FOR IMMEDIATE RELEASE

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NOTE: This news release is a summary extract of content in the Q1 2018 update edition of Foote Partners' ***IT Skills Demand and Pay Trends Report***, a market intelligence trend report updated every 3 months from data contributed by 3,105 U.S. and Canadian employers and contains tech jobs and skills compensation and supply/demand benchmark research published in the firm's IT Professional Salary Survey and ***IT Skills and Certifications Pay Index™***.

Vero Beach, FL – February 3, 2018 - Extra pay awarded by employers to talented IT professionals for **968 certified and noncertified IT and business skills**---also known as skills pay premiums---remained virtually unchanged in the final quarter of 2017 as 94 certified and noncertified tech related skills made gains in cash market value while 126 lost value. Volatility in pay for skills measured 23%, matching the average for the past 12 months (for more detail see page 35).

This according to the latest quarterly update of Foote Partners' ***IT Skills and Certifications Pay Index™*** (ITSCPI) based on compensation data provided by 3,105 North American private and public-sector employers who partner with the firm to report pay for their 274,660 IT professionals in the U.S. and Canada.

Drilling down further, overall market values for **522 noncertified IT skills**—currently averaging the equivalent of **9.3% of base salary for a single noncertified skill**---declined 0.3% in the fourth quarter of 2017, only the second quarterly loss since 2014. These tech skills have shown a basically steady, sustained performance stretching back to early 2010, driven most recently by gains in Database, Applications Development Tools & Platform, Enterprise Business Applications, Operating Systems, and Systems/Networking skills.

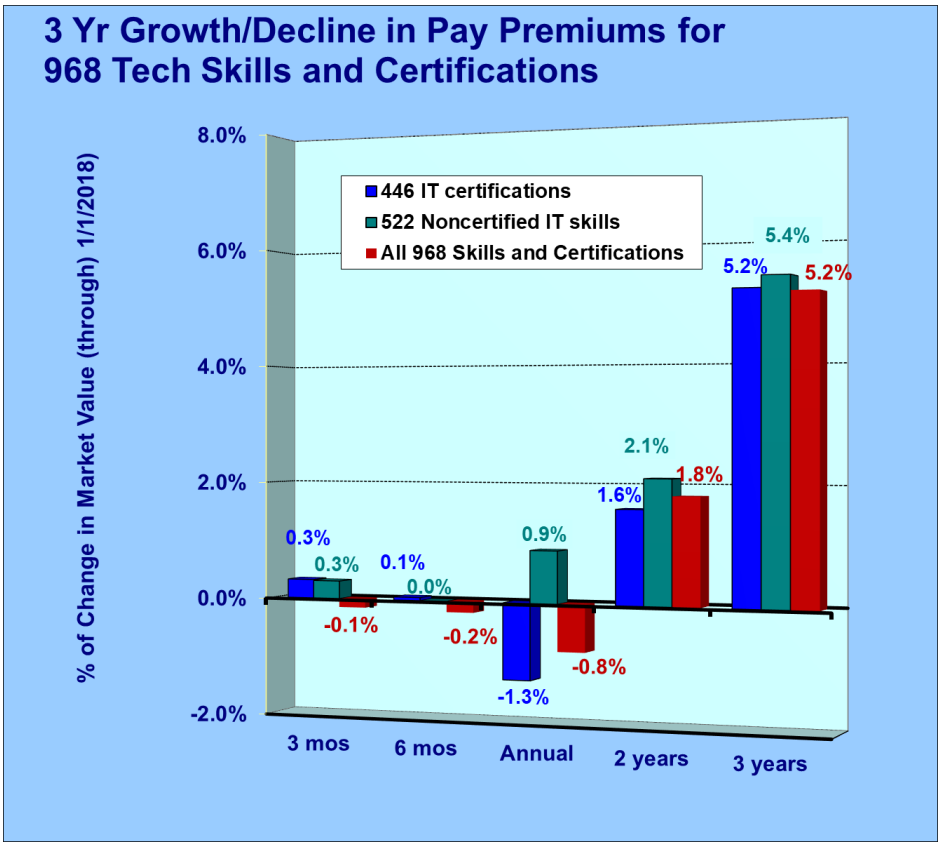
446 IT certifications rose 0.3% in overall market value following four consecutive quarterly losses. Currently earning the equivalent of **7.6% of base salary on average for a single certification**, gains this quarter were led by Networking and Communications and Applications Development and Programming Language certifications.

Since its launch in 1999, the ***IT Skills and Certifications Pay Index™*** has continuously tracked quarterly market values for individual IT skills and certifications earned by 73,664 tech professionals at employers in 83 U.S. and Canadian cities. Rigorously validated data and detailed market analyses are updated and published by Foote Partners every 90 days.

Pay Performance, 3/12/24/24/36 months
Certified vs. Noncertified IT Skills

(73,664 IT professionals, data through 1/1/2018)

Figure 1



Source: Foote Partners, *IT Skills and Certifications Pay Index™* (4Q2014 – 4Q2017 editions)

HIGHLIGHTS: Quarterly and Annual Results – Through January 1, 2018

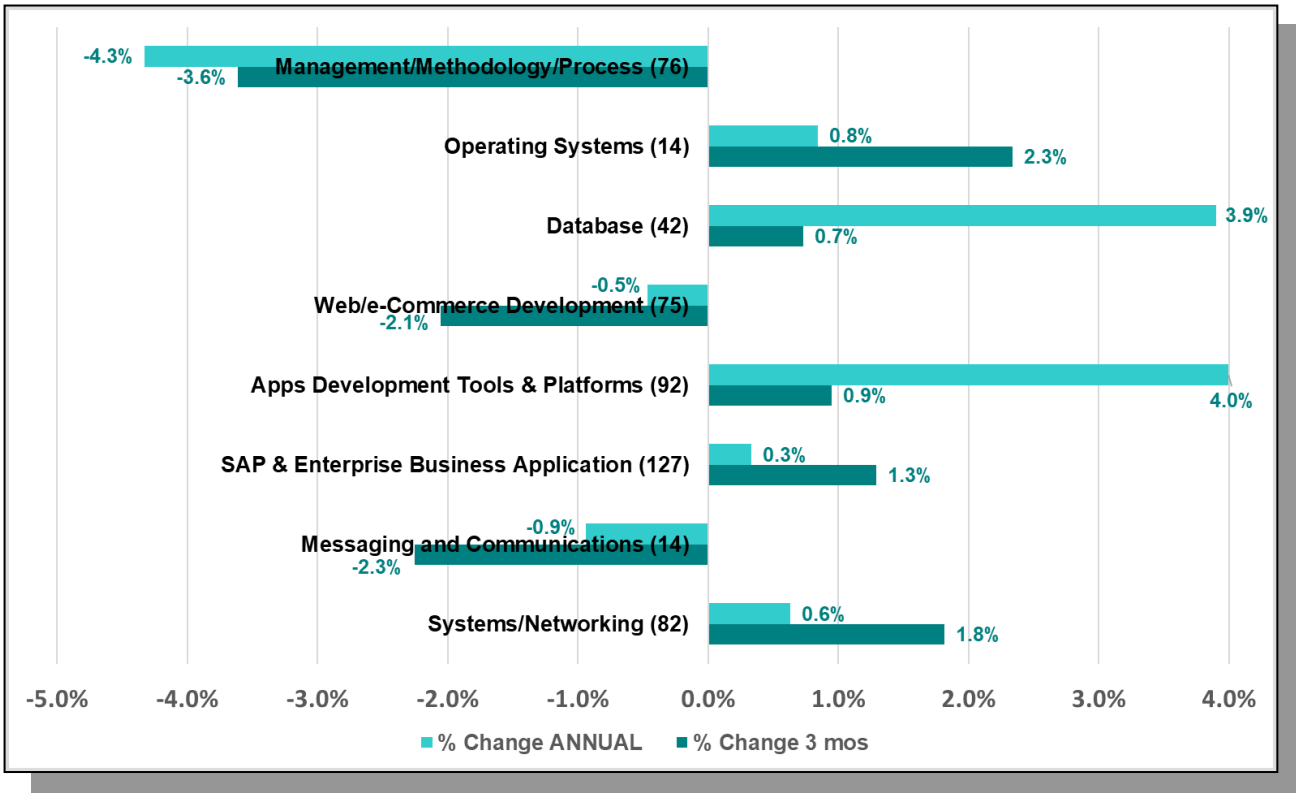
A. IT Skills and Certifications Pay Performance: By Category

NONCERTIFIED IT SKILLS. Cash pay premiums for **522 noncertified skills** decreased slightly during the fourth quarter of 2017, losing an average of **-0.3%** in market value. Pay performance was stronger across five of eight noncertified skills categories reported:

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

(522 skills, data through 1/1/2018)

Figure 2



NONCERTIFIED IT SKILLS TREND HIGHLIGHTS: Market Value Gainers

These noncertified IT skills ***gained 10% or more in market value*** in the calendar quarter ending January 1, 2018 vs. prior quarter (by segment). Listed in ***descending order of amount of % gain***, including ties.

IT SKILLS (noncertified)

Applications Development skills
Cerner Millennium
Integration Testing
Ruby on Rails
Apache Zookeeper
Drupal
GitLab
MATLAB
Microsoft Azure
Eclipse
Apache Ant
NetWeaver
JUnit

Database Skills
Base SAS
Riak
Microsoft Exchange Server 2003/2007/2010/ 2013
OpenEdge ABL (Progress 4GL)

Messaging & Communications skills
Message-oriented Middleware (Wave, XMPP/Jabber, etc.)

Management, Process & Methodology skills
Data Science
Data Quality
Game Development

Operating Systems/Systems Software Skills
HPUX
Solaris
CoreOS
OpenStack

Web/SOA/E-Commerce skills
Magnolia
JavaFX
Magento
Joomla!
ColdFusion/ColdFusion MX
Sitecore CMS
WSDL (Web Services Description Language)
WebSphere Datapower
Redux

SAP/ERP skills
SAP NWDS (NetWeaver Studio)
SAP Oil & Gas
SAP BOXI (Business Objects XI)
SAP Business Workflow/Webflow
SAP MII (Manufacturing Integration and Intelligence)
SAP PSCD (Collection and Disbursement)
SAP FI - CA (Contract Accounting)
SAP SRM (Supplier Relationship Management)
SAP WEBI (BusinessObjects Web Intelligence)
Microsoft Dynamics
SAP MM (Materials Management)
Web Dynapro
SAP SM (Service Management)
SAP CAR (Customer Activity Repository)
SAP PS (Project Systems)
SAP PLM (Product Lifecycle Management)
SAP FI - FSCM (Financial Supply Chain Management)
Oracle SOA Suite
SAP for Retail (IS-Retail)
SAP Exchange Infrastructure (XI)

Systems/Networking skills
Microsoft SCVMM
Cisco IPCC
Network security management
Cisco UCCE
Cisco CUCM
HP Quality Center
Cisco UCCX
PaaS
Cisco Nexus
IaaS
SolarWinds
Vagrant

Source: *2018 IT Skills and Certifications Pay Index™ – Q4 2017 edition*

NONCERTIFIED IT SKILLS TREND HIGHLIGHTS: Market Value Losers

These noncertified IT skills ***declined 10% or more in market value*** in the calendar quarter ending January 1, 2018 vs. prior quarter (by segment).
Listed in ***descending order of amount of % decline***, including ties.

IT SKILLS (Noncertified) Losers

Applications Development skills
iRise
Visual C++
Java SE/Java EE
Apache Lucene
Google Kubernetes
Apache Flex
Cobol

Management, Process & Methodology
Big Data analytics
Change Management
Network Architecture
Quantitative Analysis/Regression Analysis
Metadata design and development
SEO

Messaging & Communications skills
TIBCO Rendezvous

Operating Systems skills
Linux

SAP & Enterprise Business Applications skills
SAP MDM (Master Data Management)
SAP AFS (Apparel and Footwear Solutions)
Oracle Eloqua
SAP MDG (Master Data Governance)
Oracle CRM (Customer Relationship Management)
Oracle Financials
SAP MI (Mobile Infrastructure)
SAP CS (Customer Service)
Oracle SCM (Supply Chain Management)
SAP Smart Forms
SAP WM (Warehouse Management)
Oracle Payroll
SAP QM (Quality Management)
Siebel
ABAP
SAP Lumira
SAP HR-PY (Payroll)

Systems/Networking skills
Storage virtualization/administration
Cisco ICM
vCloud
Cisco ISE (Identity Services Engine)
Routing (e.g. OSPF, RIP, IGRP)
Citrix XenServer
Tivoli

Web/E-commerce Development skills
Wikis
UDDI (Universal Description, Discovery and Integration
Google App Engine
Secure software development
Mobile applications development
HTML5
KnockoutJS
XML (all variants)
AngularJS
JavaBeans/EJB 3.0
RESTful
Microsoft Internet Security and Acceleration Server (ISA)
Microsoft Commerce Server
Docker

Source: *2018 IT Skills and Certifications Pay Index™ – Q4 2017 edition*

HIGHLIGHTS – cont'd:

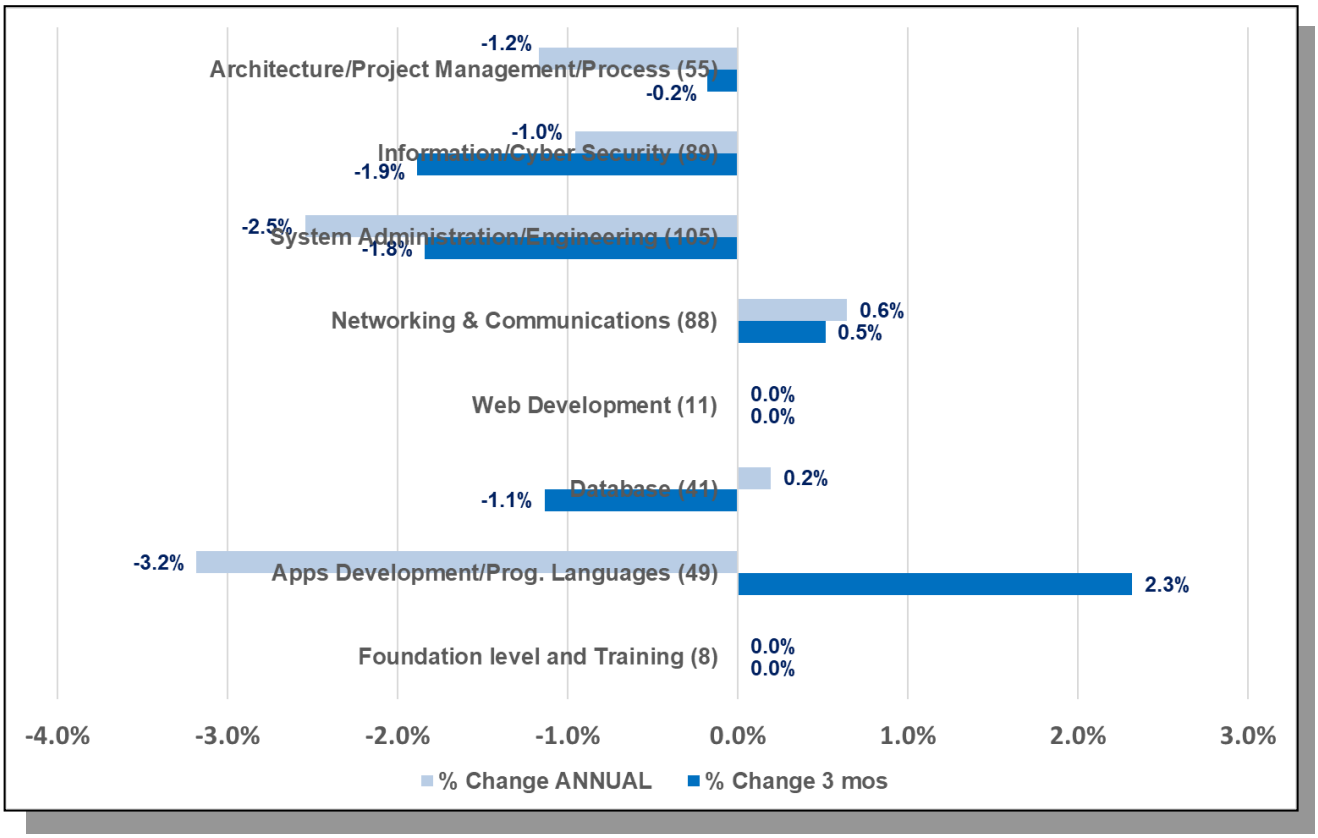
IT CERTIFICATIONS. Cash pay premiums for **446 IT certifications increased +0.3%** in the fourth quarter of 2017 following three consecutive quarterly losses. Prior 2017 tech certifications tracked in the **IT Skills and Certifications Pay Index™** recorded 15 consecutive calendar quarters of increasing overall market value going back to 2013.

Only two of eight certifications segments in the new ITSCPI data posted gains in the last three months of 2017:

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

(446 certifications, data through 1/1/2018)

Figure 3



IT CERTIFICATION PAY TREND HIGHLIGHTS: Market Value Gainers

These IT certifications ***gained 10% or more in market value*** in the calendar quarter ending January 1, 2018 vs. prior quarter (by segment).
Listed in ***descending order of amount of % gain***, including ties.

IT CERTIFICATION Gainers

Application Development/Programming Languages
Oracle Certified Professional - Java SE Programmer
Oracle Certified Master - Java SE Developer
Microsoft Certified Solution Developer (MCSD)

Architecture, Project Management and Process certifications
Certified Associate in Project Management (CAPM)
Six Sigma Black Belt
Certified Software Quality Analyst (CSQA)

Info/Cyber Security certifications
GIAC Certified Project Manager (GCPM)
GIAC Systems and Network Auditor (GSNA)
GIAC Exploit Researcher and Advanced Penetration Tester (GWAPT)
GIAC Certified Forensics Examiner (GCFE)
GIAC Mobile Device Security Analyst (GMOB)
GIAC Certified Windows Security Administrator (GCWN)
GIAC Information Security Professional (GISP)
GIAC Secure Software Programmer--Java
Check Point Certified Security Administrator (CCSA)

Networking and Communications certifications
Juniper Networks Certified Internet Professional (JNCIP)
Cisco Certified Network Associate - Data Center
EMC Storage Administrator - Associate (EMCSA-A)
Juniper Networks Certified Internet Expert (JNCIE)
EMC Storage Administrator - Specialist (EMCSA-S)
EMC Storage Administrator - Expert (EMCSA-E)
Cisco Certified Design Expert (CCDE)

Systems Administration certifications
HP Accredited Integration Specialist (AIS)
CompTIA Server+
NetApp Certified Data Administrator, ONTAP (NCDA)

Source: *2018 IT Skills and Certifications Pay Index™ – Q4 2017 edition*

IT CERTIFICATION PAY TREND HIGHLIGHTS: Market Value Losers

These IT certifications ***declined 10% or more in market value*** in the calendar quarter ending January 1, 2018 vs. prior quarter (by segment).
Listed in ***descending order of amount of % decline***, including ties.

IT CERTIFICATIONS Losers

Architecture, Project Management, and Process Certifications
Six Sigma Master Black Belt
HP ASE Cloud Architect V2

Database certifications
Oracle Certified Associate - DBA (OCA)
Oracle Certified Associate - MySQL 5

Info/Cyber Security certifications
Check Point Certified Security Master (CCSM)
EC-Council Certified Incident Handler (ECIH)
GIAC Certified Forensics Analyst (GCFA)
GIAC Assessing and Auditing Wireless Networks
Certified Secure Software Lifecycle Professional (CSSLP)
GIAC Certified Incident Handler (GCIH)
EC-Council Computer Hacking Forensic Investigator (CHFI)
GIAC Certified Perimeter Protection Analyst (GPPA)
InfoSys Security Architecture Professional (ISSAP/CISSP)
CompTIA Advanced Security Practitioner (CASP)

Systems Administration certifications
HP Accredited Technical Professional (ATP - all)
RedHat Certified Specialist in Virtualization
Red Hat Certified System Administrator in Red Hat OpenStack
Novell Certified Engineer (CNE)
RedHat Certified Technician (RHCT)
Citrix Certified Administrator - Networking (CCA)
HP Accredited Solutions Expert (ASE - all)
Red Hat Certified Systems Administrator (RHCSA)
HP Master ASE - Storage Solutions Architect V1 /V2
HP Master Accredited Solutions Expert (MASE - all)
VMware Certified Advanced Professional (VCAP)
VMware Certified Professional 4/5/6(VCP 4/5/6)
Red Hat Certified Engineer(RHCE)
HP ATP - Cloud Administrator V1
VMware Certified Design Expert (VCDX)

Networking & Communication certifications
Juniper Networks Certified Internet Specialist (JNCIS)
CompTIA Network (Network+)
Cisco Certified Entry Network Technician (CCENT)
Cisco Certified Design Associate (CCDA)

Source: *2018 IT Skills and Certifications Pay Index™ – Q4 2017 edition*

Labor Trends Discussion & Analysis

IT Skills and Certifications Pay Index™

Data collected through January 1, 2018

LABOR TRENDS DISCUSSION & ANALYSIS

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

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

- Internet of Things/M2M/ Telematics
- AI/Machine Language
- Blockchain
- Digital engagement
- Mobility
- Big Data/BI analytics/Information Integration
- Cybersecurity
- DevOps
- Carbon-reducing technology/exponential energy
- Self-service IT
- Carbon-reducing tech/Exponential Energy
- Telemedicine
- Cloud computing

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

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

Why 2018 will be a dramatically different year for tech labor

Our take on the tech labor market in 2018—informed by our 3,150 research partner employers in the U.S. and Canada---is that it will be conspicuously different than any year in recent history. Unusually so.

That's because two long time labor trends have quite dramatically shifted recently. First, market value volatility for tech skills is ebbing; the 968 certified and noncertified tech skills tracked in Foote Partners' ***Tech Skills and Certifications Volatility Index*** have smoothed out after more than a decade of high volatility (see page 35). Second, the constant frenzy surrounding short term skills gaps and unfilled jobs targeted at point solutions has quieted down according to recent quarterly labor market benchmark research. It's being overtaken by something more urgent and potentially catastrophic when it comes to managing tech professionals.

***Labor Trends Discussion*, cont'd.**

Sounds a bit ominous? It should if your company is unprepared for several early stage, game-changing emerging technologies that will soon alter the landscape of not just businesses but the private lives of billions of people. Among them are Blockchain, Internet of Things(IoT), AI/machine language, Automation, and a range of digital solutions.

The upshot is 2018 is shaping up to be a much-anticipated year when employers will finally take stock in how poorly prepared they are from a talent perspective for consuming these revolutionary though nascent technologies. And trust me, they will all be enthusiastically embracing them within the next three years.

The hard truth is that the human resource management function supporting technology professionals at too many companies has for years been unable to get in front of the unique demands of the technology workforce. They've been barely getting by with work around solutions and short-term fixes.

The next few years will test employers' people management capabilities will like never before. 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 Blockchain, IoT, AI/machine language, Automation, and the rest 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 good news is there is a window of opportunity *right now* while these new technologies are maturing.

We believe 2018 will be a breakthrough year as businesses sense this labor tsunami coming at them. They will finally commence the serious work of repairing broken or underperforming people management systems and practices.

The only viable solution to this mess we've seen is applying architecture principals to the management of people. This shouldn't be a novel idea but it is. It's similar to how architecture thinking and practices were applied to technology inventorying and acquisition in the early 1990s and to businesses since the day they began. Enterprise architecture later became its own discipline as technology and business converged over the last two decades

We believe 2018 will be a breakthrough year for "people architecture" and agile compensation models as companies sense this labor tsunami coming at them. They will finally commence the serious work of repairing broken or underperforming people management systems and practices.

Labor Trends Discussion, cont'd.

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

But with Agile Compensation and 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 People Architecture and Agile Compensation in 2018.

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: Blockchain

At a high level, blockchain technology is a way of securely managing access and information. What makes this distributed ledger technology so interesting to businesses and some governments is how it is positioned to make vast improvements in an almost endless array of transactional activities.

Modest prognostications are that it might have a widespread impact on the Four Horsemen of Capitalism: revenues, profitability, market share, and customers satisfaction. More intrepid analysts including Foote Partners are suggesting that once the kinks get worked out—and they will---the blockchain platform, in concert with other key technology fueled developments such as Internet of Things, will propel a revolution at a deep core business process level.

Previously unattainable ways to reduce costs and improve efficiencies will become commonplace. Even more, it will enable practical solutions for saving human lives and easing suffering as its benefits are applied to, for example, food distribution and manufacturing supply chains and to healthcare.

Labor Trends Discussion, cont'd.

Research analyst firm IDC forecasts that by 2021 at least 25 percent of the Global 2000 will use blockchain services as a foundation for digital trust at scale. Dozens of high profile companies—Maersk, Barclays, UBS, Walmart, Sony, and Samsung among them---have already implemented or experimented with Blockchain. Large vendors IBM, Microsoft, Hewlett Packard Enterprise, Amazon Web Services, and SAP are queueing up with sizable investments that will no doubt facilitate countless Blockchain solutions in their partner accounts. Aside from North America, we see big blockchain technology investments in the Middle East, Asia, and in Europe where Blockchain centers have already emerged in Berlin, Zurich, Singapore, and London.

The explosive 2017 growth of bitcoin notwithstanding, we believe 2018 will mark the true beginning of a broader labor marketplace awareness of demand for specific Blockchain skills. There will be more awareness of skills shortages for developers and especially architects who can design and build Blockchain operating models. Understanding how Blockchain integrates with IoT, Artificial Intelligence, Machine Language, Robotics, and other technologies is a plus now for architects but will be a requirement in the future as these other technologies mature and adoption rates increase.

Blockchain skills in short supply and therefore best bests in 2018 for tech professionals looking to gain entry into this niche include:

- Ethereum's smart contracts platform.
- Cryptocurrency platforms. Filecoin (for storage); SparkleCOIN; Bitcoin.
- Gameflip, a global marketplace for gamers to transact digital goods for games across all media platforms
- Smart contract programming languages: Solidity; LLL; Serpent.
- Java, C++, Go and Python developers with experience programming on a Blockchain platform.

Blockchain developers will need a minimum of two years professional experience as a software engineer; a solid understanding of ledgers, consensus methods, blockchains, and cryptocurrencies; expertise in threat analytics, anomaly detection, and performance management; strong understanding of algorithms, data structures, cryptography and data security, and decentralized technologies. Technical skills for developers may include strong demonstrated coding skills in at least one of these languages: Go, C, C++, JAVA, Python; a good understanding of distributed storage; at least some degree of experience creating blockchain frameworks and business applications; and soft skills common to any effective developer operating in any high-performance team setting.

Foote Partners latest cash skills pay premium survey data reveals Blockchain premiums are ranging from the equivalent of 12 percent to 17 percent of base salary, and averaging 15 percent.

Basically, the move to digitized transactions is unstoppable and blockchain will be a part of that process. Blockchain skills are not at the top of our list of sought-after skills for 2018, and don't mistake any uptick in demand next year for a tidal wave. This will be a moderate but steady climb 2018 and into 2019, expected to accelerate in mid-2019 as blockchain technology gains acceptance.

Labor Trends Discussion, cont'd.

LABOR FORECAST: Internet of Things

Internet of Things explosion will create staffing deficits. McKinsey is expecting the Internet of Things (IoT) to have a $4 to $11 trillion global economic impact by 2025 as businesses look to IoT technologies to enable new business models and transform business processes. IDC is predicting a 30% CAGR in IoT over the next 5 years. Gartner predicts that by 2020, more than 25 percent of identified attacks in enterprises will involve IoT, although IoT will account for less than 10 percent of IT security budgets. A recent AT&T study titled "The CEO's Guide to Securing the Internet of Things" reports that 90 percent of organizations it surveyed lack full confidence in their IoT security.

Three key questions come to mind: What can employers and tech professionals do to prepare for IoT? What jobs and skills are needed to transition into an IoT world? What is trending right now in jobs, skills, and certifications that are being driven by IoT growth?

Staffing for the "things" portion of IoT is defined by a number of elements addressing device management, MEMS (Microelectromechanical systems), and integration and gateway skills.

Device Management/MEMS

- Embedded systems, software and design
- Wireless sensor network design
- Circuit design
- Microcontroller programming
- Machine learning
- Sensor data analysis
- Quality assurance and testing

Integration & Gateways

- MQ Telemetry Transport
- TCP/IP
- IPV4 & IPV6
- Programming (e.g., Node.js)

Communications

- Wireless
- RFI, S/N basics

Hot jobs in the "things" space include:

- Data Scientists
- Network Engineers
- Design Engineers
- Hardware Engineers
- GPS Development Engineers
- Electrical Engineers
- Network Engineers
- AI Engineers
- Info/Cyber Security Engineers and Analysts
- Info/Cyber Security Infrastructure (cloud, network, software development)

Labor Trends Discussion, cont'd.

The area of the Internet of Things particularly rich in in-demand skills and jobs is the connecting of the "I" with the "T". We believe employers will focus a great deal of their efforts in the broad and diverse skills and jobs that make up the connective tissue, among them:

- Cybersecurity
  - Visibility, Analytics, Identity, Risk
- AI Experts
- UX/UI Designers
- Interaction Designers
- Visual Designers
- Product Designers
- Digital Product Designers
- NoSQL and NewSQL Apache Spark
- BI Professionals
  - JIRA, Confluence, Cognos, Tableau, SSAS, SSIS, SSRS, Advanced SQL and SAS, Predictive Analytics
- Big Data
  - Apache Hadoop, HDFS, Hbase, MapReduce, Flume, Oozie, Hive, Pig, YARN
- Cross-Skilling
  - HW skills for software developers
  - SW skills for hardware developers
- Communication interfaces
- Associative thinking
- Collaboration
- Pattern recognition
- Machine Learning
- Data Mining

Objects in the Internet of Things will come in every shape and size; some will have very small screens, and others will have no visual display at all. Talented ***User Interface*** and ***User Experience Designers*** will be a hot commodity as IoT providers strive to develop effective, user-friendly interfaces despite this shift in paradigm. Marketable skills for UI/UX Designers in the IoT include Responsive Web Design (wherein visuals dynamically adjust to screen-size, platform and orientation) and Service Design (human-centered design approach that intuitively guides users through complex services).

Early IoT products are going to be mostly rules-driven IFTTT ("If This Then That" web services) kinds of programs. For more complicated decisions in IoT, ***AI experts*** will be in high demand especially in the retail space.

With so many devices consuming and sending exabytes of raw information, the true potential of "big data" will be realized as IoT evolves. Organizations will endeavor to collect, store, and analyze smart device data streams for actionable intelligence. ***Business intelligence specialists*** with skills in sensor data analysis, data center management, predictive analytics, and programming in the leading big data platforms---such as Hadoop and NoSQL---will be ideally positioned to meet these needs. Strong business acumen will also be a key differentiator, particularly for BI executives tasked with divining additional opportunities in the burgeoning Internet of Things.

Hot business intelligence skills in the IoT area include:

- ***QlikView (+38% in cash market value, last 12 months), Tableau (+14.3%), Cognos***. Data visualization is a hot skill and these are arguably the most popular products for this purpose.

- ***SSAS (+20% in last 15 months), SSIS,*** *and* ***SSRS.*** There are various database management tools such as SQL Server Analysis, Integration and Reporting Services (SSAS, SSIS and SSRS respectively) that are extremely useful in developing and managing organization reports. Similarly, SSIS and SSAS comes in handy when analysis and integration of large data sets are required.

Labor Trends Discussion, cont'd.

- ***Advanced SQL and SAS (+20% in last 6 months).*** SAS are statistical analytic systems that perform analysis at various levels in a large data set and includes a variety of modules such as business intelligence, data management and predictive analysis. SAS and Advanced SQL have wide applications in the IoT domain.

- ***Predictive Analytics and Modeling.*** Predictive data and analytics are now considered a backbone of rapidly growing IoT. Over the next few years the internet will be full of information from millions of devices across the world. Businesses will be more concerned about what they should be doing this plethora of information.

A major force likely to drive the Internet of Things is ***advanced data analytics*** (aka Big Data). IoT devices will work by collecting vast amounts of data and analyzing them, ensuring fast communication and quick solutions. Even if your company doesn't seem like it would make use of big data, chances are if it is using an IoT device it will need to have at least some functional knowledge of big data. If a company is developing IoT devices, it will want to design them with data in mind first so they can function properly and efficiently. This skillset is particularly useful and valuable since right now there is a shortage of people with big data talents. At the same time, having knowledge of technologies often used with big data should be strong consideration in building an IoT workforce.

Key advanced analytics skills in the IoT area include:

- ***Apache Hadoop and related modules (HDFS, Hbase, MapReduce, Flume, Oozie, Hive, Pig, HBase, YARN)***. Apache Hadoop is the Java-based open source software framework used for storage and processing of distributed storage with very large data sets. It can be implemented on networks that are built on very large scale and at a very low cost.

- *N**oSQL (+9% in market value, last 15 months**), and **NewSQL**.* Understanding of database management systems is critical in IoT. As businesses expand into various dimensions the need for scaling database management systems will increase as compared to old school relational database management systems. NoSQL and NewSQL provide an alternative scale-up database management to the traditional DBM solutions.

- ***Apache Spark*** *(+8% in market value, last twelve months*. Understanding of database management systems is critical in IoT. As businesses grow and expand into various dimensions, the need for scaling database management systems will increase as compared to old school relational database management systems. NoSQL and NewSQL provide an alternative scale-up database management to the traditional DBM solutions.

- ***Machine Learning (paying 13% - 18% of base salary equivalent)*** *and* ***Data Mining (9% - 14% cash premiums)****.* Massive data sets in Internet of Things make the network too complex to be dealt, tracked or analyzed by humans. An IoT team developing enterprise-grade projects need to be good at machine learning and data mining techniques to be able to handle the huge data sets effectively.

Labor Trends Discussion, cont'd.

IoT Cross-Skilling. IoT is such a broad area that software developers will most likely have to program in a number of languages. Low-level assembly or C/C++ programming will be required for embedded systems. At the same time higher-level languages such as Node.js or Java will be needed for devices with more available resources. In addition, communication protocol skills will be vital because an IoT device is nothing if it can't share its data.

Hardware skills that will be most useful for software developers: Most likely, it will be the basics. Software developers won't be designing the next revision of a product's printed circuit board (PCB) but it would be useful to be able to build out a circuit on *a b*readboard for prototyping. Understanding basic electronics will be valuable. Software Developers should know how basic components like resistors, capacitors, LEDs, and such behave in a circuit. Other important skills for Software Developers might include reading data sheets, understanding timing diagrams and clocking, electronics concepts such as pull-up and pull-down resistors, Hi-Z, active-low and active high, and logic gates and transistors.

Software skills for hardware developers: Hardware developers will be designing the next revision of the product's PCB. They'll be selecting and integrating microprocessors, sensors, and radio interfaces. Like their software developer counterparts, their work will cover everything from low power embedded devices to high(er) power, high(er) resource devices. Hardware developers in the IoT world could also find it useful to know software basics. The goal is not simply to build out a 200,000-line source code base complete with an underlying build system but rather to gain an appreciation of the requirements of the other half of a development team. For example, software prototyping skills. High level languages such as **Node.js** or **Java** are excellent starting points for people new to programming. They're easy to learn and benefit from some useful features like automatic memory management. Hardware engineers could advance their skills further by studying C and C++ and managing process memory manually, or understanding how a sensor can be read in software through, for instance, a DAC over an I2C bus. This kind of knowledge will help hardware developers appreciate the importance of building their components with software flexibility in mind. For example, providing flexible I/O options so that the software team has more options available to them when they are building out the software to sit on top of the hardware team's work.

People Architecture and Agile Compensation

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

What's changed lately is not just the widespread acceptance of technology's singular role as an engine of innovation and competitiveness. Instead, it's the energized role that is being thrust upon technology professionals and organizations everywhere *to monetize technology* through enabling and leading the development of new technology products and services. 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.

Senior business management may still bring in outside help but they now ask their tech leaders as well as their business line leaders managing large segments of technology talent to be more accountable---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 cyber attacks), and capitalizing on fast moving trends such as Blockchain, AI, Machine Language, Automation, IoT, Cloud Computing, 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 IT 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 in the future.

Agile Compensation is the answer to the chaos in paying tech professionals created by the proliferation of technology related job titles and lack of consistency in job definitions and pay practices across the enterprise for the same work performed. ***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. Governance issues need careful attention and business strategy drives it all.

But with Agile Compensation and 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, 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, creating constant labor gaps, skills deficits, and failure to execute consistently.***

People Architecture/Agile Compensation, cont'd.

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

- Reduces by 50% to 70% the number of tech related job titles necessary to plan and administer pay;
- Significantly increases retention rates;
- Narrowed or altogether eliminated persistent technology skills gaps;
- Improved individual and team performance and more predictable execution,
- Increased consistent availability and quality of skills and workers
- Higher utilization rates,
- Mapping out how workers can move more effectively through promotions/career paths

Technical architecture practices have been successful because—when done well---companies achieve 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. They helped to clearly define enterprise technology capabilities and give companies more options and flexibility going forward.

This is exactly what is needed in managing IT human capital and what People Architecture has delivered to those employers who have implemented it.

Tech workforce management has had difficulty finding and retaining people that can perform at a high caliber on increasingly more difficult tasks and at the same time they're 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.

Employers tell us that people architecture practices have been instrumental is 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.

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.

"Clean sheeting" HR systems isn't realistic no matter how broken the may be. Employers desperately need a straight forward, inclusive architecture approach that can be built underneath the current HR systems, strengthening and rebuilding foundational systems over time. We've observed people architecture practices enabling just this kind of incremental change at dozens of our research partners. We endorse it as perhaps the only viable approach to managing a workforce tasked with Blockchain, AI, Machine Language, Automation, IoT, Cloud Computing, and digital innovation urgencies.

IT Skills & Certifications Pay Data Trend Charts

IT Skills and Certifications Pay Index™ – 4th Quarter 2017 data edition

(Data collected through January 1, 2018)

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

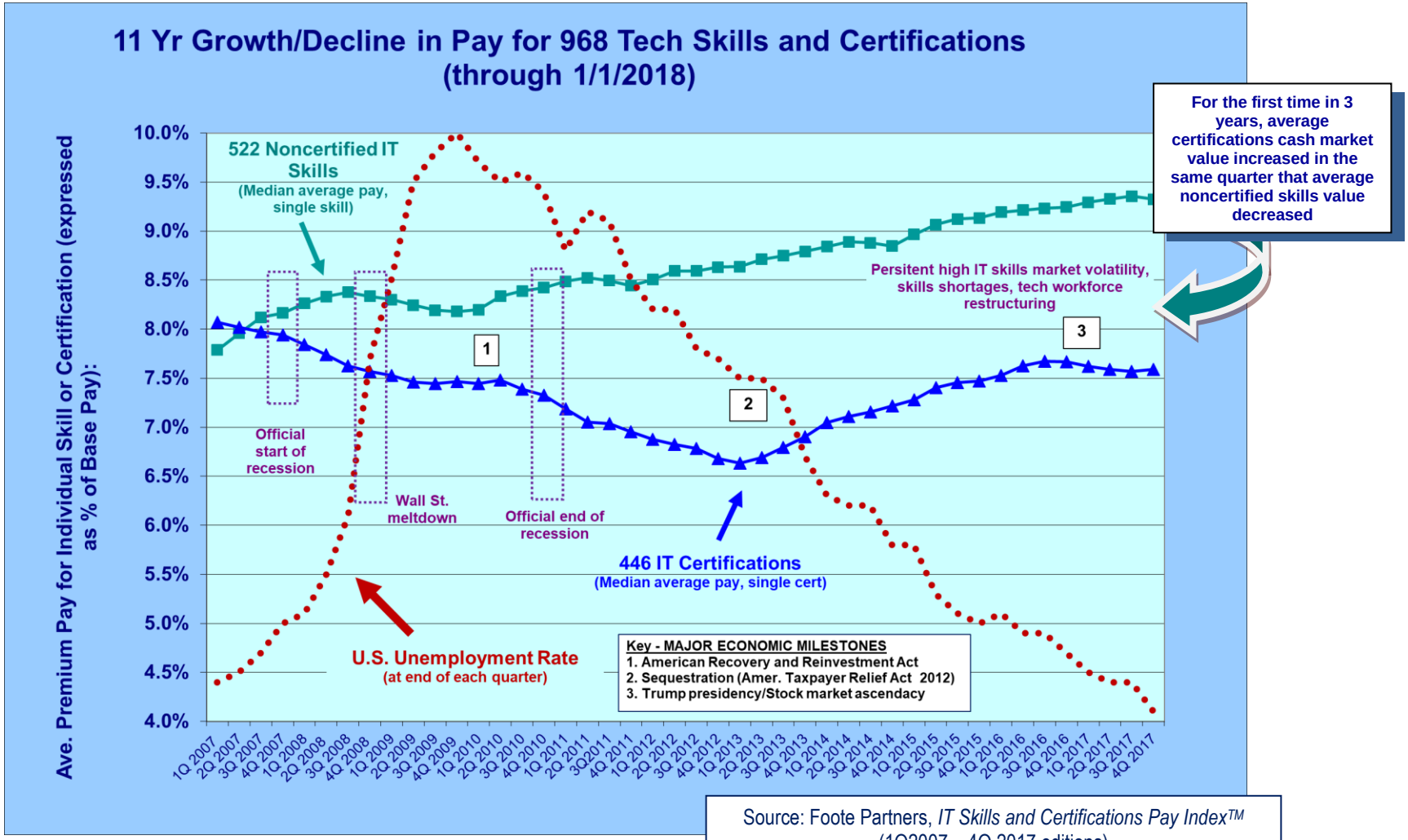
Quarterly gains and losses in premium pay reflect a widening or narrowing, respectively, in the gap between supply and demand for skills and certifications. This may occur for any number of reasons. For example, a quarterly decline in pay for a skill may signal that the market supply of talent for that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

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

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

Fig 2 - Premium Pay for Certified and Noncertified Tech Skills Has Become a Popular Component of IT Compensation as Organizations Become More Digital

(Average Median Pay for a Single Certified vs. Noncertified IT Skill, Last 10 years – 73,664 IT professionals)



For the first time in 3 years, average certifications cash market value increased in the same quarter that average noncertified skills value decreased

Source: Foote Partners, *IT Skills and Certifications Pay Index™* (1Q2007 – 4Q 2017 editions)

(Pay data supporting these charts available in the 2018 *IT Skills and Certifications Pay Index™*.)

IT Certifications: Latest market value trends

(Data collected through January 1, 2018)

2-YEAR IT CERTIFICATIONS PAY TRENDS

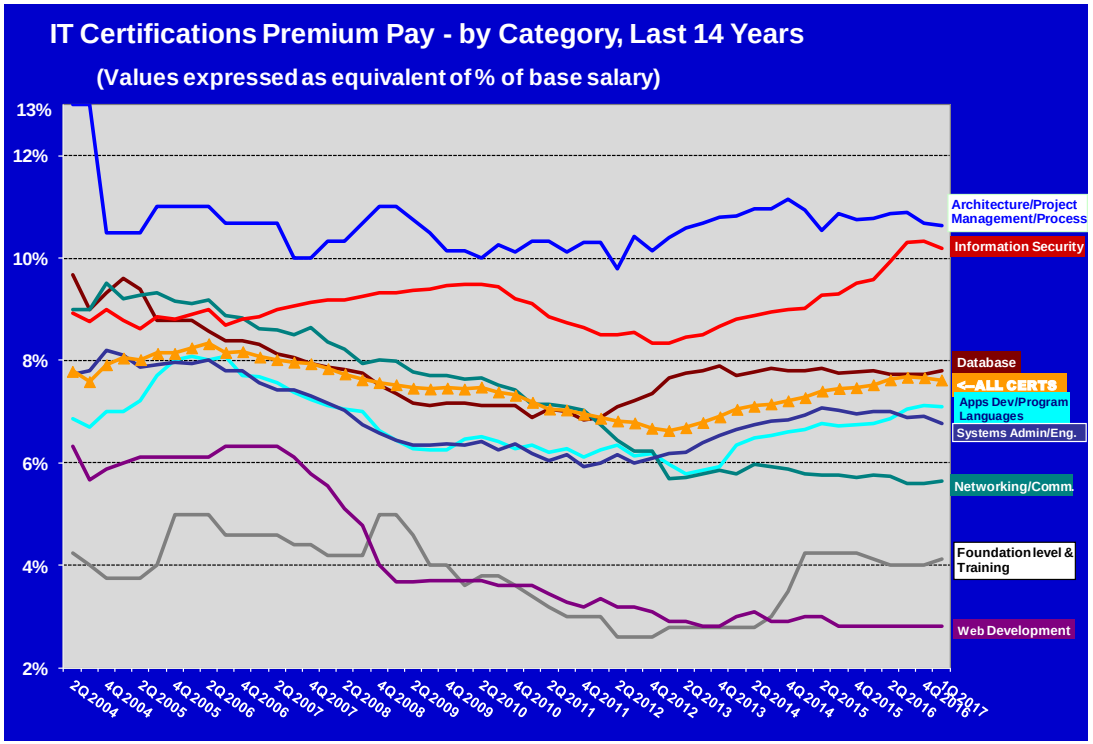
(Through 1/1/2018 – 73,664 IT Professionals)

IT CERTIFICATIONS CATEGORIES	# of certs surveyed	Change in Average Premium Pay by Category			
		% Change 3 mos	% Change 6 mos	% Change ANNUAL	% Change 2 yrs
Foundation level and Training	8	0.0%	0.0%	0.0%	-5.9%
Apps Development/Prog. Languages	49	2.3%	2.2%	-3.2%	4.8%
Database	41	-1.1%	-0.6%	0.2%	-1.5%
Web Development	11	0.0%	0.0%	0.0%	0.0%
Networking & Communications	88	0.5%	0.9%	0.6%	-0.9%
System Administration/Engineering	105	-1.8%	-2.0%	-2.5%	-5.0%
Information/Cyber Security	89	-1.9%	-1.2%	-1.0%	5.7%
Architecture/Project Management/Process	55	-0.2%	-0.6%	-1.2%	-1.9%
ALL CERTIFICATIONS REPORTED	446	0.3%	0.1%	-1.3%	1.6%

3 & 12 MONTH IT CERTIFICATIONS PAY TRENDS BY CATEGORY

(Through 1/1/2018 – 73,664 IT Professionals)

% Change in Average Median Pay for a Single IT Certification



SOURCE: Data supporting these charts is from Foote Partners *IT Skills & Certifications Pay Index*™ (2004 to 2017 quarterly editions)

(Pay data supporting these charts available in the *IT Skills and Certifications Pay Index*™ – 4Q 2017 edition)

HIGHEST PAYING IT Certifications (cash pay premiums ranked, all 446 certs surveyed)

These **IT certifications** are among those earning the highest pay premiums (data collected October 1, 2017 to January 1, 2018). **Shown in alphabetical by overall rank in descending order including ties.** **Green**/**Red** = increased/decreased in market value this quarter. **Amber** = Just made the list this quarter

1. Tie Certified Cyber Forensics Professional
Open Group Master Architect

2. Tie CyberSecurity Forensic Analyst (CSFA)
TOGAF 9 Certified

3. Tie InfoSys Security Architecture Professional (ISSAP/CISSP)
Open Group Master Certified IT Specialist
PMI Professional in Business Analysis (PMI-PBA)
PMI Program Management Professional (PgMP)
Six Sigma Master Black Belt

4.Tie Cisco Certified Architect
GIAC Exploit Researcher and Advanced Penetration Tester
GIAC Web Application Penetration Tester (GWAPT)
InfoSys Security Engineering Professional (ISSEP/CISSP
InfoSys Security Management Professional (ISSMP/CISSP)
PMI Portfolio Management Professional (PfMP)
PMI Risk Management Professional (PMI-RMP)
Salesforce.com Certified Technical Architect

5.Tie Certified Scrum Professional
Certified in Risk and Information Systems Control (CRISC)
Certified Information Security Manager (CISM)
Certified Scrum Master
Check Point Certified Security Master (CCMA)
GIAC Reverse Engineering Malware
GIAC Systems and Network Auditor (GSNA)
Open Group Certified Architect
Open Group Certified IT Specialist (Open CITS)
PMI Project Management Professional(PMP)
Six Sigma Black Belt

6.Tie Certified Cloud Security Professional
Certified Computer Examiner (CCE)
Certified Forensic Computer Examiner (CFCE)
Certified Fraud Examiner
Certified in the Governance of Enterprise IT (CGEIT)
Certified Information Systems Auditor (CISA)
Certified Information Systems Security Professional (CISSP)
Certified IT Architect (IASA CITA)
Check Point Certified Security Expert (CCSE)
Cloudera Certified Professional: Data Scientist
CSX CyberSecurity Practitioner (CSXP)
EC-Council Certified Security Analyst (ECSA)
EC-Council Computer Hacking Forensic Investigator (CHFI)
EC-Council Licensed Penetration Tester (LPT)
EMC Cloud Architect Expert
GIAC Certified Perimeter Protection Analyst (GPPA)
GIAC Cyber Threat Intelligence (GCTI)
GIAC Enterprise Defender (GCED)
PMI Agile Certified Practitioner (PMI-ACP)
SAS Certified Data Scientist
VMware Certified Design Expert - Cloud (VCDX-Cloud)

SOURCE: Foote Partners *IT Skills & Certifications Pay Index™*, 4th Quarter 2017 data edition

Avaya Certified Implementation Specialist
Avaya Certified Professional Design Specialist
Avaya Certified Solution Specialist
AWS Certified Solutions Architect – Associate
AWS Certified Solutions Architect – Professional
AWS Certified SysOpsAdministrator - Associate
AWS Certified Developer – Associate
AWS Certified DevOps Engineer - Professional
BICSI ITS Technician
Brocade Certified Network Engineer
Brocade Certified Network Professional
Brocade Certified Fabric Designer
Brocade Certified Fabric Professional (BCFP)
Certificate of Cloud Security Knowledge
Certification of Competency in Business Analysis
Certified Associate in Project Management)
Certified Analytics Professional (CAP)
Certified Business Analysis Professional (CBAP)
Certified Business Continuity Professional (CBCP)
Certified Cloud Architect
Certified Cloud Security Professional
Certified Cloud Technology Professional
Certified Computer Examiner (CCE)
Certified Computing Professional (CCP-ISC2)
Certified in Convergent Network Technologies (CCNT)
Certified Cyber Forensics Professional
Certified Database Design Specialist
Certified Data Centre Management Professional
Certified Data Management Professional
Certified Disaster Recovery Engineer (C/DRE)
Certified Forensic Computer Examiner
Certified Fraud Examiner
Certified Healthcare Information Security and Privacy Practitioner (HCISPP)
Certified IT Compliance Professional
Certified Salesforce Developer
Certified Salesforce Advanced Developer
Certified in the Governance of Enterprise IT (CGEIT)
Certified in Risk and Information Systems Control (CRISC)
Certified Information Security Manager (CISM)
Certified Information Systems Auditor (CISA)
Certified Information Systems Security Professional (CISSP)
Certified IT Architect (IASA CITA)
Certified Manager of Software Quality (CMSQ)
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 Technical Architect (Salesforce.com)
Certified Telecommunications Network Specialist (CTNS)
Check Point Certified Master Architect (CCMA)
Check Point Certified Security Administrator (CCSA)
Check Point Certified Security Expert (CCSE)
Certified Cisco Systems Instructor (CCSI)
Cisco Certified Architect
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 (CCIE)
Cisco Certified Network Associate (CCNA)
Cisco Certified Network Associate - Data Center
Cisco Certified Network Associate - Security
Cisco Certified Network Associate Wireless (CCNP Wireless)
Cisco Certified Network Professional Wireless (CCNP Wireless)
Cisco Certified Network Professional (CCNP)
Cisco Certified Network Professional - Data Center
Cisco Certified Network Professional - Security
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
Cisco IP Communications Express Specialist
Cisco IP Contact Center Express Specialist (CPCC)
Cisco IP Telephony Design Specialist
Cisco IP Telephony Support Specialist
Cisco IPS (Intrusion Prevention System) Specialist
Cisco VPN Specialist
Citrix Certified Administrator - Networking (CCA)
Citrix Certified Associate - Virtualization
Citrix Certified Enterprise Engineer (CCEE) for Virtualization
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-V
CIW Certified Database Design Specialist
CIW Network Technology Associate
CIW Web Design Professional
CIW Web Development Professional
CIW Web Foundations Associate
Cloud U (Rackspace)
Cloudera Certified Data Analyst
Cloudera Certified Developer for Apache Hadoop
Cloudera Certified Administrator for Apache Hadoop
Cloudera Certified Professional: Data Scientist
Cloudera Certified Specialist in Apache HBase
CompTIA A+
CompTIA Advanced Security Practitioner (CASP)
CompTIA Certified Technical Trainer (CTT+)
CompTIA Cloud Essentials
CompTIA Cloud+
CompTIA Linux+
CompTIA Mobile App Security+
CompTIA Mobility+
CompTIA Network (Network+)
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 Networking Expert (CWNE)
CWNP/Certified Wireless Technology Specialist (CWTS)
CWTS/Certified Wireless Technology Specialist
Cyber Security Forensic Analyst
EC-Council Certified Network Defense Architect Certification
EC-Council Certified Ethical Hacker (CEH)
EC-Council Certified Incident Handler
EC-Council Certified Secure Programmer (ECSP)
EC-Council Certified Security Analyst (ECSA)
EC-Council Certified VoIP Professional (ECVP)
EC-Council Computer Hacking Forensic Investigator (CHFI)
EC-Council Disaster Recovery Professional (EDRP)
EC-Council Licensed Penetration Tester (LPT)
EC-Council Network Security Administrator (ENSA)
EMC Cloud Architect Expert
EMC Cloud Architect Specialist
EMC Cloud Engineer (EMCCE)
EMC Data Center Architect (EMCDCA - all versions)
EMC Data Science Associate
EMC Data Science Specialist, Advanced Analytics
EMC Implementation Engineer - Expert (EMCIE)
EMC Implementation Engineer - Specialist (EMCIE)
EMC Information Storage Associate (EMCISA)
EMC Platform Engineer - Specialist (EMCPE)
EMC Storage Administrator - Associate (EMCSA-A)
EMC Storage Administrator - Expert (EMCSA-E)
EMC Storage Administrator - Specialist (EMCSA-S)
EMC System Administrator – Documentum Specialist (EMCSyA)
EMC Technology Architect - Expert (EMCTA)
EMC Technology Architect - Specialist (EMCTA)
GIAC Assessing and Auditing Wireless Networks
GIAC Certified Perimeter Protection Analyst
GIAC Certified Forensics Analyst (GCFA)
GIAC Certified Forensics Examiner
GIAC Certified Incident Handler (GCIH)
GIAC Certified Intrusion Analyst (GCIA)
GIAC Certified Penetration Tester (GPEN)
GIAC Certified Perimeter Protection Analyst (GPPA)
GIAC Certified Project Manager (GCPM)
GIAC Certified Unix Security Administrator (GCUX)
GIAC Certified Web Application Defender

GIAC Certified Windows Security Administrator (GCWN)
GIAC Critical Controls Certifications (GCCC)
GIAC Cyber Threat Intelligence (GCTI)
GIAC Enterprise Defender (GCED)
GIAC Exploit Researcher and Advanced Penetration Tester (GWAPT)
GIAC Information Security Fundamentals (GISF)
GIAC Information Security Professional (GISP)
GIAC Mobile Device Security Analyst (GMOB)
GIAC Network Forensic Analyst (GNFA)
GIAC Python Coder (GPYC)
GIAC Reverse Engineering Malware (GREM)
GIAC Secure Software Programmer--Java
GIAC Security Essentials (GSEC)
GIAC Security Leadership(GSLC)
GIAC Systems and Network Auditor (GSNA)
GIAC Web Application Penetration Tester (GWAPT)
Help Desk Analyst: Tier 1 Support Specialist/Ed2Go
Help Desk Team Lead/RCCSP
HDI Customer Service Representative
HDI Desktop Support Manager
HDI Desktop Support Technician
HDI Support Center Analyst
HDI Support Center Director
HDI Support Center Manager
HP ASE – Cloud Integrator V2
HP ASE - Data Center and Cloud Architect V2/V3
HP ASE - Storage Solutions Architect V1 /V2
HP ASE Cloud Architect V2
HP ASE Vertica Big Data Solutions Administrator V1
HP ATP - Cloud Administrator V1
HP ATP - Storage Solutions V1 /V2
HP ATP Big Data Vertica Solutions V1
HP Master Accredited Solutions Expert (MASE - all)
HP Master ASE - Storage Solutions Architect V1 /V2
HP Accredited Integration Specialist (AIS)
HP Accredited Solutions Expert (ASE - all)
HP ASE--Data Center and Cloud ArchitectV1
IBM Advanced Systems Administrator (all)
IBM Certified Administrator for SOA Solutions: WebSphere Process Server
IBM Certified Advanced Application Developer (all)
IBM Certified Advanced Database Administrator
IBM Certified Advanced Security Professional
IBM Certified Advanced Technical Expert - Power Systems with AIX v2/v3
IBM Certified Application Developer (all)
IBM Certified Database Administrator - DB2
IBM Certified Developer - Cognos
IBM Certified Infrastructure Systems Architect
IBM Certified Operator - AIX Basic Ops
IBM Certified SOA Solution Designer
IBM Certified Solution Advisor - Cloud Computing Architecture V4
IBM Certified Solution Architect – Cloud Computing Infrastructure V1
IBM Certified Solution Designer - WebSphere
IBM Certified Solution Developer - DB2 SQL
IBM Certified Solution Developer: WebSphere (all)
IBM Certified Solution Expert - Cognos
IBM Certified Specialist - System z
IBM Certified Specialist - Cognos
IBM Certified Specialist - Storage
IBM Certified Systems Administrator - AIX 7
IBM Certified Systems Administrator - IBM i 6.1
IBM Certified Systems Administrator - WebSphere
IBM Certified Systems Administrator (all)
IBM Certified Systems Expert - AIX and Linux v2
IBM Certified Systems Expert - Virtualization Technical Support for AIX and Linux - v2
InfoSys Security Engineering Professional (ISSEP/CISSP)
InfoSys Security Management Professional (ISSMP/CISSP)
ITIL Expert Certification
ITIL Intermediate Level Certification
JBoss Certified Developer (Seam, Persistence, ESB)
Juniper Networks Certified Internet Associate
Juniper Networks Certified Internet Specialist
Juniper Networks Certified Internet Professional
Juniper Networks Certified Internet Expert
Linux Professional Institute certification (LPIC- 2)
Linux Professional Institute certification (LPIC- 3)
Microsoft Certified IT Professional: DBA
Microsoft Certified Professional Developer (all)
Microsoft Certified Solution Developer (MCSD)
Microsoft Certified Solution Developer: Applications Lifecycle Management
Microsoft Certified Solutions Associate(all)
Microsoft Certified Solutions Associate: SQL Server 2012/2014
Microsoft Certified Solutions Associate: Windows Server 2016
Microsoft Certified Solutions Expert: Business Intelligence
Microsoft Certified Solutions Expert: Communications
Microsoft Certified Solutions Expert: Data Management and Analytics
Microsoft Certified Solutions Expert: Data Platform
Microsoft Certified Solutions Expert: Desktop Infrastructure
Microsoft Certified Solutions Expert: Private Cloud
Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure
Microsoft Certified Solutions Master(all)
Microsoft Certified Technology Specialist: Microsoft Dynamics CRM
Microsoft Certified Technology Specialist: SQL Server 2008
Microsoft Certified Trainer (MCT)
Microsoft Office Specialist
Microsoft Specialist Certification in Microsoft Azure
Microsoft Specialist in Windows 10
Mongo DB Certified DBA
Mongo DB Certified Developer
NetApp Certified Data Administrator, ONTAP (NCDA)
NetScout/nGenius Certified Analyst (nCA)
NetScout/nGenius Certified Expert (nCE)
NetScout/nGenius Certified Master (nCM)
NetScout/nGenius Certified Professional (nCP)
Novell Certified Instructor
Novell Certified Linux Engineer (Novell CLE)
Novell Certified Linux Professional (Novell CLP)
Novell/Certified Internet Professional (CIP)
Novell/Certified Novell Administrator (CNA)
Novell/Certified Novell Engineer (CNE)
Novell Identity Manager Administrator
Oracle Administrator Certified Associate - DBA (OCA)
Open Group Certified Architect (Open CA)
Open Group Certified IT Specialist (Open CITS)
Open Group Master Architect
Open Group Master Certified IT Specialist (Open CITS)
Oracle Business Intelligence Foundation Suite 11G Certified Implementation Specialist
Oracle Certified Associate - DBA (OCA)
Oracle Certified Associate - Java SE Programmer
Oracle Certified Associate - MySQL 5
Oracle Certified Associate - WebLogic Server Administrator
Oracle Certified Expert - Java Platform EE Developer (all)
Oracle Certified Expert - MySQL 5.1 Cluster Database Administrator
Oracle Certified Expert - Siebel CRM Business Analyst
Oracle Certified Expert - Solaris 10 Network Administrator for Solaris
Oracle Certified Master - DBA (OCM)
Oracle Certified Master - Java EE Enterprise Architect
Oracle Certified Master - Java SE Developer
Oracle Certified Professional - Advanced PL/SQL Developer
Oracle Certified Professional - Application Server Administrator
Oracle Certified Professional - Database Cloud Administrator
Oracle Certified Professional - DBA (OCP)
Oracle Certified Professional - E-Business Suite 12
Oracle Certified Professional - Forms Developer
Oracle Certified Professional - Java EE Web Services Developer
Oracle Certified Professional - Java SE Programmer
Oracle Certified Professional - MySQL 5 Database Administrator
Oracle Certified Professional - MySQL 5 Developer
Oracle Certified Professional - PL/SQL Developer
Oracle Certified Professional - Solaris 10 Systems Administrator
Oracle Certified Professional, Java EE Web Component Developer
Oracle Certified WebLogic Server System Administrator Certified Expert
Oracle Exadata 11g Certified Implementation Specialist
Oracle Linux Certified Administrator (OCA)
Oracle SOA Infrastructure Implementation Certified Expert
Oracle VM 3.0 for x86 Certified Implementation Specialist

Pegasystems Certified Lead System Architect
Pegasystems Certified Senior Systems Architect
Pegasystems Certified System Architect
Pegasystems Certified Pega Business Architect
PMI Agile Certified Practitioner (PMI-ACP)
PMI Portfolio Management Professional (PfMP)
PMI Professional in Business Analysis (PMI-PBA)
PMI Program Management Professional (PgMP)
PMI Project Management Professional (PMP)
PMI Risk Management Professional (PMI-RMP)
Professional Certified Investigator
Professional in Project Management (GAQM)
Qualified Information Security Professional Q/ISP
Red Hat Certified Architect (RHCA)
Red Hat Certified Architect: Application Development
Red Hat Certified Architect: Application Platform
Red Hat Certified Architect: Cloud
Red Hat Certified Architect: DevOps
Red Hat Certified Datacenter Specialist (RHCDS)
Red Hat Certified Engineer in Red Hat OpenStack
Red Hat Certified Engineer(RHCE)
Red Hat Certified Security Specialist (RHCSS)
Red Hat Certified System Administrator in Red Hat OpenStack
Red Hat Certified Systems Administrator (RHCSA)
RedHat Certified Technician (RHCT)
RedHat Certified Specialist in Virtualization
RSA Certified Administrator (RSA/CA)
RSA Certified Instructor (RSA/CI)
RSA Certified Systems Engineer (RSA/CSE)
Salesforce.com Certified Technical Architect
SAS Certified Advanced Programmer
SAS Certified Base Programmer
SAS Certified Big Data Professional Using SAS 9
SAS Certified Data Inegration Developer for SAS 9
SAS Certified Data Scientist
SAS Certified Predictive Modeler - SAS Enterprise Miner 7
SAS Certified Statistical Business Analyst - SAS 9
Security Certified Network Architect (SCNA)
Security Certified Network Professional (SCNP)
Security Certified Network Specialist (SCNS)
Siebel 8 Consultant Certified Expert
Six Sigma Black Belt
Six Sigma Master Black Belt
Six Sigma Green 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)
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
TIBCO Certified Professional
TIBCO Certified SOA Architect
TOGAF 9 Certified
VMware Certified Advanced Professional – Cloud Infrastructure Administration (VCAP-CIA)
VMware Certified Advanced Professional – Cloud Infrastructure Design (VCAP-CID)
VMware Certified Advanced Professional – Data Center Administration (VCAP-DCA)
VMware Certified Advanced Professional – Data Center Design (VCAP-DCD)
VMware Certified Advanced Professional (VCAP)
VMware Certified Associate - Cloud (VCA-Cloud)
VMware Certified Associate - Data Center Virtualization (VCA-DCV)
VMware Certified Associate - Workforce Mobility (VCA-WM)
VMware Certified Design Expert - Cloud (VCDX-Cloud)
VMware Certified Design Expert (VCDX)
VMware Certified Design Expert 5 - Data Center Virtualization (VCDX5-DCV)
VMware Certified Professional 4/5/6(VCP 4/5/6)
VMware Certified Professional 5 - Data Center Virtualization (VCP5-DCV)
VMware Certified Professional 6 - Data Center Virtualization (VCP6-DCV)
VMware Certified Professional-Cloud (VCP6-Cloud)

IT Skills (Noncertified): Latest market value trends

(Data collected through January 1, 2018)

2-YEAR NONCERTIFIED IT SKILLS PAY TRENDS

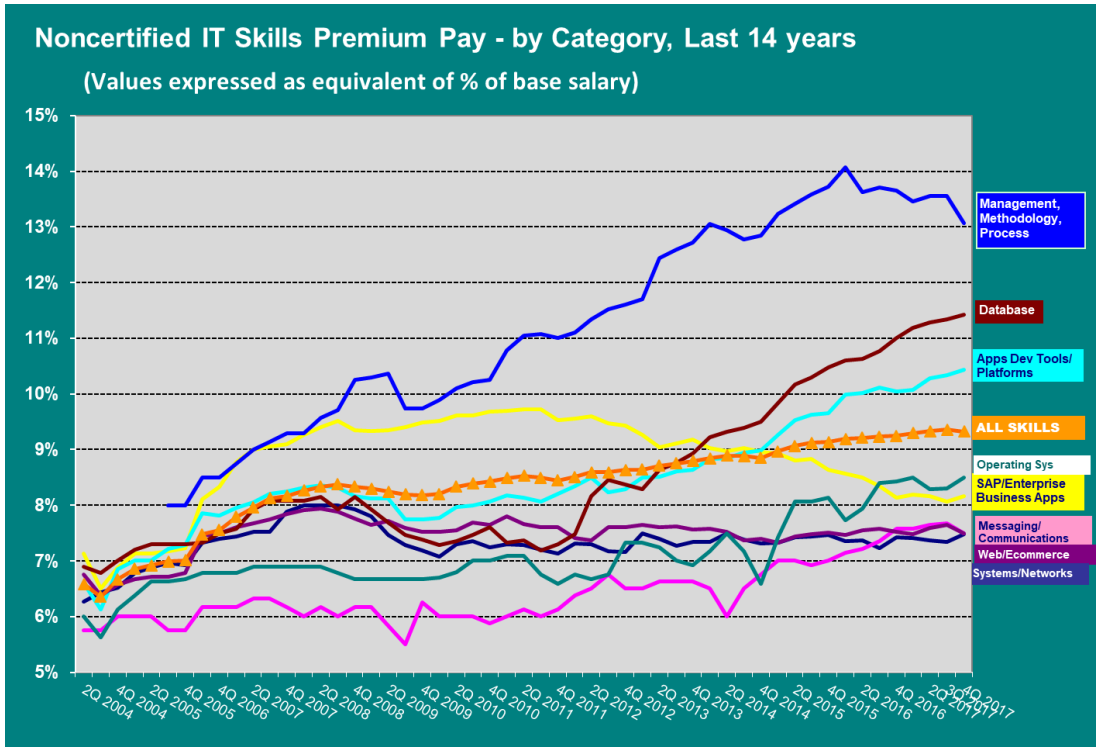
(Through 1/1/2018 – 73,664 IT Professionals)

NONCERTIFIED IT SKILLS CATEGORIES	# of skills surveyed	Change in Average Premium Pay by Category: % Change 3 mos	% Change 6 mos	% Change ANNUAL	% Change 2 yrs
Systems/Networking	82	1.8%	1.5%	0.6%	0.1%
Messaging and Communications	14	-2.3%	-1.9%	-0.9%	7.1%
SAP & Enterprise Business Applications	127	1.3%	0.0%	0.3%	-5.5%
Apps Development Tools & Platforms	92	0.9%	1.5%	4.0%	8.1%
Web/e-Commerce Development	75	-2.1%	-1.3%	-0.5%	-0.2%
Database	42	0.7%	1.3%	3.9%	9.1%
Operating Systems	14	2.3%	2.6%	0.8%	4.5%
Management/Methodology/Process	76	-3.6%	-3.6%	-4.3%	-4.7%
ALL NONCERTIFIED SKILLS REPORTED	522	-0.3%	0.0%	0.9%	2.1%

NONCERTIFIED IT SKILLS PAY TRENDS BY CATEGORY

Average Median Pay for a Single IT Skill (noncertified)

(Through 1/1/2018 – 73,664 IT Professionals)



SOURCE: Data supporting these charts is from Foote Partners *IT Skills & Certifications Pay Index™* (2004 to 2017 quarterly editions)

(Pay data supporting these charts available in the *IT Skills and Certifications Pay Index™* – 4Q 2017 edition)

HIGHEST PAYING Noncertified IT Skills (ranked, all 522 skills surveyed)

These **noncertified IT skills** are among those earning the highest pay premiums (data collected October 1, 2017 to January 1, 2018). **Shown in alphabetical by overall rank in descending order including ties. Green/Red** = increased/decreased in market value this quarter. **Amber** = Just made the list this quarter

1. Tie
- Complex Event Processing/Event Correlation
- Data Architecture
- Security architecture and models
- TIBCO ActiveMatrix BusinessWorks
- TOGAF (Enterprise Architecture)

2. Tie
- Apache Zookeeper
- COBIT
- Machine Learning
- Prescriptive Analytics
- Risk analytics/assessment
- Zachman Framework

3.Tie
- Apache Hive
- Blockchain
- Cloud Foundry PaaS
- Cybersecurity
- Data Governance
- DevOps
- Ethereum
- Hbase
- Metadata design and development
- Microservices
- Objective Caml (Ocaml)
- Oracle Coherence
- Predictive Analytics and Modeling
- Risk management
- Security skills (DW/BI, ERP, Web, project assignments)

4.Tie
- Apache Cassandra
- Apache Pig
- Apache Spark
- Artificial Intelligence
- Big Data analytics
- Business analytics
- Cloudera Impala
- Configuration Management
- Continuous Improvement
- Continuous Integration
- Cryptography (encryption, VPN, SSL/TLS, Hybrids)
- Data Analytics
- Data Integration
- Data Management
- Data Modelling
- Data Quality
- Infrastructure architecture
- IT Governance
- Kanban
- MapReduce
- Master data management
- Penetration testing
- Program Management
- Riak
- Robotic Process Automation
- SAP MII (Manufacturing Integration and Intelligence)
- Scala
- Splunk
- Sqoop

5.Tie
- Amazon DynamoDB
- Amazon Kinesis
- Amazon RedShift
- Apache CouchDB
- Apache Hadoop
- C++ /CLI
- Clojure
- Data Science
- Data Visualization
- Go language (Golang)
- Information management
- Mobile security
- Network Architecture
- Oracle Exadata
- Project management/governance
- Quality management/TQM
- Quantitative Analysis/Regression Analysis
- R language
- Redis
- Smart Contract
- Test Driven Development/Scripting
- User Experience/Interface Design
- Web services security
- Webtrends analytics

SOURCE: Foote Partners *IT Skills & Certifications Pay Index™*, 4th Quarter 2017 data edition

522 Noncertified IT Skills Reported

(new this quarter in red)

Applic. Dev. Tools/Platforms

Agile software development
Amazon Kinesis
Amazon Web Services (EC2, S3, ASW, SQS, ELB, et. al.)
Apache Ant
Apache Cloudstack
Apache Cordova
Apache Flex
Apache Hadoop
Apache Lucene
Apache Maven
Apache Pig/Pig Latin
Apache Spark
Apache Struts/Struts2
Apache Tomcat
Apache Zookeeper
Automated Testing
AWS CloudFormation
AWS Lambda
Bitbucket
Boost C++
Business Objects
C
C#
C++
C++ /CLI
CA PPM(Clarity PPM)
Cerner Millennium
Clojure
Cloudera software
Cloud Foundry PaaS
Cobol
Cognos
Confluence
Cucumber
Delphi
Drupal
Eclipse
Epic Systems applications
Ethereum
F#
Git/GitHub
GitLab
Go language (Golang)
Google Kubernetes
Groovy/Grails
Grunt
Hibernate
HP ALM (App. Lifecycle Mgt)
Integration Testing
iRise
Jasmine
Java SE/Java EE
JBehave
Jenkins
JIRA
JUnit
MapReduce
MATLAB
Microsoft Azure
Microsoft SQL Server Mgt Studio
Microsoft Team Foundation Server
NetWeaver
Nim
NUnit
Objective-C
Objective Caml (Ocaml)
OpenShift
Oracle Apps Developer Framework
PL/SQL
Powerbuilder
Progress 4GL/Development tools
R language
Ruby
Ruby on Rails
Saas
SAS
Scala
Scrum
Selenium
ServiceNow ITSM
SPSS
SQL
Swift
Tcl
Transact-SQL
UML (unified modeling language)
Visual Basic 6.0
Visual C++
VMware Cloud Foundry PaaS
WebSphereMQ
Xcode

SAP & Enterprise Bus. Apps.

ABAP (all modules)
Baan
IBM Sterling
J.D. Edwards /Oracle
Lawson
Microsoft Dynamics
NetWeaver
NetWeaver Portal (SAP EP)
Oracle BPM
Oracle CRM
Oracle E-Business suite
Oracle Eloqua
Oracle ERP
Oracle Financials
Oracle HFM (Hyperion Fin. Mgt)
Oracle HRMS
Oracle NetSuite
Oracle Payroll
Oracle Retail
Oracle SCM
Oracle SOA Suite
Pega
PeopleSoft (CRM/Financials/HCM)
Remedy
Salesforce
Accelerated SAP (SLM)
SAP AFS
SAP ALE
SAP APO
SAP Auto-ID infrastructure
SAP Banking
SAP Basis Components
SAP BI Accelerator
SAP BODI
SAP Data Services (SAP BODS)
SAP BOXI
SAP BPC
SAP BSP
SAP Business One
SAP Business Workflow/Webflow
SAP CA
SAP CAF
SAP CAR (Customer Activity Repository)
SAP CCM
SAP CE
SAP CFM
SAP CO
SAP CO-PA
SAP CRM
SAP Crystal Reports
SAP CS
SAP EBP
SAP EDI
SAP EHS
SAP EPM
SAP ERP
SAP ESA
SAP Exchange Infrastructure (XI)
SAP FI (Financial Accounting)
SAP FI - CA
SAP FI – FSCM
SAP FI - Travel Management
SAP Fiori
SAP F&R (Forecasting and Replenishment)
SAP FS (Insurance)
SAP GRC
SAP GTS
SAP HANA
SAP HCM (SAP HR)
SAP HCM ESS/MSS
SAP HR-PA
SAP Hybris
SAP IS-Retail
SAP IS-U (Utilities)
SAP ITS
SAP LES
SAP LO
SAP Lumira
SAP Manufacturing
SAP MDG (Master Data Governance)
SAP MDM
SAP MDX
SAP MI
SAP MII
SAP MM
SAP MRO
SAP MRS
SAP Netweaver Applications Server
SAP Netweaver BW (BIW)
SAP NetWeaver Visual Composer
SAP NWDI
SAP NWDS
SAP Oil & Gas
SAP PI (NetWeaver Process Integ.)
SAP PLM
SAP PM
SAP POSDM
SAP PP
SAP PS
SAP PSCD
SAP Public Sector Management
SAP PY (Payroll)
SAP QM
SAP Service & Asset Mgt
SAP S/4HANA
SAP SCM
SAP SD
SAP SD - GTS
SAP Security
SAP SEM
SAP SM
SAP Smart Forms
SAP Solution Manager
SAP SRM
SAP TM
SAP UI5 (UI development toolkit for HTML5)
SAP Web Application Server
SAP WEBI
SAP WM
SAP WM – EWM
SAP Xcelsius
Siebel
Software AG webMethods
SuccessFactors
Web Dynapro
Workday HCM

522 Noncertified IT Skills Reported

(new this quarter in red)

Web/e-Commerce Development

Active Server Pages
ActiveX
Ajax
AngularJS
Apache Solr
Apache web server
Backbone.js
CGI
Cold Fusion MX
Content management systems
CSS/CSS3
Django
Docker
Documentum
Elasticsearch
Front End Development
Google Analytics
Google App Engine
Google Cloud Platform
HTML5
JavaBeans/EJB 3.0
JavaFX
HTML5
JavaBeans/EJB 3.0
JavaFX
JavaScript
JavaScript
Java Server Pages
JBoss Enterprise
Jetty
Joomla!
jQuery
JSON
KnockoutJS
Magento
Magnolia
Microsoft .NET
Microsoft BizTalk Server
Microsoft Commerce Server
Microsoft Identity Integration Server
Microsoft Internet Information Services
Microsoft Internet Security and Acceleration Server (ISA)
Microsoft Sharepoint/Sharepoint Server
Microsoft Silverlight
Microsoft Visual Studio
Mobile applications development
Mule/MuleESB
Node.js
Oracle Fusion
Oracle WebLogic
Oracle Workflow
Perl
PHP (all)
Python
React.js
Redux
REST
RESTful
Secure software development
Sitecore CMS
SOAP
Social Media/Networks
Spring Framework
TIBCO
UDDI
Umbraco
VBScript
Video/graphics editing
Visual Interdev
VoiceXML
Web collaboration appliances
WebSphere
WebSphere Datapower
Wikis
WSDL
XAML/XACML
XHTML MP
XML (all variants

Management, Methodology and Process

Artificial Intelligence
Big Data Analytics
Bioinformatics
Business Analysis
Business Analytics
Business intelligence
Business process management/ modeling/improvement
Business performance management (software/systems)
Capacity Planning/Management
Change management
COBIT
Collaboration software
Complex Event Processing/Event Correlation
Configuration Management
Continuous Improvement
Continuous Integration CRM
Cryptography (encryption, VPN)
Cybersecurity
Data Analytics
Data Architecture
Data Cleansing
Data Governance
Data Integration
Data Management
Data Modelling
Data Quality
Data Science
Data Visualization
DevOps
E-Procurement
ERP
Game Development
General Data Protection Regulation(GDPR) (EU) 2016/679
Incident Management
Information management
IT Governance
ITIL V3
Kanban
Machine Learning
Marketo
Metadata design and development
Microservices
Microsoft SQL Server Analysis Services
Microsoft Visio
Network Architecture
Penetration testing
Predictive Analytics and Modeling
Prescriptive Analytics
Program Management
Project management/governance
QlikView
Quality management/TQM
Quantitative Analysis/Regression Analysis
Requirements Engineering/Analysis
Risk analytics/assessment
Risk management
Robotic Process Automation
Security architecture and models
SEO
Service Management
Six Sigma/Lean Six Sigma
Social media analytics
Software development lifecycle management
Splunk
Tableau
Test automation
Test Driven Development/Scripting
TIBCO ActiveMatrix BusinessWorks
TOGAF (Enterprise Architecture)
User Acceptance Testing
User Experience/Interface Design
Waterfall
Web Analytics
Webtrends analytics
Zachman Framework

Operating Systems

AIX
Apache Cloudstack
CoreOS
HP-UX
Linux
Mac OS X
Mobile operating systems(iOS, Android)
OpenStack
Red Hat Enterprise Linux
Solaris
Unix (all)
VMware vSphere
Windows 8/7
Windows NT
Windows Server 2008/2003

Database

Amazon DynamoDB
Apache Cassandra
Apache CouchDB
Apache Hive
Azure SQL Database
Amazon RedShift
Base SAS
Blockchain
Cloudera Impala
Couchbase Server
Database management
Data mining
Data security
DB2
dbase/xbase
ETL (Extract, transform, load)
Hbase
Informatica
Java Database Connectivity
Master data management
Microsoft Access
Microsoft Exchange Server 2003/2007/2010/2013
Microsoft SQL Server 2016/2014/2012/2008/2005
MongoDB
MySQL
NoSQL
OpenEdge ABL (Progress 4GL)
Oracle Application Server
Oracle Business Intelligence Enterprise Edition Plus
Oracle Coherence
Oracle DB 9i/10g/11i/12c
Oracle Enterprise Manager
Oracle Exadata
Oracle Forms
Oracle Reports
PostgreSQL
Redis
Riak
Sqoop
Sybase Adaptive Server
TIBCO Spotfire
Visual SQL

522 Noncertified IT Skills Reported

(new this quarter in red)

Systems/Networks

Active Directory
Ansible
Apache Flume
Arista
ATM
Business continuity and disaster recovery planning
CA Endevor
Chef/Opscode
Cisco ASA
Cisco CUCM
Cisco ICM
Cisco ISE/Identity Services Engine
Cisco IPCC
CiscoNexus
Cisco Prime
Cisco UCCE
Cisco UCCX
Citrix XenApp
Citrix XenServer
Cloud architecture
Cloud security
DHCP
EIGRP
Ethernet
Fast Ethernet
Gigabit Ethernet(1 GigE/10 GigE)
HP Converged System
HP Quality Center
HTTPS
IaaS (Infrastructure as a Service)
Infrastructure architecture
Intrusion prevention/detection systems
IPX/SPX
Juniper
LAN
LTE
Microsoft Application Virtualization
Microsoft Hyper-V
Microsoft SCVMM
Microsoft Virtual Server
Mobile device management
Mobile security
Multiprotocol Label Switching
Network access control/Identity mgt systems
NAS/Network Attached Storage
Network security management
PaaS
Performance Analysis/Tuning
Performance Testing
Puppet
Rackspace Cloud
Routing (e.g. OSPF)
Salt
SAN/Storage Area Networks
Security skills (project-based)
Smart Contract
SMTP
SNA
SolarWinds
Storage virtualization/administration
TCP/IP
Terraform
Tivoli
Vagrant
vCloud
Virtualization (various)
Virtual security
VMware Server/ESX, ESXi Server
VoIP/IP telephony
VPN/OpenVPN
WAN/3G/4G services
Web services security
Wireless Network Mgmnt
Wireless security
Wireless sensors/RFID
Wireline Networking/Telecomm.
WML

Messaging & Communications

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

Q1 2018 Trend Charts

2018 IT Skills & Certifications Volatility Index™

(Data collected through January 1, 2018)

Demand dynamics in benchmarked certified and noncertified IT skills pay

TRENDS 2018 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---has been unusually high in the years following the collapse of financial markets in 2008. But according to Foote Partners' long-running *IT Skills and Certifications Pay Index™* of market values for IT and business skills, something changed in 2017: volatility has smoothed out. The ITSCPI measures market value by tracking additional cash compensation paid to workers for specific certified and noncertified skills they possess.

Current Quarterly Recap (data collected through January 1, 2018)

TOTAL: All Skills and Certifications

- **23%** of skills and certifications (220 of 945) changed in market value in 4th Quarter 2017 compared to **22**% in prior quarter
- **94** gained value (from 104 prior quarter), **126** declined in value (96)

CERTIFIED SKILLS

- **16.7%** of reported certifications (73 of 438) changed market value in 4th Quarter 2017, up from **16.5%** volatility in the prior quarter.
- **29** certifications gained market value (34 in prior quarter); **44** declined in value (from 37 certs).

NONCERTIFIED SKILLS

- **28.9%** of reported skills (146 of 507) changed value in 4th Quarter 2017, down slightly from **26.7%** in the prior quarter.
- **65** gained in market value (same as 76 prior quarter); **82** declined in value (59).

Tracking volatility is useful for both analyzing and forecasting demand for skills, for monitoring IT workforce transition, and for 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.

Similar to jobs, IT skills have broad skills categories that can be tracked (e.g., security, networking, systems, database, applications development). But unlike jobs pay can be pinpointed to hundreds of niches: for example, SAN, virtualization, cloud, frameworks and processes, tools, and software modules. 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 (e.g., SAP, Hadoop, Informatica, Ruby on Rails, Microsoft Sharepoint, collaboration appliances, Oracle database).

Since 2009 the strategic focus of many employers has emphasized *acquisition of skills* more so than the addition of full time jobs. In doing so employers have harvested skills from multiple labor channels: managed services, consultants, contractors, part timers, and only very selectively expanding the internal workforce with critical full-time hires. **More reliance on the IT services industry has in fact added 289,600 additional IT service related jobs to payrolls in the past 24 months and 429,100 in the past 36 months according to the U.S. Department of Labor.**

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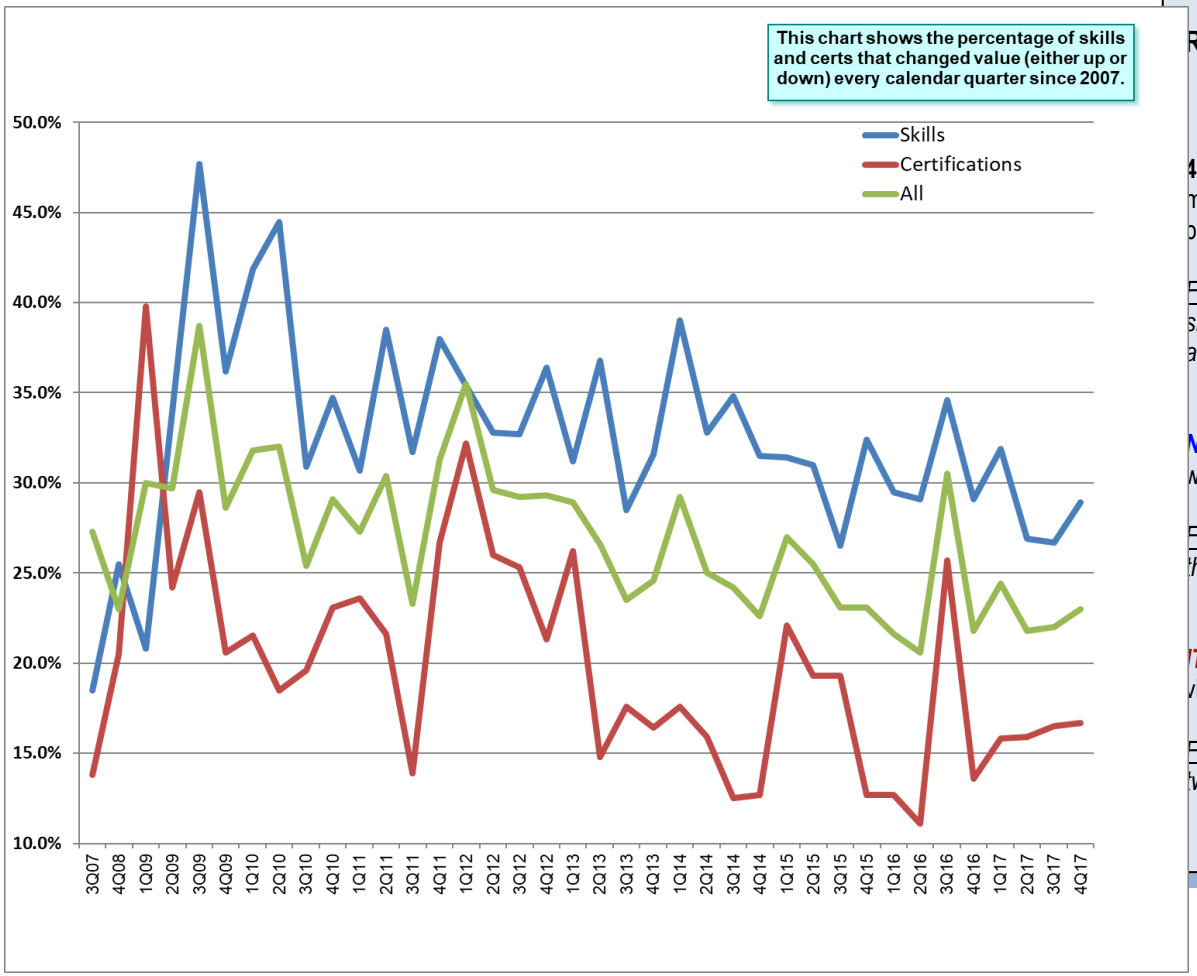
VOLATILITY HIGHLIGHTS - 10 Year Trending

IT Skills and Certifications Volatility Index™ – 968 Skills and Certifications



(Source: Foote Partners LLC, 2018 IT Skills & Certifications Pay Index™)

Recent IT skills and certifications volatility trends

QUARTERLY SUMMARY

4rh Quarter 2017 volatility in skills and certifications values measured 23%, just one point less than the 22% volatility in the prior quarter

FINDING: Overall volatility of tech skills and certifications is smoothing out after 10 years of relatively high volatility, signally a s conspicuous change in the tech labor market.

NONCERTIFIED SKILLS VOLATILITY in this quarter (28.9%) was slightly higher than the prior quarter (26.9%)

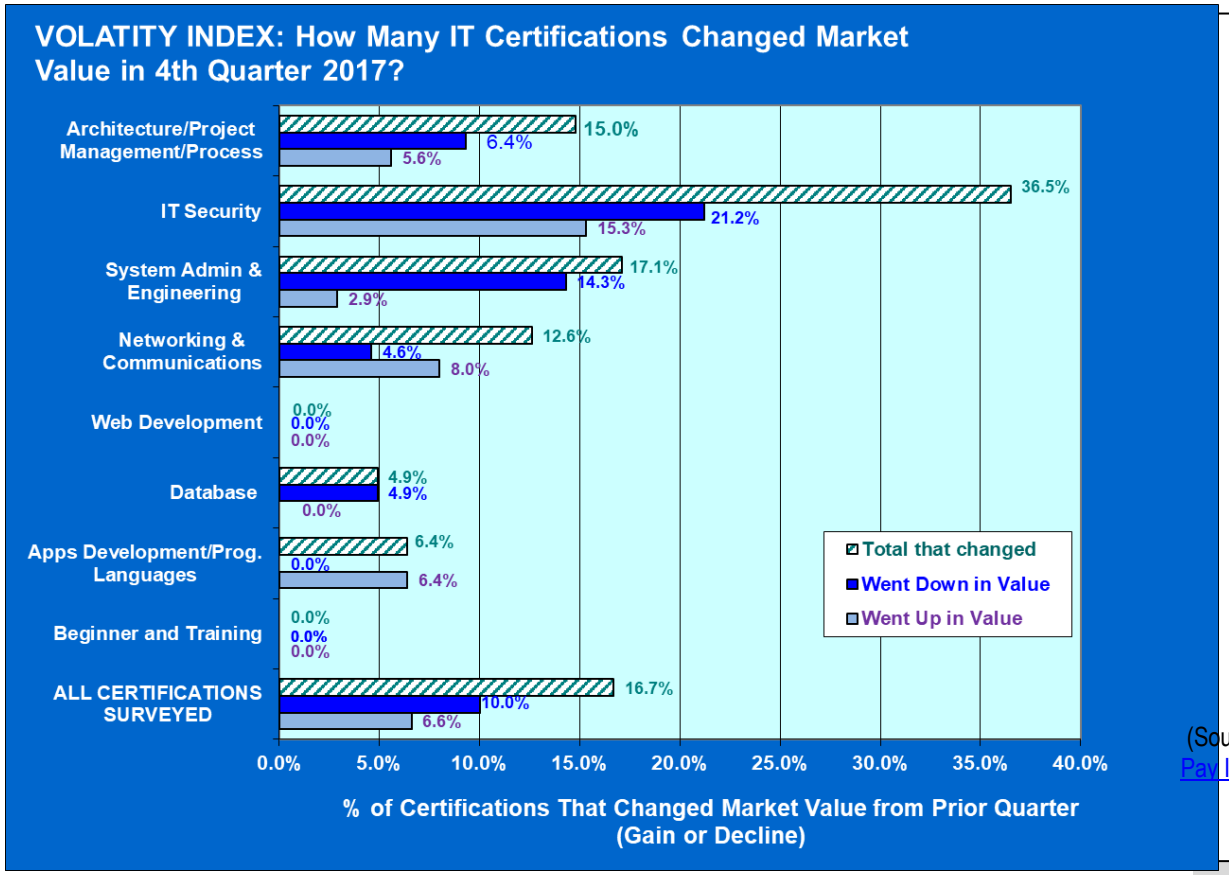
FINDING: Q4 volatility is consistent with the 28.6% average for the past 12 months.

IT CERTIFICATIONS VOLATILITY in this quarter (16.7%) was virtually unchanged from the prior quarterly (16.5%).

FINDING: This quarter's volatility is consistent with the 16.2 twelve-month and 16% twenty-four months average volatility.

(Pay data supporting these charts available in the *IT Skills and Certifications Pay Index™* – 2007 to 2017 quarterly data edition)

VOLATILITY HIGHLIGHTS – IT Certifications (4Q 2017 data)



IT Skills and Certifications Volatility Index™
4Q 2017 data edition findings: IT Certifications

Among 438 certifications surveyed, highest volatility (≥20%) occurred in these segments (ranked highest to lowest):

- IT Security

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

- IT Security

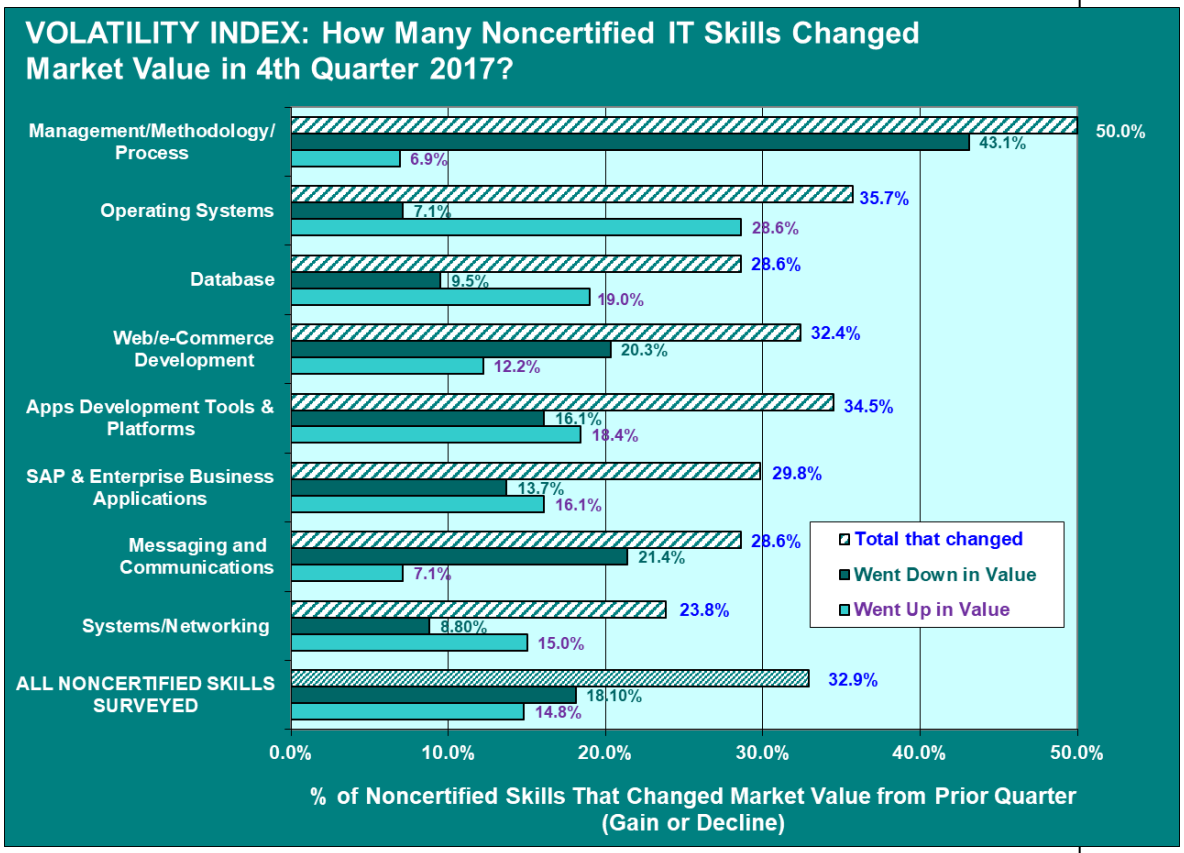
Within segments, notable downward volatility (value **declines**) occurred most in these (ranked):

- IT Security
- Systems Administration & Engineering

(Source: Foote Partners LLC, 2018 IT Skills & Certifications Pay Index™)

(Pay data supporting these charts available in the *IT Skills and Certifications Pay Index™* – 4th Quarter 2017 data edition

VOLATILITY HIGHLIGHTS – Noncertified IT Skills (4Q 2017 data)



(Pay data supporting these charts available in the *IT Skills and Certifications Pay Index™* – 4th Quarter 2017 data edition

IT Skills and Certifications Volatility Index™
4Q 2017 data findings: Noncertified IT Skills

Among 507 noncertified IT skills surveyed, high volatility (>20%) occurred in these segments (ranked highest to lowest):

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

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

- Operating Systems

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

- Management/Methodology/Process
- Messaging & Communications
- Web/Ecommerce Development

(Source: Foote Partners LLC, 2018 IT Skills & Certifications Pay Index™)

IT Skills and Certifications Pay Index™

- Pay premiums for **968 certified and noncertified IT skills**
  - Three data points for each position: 10th, 50th, 90th percentile
- Verified and validated IT skills pay data from **73,664 IT professionals at 3,105 employers** in US and Canada
- Current data collected through January 1, 2018 (updated quarterly)
- Excel format data tables
- Certifications Guide containing basic information about surveyed IT certifications (pre-requisites; costs; te content; lab requirements, etc.)

Pricing: ~~$5,400~~ single edition. ~~$18,335~~ annual subscription

Limited time promotion price (through 2/15/2018**: $2,700 single edition. $10,800 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 272,664 IT professionals at 3,105 employers in 83 U.S. and Canada cities are reported for IT salaries and skills pay earned for 212 positions and 968 certified and noncertified technical and business skills. Verified and validated pay data for 73,664 IT workers has been included in the 4th Quarter 2017 edition of the ITSCPI, compiled from data collected through January 1, 2018.

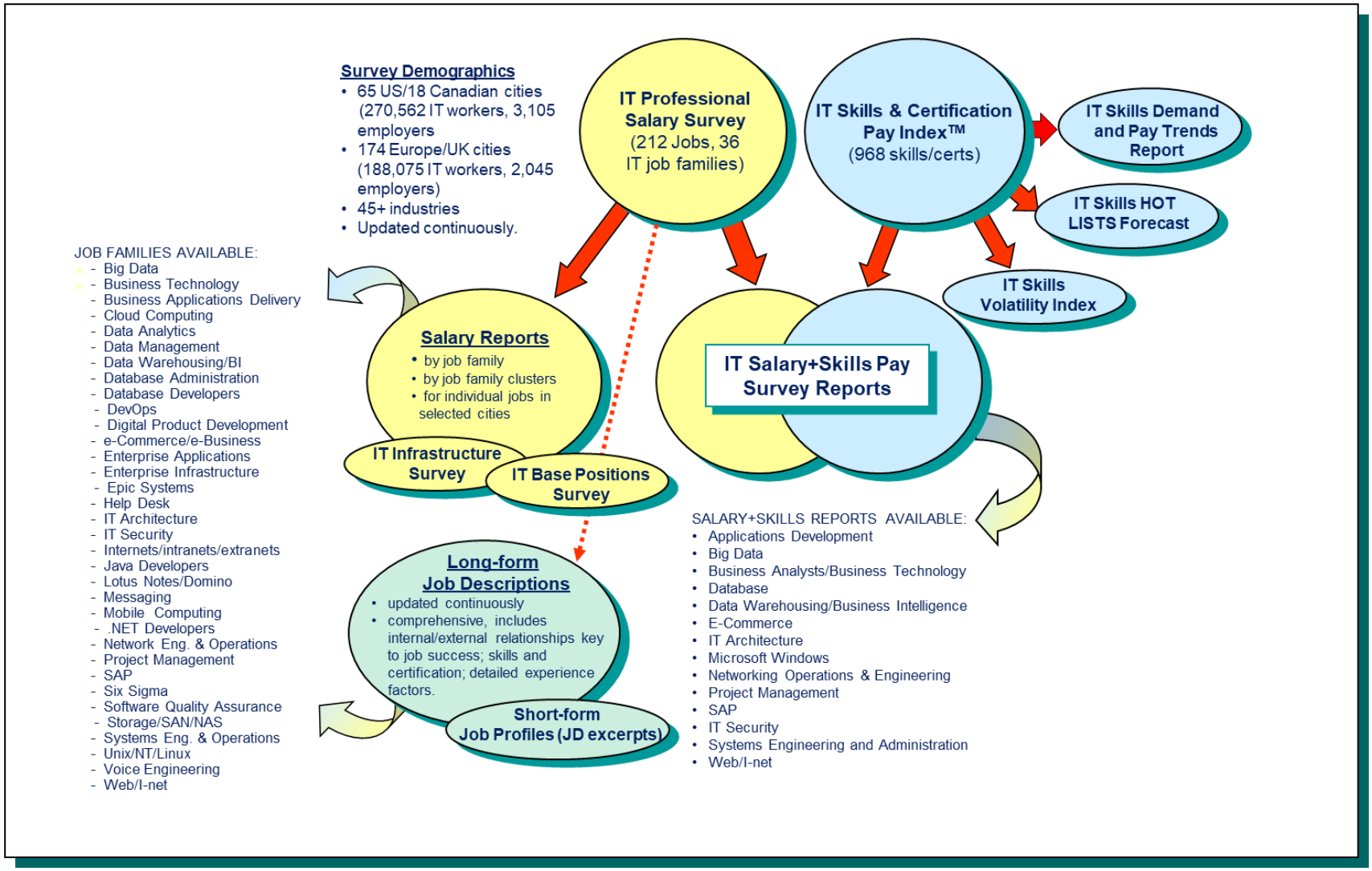
Demographics of the participating organizations for our latest update are as follows, measured most appropriately for the type of business, by revenues, assets, total premiums and operating budgets:

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

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

Please visit the Foote Partners web site: http://www.footepartners.com/itcompensation.html

Foote Partners 2018 IT Compensation Survey Product Map



ABOUT FOOTE PARTNERS

Foote Partners, LLC is an IT analyst firm and independent benchmark research organization focusing on the human capital and user (versus vendor) side of managing technology and IT value creation. A thought leader and trusted advisor to more than 4,600 employers on five continents who purchase our products and services, our company provides pragmatic forward -thinking advice and market intelligence targeting the human capital side of the modern highly integrated business/IT hybrid environment in which virtually all private and public organizations operate their businesses.

Our products are deeply grounded in specialized proprietary data-driven statistical and empirical research, 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 they were selected to meet strict criteria for what we believe is the most meaningful demographic representation for IT professionals for benchmarking purposes.

Founded in 1997 and comprised of former Gartner and META Group industry analysts, McKinsey & Company, Mercer and TowersWatson senior consultants, and former corporate HR, IT, and business executives, the firm's research division publishes 100+ 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 IT workforce and compensation survey findings and analyses are featured regularly in hundreds of HR, IT and business periodicals and media sources around the globe, including *Bloomberg BusinessWeek, Forbes, Fortune, Wall Street Journal*, *New York Times*, *CIO Magazine, ComputerWorld, Network World,* WorldatWork's *Journal* and *Workspan Magazine*; and in analyst appearances on network and cable television, National Public Radio, and countless podcasts and webcasts.

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