# Strategic Insights into Selecting the Operating System that Best Meets Your Long-Term Business Vision

**Honeywell**

# Executive Summary

The most used and most widely supported mobile operating system for enterprise operations – Windows® Embedded Handheld 6.5 (WEH 6.5) – is nearing its end of life and there is no clear-cut migration path for the millions of business users that depend on it. This is a significant end-of-life issue because many WEH 6.5 applications will not be compatible with Microsoft's next-generation mobile operating systems. Thousands of enterprises will need to replace their WEH 6.5 devices and software in the next few years. Enterprises today have the rare opportunity to assess their mobility requirements, redefine their mobile strategies and commit to the operating system that best meets their long-term vision.

Microsoft is encouraging WEH 6.5 customers to migrate to the Windows Embedded 8.1 Handheld or Windows 10 platforms. However, there is much less of a barrier now to leaving the Microsoft platform than there was in the past. There are also more options for operating systems to power devices used in non-office environments where durable devices and automatic identification and data collection (AIDC) technologies are needed. Google's Android and Apple's iOS platforms each have notable advantages and limitations for certain enterprise environments and work processes, including inventory management, route automation, field service, transportation, logistics and maintenance management.

WHITE PAPER

This combination of factors is setting the stage for an unprecedented migration in the enterprise mobility market. At the end of 2014 Gartner predicted that 50 percent of currently deployed mobile enterprise applications would be rewritten or replaced in the next two years.

This whitepaper will help enterprise decision makers develop their next-generation mobile OS strategies. It focuses on the specific needs of enterprises that use mobile computers outside office environments where operations require more than messaging and personal productivity applications. The paper:

- Presents an overview of advantages and disadvantages to selecting the Android, iOS and future versions of Windows platforms as an enterprise's next-generation mobile OS

- Highlights the important differentiators among the operating systems, including support for data collection technologies and devices and available development and management tools

- Explains why HTML5 can provide protection against OS compatibility problems and identifies the limitations to HTML5 applications

- Presents guidance on how organizations can identify the most important selection criteria for their next-generation mobile OS decision

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## The Current State

Android has significant momentum in the enterprise mobility market and iOS always attracts a lot of attention. These developments tend to overshadow the fact that Windows Embedded Handheld 6.5 was perhaps the most successful mobile operating system ever introduced. It had more than 80 percent of the enterprise market as recently as 2013.[1] Never before in the history of enterprise mobile computing has an operating system with such a large share of market been so close to its end of life.

And perhaps never before has the future path been less certain for enterprises facing a mobile OS migration. The Android OS has proven itself as a viable option for enterprise operations and has expanding developer and device options. iOS-based iPad and iPhone mobile devices can be suitable for some retail and other non-industrial environments, and association with the Apple brand is very appealing to some enterprises. Meanwhile, the next-generation Windows mobile operating systems build on the platform's market-leading device management and security capabilities and include other enhancements for the enterprise market.

No matter which of these operating systems current WEH 6.5 customers choose, they will need to redevelop their applications. That adds significant importance to the decision because development, transition costs and ongoing costs will need to be accounted for.

In recent years many organizations have used HTML5 as a hedge against OS uncertainty. Applications developed for HTML5 can run on any device (mobile or desktop, regardless of OS) that supports the browser. Therefore HTML5 represents a lifeline for organizations that use Windows Embedded Handheld 6.5 and those that are leery about the frequent changes to the Android and iOS operating systems. However, HTML5 is better for tasks that require data collection rather than for those that require data processing, so many organizations will need more powerful applications that are native to a specific OS. Enterprise mobility users often go a step farther than native apps by developing software for specific models of devices so they can take advantage of advanced data collection capabilities (e.g. bar code and RFID reading) that enterprise-class mobile computers offer.

Honeywell has helped thousands of organizations implement enterprise mobility technologies and supports the Windows Embedded Handheld, Android and iOS operating systems. In our experience, enterprises can get the functionality they need from any of these principal operating systems. Determining which OS will provide the best performance, longevity and value usually depends on factors specific to the organization, including its approach to mobile application development and user support. Key considerations about these and other decision factors are presented in the following sections.

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1. "Rugged Handheld OS: Microsoft's Market to Lose… But for How Long?" VDC Research, March 2013.

## Why Windows Embedded Handheld 6.5 is Not the OS of the Future, Even If It Is the OS of the Present

The Windows Embedded Handheld 6.5 operating system debuted in 2010 and quickly became the leading operating system used on enterprise mobile computers. Since then, it has offered nearly everything an enterprise could want in an operating system: a wide range of device options available from many competing hardware vendors, a large development community, and a wide range of application development libraries and tools from Microsoft and other vendors, including support from many mobile device management (MDM) solution providers. Windows Embedded Handheld 6.5 has also provided stability, as Microsoft gave the OS ten years of support. This is a notable contrast to Android and iOS, which can quickly become obsolete because the operating systems are frequently overhauled to satisfy consumer demand for the latest new technologies and features.

The biggest negative associated with Windows Embedded Handheld 6.5 is its future. Microsoft is ending support on January 14, 2020. Some mobile computer makers are ending their support for Windows Embedded Handheld 6.5 long before Microsoft. That could make it difficult for organizations to get replacement products and may require them to redevelop applications sooner than they anticipated.

For these reasons most organizations that are currently using Windows Embedded Handheld 6.5 will need new hardware and software in the next few years. However, it should be noted that organizations can continue using Windows Embedded Handheld 6.5 after Microsoft officially ends support. Devices and applications will continue to function, but security patches and other important updates will no longer be available from Microsoft, so a third-party support organization or in-house development expertise may be required to keep systems running reliably. Using an unsupported operating system introduces risk and creates dependencies on specialized resources that may be hard to obtain.

## Why HTML5 Won't Eliminate the Need to Redevelop Apps

HTML5 is not an operating system but can be used to create web applications that can run on any OS. HTML5 thus provides protection against incompatibilities that can result from OS changes and is also advantageous for organizations that need to support multiple mobile operating systems, such as in BYOD environments. Intermec (now part of Honeywell) recognized these investment-protection advantages and was the first enterprise mobile computer provider to offer an HTML5-compatible browser in its products. Since then, HTML5-based Web applications have become an attractive option for enterprises that are concerned about the compatibility and support problems that can result from the rapid changes that are occurring in mobile devices and operating systems.

HTML5 compatible browsers are a standard component of most current operating systems, including Windows Embedded 8 Handheld, Windows 10, Android and iOS 9. Migrating HTML5 applications to different hardware, even if it runs a different operating system, can be achieved with little or no rework of the application code. HTML5 can also simplify support, because updating applications across an entire device population can be executed by refreshing a web page. Organizations that use HTML5 applications are also less reliant on data storage on the device because in many cases the captured data is transmitted directly to a website. Unlike previous HTML versions, HTML5 supports offline operation, which means users can continue with their work even in the case where connectivity is interrupted.

Not all applications are suitable for HTML5. Apps oriented around data capture, including scanned data, and forms-based applications are common in the AIDC industry and are ideal candidates for development under HTML5. However, applications that rely on complex grid controls for data input, or that require heavy database processing at the point of transaction, may not deliver satisfactory results in an HTML5 environment.

HTML5 applications that are currently running on WEH 6.5 can be ported to devices running Android, iOS 8 and newer versions of Windows fairly easily, but HTML5 will still be limited for database-intensive applications. As organizations look to do more on their mobile devices, they will likely need more robust applications that are native to a specific OS.

## OS Decision Considerations

Enterprises have more mobile operating systems and supporting devices to choose from than ever before, which makes the OS decision process different and more challenging than in the past. Proponents of the Android, iOS and Windows operating systems can each cite many satisfied enterprise customers, vibrant developer bases and technology heavyweights that are committed to the long-term success of the platform. That's not to say an enterprise can't make a bad choice. In most cases, one mobile operating system is better aligned with enterprise requirements than the others. Finding the best match requires assessing available software, support, tools and talent.

**Application Software**
The application software and partner ecosystem for each operating system is important for all enterprise mobility customers and is a critical consideration for organizations that primarily plan to acquire mobile software solutions instead of developing them in house. There are various statistics about the thousands of applications available for Android, iPhone and Windows devices, but the numbers are often meaningless because they are inflated by consumer-oriented games and apps. Enterprise customers should investigate the range of solutions that are available for their intended mobile workflows, and should ask mobile device providers about the software that is available from their partners.
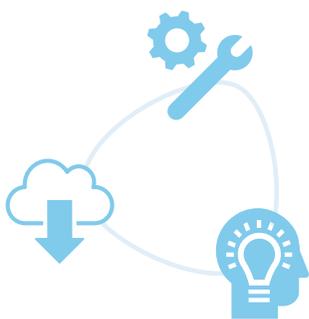
## Tools

The enterprise-class tools available for device management, security and application development are a major differentiator among mobile operating systems. As with applications, much of what is available on the market is oriented to consumers, not enterprises.

There are many mobile device management (MDM) solutions available and most support multiple operating systems. However, their depth of support and specific features vary considerably. An MDM may be optimized for one mobile OS and may provide less functionality for others.

For software development tools, look for support for bar code and RFID data entry, touchscreen input, signature capture, GPS and other automated data collection capabilities that are essential to mobile enterprise activity. Many application development tools do not support these technologies or provide configuration shortcuts for mobile computers with data collection capabilities. Not having such functionality adds time to application development, integration and deployment, which reduces the value of the mobility solution.

## Talent

An enterprise's dependency on tools and third-party software applications relates directly to the talent and philosophy of its IT organization. Enterprises that want to develop and support their applications in house need to commit to investing in recruiting, staff development and developer tools on an ongoing basis. Enterprises that use a mix of in-house and outside service providers have more flexibility. In both cases, an enterprise needs to inventory the skills available in its current staff and decide what additional employees, training and tools would be required to support each mobile OS that is being considered.

## Supporting Hardware Vendors

An enterprise's need for in-house skills and supporting tools and software is partially dependent on the mobile device maker that is selected, independent of the OS. Leading mobile device makers do not just produce hardware but also create development libraries, configuration tools, management utilities and other value-added resources for their customers. Such vendor-developed tools have been especially valuable for enterprises that use bar code, RFID and other AIDC technologies in their mobile work processes, because many software development tools do not support these technologies, or provide only basic support and cannot enable capabilities that are specific to devices. For example, high-performance imagers that are built into some enterprise mobile computers can recognize and process text from forms and can recognize many more bar code formats than a phone camera that can read UPC symbols and QR Codes.

Hardware vendor competition is another aspect to consider. There are many vendor options for Windows and Android-based mobile computers; Apple remains the only manufacturer of iOS products. Many manufacturers that are

focused on field service, logistics and light industry enterprise markets now offer both Windows and Android mobile computers. Potential customers should inquire about product roadmaps and support plans to ensure the vendor will continue to support their desired OS.

## Introducing the Contenders for Your Next-Generation Mobile OS

Windows (various versions) is the most-used OS in the mobile enterprise market, Android has the most momentum and iOS has perhaps the most passionate support base. The following sections explain OS decision considerations that are relevant for organizations that use mobile computers in non-office environments such as field service, warehousing, distribution, manufacturing, etc.

**Windows Embedded Handheld**

The Windows Embedded 8.1 Handheld OS and later versions (including Windows 10) represent a significant departure from WEH 6.5 and include enhanced security and other features developed for the enterprise market with extensive input from enterprise-oriented device manufacturers.[2] Windows Embedded 8.1 Handheld provides a user experience that is very consistent across all types of devices – handheld computers, tablets, smartphones and PCs. Microsoft is known for long support cycles and has pledged to support Windows Embedded 8.1 Handheld until 2019.

Besides cross-platform compatibility, Windows Embedded Handheld provides a very strong development environment, is widely supported by device manufacturers and provides consistent performance across devices from different vendors. Most software companies that develop applications and tools for the mobile enterprise market have historically supported Microsoft offerings, which has helped customers take full advantage of AIDC technologies in their mobile work processes.

The primary drawback to Windows Embedded 8.1 Handheld and later versions is that they are incompatible with Windows Embedded Handheld 6.5 and previous releases. However, Microsoft announced that applications developed for Windows Embedded 8.1 Handheld will be compatible with Windows 10, the next major release. Other drawbacks to Windows Embedded Handheld include its lack of support for Cisco© CCX and additional VPN limitations. Developers do not have as much access as they did to WEH 6.5; there are some restrictions on data sharing among applications and there is no remote device control capability through MDM systems.

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2. Microsoft selected only five device makers as inaugural launch partners when Windows Embedded Handheld 8.1 was released in 2013. Intermec and Honeywell were two of Microsoft's five partners for the launch, which occurred before the Honeywell-Intermec merger.

> "Rugged Android has been a key storyline with major enterprise customers overcoming their tension by placing big bets on these solutions. We anticipate more OS see-sawing in the rugged handheld space."
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> — **VDC Research blog**, *Rugged Mobile Market Entering 2015 With a Head of Steam…Sort of April 2015*

## Android

Android is the leading OS for smartphones and enjoys a large and growing developer community. It began as a consumer technology but evolved into a viable option for enterprise customers. There is growing Android support among ruggedized mobile computer makers, which is drawing their partners that create specialized business applications into the Android market. This migration is helping remove one of the significant barriers to enterprise Android adoption, the limited amount of packaged application software solutions and development tools that support AIDC technologies.

Many advantages of the Android operating system can also pose disadvantages. For example, there is a very broad range of handheld computers, smartphones, tablets and other devices from many vendors that support the OS. The downside is that the market is fragmented and there is application inconsistency across devices. Android's extreme popularity also makes it a leading target for malware developers.

Android solutions in the AIDC market tend to rely on mobile device management systems for mobile device configuration and maintenance and configuration. Google provides few tools to manage enterprise systems, i.e., company-owned devices managed on behalf of the end users.

Because Android is a consumer-oriented OS it is prone to frequent updates and short lifecycles (Android 5.0, better known as Lollipop, was introduced in 2014 and was at least the twelfth major release since Android 1.0 made its public debut in September 2008). Enterprise customers have been frustrated by the pace of change because it has required them to support multiple versions of the OS that result in application compatibility problems. When Android devices break and need to be replaced, the new products available often run a newer operating system that creates inconsistencies and sometimes incompatibility with applications. There is little publicly available insight into Android lifecycles and product roadmaps. Hardware manufacturers take on much of the OS support responsibility and are inconsistent in how long they will support various versions, which is an important consideration for enterprise customers to investigate.

Many of the challenges associated with Android are the result of a market that is quickly changing. The Android market is also quickly maturing as more enterprise-oriented developers are supporting the operating system, which will likely lead to more application and support options, and shorter deployment times.

## iOS

In contrast to Android, there is no hardware fragmentation in the iOS market. Apple's single-vendor approach results in a tightly controlled environment, although the frequent OS upgrades can cause compatibility and support problems for enterprise customers. Apple has not produced ruggedized iPhone and iPad devices that are suitable for many industrial, distribution and field

> **"**In an effort to maintain the tablet's relevance, Apple is redoubling its efforts in the enterprise, where the iPad has gained considerable traction. To that, CEO Tim Cook announced that Apple is working with an increased number of partners to expand its reach into the enterprise and change how people work."
>
> — **VDC Research blog**, *Following Record Q2 Earnings, Apple Turns to Partnerships to Bolster Enterprise Ambitions, May 2015*

service environments, but its devices are an option for some light-duty enterprise operations. Apple does not build in high-performance bar code readers or RFID capability (although iPhone 6 supports NFC) but those capabilities are available through add-on peripherals from manufacturers like Honeywell.

Similar to Android, iOS is a consumer-centric OS that is gaining support among enterprise solution providers, but at a smaller scale. Support for iOS is growing in the enterprise developer community and in 2015 Apple announced several initiatives intended to attract more enterprise-oriented ISVs, so more packaged applications, development tools and management utilities are expected to enter the market. There are already multiple MDM solutions that support iOS and allow enterprises to manage iOS, Android and Windows-based devices in the same environment.

## Deciding Factors

Enterprises rarely have to use a specific mobile operating system because it is the only one that supports the features and performance that their particular situation requires. Even hardware preference is often no longer a major limiting factor. For years, rugged mobile devices with AIDC capabilities intended for use in non-office environments only ran Windows operating systems, but now there are many Android options plus cases and data capture accessories for iPhone and iPad devices. Because the Android, iOS and Windows Embedded Handheld systems are all capable of performing most mobile enterprise operations, the best choice for an organization depends on its preferences and limitations, most importantly its approach to mobile software and support.

**Application Software**
An enterprise's source of mobile applications – whether they are developed in-house or sourced from an integrator or application software vendor – could be the most important variable in the operating system decision. Organizations that rely on purchased software must ensure all their new operating system supports all required applications. The Android and iOS platforms both have larger ecosystems of developer and packaged applications than the Windows OS, however Microsoft is the most focused on the enterprise market. Organizations that favor in-house development must consider their developers' talents and preferences, plus any investment in new tools and training that would be necessitated by adopting a new OS.

**Support and Stability**
Setting expectations for how long the next-generation mobile platform should serve the enterprise will make it easier to put a value on how well Apple, Google and Microsoft support their respective operating systems. As noted, the Android and iOS operating systems frequently undergo major changes. Google and Apple each tend to support two previous releases with security updates and other fixes; enterprise customers will have to self-support or find other resources if they want to keep older versions running. Microsoft's support approach is

changing, but the company still provides the longest support period. Microsoft formerly provided set timelines for OS support, but now provides a rolling, five-year support window that resets each time customers update the OS. In other words, Microsoft customers will be supported for five years from their most recent update, while Android and iOS users will be supported through the first two updates to their specific version of the OS.

**Device Hardware**

Hardware limitations can influence the OS decision. Apple remains the only manufacturer of iOS devices and to date has not produced any ruggedized models or supported advanced integrated bar code scanning capability. If these capabilities are important to enterprises, they would be better served by committing to Android or Windows, which offer many more product options and are more competitive market segments.

## Conclusion

The Android, iOS and Windows Embedded Handheld operating systems each has a strong base of committed enterprise customers, developers and partners – and with good reason. Each operating system can be effective for enterprises and has a place in a mobile market that is growing and evolving enough to support all three. iOS features Apple's revered user interface, Android is also popular with users and is a more mature option for enterprise customers, and Windows Embedded Handheld sets the enterprise market standard for the stability, security and management features that business users need. Those strengths will keep each of the respective operating systems viable in the enterprise mobility market for the foreseeable future.

Honeywell has helped guide thousands of organizations through mobile strategy decisions and technology rollouts and has successful customers that use Android, iOS and Windows Embedded Handheld devices. Honeywell sees value in all three principal mobile operating systems and wants its customers to have the full choice of options for their next-generation mobile OS. Enterprises should not be forced into an OS in order to get the type of device or software they prefer. Instead, the choice should be made based on the OS-device combination that provides the most value through its functionality and compatibility with enterprise preferences for software, device type, AIDC capabilities and support requirements. Therefore Honeywell is committed to offering solutions for Android, iOS and Windows Embedded Handheld and is the only enterprise computer manufacturer to do so. By offering products and support for all three operating systems, Honeywell can help ensure each enterprise customer will select the solution that best meets its specific needs.

**About Honeywell**

Honeywell Sensing & Productivity Solutions (HS&PS) is a leading manufacturer of high-performance image- and laser-based data collection hardware, including rugged mobile computers and bar code scanners, radio frequency identification solutions, voice-enabled workflow and printing solutions. With the broadest product portfolio in the automatic identification and data collection industry, HS&PS provides data collection solutions for retail, healthcare, distribution centers, direct store delivery, field service, manufacturing and transportation and logistics companies seeking to improve operations and enhance customer service. Additionally, HS&PS provides advanced software, service and professional solutions that help customers better manage data and assets. HS&PS products are sold worldwide through a network of distributor and reseller partners. For more information on Honeywell Sensing & Productivity Solutions, please visit www.honeywellaidc.com.

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