FOR IMMEDIATE RELEASE

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772-234-2787

Average market values for 585 non-certified tech skills rose in the first three months of 2020, driven by increases in cash pay premiums for skills in: Management/Methodology/Process, Applications Development Tools & Platforms, Messaging and Communications, Data/Database, and Operating Systems areas.

505 tech certifications continued their three-year overall decline in market value, with pay premiums losses spread across a wide variety of certification categories.

Only one viable enterprise solution to constant tech skills gaps and job deficits is having consistent success and results suggest that it’s accessible to any public or private sector organization—without the need for expensive consultants.

NOTE: This news release is a summary extract of content in the 2nd Quarter 2020 update of Foote Partners’ Tech Skills Demand and Pay Trends Report and IT Skills and Certification Volatility Index, two market intelligence trend reports updated every 3 months from data contributed by 3,578 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.

Vero Beach, FL – May 5, 2020 - Extra pay awarded by employers to talented tech professionals for 585 non-certified tech skills ---also known as cash pay premiums---increased slightly in the first calendar quarter of 2020. Currently averaging the equivalent of 9.6 percent of base salary on average for a single non-certified skill, the highest in 20 years. Conversely, average market values for 505 tech certifications decreased from January to March, down nearly 2 percent overall, currently earning the equivalent of 7.0 percent of base salary on average for a single certification. That's the lowest average pay premium for IT certifications in 7 years and the widest gap between certified and noncertified tech skills pay in 20 years.

This according to the latest quarterly update of Foote Partners’ IT Skills and Certifications Pay Index™ (ITSCPI) based on compensation data provided by 3,578 private and public-sector employers in 83 U.S. and Canadian cities who partner with the firm to report pay for their 324,480 technology professionals in the U.S. and Canada.
Since its launch in 1999, the *IT Skills and Certifications Pay Index™* has continuously tracked cash pay premiums paid to tech professionals by their employers for an ever-increasing number of popular tech skills and certifications. Rigorously validated data and detailed market analyses are updated and published by Foote Partners every 90 days. Currently, premiums are reported for 1,090 certifications and non-certified skills.

**Pay Performance, 3/12/24/24/36 months**
**Certified vs. Non-certified Tech Skills**
(79,652 IT professionals, data through 4/1/2020)

![Figure 1](image-url)

*Source: Foote Partners, IT Skills and Certifications Pay Index™ (1Q2017 – 1Q2020 datasets)*

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Figure 2

SOURCE: Foote Partners IT Skills and Certifications Pay Index™ 2000 to 2020 quarterly editions
TECH SKILLS AND CERTIFICATIONS SUMMARY: Quarterly and Annual Results – Through April 1, 2020

TECH CERTIFIED AND NON-CERTIFIED SKILLS PAY PERFORMANCE: By Category

NON-CERTIFIED TECH SKILLS. 149 of 585 non-certified tech skills changed in cash market value in the first quarter of 2020, with average cash pay premiums increasing by 1.1% overall. Pay performance in the first quarter of 2020 was higher for seven of eight non-certified tech skills categories reported. For the twelve-month period ending April 1, pay was higher for only three: Management/Methodology/Process, Data/Database; Applications Development skills.

Noncertified Tech Skills - % Growth/Decline
3 months & 12 months
(585 skills, data through 4/1/2020)

Source: Foote Partners IT Skills & Certifications Pay Index™, 1st Quarter 2020 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 April 1, 2020 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.

<table>
<thead>
<tr>
<th>TECH SKILLS (noncertified)</th>
<th>Highest Paying – Cash Premiums (A-Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications Development skills</td>
<td>- Amazon Athena</td>
</tr>
<tr>
<td>Elixir</td>
<td>- Amazon DynamoDB</td>
</tr>
<tr>
<td>HP Unified Functional Testing</td>
<td>- Amazon RedShift</td>
</tr>
<tr>
<td>Rstudio</td>
<td>- Apache Cassandra</td>
</tr>
<tr>
<td>Grunt</td>
<td>- Apache Hive</td>
</tr>
<tr>
<td>Apache Airflow</td>
<td>- Artificial Intelligence</td>
</tr>
<tr>
<td>Microsoft SQL Server Management Studio (SSMS)</td>
<td>- Big Data analytics</td>
</tr>
<tr>
<td>Selenium</td>
<td>- Blockchain</td>
</tr>
<tr>
<td>Automated Testing C#</td>
<td>- Cryptography (encryption, VPN, SSL/TLS, Hybrids)</td>
</tr>
<tr>
<td>C++</td>
<td>- Data Analytics</td>
</tr>
<tr>
<td>HP ALM (Application Lifecycle Management)</td>
<td>- Data Architecture</td>
</tr>
<tr>
<td>Integration Testing</td>
<td>- Data Engineering</td>
</tr>
<tr>
<td>MATLAB</td>
<td>- Data Science</td>
</tr>
<tr>
<td>Web/SOA/E-Commerce skills</td>
<td>- DevSecOps</td>
</tr>
<tr>
<td>XHTML MP</td>
<td>- Google TensorFlow</td>
</tr>
<tr>
<td>Video/graphics editing</td>
<td>- Hbase</td>
</tr>
<tr>
<td>Java Server Pages</td>
<td>- Identity and access management</td>
</tr>
<tr>
<td>Jetty</td>
<td>- IT Governance</td>
</tr>
<tr>
<td>Content management systems</td>
<td>- Machine Learning</td>
</tr>
<tr>
<td>Microsoft Silverlight</td>
<td>- Master data management</td>
</tr>
<tr>
<td>Umbraco</td>
<td>- Metadata design and development</td>
</tr>
<tr>
<td>Spring MVC</td>
<td>- Microservices</td>
</tr>
<tr>
<td>JBoss/WildFly</td>
<td>- Natural language processing</td>
</tr>
<tr>
<td>Google App Engine</td>
<td>- Neural Networks</td>
</tr>
<tr>
<td>Julia</td>
<td>- NIST</td>
</tr>
<tr>
<td>Mule/MuleESB</td>
<td>- Oracle Exadata</td>
</tr>
<tr>
<td>Applications skills</td>
<td>- Prescriptive Analytics</td>
</tr>
<tr>
<td>SAP Business One</td>
<td>- Quantitative Analysis/Regression Analysis</td>
</tr>
<tr>
<td>SAP CCM (Catalog Content Management)</td>
<td>- Risk analytics/assessment</td>
</tr>
<tr>
<td>Salesforce</td>
<td>- Rstudio</td>
</tr>
<tr>
<td>Oracle Eloqua</td>
<td>- Scala</td>
</tr>
<tr>
<td>SAP HR-PY (Payroll)</td>
<td>- Security architecture and models</td>
</tr>
<tr>
<td>SAP IS-U (Utilities)</td>
<td>- Smart Contract</td>
</tr>
<tr>
<td>Web Dynapro</td>
<td>- Tivoli</td>
</tr>
<tr>
<td>Oracle HFM (Hyperion Financial Management)</td>
<td>- UNIX</td>
</tr>
<tr>
<td>Systems/Networking skills</td>
<td>- Unix all</td>
</tr>
<tr>
<td>Apache Flume</td>
<td>- Mobile operating systems(iOS, Android, etc.)</td>
</tr>
<tr>
<td>Network security management</td>
<td></td>
</tr>
<tr>
<td>Cisco UCCE</td>
<td></td>
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<tr>
<td>Gigabit Ethernet</td>
<td></td>
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<tr>
<td>Storage virtualization/administration</td>
<td></td>
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<tr>
<td>Cisco UCCX</td>
<td></td>
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<tr>
<td>Microsoft Application Virtualization</td>
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<tr>
<td>Performance Analysis/Tuning</td>
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<tr>
<td>Tivoli</td>
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<tr>
<td>HP Quality Center</td>
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<tr>
<td>SAP &amp; Enterprise Business</td>
<td></td>
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<tr>
<td>Applications skills</td>
<td></td>
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<tr>
<td>SAP Business One</td>
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<tr>
<td>SAP CCM (Catalog Content Management)</td>
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<tr>
<td>Salesforce</td>
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<tr>
<td>Oracle Eloqua</td>
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<tr>
<td>SAP HR-PY (Payroll)</td>
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<td>SAP IS-U (Utilities)</td>
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<tr>
<td>Web Dynapro</td>
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<tr>
<td>Oracle HFM (Hyperion Financial Management)</td>
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<tr>
<td>Database Skills</td>
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<td>Base SAS</td>
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<tr>
<td>Oracle Coherence</td>
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<td>Tibco Spotfire</td>
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<tr>
<td>Teradata</td>
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<tr>
<td>Management, Process &amp; Methodology skills</td>
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<tr>
<td>Digital Analytics</td>
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<td>Tableau</td>
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<tr>
<td>Web Analytics</td>
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<tr>
<td>IT Audit</td>
<td></td>
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<tr>
<td>Data Quality</td>
<td></td>
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<tr>
<td>IT Governance</td>
<td></td>
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<tr>
<td>Game Development</td>
<td></td>
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<tr>
<td>Messaging/Communications skills</td>
<td></td>
</tr>
<tr>
<td>Oracle Communications Messaging Server</td>
<td></td>
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<tr>
<td>ActiveMQ</td>
<td></td>
</tr>
<tr>
<td>Message-oriented Middleware (Wave, XMPP/Jabber, etc.)</td>
<td></td>
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<tr>
<td>RabbitMQ</td>
<td></td>
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<tr>
<td>Operating Systems skills</td>
<td></td>
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<tr>
<td>Mac OS X</td>
<td></td>
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<tr>
<td>Solaris</td>
<td></td>
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<tr>
<td>Red Hat Enterprise Linux</td>
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<tr>
<td>Unix (all)</td>
<td></td>
</tr>
<tr>
<td>Mobile operating systems(iOS, Android, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Foote Partners IT Skills & Certifications Pay Index™, 1st Quarter 2020 data edition
NON-CERTIFIED IT SKILLS TREND HIGHLIGHTS: Market Value Losers

These noncertified IT skills *declined 10% or more in market value* in the three months ending April 1, 2020 (grouped by segment). Listed in *descending order of amount of % decline*, including ties.

<table>
<thead>
<tr>
<th>TECH SKILLS (Noncertified) Losers</th>
<th>SAP &amp; Enterprise Business Applications skills</th>
<th>Data/Database</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applications Development skills</strong></td>
<td>SAP LES (Logistics Execution System)</td>
<td>Oracle Enterprise Manager</td>
</tr>
<tr>
<td>Objective Caml (OCaml)</td>
<td>IBM Sterling</td>
<td>Java Database Connectivity (JDBC)</td>
</tr>
<tr>
<td>Ethereum</td>
<td>SAP ALE (Application Link Enabling)</td>
<td>dBASE/xBASE</td>
</tr>
<tr>
<td>Apache Pig</td>
<td>Baan</td>
<td></td>
</tr>
<tr>
<td>Apache Camel</td>
<td>SAP MDM (Master Data Management)</td>
<td></td>
</tr>
<tr>
<td>Web/E-commerce Development skills</td>
<td>SAP Exchange Infrastructure (XI)</td>
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<tr>
<td>CGI</td>
<td>SAP PI (NetWeaver Process Integration)</td>
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<tr>
<td>ColdFusion/ColdFusion MX</td>
<td>SAP SRM (Supplier Relationship Management)</td>
<td></td>
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<tr>
<td>Oracle WebLogic/Portal</td>
<td>SAP EBP (e-Procurement)</td>
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<tr>
<td>Documentum</td>
<td>SAP PSCD (Collection and Disbursement)</td>
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<tr>
<td>Magnolia</td>
<td>SAP Business Workflow/Webflow</td>
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<tr>
<td>RESTful</td>
<td>SAP BusinessObjects Dashboards (Xcelsius)</td>
<td></td>
</tr>
<tr>
<td>Apache Solr</td>
<td>SAP EPM (Enterprise Performance Management)</td>
<td></td>
</tr>
<tr>
<td>Oracle Fusion</td>
<td>SAP WEBI (BusinessObjects Web Intelligence)</td>
<td></td>
</tr>
<tr>
<td>Oracle Workflow</td>
<td>SuccessFactors</td>
<td></td>
</tr>
<tr>
<td>XAML/XACML</td>
<td>SAP CO (Controlling)</td>
<td></td>
</tr>
<tr>
<td>Management, Process &amp; Methodology</td>
<td>SAP PS (Project Systems)</td>
<td></td>
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<tr>
<td>Zachman Framework</td>
<td>SAP GRM (Governance, Risk, and Compliance)</td>
<td></td>
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<tr>
<td>TIBCO ActiveMatrix BusinessWorks</td>
<td>Oracle Payables</td>
<td></td>
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<tr>
<td>Penetration testing</td>
<td>PeopleSoft (CRM/Financials/HCM)</td>
<td></td>
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<tr>
<td>Metadata design and development</td>
<td>SAP APO (Advanced Planner &amp; Optimizer)</td>
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<td></td>
<td>SAP S/4HANA</td>
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<tr>
<td></td>
<td>SAP Security</td>
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<tr>
<td></td>
<td>SAP WM (Warehouse Management)</td>
<td></td>
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<tr>
<td></td>
<td>Oracle BPM</td>
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<tr>
<td></td>
<td>Pega</td>
<td></td>
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<tr>
<td></td>
<td>Software AG webMethods</td>
<td></td>
</tr>
</tbody>
</table>

Source: Foote Partners *IT Skills & Certifications Pay Index™*, 1st Quarter 2020 data edition
SUMMARY – cont’d.

TECH CERTIFICATIONS. The average cash pay premium for a tech certification is currently at its five-year low. In the quarter ending April 1, 2020, 505 tech certifications lost even more value, down an average of 1.9% in the quarter. Pay performance from January to March 2020 was lower for all but one certification segment, Applications Development & Programming Languages. For the twelve-month period ending April 1, 2020 pay was lower in all certification categories.

Tech Certifications - % Growth/Decline
3 months & 12 months
(505 certifications, data through 4/1/2020)

Figure 4

Source: Foote Partners IT Skills & Certifications Pay Index™, 1st Quarter 2020 data
# IT 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 April 1, 2020* (seen below grouped by segment). Listed in *descending order of amount of % gain in cash pay premium* (including ties). Highest paying skills listed on right in *alphabetical order*.

## TECH CERTIFICATION Gainers

<table>
<thead>
<tr>
<th>Info/Cyber Security certifications</th>
<th>Applications Development/Programming Languages</th>
<th>Systems Administration certifications</th>
<th>Architecture, Project Management, and Process Certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-Council Computer Hacking Forensic Investigator</td>
<td>Microsoft Certified Solutions Developer: Applications Builder</td>
<td>Red Hat Certified Architect</td>
<td>ITIL Foundation Certification</td>
</tr>
<tr>
<td>GIAC Certified Forensics Examiner</td>
<td>SAS Certified Base Programmer for SAS 9</td>
<td>HP ATP - Cloud Administrator V1</td>
<td>HDI Customer Service Representative</td>
</tr>
<tr>
<td>GIAC Certified Enterprise Defender</td>
<td></td>
<td>HP Accredited Solutions Expert (ASE - all)</td>
<td>Six Sigma Green Belt</td>
</tr>
<tr>
<td>Certified Secure Software Lifecycle Professional</td>
<td></td>
<td>Linux Professional Institute certification (LPIC-Level 3)</td>
<td>Certification of Competency in Business Analysis</td>
</tr>
<tr>
<td>CompTIA Advanced Security Practitioner</td>
<td></td>
<td>Red Hat Certified Engineer in Red Hat OpenStack</td>
<td>Certified Business Analysis Professional</td>
</tr>
<tr>
<td>GIAC Certified Perimeter Protection Analyst</td>
<td></td>
<td></td>
<td>Six Sigma Black Belt</td>
</tr>
<tr>
<td>GIAC Security Professional</td>
<td></td>
<td></td>
<td>HDI Technical Support Professional</td>
</tr>
<tr>
<td>GIAC Systems and Network Auditor</td>
<td></td>
<td></td>
<td>Salesforce.com Certified Technical Architect</td>
</tr>
<tr>
<td>EC-Council Certified Security Analyst</td>
<td></td>
<td></td>
<td>Certified Associate in Project Management</td>
</tr>
<tr>
<td>Networking and Communications certifications</td>
<td></td>
<td></td>
<td>ITIL Expert Certification</td>
</tr>
<tr>
<td>BICSI ITS Technician</td>
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<tr>
<td>BICSI Technician and Registered Communications Distribution Designer</td>
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<tr>
<td>CWNP/Certified Wireless Network Administrator</td>
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<tr>
<td>Brocade Certified Fabric Professional</td>
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<tr>
<td>Certified Telecommunications Network Specialist</td>
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<tr>
<td>Cisco Certified Design Associate</td>
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<tr>
<td>Cisco Certified Design Professional</td>
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<tr>
<td>VMware Certified Advanced Professional – Network Virtualization</td>
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<tr>
<td>Data/Database</td>
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<tr>
<td>Oracle Certified Professional - MySQL 5 Developer</td>
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<tr>
<td>Web Development</td>
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</tr>
<tr>
<td>CIW Certified Database Design Specialist</td>
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</tbody>
</table>

## Highest Paying – Cash Premiums (A – Z)

- Certified Business Analysis Professional (CBAP)
- Certified Cloud Security Professional (CCSP)
- Certified Computer Examiner (CCE)
- Certified Cyber Forensics Professional
- Certified Forensic Computer Examiner (CFCE)
- Certified in Risk and Information Systems Control (CRISC)
- Certified Information Systems Auditor (CISA)
- Certified Information Systems Security Professional (CISSP)
- Certified ScrumMaster
- Certified Secure Software Lifecycle Professional (CSSLP)
- Check Point Certified Security Master (CCSM)
- Cisco Certified Architect
- Cisco Certified Network Professional - Security
- Cloudera Certified Professional: Data Engineer
- CompTIA Advanced Security Practitioner (CASP)
- Cybersecurity Forensic Analyst (CSFA)
- EC-Council Certified Encryption Specialist (ECES)
- EC-Council Certified Incident Handler V2 (ECIH)
- EC-Council Computer Hacking Forensic Investigator (CHFI)
- EC-Council Licensed Penetration Tester (LPT)
- GIAC Certified Forensics Analyst (GCFIA)
- GIAC Certified Penetration Tester (GPTN)
- GIAC Security Expert (GSE)
- GIAC Security Leadership (GSLC)
- InfoSys Security Architecture Professional (ISSAP/CISSP)
- InfoSys Security Engineering Professional (ISEE/CISSP)
- PMI Portfolio Management Professional (PMP)
- PMI Professional in Business Analysis (PMI-PBA)
- PMI Program Management Professional (PgMP)
- PMI Risk Management Professional (PMI-RMP)
- Six Sigma Black Belt
- Zachman Certified - Enterprise Architect

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Source: Foote Partners' *Skills & Certifications Pay Index™*, 1st Quarter 2020 data edition
**IT CERTIFICATION PAY TREND HIGHLIGHTS: Market Value Losers**

These tech IT certifications declined 10% or more in market value in the three months ending April 1, 2020 vs. prior quarter (grouped by segment). Listed in descending order of amount of % decline, including ties.

<table>
<thead>
<tr>
<th>Application Development/Programming Languages</th>
<th>Systems Administration certifications</th>
<th>Web Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salesforce Certified Platform Developer</td>
<td>CompTIA Server+</td>
<td>VMware Certified Advanced Professional 6.5 - Data Center Virtualization Design</td>
</tr>
<tr>
<td>Siebel 8 Consultant Certified Expert</td>
<td>Pivotal Cloud Foundry Operator certification</td>
<td>VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Design</td>
</tr>
<tr>
<td>Microsoft Office Specialist</td>
<td>IBM Certified Specialist - z System (all)</td>
<td>VMware Certified Design Expert 6 - Data Center Virtualization</td>
</tr>
<tr>
<td>IBM Certified Developer - Cognos</td>
<td>IBM Certified Systems Administrator: WebSphere DataPower SOA</td>
<td>AWS Certified SysOpsAdministrator-Associate (Cloud)</td>
</tr>
<tr>
<td>IBM Certified Administrator - Cognos</td>
<td>IBM Certified Systems Administrator - AIX V1</td>
<td>NetApp Certified Storage Associates – Hybrid Cloud</td>
</tr>
<tr>
<td>IBM Certified Designer - Cognos BI</td>
<td>Novell Certified Administrator (CNA)</td>
<td>Rackspace Certified Technician</td>
</tr>
<tr>
<td>Microsoft Certified Solutions Associate: Microsoft Dynamics 365</td>
<td>SUSE Certified Administrator</td>
<td>Salesforce.com Certified Advanced Administrator</td>
</tr>
<tr>
<td>Oracle Certified Expert - Java Platform EE Developer (all)</td>
<td>IBM Advanced Systems Administrator (all)</td>
<td>VMware Certified Design Expert (all)</td>
</tr>
<tr>
<td>PHP Certification</td>
<td>IBM Certified Systems Administrator (all)</td>
<td>VMware Certified Design Expert - Cloud Mgt and Automation</td>
</tr>
<tr>
<td>Salesforce Commerce Cloud Digital Developer</td>
<td>Novell Certified Linux Engineer (CLE)</td>
<td>General/Foundation level and Training</td>
</tr>
<tr>
<td></td>
<td>Novell Identity Manager Administrator</td>
<td>CompTIA Certified Technical Trainer (CTT+)</td>
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<td></td>
<td>SUSE Enterprise Engineer (SCE)</td>
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<tr>
<td></td>
<td>IBM Certified Solution Advisor - Cloud Computing Architecture V5</td>
<td>Web Development</td>
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<tr>
<td></td>
<td>Red Hat Certified Engineer (RHCE)</td>
<td>CIW Web Design Professional</td>
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<tr>
<td></td>
<td>Red Hat Certified Systems Administrator (RHCSA)</td>
<td>Microsoft Certified Solutions Associate: Web Applications</td>
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<tr>
<td></td>
<td>SUSE Enterprise Architect (SEA)</td>
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</tbody>
</table>
## IT CERTIFICATION PAY TREND HIGHLIGHTS: Market Value Losers – cont’d

### TECH CERTIFICATIONS Losers – cont’d

**Architecture, Project Management, and Process Certifications**
- Certified in the Governance of Enterprise IT (CGEIT)
- Certified IT Architect (IASA-CITA)
- Help Desk Analyst: Tier 1 Support Specialist/Ed2Go
- EMC Cloud Architect Specialist
- Certified Scrum Developer
- Microsoft Specialist in Windows 10
- Certified Scrum Professional
- Certified ScrumMaster
- Cisco Certified Architect
- HDI Support Center Analyst
- Certified Software Quality Analyst (CSQA)
- Help Desk Team Lead/RCCSP
- PMI Program Management Professional (PgMP)
- Certified Cloud Architect
- Professional in Project Management (GAQM)
- TOGAF 9 Certified

**Networking & Communication**
- CWNP/Certified Wireless Analysis Professional (CWAP)
- CWNP/Certified Wireless Design Professional (CWDP)
- EMC Implementation Engineer - Specialist (EMCIE)
- Avaya Certified Design Specialist (ACDS)
- Cisco Certified Network Professional - Cloud
- EMC Implementation Engineer - Expert (EMCIE)
- EMC Technology Architect - Expert (EMCTA)
- CWNP/Certified Wireless Network Expert (CWNE)
- Juniper Networks Certified Internet Professional (JNCIP)

**Info/Cyber Security certifications**
- GIAC Secure Software Programmer-- .NET
- GIAC Network Forensic Analyst (GNFA)
- Qualified/ Information Security Professional Q/ISP
- GIAC Exploit Researcher and Advanced Penetration Tester (GXPN)
- EC-Council Certified Application Security Engineer (CASE)
- GIAC Web Application Penetration Tester (GWAPT)
- GIAC Secure Software Programmer--Java
- Cybersecurity Forensic Analyst (CSFA)
- GIAC Cyber Threat Intelligence (GCTI)
- RSA Certified Administrator (RSA/CA)
- CSX Cybersecurity Practitioner (CSXP)
- EC-Council Disaster Recovery Professional (EDRP)
- GIAC Certified Web Application Defender
- Certified Forensic Computer Examiner (CFCE)
- GIAC Python Coder (GPYC)
- CompTIA Security+

Source: Foote Partners IT Skills & Certifications Pay Index™, 1st Quarter 2020 data edition
2Q 2020 Tech Labor Trends Discussion & Analysis

IT Skills and Certifications Pay Index™

Data collected through April 1, 2020
TECH LABOR MARKET DISCUSSION & ANALYSIS

A. INTRODUCTION

2020 began with a bang for IT professionals with 25,300 tech jobs added to U.S. payrolls in the first two months according to the U.S. Bureau of Labor Statistics (BLS). But by March this number dropped to only 6,000 new IT jobs and then the bottom dropped out in April with the BLS reporting a stunning net loss of 181,300 tech jobs in America.

Clearly, for those of us who analyze the tech workforce and forecast tech labor markets the elephant in the room is the COVID-19 pandemic and how the economy will react to it in the coming months. It’s too early to say with accuracy what lies ahead but one thing is already certain: before the pandemic employers were already struggling mightily with devising and building successful tech staffing models to meet their future and present needs and now these objectives have become even more elusive.

In fact, it’s almost idyllic to think that prior to the pandemic the most common challenge shared by employers was balancing three things: the urgencies of digital transformation, combating ever deepening security threats, and at the same time keep increasingly complex systems and networks running smoothly and efficiently.

The staffing challenge has now moved well beyond this. More than ever, hiring managers need to think about their tech staffing needs strategically over the next few years, define specific tech skills that will be required and at what bench strength and not rely on consultants and contingent workers to solve their skills gap problems. They need to configure a roadmap for how to get there so that they’re not scrambling for talent last minute when the time comes.

We conducted interviews in early 2020 with 350+ senior tech execs and decision makers across 40 industries to inquire about their tech workforce plans. Our findings? Many not only realized the threat of constant inadequacy of their tech staffing bench strength but were conspicuously stressed out about it prior to the pandemic. They sensed harder tech labor challenges in 2020 than any year in recent history and this was before the pandemic took hold. They were open about ‘people problems’ getting exponentially worse unless their companies begin laying the groundwork right now for a new strategy for staffing that has, or soon will, be thrust upon each and every one of them.

What has concerned them most prior to the arrival of COVID-19 were game-changing emerging technologies that have been altering the landscape of not just businesses but the private lives of billions of people. Layered into all of these is also a requirement to build deeper cybersecurity capabilities for the escalating threat levels that these disruptors have created:

- Next-gen Internet of Everything
- AI-driven development
- Blockchain
- Mobility
- Big Data/Information Integration/ BI analytics
- Cybersecurity
- Distributed Cloud computing
- Hyperautomation/Robotic Process Automation
- Autonomous things
- Multiexperience Platforms
- Edge computing
- Healthcare tech/IoMT/Telemedicine
- Carbon-reducing technology/exponential energy
TECH LABOR MARKET DISCUSSION – cont’d.

Some execs believe that the coronavirus pandemic will undoubtedly create an acceleration in labor trends such as automation at their companies as they are forced to find ways to operate with fewer employees physically present. We agree it is likely that companies are going to be going digital and automating much faster. But at the same time there will need to be a significant up-skilling and retraining, especially for laid off workers. Moreover, we would not be surprised to see a reduction in middle management in the months and years ahead similar to the global recession in 2008.

We also heard many opinions about the newly amped up stay-at-home workforce remaining in place after the pandemic winds down. With tech professionals balancing the demands of work life and home life all in the same place, employers have relaxed rules about the number of hours their workforces are working which makes sense: it’s just a lot harder for employers to deny flexibility around work hours and work settings. The execs and decision makers we interviewed are increasingly calibrating expectations for when they need everyone in the office or online for staff meetings and other team activities.

Altogether this amounts to a massive transformation of the technology and tech-business hybrid workforce as the focus becomes how to deliver on a wide variety of new operational solutions and revenue-generating opportunities. And all of these prospects depend on solving a puzzle: how to get the mix of critical technology and business skills and experience just right when shortages of skills and talent have never been more constraining to business transformation, and to do it during pandemic uncertainties.

We believe the pandemic will not have a negative impact on technology evolution, a fact that has been proven time and again with past market interruptions. Evolving technology always seems to barrel down the train tracks at breakneck speed no matter what, often out-distancing the ability of humans to adopt it or turn it into elements of competitive advantage, market share, or profitability.

But what it will change is how various employers and industries choose to invest in technology now as their normal revenue channels are disrupted. For example, industries most directly affected by the pandemic—travel, hospitality, restaurants—are all buyers of technology and their relationship with their technology vendors and service providers will change, unlike those of Amazon, Alphabet/Google, Facebook, Netflix and even Apple who hold vast amounts of cash reserves and unwavering customer bases.

So too will this pandemic tip the scales in favor of large employers with sufficient resources to finance ferocious predatory behaviors in local tech talent markets stunned by recent developments. Recent data and empirical research collected from companies in our 3,578 research partner network in the U.S. and Canada has revealed many stories of ‘surgical’ labor losses by aggressive recruiters targeting specific individuals and also clusters of highly valued talent in specialized skill areas and product domains. Many employers caught in the haze of pandemic confusion never saw these critical talent losses coming and had only withering defenses to combat their talent defections.

One long time labor trend has shifted recently that will help them in the short term: the constant frenzy surrounding short term skills gaps and unfilled jobs targeted at point solutions has quieted down. There are many indicators for this including the fact that growth in pay for the 1,090 skills and certifications in our quantitative research has been flat for the past six months but negative for the past 12 months. In other words, the gap between supply and demand for tech skills has held constant across all certified and non-certified skills surveyed in recent months following more than two years of overall negative growth.
TECH LABOR MARKET DISCUSSION – cont’d.

The upshot is 2020 will continue the trend of employers taking stock in how poorly prepared they are from a talent perspective for consuming these revolutionary technologies and on top of that, when (or whether) they will continue to invest in them based on an anticipated global recession. We’ll know more as the weeks pass.

Digging out of the hole

Perhaps the hardest truth and most difficult barrier for most managers has been 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

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 arecommencing the serious work of repairing broken or underperforming people management systems and practices.
Architecture to the rescue—but this time for managing tech professionals

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 they will need to be operational in their future.

Our observation across more than 3,578 employers is that the only approach to this particular work that has ever achieved consistent success --- much less any proven success at all --- has been one based on a strong architectural foundation. Not business architecture or technical architecture but rather people architecture.

By this we mean applying, to human capital management, traditional architecture principles and practices. 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 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 around for years but primarily at consulting industry employers and 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.

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.

(For a detailed explanation of Tech People Architecture see: WorldatWorld Journal - November/December 2019 issue)

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 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 the past few years 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 Artificial Intelligence 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.
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 used to plan and administer pay — without changing the actual job titles bestowed on tech workers.
- Reducing tech staff churn in key roles, especially the most experienced tech workers
- Streamlining and simplifying compensation administration, giving employers the capacity to classify and market price any job, no matter how unique it is.
- Reducing uncertainty about how much to pay tech professionals, especially new jobs and the “Swiss Army knife” hybrid positions.
- Reducing job definition/design chaos around tech jobs that don’t fit in with established tech roles.
- Increasing consistent availability and quality of skills and workers and achieving higher utilization rates.

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.

**LABOR FORECAST: 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. 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 ANALYSIS: Training becomes the critical differentiator**

A recent 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: Ten of the Top Twelve certifications earning the highest certification cash premium among all 505 reported in the *Pay Index* are security-related certifications, averaging the equivalent of 13% to 15% of base salary. Further, in the most recent April 2020 data update of our *IT Professional Salary Survey*, Cybersecurity Specialists with three years of experience are averaging $99,225 in base salary in 65 U.S. cities. Senior level cyber specialists with five years’ experience are averaging $127,100.

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

Figure 5 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.

**Figure 5**

Activities in this quadrant offer good value at comparatively low cost.

Activities in this quadrant offer good value at higher cost.

Source: Cyentia Institute
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
IT Skills & Certifications Pay Data Trend Charts & Analysis

IT Skills and Certifications Pay Index™ – 1st Quarter 2020 data edition

(Data collected through April 1, 2020)

- Tech Certifications  (Page 24)
- Noncertified Teck Skills  (Page 39)
- Tech Skills & Certifications Volatility Index™ (Page 53)
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.
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. Non-certified IT Skill, Last 13 years – 79,652 IT professionals)

Source: Foote Partners, IT Skills and Certifications Pay Index™ (1Q 2007 – 1Q 2020 data editions)
Tech Certifications: Latest market value trends

(Data collected through January April 1, 2020)
2-YEAR TECH CERTIFICATIONS PAY TRENDS
(Through 4/1/2020 – 79,649 IT Professionals)

3 & 12 MONTH TECH CERTIFICATIONS PAY TRENDS BY CATEGORY
(Through 4/1/2020 – 79,649 IT Professionals)

% Change in Average Median Pay for a Single IT Certification
505 Tech Certifications Reported

Avaya Certified Design Specialist
Avaya Certified Implementation Specialist
Avaya Certified Integration Specialist
Avaya Certified Solution Specialist
Avaya Professional Design Specialist
AWS Certified Developer – Associate
AWS Certified DevOps Engineer – Professional
AWS Certified Solutions Architect – Associate
AWS Certified Solutions Architect – Professional
AWS Certified SysOps Administrator – Associate
BICSI Technical
BICSI Technician and Registered Communications Distribution Designer
Brocade Certified Network Engineer
Brocade Certified Network Professional
Brocade Certified Fabric Designer
Brocade Certified Fabric Professional (BCFPI)
Certificate of Cloud Security Knowledge
Certification Authorization Professional (CAP)
Certification of Competency in Business Analysis
Certified Analytics Professional (CAP)
Certified Associate in Project Management
Certified Business Analysis Professional (CBAP)
Certified Business Professional (CBP)
Certified Cloud Architect
Certified Cloud Security Professional
Certified Cloud Technology Professional
Certified Computer Examiner (CCE)
Certified Computing Professional (CCP-ISC²)
Certified Cyber Forensics Professional
Certified Data Center Management Professional
Certified Data Management Professional
Certified Database Design Specialist
Certified Disaster Recovery Engineer (C/DRE)
Certified Forensic Computer Examiner
Certified Fraud Examiner
Certified Healthcare Information Security and Privacy Practitioner (HCISPP)
Certified in Convergent Network Technologies (CCNT)
Certified in Governance, Risk and Compliance
Certified in Risk and Information Systems Control (CRISC)
Certified in the Governance of Enterprise IT (CGEIT)
Certified Information Privacy Manager – all countries
Certified Information Privacy Professional – all countries
Certified Information Privacy Technologist – all countries
Certified Information Security Manager (CISM)
Certified Information Systems Auditor (CISA)
Certified Information Systems Security Professional (CISSP)
Certified IP Telecom Network Specialist (CIPTS)
Certified IT Architect (IASA CITIA)
Certified IT Compliance Professional
Certified Manager of Software Quality (CMSQ)
Certified Penetration Testing Engineer (CPTPE)
Certified Project Management Practitioner
Certified Protection Professional
Certified ScrumMaster
Certified Scrum Coach
Certified Scrum Developer
Certified Scrum Product Owner
Certified Scrum Professional
Certified Scrum Trainer
Certified Secure Software Lifecycle Professional (CSSLP)
Certified Software Quality Analyst (CSQA)
Certified Telecommunications Network Specialist (CTNS)
Check Point Certified Master Architect (CCMA)
Check Point Certified Security Administrator (CCSA)
Check Point Certified Security Expert (CCSE)
Cisco Certified Architect
Cisco Certified Systems Instructor (CCSI)
Cisco Certified Design Associate (CCDA)
Cisco Certified Design Expert (CCDE)
Cisco Certified Design Professional (CCDP)
Cisco Certified Entry Network Technician (CCENT)
Cisco Certified Internetwork Expert – All (CCIE)
Cisco Certified Network Administrator – Cloud
Cisco Certified Network Associate (CCNA)
Cisco Certified Network Associate – CyberOps
Cisco Certified Network Associate – Data Center
Cisco Certified Network Associate - Routing and Switching
Cisco Certified Network Associate - Security
Cisco Certified Network Associate Wireless (CCNP Wireless)
Cisco Certified Network Professional (CCNP)
Cisco Certified Network Professional – Cloud
Cisco Certified Network Professional – Collaboration
Cisco Certified Network Professional - Data Center
Cisco Certified Network Professional - Routing and Switching
Cisco Certified Network Professional - Security
Cisco Certified Network Professional - Wireless
Cisco Certified Systems Instructor (CCSI)
Cisco Data Center Unified Computing Design Specialist
Cisco Data Center Unified Computing Support Specialist
Cisco Data Center Unified Fabric Design Specialist
Cisco Data Center Unified Fabric Support Specialist
Citrix Certified Administrator – Networking (CCA)
Citrix Certified Associate – Virtualization
Citrix Certified Expert – Networking
Citrix Certified Expert – Virtualization
Citrix Certified Instructor (CCI - Virtualization, Networking, or Mobility)
Citrix Certified Professional – Mobility (CCP-M)
Citrix Certified Professional - Networking
Citrix Certified Professional-Virtualization (CCP-VOV)
CIW Certified Database Design Specialist
CIW Web Development Professional
CIW Web Foundations Associate
CIW Web Security Professional
Cloud U (RackSpace)
Cloudera Certified Associate Administrator
Cloudera Certified Associate Data Analyst
Cloudera Certified Associate Spark and Hadoop Developer
Cloudera Certified Professional: Data Engineer
CompTIA A+
CompTIA Advanced Security Practitioner
CompTIA Certified Technical Trainer
CompTIA Cloud Essentials
CompTIA Cloud+1
CompTIA Cybersecurity Analyst+
CompTIA Linux+
CompTIA Mobile App Security+
CompTIA Mobility+
CompTIA Network (Network+)
CompTIA Penetration Tester
CompTIA Project+
CompTIA Security+
CompTIA Server+
CompTIA Storage+
Convergence Technologies Professional (CTP)
CSX Cybersecurity Practitioner (CSXP)
CWNP Certified Wireless Security Professional (CWSP)
CWNP/Certified Wireless Analysis Professional (CWAP)
CWNP/Certified Wireless Design Professional (CWDP)
CWNP/Certified Wireless Network Administrator (CWNA)
CWNP/Certified Wireless Network Trainer (CWNT)
CWNP/Certified Wireless Network Expert (CWNE)
CWNP/Certified Wireless Technology Specialist (CWTS)
Cyber Security Forensic Analyst
EC-Council Certified Advanced Network Defense (CAND)
EC-Council Certified Application Security Engineer
EC-Council Certified Encryption Specialist (ECES)
EC-Council Certified Ethical Hacker (CEH)
EC-Council Certified Incident Handler/V2 (CIH)
EC-Council Certified Network Defender (CND)
EC-Council Certified Security Analyst (ECSA)
EC-Council Computer Hacking Forensic Investigator (CHFI)
EC-Council Disaster Recovery Professional (EDRP)
EC-Council Licensed Penetration Tester (LPT)
EMC Cloud Architect Expert
EMC Cloud Architect Specialist
EMC Cloud Engineer (EMCC)
EMC Data Center Architect (EMDCA - all versions)
EMC Data Science Associate
EMC Data Science Specialist, Advanced Analytics
EMC Implementation Engineer - Expert (EMCIE)
EMC Implementation Engineer - Specialist (EMCIE)
EMC Information Storage Associate (EMCSA)
EMC Platform Engineer - Specialist (EMCPE)
EMC Storage Administrator - Associate (EMCSA-A)
EMC Storage Administrator - Expert (EMCSA-E)
EMC Storage Administrator - Specialist (EMCSA-S)
EMC System Administrator – Documentum Specialist (EMCSYS)
EMC Technology Architect - Expert (EMCTA)
EMC Technology Architect - Specialist (EMCTA)
GIAC Assessing Wireless Networks
GIAC Certified Defending Advanced Threats (GDAT)
GIAC Certified Detection Analyst (GCDA)
GIAC Certified Enterprise Defender (GCED)
GIAC Certified Forensics Analyst (GFA)
GIAC Certified Forensics Examiner
GIAC Certified Incident Handler (GCIH)
GIAC Certified Intrusion Analyst (GClA)
GIAC Certified Penetration Tester (GPTN)
GIAC Certified Privacy Protection Analyst (GPPA)
GIAC Certified Project Manager (GCPM)
GIAC Certified Unix Security Administrator (GCUX)
GIAC Certified Web Application Defender
GIAC Certified Windows Security Administrator (GCWN)
GIAC Critical Controls Certifications (GCC)
GIAC Cyber Threat Intelligence (GCTI)
GIAC Exploit Research and Advanced Penetration Tester (GWAPT)
GIAC Information Security Fundamentals (GISF)
GIAC Information Security Professional (GISP)
Red Hat Certified Architect
Red Hat Certified Architect: Application Development
Red Hat Certified Architect: Application Platform
Red Hat Certified Architect: Cloud
Red Hat Certified Architect: DevOps
Red Hat Certified Datacenter Specialist
Red Hat Certified Engineer in Red Hat OpenStack
Red Hat Certified Engineer
Red Hat Certified Specialist in Virtualization
Red Hat Certified System Administrator in Red Hat
OpenStack
Red Hat Certified Systems Administrator
RSA Certified Administrator (RSA/CA)
RSA Certified Instructor (RSA/CI)
Salesforce Certified Administrator
Salesforce Certified Advanced Administrator
Salesforce Certified Application Architect
Salesforce Certified Data Architecture and Management Designer
Salesforce Certified Mobile Solutions Architecture Designer
Salesforce Certified Platform Developer
SAS Certified Advanced Programmer for SAS 9
SAS Certified Base Programmer for SAS 9
SAS Certified Big Data Professional Using SAS 9
SAS Certified Data Integration Developer for SAS 9
SAS Certified Data Scientist Using SAS 9
SAS Certified Predictive Modeler - SAS Enterprise Miner
  14
SAS Certified Statistical Business Analyst - SAS 9
SAS® Certified Advanced Analytics Professional Using SAS®9
SAS® Certified BI Content Developer for SAS®9
SAS® Certified Data Quality Steward for SAS®
Siebel 8 Consultant Certified Expert
Six Sigma Black Belt
Six Sigma Green Belt
Six Sigma Master Black Belt
Six Sigma Yellow Belt
SNIA Certified Storage Architect
SNIA Certified Storage Networking Expert (SCSN-E)
SNIA Certified Storage Professional
SNIA Certified Systems Engineer Sniffer Certified Expert
SolarWinds Certified Professional (SCP)
SUSE Certified Administrator
SUSE Enterprise Engineer (SCE)
SUSE Enterprise Architect or (SEA)
Systems Security Certified Practitioner (SSCP)

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
RSA Certified Professional
RSA Certified SOA Architect
TIBCO Certified Professional
TIBCO Certified SOA Architect
TOGAF 9 Certified
VMware Certified Advanced Professional 6.5 - Data Center Virtualization Design
VMware Certified Advanced Professional – Network Virtualization
VMware Certified Advanced Professional (all)
VMware Certified Advanced Professional 6 - Data Center Virtualization Deployment
VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Deployment
VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Design
VMware Certified Associate - Cloud
VMware Certified Associate - Data Center Virtualization
VMware Certified Design Expert – Network Virtualization
VMware Certified Design Expert - Cloud Mgt and Automation
VMware Certified Design Expert (all)
VMware Certified Design Expert 6 - Data Center Virtualization
VMware Certified Professional - Digital Workspace
VMware Certified Professional – Desktop and Mobility 2019
VMware Certified Professional - Network Virtualization
VMware Certified Professional 6 - Data Center Virtualization (VCP6-DCV)
VMware Certified Professional 6.5 - Data Center Virtualization (VCP6.5-DCV)
VMware Certified Professional 6/6.5
VMware Certified Professional 6/7 - Cloud Mgt and Automation
ANALYSIS – Tech Certifications

A. TECH CERTIFICATIONS CURRENTLY EARNING WELL ABOVE-AVERAGE PAY AND STILL GAINING IN CASH MARKET VALUE

Average market values for 505 tech certifications decreased in the first three months of 2020 for the seventh consecutive calendar quarter, down nearly 2 percent overall down 4.5 percent in market value in the last twelve months. Pay premiums for single certifications are averaging the equivalent of 7.0% of base salary in March 2020.

Why are more certifications losing value than gaining value?

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

But just as often it’s their popularity that drives down pay premiums for a certification: as interest in a certification escalates and more people attain the certification the gap between supply and demand for the certification narrows, driving down its market value as the laws of scarcity would dictate. This has been documented in the case of dozens of certifications over the 19 years Foote Partners has been tracking and reporting their market values in the IT Skills and Certifications Pay Index.

*  *  *

Which certifications are bucking the trend—highest paying and still growing in value? The following tech certifications are distinctive for two reasons: they recorded notable gains in cash market value in the six months ending April 1, 2020 and are also earning cash pay premiums significantly higher than the average of all 505 certifications being reported.

INFO / CYBERSECURITY

1. EC-Council Computer Hacking Forensic Investigator (CHFI)
ComptIA Advanced Security Practitioner (CASP)

   Average Pay Premium: 13 percent of base salary equivalent
   Market Value Increase: 30 percent (in the six months through April 1, 2020)

The ComptIA Advanced Security Practitioner (CASP) is a hands-on, performance-based certification for practitioners — not managers — at an advanced skill level of cybersecurity. While cybersecurity managers help identify what cybersecurity policies and frameworks could be implemented, CASP certified professionals figure out how to implement solutions within those policies and frameworks. This certification validates advanced-level competency in risk management, enterprise security operations and architecture, research and collaboration, and integration of enterprise security. It measures knowledge in the following:
ANALYSIS - cont'd

- Enterprise security domain expanded to include operations and architecture concepts, techniques and requirements
- More emphasis on analyzing risk through interpreting trend data and anticipating cyber defense needs to meet business goals
- Expanding security control topics to include mobile and small-form factor devices, as well as software vulnerability

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 but not limited to 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.

Likewise, achieving the **Computer Hacking Forensic Investigator (CHFI)** certification validates that you have the knowledge and skills to detect hacking attacks, to properly obtain evidence needed to report the crime and prosecute the cybercriminal, and to conduct an analysis that enables you to prevent future attacks. CHFI presents a methodological approach to computer forensics including searching and seizing, chain-of-custody, acquisition, preservation, analysis and reporting of digital evidence. With a focus on computer forensics from a vendor-neutral perspective, CHFI certification provides the ideal level of network security expertise for law enforcement personnel, system administrators, security officers, defense and military personal, legal professionals, bankers, security professionals and anyone who is concerned about the integrity of the network infrastructure.

CHFI investigators can draw on an array of methods for discovering data that resides in a computer system, or recovering deleted, encrypted, or damaged file information known as computer data recovery. The purpose of the CHFI credential is to validate the candidate’s skills to identify an intruder’s footprints and to properly gather the necessary evidence to prosecute in the court of law.

2. **GIAC Certified Forensics Analyst (GCFA)**  
   **Certified Secure Software Lifecycle Professional (CSSLP)**  
   Average Pay Premium: 13 percent of base salary equivalent  
   Market Value Increase: 18.2 percent (in the six months through April 1, 2020)

The **GIAC Certified Forensics Analyst** focuses on computer forensics in the context of investigation and incident response, and thus also focus on the skills and knowledge needed to collect and analyze data from Windows and/or Linux computer systems during such activities. It certifies that candidates have the knowledge, skills, and ability to conduct formal incident investigations and handle advanced incident handling scenarios, including internal and external data breach intrusions, advanced persistent threats, anti-forensic techniques used by attackers, and complex digital forensic cases. The GCFA certification focuses on core skills required to collect and analyze data from Windows and Linux computer systems.

GCFAs are front line investigators during computer intrusion breaches across the enterprise. They can help identify and secure compromised systems even if the adversary uses anti-forensic techniques. Using advanced techniques such as file system timeline analysis, registry analysis, and memory inspection, GCFAs are adept at finding unknown malware, rootkits, and data that the intruders thought had been eliminated from the system.
Areas of expertise covered in this certification include:

- Advanced Incident Response and Digital Forensics
- Memory Forensics, Timeline Analysis, and Anti-Forensics Detection
- Threat Hunting and APT Intrusion Incident Response

These are the most common roles for GPEN certificants:

- Incident Response Team Members
- Threat Hunters
- SOC Analysts
- Experienced Digital Forensic Analysts
- Information Security Professionals
- Federal Agents and Law Enforcement Professionals
- Red Team Members, Penetration Testers, and Exploit Developers
- GCFE and GCIH Cert Holders

Like other (ISC)² certifications, the **Certified Secure Software Lifecycle Professional (CSSLP)** is a vendor-neutral credential relevant to many kinds of programming and development projects. Aimed at software developers, engineers, architects, QA and penetration testers, security specialists and the like, the CSSLP recognizes competency in securing applications throughout the software development lifecycle. Prerequisites include at least four years' full-time work-related experience in the software development lifecycle (SDLC) in at least one of eight CSSLP domains, or three years' experience plus a bachelor's degree or equivalent in an IT-related field such as computer science or information technology. The required exam covers all phases of this lifecycle, including secure software concepts, requirements, design, implementation and coding, and testing. Candidates should also be up to speed on the eight CSSLP Common Body of Knowledge (CBK) domains which include software concepts, requirements, design, implementation/programming, testing, lifecycle management, deployment, and operations.

3. **EC-Council Certified Incident Handler V2 (ECIH)**
   - **Average Pay Premium:** 12 percent of base salary equivalent
   - **Market Value Increase:** 33.3 percent (in the six months through April 1, 2020)

Incident handler is a term used to describe the activities of an organization to identify, analyze, and correct hazards to prevent a future reoccurrence. These incidents within a structured organization are normally dealt with by a either an Incident Response Team (IRT), or an Incident Management Team (IMT). The teams are often either designated beforehand, or during the event and are placed in control of the organization while the incident is dealt with, in order to retain business processes. The **EC-Council Certified Incident Handler** is a skilled professional who is able to handle various types of incidents, risk assessment methodologies, and various laws and policies related to incident handling. They are able to create incident handling and response policies and deal with various types of computer security incidents such as network security incidents, malicious code incidents, and insider attack threats. The sheer number cyber incidents that require these skills is clearly on the rise and so therefore are ECIH certified workers.
SUMMARY - cont’d

High-value penetration testing doesn't involve just throwing a bunch of hacks at a target environment and declaring victory when a shell prompt magically pops up. Instead, the best penetration testers focus on understanding their craft in-depth. Pen Test professionals provide significant value to organizations by improving their security stance through technical excellence and implementation of well-understood and repeatable methodologies. Ultimately, delivering real savings through information security to the business.

4. GIAC Certified Penetration Tester (GPEN)
   Average Pay Premium: 12 percent of base salary equivalent
   Market Value Increase: 20 percent (in the six months through April 1, 2020)

The GIAC Certified Penetration Tester certification validates a practitioner's ability to properly conduct a penetration test, using best practice techniques and methodologies. GPEN certification holders have the knowledge and skills to conduct exploits and engage in detailed reconnaissance, as well as utilize a process-oriented approach to penetration testing projects.

Areas of expertise covered in the GPEN include:
- Comprehensive Pen Test Planning, Scoping, and Recon
- In-Depth Scanning and Exploitation, Post-Exploitation, and Pivoting
- In-Depth Password Attacks and Web App Pen Testing

These are the roles most common roles for GPEN certificants:
- Security personnel responsible for assessing networks and systems to find and remediate vulnerabilities
- Penetration testers
- Ethical hackers
- Red Team members
- Blue Team members
- Defenders, auditors, and forensic specialists who want to better understand offensive tactics

5. EC-Council Certified Encryption Specialist (ECES)
   Average Pay Premium: 12 percent of base salary equivalent
   Market Value Increase: 9.1 percent (in the six months through April 1, 2020)

The EC-Council Certified Encryption Specialist (ECES) certifications introduces professionals and students to the field of cryptography. Certificants have a solid foundation in modern symmetric and key cryptography including the details of algorithms such as Feistel Networks, DES, and AES, plus:
- Other algorithms such as Blowfish, Twofish, and Skipjack
- Hashing algorithms including MD5, MD6, SHA, Gost, RIPMD 256 and others.
- Asymmetric cryptography including thorough descriptions of RSA, Elgamal, Elliptic Curve, and DSA.
- Significant concepts such as diffusion, confusion, and Kerkchoff’s principle.
Certificants are also qualified to provide a practical application of the following:

- How to set up a VPN
- Encrypt a drive
- Hands-on experience with steganography
- Hands on experience in cryptographic algorithms ranging from classic ciphers like Caesar cipher to modern day algorithms such as AES and RSA.

6. **GIAC Certified Enterprise Defender (GCED)**
   
   Average Pay Premium: 11 percent of base salary equivalent  
   Market Value Increase: 22.2 percent (in the six months through April 1, 2020)

   *The GIAC Certified Enterprise Defender (GCED) certification builds on the security skills measured by the GIAC Security Essentials certification. It assesses more advanced, technical skills that are needed to defend the enterprise environment and protect an organization as a whole. GCED certification holders have validated knowledge and abilities in the areas of defensive network infrastructure, packet analysis, penetration testing, incident handling and malware removal. Areas covered by this certification include:*

   - Incident handling and computer crime investigation
   - Computer and network hacker exploits
   - Hacker tools (Nmap, Nessus, Metasploit and Netcat)

7. **GIAC Certified Forensics Examiner (GCFE)**
   
   Average Pay Premium: 10 percent of base salary equivalent  
   Market Value Increase: 11.1 percent (in the six months through April 1, 2020)

   *The GIAC Certified Forensic Examiner (GCFE) certification validates a practitioner's knowledge of computer forensic analysis, with an emphasis on core skills required to collect and analyze data from Windows computer systems. GCFE certification holders have the knowledge, skills, and ability to conduct typical incident investigations including e-Discovery, forensic analysis and reporting, evidence acquisition, browser forensics and tracing user and application activities on Windows systems. Areas covered by this certification include:*

   - Windows Forensics and Data Triage
   - Windows Registry Forensics, USB Devices, Shell Items, Key Word Searching, Email and Event Logs
   - Web Browser Forensics (Firefox, IE and Chrome) and Tools (Nirsoft, Woanware, SQLite, ESEDatabaseView and Hindsight)
ARCHITECTURE, PROJECT MANAGEMENT AND PROCESS

1. Six Sigma Black Belt
   Average Pay Premium: 12 percent of base salary equivalent
   Market Value Increase: 20 percent (in the six months through April 1, 2020)

Six Sigma levels simplified. Six Sigma is defined as a method for reducing variation in manufacturing, service or other business processes. At the project level, there are master black belts, black belts, green belts, yellow belts, and white belts. These people conduct projects and implement improvements.

- **Master Black Belt**: Trains and coaches Black Belts and Green Belts. Functions more at the Six Sigma program level by developing key metrics and the strategic direction. Acts as an organization’s Six Sigma technologist and internal consultant.
- **Black Belt**: Leads problem-solving projects. Trains and coaches project teams.
- **Green Belt**: Assists with data collection and analysis for Black Belt projects. Leads Green Belt projects or teams.
- **Yellow Belt**: Participates as a project team member. Reviews process improvements that support the project.
- **White Belt**: Can work on local problem-solving teams that support overall projects, but may not be part of a Six Sigma project team. Understands basic Six Sigma concepts from an awareness perspective.
- **Brown Belt**: Brown Belt is not traditionally used in Six Sigma and is not recognized by most organizations or accrediting agencies. However, some organizations may classify a Brown Belt as a person who has their Green Belt and has passed the Black Belt certification exam, but hasn't completed a second Six Sigma project.

The **Certified Six Sigma Black Belt** is a professional who can explain Six Sigma philosophies and principles, including supporting systems and tools. A Black Belt should demonstrate team leadership, understand team dynamics and assign team member roles and responsibilities. Black Belts have a thorough understanding of all aspects of the define, measure, analyze, improve and control (DMAIC) model in accordance with Six Sigma principles. They have basic knowledge of lean enterprise concepts, are able to identify non-value-added elements and activities and are able to use specific tools.

Earning a **Six Sigma Black Belt** requires two completed projects with signed affidavits or one completed project with signed affidavit and three years of work experience in one or more areas of the Six Sigma Body of Knowledge. The Six Sigma Black Belt project is one that uses appropriate tools within a Six Sigma approach to produce breakthrough performance and real financial benefit to an operating business or company. The tools are generic: It is the structure of the project and the associated process (improvement model) that distinguish a Black Belt project from other similar quality improvement projects. Financial impact as an outcome is also a requirement within a Black Belt project when compared to other projects.

**Examples of projects that qualify:**
- Manufacturing product defect reduction.
- Human resources recruitment cycle time reduction.
- Reduced accounts payable invoice processing costs.
- Reduced Manufacturing machine setup time.
Projects that do not qualify:
- Prepackaged or classroom exercise that are mock, or simulated projects that were previously completed and/or that do not include actual "hands on" work.
- No real organization or business unit; no current problem or cost benefit.
- Basic product improvement projects not associated with process improvements.
- Software maintenance or remediation without detailed process measurements.
- Any project without measured before-and-after cost benefits.

2. **Certification of Capability in Business Analysis (CCBA)**
   
   **Average Pay Premium:** 11 percent of base salary equivalent  
   **Market Value Increase:** 22.2 percent (in the six months through April 1, 2020)

   The **Certification of Capability in Business Analysis (CCBA)** designation is a professional certification from International Institute of Business Analysis (IIBA) for business analysis practitioners who want to be recognized for their expertise and skills.

   The CCBA highlights a certificant’s capability to work effectively with stakeholders, to model business processes, and identify and evaluate opportunities for better business outcomes. The certification represents skills and knowledge applied to real-life scenarios.

   The CCBA exam is based on *A Guide to the Business Analysis Body of Knowledge* (BABOK Guide). To earn the CCBA designation, a business analyst needs to be knowledgeable in all six knowledge areas in the BABOK Guide with proficiency in at least two. To apply for the Capability in Business Analysis (CCBA) exam, applicants must meet the following criteria:

   - Minimum 3750 hours of business analysis work experience aligned with BABOK Guide in the last seven years
   - Minimum 900 hours in each of 2 of the 6 knowledge areas OR 500 hours in each of 4 of the 6 knowledge areas
   - Minimum 21 hours of Professional Development in the past four years
   - Minimum high school education or equivalent
   - Two references from a career manager, client or Certified Business Analysis Professional recipient

3. **Six Sigma Green Belt**

   **Average Pay Premium:** 10 percent of base salary equivalent  
   **Market Value Increase:** 25 percent (in the six months through April 1, 2020)

   The **Six Sigma Green Belt** operates in support of or under the supervision of a Six Sigma Black Belt, analyzing and solving quality problems and involved in quality improvement projects. They help with statistical analysis and may lead projects in a part-time capacity. A Green Belt has at least three years of work experience who wants to demonstrate his or her knowledge of Six Sigma tools and processes. They are employees who spend some of their time on process improvement teams.

   The Six Sigma Green Belt certification requires three years of work experience in one or more areas of the Six Sigma Green Belt Body of Knowledge. Candidates must have worked in a full-time, paid role. Paid intern, co-op or any other course work cannot be applied toward the work experience requirement.
Minimum expectations of a Certified Six Sigma Green Belt are:

- Operates in support of or under the supervision of a Six Sigma Black Belt.
- Analyzes and solves quality problems.
- Involved in quality improvement projects.
- Participated in a project, but has not led a project.
- Has at least three years of work experience.
- Has ability to demonstrate their knowledge of Six Sigma tools and processes.

### 4. ITIL Expert Certification

**Average Pay Premium:** 10 percent of base salary equivalent  
**Market Value Increase:** 11.1 percent (in the six months through April 1, 2020)

The ITIL Expert is an advanced certification that encompasses the breadth and depth of ITIL processes and practices across all ITIL disciplines. This certification is aimed at those who are interested in demonstrating knowledge of the ITIL Scheme in its entirety. The certificate is awarded to candidates who have achieved a range of ITIL certifications and have achieved a well-rounded, superior knowledge and skills base in ITIL Best Practices. ITIL Expert certification is also a prerequisite for the ITIL Master certification.

There are many possible combinations of modules from the ITIL framework available to those wishing to attain the ITIL Expert certificate, but there are some key requirements:

- End learners must hold the ITIL v3 Foundation* certificate or ITIL 4 Foundation certificate
- End learners must have earned a minimum total of 17 credits from the Foundation and Intermediate modules.
- Some credits from earlier qualifications and complementary certifications can also count towards these 17 credits. See the ITIL Credit System page for more information.
- The Managing Across the Lifecycle (MALC) module must then be taken and passed to achieve a total of 22 credits, which is the minimum required for the ITIL Expert certificate.

**What is ITIL?** The Information Technology Infrastructure Library, better known as ITIL, is a framework for managing IT service delivery around the world. ITIL defines a service lifecycle model that prescribes specific processes and activities during the design, development, delivery, and support of IT services, that is, any IT activities that deliver business value to a company's end users, customers and other internal or external stakeholders. Examples of IT services include centralized corporate email and corporate websites based on back-end IT processes, such as server and network administration. The current version of ITIL is known as ITIL V3.

By adopting the ITIL framework, companies ensure that their services are delivered according to a set of consistent, well-defined processes that incorporate best practices and processes, resulting in a predictable level of service for users. The benefits of ITIL include reduced cost of service development and deployment, improved customer satisfaction with service delivery, increased productivity from IT personnel, quality improvements, better management metrics of services and increased flexibility in adapting services to changing business requirements.
SUMMARY - cont’d

The ITIL service lifecycle consists of five practice areas or phases, with supporting principles, policies and processes within each phase:

- **Service Strategy**: This phase focuses on defining services as strategic assets, and then maintaining and implementing a coherent, deliberate strategy. Service strategy principles address business processes, corporate governance and compliance, policies, corporate culture and decision-making, and ensure that the business is geared for service improvement.
- **Service Design**: This phase includes the assessment of business management processes (service level, availability, capacity, etc.) to design and develop new service offerings or improve existing offerings.
- **Service Transition**: This phase covers the transition from development to production operations, including testing and quality control.
- **Service Operation**: This phase defines how to manage services once they’re in production use. It addresses service operation processes, such as event management, access management, incident response, the application lifecycle and helpdesk support.
- **Continuous Service Improvement**: This phase defines new requirements for the preceding phases of ITIL based on operational feedback and service levels. It helps to ensure that policies and procedures are followed, that service level agreements are met and that operational lessons learned are incorporated into existing and future service refinements.

ITIL offers five different certification levels: Foundation; Practitioner; Intermediate (Service Lifecycle and Service Capability categories); Expert; Master

APPLICATIONS DEVELOPMENT & MANAGEMENT/PROCESS/METHODOLOGY

1. **AWS Certified DevOps Engineer – Professional**
   - Average Pay Premium: 10 percent of base salary equivalent
   - Market Value Increase: 11.1 percent (in the six months through April 1, 2020)

*The AWS Certified DevOps Engineer certification is all about provisioning, operating, and managing applications on the AWS platform. This certification focuses heavily on continuous delivery (CD) and the automation of processes, two fundamental concepts of the DevOps movement. Areas of knowledge covered to pass the exam include: The basics of modern CD methodologies; How to implement CD systems; Set up, monitoring, and logging systems on AWS; How to implement highly available and scalable systems on AWS; and How to design and manage tools that enable automation of production operations.*

*Abilities validated by the certification:*  
- Implement and manage continuous delivery systems and methodologies on AWS  
- Implement and automate security controls, governance processes, and compliance validation  
- Define and deploy monitoring, metrics, and logging systems on AWS  
- Implement systems that are highly available, scalable, and self-healing on the AWS platform  
- Design, manage, and maintain tools to automate operational processes
### SUMMARY - cont’d

Recommended knowledge and experience:
- Experience developing code in at least one high-level programming language
- Experience building highly automated infrastructures
- Experience administering operating systems
- Understanding of modern development and operations processes and methodologies

### B. TECH CERTIFICATIONS LOSING THE MOST IN CASH MARKET VALUE

In the table below are tech certifications currently recording the largest market value losses in the six months ending April 1, 2020. In some 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>6-mo. Market Value Change (Oct. 2019 to April 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siebel 8 Consultant Certified Expert</td>
<td>4 %</td>
<td>-42.9 %</td>
</tr>
<tr>
<td>GIAC Secure Software Programmer - .NET</td>
<td>8 %</td>
<td>-33.3 %</td>
</tr>
<tr>
<td>IBM Certified Solution Advisor - Cloud Computing Architecture V5</td>
<td>6 %</td>
<td>-33.3 %</td>
</tr>
<tr>
<td>Microsoft Certified Solutions Associates; Web Applications IBM Certified Specialist – z Systems (all)</td>
<td>4%</td>
<td>-33.3 %</td>
</tr>
<tr>
<td>CIW Web Design Professional</td>
<td>2 %</td>
<td>-33.3 %</td>
</tr>
<tr>
<td>Certified in Convergent Network Technologies IBM Advanced Systems Administrator (all)</td>
<td>5 %</td>
<td>-28.6 %</td>
</tr>
<tr>
<td>GIAC Information Security Fundamentals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIAC Network Forensic Analyst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIAC Web Application Penetration Tester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIAC Security Software Programmer – Java</td>
<td>8 %</td>
<td>-27.3 %</td>
</tr>
<tr>
<td>Certified in the Governance of Enterprise (CGEIT)</td>
<td>11 %</td>
<td>-26.7 %</td>
</tr>
<tr>
<td>Certified IT Architect (IASA- CITA)</td>
<td>9 %</td>
<td>-25.0 %</td>
</tr>
<tr>
<td>GIAC Mobile Device Security Analyst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Desk Analyst: Tier 1 Support Specialist/Ed2Go HP Master Accredited Solutions Expert</td>
<td>6%</td>
<td>-25.0 %</td>
</tr>
<tr>
<td>Qualified/Information Security Professional (Q/ISP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Hat Certified Systems Administrator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salesforce Certified Platform Developer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CompTIA Server+</td>
<td>3 %</td>
<td>-25.0 %</td>
</tr>
</tbody>
</table>

Fig 5
Tech Skills (Non-certified): Latest market value trends

(Data collected through April 1, 2020)
### NONCERTIFIED IT SKILLS CATEGORIES

<table>
<thead>
<tr>
<th>Category</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>
<th>% Change 3 yrs</th>
<th>% Change 4 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems/Networking</td>
<td>85</td>
<td>2.0%</td>
<td>-0.3%</td>
<td>-1.8%</td>
<td>-1.9%</td>
<td>-1.2%</td>
<td>-1.7%</td>
</tr>
<tr>
<td>Messaging and Communications</td>
<td>13</td>
<td>-1.1%</td>
<td>1.1%</td>
<td>-3.1%</td>
<td>-10.5%</td>
<td>-11.3%</td>
<td>-4.1%</td>
</tr>
<tr>
<td>SAP &amp; Enterprise Business Applications</td>
<td>129</td>
<td>-2.5%</td>
<td>-3.0%</td>
<td>-5.5%</td>
<td>-9.6%</td>
<td>-9.3%</td>
<td>-14.5%</td>
</tr>
<tr>
<td>Apps Development Tools &amp; Platforms</td>
<td>99</td>
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<tr>
<td>Management/Methodology/Process</td>
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<td>-2.0%</td>
<td>-2.4%</td>
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<tr>
<td><strong>ALL NONCERTIFIED SKILLS REPORTED</strong></td>
<td><strong>578</strong></td>
<td><strong>0.7%</strong></td>
<td><strong>0.9%</strong></td>
<td><strong>0.8%</strong></td>
<td><strong>1.3%</strong></td>
<td><strong>2.2%</strong></td>
<td><strong>3.5%</strong></td>
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</tbody>
</table>

### 2-YEAR NON-CERTIFIED TECH SKILLS PAY TRENDS

(Through 4/1/2020 – 79,649 IT Professionals)

### NON-CERTIFIED TECH SKILLS PAY TRENDS BY CATEGORY

Average Median Pay for a Single Tech Skill (Non-certified)

(Through 4/1/2020 – 79,649 IT Professionals)

SOURCE: Data supporting these charts is from Foote Partners IT Skills & Certifications Pay Index™ (2004 to 2020 quarterly editions)

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<tbody>
<tr>
<td>Agile software development</td>
<td>ABAP (all modules) Baan</td>
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<td>J.D. Edwards /Oracle</td>
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<td>Apache Cordova</td>
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<td>Cloudera software</td>
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<td>Cobol</td>
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<td>Elixir</td>
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<td>Git/GitHub</td>
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<td>Grunt</td>
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<td>HP ALM (App. Lifecycle Mgt)</td>
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<td>Jasmine</td>
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<td>Java SE/Java EE</td>
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<td>JBehave</td>
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<td>JIRA</td>
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<td>Workday HCM</td>
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### Web/e-Commerce Development
- Active Server Pages
- ActiV
- Adobe Experience Manager
- Ajax
- Amazon Cloudwatch
- AngularJS
- Apache Solr
- Apache web server
- Apache Velocity
- Apache Wicket
- Apex Code
- Backbone.js
- CGI
- Cold Fusion MX
- Content management systems
- CSS/CSS3
- Django
- Docker /Docker Swarm
- Documentum
- Elasticsearch
- Ember.js
- Front End Development
- GatsbyJS
- Google Analytics
- Google App Engine
- Google Cloud Platform
- HTML5
- JavaBeans/EJB 3.0
- JavaFX
- JavaScript
- Java Server Pages
- JBoss/Wildfly
- Jetty
- Joomla!
- JQuery
- JSON
- Julia
- KnockoutJS
- Laravel PHP
- Magento
- Magnolia
- Microsoft .NET
- Microsoft BizTalk Server
- Microsoft Commerce Server
- Microsoft Identity Integration Server
- Microsoft Internet Information Services
- Microsoft Internet Security and Acceleration Server (ISA)

### Management, Methodology and Process
- Artificial Intelligence
- Azure Machine Learning
- Big Data Analytics
- Bioinformatics
- Business Analysis
- Business Analytics
- Business intelligence
- Business process management/ modeling/improvement (software/systems)
- Business performance management
- Capacity Planning/Management
- Change management
- COBIT
- Collaboration software
- Complex Event Processing/Event Correlation
- Configuration Management
- Continuous Improvement
- Continuous Integration
- CRM
- Cryptography (encryption, VPN)
- Cybersecurity
- Cyber Threat Intelligence
- Data Acquisition and Control Systems
- Data Analytics
- Data Architecture
- Data Cleansing
- Data Engineering
- Data Governance
- Data Integration
- Data Management
- Data Modelling
- Data Quality
- Data Science
- Data Security
- Data Visualization
- DevOps
- DevSecOps
- Digital Forensics
- Digital Analytics
- eDiscovery
- E-Procurement
- ERP
- Flink
- Functional Programming
- Game Development
- General Data Protection Regulation
- Google TensorFlow
- HL7
- Identity and access management
- Incident Management
- Information management
- IT Audit
- IT Governance
- ITIL V3
- Kanban
- Machine Learning
- Markets
- Metadata design and development
- Microservices
- Microsoft SQL Server Analysis Services
- Microsoft Visio
- Natural language processing
- Network Architecture
- Neural Networks
- NIST
- Penetration testing
- Power BI
- Predictive Analytics and Modeling
- Prescriptive Analytics
- Program Management
- Project management/governance
- QlikView
- Quality Assurance/QA Automation
- Quality management/TQM
- Quantitative Analysis/Regression Analysis
- Razor
- Requirements Engineering/Analysis
- Risk analytics/assessment
- Risk management
- Robotic Process Automation
- Security architecture and models
- Security auditing
- SEO
- Service Management
- Six Sigma/Lean Six Sigma
- Social media analysis/Analytics
- Software development lifecycle management
- Splunk
- Tableau
- Test automation
- Test Driven Development/Scripting
- TIBCO ActiveMatrix BusinessWorks
- TOGAF (Enterprise Architecture)
- Usability Research/Human Factors Research
- User Acceptance Testing
- User Experience/Interface Design
- Vulnerability Scanning/Assessment/Management
- Waterfall
- Web Analytics
- Webtrends analytics
- Zachman Framework

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

### Operating Systems
- AIx
- Apache Cloudstack
- CoreOS
- HP-UX
- Linux
- Mac OS X
- Mobile operating systems (iOS, Android)
- OpenStack
- Red Hat Enterprise Linux
- Solaris
- SUSI
- Unix (all)
- VMware vSphere
- Windows 8/10
- Windows NT
- Windows Server 2008/2012
## Systems/Networks
- Active Directory
- Ansible
- Apache Flume
- Arista
- ATM
- Azure Active Directory
- Business continuity and disaster recovery planning
- CA Endor
- Chef/Opscode
- Cisco ASA
- Cisco CUCM
- Cisco ICM
- Cisco ISE/Identity Services Engine
- Cisco IPCC
- Cisco Nexus
- Cisco Prime
- Cisco UCCE
- Cisco UCCX
- Citrix Virtual Apps (XenApp)
- Citrix Hypervisor (XenServer)
- Cloud architecture
- Cloud security
- DHCP
- EIGRP
- Ethernet
- Fast Ethernet
- Gigabit Ethernet
- HP Converged System
- HP Quality Center
- HTTPS
- IaaS (Infrastructure as a Service)
- Infrastructure architecture
- Intrusion prevention/detection sys
- IPX/SPX
- Juniper
- Kubernetes
- LAN
- Microsoft Application Virtualization
- Microsoft Hyper-V
- Microsoft SCCM
- Microsoft SCVMM
- Microsoft Virtual Server
- Mobile device management
- Mobile security
- Multiprotocol Label Switching
- Network access control/Identity mgt systems

## Data/Database
- NAS/Network Attached Storage
- Network security management
- Novell Netware
- PaaS
- Performance Analysis/Tuning
- Performance Testing
- Prometheus
- Puppet
- Rackspace Cloud
- RedHat OpenShift
- Routing (e.g. OSPF)
- Salt
- SAN/Storage Area Networks
- Security skills (project-based)
- Security Information and Event Management (SIEM)
- SMTP
- SNA
- SolarWinds
- Storage virtualization/administration
- TCP/IP
- Terraform
- Tivoli
- Vagrant
- vCloud
- Virtualization (various)
- Virtual security
- VMware ESXi Server
- VMware NSX
- VoIP/IP telephony
- VPN/OpenVPN
- WAN/3G/4G services
- Web Infrastructure
- Web services security
- Wireless Network Management
- Wireless security
- Wireless sensors/RFID
- Wireless Networking/Telecomm.
- WML
- Amazon Athena
- Amazon DynamoDB
- Amazon RedShift
- Apache Cassandra
- Apache CouchDB
- Apache Hive
- Azure Cosmos DB
- Azure Data Factory
- Azure SQL Database
- Base SAS
- Blockchain
- Cloudera Impala
- Couchbase Server
- Data mining
- Data security
- Database management
- DB2
- dBASE/xBASE
- ETL (Extract, transform, load)
- GIS
- Hbase
- Informatica
- Java Database Connectivity
- Master data management
- Microsoft Access
- Microsoft Exchange Server
- Microsoft SQL Server Integration Services
- MongoDB
- MySQL
- NoSQL
- OpenEdge ABL (Progress 4GL)
- Oracle Application Server
- Oracle Business Intelligence Enterprise Edition Plus
- Oracle Coherence
- Oracle DB 9/10g/11i/12c
- Oracle Enterprise Manager
- Oracle Exadata
- Oracle Forms
- Oracle Reports
- PostgreSQL
- Redis

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ANALYSIS – Noncertified Tech Skills

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

The following non-certified tech skills meet two prerequisites: they are earned workers cash pay premiums well above the average of all 585 skills reported in our IT Skills and Certifications Pay Index™, and they recorded gains in cash market value in the six months ending April 1, 2020. No skill below is earning less than the equivalent of 15 percent of base salary—significant considering the average for all skills reported is 9.6 percent of base—and are listed in descending ranked order of cash premium and market value increases (including ties).

1. DevSecOps
   
   Average Pay Premium: 19 percent of base salary equivalent  
   Market Value Increase: 18.8 percent (in the six months through April 1, 2020)

DevSecOps is the philosophy of integrating security practices within the DevOps process and involves creating a ‘Security as Code’ culture with ongoing, flexible collaboration between release engineers and security teams. It’s a natural and necessary response to the bottleneck effect of older security models on the modern continuous delivery pipeline. The goal is to bridge traditional gaps between IT and security while ensuring fast, safe delivery of code. Silo thinking is replaced by increased communication and shared responsibility of security tasks during all phases of the delivery process.

In DevSecOps, two seemingly opposing goals — “speed of delivery” and “secure code” — are merged into one streamlined process. In alignment with lean practices in agile, security testing is done in iterations without slowing down delivery cycles. Critical security issues are dealt with as they become apparent, not after a threat or compromise has occurred.

There are six important components to a DevSecOps approach:

- **Code analysis** – deliver code in small chunks so vulnerabilities can be identified quickly.
- **Change management** – increase speed and efficiency by allowing anyone to submit changes, then determine whether the change is good or bad.
- **Compliance monitoring** – be ready for an audit at any time (which means being in a constant state of compliance, including gathering evidence of GDPR compliance, PCI compliance, etc.).
- **Threat investigation** – identify potential emerging threats with each code update and be able to respond quickly.
- **Vulnerability assessment** – identify new vulnerabilities with code analysis, then analyze how quickly they are being responded to and patched.
- **Security training** – train software and IT engineers with guidelines for set routines

2. Prescriptive Analytics

   Average Pay Premium: 18 percent of base salary equivalent  
   Market Value Increase: 20 percent (in the six months through April 1, 2020)

Prescriptive analytics, an area of business analytics dedicated to finding the best course of action for a given situation, is related to both descriptive and predictive analytics. While descriptive analytics aims to provide insight into what has happened and predictive analytics helps model and forecast what might happen, prescriptive analytics seeks to determine the best solution or outcome among various choices given the known parameters. It can also suggest decision options for how to take advantage of a future opportunity or mitigate a future risk, and illustrate the implications of each decision option. In practice, prescriptive analytics can continually and automatically process new data to improve the accuracy of predictions and provide better decision options.
Specific techniques used in prescriptive analytics include optimization, simulation, game theory and decision-analysis methods. Advancements in the speed of computing and the development of complex mathematical algorithms applied to the data sets have boosted demand for prescriptive analysis skills.

Prescriptive analytics can be used in two ways:

- **Inform decision logic with analytics.** Decision logic needs data as an input to make the decision. The veracity and timeliness of data will ensure that the decision logic will operate as expected. It doesn’t matter if the decision logic is that of a person or embedded in an application — in both cases, prescriptive analytics provides the input to the process. Prescriptive analytics can be as simple as aggregate analytics about how much a customer spent on products last month or as sophisticated as a predictive model that predicts the next best offer to a customer. The decision logic may even include an optimization model to determine how much, if any, discount to offer to the customer.

- **Evolve decision logic.** Decision logic must evolve to improve or maintain its effectiveness. In some cases, decision logic itself may be flawed or degrade over time. Measuring and analyzing the effectiveness or ineffectiveness of enterprises decisions allows developers to refine or redo decision logic to make it even better. It can be as simple as marketing managers reviewing email conversion rates and adjusting the decision logic to target an additional audience. Alternatively, it can be as sophisticated as embedding a machine learning model in the decision logic for an email marketing campaign to automatically adjust what content is sent to target audiences.

3. **RStudio**
   **Neural Networks**
   *Average Pay Premium: 17 percent* of base salary equivalent
   *Market Value Increase: 21.4 percent* (in the six months through April 1, 2020)

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

- **R is open source.** It’s free which is an advantage against paying for MATLAB or SAS licenses. This is also important if you’re working with global teams in areas where software is expensive of in inaccessible. It also means that R is actively developed by a community and there are regular updates.
- **R is widely used.** R is used in many subject areas (not just bioinformatics) making it more likely for finding help online when it’s needed.
- **R is powerful.** R runs on multiple platforms (Windows/MacOS/Linux). It can work with much larger datasets than popular spreadsheet programs like Microsoft Excel, and because of its scripting capabilities it is more reproducible. There are thousands of available software packages for science, including genomics and other areas of life science.
Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret sensory data through a kind of machine perception, labeling or clustering raw input. The patterns they recognize are numerical, contained in vectors, into which all real-world data, be it images, sound, text or time series, must be translated.

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

4. Cryptography
   Smart Contract
   Average Pay Premium: 17 percent of base salary equivalent
   Market Value Increase: 13.3 percent (in the six months through April 1, 2020)

Cryptography (or cryptology) is the practice and study of techniques for secure communication in the presence of third parties called adversaries. More generally, cryptography is about constructing and analyzing protocols that prevent third parties or the public from reading private messages. Various aspects in information security such as data confidentiality, data integrity, authentication, and non-repudiation are central to modern cryptography. Modern cryptography exists at the intersection of the disciplines of mathematics, computer science, electrical engineering, communication science, and physics. Applications of cryptography include electronic commerce, chip-based payment cards, digital currencies, computer passwords, and military communications.

Modern cryptography is heavily based on mathematical theory and computer science practice. Cryptographic algorithms are designed around computational hardness assumptions, making such algorithms hard to break in practice by any adversary. It is theoretically possible to break such a system, but it is infeasible to do so by any known practical means. These schemes are therefore termed computationally secure; theoretical advances, e.g., improvements in integer factorization algorithms, and faster computing technology require these solutions to be continually adapted. There exist information-theoretically secure schemes that provably cannot be broken even with unlimited computing power—an example is the one-time pad—but these schemes are more difficult to use in practice than the best theoretically breakable but computationally secure mechanisms.

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 be 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.
5. **Data Engineering**
   *Average Pay Premium: 17 percent of base salary equivalent*
   *Market Value Increase: 6.3 percent (in the six months through April 1, 2020)*

Data engineering is the aspect of data science that focuses on practical applications of data collection and analysis. For all the work that data scientists do to answer questions using large sets of information, there have to be mechanisms for collecting and validating that information. In order for that work to ultimately have any value, there also have to be mechanisms for applying it to real-world operations in some way. Those are both engineering tasks: the application of science to practical, functioning systems.

6. **Quantitative Analysis/Regression Analysis**
   *Average Pay Premium: 16 percent of base salary equivalent*
   *Market Value Increase: 23.1 percent (in the six months through April 1, 2020)*

Using complex mathematical and statistical models, quantitative analysis quantifies objective business data and determines the effects of a decision on the business operations by studying behavior and predicting outcomes. It is the process of collecting and evaluating measurable and verifiable data such as revenues, market share, and wages in order to understand the behavior and performance of a business. With respect to investing, this approach quantifies trends following patterns and strategies of high-frequency trading to identify the correlation between the variables and determine the worthiness of an investment. As such, the most commonly used forms of quantitative analysis in business are the cost-benefit analysis, the break-even analysis, the statistical analysis, and the feasibility study.

A quantitative analyst’s main task is to present a given hypothetical situation in terms of numerical values; quantitative analysis helps in evaluating performance, assessing financial instruments, and making predictions. It encompasses three main techniques of measuring data: regression analysis, linear programming, and data mining.

Regression Analysis is a common technique that is not only employed by business owners but also by statisticians and economists. It involves using statistical equations to predict or estimate the impact of one variable on another. For instance, regression analysis can be used to determine how interest rates affect consumers’ behavior regarding asset investment. One other core application of regression analysis is establishing the effect of education and work experience on employees’ annual earnings. In the business sector, owners can use regression analysis to determine the impact of advertising expenses on business profits. By using this approach, a business owner can establish whether there’s a positive or negative correlation between two variables.

7. **TensorFlow**
   **IT Governance**
   *Average Pay Premium: 16 percent of base salary equivalent*
   *Market Value Increase: 14.3 percent (in the six months through April 1, 2020)*

TensorFlow is a popular open-source deep learning library, developed at Google, which uses machine learning in all of its products to take advantage of their massive datasets and improving the search engine, translation, image captioning and recommendations. TensorFlow is also used for machine learning applications such as neural networks. Its flexible architecture allows for the easy deployment of computation across a variety of platforms (CPUs, GPUs, TPUs), and from desktops to
clusters of servers to mobile and edge devices. TensorFlow provides stable Python and C APIs; and without API, backwards
compatibility guaranteed for C++, Go, Java, JavaScript and Swift. Third-party packages are available
for C#, Haskell, Julia, R, Scala, Rust, OCaml and Crystal. Python has always been the choice for TensorFlow due to the
language being extremely easy to use and having a rich ecosystem for data science including tools such as Numpy, Scikit-
learn, and Pandas.

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

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

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

8. Amazon DynamoDB
   Apache Cassandra
   Data Analytics
   Master data management
   NIST (National Institute of Standards and Technology)
   Artificial Intelligence
   
   Average Pay Premium: 16 percent of base salary equivalent
   Market Value Increase: 6.7 percent (in the six months through January 1, 2020)

**Amazon DynamoDB** is a fully managed proprietary NoSQL database service that supports key-value and document data
structures and is part of the Amazon Web Services portfolio. DynamoDB exposes a similar data model to (and derives its
name from) Dynamo, but has a different underlying implementation. DynamoDB uses synchronous replication across
multiple data centers for high durability and availability. It differs from other Amazon services by allowing developers to
purchase a service based on throughput, rather than storage. Administrators can request throughput changes and
DynamoDB will spread the data and traffic over a number of servers using solid-state drives, allowing predictable
performance. It offers integration with Hadoop via Elastic MapReduce.
Apache Cassandra is a free open-source, distributed, wide column store, NoSQL database management system designed to handle large amounts of data across many commodity servers, providing high availability with no single point of failure. Cassandra offers robust support for clusters spanning multiple datacenters, with asynchronous masterless replication allowing low latency operations for all clients.

It is the database is the right choice when you need scalability and high availability without compromising performance. Linear scalability and proven fault-tolerance on commodity hardware or cloud infrastructure make it the perfect platform for mission-critical data. Cassandra’s support for replicating across multiple datacenters is best-in-class, providing lower latency for your users and the peace of mind of knowing that you can survive regional outages.

Data analytics is the process of examining data sets in order to draw conclusions about the information they contain, increasingly with the aid of specialized systems and software. Data analytics technologies and techniques are widely used in commercial industries to enable organizations to make more-informed business decisions and by scientists and researchers to verify or disprove scientific models, theories and hypotheses.

Data analytics initiatives can help businesses increase revenues, improve operational efficiency, optimize marketing campaigns and customer service efforts, respond more quickly to emerging market trends and gain a competitive edge over rivals -- all with the ultimate goal of boosting business performance. Depending on the particular application, the data that's analyzed can consist of either historical records or new information that has been processed for real-time analytics uses. In addition, it can come from a mix of internal systems and external data sources.

Master data management (MDM) arose out of the necessity for businesses to improve the consistency and quality of their key data assets, such as product data, asset data, customer data, location data, etc. Many businesses today, especially global enterprises have hundreds of separate applications and systems (i.e. ERP, CRM) where data that crosses organizational departments or divisions can easily become fragmented, duplicated and most commonly out of date. When this occurs, answering even the most basic, but critical questions about any type of performance metric or KPI for a business accurately becomes hard. The basic need for accurate, timely information is acute and as sources of data increase, managing it consistently and keeping data definitions up to date so all parts of a business use the same information is a never-ending challenge. That’s what has and will continue to drive a premium on MDM skills.

The National Institute of Standards and Technology (NIST) is a non-regulatory agency of the United States Department of Commerce whose mission is to promote innovation and industrial competitiveness. NIST’s activities are organized into laboratory programs that include nanoscale science and technology, engineering, information technology, neutron research, material measurement, and physical measurement.

Driving demand for NIST expertise most in the IT marketplace right now is arguably its Cybersecurity Framework which provides a policy framework of computer security guidance for how private sector organizations can assess and improve their ability to prevent, detect, and respond to cyber-attacks. It provides a high-level taxonomy of cybersecurity outcomes and a methodology to assess and manage those outcomes and is being used by a wide range of businesses and organizations to help shift organizations to be proactive about risk management.

Artificial Intelligence is a term that means different things to different people, from robots coming to take your jobs to the digital assistants in your mobile phone and home. But it is actually a term that encompasses a collection of technologies that include machine learning, deep learning, natural language processing, computer vision, and more. Artificial intelligence can
also be divided into ‘narrow AI’ and ‘general AI’. Narrow AI is the kind we most often see today -- AI suited for a narrow task. This could include recommendation engines, navigation apps, or chatbots. These are AIs designed for specific tasks.

Artificial general intelligence is about a machine performing any task that a human can perform, and this technology rapidly expanding though still relatively aspirational for many organizations.

*Machine learning* is typically the first step for organizations that are adding AI-related technologies to their IT portfolio and one of the reasons why AI skills pay is growing. This is about automating the process of creating algorithms by using data to "train" them rather than human software developers writing code. Basically, what you are doing is showing the algorithm examples, in the form of data. By "looking" at all these examples, the machine learns to recognize patterns and differences.

*Deep learning* takes machine learning a few steps further by creating layers of machine learning beyond the first decision point. These hidden layers are called a neural network—as described earlier—and are meant to simulate the way human brains operate. Deep learning works by taking the outcome of the first machine learning decision and making it the input for the next machine learning decision. Each of these is a layer. Python is also the language of deep learning and neural networks.

Human language doesn't speak in zeros and ones, but there's a lot of benefit and productivity that can be gained when machines are taught to understand human language. That's the goal of *natural language processing*. Early efforts at this include pieces of the digital assistants like Alexa, Microsoft Cortana, Google Assistant, Siri, and others that are hitting the market now. NLP is also essential when it comes to working with many types of unstructured data such as the data in electronic health records, emails, text messages, transcripts, social media posts -- anything with a language component. It's through NLP that we can get to more advanced technologies such as sentiment analysis.

9. **TIBCO Spotfire**

   Average Pay Premium: 15 percent of base salary equivalent
   Market Value Increase: 25 percent (in the six months through April 1, 2020)

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

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

Data Quality

*Average Pay Premium: 15 percent of base salary equivalent*

*Market Value Increase: 15.4 percent* (in the six months through April 1, 2020)

**Apache Airflow** is an open-source workflow management platform that started at Airbnb as a solution to manage the company's increasing complex workflows. Building on the popularity of Python as the de facto programming language for data, Airflow is written in Python and workflows are created via Python scripts. It is designed under the principle of "configuration as code". While other "configuration as code" workflow platforms exist using markup languages like XML, using Python allows developers to import libraries and classes to help them create their workflows. Airflow is integrated with multiple platforms including Microsoft Azure, Amazon Web Services, Google Cloud Platform and Databricks.

Creating Airflow allowed Airbnb to programmatically author and schedule its workflows and monitor them via the built-in Airflow user interface. From the beginning, the project was made open source, becoming an Apache Incubator project in March 2016 and a Top-Level Apache Software Foundation project in January 2019.

**Data Quality** refers to the state of qualitative or quantitative pieces of information, a critical determination given the current explosion in popularity in all things data. There are many definitions of data quality, but data is generally considered high quality if it is "fit for [its] intended uses in operations, decision making and planning" and if it correctly represents the real-world construct to which it refers. Moreover, apart from these definitions, as the number of data sources increases, the question of internal data consistency becomes significant, regardless of fitness for use for any particular external purpose. People's views on data quality can often be in disagreement, even when discussing the same set of data used for the same purpose. When this is the case, data governance is used to form agreed upon definitions and standards for data quality. In such cases, data cleansing, including standardization, may be required in order to ensure data quality.

While all of the data-related noncertified skills in the ITSCPI are earning well above-average cash skills pay premiums, the current winners in growth of pay premiums are data analytics, data engineering, data quality and data visualization.

11. Clojure

Functional programming

Amazon Kinesis

*Average Pay Premium: 15 percent of base salary equivalent*

*Market Value Increase: 7.1 percent* (in the six months through April 1, 2020)

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

Functional features of Clojure include:

- **Declarative programming model.** You express the logic of a program’s structure and elements (what you want data to do) without having to describe its control flow (how it’s done).
- **Support for higher order functions.** These are functions that can take in functions as arguments and/or return functions as results.
• **Immutable persistent data structures.** When a change occurs, the old data structure is preserved, and a new structure is returned expressing the relevant parts of the old structure with the newly created data. Because they are immutable, they eliminate many typical errors found in most concurrent programming.

• **Absence of side effects.** While complete absence of side effects is impossible for real-world applications, Clojure’s immutable information model does a good job of isolating them. Clojure uses side effects explicitly via its language syntax.

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

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

Clojure has several powerful concurrency primitives. They make code that deals with multiple threads easy to write and read correctly. Most concurrent programming is based on locks, but locks are notoriously hard to get right. Clojure’s concurrency primitives make taking advantage of multiple cores very easy.

**Amazon Kinesis** is an Amazon Web Service (AWS) for processing big data in real time. Kinesis is capable of processing hundreds of terabytes per hour from high volumes of streaming data from sources such as operating logs, financial transactions and social media feeds. Kinesis fills a gap left by Hadoop and other technologies that process data in batches, but that don’t enable real-time operational decisions about constantly streaming data. That capability, in turn, simplifies the process of writing apps that rely on data that must be processed in real time.
Q1 2020 Data Trend Charts

2020 IT Skills & Certifications Volatility Index™
(Data collected through April 1, 2020)

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

2020 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 January 1, 2020 to April 1, 2020 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.

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

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

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

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

Current Quarterly Recap (data collected through April 1, 2020)

TOTAL: All Skills and Certifications

- 29% of skills and certifications (312 of 1,078) changed in market value in 1st Quarter 2020 compared to 21.1% in the prior quarter
- 142 gained value and 170 declined in value

CERTIFIED SKILLS

- 28.2% of reported certifications (141 of 500) changed market value in 1st Quarter of 2020, almost double the 15.5% volatility in the prior quarter.
- 30 certifications gained market value; 102 declined in value

NON-CERTIFIED SKILLS

- 29.6% of reported skills (171 of 578) changed value in 1st Quarter of 2020, nearly four points higher than 26% in the prior quarter.
- 103 gained in market value; 68 declined in value
Recent IT skills and certifications volatility trends

QUARTERLY SUMMARY

1st quarter 2020 volatility in skills and certifications values measured 29%, well above the 1-year and 2-year average of 22.6% for all 1,090 certified and noncertified skills reported by Foote Partners.

NON-CERTIFIED SKILLS VOLATILITY in 1Q 2020 was nearly 4 points higher than the prior quarter and nearly two points higher than the average volatility over the past 2 years (28.1).

IT CERTIFICATIONS VOLATILITY in 1Q 2020 exploded, nearly double the volatility in the prior quarter and twelve points higher than the two-year average volatility of 16.5%.

(Pay data supporting these charts available in the IT Skills and Certifications Pay Index™ – 2007 to 2020 quarterly data edition)
**VOLATILITY HIGHLIGHTS**

IT Certifications – 1st Quarter 2020 data

<table>
<thead>
<tr>
<th>Segment</th>
<th>% of Certifications That Changed Market Value (Gain or Decline)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Architecture/Project Mgmt/Process</strong></td>
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</tr>
<tr>
<td><strong>Info/Cyber Security</strong></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>System Admin &amp; Engineering</strong></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>Web Development</strong></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>Networking &amp; Communications</strong></td>
<td><img src="image" alt="Diagram" /></td>
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<tr>
<td><strong>Data/Database</strong></td>
<td><img src="image" alt="Diagram" /></td>
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<tr>
<td><strong>Apps Development/Prog. Languages</strong></td>
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<tr>
<td><strong>Beginner and Training</strong></td>
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</tr>
<tr>
<td><strong>ALL CERTIFICATIONS SURVEYED</strong></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>

(Source: Foote Partners LLC, **2020 IT Skills & Certifications Pay Index™**)
VOLATILITY HIGHLIGHTS Non-certified IT Skills – 1st Quarter 2020 data

VOLATILITY INDEX: How Many of 585 Noncertified IT Skills Changed Market Value in 1st Quarter 2020?

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>% of Noncertified Skills</th>
<th>% Went Up in Value</th>
<th>% Went Down in Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management/Methodology/Process</td>
<td>9.9%</td>
<td></td>
<td>30.4%</td>
</tr>
<tr>
<td>Operating Systems</td>
<td>9.7%</td>
<td></td>
<td>33.3%</td>
</tr>
<tr>
<td>Data/Database</td>
<td>13.4%</td>
<td>11.1%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Web/Commerce Development</td>
<td>14.0%</td>
<td></td>
<td>29.7%</td>
</tr>
<tr>
<td>Applications Development Tools &amp; Platforms</td>
<td>18.6%</td>
<td></td>
<td>26.7%</td>
</tr>
<tr>
<td>SAP &amp; Enterprise Business Applications</td>
<td>21.6%</td>
<td></td>
<td>28.7%</td>
</tr>
<tr>
<td>Messaging and Communications</td>
<td>22.6%</td>
<td></td>
<td>28.7%</td>
</tr>
<tr>
<td>Systems/Networking</td>
<td>24.7%</td>
<td></td>
<td>30.8%</td>
</tr>
<tr>
<td>ALL NONCERTIFIED SKILLS SURVEYED</td>
<td>29.6%</td>
<td></td>
<td>31.4%</td>
</tr>
</tbody>
</table>

(Source: Foote Partners LLC, 2020 IT Skills & Certifications Pay Index™)

IT Skills and Certifications Volatility Index™
1Q 2020 data edition findings: Non-certified IT Skills

Noncertified IT Skill Pay Volatility Highlights

Among 585 noncertified IT skills surveyed, high volatility (>20%) occurred in these segments (ranked highest to lowest):

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

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

- Operating Systems
- Management/Methodology/Process
- Messaging and Communications
- Applications Development Tools & Platforms

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

- SAP & Enterprise Business Apps

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

- Pay premiums for **1,090 certified and noncertified IT skills**
  - Three data points for each position: 10th, 50th, 90th percentile
- Verified and validated IT skills pay data from **79,652 IT professionals at 3,578 employers** in US and Canada
- Current data collected through April 1, 2020 (updated quarterly)
- **Excel format data tables. Master agreements for data loading in place with MarketPay, CompAnalyst, WillisTowersWatson.**
- Certifications Guide containing basic information about surveyed IT certifications (pre-requisites; costs; test content; lab requirements, etc.)

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

**Definition of IT skills premium pay**

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

Foote Partners’ primary research survey for tracking IT skills and certifications pay and supply/demand volatility is the industry-leading IT Skills and Certifications Pay Index™ (ITSCPI), launched in 1999 and updated every three months since that time. Data covering 324,480 tech professionals at 3,578 employers in 83 U.S. and Canada cities are reported for IT salaries and skills pay earned for 235 positions and 1,090 certified and noncertified technical and business skills. Verified and validated pay data for 79,652 tech workers has been included in the 1st Quarter 2020 data edition of the ITSCPI, compiled from data collected through April 1, 2020.

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

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

TO OBTAIN A COPY OF THE LATEST IT SKILLS AND CERTIFICATIONS PAY INDEX™

Please visit the Foote Partners web site: IT Skills and Certifications Pay Index
Foote Partners 1Q 2020 Tech Compensation Survey Product Map
ABOUT FOOTE PARTNERS

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

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

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

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

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