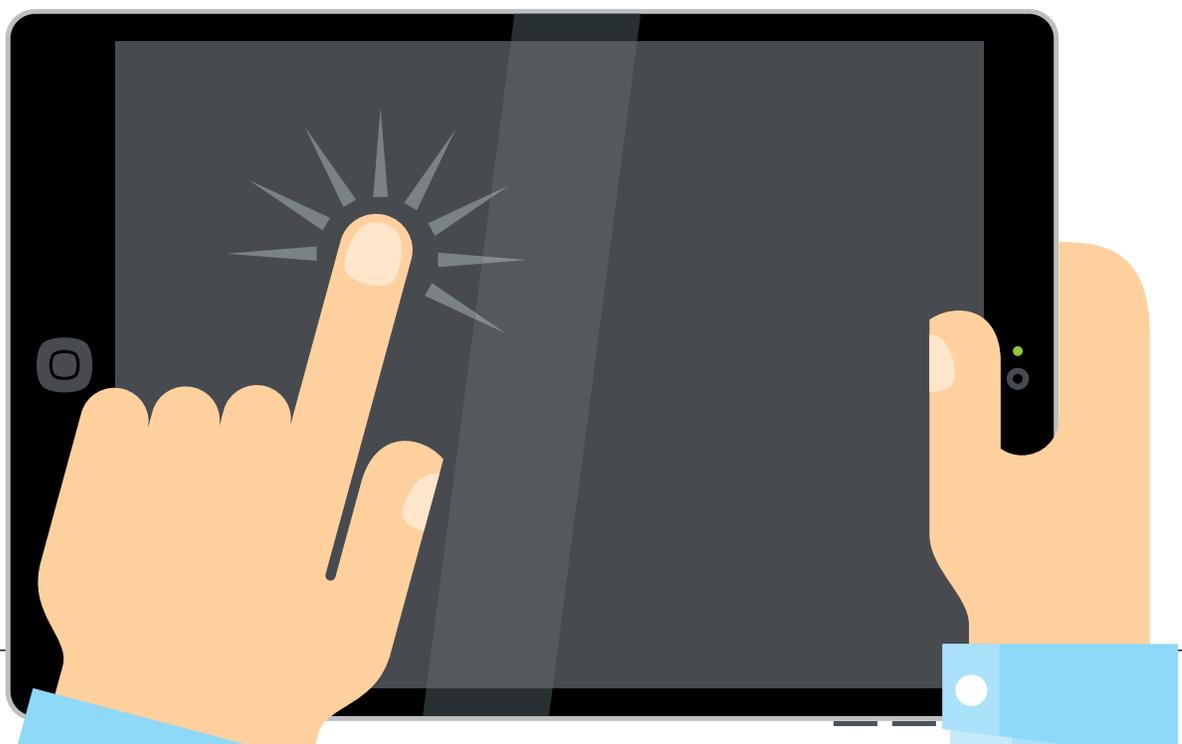




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## EXECUTIVE SUMMARY



CIOs are faced with the challenge of creating new opportunities and enhancing collaboration while monitoring emerging threats and managing and deploying adaptable technology. At the same time, they have to accommodate five generations in the workforce and all the different work habits they bring with them. The CIO must take on a new role of enabler rather than enforcer—a change manager who takes proactive steps to both empower employees and exploit IT.



Mobility and on-demand access to data and services are dissolving the four walls of the enterprise. Connected endpoints, location technology and leading-edge visualization technology are blurring the lines between the virtual and the physical.



Enterprise technology is going the way of consumer technology, with an application-based interface on a mobile operating system that works on a desktop computer as well as a smartphone or any other connected device.



The mobile workspace puts technology in the hands of users when and how they need it. By combining the power of analytics with the ubiquity of mobile, organizations can serve up rich data on demand, with contextual understanding, based on user preferences and behaviors. To optimize the environment requires an understanding of a day in the life of the end-user.



Unified endpoint management can provide secure access to enterprise data and systems no matter what device or who owns it. A mobile management system can collect and collate intelligence that can improve both understanding and efficiency about the way people work and what they need to work better.



Mobility is already redefining operating and engagement models for organizations and consumers, and it can help shift the design of enterprise systems to focus on the experience of the end-user. These changes are fundamentally transforming the relationship between employee and employer.

## INTRODUCTION

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The workplace as we know it is undergoing a seismic shift. Mobility and on-demand access to data and services are dissolving the four walls of the enterprise. Connected endpoints, location technology and leading-edge visualization technology are blurring the lines between the virtual and the physical. The potential for cognitive and analytics capabilities to augment the amount of insight, knowledge and automation of repetitive tasks will transform the way we work.

What does this mean for the end-user? Most of us just want to be able to use whichever device we choose and have it work the way we expect, whether it's a blood pressure monitor connected to a hospital system, a mobile application for a conference call or an engineering workstation to simulate multi-dimensional rocket dynamics.

Creating and maintaining that technological agility—and keeping it secure—is a challenge for CIOs. If end-users don't like what their organizations' IT department has to offer, they will go out and find what they need, putting enterprise data and intellectual property at risk. New tools and technologies allow employees to work where they want, when they want, but simply giving employees a choice is not enough. Without a transition plan and a coherent implementation strategy that includes change management disciplines, device migration and support limbo can cause a flood of downtime and complaints. At the same time, most IT departments face pressure to cut budgets.

Unified device management can help provide secure access to enterprise data and systems no matter what device or who owns it. A mobile management system can collect and collate intelligence that can improve both understanding and efficiency about the way people work and what they need to work better. We are moving to an app-based world. Enterprise technology is going the way of consumer technology, with an application-based interface on a mobile operating system that works on a desktop computer as well as a smartphone or any other connected device.

For users, the mobile workspace should feel as familiar and intuitive as hitting the home button on a smartphone. But creating a seamless user experience requires a strategic refresh in the way devices are provisioned and the way data is accessed and secured to attain the greatest cost savings, develop the best productivity tools for the anywhere, anytime workspace, and help the business achieve strategic goals.

**"This is an exciting time in our business as IT continues to evolve. We have entered an era of the unified workspace—a virtual space with applications, services and information on demand from any device,"** says Carol Zichi, strategy and portfolio executive, Digital Workplace Services, IBM. However, this convergence of end-user computing activities is outpacing the capabilities of an IT management framework designed for an era of desktop computing. **"CIOs need to move to a modern IT infrastructure,"** she adds. At

the core of this will be analytics, automation and cognitive. **“CIOs must transform IT by bringing in innovation that establishes a secure infrastructure, leading to business transformation,”** says Zichi. **“This is not a simple convergence. Change management disciplines must be embraced.”**

Last year, Forbes Insights and IBM published “The Digital Workplace in the Cognitive Era,”<sup>1</sup> a study of how cognitive support is transforming the helpdesk and parsing vast amounts of information to learn what people need to do their jobs more effectively. This paper will explore what unified workspace management means for the borderless workplace and the role that virtualization, collaboration tools and unified device management can play in the convergence. We’ll explain:

- How to transform the workplace into a secure, collaborative and productive environment.
- How to give users the technology they need to work anytime, anywhere by enabling and refining devices, applications and services for an individual task or employee.
- How to create cost-efficient capabilities for a more effective digital workplace with all the advantages of agility, team collaboration, tailored business applications and cognitive capabilities.



“This is not a simple convergence. Change management disciplines must be embraced.”

**CAROL ZICHI**, STRATEGY AND PORTFOLIO EXECUTIVE, DIGITAL WORKPLACE SERVICES, IBM

<sup>1</sup> “The Digital Workplace in the Cognitive Era,” Forbes Insights and IBM, 2016: [https://www.forbes.com/forbesinsights/ibm\\_mobility/index.html](https://www.forbes.com/forbesinsights/ibm_mobility/index.html).

## THE WORKPLACE TODAY

**“There is so much power in the hands of the end-user today,”** says Zichi. **“People carry incredible computing power with them wherever they go—and they expect to be able to work wherever they go,”** she adds.

As employees and consumers, we want to be able to do what we need to do, anywhere, anytime with tools that work intuitively. Millennials in particular don't understand why corporate technology doesn't work the way their consumer devices do. That sort of on-demand availability is causing pressure around security for data, network devices and applications. Add that to the convergence of work and personal in our digital lives and it's easy to see the challenge faced by CIOs in every organization. **“The workforce continues to challenge the idea of a traditional workplace,”** says Zichi.

One of the biggest changes is that you don't necessarily need to go to a preordained workplace to work anymore, explains Henry Cipriano, senior client technical architect, Digital Workplace Services, IBM. Something as simple as finalizing a report after an offsite meeting used to mean a trip back to the office. Now details can be entered remotely or even automated in some cases.

The idea of a meeting no longer means everyone gathering together in the same room. **“There is a belief that you need to sit next to each other, but people want to work where they are,”** explains Cipriano. And sometimes they have to work where they are. Think of an engineer on an oil rig, a specialist in a hospital or a factory manager. In a global marketplace, collaboration tools allow colleagues, partners, clients and suppliers to work where they are, even when they are needed on the other side of the world. At the same time, tools that allow simultaneous editing and real-time sharing of visual aids can accommodate an “agile scrum” approach to a lot of knowledge work, with an iterative process that encourages teamwork, self-organization, high accountability and as little overhead as possible.

IT models have not always kept up. The traditional corporate one-size-fits-all model worked well in a world of desktop computers where everything was hooked together and people worked at their desk. **“Now we have a spectrum of devices and we're getting much more focused on the ways that people choose to engage and do their work,”** explains Pat Bolton, IBM Distinguished Engineer and chief technology officer for Digital Workplace Services. **“We see the new model of computing as being very experience-centric.”** Video chat, for example, changed the way we as consumers experience communication. Now, as employees, we want to compose these types of experiences on our devices, not from a corporate data center, but from services and applications that are streamed. Many of these applications use a back-end service that is not available through the average corporate network.

**“The way we all interact is becoming more automated, more electronic and more mobile,”** says Bolton. **“Think about how you can use your phone to bank or the ability to view results from a medical test online. Mobility is a reality already, and it is becoming a business differentiator,”** she adds.



**“We see the new model of computing as being very experience-centric.”**

**PAT BOLTON, DISTINGUISHED ENGINEER AND  
CHIEF TECHNOLOGY OFFICER FOR DIGITAL  
WORKPLACE SERVICES, IBM**

## BLURRING BOUNDARIES: CIOs BELIEVE INDUSTRY CONVERGENCE IS THE BIGGEST TREND ON THE HORIZON



Industry convergence



Rising cyber risk



The “anywhere” workplace

In “Redefining Connections: Insights from the Global C-suite Study—The CIO perspective,” the overwhelming majority of CIOs—77%—say they are experiencing the disruptive influence of new technologies. They believe mobile solutions, cloud computing and the Internet of Things (IoT) will have the most significant effect on their organizations over the next three to five years, even though these technologies have been available for a long time.

Source: IBM C-suite 2016 survey

## TECH SPEC: THE TECHNOLOGIES CIOs EXPECT TO REVOLUTIONIZE BUSINESS ARE LARGELY IN PLAY



Mobile solutions



Cloud computing  
and services



Internet of Things

What’s disconcerting is the fact that only six out of 10 CIOs are reassessing their strategic direction in light of the advances they expect. Many of the infrastructure decisions the IT department makes are no longer purely technological; they’re core components of an organization’s business strategy—essential elements in the scramble for market advantage.<sup>2</sup>

Technology is a big disruptor in all industries. Is your organization ready?

Source: IBM C-suite 2016 survey

<sup>2</sup> Brown, Doug, Justin Chua, Nate Dyer, Eric Lesser and Jacqueline Woods. “New technology, new mindset: Strategic IT infrastructure to compete in the digital economy.” IBM Institute for Business Value. September 2015. [http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=XB&infotype=PM&htmlfid=GBE03698USEN&attachment=GBE03698USEN.PDF&ce=ism1002&cmp=IBMSocial&ct=M16402CW&cm=h&IIO=BSYS&csr=blog&cr=casyst&ccy=us&s\\_tact=M16402CW&s\\_pkg=ovxxxx](http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=XB&infotype=PM&htmlfid=GBE03698USEN&attachment=GBE03698USEN.PDF&ce=ism1002&cmp=IBMSocial&ct=M16402CW&cm=h&IIO=BSYS&csr=blog&cr=casyst&ccy=us&s_tact=M16402CW&s_pkg=ovxxxx).

## UNDERSTANDING USERS

Workplace technology has one essential purpose: to securely deliver the appropriate IT business capability to the end-user on the best device, refined for the user's role in the enterprise. It sounds so simple and so logical, but to truly provide the best device and create the right capabilities would challenge the IT practices at most organizations today.

Does every employee need a desktop computer and a landline? Or is better access to data, well-designed applications and seamless security what they really need? Should all hardware be supplied by the organization or does it make more sense to give users access to the enterprise system through their own devices?

To optimize the environment, you have to understand a day in the life of the end-user, says Cipriano at IBM. "Do you really understand what they use, when they use it, why they use it and have some level of contextual awareness about how they use it?" he asks. "If you can deliver the data and the applications so users can do their job and be efficient on any device at any time, you will reduce your total cost per user, increase productivity and provide a superb end-user experience."



"To optimize the environment, you have to understand a day in the life of the end-user."

**HENRY CIPRIANO**, SENIOR CLIENT TECHNICAL ARCHITECT, DIGITAL WORKPLACE SERVICES, IBM

## DIRTY, DANGEROUS AND MOBILE

Smartphones and tablets may have freed many office workers from their desks, but not everyone works at an office. Wearable devices using geolocation, orientation, near-field communications, voice interaction, picture, video and fingerprint identification capabilities have increased safety and efficiency in many dangerous and physical occupations. This technology can leverage specialized connected devices, such as thermal cameras and RFID readers, and interact across multiple systems to support functions such as scheduling and dispatch, outage reporting, billing, mapping and asset management. The technology can also support external traffic, weather and social media platforms.

Take this day in the life of a utility repair crew, for example. The crew downloads a schedule at the beginning of their workday on a mobile device. First appointment: Assess and repair a utility pole hit by a car. The job description includes GPS directions to the site of the damaged pole. Updates

on the crew's arrival and progress can be sent automatically to affected customers while the dispatcher and customer service personnel field calls about the outage.

The crew can find colleagues, view the circuit and learn about assets and outages as needed. They can utilize cognitive capabilities to learn best practices or turn to subject matter experts with questions. Other features include preloaded data and voice dictation and weather updates. If there is an injury on the job, an SOS feature provides one-touch access to alert dispatch, emergency services and a supervisor.

As the crew finishes, a reminder prompts them to add a note and a photo of the completed work. This helps to close out jobs more quickly.<sup>3</sup>



<sup>3</sup> Adapted from IBM Institute for Business Value analysis, "Mobilizing the utility workforce: How mobile technology and analytics will transform work," Feb. 2016.

## SHADOW IT

The first step in understanding users, says Cipriano, is assessing the technology they already use. **“When we go through that assessment process with clients, we usually uncover a lot of shadow IT and applications that the IT department doesn’t know about and doesn’t support,”** he explains.

When users are given tools that don’t work, they will find their own solutions. At one firm, engineers were provided with a virtual desktop that didn’t have the computing power they needed to do their work. Their solution? Reverting to the desktops they were accustomed to using. **“This company was doubling its costs because the IT department never thought to ask these engineers, ‘Does this work?’ or check to see if they were actually using it,”** says Cipriano.

End-users are particularly impatient when it comes to mobile technology.

### A 2016 CCS INSIGHT SURVEY REVEALED A STAGGERING



One example that will sound familiar to many comes from the trading floor of a major financial institution where employees relied on hulking desktop computers and an array of screens for decades. Traders lobbied the IT department for tablet devices so they could move around the floor and take their data and applications with them. The IT department refused to provide any hardware beyond the sanctioned thin-client desktop computers already installed. So the floor managers did what so many other business line managers do and bought tablets for their team, creating redundant costs for the firm and potential security problems.

End-user experience is ultimately where the IT pain points are, whether they originate with sanctioned IT or shadow IT, says Cipriano. **“If you can remove that pain, you will resolve most of your problems,”** he says.

A user-based approach also changes the way success is measured. Traditionally, service-level agreement scores take into account things like server availability and uptime, he explains, when what really matters is productivity. **“If users are able to do their job well, who cares about server availability?”** he asks. New mobile app-based software can track end-user experience and produce a score around a series of relevant metrics. A low score can help pinpoint where problems and pain points are and begin to anticipate and mediate them over time. Such scoring also creates a baseline to improve delivery year over year.

<sup>4</sup> CCS Insight, “Decision-Maker Mobile Technology Survey, 2016,” <http://www.ccsinsight.com/blog/it-buyer-survey-reveals-changes-in-mobility-and-digital-workplace>.

## CREATING THE BORDERLESS WORKPLACE

How can IT help to empower users to work independently and collaboratively wherever they are? How can organizations tailor information platforms to each employee's specific needs and dynamically reconfigure workflows to get the right information (and only the right information) to the right people, at the right time, in the right place?

One thing is clear: The answer will be mobile, and it lives in the cloud. Mobility is already redefining operating and engagement models for organizations and consumers, and it can help shift the design of enterprise

systems to focus on the experience of the end-user. Cloud services, whether public, private or hybrid, mean data, systems and services can be accessed anywhere there is connectivity. They can also be monitored and controlled automatically to increase security.



“Two years ago, mobile meant phones and tablets....Now, even desktop computers can be managed with mobility tools.”

**GENE MORITA**, GLOBAL OFFERING MANAGER,  
DIGITAL WORKPLACE SERVICES, IBM

By combining the power of analytics with the ubiquity of mobile, organizations have the opportunity to serve up rich data on location, within the proper context, based on user preferences and behaviors.<sup>5</sup> What's more, mobility solutions will increasingly serve as a cognitive extension, empowering employees and organizations to quickly acquire new skills, work more and better together, and make better decisions.

“Two years ago, mobile meant phones and tablets,” explains Gene Morita, global offering manager, Digital Workplace Services, IBM. But mobility isn't only for mobile devices anymore.

Now, with the release of Windows 10 by Microsoft,

even desktop computers can be managed with mobility tools. In an app-based world, organizations can realize the full transformational potential of mobility for the workplace and the enterprise.

The challenge will be to:

- **Make it seamless**
- **Create and maintain the infrastructure and networks to deliver data, applications and connectivity**
- **Make it secure**

<sup>5</sup> IBM Institute for Business Value, “The Individual Enterprise: How mobility redefines business,” July, 2014.

## THE COMPOSABLE WORKSPACE

Ideally, the mobile workplace puts technology in the hands of users when and how they need it. Pat Bolton at IBM sees that as a matrix of users, applications and devices in a composable workspace. “You pick up your device and compose your workspace around your role in the organization and what you need to accomplish,” explains Bolton.

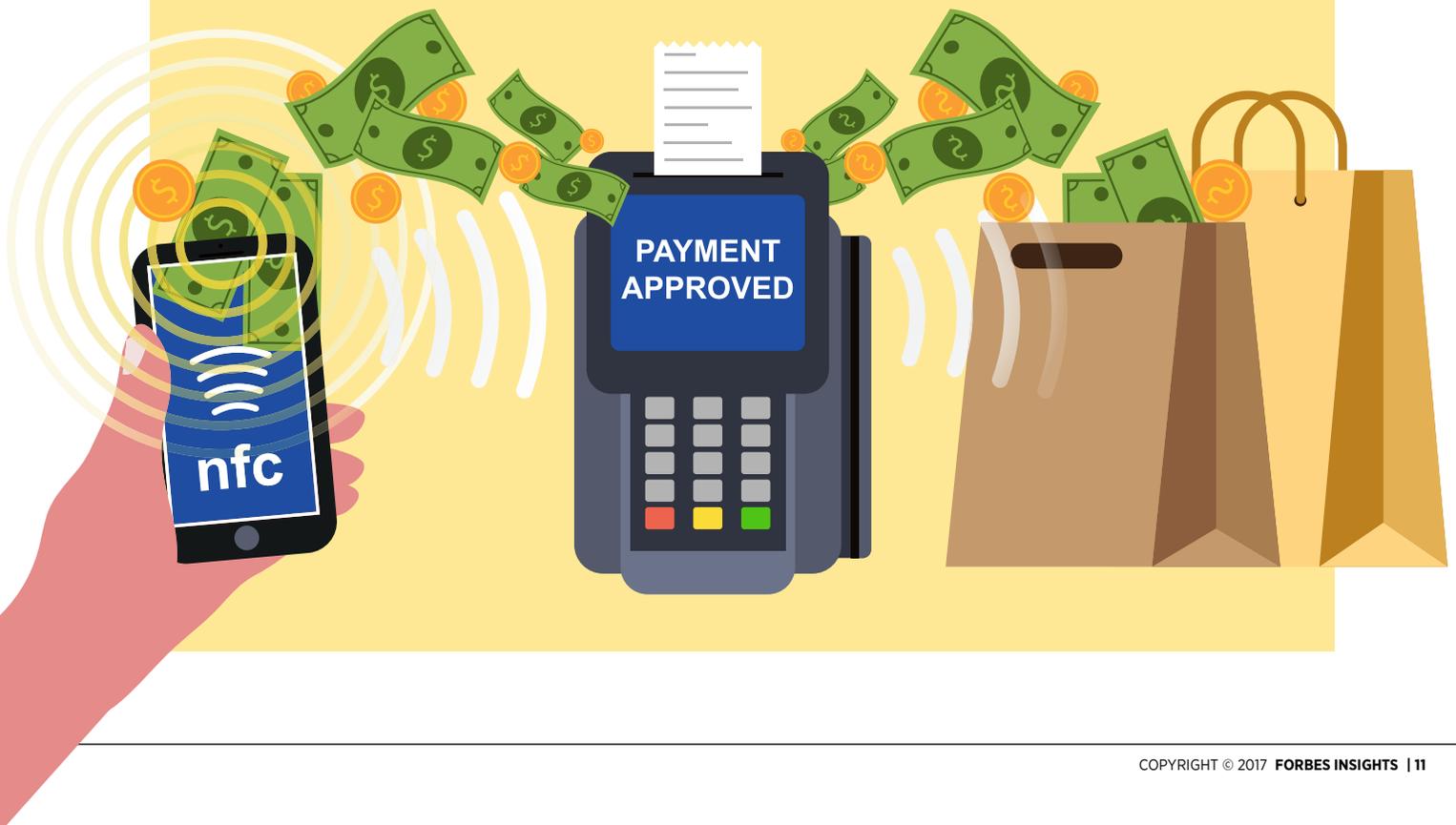
One way to understand the roles and needs of different users is to develop personas: What devices and access does a salesperson need on the road versus a factory floor manager or an executive working from home? This is the start to a process that can help refine device choices, select the most appropriate applications and determine data access for different types of users. Organizing devices and workflows around personas also helps build knowledge around how people work with their technology over time.

### THE MOBILE RETAILER: WHO NEEDS A CASH REGISTER?

Some retailers are telling their customers to skip the queue. Instead, they are sending their sales staff out with mobile devices that can process payments with mobile credit card readers wherever and whenever they are ready. Near-field communications can turn on whichever printer is nearby to create a paper receipt or invoice, if one is needed. If a customer has a question or something is out of stock, the same handheld device can be used to tap inventory data or place an order.

These technologies are not only making the cash register

obsolete at brick-and-mortar retailers, but they are also breaking down the teller desk at local bank branches. A banker can sit down with a client, and with authentication from the client's cellphone, access the client's information to complete a transaction, apply for a loan, open an account, offer advice or resolve a problem. Service organizations have gotten the message: If we can't do it ourselves, most of us would prefer to speak to a human that has the tools to help us on the spot rather than wait in line, fill out a form or navigate the helpdesk.



## CHOOSE YOUR OWN DEVICE

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Everyone loves shopping with someone else's money. Most employees will appreciate being able to choose their own devices rather than being handed a standard-issue desktop or mobile phone.

Once an organization develops personas or archetypes around its users, it can set up a portal to offer a choice of approved devices and help in choosing the right one. Would a highly mobile user trade computing power for a lighter-weight device? Some organizations are beginning to ask: Do we need to provide hardware to all our employees? For some occupations, it may make sense to give employees the ultimate in choice: a hardware allowance that lets them use their own devices to access enterprise systems.

"We are trying to make this very automated for users: These are the types of devices for these types of employees, here is how to use your own device for work-related tasks and here's how to access what you need," says Cipriano. The goal is to onboard users in an organized fashion and prevent helpdesk calls—something that should please everyone.

## DYNAMIC PROVISIONING

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For the last few decades, IT staff would configure every new computer with a corporate image: an operating system customized for each company and typically for each department or business unit. Only smartphones and tablets were eligible for dynamic provisioning. But now, with the evolution in operating systems and innovations in mobile device management, almost any computer or device is eligible for dynamic provisioning over the air, bypassing the trip to the IT department.

**"Most IT departments have one system that manages PCs, one that manages Mac products, and another that manages phones,"** says Zichi.

**"One of the profound changes now is that we see the opportunity to have one kind of device management that will span all devices regardless of the platform."**

With the Windows 10 migration, for example, CIOs have a choice: to transition to enterprise mobility management or continue to manage with corporate images. **"Many organizations are not aware that enterprise mobility management is imageless,"** says Morita. **"We could do away with imaging completely and move to a more automated provisioning and management system."**

In a recent survey, CCS Insight found that there will be significant internal realignment within IT departments with the Windows 10 migration. Eighty-three percent of respondents said that desktop and mobility operations in IT departments will converge into a single strategy team within the next three years; 44% said this would happen within 12 months.<sup>6</sup>

With mobile device management, most users can receive their phone, tablet, laptop or any other device directly from the manufacturer. As soon as the device is turned on, device enrollment begins, the designated security profile starts to apply and settings are automatically customized for that user. Organizations can configure the device, blocking unapproved applications, games, movie streaming, peer-to-peer clients or anything else they don't want running on enterprise systems. It is a one-step process.

Certain applications are mandatory at most organizations, such as email, antivirus or security-related applications. These applications are typically deployed to the user's device at the time of enrollment. If users require additional services or applications to perform their job, organizations can set up an enterprise app store that works much like the consumer variety, bypassing, again, the need to call the helpdesk or install the application. Applications can be designed to work efficiently and securely with the enterprise system, and updates are pushed out automatically. Self-service features traditionally reserved for phones, like remote locate,

<sup>6</sup> CCS Insight, "Decision-Maker Mobile Technology Survey, 2016."

lock and wipe, are now available for all platforms, including Windows and Macintosh, to provide a more consumer-like experience.

For the IT department, dynamic provisioning is much more cost-effective than managing corporate images. **“Traditionally, IT would have to rebuild several corporate images to accommodate an update,”** explains Morita. **“That’s why image refreshes were usually done only twice a year.”**

## SECURING THE ANYTIME, ANYWHERE WORKSPACE

Users will always find a way to circumvent security. If they want to work on a file at home, they will put it on USB. If they use their personal device for work and leave it at the coffee shop or drop it, files and data could be lost or intellectual property and client data could be put at risk. The key is to enable users, but keep enterprise assets secure.

With enterprise mobility management tools, security can be managed at a very granular level, says Morita. Access can be controlled for individual users as well as their location, regardless of which device they are using or who owns it. For example, geofencing defines a geographical area, like an office building, where certain corporate resources may be accessible inside but not outside of the building. Device cameras may be disabled in certain locations, say, in a research area or a police station. Micro-segmentation can target specific users, data or functions at whatever layer needs to be secured. Unified endpoint management makes it easier to push out patches and updates and enforce good password practices as well.

If a device is lost, a locate-my-device feature can help find it, lock it and, if it can’t be retrieved, wipe it. Corporate resources can be containerized and encrypted on any device, restricting users to a secure browser and containerized apps when they are accessing enterprise resources. That way, no other applications can interact with enterprise data,

email or applications. Administrators can restrict the forwarding of attachments to external domains or disable external drives. And if a device is ever compromised, an enterprise wipe can be performed, deleting all enterprise containers and leaving personal files intact.

### UNIFIED DEVICE MANAGEMENT:



Works out of the box



Dynamic provisioning



Secure access on any device



Containerization



Collaboration tools

## DEALING WITH LEGACY APPLICATIONS THROUGH VIRTUALIZATION

The average firm has thousands of legacy applications, many of which were never designed to run in a modern environment. Converting them all is cost and time prohibitive. **“Most of the time, the people who know the code are not even around anymore,”** explains Cipriano. As an immediate solution, applications can be virtualized to run on a range of devices.

Longer term, it makes sense to optimize the environment. Start with an assessment of what people are actually using. The average business unit or function uses only a dozen or so applications, says Cipriano, not thousands. Many of those can be further streamlined. For example, why run multiple versions of popular software such as Excel or Adobe?

A unified, cloud-based device management system opens new possibilities to make legacy applications more useful than they were designed to be. Middleware solutions can find non-mobile-friendly applications and replicate key functionalities to run as virtual applications on any device. **“You can take slices of data from multiple applications and make it run together in one application,”** explains Cipriano. **“Users can get what they need where they need it instead of having to open multiple devices or multiple applications.”**

## THE BENEFITS OF UNIFIED DEVICE MANAGEMENT

One of the greatest benefits of a unified enterprise platform is the ability to capture data about how people work with their devices and use that data to help them work better. Companies are starting to look at how they harness data for two broad categories, explains Carl Satterfield, enterprise architect, Digital Workplace Services, at IBM. First, how to optimize business operations, and second,

how to create a more personal experience for customers, employees, suppliers and anyone else that interacts with the organization.



**“Cognitive capabilities can be added to troubleshoot common device problems, to time software updates and to minimize service desk calls with an intelligent self-help alternative.”**

**CARL SATTERFIELD, ENTERPRISE ARCHITECT,  
DIGITAL WORKPLACE SERVICES, IBM**

**“Large volumes of data are being collected, analyzed, and that data needs to be converted into insight and action in a highly automated manner,”** he explains. Machine learning allows an organization to collect data and use it to improve the user experience and provide personalized services, says Satterfield. That data can be used to optimize for cost, efficiency and overall resource effectiveness.

For client-facing technology, organizations can run metrics in the background to see whether devices and systems are working optimally, explains Satterfield. **“With the right data, cognitive capabilities can be added to troubleshoot common device problems, to time software updates and to minimize service desk calls with an intelligent self-help alternative,”** says Satterfield. IBM’s Watson is already looking at how people are using their devices, which applications work most effectively and which devices in the workplace require the most maintenance.

## IN THE HOSPITAL WITH MOBILE TECHNOLOGY

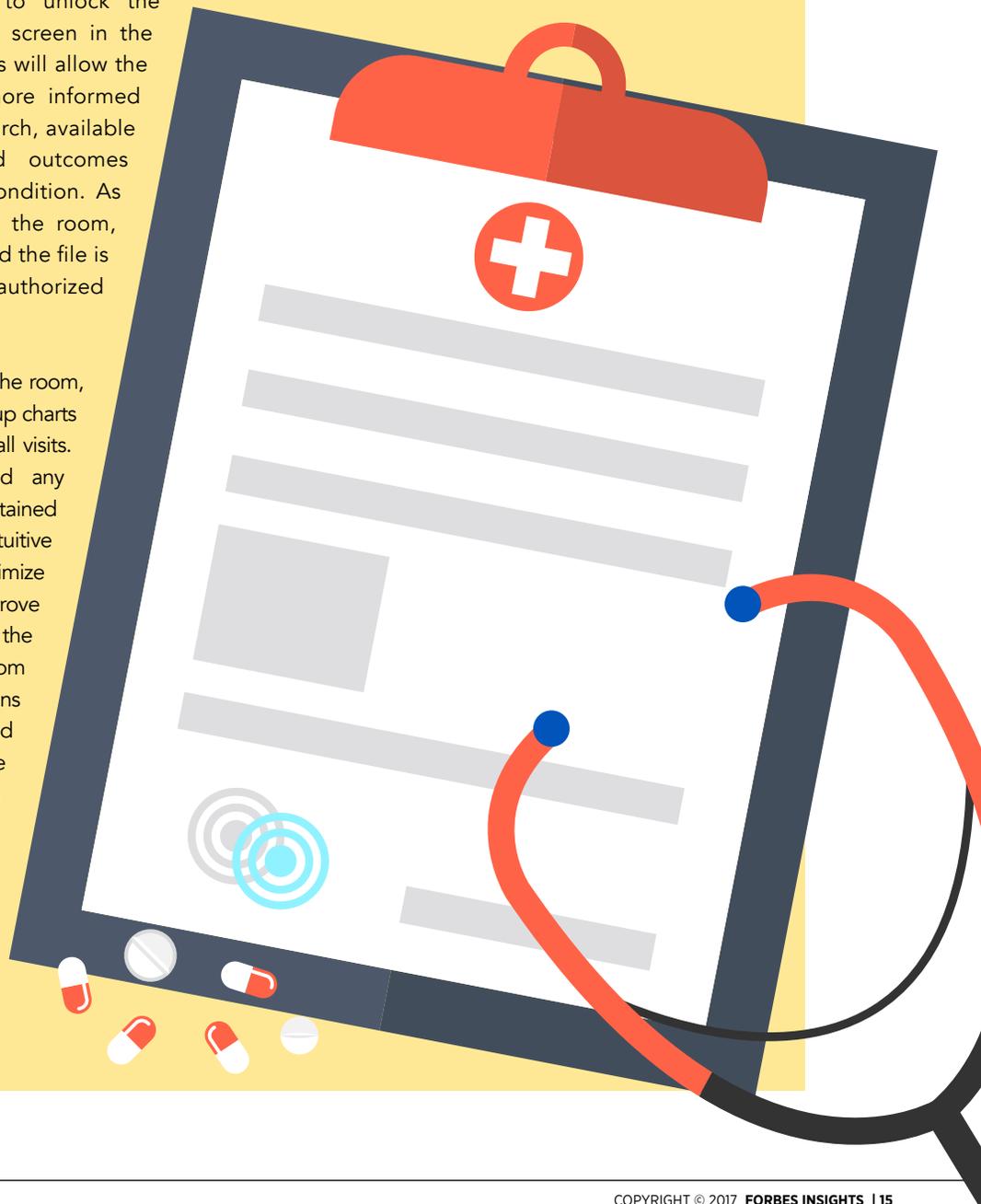
Real-time locating systems (RTLS), near-field communications, voice interaction and advanced authentication capabilities are also changing the way hospital staff interact with patients and visitors.

Picture this: A surgeon walks into a patient's room. As soon as the doctor is in range, her cellphone communicates with the patient's identity bracelet and allows her to unlock the patient's medical file on a screen in the room. Cognitive capabilities will allow the doctor to give a vastly more informed opinion about current research, available treatments and expected outcomes tailored to that patient's condition. As soon as the doctor leaves the room, the connection is broken and the file is saved and locked until an authorized user calls it up again.

Whenever a nurse walks into the room, the same technology can call up charts and schedules as well as log all visits. Vital signs, medications and any notes can be entered and retained automatically. More intuitive record keeping can help minimize medical error and improve medical care now and in the future. Detailed metadata from all patient-caregiver interactions and outcomes can be used to minimize risks, improve practices and comply with insurers and regulators.

GPS and mobile applications are also helping administrators and visitors.

Some hospitals are beginning to test parking planners and way-finding apps to help patients, visitors and staff use their mobile phones to navigate hospital complexes—a particular problem for sprawling urban and university hospitals that were built piecemeal. RTLS location technology can also help keep track of equipment, whether it be wheelchairs or MRI machines.



## BUILDING AGILITY

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A dynamic flow of user information can also start to build more flexibility into some of the more arbitrary—and expensive—elements of IT management.

Organizations can start to modify on the fly, says Carol Zichi. Most hardware is refreshed every two or three years, for example. But maybe some users need new devices sooner and others not as often. By analyzing device usage at a granular level, organizations can optimize expenses associated with devices such as carrier plans, the devices themselves and supporting applications. “The dynamics of the information being captured today can be used to help companies manage expenses and cut the total cost of ownership per device,” says Zichi. “Integrating automation, analytics and cognitive capabilities into modern IT will be game-changing.”

Perhaps the greatest challenge to technical agility comes after a merger. In an always-on world, no company can afford to spend years integrating systems, says Henry Cipriano. In order to expedite integration, you have to have a system in place that allows for ubiquitous access, with IT automation for seamless onboarding, and clearly defined personas, roles and profiles in place, explains Cipriano. “Also, a detailed assessment of the environment you’re seeking to integrate is essential for success and to prevent the necessity of reworking your IT platform to accommodate a merger,” he adds. That could cost millions after the fact and have a severe impact on productivity, security and end-user experience.

## CHANGE MANAGEMENT: THE MOST DIFFICULT PROCESS

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The mobile workplace has untethered people from their desks. At the same time, automation has freed many occupations from repetitive and mundane tasks. New cyber-physical systems will change the way some tasks are performed, from building security to autonomous vehicles. Cognitive technologies, likewise, will bring a universe of knowledge and learning to certain occupations.

But for many organizations, technology is progressing faster than business models can keep up. These changes are fundamentally transforming the relationship between employee and employer, bringing with it a cultural and generational change that may unfold in unpredictable ways.

**“The workplace today has five different generations, and everybody works with a different style,”** says Zichi. “This is an interesting time for CIOs. How are they going to keep employees productive, secure their assets, and attract and retain new talent?” she asks. This is much larger than automating the back-end or creating a personalized experience for customers. CIOs need to be looking at how to methodically implement some of these changes and recognize that there is a major cultural shift underway. The productivity advantages of such innovations as automatic provisioning and cognitive assistance will be lost if end-users continue to pick up the phone and call an agent. Managing people’s expectations and initiating a process to shift behavior is just as important as managing the technology.

## FROM ENFORCER TO INNOVATOR

The modern CIO is faced with the challenge of creating new opportunities and enhancing collaboration while monitoring emerging threats and managing and deploying adaptable technology for both on-site and off-site employees, says Zichi. Not all employees are created equal, and they all have different work habits. These factors require the CIO to take on a new role of purveyor of change management, who takes proactive steps to both empower employees and exploit IT.

**How are modern CIOs embracing the role of innovator instead of the traditional role of enforcer? By building agile cultures where rapid experimentation, informed by reliable intelligence, is the norm,** she explains.

CIOs are paying close attention to the employee experience and the customer experience to identify new trends and isolate problems. The modern CIO is focusing less on reducing costs and more on stimulating innovation to deliver capabilities that are mission critical for success. “That is true digital disruption,” says Zichi.

### WORKSPACE-AS-A-SERVICE

With all the changes in the workplace—from the broader generational shifts to the more specific trends toward unified endpoint management—some organizations are employing a workspace-as-a-service model. Rather than purchase and provision new equipment, maintain assets, update software, staff a support desk, and manage security and privacy, workspace-as-a-service means companies can provide their employees with the business applications and data they need on the device that makes the most sense while minimizing capital outlays. Workspace-as-a-service:



**REDUCES COST STRUCTURE**



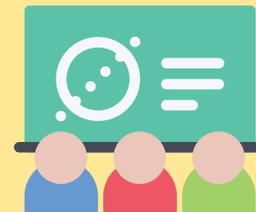
**GIVES EMPLOYEES A CHOICE OF DEVICES**



**MANAGES SECURITY**



**KEEPS APPLICATIONS UP TO DATE**



**PROVIDES TRAINING AND SUPPORT**

## CHECKLIST FOR THE DIGITAL WORKPLACE

- Assess your current capabilities for how you embrace mobile, cognitive, security and analytics within the context of the borderless enterprise
  - Evaluate users and how they get work done
  - Evaluate client-facing products and services
- Develop a strategy to build the flexible, scalable workplace for the future
- Prioritize opportunities to apply new digital technologies
  - Provide mobile devices: Mobility with new powerful devices enables employees to work anywhere and bring their computing capabilities with them where they are needed, when they are needed.
  - Deploy location technology: The market is rapidly changing for location technology to allow enterprises to innovate and address business operations with new capabilities.
  - Explore the intersection of mobility and IoT: Leverage new capabilities, such as IoT, and mobility to create innovative solutions in your industry.
  - Integrate cognitive capabilities: Emerging cognitive applications will leverage machine learning to understand and personalize the end-user experience within the enterprise. Cognitive applications will be able to:
    - Anticipate the end-user's and organization's needs
    - Streamline the user interactions with enterprise systems
    - Optimize processes and improve cost efficiencies
- Pick an area aligned to strategic goals and get started

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# ACKNOWLEDGMENTS



Forbes Insights and IBM would like to thank the following individuals for their time and expertise.

- **Pat Bolton**, Distinguished Engineer and Chief Technology Officer for Digital Workplace Services, IBM
- **Henry Cipriano**, Senior Client Technical Architect, Digital Workplace Services, IBM
- **Gene Morita**, Global Offering Manager, Digital Workplace Services, IBM
- **Carl Satterfield**, Enterprise Architect, Digital Workplace Services, IBM
- **Carol Zichi**, Strategy and Portfolio Executive, Digital Workplace Services, IBM

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