



ACCELERATING THE PACE OF BUSINESS THROUGH IT INNOVATION

2016-2017 Intel IT Annual Performance Report

CONTENTS

Transforming How Intel's Businesses Run and Grow.....	4
Advancing Intel's Products and Services....	8
Increasing Workforce Productivity	10
Promoting an Innovative Workforce....	11
Strengthening Intel's Security Culture	12
Looking Ahead	13



INTEL IT: ACCELERATING THE PACE OF BUSINESS

Welcome to the Intel IT Annual Performance Report (APR). I have been Intel's CIO for less than a year, but I can see that the company is well positioned for strong growth and believe this is a great time to be in IT at Intel. Intel® products and solutions will power the transformation that is necessary for companies to compete in today's digital economy. And Intel IT plays a crucial role in providing the solutions and services to accelerate Intel's own digital transformation.

As discussed in our last [APR](#), Intel IT is highly collaborative with Intel's business units. Over time, we have moved from the backroom to boardroom, placing us at the heart of business success. With a strong partnership, we are able to anticipate business needs, provide thought leadership, and help accelerate Intel's [Virtuous Cycle of Growth](#) and the digital business transformation.

We are in a period of unprecedented technological and economic disruption. [IDC](#) predicts that 70 percent of Global 2000 CEOs will center their corporate strategies around digital transformation. [PNC](#) says that 40 percent of the top 20 businesses in every industry will be disrupted by digitally transformed competitors. IT is critical to a company's ability to compete in this evolving business landscape.

For the last few years, we have discussed how businesses need to become a disruptor or risk becoming the disrupted. We are continually exploring new ways IT can help the company shift to new business models—become the disruptor—in this rapidly changing business world. Technology and information insights present a significant opportunity to improve the way businesses perform, make decisions, and serve customers.

We set out in 2016 to grow the business through digitization; operate with velocity; and protect our assets. We accomplished these goals through the use of advanced analytics, emerging data center technologies, and cloud-based solutions and services in five corporate focus areas: advancing Intel's products and services in the marketplace, transforming how Intel's businesses run and grow, increasing workforce productivity and experiences, delivering operational excellence, and promoting an engaged and innovative workforce—all executed against a backdrop of increased cybersecurity awareness.

I see new opportunities for IT to accelerate Intel's transformation by reimagining and optimizing our end-to-end business processes and how we serve our customers by using key digital technologies and artificial intelligence. We will also enhance how we engage with Intel businesses to deliver innovative solutions in the marketplace. Intel IT contributed significantly to Intel's record USD 59.4 billion in revenue in 2016; in 2017, we will continue to raise the bar for Intel IT to provide better leadership in driving innovation, operational improvements, and workforce productivity that will unlock more business growth for Intel.

It is my hope that by sharing Intel IT's digital transformation story—our successes, challenges, and plans for improvement—we can help other business leaders and IT organizations digitally transform their own companies. Please share your insights and reactions with me on [LinkedIn](#) or learn more at [intel.com/IT](#).

Paula Tolliver
Chief Information Officer, Intel IT

Defining Digital Transformation

“**Digital**” refers to the use of technology that generates, stores, and processes data.

“**Transformation**” refers to a fundamental change to an organization's day-to-day business—from the types of products and services it produces to how it delivers them.

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IT People

Total employee count only includes employees Intel IT directly supports.



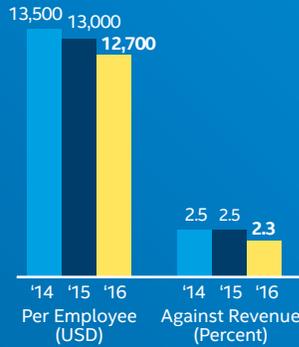
~106K Intel Employees

5,775 Intel IT Employees

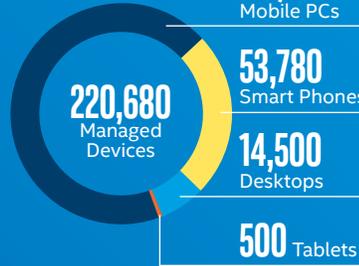
23 IT Sites Support 150 Intel Sites in 49 Countries

IT Spending¹

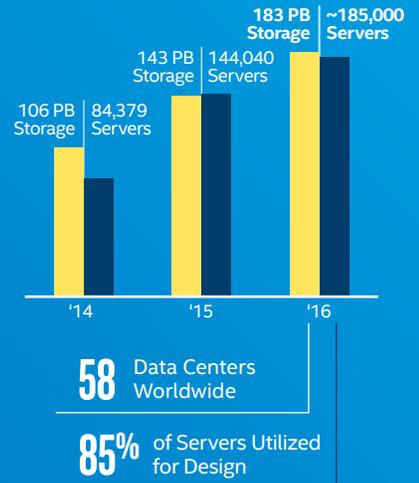
¹'14/'15 financial data was restated to include wholly owned subsidiaries that have since been integrated.



IT Device Management



IT Storage and Servers



INTEL IT ENVIRONMENT

CONNECTING

INNOVATION TO BUSINESS VALUE

Application Development

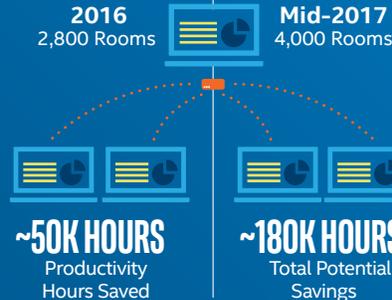
1,719 IT-Owned Applications

696 Mobile Applications

99 SaaS Solutions

>2,500 Security Certified Applications

Intel Unite® Solution-Enabled Conference Rooms



IT Invention Filings

143 User Interaction App Inventions

34 Client System Inventions

29 Network App Inventions

26 Security Inventions

23 Sensors Inventions

347 Inventors

REALIZED REVENUE OVER USD 500 MILLION

A new, customer-centric experience, based on connected sales and marketing data and unified business processes, is boosting sales revenue and customer satisfaction.

IMPROVED TIME TO MARKET ~39 WEEKS

Machine learning has accelerated our time to market and increased product quality.

BUSINESS VALUE OF USD 656 MILLION

Incorporating predictive analytics across the enterprise has transformed our IT environment and created hundreds of millions in business value.

¹ Employee count represents an average at the beginning and end of year.



TRANSFORMING HOW INTEL'S BUSINESSES RUN AND GROW

Defining "One IT"

All IT segments working in concert to accomplish a single mission: delivering the highest business value possible.

IT shops have more influence than ever before on how companies innovate through technology to transform market offerings, relationships, and processes. Intel IT is accelerating the adoption of IT innovations to increase Intel's business velocity. Multiple IT teams, such as manufacturing, supply chain, and sales and marketing, are working together as "One IT" to facilitate innovation in our end-to-end business processes. We are redefining how Intel's businesses run and grow.

Intel IT is in a unique position to lead Intel's digital transformation: We have visibility and partnerships across the enterprise. We also possess deep expertise in emerging technology best practices. With a "seat at the table" within the business units, we can anticipate business needs and quickly create solutions that enable a hyper-agile, digital business. The following examples illustrate how we are enhancing business processes, enabling data-driven decision making, and delivering insights and solutions.

Transforming Intel's B2B Customer Experience

Intel IT, in partnership with Intel's sales and marketing organizations and business units, has streamlined business processes and reduced technical debt. We have created an end-to-end connected digital business-to-business (B2B) customer experience, increased revenue, and enabled Intel to understand its customers better.

In 2015, we began connecting data from marketing activities to sales data to enable more strategic decision making. We unified hundreds of business processes and dozens of fragmented design centers and product portals. We continue to refine the B2B customer experience by using marketing automation

and analytics to deliver personalized content, accelerating the buyer's journey and increasing return on investment from marketing campaigns.

Customer-centric marketing benefits both customers and Intel:

- Customers have a single entry point and login for their interactions with Intel.
- Customers receive context-specific information targeted to their needs and interests, which helps them expedite their products to market.
- Intel's marketing investments can be directly tied to sales results.

To date, our efforts have increased Intel's ability to scale to new markets and new customers, have improved customer satisfaction, and have enabled Intel's sales and marketing organizations to realize over USD 500 million in revenue.

Evolving the Data Center to Support Our Engineering and Product Development Capabilities

Intel IT plays a crucial role in supporting Intel's design of products, from chips that power the Internet of Things (IoT) to state-of-the-art networking and memory technologies. We manage the heart of Intel's design process—Intel's data centers. Our data center strategy leads Intel's digital transformation by providing the compute capacity and analytics needed for rapid innovation. We run Intel data centers like a factory, achieving disciplined change and applying breakthrough technologies, solutions, and processes.

As Intel's products are increasingly being used to power the cloud and billions of smart connected devices, the number of products Intel produces



CUSTOMER-CENTRIC EXPERIENCE

We realized over USD 500,000,000 in revenue by creating an end-to-end connected digital B2B experience.

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annually has increased 5x over the last four years. To match data center demand and increase efficiency, we are deploying software-defined infrastructure and cloud-based technologies, as well as increasing data center density. Two years ago, Intel IT, design groups, and facilities experts collaborated to retrofit an unused fab factory space, creating two ultra-high-efficiency data centers. These facilities have the industry's highest compute density—280 Intel® Xeon® processor-based nodes in each 60-unit rack—and power usage effectiveness—1.06 PUE.

Our ability to scale our data centers enables us to provide an enterprise private cloud that cost-effectively hosts many on-premises workloads. However, our data center strategy has evolved to include the use of a hybrid cloud—a mix of public and private cloud infrastructure and services. In 2016, Intel conducted research involving more than 125 customer and systems integrator focus groups worldwide across all major industries. We identified the most important technical characteristics that help determine cloud workload placement. For example, we consider a workload's performance, security, integration, and data requirements; the availability of suitable communications service providers and commercial solutions; and software-as-a-service (SaaS) application maturity. We have found that often, a mix of public and private cloud services provides on-demand access to computing resources for rapid provisioning and release with minimal management.

Accelerating Sales Using Advanced Analytics

Analytics increases velocity to insight, enables better decision making, and provides a key opportunity for IT to transform the business through digitization. For example, in sales and marketing, trusted, real-time data can boost revenues and reduce costs by focusing sales and marketing activities on the most promising opportunities.

During 2016, we developed a market intelligence system. The system combines Intel's customer relationship management system data with vast amounts of unstructured public data such as news publications, patent filings, hiring information, and venture capital and merger-and-acquisition information. In the first proof of concept, which analyzed the augmented reality market, the data consisted of 125,000 entities, 35,000 articles, and 50 million words. It would take humans months to process this amount of data; the market intelligence

system completed its analysis in just a few hours. More importantly, the system was able to generate unique insights by using machine learning to identify correlations and patterns.

Our Sales and Marketing Account Recommendation Tool (SMART) uses predictive analytics to extend Intel's reach, relationships, and revenue in our marketing channels. SMART garnered Intel a 2014 CIO 100 award for creating USD 76.2 million in business value through the effective and innovative use of information technology. We have continued to expand SMART to multiple countries and sales channels. In 2016, SMART increased Intel revenue by approximately USD 115 million by using machine-learning algorithms and predictive analytics to prioritize which channel customers to engage with, when to engage with them, and which content and promotions to target.

We intend to build on our work with analytics to continue to accelerate sales and drive net new revenue for Intel.

Making Intel's Factories Smarter

As the world's largest chip maker, Intel's success depends on the performance of its factories. As Intel's product portfolio grows and the virtuous cycle of growth accelerates, Intel's factories have experienced growing complexity in products and manufacturing processes and a corresponding increase in data. For example, thousands of silicon wafers are sorted per day, each associated with roughly one gigabyte of data. Thousands of manufacturing tools equipped with multiple sensors generate enormous amounts of data. Data processing is performed both in near real time as well as offline. Every wafer is checked at the time of processing to ensure the highest quality standards are enforced. Additionally, the tools' sensor data is collected for additional data integration and analytics.

Manufacturing automation and the effective use of data are central elements of Intel's competitive strategy. While we've used automation in Intel's factories for several decades, we continue to improve it through deployment of wide-spread IoT and predictive analytics solutions, which decrease time to market, improve resource utilization, increase yield, and reduce costs.

Intel's smart factory automation has shown consistent year-over-year gains in efficiency in three key areas: increased uptime, accelerated output, and higher yield.

Learn More about Intel's B2B Customer Experience

Blog: [IT Takes an Active Role in Creating a Customer-centric B2B Experience](#)

Paper: [Customer-centric Experience: Transforming Intel's B2B Digital Experience](#)

Learn More about Evolving Intel's Data Centers

Blog: [Data Center Design Is the Key to Industry-Leading PUEs](#)

Paper: [Data Center Strategy Leading Intel's Business Transformation](#)

Paper: [Intel IT Redefines the High-Density Data Center: 1,100 Watts/Sq Ft](#)

Paper: [Intel IT: Extremely Energy-Efficient, High-Density Data Centers](#)

Paper: [Making Private-Public Cloud Decisions on the Way to a Hybrid Cloud](#)

Paper: [Optimal Workload Placement for Public, Hybrid, and Private Clouds](#)

Learn More about Accelerating Sales

Blog: [Putting Machine Learning and Data Mining to Work at Intel](#)

Paper: [Data Mining Using Machine Learning to Rediscover Intel's Customers](#)

Paper: [How Intel IT's Integrated Analytics Platform Helps Sales and Marketing](#)

Paper: [Maximizing Marketing Insight through Big Data Analytics](#)



Learn More about Making Intel's Factories Smarter

Blog: [Automated Manufacturing 101](#)

Blog: [Putting Sensors to Work in the Factory Environment: Data to Information to Wisdom](#)

Podcast: [Episode 100-Inside IT: Improving Manufacturing with Advanced Data Analytics](#)

Paper: [Joining IoT with Advanced Data Analytics to Improve Manufacturing Results](#)

Paper: [Using Big Data in Manufacturing at Intel's Smart Factories](#)

Paper: [Improving Manufacturing with Advanced Data Analytics](#)

Paper: [Integrating IoT Sensor Technology into the Enterprise](#)

For example, use of advanced analytics to process more than five billion data points per day per factory enables engineers to extract needed information in 30 seconds instead of four hours. Now engineers can focus on solving problems and designing solutions instead of extracting data.

In another example, we created a data visualization tool that presents factory engineers with graphs that distinguish critical errors from noncritical errors and show where manufacturing equipment is running well and where opportunities exist to improve efficiency. This focuses attention on the most meaningful improvements to increase equipment availability and yield.

Our factory automation and analytics projects have significantly reduced mean time to repair, and overall, saved Intel millions through IoT-enabled efficiencies. We are also helping to create IoT data standards and reference architectures for smart buildings and smart facilities (see the [“Driving Profitable Growth with New Solutions”](#) section for more details).

Deploying a Mobile-First, Cloud-First Human Resources Platform

Our deployment of a SaaS-based human resources (HR) platform is an excellent example of how “mobile-first, cloud-first” services contribute to Intel’s digital transformation by boosting efficiency and productivity. The new platform replaced our 18-year-old legacy HR system. It provides mobile access to HR data and tools and empowers Intel’s workforce by putting analytics and intelligence into the hands of company leaders, managers, and employees—at their desks or on the go.

This project was the largest SaaS deployment in Intel history. A cross-functional team of HR and IT experts enabled us to reduce delivery time by 12 months and increased the quality of the result with no business disruptions. The resulting platform handles all HR tasks, including payroll processing for

nearly 106,000 employees in 49 countries and more than 1,800 business processes. We redesigned 224 integrations to external suppliers and internal downstream applications. In addition, the new platform simplified the overall HR system landscape by eliminating more than 250 legacy applications and interfaces.

Digitizing the Supply Chain

Digital supply chains increase efficiency, organizational agility, and competitive advantage in today’s global market. Intel fulfills over 1 million orders a year from several factories and 30 warehouses. Intel IT is committed to creating an intelligent, digitized supply chain through the use of IoT and prescriptive analytics technologies. The resulting interoperable and integrated system is increasing business velocity and enabling our supply chain to become more customer-centric and flexible. Our use of IoT solutions and analytics enable a high degree of supply chain visibility as well as dynamic inventory tracking, warehousing, supplier security management, and capacity utilization functions.

The industry is noticing our success—in 2016, Intel was once again in the top tier of Gartner’s Supply Chain Top 25, coming in at number four. The ranking is based on business performance and experts’ opinion about the company’s potential and leadership in the supply chain community. Gartner noted three trends that Intel and other leading companies are pursuing: customer-driven partner integration, adoption of advanced analytics, and increased focus on corporate social responsibility.

Intel IT plays a leadership role in creating a supply chain that can support new, expanding business models and expansion of Intel’s manufacturing capabilities. In 2016, we used our integrated data platform to provide one source of truth across the entire supply chain, which enhances sales and operations planning capabilities and enables real-time decision making.

In 2016, our automated inventory management system delivered USD 121.3 million in business value by reducing pipeline inventory by 12.5 percent. Lower inventory levels means money that was tied up in unnecessary parts and materials can now be used for higher-value activities such as proactive demand-and-supply management, new product development, and expanded marketing and sales efforts. We are investigating additional supply chain use cases including producing integrated business planning reports, standardizing procurement processes,

“I just think it’s been absolutely outstanding, the work that has been done. Not just the quality of the end product, but because there is a story of clarity and partnership and understanding our business from the beginning of the project.”

*—Richard Taylor
Former Intel Senior VP, Director Human Resources*

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“[A] trend we see at leading supply chains is the use of advanced analytics to aid in running multiple parts of their operations, spanning the entire end-to-end supply chain. ... [T]he value ... is in the algorithms that convert disparate data points into operational insights.” (Gartner)



and leveraging big data analytics to lower supply chain costs as well as to enable more flexible procurement vendor choices.

Other supply chain initiatives in 2016 included:

- Developing descriptive and predictive analytics to transform our sourcing process from end to end.
- Investing in supply chain cybersecurity to manage our risks and protect our assets.
- Enabling new build-to-order and assemble-to-order business models to accelerate growth.
- Standardizing and automating business processes to better handle exceptions and automate the next best action.

To solve complex problems, we are cultivating a culture of innovation in supply chain IT. For example, when Intel's factories convert from one

process to another (such as from 14nm to 10nm), factories save money by converting existing tools to support the new process instead of buying expensive new machines. We conducted a proof of concept using IoT technology to trace these conversion kits from the equipment supplier to the Intel site. Improved traceability and utilization enabled factories to better orchestrate the tool installation and qualification processes—accelerating the supply chain, informed decision making, and factory ramp. Two more examples of supply chain innovation include testing drones in the warehouse for inventory cycle count and using Intel® RealSense™ technology for measurement and visual inspection.

We intend to use analytics and IoT technology in order to continue streamlining Intel's supply chain processes.

Learn More about Digitizing the Supply Chain

Blog: [Key Learnings for Migrating Supply Chain Management Applications to an In-Memory Data Platform](#)

Paper: [Optimizing Intel's Supply Chain with an In-Memory Data Platform](#)

Manufacturing Game-Changer Program

The digital transformation projects we've worked on during 2016 have sparked enthusiasm and a thirst for more. The Intel IT group responsible for supporting Intel's manufacturing processes has launched the Game-Changer program to fund multi-year projects that can fundamentally change business processes. Here are two game-changer projects we'll be working on in 2017 and beyond:

Augmented Reality. Intel IT, working with Intel Venture, Intel Labs, Intel's Software and Services group, and the Internet of Things (IoT) group, developed Intel® Remote EyeSight (Intel® RES). This is a secure, hardware-agnostic, collaborative software solution for the connected worker. Intel RES enables hands-free human-to-human and human-to-machine collaboration through the use of wearables and connected devices. For example, a factory worker can view an instructional video while working on a complex repair. We are also experimenting with using a smart helmet powered by an Intel® Core™ m7 processor, which delivers real-time data based on the environment to improve preventative maintenance accuracy.

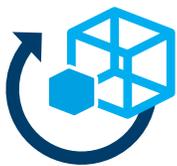
Remote Tool Control. We are investigating the reuse of long-standing effective remote control methods already in use in Intel's fabrication factories to achieve similar gains in the company's assembly-test factories. Command centers for clusters of tools, instead of having an operator at each tool, can increase the efficiency of factory technicians (perhaps by as much as 5x). Technicians will no longer be tied to a single machine and can be available to work on more valuable activities.



Intel® RES blends real and virtual scenes to enable interactive remote communication on smart glasses, which makes in-the-field repair easier and more efficient.



ADVANCING INTEL'S PRODUCTS AND SERVICES



BETTER DESIGN-PHASE VALIDATION

We used our machine-learning platform to uncover patterns, automate test generations, and increase functional validation testing by 60x.

Intel IT capitalizes on technology to create business value and catalyze organizational transformation. We partner with business units to define strategies and create solutions that fuel Intel's growth. Increasing our IT teams' business knowledge and deepening their understanding of Intel's business challenges enables us to deliver solutions ahead of business need.

Our IT leaders understand available in-house, third-party, and cloud-based technology offerings and can guide Intel's business units to the most valuable solution. Our partnership with Intel's business units, combined with advanced analytics expertise, enable Intel's business units to overcome business challenges, boost revenue opportunities, and deliver products to market faster—increasing business velocity and driving profitable growth.

Increasing Intel's Business Velocity

Today's marketplace is fast-paced and the windows of opportunity are small. Therefore, business velocity is critical. As mentioned in the previous section, we are using our expertise in big data and analytics to reduce the time it takes to develop, test, and bring products to market, thereby advancing Intel's products and services in the market.

For example, machine learning played a fundamental role in the development of CLIFF, a machine-learning platform that uncovers bugs that would otherwise have gone undiscovered during the design phase of product development. The platform assists with design-phase product validation—before the product is actually manufactured—by quickly browsing through many thousands of historical test records to uncover hidden patterns. This task would take a

human hundreds to thousands of hours and would be impractical to perform manually.

Historically, design-phase product validation is the one of the most expensive and time-consuming product-development processes, consuming up to 50 percent of the development cycle and requiring several iterations of design and prototyping. Using automated test generation, CLIFF has significantly shortened time-to-market for Intel products and improved product quality. Compared to standard regression tests, CLIFF validates the targeted functionalities 60x more, identifies 30 percent more new issues on each run, and has already identified over twenty new bugs in one product.

This highly scalable solution was a Cloudera [2016 Data Impact Award](#) winner. The winning organizations' implementations "demonstrate exemplary creativity, maturity, industry or application relevance, and tangible results." The solution is already in production for 10 CPU research and development organizations at Intel, and we plan to extend its use to several more in the coming months.

We have also developed a dashboard that provides visibility and online analysis for all the intellectual property design data for Intel's system on a chip (SoC) products. The dashboard enables top-to-bottom analysis capabilities on the quality of validation and other information such as schedules. Using this unified platform, Intel's product groups can accelerate the pace at which IP blocks (reusable units of logic, cell, or chip layout design) are approved for production. The solution is now used by more than 2,000 users and the user base is growing quickly. The solution generated USD 101 million in business value in 2016 and saved USD 40 million per SoC project.

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Reimagining Server Design

In 2016, we dramatically increased the density of one of our data centers by designing and building a new approach to server hardware: a disaggregated server which complements Intel® Rack Scale Design. Normally, a server refresh means replacing not just the server's CPU and I/O modules, but the entire server. Our patent-pending disaggregated server architecture enables independent upgrades of the compute and I/O modules without replacing the rest of the enclosure (networking, storage, fans, and power supplies), which typically refresh at a slower rate.

IT took the idea from whiteboard to production in just five weeks; within a few more weeks several thousand of the new servers were installed and running design jobs. We have installed more than 30,000 of these servers so far and estimate that they will cut refresh costs by a minimum of 44 percent, and possibly by as much as 65 percent—enabling more frequent refreshes that will put the latest, most advanced Intel® Xeon® processor-based technology to work for Intel's design teams. We also anticipate about USD 1 million per year in operational expense savings due to these 30,000 high-density disaggregated servers.

Driving Profitable Growth with New Solutions

We use Intel's products and other IT solutions to solve problems within our IT organization. We share our innovations, expertise, and proof points of Intel's products with Intel's own business units and with Intel's customers. In this way, we can advance Intel's solutions and services in the market, collaborate to improve Intel products, demonstrate the value of Intel® technology with practical applications, and in some cases, create products or solutions that Intel can sell. Here are two examples:

“Disaggregating CPU and memory allows data centers to reduce refresh cycle costs. When viewed over a three- to five-year refresh cycle, a disaggregated server architecture delivers, on average, higher-performing and more efficient servers at lower costs than traditional rip-and-replace models by allowing data centers to independently optimize adoption of new and improved technologies.”

—Shesha Krishnapura, Intel Fellow and Intel IT CTO

- **Smart Building and Venue Experience Center, built on the Intel® IoT Platform.** This Center is the proving ground for IoT technologies, and is becoming the catalyst for bringing Intel's enterprise IoT solutions to market. The Center occupies an entire building at our Chandler, Arizona campus, and all building systems, such as HVAC, lighting, restrooms, and the parking lot, are IoT-enabled. Our goal is to show what is possible in a smart, connected world and then “make it real.” We are demonstrating many other IoT-enabled solutions that boost security, reduce operating costs, and increase customer satisfaction.
- **Wearable analytics platform.** Based on Intel IT's collaboration with the [Michael J. Fox Foundation](#) in 2014, we developed an edge-to-cloud artificial intelligence platform that enables remote monitoring of patients to collect high-quality data to assess symptoms more efficiently. The platform's machine-learning algorithms generate objective measures that quantify the impact of therapies, helping accelerate clinical trials and the drug-approval process, thereby lowering drug development costs. This year, Teva Pharmaceuticals licensed the platform and its services in a phase-2 clinical trial for a new drug for Huntington's disease.

Each of the projects highlighted here demonstrates IT's ability to drive new revenue by applying our IoT and analytics expertise to a variety of scenarios—resulting in better, faster business insights. Speeding time to market and improving product quality contribute to Intel's competitive advantage in today's fast-paced market.

Learn More about Driving Profitable Growth

Blog: [Bringing the Internet of Things to Life](#)

Paper: [IoT Data Standards Provide the Foundation for Smart Buildings](#)

Paper: [Integrating IoT Sensor Technology into the Enterprise](#)





INCREASING WORKFORCE PRODUCTIVITY

We strive to increase employee connectivity, collaboration, and productivity by optimizing the user experience when employees use Intel IT services. Intel's workforce relies on our services to get their jobs done. Our job is to make them more productive. Therefore, as we design our services and solutions, we put Intel employees at the center, learning how they work and developing solutions that boost their productivity.

Agile and DevOps Focus

We are transitioning all of IT to an Agile and DevOps methodology. Our newly formed Agile and DevOps Program Transformation (ADOPT) team reinforces the One IT mindset, helping to eliminate silos and increase visibility of investments across IT to optimize spending, resources, and effort. The ADOPT team has already trained nearly 1,500 people on Agile—we believe that Agile and DevOps will enable us to reduce costs and deliver products, capabilities, and services in hours, not weeks or months. As we shift from a command-and-control structure to a self-directed, empowered team environment, we will be able to use resources more efficiently and work on higher-value business activities, not the mundane things we can automate.

Seamless User Workspace

Our recent efforts are enabling Intel employees to seamlessly work from anywhere on any device through easy-to-use, cloud-enabled integrated solutions. Traditionally, user content, applications, and settings (the "workspace") are woven into the OS and the hardware. This hinders access to the same content, applications, and user personalization across devices. It also makes upgrading to a new device slow and labor-intensive. We use the cloud

to enable a seamless user workspace. With this solution, users can be productive anytime and anywhere, even as they switch from one device to another. When upgrading to a new PC, users can restore applications and user personalization and return to productive work in less time than before—sometimes in as little as a half-hour.

Easy Collaboration During Meetings

Employee collaboration across the globe plays a vital role in Intel's ability to innovate quickly and respond to marketplace opportunities. Our recent deployment of the Intel Unite® solution lets meeting participants share and annotate their content and presentations seamlessly and instantly in conference rooms or remotely, without wires. Having the Intel Unite solution in 2,800 conference rooms saved Intel an estimated 50,000 hours of employee meeting time in 2016. The Intel Unite solution has had such a positive impact on productivity that we plan to upgrade at least 1,200 additional conference rooms worldwide in 2017. As an added bonus, if there are problems with the PC running the Intel Unite solution, we can use Intel® vPro™ Technology to remotely manage the PC, further increasing the solution's efficiency.

"Our user experience with Intel Unite® is quite positive. Now it is very common to have more than 40 people 'united' in one room and have no issues. THANK YOU!"

*—Bruce Tufts
VP, Logic Technology Development, Intel*

Learn More about Increasing Workforce Productivity

Blog: [Same User Workspace, Different Devices](#)

Blog: [Intel IT Answers Top Questions about the Intel Unite Solution for Conference Room Collaboration](#)

Paper: [Enabling a Seamless User Workspace across Devices and Platforms](#)

Paper: [Best Practices in User-Centered IT](#)

Paper: [Best Practices: Deploying the Intel Unite Solution](#)

Paper: [Conference Room Collaboration Using Intel® vPro™ Technology](#)

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PROMOTING AN INNOVATIVE WORKFORCE

Technology is only one aspect accelerating Intel's digital transformation and the pace of business; our success also depends on the talent and skills of our people. Intel IT supports our CIO's mission to catalyze, innovate, and drive IT's cross-functional objectives and initiatives by maintaining a talent pipeline that meets Intel's needs; providing career and leadership development; promoting a diverse and inclusive work environment; and nurturing innovation throughout the workforce.

Investing in Skills for Transformation

We spent USD 1.4 million in 2016 on training IT employees. By tracking emerging and declining industry skills and investing accordingly, we create an agile, positive-thinking innovative workforce that embraces the collaborative One IT culture. We encourage employees to take a range of courses because our most valuable employees have both business acumen and experience across disciplines. We also build management depth through leadership development and succession planning. Management training and networking nurtures effective leadership, which in turn powers business transformation.

Nurturing Diversity and Inclusion

Intel IT actively supports Intel's diversity goals through activities such as the Rapid Orientation for Accelerated Results (ROAR) program, which provides technical females and underrepresented minorities with a networking-intensive three-day program led by business unit leaders, and Employee Resource Group (ERG), which promotes understanding different cultures to build a more inclusive community.

Inspiring Innovation

We empower employees' creativity and encourage possibility thinking through coordinating events that spark discussions and solutions, teaching managers and team leaders to embed innovation in each employee's work, and recognizing innovation with awards. We have formed the IT Patent Council, developed an Intel Innovation Hub, and are exploring crowd-sourced development of inventions. Our efforts to inspire our people have created an innovative workforce as Intel IT has filed more than 600 patents in the last five years.

"Exposure to our own challenges and collaboration with peers in the industry uncovers problems that seed the development of inventions and creation of new markets."

—Robert Vaughn
Patent Council Chair
Intel IT

Meet Qually Jiang—Inventor Extraordinaire

Qually Jiang has worked in Intel IT for 18 years. He has been an automation engineer, application developer, IT support specialist, project manager, IT manager, procurement manager, engineering manager, and software engineer. Combining this extensive experience with a keen sense of innovation, Qually has had 25 invention disclosure forms selected for patents so far and has received four "High Five" awards (reserved for Intel employees who file five patents in a single year).

"Intel's culture, especially the ethics of Intel's employees, makes me feel safe to talk openly and directly," said Qually. That openness, according to Qually, is important for inspiring innovation; the inventor doesn't have to worry about an idea being stolen by colleagues. Qually also noted that Intel IT offers plenty of different job opportunities. "That [variety] helps me open my eyes to other domains."





STRENGTHENING INTEL'S SECURITY CULTURE

"The threat landscape is constantly evolving and becoming more sophisticated, which means we have to do all we can to protect our assets, plans, and data from being leaked, compromised, or stolen."

—Brent Conran
Intel Chief Information Security Officer

Threats to corporate environments are increasing both in number and sophistication. Enhancing and accelerating employee security training and awareness is essential to reducing enterprise risk. Embedding security awareness into Intel's culture is key to our cybersecurity strategy. We are creating a security-smart workforce to strengthen our "human defense perimeter," which will help establish robust security, privacy, and compliance capabilities.

Improving Security with Knowledge

In 2016, we established the Intel Security College, which offers over 100 cybersecurity courses for 11 different technical roles. The Security College improves our security posture and helps reduce costs by training our developers to write secure code from the outset. According to the National Institute of Science and Technology (NIST), it costs 30x more to fix application vulnerabilities once an application is in production.

Our Security College courses are based on industry best practices, such as the NIST 800.16 security training requirements. Content can be used as Continuing Professional Education (CPE) credits for existing technical certifications, and is available in five localized languages.

We augment the Security College by partnering with Intel's business units to improve enterprise application security and security processes. Legacy applications exist that may not reflect modern information security practices. In 2016, we created a strategic path to application security certification for all enterprise applications.

To support our application security certification program, we updated our application inventory so we have a comprehensive understanding of the applications in use. Our definition of "application" includes web sites, web services, cloud apps, on-premises applications—any software asset with at least 500 lines of code and/or 10+ users.

As we work with the business units, we are partners, not gatekeepers or enforcers. We provide guidance that is customized for a specific app, and our easy-to-use portal provides self-service application certification. In 2017, we will transition from updating legacy applications to embedding application security earlier in the development lifecycle. DevOps teams will be able to secure their apps from requirements to design and test to deployment.

These efforts help create a security-conscious culture at Intel, where security is a daily and easy part of doing business, not an afterthought. Strengthened application security throughout the enterprise will also support the business' ability to securely communicate and collaborate anywhere, anytime.

Sharing Responsibility for Security

Intel IT found that successful digital transformation requires a distributed operational and support model. Our security strategy for IaaS in the public cloud defines responsibilities that are shared among the business unit who owns the account, the cloud service provider, and Intel IT. Application owners must identify the classification level of the data they send to the public cloud, as well as assess their applications for vulnerabilities and remediate any that are found, with IT assistance if

Learn More about
Strengthening Intel's
Security Culture

Paper: Boosting IaaS
and PaaS Security in
the Public Cloud

Paper: SaaS Security
Best Practices: Minimizing
Risk in the Cloud

Paper: Taking Enterprise
Security beyond the Edge

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needed. IT is responsible for capabilities such as risk assessment, policy enforcement, cloud brokering, and more. The cloud service providers deliver the infrastructure and services such as account discovery and configuration management.

We understand that business units may not understand information security as well as they understand their own IaaS needs, so we provide

them with training and make it easy to use our security solutions and controls.

Defense against the growing sophistication and volume of information security threats requires Intel IT, all of Intel, and the industry ecosystem to work together. A strong security culture built on knowledge and applied technology helps protect the enterprise from attack.

“Understanding Intel’s guidelines and leveraging security tools and resources will help us all live our value—keep Intel information secure.”

*—Brent Conran
Intel Chief Information Security Officer*



LOOKING AHEAD

The stories in this report illustrate the transformative power and business value of IT. We had a great year in 2016; that sets the bar even higher for us in 2017. Intel IT has a key role in accelerating Intel's growth and transformation. As Intel's CIO, I know we can do more—we have the right IT strategy and priorities but execution and teamwork will be the key. We must translate our IT strategy and supporting initiatives into results with a sense of urgency and a well-coordinated plan. The degree of change going on in most IT organizations is unprecedented, and we need to get through our transformation quickly so we can provide more leadership in helping our business partners through their change. Over the next year, we will be focused on the following priorities:

- Strengthen our business engagement to advance Intel's solutions in the market.

- Transform our end-to-end business processes using advancements in digital technologies.
- Enable a data-driven culture through enhanced data, advanced analytics, and artificial intelligence.
- Enhance workforce productivity and collaboration.

I am inspired by the change going on at Intel and the opportunity for Intel IT to accelerate that change and drive significant value. I'm confident these focus areas will drive business value in a meaningful, collaborative way and will accelerate Intel's growth. To achieve this, we must nurture a culture across IT that fosters innovation and collaboration, adapts and learns, and operates with agility. It truly is an exciting time to be in Information Technology!

Read More from Our CIO on IT Innovation

Blog: [Building a Corporate Strategy for Today's Digital Economy](#)

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