

# Modernizing Legacy Mobile Applications



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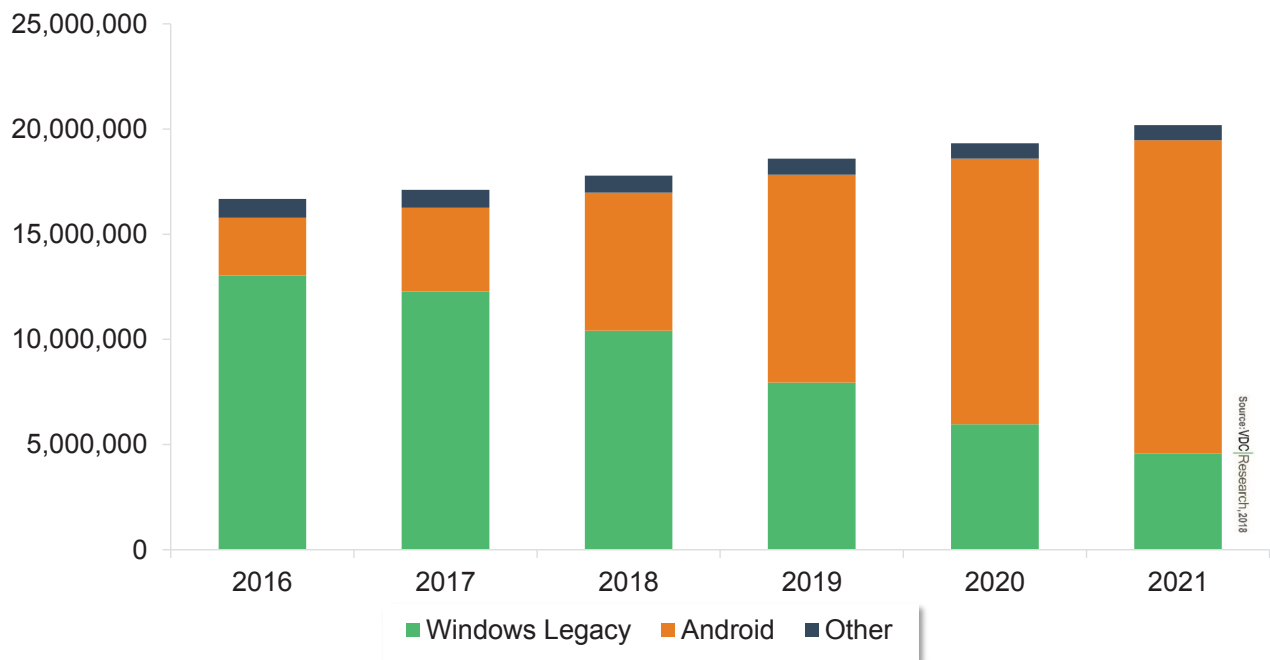
**Stratix**

By David Krebs, Executive Vice President

# THE SITUATION

Microsoft’s Windows CE and Windows Embedded Handheld 6.5 (WEH6.5) have long a tenure as the OS platforms of choice for rugged handheld computers supporting business and mission critical applications across most industries, including retail, logistics, manufacturing, healthcare among others. The portfolio of devices and form factors is broad, development tools are mature, and the developer community is sizeable. In addition, with support from Microsoft for the past decade, businesses have been able to effectively manage and maintain their deployments. But change has been forced on this ecosystem, with Microsoft’s end of life of its prolific legacy Windows platforms – and recent decision to stop investments in its next generation mobile roadmap. To fill this void device OEMs have shifted their investments toward a new generation of modern Android powered purpose-built ruggedized handheld devices while enterprise decision makers have also increasingly deployed Android and iOS powered “consumer” devices to support their enterprise mobile workflows.

*Exhibit 1: Installed Base of Rugged Handheld Computers by OS*



Preparing for Microsoft’s most prolific Windows Embedded Operating Systems End of Life is essential for any organization maintaining these deployments; the devices impacted are often required for day-to-day job-related activities/functions of their users. In fact, according to VDC’s research, the installed base of Windows-powered devices that this transition is impacting numbers well over 10 million devices. While awareness is no longer an issues – well over 90% of organizations still supporting devices running legacy WEH 6.5/Windows CE are aware that these platforms are nearing end of life/end of service. However, many have – and continue to – take a wait and see approach, extending the lifecycle of existing devices beyond their intended use. Making this transition is not trivial, with substantial resource requirements to support. However, the investments OEMs have made in delivering enterprise grade modern mobile solutions and the solution provider eco-system available to support enterprises with their migration initiatives have broken down many of the previous barriers. Moreover, the opportunity to drive additional operational efficiencies by refining workflows, leveraging the capabilities of modern mobile devices and offering employees a richer and more intuitive mobile experience only future enhance the situation.

# STATE OF THE MARKET

From warehouse workers and delivery drivers to first responders and retail associates, rugged handheld devices are used to support some of the most business and mission critical applications today. However, the underlying Windows operating systems supporting applications running on these devices are rapidly reaching EOS. Microsoft's Windows CE and Windows Embedded Handheld 6.5 have long a tenure as the OS platforms of choice for the majority of these deployment scenarios. The portfolio of devices and form factors is broad, development tools are mature, and the developer community is sizeable. In addition, with support from Microsoft for the past decade, businesses have been able to effectively manage and maintain their deployments (often longer than expected). But change has been forced on this ecosystem, with Microsoft's end of life of its prolific Windows platforms looming, and the emergence of a new generation of modern Android-powered purpose-built ruggedized handheld devices not to mention the flood of smartphones being used in various corporate settings. Below are several important dates that should be marked on your calendar:

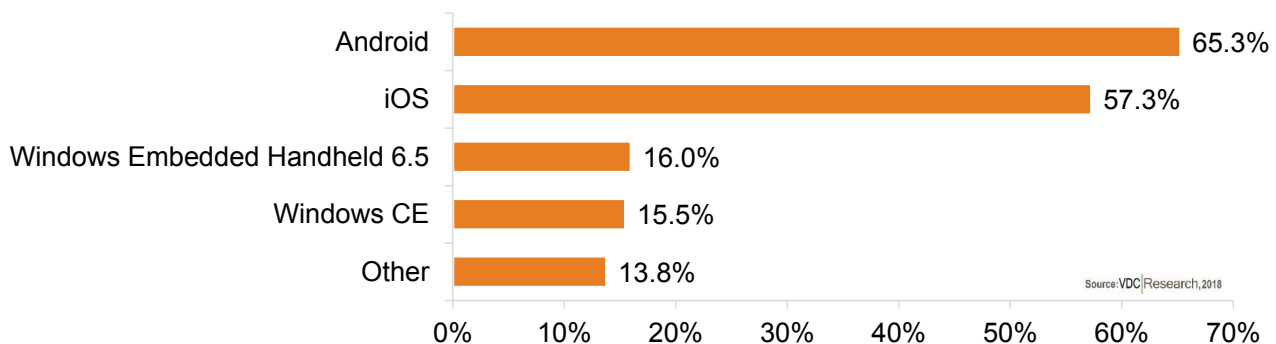
- > June 10, 2018 — Windows Embedded CE 6.0 will be End of Life
- > June 9, 2019 — Windows Embedded 8.1 Handheld will be End of Life
- > January 14, 2020 — Windows Embedded Handheld (WEH) 6.5 will be End of Life

Preparing for Microsoft's most prolific Windows Embedded Operating Systems End of Life is essential for any organization maintaining these deployments; the devices impacted are often required for day-to-day job-related activities/functions of their users. Thus, the need to upgrade the applications to run on modern operating systems is an imperative facing thousands of the largest and most iconic brands the world over. Ensuring that decisions made regarding next generation investments do not compromise their utility is imperative. From an OS perspective, decision-makers have several options, each of which carries with it benefits and potential concerns. Moreover, from an application development perspective, options exist including rewriting/recoding the application natively, leveraging HTML5 or using cross-platform tools that leverage existing .NET/C# skill sets. There is no silver bullet answer. However, doing nothing or pursuing the wrong option can result in performance issues, disruption to operations, and budget overruns. Ultimately the right decision will be based on a combination of key factors including ISV support and availability of third-party applications, availability of enterprise-class software tools to support and manage your mobile devices and applications, access to talented developers who can support your initiatives, and a broad portfolio of mobile devices to select from that best support your requirements.

## Current Mobile OS Landscape & Migration Plans

Respondents to a recent survey conducted by VDC Research among enterprise mobility decision makers revealed the diversity of mobile OS platforms supported for their mobile solutions. While most solutions deployed run on modern mobile platforms such as Android or iOS, the use of mobile devices running legacy Windows platforms and applications is not insignificant with over 15% of respondents supporting either OS. As stated previously there remain over 10 million devices in use today running on these legacy platforms.

*Exhibit 2: Mobile OSes Currently Supported*

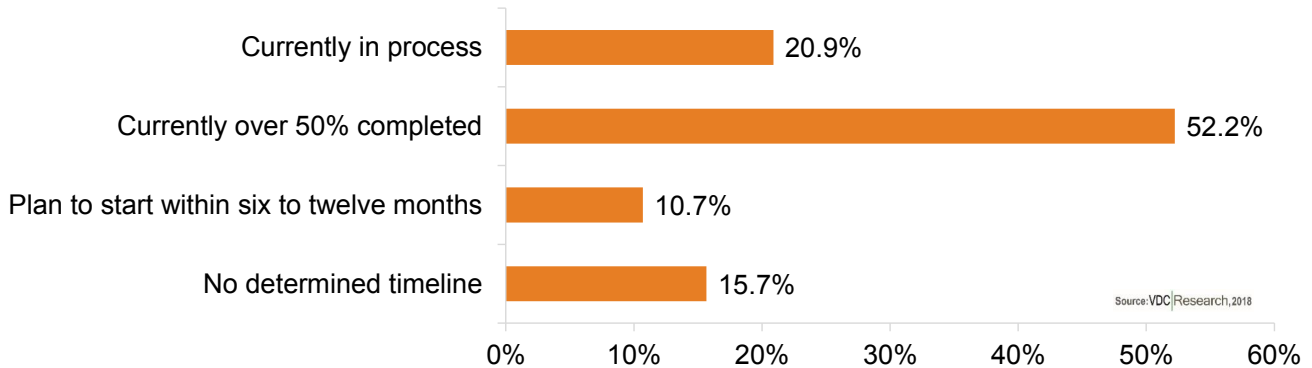




## Timing of Transition From Legacy Windows

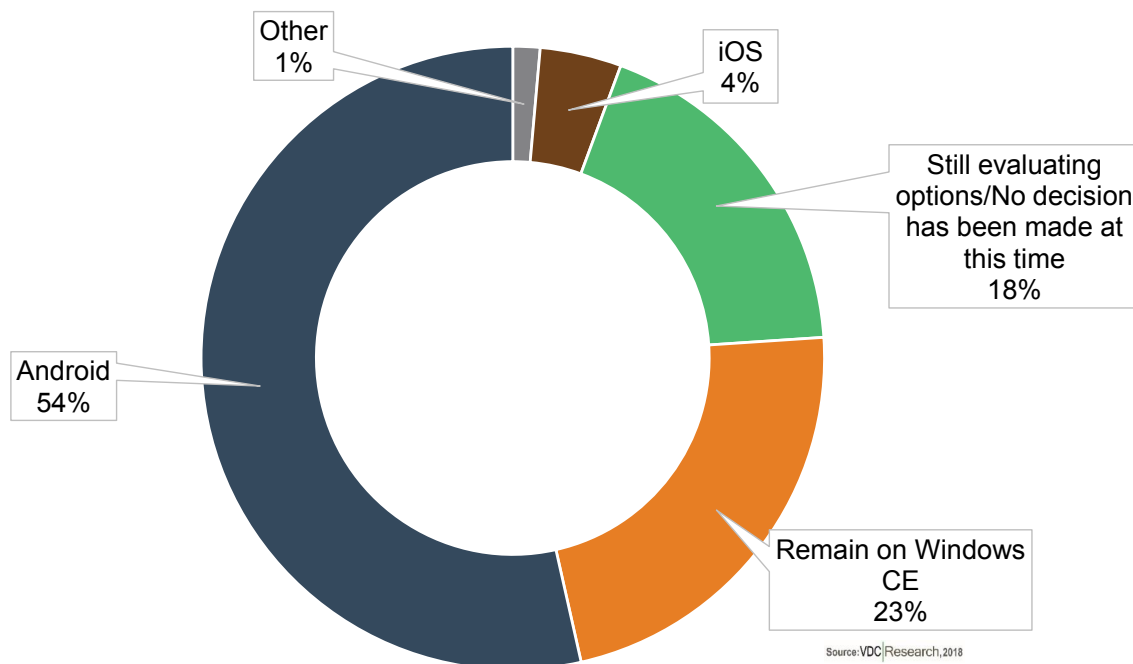
With a high level of awareness surrounding the EOL/EOS of these legacy Windows solutions, most respondents supporting these devices have Windows migration plans in place or are beginning to formulate plans. However, 25% are only planning to start formulating plans in six to twelve months and/or have no determined timeline. For these organizations time is not on their side and it will become increasingly critical to put plans in place or risk the potential of disrupting their operations or exposing their organizations to additional security vulnerabilities and no new security patches will be introduced post deadline.

Exhibit 3: Windows Migration Timeframe



The leading OS candidate to support migration plans of legacy Windows devices is Android, according to 54% of research respondents. With Android being the primary platform supporting by existing “industrial” class rugged handheld OEMs and represents over 80% of the global smartphone market, this is not surprising. What is potentially more surprising is the large number of respondents committed to remain on Windows CE for the foreseeable future – this is most common in warehouse and logistics environments – and the small representation of iOS and Apple devices as their target platform.

Exhibit 4: Target OS to Upgrade to Following Legacy Windows EOL



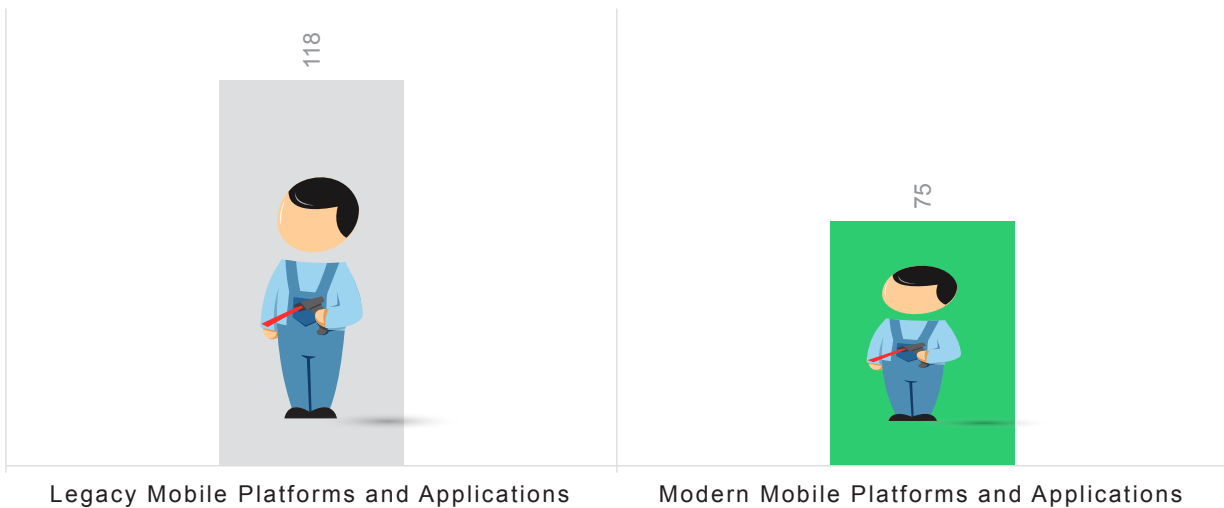
## Benefits of Modern Mobile Platforms and Devices and the Cost of Status Quo

One of the clear benefits of deploying enterprise-class rugged handheld devices is in their durability and strong lifecycle support resulting in average upgrade cycles of 4-5 years. However, one of the consequences of the uncertainty surrounding OS direction has been customers postponing upgrade decisions, thus increasing the average age of the installed base of mobile devices. In fact, according to VDC's research, the average age of the installed base of rugged handheld devices has increased substantially over the past several years. In 2010, approximately 36% of the installed base of rugged handheld devices were four years or older. By 2017, that ratio had jumped to 48% of rugged handheld devices.

Although rugged devices are designed to withstand harsh environments and everyday use, failure rates of these devices does increase as the device ages. According to VDC's research, average annual return rates for rugged handheld devices during the first year of operation is approximately 1%. However, average annual return rates of devices in their fourth year of operation jumps to 8%. Therefore, the consequences of postponing the decision to upgrade one's installed base of enterprise rugged handheld devices can lead to significantly higher costs of support and ownership of these solutions. Considering that these devices support business critical operations and that any device failure leads to a loss in productivity of up to 65 minutes, the impact on operational disruption and the potential for erosion of customer service can be substantial. In fact, each percentage point increase in mobile device failure leads to a 5% increase in total cost of ownership.

In addition to overall cost of ownership issues, another major concern for organizations continuing to support legacy mobile platforms is security. With Microsoft and their technology partners and eco-system vendors no longer providing security updates, these older devices may have expired root certificates and lack SHA-2 support.

*Exhibit 5: Employee Onboarding: Total Hours Before Hitting Full Productivity*



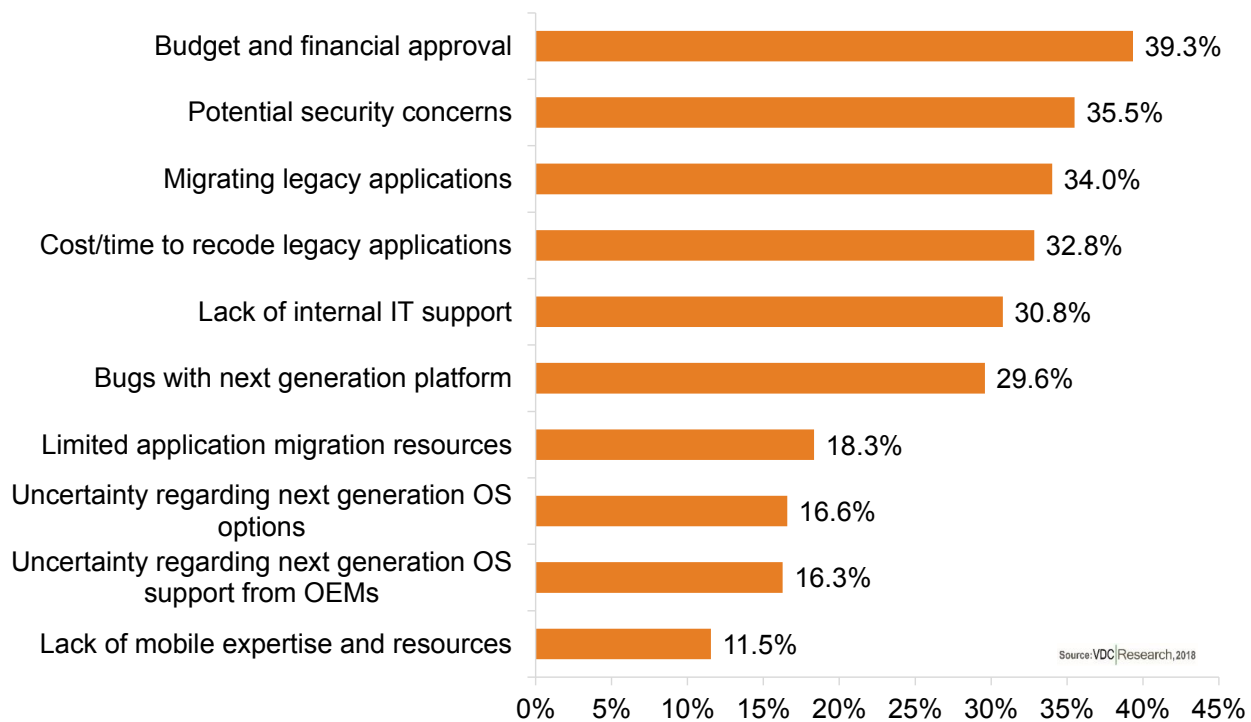
What is also increasingly evident is that the level of satisfaction with legacy enterprise mobility applications is waning. Not only do these applications not conform with the expectations of what modern mobile applications should look like, they similarly do not take full advantage of the capabilities of today's mobile devices. Moreover, lacking an intuitive user

interface can significantly impact workforce productivity and performance. One area where this is particularly acute is for warehouse and distribution center operations which are supported by part-time seasonal workers during peak times. Training these workers on legacy keyboard-based interfaces can take up to 2-4 days, while in most cases training on more modern touch-centric applications can be reduced down to several hours. For organizations such as Amazon, which hires up to 100,000 seasonal workers, this translates into substantial cost savings and operational improvements.

## Mitigating Upgrade/Migration Challenges

However, even with all benefits associated with OS and application modernization, it is not without its challenges. For many organizations this manifests itself in budget barriers and the cost associated with these significant transformation initiatives. Beyond budget, access to the appropriate internal resources and knowhow to navigate application migration represent significant challenges and often open the door to third party solution providers with experience supporting these engagements. Finally, security also represents a top of mind concern as organizations shift from “enterprise-oriented” platforms to solutions with deeper roots in consumer markets. Moreover, in particular with Android, the perception of it being a less secure and less stable platform remains a common chorus further challenging decisions. However, in this case security can present somewhat of a double edged sword with legacy platforms presenting their own security vulnerabilities and lack of compliance with modern security standards. Moreover, OEMs and the vast Android ecosystem, have invested significantly in “hardening” the platform, making it more viable for enterprise use cases.

Exhibit 6: Mobile OS Migration Barriers or Concerns



# MOBILE MODERNIZATION BEST PRACTICES

As enterprises that continue to support legacy Windows solutions evaluate their upgrade tradeoffs, they will eventually reach the conclusion that a transition is inevitable. Included among the key success criteria for businesses migrating their legacy applications to modern Android and/or iOS platforms are the following:

## 1. Mobile Requirements Analysis and Lifecycle Management

While consumer technology trends define today's mobile expectations the requirements for most mobile solutions supporting business or mission critical workflows often push the boundaries of what can be done with a mobile device. However, the gap between "industrial-class ruggedized devices" and consumer devices in terms of look and feel, performance and user experience has largely been closed. For organizations using mobile devices where maximizing uptime and reliability is critical to one's operations it is essential to ensure that the device aligns well with the target environment and use case. Consider the following:

- > **Lifecycle management and sustainable application development are key enterprise needs.** While enterprises want to take advantage of the rapid pace of mobile and wireless innovation and do not want to get "locked" into a mobile platform, the rapid upgrade cycle of consumer technology cannot be realistically supported for more sophisticated enterprise mobility solutions. A regular cadence to upgrades and the assurance of longer support scenarios is a critical enterprise requirement and key limitation among consumer devices.
- > **Protective cases help but do not address the full spectrum of issues.** While protective cases do decrease failure caused by dropping devices, the device remains vulnerable to other issues such as exposure to extreme temperatures, dust and vibration. In addition, the display is still vulnerable and exposed when dropped directly onto the corner of a hard surface. Make sure to understand the full spectrum of environmental conditions and their impact on mobile device performance before making a final selection decision.
- > **Battery performance and management is a concern.** Greater than full shift battery performance is a critical requirement for enterprise use cases. According to VDC's research, more than seven in ten smartphone users frequently or occasionally experience batteries not lasting an entire shift. For devices that do not provide access to the battery, this often translates into the need to purchase additional backup devices.
- > **Consider the processes involved with integration with your existing systems.** What will be required for seamless integration with backend applications and databases? What are the ramifications of changes to any of these systems? Make sure you can easily integrate systems now and in the future and are not limited by custom integration software.
- > **The need for enterprise grade data capture.** For many mobile applications and workflows, the ability to capture data efficiently and seamlessly is important. This often translates into the need for an enterprise grade image capture/bar code reader solution. While third party accessories that support industrial data capture and that can be coupled with consumer devices exist, enterprises prefer an integrated solution. Avoiding the accessory cost and management complexities is considered a key benefit.

## 2. Application Modernization and Migration: What are My Options?

Many organizations are sitting on several versions or iterations of legacy mobile applications, often with millions of lines of code (often undocumented). Investing in application migration and modernizing can be a time and cost intensive endeavor that requires a disciplined approach to navigate. Included among the most important decisions are:

- > **Select the application development approach that best suits your requirements.** When deciding between web-based vs. building natively – or a hybrid approach bridging both – there is no one size fits all approach and often becomes a trade-off debate between cost and performance requirements. If developing for one platform and performance – including features like offline functionality – is critical, then designing native applications is the preferred approach. Some of the key strengths and challenges of either approach are summarized below.

	NATIVE APPS	BROWSER/WEB APPS
<b>PROS</b>	<ul style="list-style-type: none"> <li>Typically, the performance is faster because they store information locally and only synchronize with the server after the user is done using the app.</li> <li>They can be used offline, making them faster to open and access anytime.</li> <li>They allow direct access to device hardware that is either more difficult or impossible with a mobile app (camera, accelerometer, etc.)</li> <li>App store approval, which means most of the time the user can be assured of improved safety and security of the app.</li> </ul>	<ul style="list-style-type: none"> <li>They are instantly accessible to users via a browser across a range of devices.</li> <li>Much easier to update or maintain by the developer.</li> <li>Just like a standard website, mobile websites / web app can be developed as database-driven web applications that act very much like native apps.</li> <li>The development is considerably more time and cost-effective than development of a native app, using programming languages and technologies that are more commonly understood and have a much larger developer base.</li> </ul>
<b>CONS</b>	<ul style="list-style-type: none"> <li>More expensive to develop, especially when the app needs to be compatible with multiple mobile operating systems.</li> <li>Cost of app maintenance is higher.</li> <li>Getting the app approved for the various app stores can prove to be long and tedious for the developer.</li> <li>Use of the app is contingent on the user's willingness to download and install the app.</li> </ul>	<ul style="list-style-type: none"> <li>Mobile Web apps only have limited scope as far as accessing a mobile device's features is concerned.</li> <li>High degree of variation between web browsers and browser versions that it makes it challenging to develop a stable web-app that runs on all devices.</li> <li>Not listed in 'App Stores'.</li> <li>Web apps are unavailable when offline, even as a basic version.</li> </ul>

- > **Use the opportunity to update workflows and processes.** The opportunity to modernize legacy mobile applications opens the door to reviewing existing processes and workflows and identifying opportunities for further optimization. This may include leveraging the capabilities of moderns mobile devices – embedded sensors, location capabilities, AR overlays, for example – to streamline workflows and make the workforce even more productive. If the end result is just a more intuitive version of the same application a massive opportunity has been missed.
- > **Revisit security.** Not surprisingly, security is a top of mind consideration when addressing legacy application migration. Meeting the requirement for rapid delivery adds to the challenge of ensuring the security of mobile apps. While the stakeholders vary by organization, in large enterprises, CISOs typically shoulder the responsibility for application security from a governance, compliance, and risk perspective. VDC believes that the need to enforce application security measures will grow with the expansion of mobile enablement programs. For this reason, organizations will be well served to implement mobile application security programs. These programs should be an extension of existing application security programs and will become increasingly important.

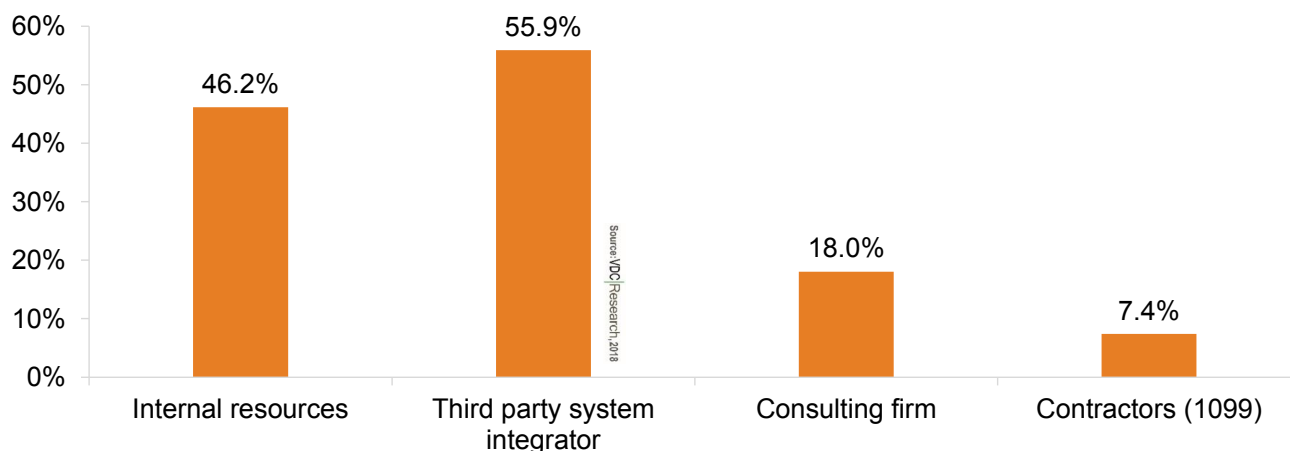


### 3. Who to turn to?

Limited internal IT support resources and application migration expertise were cited by enterprise mobility decision makers as a critical mobile migration barrier. Managed mobility providers are uniquely positioned to assist with many modernization initiatives including the adoption of next generation mobile applications. The mobility landscape is notorious for its lack of standardization, diverse vendor ecosystem, and multiple technology platforms. Moreover, enterprises have struggled to optimize connectivity and minimize security risks; and there are also the common business challenges of minimizing costs and future-proofing technology selection. Organizations struggle with decisions spanning which device types that best fit their use cases, defining the device connectivity and data format, implementing security, governance, and policy across each layer, and ultimately staging, kitting, deploying and managing these business critical operations technologies.

It is exactly for these reasons that organizations turn to third party solution providers – including managed mobility service providers. Over 50% of enterprise mobility decision makers are looking to third party solution providers to shoulder much of this with reduction of mobility deployment and increasing the pace of mobile innovation and reducing solution complexity were identified as the top two adoption drivers for third party mobile professional services.

*Exhibit 7: Primary Source to Manage OS Migration*



When evaluating and selecting third party mobile service partners, some of the critical selection considerations include:

- > Experience modernizing and migrating legacy OS applications.
- > Mobile application lifecycle services capabilities. The ability to both develop and manage mobile applications will be increasingly desired going forward.
- > Rapid deployment services – the ability to fast-track projects while helping customers understand the ROI potential of their investments.
- > Provide service and support capabilities for all connected end-points, not just mobile devices. Instrumenting legacy systems is becoming a key priority, as organizations are beginning to capitalize on the idea of connected devices and their associated business benefits.
- > Advanced monitoring and analytics capabilities – the ability to leverage cloud service and deliver real-time remote monitoring capabilities will be a key area for competitive differentiation moving forward.
- > Global service footprint – a critical element to being able to cater to multi-national requirements.

# ABOUT THIS RESEARCH

This white paper addresses the evolution of enterprise mobility solutions and outlines the evolving requirements shaping the future of mobile applications across various enterprise deployment environments and applications. Research methodology and objectives are summarized in the table below:

RESEARCH OBJECTIVES	RESEARCH METHODOLOGY
<ul style="list-style-type: none"><li>• Research mobile requirements for enterprise mobility applications</li><li>• Evaluate next-generation mobile OS migration plans</li></ul>	<ul style="list-style-type: none"><li>• Online survey focused among enterprise mobility decision makers with solution sourcing, selection and support responsibilities</li><li>• Survey was fielded in April 2018</li></ul>
RESPONDENT DETAILS	KEY RESEARCH TOPICS
<ul style="list-style-type: none"><li>• 212 qualified survey respondents</li><li>• Mix of industries including retail, transportation, manufacturing, healthcare, energy/utilities, among others</li></ul>	<ul style="list-style-type: none"><li>• Current investment in mobile solutions supporting frontline mobile workers</li><li>• Level of support for devices running legacy Windows OS platforms</li><li>• Next generation mobile OS migration plans</li><li>• Key mobile OS migration challenges</li></ul>

## ABOUT THE AUTHOR



David Krebs

**David Krebs** has more than 10 years of experience covering the markets for enterprise and government mobility solutions, wireless data communication technologies, and automatic data-capture research and consulting. David focuses on identifying the key drivers and enablers in the adoption of mobile and wireless solutions among mobile workers in the extended enterprise. David's consulting and strategic advisory experience is far reaching and includes technology and market opportunity assessments, technology penetration and adoption enablers, partner profiling and development, new product development, and M&A due diligence support. David has extensive primary market research management and execution experience to support market sizing and forecasting, total cost of ownership (TCO), comparative product performance evaluation, competitive benchmarking, and end-user requirements analysis. David is a graduate of Boston University (BSBA).

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## ABOUT STRATIX

Stratix Corporation is the trusted advisor for many industry-leading enterprises, offering the most comprehensive mobile managed services portfolio to help companies operationalize and realize the full value of their mobile investments. With over 35 years of experience, Stratix has the proven outsourcing model for enterprises looking to deliver business transformative solutions with mobile technology. For more information, visit [www.stratixcorp.com](http://www.stratixcorp.com).



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## ABOUT VDC RESEARCH

Founded in 1971, VDC Research provides in-depth insights to technology vendors, end users, and investors across the globe. As a market research and consulting firm, VDC's coverage of AutoID, enterprise mobility, industrial automation, and IoT and embedded technologies is among the most advanced in the industry, helping our clients make critical decisions with confidence. Offering syndicated reports and custom consultation, our methodologies consistently provide accurate forecasts and unmatched thought leadership for deeply technical markets.

