrate further in information security architecture and stresses the following elements of the CBK: Access control systems and methodologies; telecommunications and network security; cryptography; requirements analysis and security standards, guidelines and criteria; technology-related business continuity and disaster recovery planning (BCP and DRP); physical security integration.

The **ISSMP** allows CISSPs to concentrate further in security management areas and stresses the following elements of the CBK: Enterprise security management practices; enterprise-wide system development security; overseeing compliance of operations security; understanding BCP, DRP and continuity of operations planning (COOP); law, investigations, forensics and ethics.

**EC-Council Computer Hacking Forensic Investigator (CHFI)**

- **Average Pay Premium:** 11 percent of base salary equivalent
- **Market Value Decrease:** -26.7 percent (in the past six months through January 1, 2019)

Computer forensics is the application of computer investigation and analysis techniques in the interests of determining potential legal evidence. Evidence might be sought in a wide range of computer crime or misuse, including theft of trade secrets, theft of or destruction of intellectual property, and fraud. Computer hacking forensic investigation is the process of detecting hacking attacks and properly extracting evidence to report the crime and conduct audits to prevent future attacks. Such techniques have become ubiquitous in law enforcement, defense, military, information technology, law, banking and insurance, among others. as computer forensic investigators draw on an array of methods for discovering data that reside in a computer system or recovering deleted, encrypted, or damaged file information known as computer data recovery.

The **Computer Hacking Forensic Investigator** is one of the oldest, most popular of these certifications, attracting a lot of certificants to the program which has narrowed the supply/demand gap. Also putting pressure on demand for the CHFI has been competing certifications Certified Forensic Computer Examiner, Certified Computer Examiner, GIAC Certified Forensic Analyst, and GIAC Certified Forensic Examiner.
SUMMARY - cont’d.

Certifications declining in value but still paying above-average – cont’d.

Info/Cybersecurity – cont’d.

**GIAC Exploit Researcher and Advanced Penetration Tester (GXPN)**

- **Average Pay Premium:** 10 percent of base salary equivalent
- **Market Value Decrease:** -23.1 percent (in the past six months through January 1, 2019)

The GIAC Exploit Researcher and Advanced Penetration Tester targets security personnel whose job duties involve assessing target networks, systems and applications to find vulnerabilities. It certifies that candidates have the knowledge, skills, and ability to conduct advanced penetration tests, how to model the abilities of an advanced attacker to find significant security flaws in systems, and demonstrate the business risk associated with these flaws.

**Certified Healthcare Information Security and Privacy Practitioner (HCISPP-ISC²)**

- **Average Pay Premium:** 9 percent of base salary equivalent
- **Market Value Decrease:** -18.2 percent (in the past six months through January 1, 2019)

The healthcare industry is expected to be one of the fastest growing employment sectors for the next decade. Protecting networked systems and devices and securing patient information are already tough enough challenges but they will get even more intense as regulation evolves and the aging population demographics create more demand for services. Right now, healthcare employers are desperately searching for experienced healthcare tech professionals and eagerly investing in training and development. For those employers convinced that certifications are useful for qualifying talent, there are a few vendor-independent healthcare certifications they can turn to:

- Certified Associate/Professional in Healthcare Information & Management Systems (CAHIMS, CPHIMS)
- Certified Healthcare Technology Specialist (CHTS)
- Registered Health Information Administrator (RHIA)
- Registered Health Information Technician (RHIT)

For healthcare security skills the clear winner has been the **Certified Healthcare Information Security and Privacy Practitioner** certification from (ISC)² which experienced a spike in market value with initial demand that has now begun to level off in our compensation surveys. This certification combines cybersecurity skills with privacy best practices and techniques. It identifies people with the knowledge and ability to implement, manage and assess security and privacy controls to protect healthcare organizations using policies and procedures established by (ISC)². There are work experience prerequisites and an endorsement process that must be met to sit for a three-hour exam, but answering at least 70% of the questions correctly will secure the certification. The exam tests six domains including third-party risk management, information governance, and healthcare regulatory environment.

The HCISPP is appropriate for several job functions including: Risk Analyst; Privacy Officer; Privacy and Security Consultant; Practice Manager; Medical Records Supervisor; Information Technology Manager; Information Security Manager; Health Information Manager; Compliance Officer; Compliance auditor.
Certifications declining in value but still paying above-average – cont’d.

Info/Cybersecurity – cont’d.

**Check Point Certified Security Administrator (CCSA)**

- **Average Pay Premium:** 9 percent of base salary equivalent
- **Market Value Decrease:** -18.2 percent (in the past six months through January 1, 2019)

The Check Point Certified Security Administrator certification is for individuals who maintain day-to-day operation of Check Point security solutions and ensure secure access to information across the network. Proficiencies include creating and installing security policies, using logging and reporting features, and managing anti-spoofing, Network Address Translation (NAT), and OPSEC applications. It validates the ability to install, configure, and manage Check Point Security Gateway and Management Software Blade systems on the GAiA operating system.

**ARCHITECTURE CERTIFICATIONS**

**Open Group Certified IT Specialist (Open CITS)**

- **Average Pay Premium:** 11 percent of base salary equivalent
- **Market Value Decrease:** -26.7 percent (in the past six months through January 1, 2019)

**Open Group Certified Architect (Open CA)**

- **Average Pay Premium:** 9 percent of base salary equivalent
- **Market Value Decrease:** -30.8 percent (in the past six months through January 1, 2019)

**TOGAF 9 Certified**

- **Average Pay Premium:** 10 percent of base salary equivalent
- **Market Value Decrease:** -33.3 percent (in the past six months through January 1, 2019)

Enterprise information technology architecture (EA) had its heyday in the mid-1990s with the development of the Open Group Architecture Framework (TOGAF). EA certifications showed up soon after and achieved popularity as employers struggled to qualify talent in high level design and modeling of architecture solutions. But despite the obvious value of architecture solutions in the four domains targeted by TOGAF (business, data, applications, and technical architecture), EA proved to be a tough sell from a budget and management perspective. The ROI in IT enterprise architecture is rarely short term; as economic recessions hit businesses in the 2000s it placed tech-related budgets under agonizing scrutiny. This presented setbacks for EA with its traditionally longer, more complex or ambiguous payback track record.

Today the enterprise architecture profession is undergoing a massive transition in response to the plethora of disruptive technologies now driving businesses, such as artificial intelligence and myriad digital innovations. Likewise, The Open Group is struggling to stay current and so are its certifications including the Open Group Certified IT Specialist, Open Group Certified Architect, and TOGAF 9 certification that have all found their way onto this list of declining certs.
Certifications declining in value but still paying above-average – cont’d.

Architecture – cont’d.

The Open Group Certified IT Specialist program is designed to verify the existence of those qualities and skills in a professional that enable the effective development, implementation and operation of IT solutions. Three levels of certification are available depending on the length and characteristics of the IT Specialist's experience: Distinguished, Master, and base level. At the lowest level, Certified IT Specialist, the certified professional is able to perform as a contributing Specialist with assistance/supervision, with a wide range of appropriate skills. The program requires applicants to demonstrate skills and experience against a set of conformance requirements through written applications and peer interviews. There are no training courses to attend, and no written exams to complete.

There are two different routes to the Open Group IT Specialist certification, but the certification criteria are the same for both:
- Via Direct Certification: Application is made directly to The Open Group by individual practitioners as well as to IT Specialists working in companies or organizations that do not have an Accredited Certification Program.
- Via Accredited Certification Programs (ACPs): IT Specialists applying for certification via an ACP must be employees of the accredited organization. Application is made through the ACP.

The Open Group Certified Architect certification is designed to validate the existence of those qualities and skills in a professional that enable the effective practice of IT architecture. The program is skills and experience-based and goes beyond validating the mastery of any specific knowledge base.

The program includes a framework for accreditation of third parties to establish IT Architect certification programs affiliated to The Open Group. The framework of accreditation and certification is specifically intended to standardize the process and criteria for IT Architect professional certification and establish a foundation for the required skills and experience necessary to achieve such a distinction. The program was designed to be flexible and extensible so that the framework may be adopted by any industry, country, or organization.

The TOGAF 9 certification qualifies people who demonstrate knowledge and understanding of the Body of Knowledge covered by the Open Group Architecture Framework described earlier. Qualification is achieved through passing two exams, following a course of self-study or attendance at an Accredited Training Course.

Salesforce.com Certified Technical Architect (CTA)

Average Pay Premium: 10 percent of base salary equivalent
Market Value Decrease: -28.6 percent (in the past six months through January 1, 2019)

Salesforce architect credentials comprise three tiers of certification that recognize specialized knowledge and skills, as well as growing expertise in the Salesforce platform. The Salesforce Technical Architect credential is the pinnacle certification for those who demonstrate the knowledge, skills, and capabilities to design and build high-performance technical solutions on the Salesforce platform across all areas of domain expertise. The Salesforce Technical Architect possesses broad knowledge across multiple development platforms and draws on their skills and experience to assess customer requirements and architecture in order to design secure, high-performance technical solutions that maximize the potential of the Salesforce platform.
SUMMARY - cont’d.

Certifications declining in value but still paying above-average – cont’d.

CLOUD COMPUTING CERTIFICATIONS

VMware Certified Design Expert - Cloud Mgt and Automation (VCDX-CMA)

Average Pay Premium: 9 percent of base salary equivalent
Market Value Decrease: -25.0 percent (in the past six months through January 1, 2019)

The VMware Certified Design Expert in Cloud Management and Automation (VCDX-CMA) is the highest level of certification offered for VMware Cloud Management Platforms, including vRealize Automation enterprise design and deployments. It’s part of the overall VMware Certified Design Expert program that proves top-level skills in gathering and interpreting requirements, and planning, creating, documenting, and testing an implementable design. Earning the VCDX-CMA certification validates skills in designing, planning, and integrating world-class VMware vSphere and vCloud Management and Automation solutions and driving business value through VMware Cloud Management platforms.

To attain VCDX certification is a three-step process. First, the candidate must develop a customer-facing enterprise design and deployment plan and strategy, including comprehensive logical and physical models and implementation, installation, operating and testing guidance. Then they must submit the design portfolio that includes all aspects of a full strategic and deployable cloud management platform design and have it approved by a three-person panel. Finally, the candidate must defend the design in-person to a three-person panel and validate technical, design and critical thinking skills.

PROJECT MANAGEMENT & NETWORKING CERTIFICATIONS

Professional in Project Management (PPM - GAQM)

Average Pay Premium: 9 percent of base salary equivalent
Market Value Decrease: -18.2 percent (in the past six months through January 1, 2019)

The Global Association for Quality Management claims their project management certifications cover a broader perspective when compared with other PM course designs: “a blend of knowledge and experience, written by experienced Project Managers and Directors who have more than three decades of experience in managing and directing projects.” The Professional in Project Management certification comprises several project management modules including how to plan, execute, control and complete projects. The core focus is on key trends in managing projects and demands on the project managers and includes project schedules; developing project measures and approaches to project control; and how to develop, lead and motivate project teams. This designation is targeted towards intermediate to experienced Project Managers, who are involved in risk and crisis management, and who are involved in the day to day management of projects.
SUMMARY - cont’d.

Certifications declining in value but still paying above-average – cont’d.

Project Management & Networking, cont’d.

**Citrix Certified Administrator - Networking (CCA)**

- *Average Pay Premium:* 9 percent of base salary equivalent
- *Market Value Decrease:* -18.2 percent (in the past six months through January 1, 2019)

The **Citrix Certified Administrator – Networking** certification is designed for Citrix Gateway architects, engineers and administrators and validates knowledge and skills needed to administer enterprise environments of the Citrix Gateway to secure remote access to desktops, applications and data.
D. TECH CERTIFICATIONS DECLINING THE MOST IN CASH MARKET VALUE – Second Half, 2018

Below are tech certifications currently recording the largest market value losses in the last six months of 2018 and are currently pay average-to-below average cash pay premiums. In many cases these declines can be attributed to a narrowing of the gap between supply and demand as more candidates achieve certification. However as stated earlier in this report, not all employers recognize certification to be an adequate measure of talent in a technology discipline, preferring alternative forms of accreditation to fit their needs.

<table>
<thead>
<tr>
<th>CERTIFICATION</th>
<th>Average Pay Premium (% of base salary equivalent)</th>
<th>Market Value Decrease (last half of 2018)</th>
</tr>
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<tbody>
<tr>
<td>GIAC Systems and Network Auditor</td>
<td>8 %</td>
<td>-38.0 %</td>
</tr>
<tr>
<td>GIAC Enterprise Defender</td>
<td>7 %</td>
<td>-38.0 %</td>
</tr>
<tr>
<td>GIAC Certified Forensics Analyst</td>
<td>7 %</td>
<td>-36.4 %</td>
</tr>
<tr>
<td>CSX Cybersecurity Practitioner</td>
<td>8 %</td>
<td>-33.3 %</td>
</tr>
<tr>
<td>GIAC Certified Forensics Examiner</td>
<td>7 %</td>
<td>-30.0 %</td>
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<tr>
<td>HDI Customer Service Representative</td>
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<tr>
<td>NetApp Certified Data Administrator, ONTAP</td>
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<td></td>
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<tr>
<td>SAS Certified Base Programmer for SAS 9</td>
<td>5 %</td>
<td>-28.6 %</td>
</tr>
<tr>
<td>NetApp Certified Storage Associates – Hybrid Cloud</td>
<td>6 %</td>
<td>-25.0 %</td>
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<tr>
<td>Citrix Certified Expert - Virtualization</td>
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<tr>
<td>Microsoft Certified Solutions Associate: Cloud Platform</td>
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<tr>
<td>Oracle Certified Professional - Java SE Programmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Certified Advanced Programmer for SAS 9</td>
<td>7 %</td>
<td>-22.2 %</td>
</tr>
<tr>
<td>VMware Certified Design Expert (all)</td>
<td></td>
<td></td>
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<tr>
<td>VMware Certified Professional 6.5 - Data Center Virtualization</td>
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<tr>
<td>Cloudera Certified Administrator for Apache Hadoop</td>
<td>8 %</td>
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<tr>
<td>GIAC Information Security Professional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Certified Advanced Analytics Professional</td>
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Tech Labor Trends Discussion & Analysis

IT Skills and Certifications Pay Index™

Data collected through January 1, 2019
LABOR TRENDS DISCUSSION & ANALYSIS

INTRODUCTION. It's difficult to find an employer that isn't struggling to come up with its own unique tech staffing model that balances three things: the urgencies of digital transformation and cybersecurity threats, combating ever deepening security threats, and keeping increasingly complex systems and networks running smoothly and efficiently.

The staffing challenge has moved well beyond simply having to choose between contingent workers, full-time tech professionals, and a variety of third-party services options. Over the next few years managers will continue to be tasked with leading a massive transformation of the technology and tech-business hybrid workforce to focus on delivering a wide variety of operational solution and revenue-generating opportunities including:

- Next-gen Internet of Things/M2M
- Artificial Intelligence/Machine Learning
- Blockchain
- Mobility
- Big Data/Information Integration/ BI analytics
- Cybersecurity
- Automation
- Robotics
- Edge computing
- Quantum computing
- Cloud computing
- Healthcare tech/IoMT/Telemedicine
- Carbon-reducing technology/exponential energy
- Autonomous vehicles
- Web 3.0

All of these depend on solving the puzzle of getting the mix of critical technology and business skills and experience just right when shortages of skills and talent have never been more profound or more constraining in effecting business transformation.

These changes don’t happen overnight. Practically speaking, it takes a few fiscal cycles to get budgets in line and recruiting and training efforts in place to build any new foundation for an optimally restructured workforce. To be sure, ‘clean sheeting’ your organizational systems and practices isn’t realistic: you need to build a new human resource foundation under what you’re already doing, incrementally strengthening that foundation over time. This takes a well-thought out job role architecture plus carefully crafted agile compensation models to get people paid to true competitive market levels and incented to perform at high levels.

2019 will continue the dramatic changes in the corporate tech workforce that began this year

Employers have been facing conspicuously harder tech labor challenges in 2018 than any year in recent history. And their people problems are about to get exponentially worse unless they start laying the groundwork right now for a new staffing paradigm that will soon be thrust upon each and every one of them.

We’ve conducted interviews with 500+ senior tech execs recently. Our findings? Most not only realize this threat but are conspicuously stressed out about it. The good news is that two long time labor trends have shifted quite dramatically recently that will help them in the short term.
LABOR TRENDS DISCUSSION, cont’d.

First, market value volatility in pay for tech skills is the lowest it's been for the past decade. The 1,017 certified and non-certified tech skills tracked in Foote Partners' Tech Skills and Certifications Volatility Index are averaging market value fluctuations of 23% in the last twelve months (quarter-to-quarter percent of skills changing value) compared to 27% to 31% four years ago (see page 34 - 38).

Second, the constant frenzy surrounding short term skills gaps and unfilled jobs targeted at point solutions has quieted down according to our recent quarterly labor market benchmark research. There are many indicators for this including the fact that growth in pay for the 1,017 skills and certifications in our quantitative research is down for the past six months and negative for the year 2018. In other words, the gap between supply and demand for tech skills has narrowed broadly across all certified and non-certified skills surveyed.

What's overtaking these two trends is something more urgent and potentially catastrophic when it comes to managing tech professionals: several game-changing emerging technologies that are altering the landscape of not just businesses but the private lives of billions of people. Among them are Artificial Intelligence, Blockchain, the next generation of IoT (Internet of Things), Automation, and countless digital innovations. Layered into all of these is continuing efforts in to building deeper cybersecurity capabilities for constantly escalating threat levels.

The upshot is 2019 will continue the trend that began this year in which employers have finally taken stock in how poorly prepared they are from a talent perspective for consuming these revolutionary (though in many cases, nascent) technologies. And trust us, they will all be enthusiastically deepening their commitment to them within the next three years.

The hardest truth and most difficult barrier are that the human resource management function supporting technology professionals at most companies has for years been unable to get in front of the unique demands of the technology workforce. They’ve been barely getting by for years with short-term fixes. Here’s what it looks like from the perspective of HR leaders:

- **People management systems and practices to tech professionals that have become frighteningly ineffective.** Even ad hoc work-around solutions are failing
- **Persistent fallout**
  - Too many tech job titles
  - High tech staff churn in key roles, especially the most experienced tech workers.
  - Skills gaps. Difficulty finding and hiring tech professionals
  - Overreliance on consultants, contractors, temps
- **Confusion about pay.** Constant uncertainty about how much to pay tech professionals, especially new jobs and the “Swiss Army knife” hybrid positions.
- **Job Definition/Design Chaos.** Managing independently created tech jobs that don’t fit in very well with established tech roles…that are themselves ill-defined
- **Job Path Uncertainty:** tech workers have trouble navigating their careers and employers aren’t helping them very much
LABOR TRENDS DISCUSSION, cont’d.

If these new blockbuster technologies existed independent of one another it would not be nearly as frightening from a labor demand perspective. But they don’t: they’re all part of one gigantic dynamic mesh. This mesh will demand an unprecedented level of talent that will place a stunning labor strain on employers regardless of whether they are developing, supporting, or consuming these pervasive groundbreaking technologies.

And here’s the rub: employers cannot aspire to capitalize on these transformation technologies without first climbing out of the deep hole they’ve been digging for years. That means replacing HR management systems and practices that lack the power, agility and flexibility necessary to do competitive combat in a labor environment substantially different than what has existed heretofore. The next few years will test employers’ people management capabilities will like never before.

There is a window of opportunity right now while these new technologies are maturing. More employers are commencing the serious work of repairing broken or underperforming people management systems and practices.

Architecture to the rescue—but this time for managing people

Foote Partners has worked with countless employers over more than 25 years in rethinking how they define the work of their tech professionals and how they can shape an enterprise tech workforce to deliver on business goals. But even more important, how they need to think about and build capabilities for the future, executing on business strategies that are not yet fully formed but which we, as experienced forecasters and analysts, have helped them understand capabilities which most likely need to be operational in their future.

Our observation across more than 3,000 employers is that the only approach to this particular work that has ever achieved consistent success—much less any proven success—has been one based on a strong architectural foundation. Not business architecture or technical architecture but rather people architecture.

By this we mean applying traditional architecture principles and practices to human capital management. Adopting a framework for tech people and pay that properly defines, classifies, and aligns job roles, levels, skills and competencies across the enterprise and allows for accurate matching of people and jobs to a constantly evolving marketplace. And perhaps most importantly, one that is flexible in principle and agile enough in practice to enable job and pay scalability, meet forecasted labor needs, and accommodate growth and change with minimal pressure while also not creating new problems as a by-product.

Architecturally driven tech people management practices have been commonplace for years at consulting industry employers and virtually nowhere else. The business models and competitive focus of these employers relies on people performing services and as such their chief assets “walk out the door every night”. They operate within business models that have specialized people practices and budgets that simply are not easily replicated in other industries.
LABOR TRENDS DISCUSSION, cont’d.

This shouldn’t be a novel idea but it is. It’s similar to how architecture thinking and practices were applied to technology inventorying and acquisition in the early 1990s and to businesses since the day they began. Enterprise architecture later became its own discipline as technology and business converged over the last two decades.

Tech People Architecture is similar in principle to traditional IT architecture initiatives but applied instead to workforce management and tech human capital. There are strategy and capability roadmaps, phase gate blueprints, benchmarks, performance metrics, and stakeholder management is critical. Governance issues need careful attention and business strategy drives it all. Agile Compensation is the answer to the chaos created by the proliferation of technology related job titles and lack of consistency in job definition and pay programs across the enterprise for the same work performed.

But with Agile Compensation and Tech People Architecture it’s about how key human capital management (HCM) elements such as job definition and design, skills demand and acquisition, compensation, incentives and recognition, professional development, and work/life balance plug into an overall optimized operational model. The model is tuned to new technologies, business strategy, organizational goals, and culture and performance philosophies, and it promotes flexibility and scalability, like any disciplined architecture approach.

People architecture approaches correct lack of job title standardization in the marketplace and too many job titles floating around IT departments, corporate departments, and business lines. With so many dimensions and variability in tech jobs, employers are unable to cope with the complexity of defining, determining pay, and laying out career paths for all these jobs. For many, serious retention and hiring problems are showing up for the first time. Recruiters are picking off your best people and candidates are suddenly rejecting offers.

Tensions are palpable and that’s one of the factors driving Tech People Architecture and Agile Compensation right now. Let’s take a deeper dive into two of these emerging technologies to see why they’re going to succeed and what skills will be most in demand.

LABOR ANALYSIS: Skills training and development becomes the critical differentiator

A 2018 Cyentia Institute study entitled “Unraveling the Cyber Skills Gap & Talent Shortage” found that 80% of respondents do not feel adequately prepared to defend their organizations. 68% of the 3,109 international tech professionals surveyed (81% working in cybersecurity) express doubts about their organization’s readiness to thwart advanced threats.

Foote Partner’s latest IT Skills and Certifications Pay Index™ provides evidence of employers’ response to the cybersecurity talent retention gap: the Certified Cyber Forensics Professional certification is earning the highest certification cash premium among all 458 reported in the Pay Index, averaging the equivalent of 17% of base salary. Further, in the most recent October data update of our IT Professional Salary Survey, Cybersecurity Specialists with three years of experience are averaging $108,285 in base salary in 65 U.S. cities. Senior level cyber specialists with five years’ experience are averaging $127,000.”
LABOR TRENDS DISCUSSION, cont’d.

But with a nagging lack of consistency nationally in cybersecurity career definitions, and a shocking dearth of experienced cyber professionals, employers can expect to experience difficulties in attracting and retaining cybersecurity talent for months or even years to come.

Employers are more aware that they don’t have the right people in their security departments. What’s missing are enough experienced security professionals who understand:

- Threat Intelligence and Analysis
- Cryptography
- Valuing Asset Inventory
- Audit log analysis
- Access/Identity Management
- Compliance and policy
- Visibility
- Secure Data Management
- Cryptography
- Information Risk Management
- Audit log analysis
- Process Optimization and Agile Controls
- Secure and defensive programming
- Business Continuity Management
- Network Security
- Information Risk Management
- Secure Data Management
- Business Continuity Management

Chief Security Officers are desperate for qualified talent to determine whether or not there’s been an attack, to identify root cause, and to figure out what information has been exposed. They’re allocating more financial resources to security challenges according to our data. But the linkage between the business and the information security and cybersecurity organizations is still too weak from a labor perspective.

A common refrain in our interviews has been “We’re going to need as many people as possible to ‘hit the ground running’ to meet the demand”. That’s going to be a tall order not to mention a bit unrealistic in the short term. The fact is it’s going to take another three to five years to narrow this particular skills gap. Employers will get there because indications are that the money and incentives are sufficient to get vendors, employers, and training organizations focused on the solution. And of course, it will take that long to get the requisite experience in place, which is typically 4 to 6 years of hands-on experience.

Cybersecurity skill sets are still evolving in training protocols. Hands-on experience in a cyber security environment is more critical to cyber security jobs than just academic learning. Only 7% of the top universities around the world offer a technical cybersecurity degree at the undergraduate level. Cybersecurity curriculum has to dramatically expand and colleges need to aggressively pursue internship opportunities for their students to expose them real-world conditions. There need to be clear channels for attracting people into a profession that do not have the cache of software development.

This Cyentia Institute study concludes that organizations that invest in training show improved preparedness at both the employee and corporate level. The problem is that not enough companies are investing in training cybersecurity skills: half of the respondents pay for their own training and only 15% reported that their employers cover all cybersecurity training expenses. Moreover, 60% reported using personal time for IT and security training. Only 13% of companies conduct training during normal business hours and 35% of respondents report spending at least $1,000 annually in training-related expenses.
LABOR TRENDS DISCUSSION, cont’d.

The chart below (Figure 4) shows where investment intersects with value according to the perceptions, experience, and activities of Security Operations Center (SOC) and Incident Response (IR) staff. In theory, activities in the upper-left would offer good value at comparatively low cost. The only activity squarely in that quadrant? Training.

One of the key findings in our own recent in-depth interviews with more than 90 Chief Security Officers and Chief Information Security Officers is an expanded definition of “security professional” that is being taken more into account in hiring decisions.

It's a long list but it can be distilled down to these:

- Ability to translate technology risk to business risk.
- Think business and learn business speak
- Understand your industry
- Be open-minded and think outside the box (be strategic and not just tactical)
- Develop your people skills and work at being trustworthy.
- Be able to write and present high-level concepts coherently and succinctly. Keeping in mind the language of business
LABOR TRENDS DISCUSSION, cont’d.

Cybersecurity leadership and governance issues. In some cases, it’s going to become apparent that organizations simply don’t have the right security leadership in place,” suggests Foote. “Organizations have to ask themselves if security itself is sitting in the right place within the organization, who is accountable for security, and how to hold them accountable. You can’t avoid every serious incident, and while many businesses are good at incident management, too few have an established, organized approach for evaluating what went wrong and how to fix it. As a result, they are incurring unnecessary costs and accepting inappropriate risks.

Organizations of all sizes need to take stock now in order to ensure they are fully prepared and engaged to deal with these emerging security challenges and in particular cyber security strategy. By adopting a realistic, broad-based, collaborative approach to cyber security and resilience, government departments, regulators, senior business managers and information security professionals will better understand the true nature of cyber threats and how to respond quickly and appropriately.

Some companies are augmenting their staffing with machine learning technology and probability theory to model patterns of behavior and flag anomalous activity. Machine learning technology is increasingly being adopted as a way to reduce the noise (alerts) that traditional security products produce and to bubble up mid- and high-level concerns to IT staff. The discipline of machine learning finds its way into many large companies through the hiring of data scientists, who use algorithms to efficiently analyze event logs for their security teams.

Overall, we expect an increase in high-profile breaches in the near future. This will push corporate boards and senior business executives even farther to face decades of inadequately staffing their security operations and must now conquer a severe cybersecurity talent gap. They only solution will be to train, train, train over the next four years until as the gap narrows organically.
LABOR TRENDS DISCUSSION, cont’d.

LABOR FORECAST: Tech Workforce Transformation

Popularity of Agile Compensation and Tech People Architecture practices as solutions to persistent IT labor problems.

Clearly the widespread acceptance of technology’s singular role as an engine of innovation and competitiveness is an unquestioned, as is the energized role that has been thrust upon technology professionals and organizations everywhere to monetize technology. Too often those in the C-suite have been reluctant to hold their IT leaders accountable for such a heavy responsibility, instead choosing to create tech innovation departments and/or hire expensive consulting firms to do what they believe their IT leaders and tech workers are not capable of doing.

In 2018 senior business management has been asking tech leadership and business line leaders to be more accountable in managing large segments of technology talent— for architecting, building and securing new products and services that are largely technology based. And as these leaders are held accountable for higher levels of information and tech management, their performance is being more closely scrutinized. Examples include advanced analytics (for making more informed decisions), greater security (against dreaded cyber-attacks), and capitalizing on fast moving trends such as Blockchain, Machine learning, and digital innovation in general. Meanwhile, for the CIO, the imperative to streamline operations, reduce costs in every possible manner, and ensure compliance with countless regulations must still be met.

Taken together, this has placed tremendous pressure on tech leadership to execute flawlessly and predictably in unfamiliar areas. For many employers this can only be achieved with a dramatic transformation of the tech workforce to a more appropriately skilled group of professionals who are capable of a level of agility, flexibility and aptitude not commonly associated with their predecessors. Companies must be able to architect their human capital to meet business needs now and especially in the future.

Employers are having more difficulty finding and retaining tech talent which can perform at a high caliber on increasingly more difficult tasks. At the same time managers are feeling immense performance pressure. Plus, today the tech workforce is spread throughout the enterprise doing multidimensional jobs that are hard to categorize, price and manage. In this environment architecting of people management is the last and most logical frontier.

Our analysts are learning from tech executives that people architecture practices have been instrumental in dealing with lack of job title standardization in the marketplace and having too many job titles among their internal technology workforce. With so many dimensions and variability in tech jobs, employers have been progressively unable to cope with the complexity of defining, determining pay, and laying out career paths for all these jobs that is consistent across the enterprise.

For many, serious retention and hiring problems were showing up for the first time. Work around solutions used for years to cope with systemic weaknesses in their HR systems were no longer effective. Recruiters started picking off their best people and candidates were suddenly rejecting offers.
LABOR TRENDS DISCUSSION, cont’d.

The Agile Compensation and Tech People Architecture practices mentioned earlier focus on how key human capital management (HCM) elements such as job definition and design, skills demand and acquisition, compensation, incentives and recognition, professional development, and work/life balance plug into an overall optimized operational model. The model is tuned to new technologies, shifting business strategy and organizational imperatives, culture, and performance philosophies. Together they propel flexibility and scalability, like any disciplined architecture approach. This is exactly what has been missing for decades in the HR functions at many employers, resulting in constant labor gaps, skills deficits, and failure to execute consistently.

For employers, Agile Compensation and Tech People Architecture has solved these problems:

- Reducing by 50% to 70% the number of tech related job titles necessary to plan and administer pay;
- Significantly increasing retention rates;
- Narrowing or altogether eliminating persistent technology skills gaps;
- Improving individual and team performance and more predictable execution;
- Increasing consistent availability and quality of skills and workers;
- Achieving higher utilization rates;
- Mapping out how workers can move more effectively through promotions/career paths

Why do we think that Tech People Architecture is a viable alternative for most employers? Because architecture practices are familiar to technology executives. Technical architecture practices have been successful for decades because, when done well, companies have achieved an understanding of what they have systems-wise and could then connect it to where they were going and how they were going to get there, all within a process inclusive of all the various stakeholders who shared the risk in the outcome. A technical architecture helped to clearly define enterprise technology capabilities and give companies more options and flexibility going forward.
IT Skills & Certifications Pay Data Trend Charts

IT Skills and Certifications Pay Index™ – 4th Quarter 2018 edition

(Data collected through January 1, 2019)

- Tech Certifications
- Noncertified Tech Skills
- IT Skills & Certifications Volatility Index™
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.
Fig 5 - Premium Pay for Tech Certifications Wanes as Non-Certified Tech Skills Show Gains as Disruptive Technologies Intensify
(Average Median Pay for a Single Certified vs. Noncertified Tech Skill, Last 12 years – 77,977 IT professionals)

12 Yr Growth/Decline in Pay for 1,017 Tech Skills and Certifications (through January 1, 2019)

(Pay data supporting these charts available in the 2019 IT Skills and Certifications Pay Index™)

Source: Foote Partners, IT Skills and Certifications Pay Index™ (1Q 2007 – 4Q 2018 data editions)
**Tech Certifications**: Latest market value trends

(Data collected through January 1, 2019)
2-YEAR TECH CERTIFICATIONS PAY TRENDS
(Through 1/1/2019 – 77,977 IT Professionals)

3 & 12 MONTH TECH CERTIFICATIONS PAY TRENDS BY CATEGORY
(Through 1/1/2019 – 77,977 IT Professionals)

% Change in Average Median Pay for a Single IT Certification
<table>
<thead>
<tr>
<th>Certification</th>
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<tbody>
<tr>
<td>Avaya Certified Implementation Specialist</td>
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<td>Avaya Certified Professional Design Specialist</td>
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<td>Avaya Certified Solution Specialist</td>
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<td>AWS Certified Solutions Architect – Associate</td>
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<td>AWS Certified Solutions Architect – Professional</td>
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<td>AWS Certified SysOps Administrator– Associate</td>
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<td>AWS Certified DevOps Engineer – Professional</td>
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<td>Brocade Certified Network Professional</td>
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<td>Brocade Certified Fabric Designer</td>
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<td>Brocade Certified Fabric Professional (BCFP)</td>
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<td>Certificate of Cloud Security Knowledge</td>
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<td>Certification Authorization Professional (CAP)</td>
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<td>Certification of Competency in Business Analysis</td>
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<td>Certified Cloud Technology Professional</td>
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<td>Certified Data Centre Management Professional</td>
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<td>Certified Data Management Professional</td>
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<td>Certified Disaster Recovery Engineer (CDRE)</td>
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<td>Certified Forensic Computer Examiner</td>
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<td>Certified Fraud Examiner</td>
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<td>Certified Healthcare Information Security and Privacy Practitioner (HCISPP)</td>
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<td>Certified in Convergent Network Technologies (CCNT)</td>
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<td>Certified in Risk and Information Systems Control (CRISC)</td>
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<td>Certified Information Privacy Manager– all countries</td>
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<td>Certified Scrum Trainer</td>
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<td>Certified Secure Software Lifecycle Professional (CSSLP)</td>
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<td>Certified Software Quality Analyst (CSQA)</td>
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<tr>
<td>Certified Technical Architect                                (Salesforce.com)</td>
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<td>Certified Telecommunications Network Specialist (CTNS)</td>
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<td>Check Point Certified Master Architect (CCMA)</td>
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<td>Cisco Certified Architect</td>
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<tr>
<td>Cisco IPS (Intrusion Prevention System) Specialist</td>
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<td>Cisco VPN Specialist</td>
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<td>Citrix Certified Associate – Virtualization</td>
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<td>GIAC Assessing and Auditing Wireless Networks</td>
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<td>GIAC Critical Controls Certifications (GCCCC)</td>
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<td>GIAC Cyber Threat Intelligence (GCTI)</td>
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<td>GIAC Enterprise Defender (GCEAA)</td>
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<td>GIAC Exploit Researcher and Advanced Penetration Tester (GWAPT)</td>
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466 Tech Certifications Reported

Foote Partners News Release – January 20, 2019

GIAC Information Security Fundamentals (GISF)
GIAC Information Security Professional (GISP)
GIAC Mobile Device Security Analyst (GMDB)
GIAC Network Forensic Analyst (GNFA)
GIAC Python Coder (GPyC)
GIAC Reverse Engineering Malware (GREM)
GIAC Secure Software Programmer – Java
GIAC Security Essentials (GSEC)
GIAC Security Expert (GSE)
GIAC Security Leadership (GSLC)
GIAC Systems and Network Auditor (GSNA)
GIAC Web Application Penetration Tester (GWAPT)
HDI Customer Service Representative
HDI Desktop Support Manager
HDI Desktop Support Technician
HDI Support Center Team Lead
HDI Technical Support Professional
Help Desk Analyst: Tier 1 Support Specialist/Ed2Go
Help Desk Team Lead/RCSP
HP Accredited Integration Specialist (AIS)
HP Accredited Solutions Expert (ASE - all)
HP Accredited Technical Professional (ATP - all)
HP ASE – Cloud Integrator V2
HP ASE – Cloud Architect V2
HP ASE – Data Center and Cloud Architect V2/V3
HP ASE - Data Center and Cloud ArchitectV1
HP ASE - Storage Solutions Architect V1/V2
HP ASE - Vertica Big Data Solutions Administrator V1
HP APT - Big Data Vertica Solutions V1
HP APT - Cloud Administrator V1
HP APT - Storage Solutions V1/V2
HP Master Accredited Solutions Expert (MASE - all)
HP Master ASE - Storage Solutions Architect V1/V2
Huawei Certified Network Associate (all)
Huawei Certified Network Professional (all)
Huawei Certified Network Expert (all)
IBM Advanced Systems Administrator (all)
IBM Certified Administrator for SOA Solutions: WebSphere Process Server
IBM Certified Advanced Application Developer (all)
IBM Certified Advanced Database Administrator
IBM Certified Advanced Security Professional
IBM Certified Application Developer (all)
IBM Certified Database Administrator – DB2
IBM Certified Developer - Cognos
IBM Certified SOA Solution Designer
IBM Certified Solution Advisor - Cloud Computing
IBM Certified Solution Architect – Cloud Computing Infrastructure V1
IBM Certified Solution Designer - WebSphere
IBM Certified Solution Developer - DB2 SQL
IBM Certified Solution Developer - WebSphere (all)
IBM Certified Solution Expert - Cognos
IBM Certified Specialist - z System (all)
IBM Certified Specialist - Cognos
IBM Certified Specialist - Virtualized Storage V1
IBM Certified Systems Administrator - AIX V1
IBM Certified Systems Administrator - WebSphere
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 (J2EE, Persistence, ESB)
Juniper Networks Certified Internet Associate
Juniper Networks Certified Internet Expert
Juniper Networks Certified Internet Professional
Juniper Networks Certified Internet Specialist
Linux Professional Institute certification (LPIC-2)
Linux Professional Institute certification (LPIC-3)
Microsoft Certified Professional
Microsoft Certified Solutions Associate
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 (MCSD)
Microsoft Certified Solutions Developer: Applications Builder
Microsoft Certified Solutions Expert: Business Intelligence
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 Office Specialist
Microsoft Specialist in Windows 10
Mongo DB Certified DBA
Mongo DB Certified Developer
MongoDB Certified Developer Associate
NetApp Certified Data Administrator, ONTAP (OCF)
NetApp Certified Implementation Engineer (OCE)
NetApp Certified Storage Associates – Hybrid Cloud
NetScout/Gensys Certified Analyst (nCA)
NetScout/Gensys Certified Expert (nCE)
NetScout/Gensys Certified Master (nCM)
NetScout/Gensys 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
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 (OCO)
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 - 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 Infrastructure Implementation Certified Expert
Oracle VM 3.0 for x86 Certified Implementation Specialist
Pegasystems Certified Lead System Architect
Pegasystems Certified Senior Systems Architect
Pegasystems Certified System Architect
Pegasystems Certified Pega Business Architect PHP Certification
PMI Agile Certified Practitioner (PMI-ACP)
PMI Portfolio Management Professional (PMP)
PMI Professional in Business Analysis (PMI-PBA)
PMI Program Management Professional (PgMP)
PMI Project Management Professional (PMP)
PMI Risk Management Professional (PMI-RMP)
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

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466 Tech Certifications Reported

- 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 Mgmt and Automation Deployment
- VMware Certified Advanced Professional 6/7 - Cloud Mgmt and Automation Design
- VMware Certified Associate - Cloud
- VMware Certified Associate - Data Center Virtualization
- VMware Certified Design Expert – Network Virtualization
- VMware Certified Design Expert - Cloud Mgmt and Automation
- VMware Certified Design Expert (all)
- VMware Certified Design Expert 6 - Data Center Virtualization
- VMware Certified Professional - Digital Workspace
- VMware Certified Professional 6 - Data Center Virtualization
- VMware Certified Professional 6.5 - Data Center Virtualization
- VMware Certified Professional 6/6.5
- VMware Certified Professional 6/7 - Cloud Mgmt and Automation
- VMware Certified Professional - Network Virtualization
Tech Skills (Non-certified): Latest market value trends

(Data collected through January 1, 2019)
2-YEAR NON-CERTIFIED TECH SKILLS PAY TRENDS
(Through 1/1/2019 – 77,977 IT Professionals)

NON-CERTIFIED TECH SKILLS PAY TRENDS
BY CATEGORY
Average Median Pay for a Single Tech Skill (Non-certified)
(Through 1/1/2019 – 77,977 IT Professionals)

<table>
<thead>
<tr>
<th>NONCERTIFIED IT SKILLS CATEGORIES</th>
<th># of skills surveyed</th>
<th>% Change 3 mos</th>
<th>% Change 6 mos</th>
<th>% Change ANNUAL</th>
<th>% Change 2 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems/Networking</td>
<td>67</td>
<td>0.4%</td>
<td>1.5%</td>
<td>-0.1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Messaging and Communications</td>
<td>14</td>
<td>-1.0%</td>
<td>-5.8%</td>
<td>-7.6%</td>
<td>-8.5%</td>
</tr>
<tr>
<td>SAP &amp; Enterprise Business Applications</td>
<td>129</td>
<td>-1.6%</td>
<td>-3.6%</td>
<td>-4.3%</td>
<td>-4.0%</td>
</tr>
<tr>
<td>Apps Development Tools &amp; Platforms</td>
<td>94</td>
<td>2.2%</td>
<td>3.1%</td>
<td>5.7%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Web/e-Commerce Development</td>
<td>63</td>
<td>-0.5%</td>
<td>-0.4%</td>
<td>-1.3%</td>
<td>-1.7%</td>
</tr>
<tr>
<td>Database</td>
<td>46</td>
<td>2.8%</td>
<td>3.8%</td>
<td>4.0%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Operating Systems</td>
<td>15</td>
<td>-0.8%</td>
<td>-1.3%</td>
<td>0.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Management/Methodology/Process</td>
<td>63</td>
<td>1.3%</td>
<td>-0.6%</td>
<td>-0.1%</td>
<td>-4.5%</td>
</tr>
<tr>
<td>ALL NONCERTIFIED SKILLS REPORTED</td>
<td>551</td>
<td>0.6%</td>
<td>-0.3%</td>
<td>0.5%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Noncertified IT Skills Premium Pay - by Category, Last 15 years
(Values expressed as equivalent of % of base salary)

SOURCE: Data supporting these charts is from Foote Partners IT Skills & Certifications Pay Index™ (2004 to 2019 quarterly editions)
551 Non-Certified Tech Skills Reported

SAP & Enterprise Bus. Apps.
ABAP (all modules)
Baan
Enterprise Application Integration (EAI)
IBM Sterling
J.D. Edwards /Oracle
Lawson
Microsoft Dynamics
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 Payroll
Oracle Retail
Oracle SCM
Oracle SOA Suite
Pega
PeopleSoft (CRM/Financials/HCM)
Remedy
Salesforce
Accelerated SAP (SLM)
SAP AFS
SAP ALE
SAP APO
SAP Auto-ID infrastructure
SAP Banking
SAP Basis Components
SAP BI Accelerator
SAP BODI
SAP Data Services (SAP BODS)
SAP BO XI/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 CS
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 Hybrid
SAP Integrated Business Planning
SAP IS-Retail
SAP IS-U (Utilities)
SAP ITS
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 (B IW)
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 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 WBI
SAP WM
SAP WM – EWM
SAP Xeolius
Siebel
Software AG webMethods
SuccessFactors
Web Dynapro
Workday HCM
551 Non-Certified Tech Skills Reported

Web/e-Commerce Development
Active Server Pages
ActiveX
Adobe Experience Manager
Ajax
AngularJS
Apache Solr
Apache web server
Apache Wicket
Apex Code
Backbone.js
CGI
Cold Fusion MX
Content management systems
CSS/CSS3
Django
Docker
Documentum
Elasticsearch
Front End Development
Google Analytics
Google App Engine
Google Cloud Platform
HTML5
JavaBeans/EJB 3.0
JavaFX
HTML5
JavaBeans/EJB 3.0
JavaFX
JavaScript
JavaScript
Java Server Pages
JBoss Enterprise
Jetty
Joomla!
jQuery
JSON
KnockoutJS
Magento
Magnolia
Microsoft .NET
Microsoft BizTalk Server
Microsoft Commerce Server
Microsoft Identity Integration Server
Microsoft Internet Information Services
Microsoft Internet Security and Acceleration Server (ISA)

Management, Methodology and Process
Artificial Intelligence

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.js
Redux
REST
RESTful
SailPoint
Scalable Vector Graphics (SVG)
Secure software development
Sitecore CMS
SOAP
Social Media/Networks
Spring Framework
TIBCO
UDDI
Unbraco
VBScript
Video/graphics editing
Visual Interdev
VoicexML
Web collaboration appliances
Web Content Development
Web Design/Development
WebSphere
WebSphere DataPower
Wikis
WSDL
XAML/XACML
XHTML MP
XML (all variants)

Big Data Analytics
Bioinformatics
Business Analysis
Business Analytics
Business intelligence
Business process management/
modeling/improvement
Business performance
management (software/systems)
Capacity Planning/Management
Change management
COBIT
Collaboration software
Complex Event Processing/Event
Correlation
Configuration Management
Continuous Improvement
Continuous Integration CRM
Cybersecurity
Data Acquisition and Control
Security architecture and models
SEO
Service Management
Six Sigma/Lean Six Sigma
Social media analytics
Software development lifecycle
management
Splunk
Tableau
Test automation
Test Driven Development/Scripting
TIBCO ActiveMatrix BusinessWorks
TOGAF (Enterprise Architecture)
User Acceptance Testing
User Experience/Interface Design
Usability Research/Human Factors
Research
Waterfall
Web Analytics
Webtrends analytics
Zachman Framework

Machine Learning
Market
Metadata design and development
Microservices
Microsoft SQL Server Analysis Services
Microsoft Visio
Network Architecture
Penetration testing
Predictive Analytics and Modeling
Prescriptive Analytics
Program Management
Project management/governance
QlikView
Quality management/TQM
Quantitative Analysis/Regression Analysis
Razor
Requirements Engineering/Analysis
Risk analytics/assessment
Risk management
Robotic Process Automation
Security architecture and models
SEI
Service Management
Six Sigma/Lean Six Sigma
Social media analytics
Software development lifecycle
management
Splunk
Tableau
Test automation
Test Driven Development/Scripting
TIBCO ActiveMatrix BusinessWorks
TOGAF (Enterprise Architecture)
User Acceptance Testing
User Experience/Interface Design
Usability Research/Human Factors
Research
Waterfall
Web Analytics
Webtrends analytics
Zachman Framework

Azure Cosmos DB
Azure Data Factory
Azure SQL Database
Amazon RedShift
Azure SQL Database
Amazon RedShift
Base SAS
Blockchain
Cloudera Impala
CoucheBase Server
Database management
Data mining
Data security
DB2
dbase/xbase
ETL (Extract, transform, load)
Hbase
Informatica
Java Database Connectivity
Master data management
Microsoft Access
Microsoft Exchange Server
Microsoft SQL Server
2016/2014/2012/2008/2005
MongoDB
MySQL
NoSQL
OpenEdge ABL (Progress 4GL)
Oracle Application Server
Oracle Business Intelligence Enterprise Edition Plus
Oracle Coherence
Oracle DB 9i/10g/11/12c
Oracle Enterprise Manager
Oracle Exadata
Oracle Forms
Oracle Reports
PostgreSQL
Redis
Risk
Smart Contract
Scoop
Sybase Adaptive Server Teradata
TIBCO Spotfire
Visual SQL

Database
Amazon DynamoDB
Apache Cassandra
Apache CouchDB
Apache Hive

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### Systems/Networks
- Active Directory
- Ansible
- Apache Flume
- Arista
- ATM
- Azure Active Directory
- Business continuity and disaster recovery planning
- CA Endevor
- Chef/Opscode
- Cisco ASA
- Cisco CUCM
- Cisco ICM
- Cisco ISE/Identity Services Engine
- Cisco IPCC
- Cisco Nexus
- Cisco Prime
- Cisco UCCE
- Cisco UCCX
- Citrix XenApp
- Citrix XenServer
- Cloud architecture
- Cloud security
- DHCP
- EIGRP
- Ethernet
- Fast Ethernet
- Gigabit Ethernet (1 GgE/10 GgE)
- HP Converged System
- HP Quality Center
- HTTPS
- IaaS (Infrastructure as a Service)
- Infrastructure architecture
- Intrusion prevention/detection systems
- IPX/SPX
- Juniper
- LAN
- LTE
- 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 mgmt systems
- Network security management
- Novell Netware
- Paas
- Performance Analysis/Tuning
- Performance Testing
- Puppet
- Rackspace Cloud
- RedHat OpenShift
- Routing (e.g. OSPF)
- Salt
- SAN/Storage Area Networks
- Security skills (project-based)
- Security Information and Event Management (SIEM)
- Smart Contract
- SMTP
- SNA
- SolarWinds
- Storage virtualization/administration
- TCP/IP
- Terraform
- Tivoli
- Vagrant
- vCloud
- Virtualization (various)
- Virtual security
- VMware Server/ESX, 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
- Wireless Networking/Telecomm.
- WML

### Messaging & Communications
- ActiveMQ
- Apache Camel
- Apache Kafka
- IBM Domino
- Java Messaging Service
- Message-oriented Middleware (Wave, XMPP/Jabber, etc.)
- Microsoft Exchange
- Novell Groupwise
- Oracle Comm Messaging Server
- Outlook/cc:mail/variables clients
- RabbitMQ
- TIBCO Enterprise Message Service
- TIBCO Rendezvous
- Unified Communications/Messaging

### 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 2008/2003
Q4 2018 Trend Charts

2019 IT Skills & Certifications Volatility Index™
(Data collected through January 1, 2019)

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

2019 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 October 1, 2018 to January 1, 2019 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, 2019)

<table>
<thead>
<tr>
<th>TOTAL: All Skills and Certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 23.4% of skills and certifications (234 of 1,003) changed in market value in 4th Quarter 2018 compared to 20.3% in prior quarter</td>
</tr>
<tr>
<td>• 105 gained value and 129 declined in value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CERTIFIED SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 16.2% of reported certifications (74 of 458) changed market value in 4th Quarter 2018, down from 18.2% volatility in the prior quarter.</td>
</tr>
<tr>
<td>• 17 certifications gained market value; 57 declined in value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NON-CERTIFIED SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 29.2% of reported skills (159 of 551) changed value in 4th Quarter 2018, up from 26.1% in the prior quarter.</td>
</tr>
<tr>
<td>• 87 gained in market value; 72 declined in value</td>
</tr>
</tbody>
</table>

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.
TECH SKILLS VOLATILITY HIGHLIGHTS - 12 Year Trending

IT Skills and Certifications Volatility Index™ – 1,017 Skills and Certifications

This chart shows the percentage of skills and certs that changed value (either up or down) every calendar quarter since 2007.

Recent IT skills and certifications volatility trends

QUARTERLY SUMMARY

4th Quarter 2018 volatility in skills and certifications values measured 23.4%, virtually identical to the 23.1% quarterly average for the past 12 months and 2e% for the past 24 months.

**NON-CERTIFIED SKILLS VOLATILITY** in this quarter was nearly 30%, a sizable increase from 26.1% in the prior quarter.

**FINDING:** Q4 volatility was slightly higher than the one-year average for non-certified skills volatility.

**IT CERTIFICATIONS VOLATILITY** in this quarter was 16.2, the same as both the 12- and 24-months quarterly average for certifications.

**FINDING:** Q4 volatility was three points higher than the prior quarter the lowest since 4Q 2016.

(Pay data supporting these charts available in the IT Skills and Certifications Pay Index™ – 2007 to 2018 quarterly data edition)
VOLATILITY HIGHLIGHTS Tech Certifications – 4th Quarter 2018 data

Among 466 certifications surveyed, highest volatility (≥15%) occurred in these segments (ranked highest to lowest):

- IT Security
- Architecture/Project Mgt/Process

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

- Networking & Communications

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

- Architecture/Project Mgt/Process
- IT Security

(Source: Foote Partners LLC, 2019 IT Skills & Certifications Pay Index™)
VOLATILITY HIGHLIGHTS Noncertified Tech Skills – 4th Quarter 2018 data

VOLATILITY INDEX: How Many Noncertified IT Skills Changed Market Value in 4th Quarter 2018?

(Source: Foote Partners LLC, 2019 IT Skills & Certifications Pay Index™)

IT Skills and Certifications Volatility Index™
4Q 2018 data edition findings: Non-certified Tech Skills

Among 551 noncertified IT skills surveyed, high volatility (>20%) occurred in these segments (ranked highest to lowest):

- Applications Development Tools and Platforms
- Database
- Messaging & Communications
- SAP & Enterprise Business Apps
- Management/Methodology/Process
- Web/Ecommerce Development
- Operating systems

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

- Applications Development Tools and Platforms
- Database

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

- SAP & Enterprise Business Apps
- Messaging & Communications
IT Skills and Certifications Pay Index™

- Pay premiums for **1,017 certified and noncertified IT skills**
  - Three data points for each position: 10th, 50th, 90th percentile
- Verified and validated IT skills pay data from **77,977 IT professionals at 3,305 employers** in US and Canada
- Current data collected through January 1, 2019 (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

<table>
<thead>
<tr>
<th>Definition of IT skills premium pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Pay that IT workers receive for possessing high-value IT and business skills used on the job</td>
</tr>
<tr>
<td>- 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.)</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- May be used as a reward, recruiting inducement, retention tool, or as a guide for creating consulting rate cards</td>
</tr>
</tbody>
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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 298,000 tech professionals at 3,305 employers in 83 U.S. and Canada cities are reported for IT salaries and skills pay earned for 219 positions and 1,017 certified and noncertified technical and business skills. Verified and validated pay data for 77,977 tech workers has been included in the 4th Quarter 2018 data edition of the ITSCPI, compiled from data collected through January 1, 2019.

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: http://www.footepartners.com/itcompensation.html
Foote Partners 2019 IT Compensation Survey Product Map

Survey Demographics
- 65 US/18 Canadian cities
  (298,440 IT workers, 3,305 employers)
- 174 Europe/UK cities
  (188,075 IT workers, 2,045 employers)
- 45+ industries
- Updated continuously.

Salary Reports
- by job family
- by job family clusters
- for individual jobs in selected cities

Short-form Job Profiles (JD excerpts)

Long-form Job Descriptions
- updated continuously
- comprehensive, includes
  internal/external relationships key to job success; skills and
certification; detailed experience factors.

Salaries & Skills Reports
- SALARY+SKILLS REPORTS AVAILABLE
  - Applications Development
  - Big Data
  - Business Analyst/Business Technology
  - Database
  - Data Warehousing/Business Intelligence
  - E-Commerce
  - IT Architecture
  - Microsoft Windows
  - Networking
  - Operations & Engineering
  - Project Management
  - SAP
  - IT Security
  - Systems Engineering and Administration
  - Web/I-net

IT Infrastructure Survey
IT Base Positions Survey

IT Professional Salary Survey
(219 Jobs, 37 IT job families)

IT Skills & Certification Pay Index™
(1,017 skills/certs)

IT Skills Demand and Pay Trends Report

IT Skills HOT LISTS Forecast

IT Skills Volatility Index
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
Blog: Tech People Architecture