Which Mobile Operating System is Best for You?

Selecting the best rugged mobile solution to support enterprise workflows and applications is anything but simple given the multitude of options available to organizations. With a myriad of choices available comes a certain degree of flexibility and opportunity to leverage corporate strengths while focusing on areas that need improvement/greater efficiency or to further differentiate. Along with the flexibility these options provide, comes the arduous task of evaluating mobility choices and properties associated with them: form factor, operating system, functionality, features, connectivity, security and a line of business (LOB) software solution to guide employees through productive execution of daily tasks.

Organizations have clear, hard requirements of enterprise LOB mobility solutions: 3-5 year product life cycle, security, reliability, support, and a full complement of accessories. All organizations are keenly aware of what downtime means in terms of productivity and Total Cost of Ownership (TCO) associated with LOB solutions.

This whitepaper will explore one critical piece of the enterprise mobility selection challenge: Operating Systems with implied development options for enterprise mobility devices.

Introduction

Ruggedized mobile computers have been driving mobility in the workplace for decades. The evolution of platforms embracing new and maturing technologies are creating new markets and opportunities for enhancing user experience, creating efficiencies and improving productivity in the workplace. One of the key factors for the success of mobility in the enterprise has been Microsoft's embedded platforms providing security, stability and reliability. This whitepaper covers current Microsoft platforms as well as the paradigm shift we are experiencing with Android's popularity. It will also discuss Datalogic's mission to actively invest and research the best options and platforms to enhance and guarantee enterprise customers' mobility success and profitability.

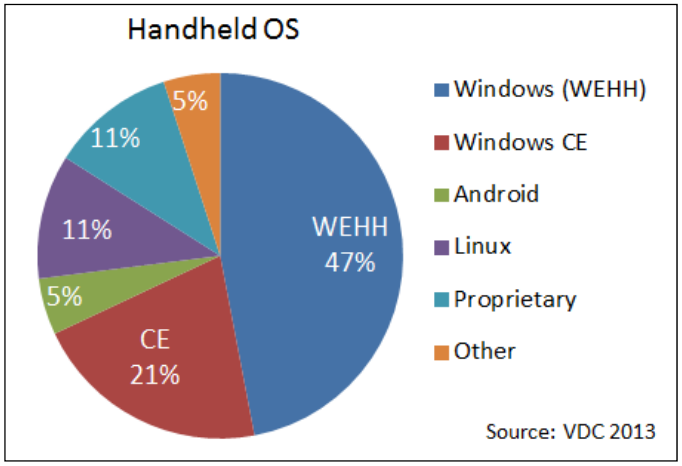
By Microsoft definition, Windows Embedded platforms target specialized devices such as ruggedized mobile computers, ATMs, Kiosks and others. Windows Embedded CE kernel had been at the heart of Windows Embedded CE and Windows Embedded Handheld (Windows Mobile), both targeting specialized rugged handheld devices that are mission critical for line of business (LOB) applications. Windows, on the other hand, focuses on general purpose computing such as PCs, laptops and tablets and targets both enterprise and consumer environments.

The release of Microsoft's Windows 8 has changed this paradigm. Windows 8 is now at the core of Windows Phone, Windows Embedded, and full Windows for the desktop/laptop/tablet, while the CE kernel continues fueling Windows Embedded Compact 2013 (WEC 2013), and of course CE 6 and WEC 7. Public acceptance and success for Microsoft's new tactic remains to be seen as this strategy has left enterprise wondering about the viability and future of both Windows Embedded Handheld and Windows Embedded Compact OS for long term investment.

Android, on the other hand, has disrupted rugged mobile device's monogamous relationship with Microsoft Windows Embedded and is proving itself as a viable alternative. Android success, up to now, has been with consumer devices, while the takeover of Microsoft Windows Embedded market share remains to be decided by enterprise end customers. The positive and most convincing fact about Android's determination to play in enterprise markets would be the significant changes it has undergone in the last couple of years to secure and stabilize the platform for LOB applications. Google's efforts and rugged handheld device and solution providers consortium to create standards to protect long-term enterprise investment is demonstrating fruitful results.

Microsoft Embedded OS Dominates Rugged Handheld Mobility

Today, Microsoft continues to control the market in the total enterprise rugged space with >80% market share, according to VDC Research. Handheld devices alone for Microsoft account for 68% (see chart at right). This number is down from over 90% market share in prior years, as Android and iOS have continued to pick up market share.



In October 2011, Microsoft announced a strategic product roadmap which focused on tight integration between the device layer, server and database software, cloud services and other infrastructure, and line-of-business applications. This became their intelligent system mantra which includes Windows 8 common platform. Windows Phone 8 and Windows Embedded 8 Handheld (superset of Windows Phone 8) are part of this common platform.

Benefits of this approach include:

- Common development tools and compatibility to reduce time to market
- Consistent user experience on end point devices
- Cost reduction, control and agility by capitalizing on existing IT investment
- Deliver latest innovation on Windows platform to embedded solutions
- Connects embedded devices to cloud services

Current Mobile Operating Systems

Currently, the stability and proven reliability of Windows Embedded systems continue to be the best option for enterprise use.

Most noteworthy:

- Legacy Applications – The Enterprise world turns much more cautiously than the consumer world. Stability and support for current infrastructure is top of mind for enterprise. This has already been established and proven by current platforms such as CE6/7 and WEHH 6.5 (Windows Mobile).
- The biggest fear factor from the enterprise is product lifecycle. While this is a valid concern, customers have both Microsoft's commitment to 15-year product availability and the longevity and assurance from Datalogic and other manufacturers that the device (including OS) will be supported for a minimum of 5-7 years from the time of purchase. Datalogic will continue to support our X3 generation devices on this platform for many years to come.

Windows Embedded CE 6 (r3)

CE 6 released in November 2006 has been a favorite for Datalogic customers and the industry as a whole. This OS provides a familiar set of tools with outstanding performance for legacy applications. Release 3 for CE6 infused a modern GUI with some important new features such as gesturing, panning/zooming and Office viewers. The biggest advantage CE has had is that version upgrades typically maintain good backwards compatibility with legacy applications. This is highly valued by both developers as well as end-users.

CE has always offered flexibility for component selection, coupled with a lean footprint to enable device manufacturers to provide real time accuracy with less overhead, at a lower cost. Windows Embedded CE 6.0 BSPs from leading silicon vendors made it a clear choice for Datalogic's niche with rugged handheld devices in traditional industrial markets. For developers, this OS follows a low risk business model. CE6 supports Visual Studio 2008 and .NET Compact Framework v3.5.

Most notable benefits for this platform include:

- Protects legacy application investment
- 3rd party HTML5 support for new and cross-platform development
- Secure, reliable and proven stability
- Microsoft has guaranteed device manufacturers can distribute CE6 through February, 2022

Challenges with this OS:

- Not supported with Visual Studio 2012 +
- No native cellular voice support
- No native camera support

Windows Embedded Handheld 6.5

WEHH6.5 and previous versions of Windows Mobile have provided great flexibility for ARM processors along with a healthy supply of board support packages. Version 6.5 brought about support for various sensors, along with improvements to better handle the touchscreen interface, and more support for various screen sizes and resolutions, providing new flexibility for different types of mobile devices.

Legacy applications and development skills are a big enterprise investment supported by this platform along with a proven track record.

From a development perspective, Windows Embedded Handheld 6.5 provides compatibility with Visual Studio 2008 as well as .NET Compact Framework 3.5 (an extremely popular place/time for Visual Studio). WEHH6.5 also enforces consistency in APIs and SDKs that are distributed by device makers to solution providers.

Most notable benefits for this platform include:

- Protects legacy application investment
- 3rd party HTML5 support for new and cross-platform development
- Secure, reliable and proven stability
- Good support for cellular data and voice, cameras and various sensors
- Microsoft has guaranteed device manufacturers can distribute WEHH 6.5 through April, 2022

Challenges with this OS:

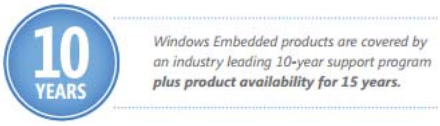
- Not supported with Visual Studio 2012 +
- Not part of the Microsoft common platform vision

Next Generation Platforms for Handheld Devices

Windows Embedded Compact 7

Windows Embedded Compact 7 (WEC 7) was released March 2011. WEC 7 is the successor to CE6 r3 and delivers improved finger touch and gesture support, IE with Flash 10.1, device provisioning, firewall, and NDIS6 support among other features. This OS is the natural selection for Datalogic next generation PDT's (key based devices), because of the acceptance in rugged handheld industries and the fact that WEC 7 provides the most flexibility while protecting the end-user solution investment.

WEC 7 targets Industrial Automation, Manufacturing and Automotive industries and is well fitted for PDT and VMC type devices.



Most notable benefits for this platform include:

- Visual Studio 2008 support, no learning curve
- Compatibility with existing Windows Embedded CE 6.0 applications
- Stability of the OS decreases risk and extends product life cycle
- Improved connectivity (Enhanced Wi-Fi, Ethernet, USB, and BT)
- Microsoft has guaranteed device manufacturers can distribute WEC 7 through February, 2026

Challenges with this OS:

- No native support for HTML5 (3rd party only)
- No support for Visual Studio 2012+
- Limited support for sensors, camera
- Data only over cellular

Windows Embedded Compact 2013 (WEC2013)

WEC2013 is the next generation of Compact Embedded (CE) released in June 2013. This version is based on CE Kernel v8 (not to be confused with Windows 8, just the next rev of CE kernel). WEC2013 improvements include integrated multi-touch, UI performance (XAML improvements), improved file system performance, better network throughput performance (IPv6 DHCP, LT2P/VPN in IPv6 tunnel) and fast OS boot. Visual Studio 2012 & 2013 and .Net 3.9 support, consistency with desktop support for C++, MFC, ATL and STL.

WEC 2013 Targets Industrial Automation, Healthcare and Retail devices that are mainly for dedicated use. Examples are appliance, GPS, medical, RFID, and HMI (monitoring for automated processes in manufacturing) devices.

Most notable benefits for this platform include:

- Support for larger effective memory by combining RAM Object Store with Flash
- Built-in tools including WordPad, Excel Viewer and IE
- Supports Compact .NET 3.9
- Visual Studio 2012 & 2013 support
- Multi-language builds for flexibility across regions
- Popular in vertical devices due to fewer restrictions and less overhead

Challenges with this OS:

- Removal of legacy features such as IE, Shell, NDIS5, ActiveSync, and others
- No binary .NET 3.5 app compatibility, apps need to be recompiled for .NET 3.9
- Native support for HTML5 or RDP not available (3rd Party Only)
- OS seems to be targeting single use devices (IoT)
- No adoption from rugged handheld device manufacturers at this point

Windows Embedded 8 Handheld (WE8H)

Microsoft released WE8H as the successor to Windows Mobile and Windows Embedded Handheld 6.5 for rugged devices in late 2013. Further enterprise functionality was added with the 8.1 release in mid-2014. Based on Window Phone 8, WE8H is considered an embedded OS addressing rugged handheld enterprise needs. Rugged handheld devices with this OS should start their appearance from mid-2014 through 2015.

According to Gartner Analysts: “WE8H will dominate the ruggedized handheld market (the OEMs may also support Android on select devices). Enterprises that use ruggedized handhelds should now begin to plan the transition. New software investments should be based on HTML5, which will ensure an easier transition in the future to Windows Embedded vNext”. (January 2013)

WE8H is part of the Windows 8 common platform strategy. Targeting touch based handheld devices, this platform supports enterprise security, and multi-touch, native HTLM5, performance improvements, fast boot, and follows the traditional desktop application model along with .NET v4.x (on par with desktop).

Security features include keyboard, write, registry, and gesturing filters. This OS also provides secure boot, multi-user login (desktop and provisioning support). From a manageability aspect, it provides an open protocol for device management to enable 3rd party MDM solutions.

Most notable benefits for this platform include:

- Common Windows 8 platform
- Native HTML5 Support
- Security Improvements (encryption, malware, lockdown, filters)
- VS2012+, .NETv4
- IT Infrastructure Support (multi-user login, AD, CCX)
- Native API for bar code scanner and MSR
- 3rd Party MDM provisioning

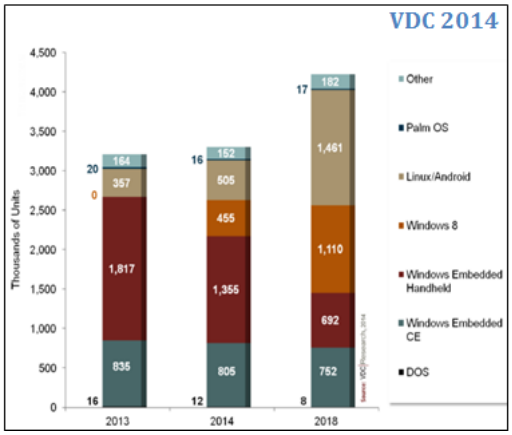
WE8H challenges for device manufacturers include:

- Breaks compatibility with legacy software solutions
- Only supports high end Qualcomm Snapdragon chip sets
- Microsoft has limited the OEMs (device manufacturers) that may license this OS

Android: Best Alternative to Windows Embedded

Google has made important incremental security enhancements since Android's 2008 release to address concerns that Android wasn't ready as an enterprise-grade platform. Android's Ice Cream Sandwich (v4) infused enterprise confidence. Early adopters of Android in the rugged handheld markets had a rough start with Android 2.3 but Android 4 caught on as it started stabilizing and adding features that were clearly targeting enterprise applications. It is now being adopted by major players in the rugged handheld space for enterprise applications as an alternative to Microsoft. This platform is especially well suited for full screen/multi-touch devices such as tablets and PDAs.

Android delivers ease of use and powerful graphical user experiences that are now expected in LOB applications. This results in higher productivity because employees assimilate more information and can act more quickly.



International by nature, it includes support for 32 languages with support for locales associated with those languages and double-byte character sets.

Support for Google Services (voice, location, maps, app store, image processing), large pool of Android developers, rich feature set and API, all lend themselves well to faster development time.

Adapting consumer-driven innovations to improve enterprise tools and systems is a selective and gradual process but Google is accelerating this process with recent enhancements in the security and stability arena. The strong acceptance from consumers, Android's open architecture and numerous tools for development with OEM tools for management, security and stability make this a viable option for enterprise use.

iOS Devices in the Enterprise, BYOD +

Although Windows Embedded is the dominant platform for ruggedized devices, the impact iOS has with its modern and intuitive interface in business environments is unmatched. Even though Apple's priorities remain with consumers, some of the efforts in more recent releases, especially iOS7 and iOS8 are clearly targeted at establishing credibility with enterprise.

Enterprise enablers offered by Apple now include a device enrollment program and Apple Configurator options. The enrollment program resolves the numerous issues with corporate-owned, personally enabled devices by allowing IT to install non-removable MDM profiles. Apple has also gained enterprise ground by changing its volume purchase and licensing programs to enable businesses to purchase apps in bulk without the need of a credit card, and most recently has allowed more centralized control of PDF and iBook distribution.

> 'Despite tremendous success in the consumer markets, the sheen has begun to wear off for Apple devices for enterprises using the devices. Given Apple's near-exclusive customer orientation, managing devices operating on iOS is no easy task and support in an enterprise setting is proving challenging. Moreover, firms are also encountering issues with wireless performance and supporting multiple users per device, further lessening Apple's enterprise appeal. On top of these technical setbacks, there is also the pervasive issue of employee theft. VDC believes that in light of these issues, companies will increasingly look to other OEMs to meet their enterprise mobility needs.'
>
> *Source: VDC*

Enterprise is clearly moving towards a multi-OS environment, especially for mobile devices. The biggest challenge for enterprise in supporting the mixed OS environment is in reducing risk. This means ensuring sustainability and lifecycle support with solution development and infrastructure integration within a scalable and reliable framework.

iOS devices target light duty applications in front end retail. Benefits of this OS:

- Easy to use - intuitive interface
- Native HTML5 support
- Employees love this platform as they use it on their personal devices

Challenges of this OS:

- No licensing to 3rd party hardware manufacturers, only consumer grade hardware available
- Lifecycle support and control of upgrades - many apps and services became non-compliant with OS upgrades and administrators have no control.
- Indirect cost of BYOD and enterprise owned devices associated with failure and replacement
- Limited multi-tasking and device sharing capabilities

Conclusion

Selecting the best rugged mobile device and OS really depends on feature set, form factor and environment needs. The good news is that the OS is becoming less critical as development moves towards a cross-platform paradigm. Device manufacturers are paving the enterprise road for next generation devices, providing stable, secure and feature-rich rugged mobile computers.

Below is a quick summary of the top 3 rugged mobile computer OS options Datalogic recommends and will support in next generation products:

CE6/WEC 7 and Windows Embedded Handheld 6.5 (WEHH 6.5)

Legacy support, reliability and dominant platforms in the rugged enterprise space today. These operating systems will continue to dominate in the years ahead, as enterprise is cautious about change and new applications must be developed to operate on the next gen platforms. Datalogic is committed to extended support for these platforms, at least until 2022.

> Windows Mobile 6.x and Windows Embedded CE will remain viable options for many end users and represent 70% of shipments in 2014 and 35% of shipments by 2018. Android's market share is expected to grow to 35% by 2018, and Windows Embedded 8/9 Handheld will account for 26% of unit shipments by 2018.
>
> ***VDC Enterprise Mobility Report 2014***

Target Devices: Best for keypad based devices including rugged PDTs, PDA's, and Vehicle Mount

Target Markets: *Retail, Manufacturing, Field Service, Transportation & Logistics*

Android 4.x

Rich feature set and API for new technologies such as sensors, cameras, NFC, latest wireless standards, etc. The device manufacturer is the most important choice you will make when selecting an Android device: support, stability, product life cycle, and security will be largely provided by the device manufacturer. Look for Android products from Datalogic in 2015.

Target Devices: Rugged full screen devices such as PDAs and Tablets
Target Markets: Retail, Healthcare, Emerging Markets

Windows Embedded 8 Handheld (WE8H)

Consider this a high end OS option and assume new development of solutions in order to leverage the LOB features it offers. If you want to maintain a high level of control and security over the device and system, this is the best choice. Costs will be higher but you have Microsoft's IP protection, excellent support infrastructure, and long product lifecycle. Rugged handheld devices supporting this OS will benefit from standards that can be relied on across device vendors. This OS is highly structured and controlled by Microsoft certification guidelines. Watch for more information in 2015.

Target Devices: Rugged PDAs

Target Markets: Retail, Field Service, Healthcare, Transportation

Datalogic ADC, the world leader in Automatic Data Capture, offers state of the art solutions with fixed position retail scanners, handheld scanners and mobile computers. Datalogic ADC's range includes in-counter and on-counter point of sale scanners, general purpose and ruggedized handheld scanners, rugged mobile computers, industrial PDAs and vehicle mount computers. Solutions for applications in several sectors include healthcare, hospitality/entertainment, manufacturing, retail, services and transportation & logistics.

Businesses in the retail sector can particularly benefit from Datalogic ADC's vision-based technology solutions, analytical tools, self-shopping solutions and consumer relationship technologies.

A division of the Datalogic Group, Datalogic ADC is headquartered in the US with a presence in over 120 countries.

For more news and information on Datalogic ADC, please visit www.datalogic.com.

Datalogic Group is a global leader in Automatic Data Capture and Industrial Automation markets. As a world-class producer of bar code readers, mobile computers, sensors, vision systems and laser marking systems, Datalogic offers innovative solutions for a full range of applications in the retail, transportation & logistics, manufacturing and healthcare industries. With products used in over a third of world's supermarkets and points of sale, airports, shipping and postal services, Datalogic is in a unique position to deliver solutions that can make life easier and more efficient for people.

Datalogic S.p.A., listed on the STAR segment of the Italian Stock Exchange since 2001 as DAL.MI, is headquartered in Lippo di Calderara di Reno (Bologna). Datalogic Group as of today employs about 2,400 members of staff worldwide distributed in 30 countries. In 2012 Datalogic Group achieved revenues for 462.3 million Euro and invested over 32 million Euro in Research and Development with a portfolio of over 1,000 patents across the world.

For more news and information on Datalogic, please visit ***www.datalogic.com.***